Designing Overarching Servitization Strategies in B2B
Why don't we serve the end-user as well?

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Designing Overarching Servitization Strategies in B2B

Why don't we serve the end-user as well?

Dissertation

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at Delft University of Technology

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chair of the Board of Doctorates

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To my family and friends

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Glossary

Abbreviation	In Full
APS	Airport Parcel Solutions
AR	Action Research
ARC	Action Research Cycle
ARCs	Action Research Cycles
B2B	Business-to-Business
B2B2C	Business-to-Business-to-Consumer
B2C	Business-to-Consumer
BaaS	Baggage-as-a-Service
BM	Business Model
IHD Team	In-House Design Team
MaaS	Mobility-as-a-Service
MVP	Minimum Viable Product
PSE	Product-Service Ecosystem
PSEs	Product-Service Ecosystems
PSS	Product-Service System
PSSs	Product-Service Systems
RDSC	R&D Steering Committee
SD	Strategic Design
TLN	'The Long Now' working name for Overarching Servitization Strategy Design Process
UX	User Experience
WwSP	Winning with Smart Platforms

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Summary

Introduction — Servitization in B2B

This doctoral study investigated servitization in the B2B manufacturing industry, focusing on the shift from product sales to integrated product–service value propositions. Servitization was defined as the transformation from product-centric to service-oriented business models that deliver value throughout a product's lifecycle. We used this definition to study a manufacturer's downstream value creation, emphasising the end-user as the ultimate recipient of value rather than limiting focus to direct B2B customers.

Servitization has become a key strategy for incumbent manufacturers seeking to differentiate themselves from digital disruptors, who challenge traditional models by leveraging data and service platforms. As a result, manufacturers must rethink their value propositions and adopt relational business models centred on recurring revenue and long-term customer relationships.

The scoping review in *Chapter 2* identified a major gap in the literature: most B2B servitization research focuses on direct customer relationships, neglecting the end-user— the *'customer-of-the-customer'*. This narrow view limits insight into downstream value creation, particularly relevant in capital goods sectors. To address this, we introduced *'Overarching Servitization'*: a strategic perspective that includes end-users and ecosystem partners as value co-creators, extending beyond traditional B2B relationships.

To investigate how manufacturers might adopt this approach, we, grounded my research in strategic design theory. Using methods such as service design and design roadmapping, we explored how end-user and future-oriented servitization strategies could be developed. Through a series of *Action Research Cycles (ARCs), we* examined how design-driven methods support the reconfiguration of end-user focused value propositions and foster engagement across the entire value chain.

Research Design

This doctoral research explored how B2B manufacturers can design *overarching servitization* strategies that go beyond direct customer relationships to also address end-users across the value chain. Existing practices in B2B industry typically focus on services for immediate customers, overlooking opportunities to create value for end-users.

To address this gap, the main research question was:

'How can B2B manufacturers design overarching servitization strategies?'

Supported by three sub-questions:

'What are the enablers and barriers of servitization within a B2B manufacturer?'

'How can a B2B manufacturer explore end-users' values?'

'How can a B2B manufacturer organise a servitization transition?'

This research aimed to uncover design principles and strategic mechanisms that enable B2B manufacturers to co-create *advanced service systems* with multiple stakeholders. Realising this potential requires a transition beyond operational optimisation towards rethinking service innovation processes and business models to create sustainable value for all actors in the value chain, including end-users.

To operationalise *overarching servitization* and unlock new value across B2B networks, we adopted a strategic design lens—drawing on service design and design roadmapping—to explore how manufacturers can identify latent end-user needs, co-develop services, and build long-term collaborative relationships.

Guided by a pragmatic stance, we chose a qualitative *Action Research* approach, well suited to the iterative and participatory nature of design methods. Over a five-year longitudinal study (2018–2023), we worked closely with a Dutch B2B manufacturer of intelligent logistics systems for the aviation sector. Across four *ARCs, we* followed Coghlan's (2019) framework of *Constructing, Planning, Taking, and Evaluating Action*, integrating reflective practice to guide decisions and adaptations.

Process theory informed my analysis of how strategic change unfolded over time, while practical knowledge was developed through action. we used *Atlas.ti™* for coding and thematic analysis of qualitative data—including interviews, discussions, visual artefacts, and *Miro™* boards—following Saldaña's strategies. Though the findings are context-specific, they offer deep insight into how B2B manufacturers can design and implement end-user-focused servitization strategies.

Insights Derived from ARC 1

During the first *Action Research Cycle (ARC)*, we gained valuable insights into how a B2B manufacturer can initiate the design of *overarching servitization* strategies. we reflected on 29 insights derived from *sub-ARCs 1.1, 1.2,* and *1.3,* which we initially clustered using five servitization lenses. As the research progressed, we introduced two additional lenses—*Overarching Servitization* and *Future Strategy*—which enabled us to formulate design criteria for subsequent design interventions as part of follow-up *ARCs.*

Overarching Servitization – End-User Value as a Strategic Driver

The company's innovation practices remained largely technology-driven, limiting its ability to fully embrace *overarching servitization*. To address this, we identified two critical shifts required for transformation. The first was the need for deeper engagement with end-users. Methods such as user trend research, context scenario development, and group discussions helped uncover latent needs and reframe the innovation process from the end-user's perspective. This user-centred shift empowered the in-house design team to act as a catalyst for more meaningful, servitized offerings.

Building on these insights, we identified nine enabling factors that support this transformation—among them, the integration of strategic designers into innovation

teams, a conscious shift from technological feasibility to end-user desirability, and the application of design-led interventions throughout the development process.

The second shift concerned the evolution of organisational capabilities. Engineers began acquiring foundational service design skills and, in mixed teams with designers, contributed to more relevant and user-centred solutions. Interdisciplinary collaboration, alongside the shift in focus from technical feasibility to user desirability, proved essential for identifying and exploring new service directions.

Future Strategy – Long-Term, Ecosystem-Driven Transformation

A key strategic shift was the move beyond short-term innovation. The innovation department had primarily focused on isolated, short-term projects, limiting its ability to pursue long-term, value-driven transformation. To address this, we introduced *Strategic Design Roadmapping* as a means to embed long-term thinking into the organisation. Collaborating with novice designers—less constrained by the company's technical conventions—helped reframe the service innovation strategy from a fresh, forward-looking perspective.

Despite these efforts, four major barriers became apparent: persistent short-term thinking, a lack of strategic design capabilities, limited market foresight, and siloed innovation processes. These challenges underscored the need for a more integrated, future-oriented approach to innovation.

In parallel, we identified digital platforms and ecosystem thinking as essential enablers of future servitization strategies. Digital capabilities opened up new business models, while stakeholder analysis beyond the traditional value chain revealed opportunities for collaboration with non-traditional partners.

Through *ARC 1, we* concluded that designing *overarching servitization* strategies requires a deliberate shift:

- *from internal, technological expertise to end-user empathy,*
- *from engineering silos to multidisciplinary teams,*
- *and from merely reactive product innovation projects to proactive, long-term product-service innovation strategies.*

By embedding these transformation principles into the organisation, we established a foundation for subsequent *ARCs* to investigate how servitization could evolve into a future-oriented practice that creates value not only for customers, but also for end-users and partners across the value chain.

Insights Derived from ARC 2

In *ARC 2*, we addressed a key gap identified in *ARC 2.1*: the lack of a structured Explore phase to initiate product-service system innovations. Through *ARCs 2.2* and *2.3, we* developed and refined strategic design interventions to integrate future-oriented, end-user-driven innovation into the company's servitization strategy. Three overarching themes appeared:

1. Strengthening Organisational Capabilities for Service Design

Embedding service and *UX Design*, along with cross-disciplinary collaboration, proved vital. Concept models supported communication of value propositions, while mixed teams encouraged knowledge sharing and a more open innovation culture.

2. Embedding a Future-Oriented Perspective in Innovation

To compensate for the absence of long-term exploration mechanisms, we introduced design interventions focused on future contexts and latent user needs. I recommended adopting future visioning and cyclical trend research to uncover new opportunities.

3. Enhancing Organisational Agility and Resilience

Overarching Servitization required time and employee adjustment, particularly within R&D. Reframing disruptions like the *COVID-19* pandemic as strategic opportunities helped improve adaptability.

Insights Derived from ARC 3

In *ARC 3,* we sought to embed an *overarching servitization* strategy process—referred to as *The Long Now (TLN)*—within the company's existing innovation framework. This involved designing and facilitating exploratory, future-focused, and end-user-centric interventions, while also navigating the practical constraints of a large corporate environment, such as limited participant availability. The process provided key insights into how to structure and operationalise *overarching servitization*, which in turn informed the development of my research sub-questions.

TLN began with a kick-off intervention to establish its purpose and create a shared foundation. In the following *Creative Trend Research* intervention, participants identified 107 relevant trends in European travel and clustered them into 37 categories, which informed the next steps.

During interventions *Empathising with End-Users* and *Envisioning the Future Context*, participants developed four future scenarios and formulated a vision statement for the Airports business unit. These scenarios framed the subsequent intervention, *Ideating End-User Value Propositions*, in which participants designed new product–service offerings tailored to a future end-user lifeworld.

In the final intervention, *Roadmapping & Connecting Dots*, participants selected three promising propositions and mapped out the activities, resources, and partnerships required for implementation. This output shaped a preliminary *Strategic Design Roadmap* aligned with the company's *overarching servitization* strategy.

ARC 3 thus introduced *TLN*, a six-part design process that deepened our understanding of how B2B manufacturers can create end-user value in a future-oriented context. Three interventions—*Empathising with End-Users*, *Envisioning Future Contexts*, and *Ideating End-User Value Propositions*—were particularly novel in the B2B setting.

Building on these insights, we contributed to the theory of *Strategic Design Roadmapping* by refining existing roadmap frameworks. By introducing three distinct value perspectives—*Value Context*, *Value Exchange*, and *Value Creation*—we advanced *overarching servitization* in the B2B industry and provided a new lens for designing end-user-focused, future-oriented product–service innovations.

Insights derived from ARC 4

ARC 4 demonstrated the full potential of the *TLN* strategy design process as both a strategic framework and catalyst for product–service innovation across three business units. *TLN* marked a shift from fragmented, short-term initiatives toward a cohesive, end-user-focused, future-oriented strategy.

Interviews with 14 *TLN* participants and a survey among 50 participants indicated that *TLN* supported cross-departmental alignment and prompted management to reconsider the company's evolving role within *Product–Service Systems (PSSs)* and *Product–Service Ecosystems (PSEs)*—for example, as orchestrator, integrator, supplier, or partner. However, its long-term impact depends on successful organisational embedding.

To support continuity, we identified key measures:

- establishing a digital documentation system,
- embedding *TLN* as a recurring process,
- forming a cross-functional governance team, and
- securing consistent leadership support.

TLN contributed to a meaningful mindset shift: it encouraged participants to look beyond immediate challenges, adopt end-user perspectives, and embrace long-term, scenario-driven thinking. Its iterative, design-driven nature fostered learning through exploration, synthesis, and implementation.

The process also strengthened internal cohesion, fostering shared ownership of strategic goals across departments. Although only two *TLN* cycles (*ARCs 3 and 4)* were completed, momentum was building to institutionalise *TLN* in the company's strategic planning.

To ensure continuity, we recommended *TLN* be governed by the Strategic Design Department, under the *Strategic Design Manager*. *ARC 4* showed that *TLN* enables B2B manufacturers to structure service innovation around future user needs, laying the groundwork for sustainable, end-user-driven servitization.

Conclusion

In this doctoral research, we examined how a technology-driven B2B manufacturer of capital goods can strategically design and implement a servitization transition, with a focus on end-user value in future scenarios. I conducted action research within the organisation, collaborating closely with designers and engineers to develop and evaluate strategic design interventions for enabling *overarching servitization*.

The thesis presents five main findings. First, we introduced the concept of *'Overarching Servitization'*, which extends beyond traditional B2B models by positioning end-users as central stakeholders in value creation. This approach encourages manufacturers to co-create value downstream through direct engagement with end-users and ecosystem partners.

Second, we identified nine enabling factors—including the integration of strategic designers, a shift towards end-user desirability, and design-led interventions—and four key barriers: short-term thinking, lack of strategic design capabilities, limited foresight, and siloed processes.

Third, we developed and validated the *TLN process (The Long Now),* a structured framework of six design interventions supporting the exploration of future user scenarios and alignment of innovation with long-term servitization goals. Evidence from *ARCs 3* and *4* confirmed its value across three principles: *Exploring End-user Perspectives, Envisioning Future Contexts*, and *Organisational Embedding of TLN*.

Fourth, the *Roles & Relationships framework* helped redefine the manufacturer's position within *PSSs* and *PSEs*, enabling value co-creation as an orchestrator in multi-actor constellations.

Fifth, the *Value-Driven Strategic Design Roadmap* supports cross-departmental alignment through three value lenses—*Value Context, Value Exchange,* and *Value Creation*—across three-time horizons, enabling future-oriented, user-centred innovation.

Together, these frameworks offer a coherent methodology for designing and implementing servitization strategies in B2B settings, directly addressing the thesis's main research question and sub-questions.

The research is grounded in four *ARCs*, embedded and implemented within a single company. This provided deep empirical insights but limits generalisability. My dual role as researcher-practitioner and contextual disruptions (e.g. *COVID-19*) may have introduced bias and complexity.

These frameworks hold relevance for design and engineering practice. They encourage engineers to incorporate end-user value and offer strategic designers practical tools for aligning innovation efforts. The *TLN process* also supports managers in embedding servitization into strategic planning and ecosystem positioning.

Finally, this research contributes to education by offering frameworks for teaching design strategy and service innovation. I recommend further testing across other sectors—such as healthcare or government—to assess the broader applicability of *overarching servitization*.

1

It is the supreme art of the teacher to awaken joy in creative expression and knowledge.

Albert Einstein

Chapter 1 — Servitization in B2B Industry

1.1 — Introduction

Servitization refers to the shift from merely selling products (e.g. machinery) to offering integrated product-service solutions (Kohtamäki et al., 2018). In practice, this involves providing services that are directly linked to the use of physical products. Neely (2008) describes a *servitized* organisation as one that *'designs, builds, and delivers one or more integrated product and service offerings that deliver value in use.'* Similarly, Baines (2009) defines servitization as *'the innovation of an organisation's capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use.'* For a detailed definition, we refer to Lightfoot et al. (2013) who describe servitization *'as a transition in business model from products to product-service systems, where product and services are bundled to generate higher use-value, pricing is based on value, and capabilities support customer-dominant orientation.'* Adopting a servitization strategy enables organisations to deliver greater value to customers while fostering long-term relationships throughout the product's lifecycle (Baines et al., 2009). Unlike traditional business models, which rely on revenue generation primarily at the point of sale, servitization establishes continuous revenue streams through services provided during the product's usage phase. Consequently, companies must realign and adapt their business models to support the transformation towards a servitization strategy (Teece, 2010).

Consider a B2B manufacturer specialising in physical capital goods, such as machinery or production equipment, that also offers supplementary services, such as preventive maintenance through remote monitoring or guarantees for pre-agreed plant performance. This approach enables the company to differentiate itself in markets where traditional products are increasingly perceived as standardised commodities with limited competitive distinction. A well-known example within the B2B sector is *Rolls-Royce*. Rather than merely selling aircraft engines, *Rolls-Royce* provides a service known as *Power-by-the-Hour* (Visnjic et al., 2017). In this model, airlines pay for engine usage and operational availability instead of purchasing the engines outright. Tukker (2004) categorises this offering as a result-oriented product-service system (*PSS*), where the delivered value—operational uptime—is achieved through *Rolls-Royce's* services. Similar product-service systems *(PSSs)* unfold in other industries. A notable example is *Uber*, which has transformed the taxi market through its digital platform. Although *Uber* is primarily recognised in the consumer market, it exemplifies how servitization can be effectively implemented (Collier et al., 2018). *Uber* not only delivers mobility through its *Mobility-as-a-Service* model but also operates a platform that enables independent entrepreneurs to act as mobility providers. While this example focuses on the consumer market, it underscores how innovative applications of digital platform technologies can create new opportunities for servitization within the B2B industry.

Although the initial literature review, as presented in *Chapter 2,* was conducted in 2019, more recent academic work has been integrated into this research to ensure relevance and currency. In recent publications, several servitization scholars have underscored the growing importance of digital technologies—and in particular, the role of digital platforms—as critical enablers of servitization transitions in B2B industries (Favoretto et al., 2022; Harrmann et al., 2023; Kohtamäki et al., 2022; Kowalkowski et al., 2024; Marcon et al., 2022). Moreover, there has been a growing emphasis in the literature on data-driven approaches to the design and governance of *PSSs* (Dijck, 2021; Paliyenko et al., 2025), as well as on service design methodologies specifically aimed at shaping digital service propositions (Iriarte et al., 2023). As will be elaborated in *Chapter 8*, their insights closely align closely with—and further substantiate—the findings of this study.

For manufacturers operating in the B2B sector, servitization has become an increasingly appealing strategy in response to growing competition from new market entrants. Many of these entrants leverage data platforms and offer innovative services that disrupt, or even render obsolete, traditional sales-driven business models. This shift compels established B2B companies to explore novel approaches to delivering sustained value to their customers (Cenamor et al., 2017; Kapoor et al., 2021; Rabetino et al., 2017).

Adopting a servitization strategy has the potential to enhance corporate profitability. Research shows that companies embracing servitization often achieve more stable revenue streams, as services like maintenance contracts and performance guarantees foster long-term customer relationships and ensure recurring revenue streams (Baines, 2015). Interest in servitization within the B2B industry is further accelerated by technological advances and evolving customer expectations. Companies that wish to remain successful must be willing to explore new innovation methods, adapt their product-service development processes, and seize new opportunities (Baines et al., 2010; Reim et al., 2013; Story et al., 2017).

The systematic literature review presented in *Chapter 2* reveals that academic discussions of servitization in the B2B industry predominantly focus on services closely tied to the operational processes of direct business customers. This emphasis reflects a relatively narrow perspective that risks overlooking alternative forms of value creation beyond immediate operational support. In response, this study adopts end-user value creation as a relevant and underexplored lens for examining servitization in B2B contexts. Operational services typically include the provision of spare parts, preventive maintenance for machinery, and leasing solutions. Within such strategies, the end-user—here referred to as the *'customer-of-the-customer'*—is generally absent from the value proposition. B2B manufacturers tend to concentrate on meeting the needs of their direct customers, without explicitly considering the values or experiences of the end user.

This limited scope is also evident in the definitions of servitization provided by the aforementioned scholars, which tend to centre on the relationship between the manufacturer and its direct customer. In contrast, our research highlights the importance of including the end user as the final link in the downstream value chain.

Building on these insights, *Section 2.2.8* discusses how the business model of *Rolls-Royce* has inspired a broader perspective on servitization—one that more deliberately addresses the needs and values of the end-user within B2B settings. While prior definitions have typically framed servitization as the manufacturer's shift from product sales to service offerings (Baines et al., 2009; Kohtamäki et al., 2018), this research refines the concept by explicitly extending the scope to the ultimate end-user. Based on this foundation, and refined throughout the course of this research, we propose the following definition of servitization:

'Servitization is defined as the transition by manufacturers from solely producing and selling products to offering integrated product–service value propositions that generate value across the downstream value chain, extending to the ultimate end-user.'

This transition involves a shift from transactional, product-centric business models to relational, service-oriented approaches that prioritise long-term value creation and exchange among all stakeholders across the value chain. By integrating services with products, B2B manufacturers can drive innovation, enhance customer engagement, and build resilient, adaptive ecosystems that respond dynamically to changing customer demands.

1.2 — Servitization in a Historical Perspective

To better understand the concept of servitization, this section explores its historical roots and the factors that have contributed to its development as a transformative service innovation strategy. By tracing its roots, one can understand the technological developments over the past centuries that have enabled servitization to revolutionise industries and create unprecedented product-service value propositions.

The first industrial revolution—*the age of steam*—which began in the late 17th century, was characterised by the invention and application of the steam engine (Lintsen, 1997). Initially designed by mining engineers to pump water out of coal mines, the steam engine rapidly became a pivotal innovation that transformed manual labour into mechanised work. This period also marked the advent of the first railway networks, with steam-powered locomotives enabling the transport of goods and people over long distances. These developments introduced the concept of service provision, as railway companies began offering new transportation services.

The second industrial revolution started in the late 19th century, dominated by the invention of electricity along with electrification of machines (Lintsen, 1997). Electrification allowed steam-powered machines to be replaced by electrically powered equipment, which was more efficient and easier to operate. Electricity networks also facilitated the distribution of energy to areas where coal was scarce, expanding industrial activities. This era saw the development of technologies such as the incandescent lamp, which paved the way for analogue electronics, further enhancing industrial capabilities.

The third industrial revolution began around the middle of the 20th century, heralded the beginning of automation and digital technologies, fuelled by the technological innovations

brought about by the two world wars (Lintsen, 1997). Breakthroughs such as transistors, semiconductors, microprocessors, and integrated circuits (ICs) laid the groundwork for digital technology. These advancements enabled the creation of programmable logic controllers (PLCs) that automated production processes, integrating machines into networks within manufacturing companies. Technologies like Computer Numerical Control (CNC) systems allowed machines to produce end products autonomously, without human intervention. These innovations not only increased efficiency but also set the stage for the next wave of technological progress, the fourth industrial revolution.

The fourth industrial revolution—*the digital age*—began around the turn of the 21st century and was catalysed by the widespread adoption of the *Internet*. While the Internet had existed in some form since the 1980s, its true potential was unlocked with advancements in wireless data transfer (e.g., Wi-Fi and mobile networks) and higher data speeds through Ethernet and fibre optics. Data speeds improved dramatically, progressing from 1 Kbps in the early days to 1 Mbps around 2000, and eventually reaching 1 Gbps in recent years—a thousandfold increase at each stage. These advancements revolutionised how software and services were delivered. Rather than requiring local installation via physical media like floppy disks or CD-ROMs, software could now be downloaded or even accessed directly from providers' servers through cloud computing.

This period also saw the rise of new technologies, including the Internet of Things (IoT), artificial intelligence (AI), and 4G/5G mobile networks (Costa et al., 2023). These technologies enabled systems, manufacturers, and users to connect across boundaries, exchanging data in real time via digital platforms. During this time, servitization developed into a strategy that leveraged digital technologies and platforms. Scholars trace the origins of servitization to this context (Baines et al., 2017; Gawer & Cusumano, 2014; Geliskhanov & Yudina, 2018; Kocher et al., 2011; Yarali, 2018). The digital tools and connectivity afforded by the fourth industrial revolution allowed companies to develop new value propositions and shift from selling standalone products to offering integrated *PSSs*. This shift, often referred to as *'something-as-a-service,'* has reshaped industries and opened new avenues for value creation (Baines et al., 2017; Plugge & Nikou, 2024; van Bommel et al., 2021; Volberda, 2017)

Nowadays, new businesses and services are emerging that address user needs previously unrecognised or impossible to satisfy without digital platform technology (Vera, 2018). A well-known example is Google's introduction of Gmail in 2004—an online email client that allowed users to access their messages anytime and anywhere with an Internet connection (Tzuo & Weisert, 2018). Gmail created a new dimension of user value that would have been unattainable without digital infrastructure. While the service appeared free to users, they in fact paid with their data, which generated substantial value for Google. By analysing users' email data, Google was able to develop and refine complementary services such as Google Search (a free search engine) and Google Ads (paid advertisements). The success of Gmail and similar services illustrates how digital technologies enable entirely new service propositions. Both start-ups and end-users have embraced such innovations, recognising the convenience and functionality offered by digital platforms. The first wave

of *'something-as-a-service'* models focused primarily on online software applications, but their impact has since expanded into many other industries.

The new terminology with which scientists describe the achievements of this fourth industrial revolution in the form of *'something-as-a-service'* value propositions differs per country (Baines, 2015). German scholars and industry leaders use the term '*Industry 4.0*' (Ematinger, 2021; Hein et al., 2019; Weking et al., 2018, 2020). In the United Kingdom, the focus is on '*servitization'* or '*circular economy'* (Baines, 2015)*.'* Scandinavian researchers frequently refer to *'product-service systems'* (Kohtamäki & Helo, 2015)*.* In the United States, terms like '*servitization'* and '*service innovation'* are common to indicate the developments resulting from the fourth industrial revolution. In this dissertation, the term *servitization* is used to describe the transition of manufacturers from solely producing and selling products to offering integrated product–service value propositions, also referred to as *'product-as-a-service'* value propositions.

The historical waves of industrial revolutions provide a context for understanding the rise of servitization. From the steam engines of the first industrial revolution to the digital technologies of the fourth, each phase has contributed to reshaping how businesses create and deliver value. Servitization, driven by the digital connectivity platforms and software tools (such as apps, IoT and AI technology) represents a significant leap forward, enabling manufacturers to offer integrated *PSSs* that meet evolving customer needs. By examining this evolution, we gain valuable insights into the factors that enable servitization to become a transformative journey. This evolution provides a promising avenue for B2B industries to initiate product–service innovation and to systematically develop and orchestrate integrated *PSEs*, wherein collaboration with multiple stakeholders throughout the value chain is actively fostered (Bluemink, et al., 2024b).

1.3 — Design Roadmapping — Theoretical Foundation of Study

This research project is part of the *Top Consortium for Knowledge and Innovation* (TKI) subsidy programme, a Dutch government-funded initiative aimed at fostering collaboration and knowledge exchange between academia and industry. Within the framework of this TKI programme, the *Faculty of Industrial Design Engineering* of *Delft University of Technology* and a B2B manufacturer entered into a formal agreement to jointly explore servitization design practices. It builds upon the findings of the earlier *PASSME* project *(Personalised Airport Systems for Seamless Mobility and Experience)*, conducted within the *Faculty of Industrial Design Engineering*. The *PASSME* project, aligned with the faculty's *People-in-Transit* research topic, focused on understanding people's behaviour and experiences related to mobility. Its successful completion in mid-2018 generated significant interest from the focal company, prompting the development of this follow-up servitization research (De Lille, 2018).

This study is theoretically grounded in design methodology. Through a series of *Action Research Cycles* (*ARCs)*, it demonstrates the application of strategic design approaches that are widely adopted in business-to-consumer (B2C) industries but remain underutilised or largely unexplored in business-to-business (B2B) contexts. These approaches include

creating strategic value by design (Calabretta et al., 2015, 2017; Hekkert, 2014; Liu et al., 2017; Vermaas et al., 2015), service design (N. Costa et al., 2018; Harrison, 2017; Polaine et al., 2013), design roadmapping (Kim et al., 2018; Simonse, 2014; Simonse, 2018), user experience (UX) design (Ryu et al., 2018) and design thinking (Beltagui, 2018; Dunne, 2018; Stompff, 2018; Wrigley et al., 2020).

The primary aim of this research is to design and evaluate interventions that support the innovation of end-user-oriented product–service solutions within a B2B manufacturing context. In doing so, we adopt the definition of intervention as proposed by Cummings and Worley (2015):

'A sequence of activities, actions, and events intended to help an organisation improve its performance and effectiveness.'

In other words, an intervention is not a one-off action or isolated event, but a deliberately composed sequence of actions aimed at strengthening an organisation's functioning and performance. Cummings and Worley (2015) position interventions as a preparation for organisational change processes. They are situated within a broader plan of action that begins with organisational analysis and diagnosis and concludes with the implementation and evaluation of interventions initiating the intended change.

For this research, we build on the insights of Worley (2015) as well as the empirical study of Smulders et al. (2003), who examined how interventions in new product development (NPD) processes can be employed in existing operational processes to bring about organisational change. Extending this line of inquiry, the present study investigates how interventions can be designed and implemented within a B2B manufacturing context to support a servitization transition. In doing so, it moves beyond the scope of NPD to address the strategic challenge of developing end-user-oriented product–service solutions and orchestrating product–service ecosystems.

This represents a novel contribution to the literature. While the servitization literature (Baines et al., 2009; Kowalkowski et al., 2017; Raddats et al., 2019) has extensively examined business models, capabilities, and organisational barriers, it has paid far less attention to the role of interventions as vehicles for change. Earlier studies that did discuss interventions tended to position them as operational tools for optimising product development processes. By contrast, this dissertation reconceptualises interventions as strategic instruments for enabling *overarching servitization* in B2B industries. In doing so, it addresses a critical gap in the literature and signals a paradigm shift—from viewing interventions merely as means of improving operational practices to recognising them as enablers of strategic organisational transformation.

To this end, the research adopts Simonse's (2018) *Strategic Design Roadmapping* methodology to develop strategic design interventions on two levels. First, it introduces interventions aimed at designing a process through which the organisation can learn how to create end-user-oriented product–service offerings and servitization strategies *(Chapter 5).* Second, it implements interventions that apply this process within the focal manufacturer's organisation *(Chapters 6 and 7).* Finally, *Chapter 8* reflects on the overall

contribution of this research to the theory. This action-oriented approach not only strengthens the focal company's servitization capabilities but also contributes to the wider academic discourse on servitization design practices in B2B contexts.

1.3.1 — Roadmapping

The Oxford Dictionary (Stevenson, 2010) provides two definitions for a roadmap:

1)   *A map, especially one designed for motorists, showing the roads of a country or area.*
2)   *A plan or strategy intended to achieve a particular goal.*

According to the first definition, a roadmap represents a physical environment that provides orientation and allows someone to navigate to a particular location. According to the second definition, a roadmap represents the execution of a strategy aimed at achieving a certain goal. According to Simonse et al. (2015) the strategy development process can be compared to a journey where a roadmap guides a company through various landmarks and intermediate destinations towards the ultimate goal of a well-defined strategy. Therefore, the authors consider the roadmap as a powerful metaphor. Obviously, we use the latter definition in the context of our research. The concept of a roadmap can be applied in different situations and contexts for mapping out an innovation strategy towards a formulated future vision. The roadmapping process includes three interrelated activities: *time-pacing the strategy*, *synchronising innovation dialogues across departments*, and *mapping innovation elements on a timeline* (Simonse et al., 2015). Phaal & Muller (2009) argue that a roadmap should answer three questions: (1) '*Where are we going?*' (2) '*Where are we now?*' and (3) '*How can we get there?*'. A strategic roadmap depicts the company's strategy and is generally a visual representation of the innovation strategy that will be implemented (see *Figure 1-1*).
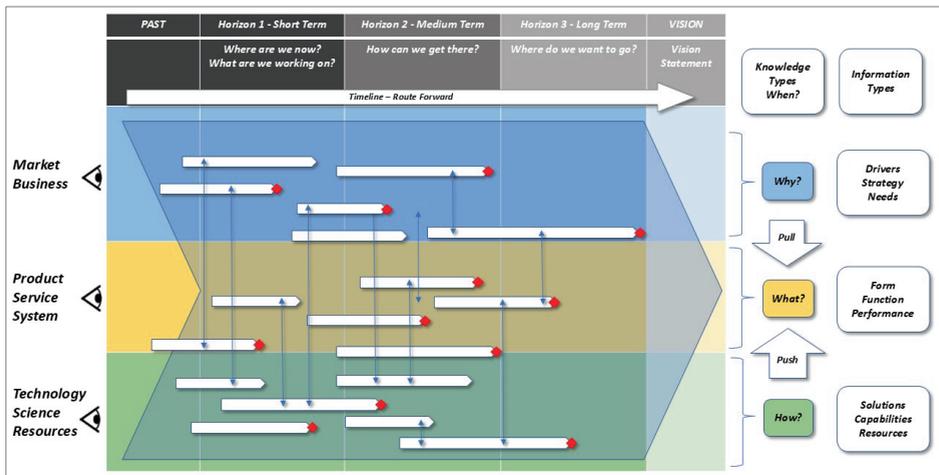
Figure 1-1 — Roadmap Framework for Supporting Integrated and Aligned Strategic Innovation Planning [Figure Adapted from Phaal & Muller (2009)]

It can consist of various aspects shown in horizontal layers, depending on the purpose and outcome the roadmap is meant to achieve. As a result, it is a valuable tool that organisations can use to plan and implement innovation strategies. Using it helps an organisation define its current state, goals, and objectives. It also helps to identify the steps and resources needed to reach those goals and track progress while working towards achieving them. Furthermore, it assists the organisation in focusing on crucial elements of innovation and prioritising its activities according to their value and impact. A strategic roadmap conveys and communicates the essence of a strategic plan, organisational transformation, innovation pathway, and future actions. According to Phaal & Muller (2009), *'The structure of the roadmap, and the process for developing and maintaining the roadmap, should be designed to serve the purpose for which the activity is intended to satisfy, providing a 'common language and structure' for both development and deployment of strategy.'* We will use Phaal and Muller's (2009) framework to highlight the difference between their roadmap framework (see *Figure 1-1)* and *The Oxford Dictionary's* (Stevenson, 2010) definition. They argue that a strategic roadmap has a timeline along which different activities develop and use three questions to divide the timeline into three timeframes: *'Where are we now?'* for the short term, *'How can we get there?'* for the medium term and *'Where are we going?'* for the long term. Simonse (2018) refers to these time frames as: *Horizon 1 (H1), Horizon 2 (H2)* and *Horizon 3 (H3)*. Depending on the business context and chosen time perspective, the three timeframes can vary in length. When these elements are combined, three different timeframes *H1 – Short Term*, *H2 – Medium Term*, and *H3 – Long Term* become apparent, as shown in the grey horizontal bars at the top of *Figure 1-1*. We must consider that the three horizons do not stand alone but rather have many interrelationships; in the sense that, for example, the intended outcomes in *H3* relate to and affect activities undertaken in *H1* and *H2* (Simonse, 2018).

Consolidating outcomes of design interventions into a roadmap is a way to communicate and align strategic directions, anchoring them within the organisation. In doing so, the roadmap acts as a boundary object, as defined by Star & Griesemer (1989): *'Boundary objects are objects that are plastic enough to adapt to the local needs and constraints of the different parties using them, but robust enough to maintain a common identity across locations.'* In other words, boundary objects are physical or virtual artefacts that help break down departmental barriers by creating a common language between different business disciplines while remaining open to interpretation. However, Spee & Jarzabkowski (2009) found that the use of boundary objects has been little researched in organisational science. They argue that boundary objects are relevant for aligning strategic change processes within the organisation because they help us better understand the considerations and decisions made during the strategy change process. Jarzabkowski (2005) states that strategy change processes are susceptible to different interpretations and complex interactions between departmental boundaries, as tasks and authority are distributed hierarchically (senior or middle management) or by functional organisational discipline (departments or business units). Carlile (2002) argues that boundary objects can be helpful

in transferring, translating, and transforming knowledge within such heterogeneous groups; for one department, they communicate the technological aspects needed, while for another, they explain the user value drivers and relevant trends. In addition to defining the roadmap, scholars also define the verb *roadmapping*. Phaal and Muller (2009) describe *roadmapping* as a visual strategic planning process and define the *roadmap* as a representation of the strategy resulting from this process. They note that the activities involved in designing a roadmap may vary depending on its intended use.

1.3.2 — Design Roadmapping

The design roadmapping process, as described by Simonse (2018), involves three interrelated activities: *time-pacing the strategy, synchronising innovation dialogues* (across departments), and *mapping innovation elements on a timeline. Time-pacing the strategy* establishes a time interval in relation to the time continuum of the future for launching innovative new products or services. It creates a rhythm based on predictable time intervals. *Synchronising dialogue* is a creative group conversation about future product-service innovation plans, with the timeline serving as a focal point for mutual understanding. *Mapping innovation elements to a timeline* involves identifying, allocating, ordering, and interlinking innovation elements related to technology foresight, long-term market encounters, and product line evolution in a future map with a timeline (Simonse et al., 2015).

The literature discusses different types of roadmapping, such as *technology roadmapping, innovation roadmapping, product roadmapping, and design roadmapping*. All types are driven by innovation strategies and support strategic long-term planning (Phaal, 2004; Phaal et al., 2008; Simonse, 2018), combining market demand and technological knowledge to create a push from the technology side and a pull from the market side (see *Figure 1-1*).

In their research, Kim et al. (2018), propose incorporating customer experience into strategic roadmapping by shifting from a feature-focused approach to an experience-driven one. The authors emphasise the importance of identifying user values and aligning them with technological features to create intended value propositions. Identifying user values requires a comprehensive understanding of end-users, as their underlying needs and values are often concealed and must be uncovered through research into the end-user context. Additionally, Simonse (2018) and Kim et al. (2015) argue that design roadmapping involves industrial designers as integrators, playing a crucial role in the process. Simonse (2018) also suggests that a diverse group of innovation professionals with varied backgrounds and roles should comprise the design roadmapping team; with the designer occupying a central position as an integrator. Notably, design roadmapping is a suitable method for creatively addressing complex strategic challenges, with increased flexibility to adapt to market changes (Kim et al., 2015, 2018; Simonse, 2018). Since markets can change quickly, regularly updating the roadmap will help maintain an overview and, if necessary, adjust the strategy.

Synchronising dialogues in a design roadmapping process is especially critical because the design roadmap summarises and consolidates the innovation strategy and the related design decisions made during these dialogues (Simonse et al., 2015). Therefore, a design roadmap plays a vital role in convincing stakeholders and communicating the essence of strategic design plans, their organisational impact, the innovation project portfolio, and its associated actions. Appropriate communication tools can stimulate creative dialogues and utilise visual outputs like drawings, wallpapers, and short videos (Kim et al., 2022; Nas [in Simonse], 2018). These visual outputs create shared mental concepts that help everyone remember the creative dialogues and can be referenced in future decisions. Design roadmaps can reduce the time needed for decision-making and increase the chances of success of the intended strategy.

Finally, the strategic design roadmap can play a significant role in convincing senior management. There may be a limited understanding of methods such as *strategic design*, *service design* and *design roadmapping* in the B2B industry. Since senior management is generally unfamiliar with these design methods, they need to be convinced of the benefits. For design roadmapping to be successful, it must be supported at all levels of the company, making the involvement of senior management crucial (Kappel, 2001; Nas [in Simonse], 2018). Early involvement of senior management helps create buy-in to drive a design roadmapping-based strategic process and allocate the right resources. Conversely, it is also essential to foster bottom-up innovation at all levels of the organisation to implement the created roadmap and carry out the associated actions. To advance the design roadmapping process within the organisation, Dissel et al. (2009) argue that it is crucial to have a process owner or champion supported by clear management commitment.

Simonse (2018) argues that *Strategic Design Roadmapping* involves several *design* activities that are considered essential, but its process is flexible. There is no rigid set of design activities that must be used in a session to create a strategic design roadmap, as this largely depends on the organisation and the intended outcome. However, multiple approaches are generated and proposed by various researchers (Kerr & Phaal, 2022; Kim et al., 2016; Phaal et al., 2007; Simonse, 2018). In particular, Simonse (2018) and Kim et al. (2016) focus on understanding the design context and requirements before creating a roadmap. Each approach differs in how it defines goals and objectives and structures the design process. They share the common goal of helping organisations create roadmaps that drive the company's innovations. Phaal et al.'s (2007) approach emphasises the importance of understanding the design objectives and constraints before creating the roadmap. Kim et al. (2016) highlight the need to understand the customer's context and goals before developing the roadmap. Simonse (2018) proposes a more structured approach that incorporates user values and stakeholder feedback into the design process. All three roadmapping methods assist organisations in better understanding the design context and creating roadmaps tailored to their individual needs. They share a focus on the fuzzy front-end as a driver of the strategic innovation process and the formulation of a future vision.
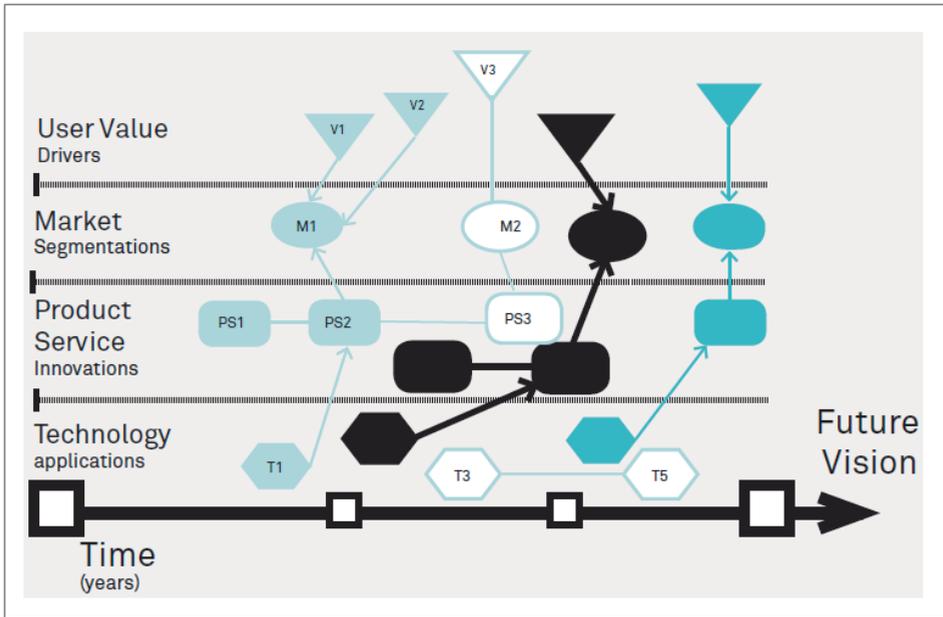
Figure 1-2 — Schematic Overview of Core Elements of a Strategic Design Roadmap (Simonse, 2018; p.14)

A strategic design roadmap serves as a discussion document for cross-departmental conversations with management, innovation, and account teams to realise the proposed value propositions. Simonse considers it a boundary object that fosters a common understanding and provides the reasoning behind the organisation's strategic choices (Simonse, 2018). The core elements of a strategic design roadmap comprise horizontal swimming lanes arranged along a timeline: *User Value Drivers*, *Market Segmentations*, *Product–Service Innovations*, and *Technology Applications*, complemented by a future vision statement (see *Figure 1-2*).

The servitization literature demonstrates that organising and realising a servitization transition is far from straightforward for B2B manufacturers. We therefore argue that such a transition requires a methodological scaffold to inform the design of interventions. Based on the above considerations, we contend that Simonse's *Strategic Design Roadmapping* process offers a comprehensive methodological conceptual foundation for guiding the design of these interventions.

1.4 — Personal Motivation

Throughout my career as an industrial designer and innovation manager, I have developed products and services for both B2C and B2B industries. This experience has provided valuable insights into why some companies successfully reinvent themselves and uncover new opportunities while others struggle to adapt. It raises a crucial question: why can one company craft a successful innovation strategy grounded in a clear vision while another remains constrained by short-term thinking?

These reflections motivated me to return to academia, where I was invited to lead a research project on designing a servitization transition. This project became the foundation of my PhD study, enabling me to merge practical design experience with academic research. The study focused on developing servitization strategies for B2B industries that create value for end-users while preparing businesses to address future challenges.

Through this work, we explored how B2B companies can effectively design and implement future-oriented servitization strategies. Despite challenges, the servitization transition proved to be a robust approach for companies to remain relevant in dynamic business contexts. I hope my thesis inspires organisations to embrace servitization strategies—enabling them to generate new service value propositions, forge partnership collaborations, enter new markets, stabilise revenues, and gain competitive advantages.

In this section, I wish to clarify the use of personal pronouns in this thesis. In the text above, both the 'we'-form and the 'I'-form are employed, reflecting the distinct roles I assume in this research. I use the 'I'-form when referring directly to my own experiences—such as the personal motivations and drivers mentioned above—and when describing my observations during the *ARCs* (details are provided in *Chapter 3*). Conversely, I utilise the 'we'-form when recounting the shared experiences, observations, and reflections developing from the collaborative action research with the involved participants.

1.5 — Thesis Perspective of Industrial Design Engineering

1.5.1 — Strategic Design Knowledge Domains

In this thesis, the domain of servitization in the B2B industry is examined from the perspective of *Industrial Design Engineering*, with particular emphasis on user-centred design approaches. Previous research on user-centred design has predominantly addressed small and medium-sized enterprises, which often maintain direct relationships with end-users (De Lille, 2014). This dissertation specifically examines large industrial firms, where such direct connections are typically absent, thereby addressing a critical knowledge gap in understanding how user-centred approaches can inform servitization strategies in complex B2B contexts. As illustrated in the Venn diagram of *Figure 1-3*, the dark blue circles represent the scope of *Servitization in B2B industry*, while the white circle denotes the perspective of *Industrial Design Engineering*.

To address the research questions outlined in *Section 2.3*, we draw on established methods and techniques from *Industrial Design Engineering*, notably *Strategic Design*, *Service Design*, and *Design Roadmapping*. The relations between these three knowledge domains are visualised through the light blue circles of *Figure 1-3*. The intersections—marked by the green explosion symbol—illustrate where the research questions emerge. These intersections indicate the critical areas for product–service innovation in B2B manufacturing, showing how theoretical frameworks can be bridged with practical applications. In this way, the figure illustrates how the study seeks to build a more integrated understanding of servitization-driven transitions in the B2B industry.
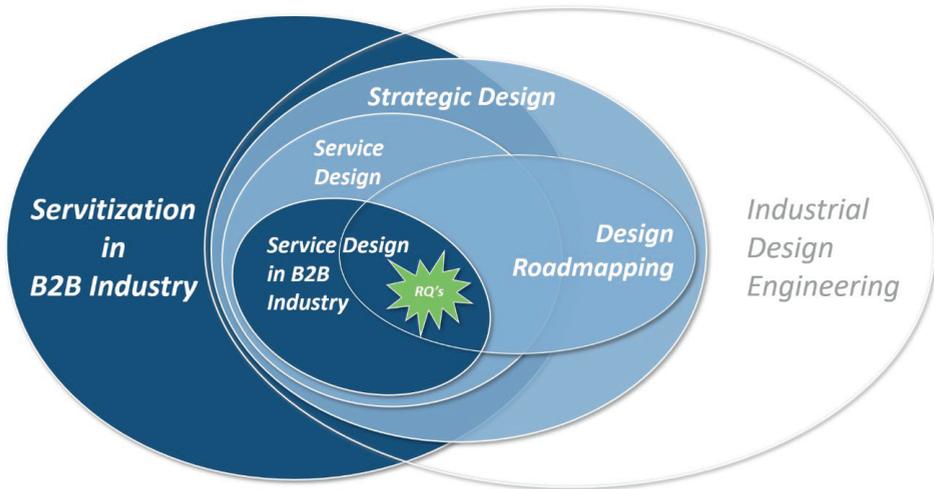
Figure 1-3 — Venn Diagram Visualising the Knowledge Domains and the Focal Point of the Research Questions

1.5.2 — Thesis Outline — Readers Guideline

The Venn diagram in *Figure 1-4* visualises the thesis outline with the corresponding chapters.

Chapter 1 introduces servitization in the B2B industry, offering both a historical perspective and contextual background, illustrated by the dark blue circle. It also includes a brief personal motivation from the author, emphasising the relevance of the research, and outlines the overall structure of the thesis to guide the reader through its key research areas and objectives.

Chapter 2 presents a scoping review of the literature, conducted to develop a structured understanding of servitization in the B2B domain. Guided by an initial research question, the review is depicted as the lower yellow circle in *Figure 1-4.* The findings, reported in *Section 2.2*, highlight key challenges and reveal a research gap concerning *overarching servitization*, which led to the refinement of the initial question into four focused questions (*Section 2.3*).

Chapter 3 discusses the research design and methodology employed to address the research questions. It outlines the action research method proposed by Coghlan (2019), which was applied to examine interventions (Cummings & Worley, 2015; Smulders et al., 2003) in the focal manufacturer's organisation. This approach is represented by the intersection of the three yellow circles at the centre of *Figure 1-4*.
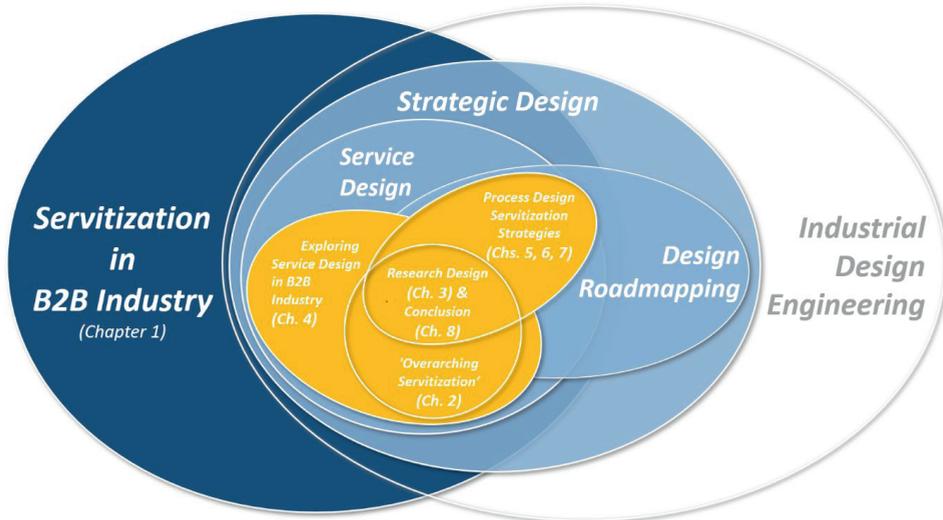
Figure 1-4 — Venn-Diagram Visualising the Knowledge Domains and the Related Thesis Chapters

Chapter 4 presents the ongoing exploratory phase of the research, focusing on identifying service innovation and servitization initiatives within the focal manufacturer. It reports *Action Research Cycle 1 (ARC 1)*, which consists of three sub-*ARCs: ARC 1.1, ARC 1.2*, and *ARC 1.3*. These sub-cycles examine the service design processes employed by the organisation to develop value propositions for physical products and installations integrated with service components. As a typical B2B manufacturer, the case company provides a relevant context for identifying value propositions that address not only direct customer relationships but also those of the customer's customer (the end-user). Given the scarcity of empirical studies on this topic in the B2B domain, this chapter investigates how a manufacturer of technologically advanced installations and products structures and sustains an *overarching servitization* development process. In this initial cycle, strategic design interventions were developed to demonstrate and disseminate service design practices throughout the organisation, as depicted in the yellow circle on the left side of *Figure 1-4*.

Chapter 5 presents *ARC 2,* conducted within the same organisational context and represented by the yellow circle on the right side of *Figure 1-4*. Drawing on Schön's (1984) methodology of reflective practice, this chapter reports the experiential learning generated through the iterative design and implementation of strategic design interventions. Collectively, these interventions establish the foundation of an *Overarching Servitization Strategy Design process*, aimed at fostering the innovation of end-user-centred, future-oriented product–service value propositions across the *ARCs*.

Chapter 6, represented by the yellow circle on the right side of *Figure 1-4*, documents the design and pilot testing of the *Overarching Servitization Strategy Design process*. By synthesising insights from *ARC 1* and *ARC 2* with existing literature on servitization and strategic design, this chapter establishes the basis for *ARC 3*. In this cycle, a set of design

interventions was implemented and critically reflected upon within the *Airports* business unit of the focal manufacturer.

Chapter 7, likewise symbolised by the yellow circle on the right side of *Figure 1-4*, outlines *ARC 4,* in which strategic design interventions were conducted with participants from multiple departments across four distinct business units. *ARC 4* serves to validate the process developed in *ARC 3* for designing a future-oriented *overarching servitization* strategy. It illustrates how participants engage in anticipatory thinking and applied strategic design methods to generate novel product–service value propositions.

Chapter 8—Conclusion & Discussion—represented by the intersections of the three yellow circles at the centre of *Figure 1-4,* presents the principal findings of the case study. It synthesises insights from the four *ARCs*, addressing the research questions, and discussing the significance of the study. The chapter highlights its contributions to multiple fields of knowledge and outlines potential directions for future research. It also reflects on the study's limitations and considers its implications for designers, engineers, managers, and educators.

2

An idea that is developed and put into action is more important than an idea that exists only as an idea.

Edward de Bono

Chapter 2 — Servitization Processes in Industrial Manufacturing — a Scoping Review[1]

2.1 — Introduction

This scoping review examines the servitization literature with the aim of identifying relevant studies, highlighting underexplored research gaps, and synthesising insights into the current state of knowledge in the field. Conducted between March and May 2019, the review analysed scholarly publications on servitization practices in B2B industries, mapping influential scholars. The study follows Arksey and O'Malley's (2005) scoping study framework, which consists of five stages elaborated in *Sections 2.1.1* to *2.1.4*: *formulating the research question, identifying relevant studies, selecting studies, charting the data,* and *collating, summarising, and reporting the results.*

Although foundational studies on servitization date back to the 1980s, this review deliberately concentrates on the period 2010–2019 to capture recent theoretical developments and emerging empirical trends. Consistent with Baines et al. (2009), who identify Scopus as the leading database for servitization research, this platform was selected as the primary search tool. Its broad coverage of high-impact, peer-reviewed journals provided a rigorous basis for study selection, thereby minimising potential bias in identifying authoritative contributions.

2.1.1 — Identifying Relevant Studies Based on the Initial Research Question

To define the initial search string for identifying relevant studies, Arksey & O'Malley (2005) emphasise the importance of determining the keywords based on the initial research question. Including too many aspects—and thus using an overly complex search string— can yield a limited number of results and risk omitting relevant articles. Conversely, a search string based on too few keywords may produce an unmanageable volume of references.

Our objective is to examine cases that explore strategies, processes, and methods for designing *PSSs* in the B2B manufacturing industry. As a starting point for our scoping process, we formulated an initial research question to guide the selection of keywords:

'How can B2B manufacturers of investment goods transition to providers of product-service systems and offer service value propositions throughout the value chain?'

In this stage of the scoping process, we conducted a literature search to assess the volume of published works on servitization. We began by searching for the term 'servitization' in the Scopus search engine, which generated 2,245 results (see the first row of *Table 2-1*).

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[1] *Chapter 2* was derived from a peer-reviewed conference paper (Bluemink et al., 2020) presented at the *ServDes 2020 Conference*, Melbourne.

To refine our search, we incorporated keywords related to our initial research question, which narrowed the results to 80 journal articles. The search string included *Servitization* and *Business Model* in the article title, abstract, and keywords, along with *Transition*, *Network*, *Manufacturing*, and *Supply Chain* across all database fields. We also restricted the search to English-language publications (see the second row of *Table 2-1*).

To refine the results, we excluded conference papers, press articles, and book chapters, reducing the number of relevant studies to 61 (see the third row of *Table 2-1*).

2.1.2 — Study Selection

In a third refinement, we selected papers specifically related to servitization in technology-driven manufacturers of investment goods. To maintain focus on B2B manufacturing industries, we excluded studies that out the scope of our research question. This included articles on servitization in healthcare, fast-moving consumer goods, B2C markets, governmental organisations, and NGOs, as well as studies employing mathematical approaches investigating servitization effects. As shown in the fourth row of *Table 2-1*, these exclusion criteria further reduced the number of relevant papers to 50.

Table 2-1 — Search String and Number of Search Results

Search Engine	Search String	Selection Criteria	Number of Studies
Scopus search results	'servitization'	**none**	**2245**
1st refinement of Scopus Results	'servitization' AND 'business model' AND 'transition' AND 'network' AND 'manufacturing' AND 'supply chain' AND LIMIT-TO (LANGUAGE, 'English')	**Article Title/Abstract/Keywords** *All Fields* *All Fields*	**80**
2nd refinement of Scopus Results		**Exclusion criteria:** *Conference papers* *Press articles* *Book chapters*	**61**
3rd refinement of Scopus Results		**Exclusion criteria:** *Studies related to healthcare* *Studies related to FMCG industry* *Studies related to government and NGO's* *Studies related to pure B2C industries* *Mathematical approach of PSS*	**50**

2.1.3 — Charting the Data

After identification and selection, we classified the search results in an *Excel* file according to the following criteria: *Title, First Author, Citation Score, Institute, Originating Country, Journal, Year of Publication, Type of Study, Journal, Research Subject*, and *Overall Perspective* (see *Appendix A — ARC 3 — Data Table of Literature Scoping Review* on page

269). We then conducted a thematic analysis of the data to identify recurring patterns, key themes, and critical insights related to servitization in the B2B industry. By examining the data from different angles, we were able to uncover both commonalities and differences across the literature. The approach and findings of this analysis are described in detail in *Section 2.2*.

2.1.4 — Collating, Summarising, and Reporting the Scoping Results

The fifth stage of the scoping review framework involves *collating, summarising, and reporting the results*. In line with this, we synthesised the findings from our thematic analysis and structured them around the key themes identified in the literature. These results are presented and discussed in the following *Section 2.2*.

2.2 — Reporting the Scoping Results

2.2.1 — Servitization Research in the B2B Manufacturing Industry

After analysing the results, we sought to determine the geographical distribution of servitization research in industrial manufacturing. To do so, we first examined the number of citations per country for servitization scholars, listed in descending order in the second column of *Table 2-2*. The third column presents the number of servitization scholars based on their country of origin. From *Table 2-2*, we concluded that servitization research is primarily concentrated in Europe. Notably, UK-based researchers lead the field in servitization within the B2B manufacturing industry, followed closely by scholars from Finland, Sweden, Italy, and Spain.

Table 2-2 — Top-5 Number of Citations / Servitization Scholars per Country

Originating Country of Scholars	Number of Citations	Number of Servitization Scholars
United Kingdom	1169	34
Sweden	342	19
Spain	247	11
Finland	140	21
Italy	66	17

Furthermore, we concluded that servitization research is conducted at universities with a strong focus on technical disciplines, such as industrial engineering, industrial manufacturing, manufacturing operations, information technology, technology management, and industrial economics.

We also observed that the UK, Sweden, and Spain rank relatively high in the citation rankings of *Table 2-2*. An explanation is that universities in these countries actively promote and facilitate servitization research. First, *Aston University* in Birmingham established the *Advanced Services Group (ASG),* which specialises in advanced services and servitization research. The *ASG* also organises the annual *Spring Servitization Conference*, fostering knowledge exchange on servitization processes. Second, the *Business School of Deusto University* in Bilbao, Spain, hosts the annual *International Conference on Business Servitization*. Third, *Linköping University* in Sweden conducted a research programme

titled Value Creation in Innovative Service Systems, which examined service transitions in industrial networks. Funded by the Bank of Sweden, this programme generated multiple publications on value creation in industrial manufacturing networks.

2.2.2 — Lenses of Servitization Research

Through a systematic analysis of abstracts and keywords from the selected studies, we methodologically categorised the literature according to central thematic foci. This process revealed five predominant research lenses, ranked in descending order by study frequency (summarised in *Table 2-3*). By rigorously evaluating abstract content, we mapped the core conceptual and thematic priorities of each publication. Following this analytical approach, we identified five distinct lenses, each capturing critical dimensions of a servitization transition: (1) *Business Model* innovation, (2) *Organisational Transformation*, (3) *Value Creation* mechanisms, (4) *Network Collaboration* dynamics, and (5) *Servitization Strategy* formulation. In the following subsections, we will highlight each lens, briefly discussing the most relevant papers that align with our research interests.

Table 2-3 - Number of Studies per Main Topic Addressed

Servitization Lenses	Number of Studies	Short Description of each Lens
Business Models	16	Discussing Business Models in Servitization
Organisational Transformation	11	Discussing the Impact of a Servitization Transition on the Organisation
Value Creation	9	About Value Creation through Servitization
Network Collaboration	6	Discussing Providing PSSs through Cooperation in a Network
Servitization Strategies	8	Discussing Strategic Frameworks and practices for Servitization

2.2.3 — The Lens of Servitization Business Models

Research on business models in servitization suggests that B2B manufacturers innovating products linked to services should prioritise redesigning their business models to accommodate evolving interactions with customers and suppliers. In selecting the literature, we primarily focused on papers with high citation scores. However, we acknowledge that more recent studies, despite having lower citation indices, may provide valuable insights into unfolding research areas and be particularly relevant to our research question. For instance, Adrodegari et al. (2018) identified various servitization business models employed in the capital goods industry. Additionally, Adrodegari et al. (2017) developed a framework to support industrial companies in transitioning from product-centric to service-oriented business models in a structured and manageable way.

Table 2-4 presents 16 studies on business models in servitization, ranked in descending order based on citation scores. Reim et al. (2015) contributed to this field with their systematic literature review, *Product-Service-Systems Business Models and Tactics*, which enhances the understanding of how business models are applied in *PSSs*. Their paper offers valuable insights into various business models implemented in servitization practices. Similarly, Tongur & Engwall (2014) investigated the challenges manufacturing industries

encounter in innovation processes. They concluded that technological innovation must be integrated with service innovation to establish a viable business model.

Table 2-4 — Studies Related to Business Models in Servitization

ID*	Title	Originating Country	Citation Score	Type of Study	Journal
34	Product-Service-Systems (PSS) Business Models and Tactics - A Systematic Literature Review (Reim et al., 2015)	Sweden	183	Literature review	Journal of Cleaner Production
36	The Business Model Dilemma of Technology Shifts **(Tongur & Engwall, 2014)**	Sweden	52	Case Study	Technovation
5	Meta-Model of Servitization: The Integrative Profiling Approach **(Brax & Visintin, 2017)**	Finland	35	Literature Review	Industrial Marketing Management
32	Strategy Map of Servitization (Rabetino et al., 2017)	Finland	30	Case Studies (3)	International Journal of Production Economics
15	A Decision Methodology to Support Servitization of Manufacturing **(Dimache & Roche, 2013)**	Ireland	24	Framework	International Journal of Operations and Production Management
29	Constructing A Sustainable Service Business Model: An S-D Logic-Based Integrated Product Service System (IPS S)(C. H. Liu et al., 2014)	Taiwan	15	Literature Review	International Journal of Physical Distribution and Logistics Management
39	What Brings The Value to Outcome-Based Contract Providers? Value Drivers in Outcome Business Models (Visnjic et al., 2018)	Spain	10	Case Studies (4)	International Journal of Production Economics
4	The Digitalization and Servitization of Manufacturing: A Review on Digital Business Models (Luz Martín-Peña et al., 2018)	Spain	9	Literature Review	Strategic Change
9	PSS Business Model Conceptualization and Application (Adrodegari, Saccani, et al., 2017)	Italy	9	Framework	Production Planning and Control
10	Business Models for the Service Transformation of Industrial Firms **(Adrodegari & Saccani, 2017)**	Italy	9	Literature Review	Service Industries Journal
38	The Path to Outcome Delivery: Interplay of Service Market Strategy and Open Business Models (Visnjic et al., 2018)	Spain	8	Case Studies (12)	Technovation
20	Do Outcome-Based Contracts Exist? The investigation of Power-by-the-Hour and Similar Result-Oriented Cases **(Grubic & Jennions, 2018)**	United Kingdom	5	Case Study	International Journal of Production Economics
1	The Transition towards Service-Oriented Business Models: a European Survey on Capital Goods Manufacturers (Adrodegari et al., 2018)	Italy	3	Quantitative Survey	International Journal of Engineering Business Management
13	A Design-Thinking Perspective on Capability Development: The Case of New Product Development for Service Business Model (Beltagui, 2018)	United Kingdom	2	Case Study	International Journal of Operations and Production Management
30	Lessons Learned from a Successful Industrial Product-Service System Business Model: Emphasis on Financial Aspects (Oliveira et al., 2018)	Brazil	2	Case Study	Journal of Business and Industrial Marketing
31	Servitization as Business Model Contestation: A Practice Approach (Palo et al., 2018)	United Kingdom	1	Case Study	Journal of Business Research
*) ID refers to the identification number of the paper					

Overall, the literature concurs that business model transformation is an inevitable component of the servitization process. In developing services, firms must systematically redesign their business models to accommodate changing value transactions and evolving

interactions with customers, end-users, and stakeholders across the value chain. What remains insufficiently examined, however, is how B2B manufacturers can redesign business models for a servitization transition, and the practical processes through which such transformations can be effectively enacted. Addressing this lacuna constitutes the central research problem to which this dissertation seeks to contribute.

2.2.4 — The Lens of Organisational Transformation

The identified servitization studies on the B2B manufacturing industry acknowledge the organisational transformation due to servitization and provide guidance on optimising and restructuring product-service innovation processes. *Table 2-5* presents 11 studies on the organisational transformation of servitization, ranked in descending order by citation score.

Table 2-5 — Studies Related to Organisational Transformation of Servitization

ID*	Title	Originating Country	Citation Score	Type of Study	Journal
62	Servitization: Revisiting State-of-the-Art and Research Priorities (Baines et al., 2017)	United Kingdom	119	Literature Review	International Journal of Operations and Production Management
25	Service Innovation in Product-Centric Firms: a Multidimensional Business Model Perspective (Kindström & Kowalkowski, 2014)	Sweden	106	Qualitative Study	Journal of Business and Industrial Marketing
14	Servitization and Competitive Advantage: The Importance of Organisational Structure and Value Chain Position (Bustinza et al., 2015)	Spain	37	Qualitative Study	Research Technology Management
22	Resource Realignment in Servitization: a Study of Successful Service Providers Explores How Manufactures Modify their (Huikkola et al., 2016)	Finland	16	Case Studies (9)	Research Technology Management
18	Organisational Capabilities for Pay-Per-Use Services in Product-Oriented Companies (Gebauer et al., 2017)	Switzerland	13	Case Study	International Journal of Production Economics
6	Challenges of Servitization: a Systematic Literature Review (Zhang & Banerji, 2017)	United Kingdom	10	Literature Review	Industrial Marketing Management
43	Organisational Change towards Servitization: A Theoretical Framework (Ziaee Bigdeli et al., 2017)	United Kingdom	6	Literature Review	Competitiveness Review
21	Modelling Manufacturer's Capabilities for the Internet of Things (Hasselblatt et al., 2018)	Finland	2	Qualitative Study	Journal of Business and Industrial Marketing
11	Financial Performance of Servitized Manufacturing Firms: A Configuration Issue between Servitization Strategies and Customer-Oriented Organisational Design (Ambroise et al., 2018)	France	1	Quantitative Study	Industrial Marketing Management
24	Exploring the Dynamic Capabilities Required for Servitization (Kanninen et al., 2017)	Finland	1	Case Studies (14)	Business Process Management Journal
44	Servitization Intent as a Factor in the Servitization Process (Crowley et al., 2018)	United Kingdom	1	Qualitative Study	Journal of Business and Industrial Marketing

*) ID refers to the identification number of the paper

In their widely cited study, Baines et al. (2017) revisited the state of the art in servitization and outlined research priorities concerning its impact on organisational processes in production, sales, and finance departments. Their findings indicate that, while servitization offers significant benefits, it also requires strategic planning adjustments, investments in

capabilities, and efforts to address organisational challenges to fully unlock its potential. This underscores the importance of further research in this domain.

Kindström & Kowalkowski (2014) examined the organisational resources and capabilities required across the eight dimensions of his proposed service business model. This model serves as a tool to visualise organisational changes associated with new service opportunities, fostering greater understanding and awareness within the internal organisation.

More recent studies, including those by Crowley et al. (2018), Ambroise et al. (2018), and Hasselblatt et al. (2018), explored the necessary conditions and organisational mindset conducive to a successful servitization transition.

Overall, the literature on the organisational transformation of servitization highlights the pivotal role of firms in product–service innovation and provides guidance on optimising related processes. What remains insufficiently examined, however, are the specific interventions needed to reconfigure and structure organisational processes to realise a successful servitization transition. This dissertation addresses this gap by implementing action research cycles to initiate such a transition within a B2B manufacturing context. As a result, it generates both practical and theoretical insights into servitization-driven organisational transformation.

The terms *transition* and *transformation* are closely related but conceptually distinct, and are often used interchangeably in the literature, which can lead to confusion. In this dissertation, a *servitization transition* refers to the gradual and strategic shift from a product-centric to a service-oriented business model (Baines, et al., 2009; Vandermerwe & Rada, 1988). This transition entails reconfiguring organisational activities, relationships, and capabilities in response to changing value logics.

An *organisational transformation*, by contrast, refers to a more fundamental and systemic change in the organisation's structure, culture, and operations (Burke, 2022; Cummings & Worley, 2015). Such a transformation is not a prerequisite for servitization but may emerge because of it. In this study, the servitization transition is approached as a deliberate process of change that can, over time, trigger wider organisational transformation as new routines, roles, and ways of working become embedded.

2.2.5 — The Lens of Value Creation

Table 2-6 shows nine studies on value creation through servitization, ranked by citation scores. Visnjic et al. (2013) topped the list with their paper *'Servitization, disentangling the impact of service business model innovation on manufacturing firm performance'*. They identified that implementation hurdles can lead to lower profitability. Although they discussed business models, their paper primarily focused on value creation through servitization. Their survey of manufacturing industries reported increased turnover for companies that successfully provided additional services connected to their products. It also indicated that investments to create economies of scale for their services positively contribute to higher profitability. However, companies offering services separate from

their products are less successful and experience a decline in profitability over time. More recent studies by Lindhult et al. (2018), Resta et al. (2017) and Ayala et al. (2017) emphasise the importance of identifying value flows—both upstream and downstream in the value chain—among stakeholders in cooperative networks. What remains insufficiently examined, however, are the managerial interventions and organisational practices through which firms can orchestrate networks to enhance value creation and foster more effective collaboration within such value constellations. This dissertation empirically investigates these issues through the implementation of action research in the context of a B2B manufacturer, to generate both practical and theoretical insights into servitization-driven organisational transformation.

Table 2-6 — Studies Related to Value Creation

ID*	Title	Originating Country	Citation Score	Type of Study	Journal
40	Servitization: Disentangling the Impact of Service Business Models Innovation on Manufacturing Firm Performance *(Visnjic Kastalli & Van Looy, 2013)*	Spain	191	Quantitative Study (44)	Journal of Operations Management
60	Servitized Manufacture: Practical Challenges of Delivering Integrated Product and Services *(Baines, Lightfoot, & Kay, 2009)*	United Kingdom	52	Case Study	Journal of Engineering Manufacture
16	Seeking Competitive Advantage with Service Infusion: A Systematic Literature Review *(Eloranta & Turunen, 2015)*	Finland	46	Literature Review	Journal of Service Management
26	Industrial Services - The Solution Provider's Stairway to Heaven or Highway to Hell? *(Kohtamäki & Helo, 2015)*	Finland	13	Literature Review	Benchmarking: An International Journal
17	Driver Configurations for Successful Service Infusion *(Forkmann et al., 2017)*	USA	9	Quantitative Study	Journal of Service Research
12	Knowledge Sharing Dynamics in Service Suppliers' Involvement for Servitization of Manufacturing Companies (Ayala et al., 2017)	Brazil	6	Case Studies (9)	International Journal of Production Economics
28	Value Logics for Service Innovation: Practice-Driven Implications for Service-Dominant Logic (Lindhult et al., 2018)	Sweden	1	Literature Review	Service Business
35	Enhancing The Design and Management of Product-Service Supply Chain: An Application to The Automotive Sector (Resta et al., 2017)	Italy	1	Qualitative Study	Service Science
37	Servitization in Contract Manufacturing - Evidence from Polar Business Cases (Viitamo et al., 2016)	Finland	1	Qualitative Study	Strategic Outsourcing

**) ID refers to the identification number of the paper*

2.2.6 — The Lens of Network Collaboration

Table 2-7 presents six studies on collaboration in networks. Our analysis concludes that research in this area highlights the need for new and complementary capabilities to successfully develop and maintain advanced services in B2B collaboration networks. Story et al. (2017) examined collaborations among various upstream and downstream actors in the value chain, such as manufacturers, customers, suppliers, and intermediaries, integrating additional services around the products delivered in the collaborative relationship. This paper provided valuable insights into the different roles and challenges faced by network actors in delivering what they termed *'advanced services.'* It emphasised

that advanced services can only be co-created and delivered through a combination of complementary capabilities and resources within the collaborative network. Furthermore, Burton et al. (2016) explored the types and sources of tensions that may arise between actors in relation to collaboration in the value chain. Bigdeli (2018) highlighted the risks associated with implementing strategic partnerships with network partners while concluding that a strategic alliance enhances competitiveness and protects against new market entrants. The main takeaway from the reviewed papers is that networked collaboration enhances organisational resilience. This aligns with the discussion on value creation in *Section 2.2.5.* Accordingly, this dissertation focuses on how ecosystem orchestration can strengthen collaboration and reduce firms' vulnerability to disruptive events.

Table 2-7 — Studies Related to Network Collaboration

ID*	Title	Originating Country	Citation Score	Type of Study	Journal
58	*Capabilities for Advanced Services: a Multi-Actor Perspective (Story et al., 2017)*	*United Kingdom*	*8*	*Literature Review*	*Industrial Marketing Management*
23	*Identifying Tensions in the Servitzed Value Chain (Burton et al., 2016)*	*United Kingdom*	*7*	*Qualitative Study*	*Research Technology Management*
42	*Network Positioning and Risk Perception in Servitization: Evidence from the UK Road Transport Industry (Bigdeli et al., 2018)*	*United Kingdom*	*7*	*Qualitative Study*	*International Journal of Production Research*
19	*Two Strands of Servitization: a Thematic Analysis of Traditional and Customer Co-Created Servitization and Future Research Directions (Green et al., 2017)*	*United Kingdom*	*6*	*Literature Review*	*International Journal of Production Economics*
8	*Conceptual Approach for Value Driven Performance in Servitising Companies (Adel & Wiesner, 2015)*	*Egypt*	*1*	*Literature Review*	*International Journal of Services and Operations Management*
27	*Cost-efficient Co-Creation of Knowledge Intensive Business Services (Kuula et al., 2018)*	*Finland*	*1*	*Literature Review*	*Service Business*
***) ID refers to the identification number of the paper**					

2.2.7 — The Lens of Servitization Strategies

Table 2-8 presents eight studies on servitization strategies in the B2B manufacturing industry. Although it is not very recent, we consider the literature review by Baines et al. (2009) valuable for further research due to its citation score. They examined servitization strategies in the manufacturing industry and reported higher sales and revenues among manufacturers who added services to their product portfolio through the implementation of a servitization strategy. Their survey among industrial firms in the UK indicated increased turnover and revenue for those manufacturers that successfully integrated services into their product offerings. They also observed that these manufacturers were able to establish a clear customer focus rather than solely concentrating on technology. Finally, they concluded that after an initial decline due to the transition to a new business model, the profitability of product-service propositions tends to increase. A recent study

by Ryu et al. (2018) is particularly relevant as it discusses strategies to foster collaborative product–service innovation in the B2B manufacturing industry, mitigate risks of failure, and address implementation challenges faced by customers. This resonates with the argument advanced in *Section 2.2.6,* where servitization is examined through the conceptual lens of networked collaboration, and it provides a foundation that this dissertation seeks to extend by empirically investigating how such collaboration can be orchestrated within the context of a B2B manufacturer.

Table 2-8 — Studies Related to Servitization Strategies

ID*	Title	Originating Country	Citation Score	Type of Study	Journal
59	*The Servitization of Manufacturing: A Review of Literature and Reflection on Future Challenges (Baines, Lightfoot, Benedettini, et al., 2009)*	*United Kingdom*	*667*	*Literature Review*	*Journal of Manufacturing Technology Management*
63	*Towards an Operations Strategy for Product-Centric Servitization (Baines et al., 2005)*	*United Kingdom*	*227*	*Literature Review*	*International Journal of Operations and Production Management*
3	*Product Service System: a Conceptual Framework from a Systematic Review (Annarelli et al., 2016)*	*Italy*	*44*	*Literature Review*	*Journal of Cleaner Production*
61	*The Adoption of Servitization Strategies by UK-Based Manufacturers (Baines et al., 2010)*	*United Kingdom*	*36*	*Survey*	*Journal of Engineering Manufacture*
33	*Motivations for Servitization: The Impact of Product Complexity (Raddats et al., 2016)*	*United Kingdom*	*23*	*Qualitative Study*	*International Journal of Operations and Production Management*
41	*The Development of a Generic Servitization Systems Framework (Weeks & Benade, 2015)*	*South Africa*	*2*	*Case Study*	*Technology in Society*
2	*Servicizing Solutions for Manufacturing Firms: Categorising Service Ideas from Product-Service Integrated Examples (Ryu et al., 2018)*	*South Korea*	*1*	*Literature Review*	*Design Journal*
7	*Uncovering the Topic Landscape of Product-Service-System Research: From Sustainability to Value Creation (Lee et al., 2018)*	*South Korea*	*1*	*Literature Review*	*Sustainability*
***) ID refers to the identification number of the paper**					

2.2.8 — Conclusion – Identifying the Knowledge Gap in Servitization Research

The scoping review identified five common lenses explored in servitization scholarship: (1) Business Models, (2) Value Creation, (3) Organisational Transformation, (4) Network Collaboration, and (5) Servitization Strategies. These lenses provide a conceptual framing for examining the challenges and opportunities of servitization transitions in B2B industries. They guide the investigation into how such transitions can be designed through interventions that shape product–service innovation strategies and value propositions. Collectively, the five lenses inform the main research question of this dissertation.

Business Models

The integration of services into product offerings influences traditional business models that focus exclusively on product sales. Research indicates that for service-based business models to thrive, technological innovation in research and development must be aligned

with customer-centred service design. This interdependence underscores the necessity for manufacturers to innovate not only their products but also their business models to successfully embrace servitization.

Value Creation

Closely related to business models is the lens of value creation. Research in this area frequently explores how value is captured through product-service solutions and analyses the upstream and downstream value flows within a B2B company's supply chain. A trend among scholars is the shift towards prioritising customer value, transitioning from a purely technology-driven focus to a more user-oriented approach.

Organisational Transformation

The internal organisation plays a critical role in enabling a successful transition to product-service business models. Key questions include whether the company possesses the necessary capabilities, resources, and processes to undertake a servitization journey. Studies have explored various organisational factors, such as leadership, culture, resource allocation, and innovation processes, which influence the outcomes of servitization efforts.

Network Collaboration

The importance of network collaboration is another common lens in servitization research. Studies have demonstrated that partnerships with business collaborators who provide complementary resources and capabilities can enhance the competitiveness and resilience of industrial manufacturers. By working together within a product-service ecosystem *(PSE)*, these partners deliver joint value propositions that address customer needs more effectively.

Servitization Strategies

Although strategic design methods are often underutilised or remain unexplored in B2B contexts, there is growing scholarly interest in developing servitization strategies within these industries. This awareness underscores the potential of design methods to enhance customer and end-user engagement and build organisational resilience. Although the existing literature offers a range of servitization strategies and case studies—often with a focus on revenue growth and competitiveness—it reveals a gap in the systematic integration of end-user-driven design approaches into servitization practices. In particular, the question of how such integration can be achieved remains understudied. This dissertation addresses this gap by adopting a practical, action research approach within a B2B manufacturing context.

Discovering Overarching Relationships

Despite the growing body of research, the B2B manufacturing sector—particularly companies producing capital goods with high technological complexity—continues to face significant challenges in designing product-service solutions. While much of the literature explores the impact of servitization on manufacturers, such as changes in business models and value creation processes, these studies examine traditional, linear supplier-manufacturer-customer relationships. As existing research indicates, B2B manufacturers

primarily focus on meeting the immediate needs of their direct customers (Burton et al., 2016; Bustinza et al., 2015). This includes not only the sale and delivery of equipment but also the provision of associated services, such as equipment maintenance and spare parts supply. Consequently, their involvement remains confined to a specific segment of the value chain, with limited engagement beyond their direct business customers. Consequently, they do not directly contribute to value creation for end customers at the ultimate end of the business-to-business-to-customer (B2B2C) supply chain, resulting in a lack of understanding of how product-service solutions can generate downstream benefits.

However, an anecdotal exception is the case of *Rolls-Royce*, as described by Visnjic et al. (2017). Unlike traditional approaches, *Rolls-Royce* adopted a distinctive design methodology that simultaneously addressed the needs of both its direct customers and their customers, thereby creating value across the entire supply chain.

Rolls-Royce developed a product-service value proposition that extended beyond merely providing aircraft engines to the aerospace industry. Instead, the company introduced a service solution tailored to airlines—the customers of its direct customers. Its *Power-by-the-Hour* model bypassed the conventional transactional approach by directly addressing airlines' need for operational uptime, effectively generating value at multiple levels of the supply chain. To achieve this, *Rolls-Royce* closely collaborated with both aircraft manufacturers and airlines, identifying and capitalising on new product-service business opportunities. In doing so, it orchestrated a *PSE* that delivered benefits to all stakeholders.

In the *Rolls-Royce* case, Bluemink et al. (2020) identified an overlooked gap in servitization research within the B2B sector—one that they term *'overarching servitization'*. This concept transcends the traditional linear relationships that characterise product–service value propositions in B2B supply chains by advocating for a more integrated and holistic approach to value creation, which we illustrate using *Figure 2-1*, showing the difference between *servitization* and *overarching servitization*.

The left-hand side of *Figure 2-1* depicts *servitization* as a linear value chain incorporating a product–service system, wherein the B2B manufacturer, acting as the value chain's orchestrator (O), exchanges value with its direct customer (C). An example is the manufacturer's provision of maintenance services for installations operational at the customer's premises. In this B2B relationship, the end-user (E) is not part of the *PSS* because no value is exchanged with them.

The right-hand side of *Figure 2-1* depicts *overarching servitization* as a linear value chain incorporating a *PSS*, wherein the B2B manufacturer seeks to exchange value with both its direct customer and the customer's customer further downstream in the supply chain: the end-user (E). In this *overarching* relationship, the B2B manufacturer (O) engages in value exchange not only with its direct customer (C) but also with the end-user (E), extending the *PSS's* boundaries—illustrated with the dashed lines—across the supply chain to include the end-user (E). By addressing the needs of multiple stakeholders across the supply chain, including end-users, this approach transcends the traditional focus of *servitization*

strategies on direct customers alone. By considering the broader system, B2B manufacturers are empowered to design integrated product-service value propositions that generate value for multiple stakeholders along the supply chain.
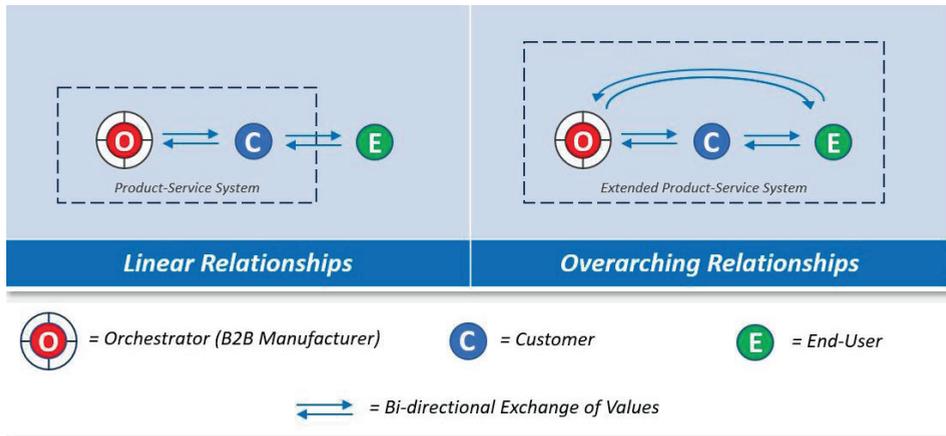
Figure 2-1 — *Illustrating the Difference between a Linear and an Overarching Relationship*

In the preceding discussion, *overarching servitization* has been introduced as a distinct manifestation of servitization. To reflect this, we have refined and extended the definition of servitization presented in *Section 1.1* t o include the relational nuances that characterise *overarching* forms of value creation. This has resulted in the following definition of *overarching servitization*:

'Overarching Servitization refers to a strategic transition in which B2B manufacturers move beyond merely producing and selling products to co-creating and offering integrated product-service value propositions. This transition fosters collaboration and value exchange among various stakeholders downstream the entire value network.'

It is noteworthy that this definition refers to a *value network* rather than a *value chain*, which reflects a deliberate shift in perspective. The concept of the value chain, as defined by Porter (1985) presents value creation as a linear process in which discrete activities are sequentially aligned to produce and deliver a product or service. Each link in the chain contributes incrementally to the value perceived by the end customer.

However, in contemporary markets, this linear model often proves inadequate. Value creation increasingly results from dynamic collaboration among multiple actors across and beyond organisational boundaries. In such settings, scholars such as Allee (2000) and Normann et al. (1993) propose the notion of a value network, in which value is generated through distributed, interactive processes involving a diverse constellation of actors—such as firms, customers, partners, and suppliers—who collectively co-create value.

This networked perspective is particularly relevant in the context of *overarching servitization*, where B2B manufacturers engage with a wider ecosystem of stakeholders to

deliver integrated, often data-driven, solutions that transcend traditional product-centric approaches.

In conclusion, this dissertation centres its investigation on the transition towards *overarching servitization*, positioning it as the principal lens through which servitization-driven organisational change is explored.

2.3 — Research Questions

Acknowledging the existing gap in the literature on *overarching servitization*, we propose the following research question to guide our inquiry into its theoretical underpinnings and practical implications:

'How can B2B manufacturers design overarching servitization strategies?'

We aim to advance the understanding and development of *overarching servitization* strategies that enable B2B manufacturers to design value propositions that create value for multiple stakeholders across the value chain. Moving beyond traditional servitization approaches, this thesis explores how B2B manufacturers can develop integrated product-service value propositions that align with the needs and priorities of diverse actors within the value network.

A key focus lies on the design of these value propositions within *PSEs*, where multiple stakeholders collaborate to generate value that no single actor could achieve independently. By exploring how B2B manufacturers can design and implement such multi-stakeholder value propositions, we aim to uncover the design principles and mechanisms that drive sustainable value creation and long-term competitiveness in complex B2B contexts.

However, designing product-service solutions in a B2B context—where service design expertise is often limited—poses a significant challenge. What if manufacturers were to adopt an *overarching servitization* approach, similar to the strategy employed by *Rolls-Royce*? Such a shift could redefine the role of B2B manufacturers, enabling them to extend their impact beyond their immediate customers and create solutions that deliver value across the entire ecosystem.

2.3.1 — The Lens of End-Users — Building Overarching Servitization Relationships

Adopting an *overarching servitization* approach has profound implications for B2B manufacturers. It necessitates a fundamental re-evaluation of existing business models to build relationships with end-users, create value for them, and establish new revenue streams. At the same time, it fosters collaboration with customers, end-users, and supply partners who bring complementary capabilities, facilitating the co-creation of innovative *PSSs*. By shifting the focus to end-users, this approach extends B2B innovation beyond traditional one-to-one customer relationships, opening avenues for new product-service value propositions. These propositions not only address latent end-user needs and generate additional revenue streams but also enhance customer satisfaction, operational efficiency, and business resilience.

To illustrate the concept of *overarching servitization*, consider the baggage reclaim area in an airport—widely recognised as a source of end-user frustration and perceived inefficiency. This raises the question: how can a B2B manufacturer specialising in baggage handling systems create service value propositions that meaningfully address these end-user concerns? To investigate this, we analyse the experience from the passenger's perspective.

The Manufacturer's Viewpoint

From the manufacturer's perspective, the primary objective is to meet the airport's requirements by delivering a system that efficiently transports luggage from arriving aircraft to the baggage reclaim area. These systems are typically designed and scaled according to predefined operational specifications, such as processing a certain number of bags within a set timeframe and delivering them to designated points in the reclaim hall.

Figure 2-2 illustrates a baggage handling system in operation. Under normal conditions, the system functions as intended, meeting the needs of the airport's baggage operations department if demand remains within expected limits. However, unexpected disruptions—such as delayed flights, technical failures, or peak traffic surges—can temporarily exceed system capacity. Such circumstances lead to prolonged baggage processing times, reducing overall system efficiency, and causing operational bottlenecks.

The End-User's Viewpoint

If passengers are considered end-users in the value chain of the B2B manufacturer in question, delays in baggage collection create uncertainty and a negative travel experience, thereby failing to generate value for them. *Figure 2-3* highlights how prolonged waiting times contribute to frustration, stress, and a perceived loss of control. Most travellers simply wish to reunite with their family and friends as quickly as possible, and inefficiencies in the baggage reclaim process exacerbate their dissatisfaction.

Figure 2-2 — Baggage Conveying Belt (picture retrieved from a manufacturer's brochure)

Figure 2-3 — Waiting Passengers in an Airport Reclaim Area [picture captured from Travel Week Asia (Jainchill, 2013), picture use licensed by iStock]

Rethinking Designing Product-Service Value Propositions in B2B Manufacturing Industry

In response to the identified knowledge gap concerning the integration of end-user values downstream the value network, this example highlights the practical relevance of the research question. Drawing on the principal researcher's experience as a design practitioner for several B2B manufacturers, it has frequently been observed that similar firms—particularly those with a strong technological focus—tend to address operational challenges within the confines of their existing business context. In response to inefficiencies, they typically propose product-oriented solutions, such as increasing baggage belt speed or expanding system capacity. On the service side, they may offer 24/7 system monitoring or preventive maintenance to reduce downtime.

While these solutions contribute to operational reliability, they rarely consider the end-user experience—namely, the needs, concerns, and expectations of passengers. The practical relevance of this research lies in the observation that B2B manufacturers often struggle to empathise with the *'customer-of-the-customer',* which constrains their ability to generate service value for end-users. This study explores whether an *overarching servitization* approach—understood as a B2B2C model that explicitly prioritises designing product-services for both direct customers and end-users—can help overcome this challenge by enabling innovation in service offerings that go beyond operational reliability and efficiency.

Shifting to an Overarching Servitization Approach

What if engineers in the baggage handling industry shifted their perspective to empathise with passengers and design solutions that address their latent needs and concerns? Such a reframing could unlock entirely new possibilities for product-service innovation. Instead of focusing solely on technical efficiency, R&D teams could consider fundamental questions from the passenger's perspective:

'When will my bag arrive at the conveyor belt?'

'Why can't I clear customs and collect my baggage at the parking lot?'

'Why must airlines make baggage handling my responsibility?'

'Why do I waste time waiting for my luggage?'

'Why can't my baggage be delivered directly to my home?'

Addressing these questions would inspire innovations that extend beyond a manufacturer's current product-service portfolio and traditional business model. Potential solutions could include home baggage delivery services, real-time baggage tracking, or redesigned customs processes that enhance passenger convenience. By adopting an *overarching servitization* approach, B2B manufacturers can move beyond incremental efficiency gains and create meaningful value across the entire value chain.

2.3.3 — Research Sub-Questions

The baggage reclaim case prompted us to further explore *overarching servitization*. Consequently, we formulated sub-questions to deepen our understanding of how B2B manufacturers can design and implement servitization strategies and associated product-service solutions that prioritise end-user values and needs, thereby unlocking new opportunities for value creation and competitive advantage:

1)   *'What are the enablers and barriers of servitization within a technology-driven B2B manufacturer?'*

2)   *'How can a technology-driven B2B manufacturer explore end-users' values?'*

3)   *'How can technology-driven B2B manufacturers organise a servitization transition?'*

2.4 — Concluding Summary

2.4.1 — Lenses in Servitization Research

The scoping process provided valuable insights into the servitization research field in relation to our research question. We identified and examined five lenses on servitization transitions in the B2B industry: *Business Models, Organisational Transformation, Value Creation, Network Collaboration,* and *Servitization Strategies*.

In B2B manufacturing industries, technological innovation must be accompanied by service innovation to establish viable business models, as servitization processes inherently involve business model transformation. The literature consistently underscores the crucial role of organisations in enabling a successful transition to product-service solutions. Furthermore, recent studies indicate a growing interest in mapping upstream and downstream value flows within collaborative networks, highlighting how collaboration enhances the competitiveness and resilience of networking B2B manufacturers.

In *Section 2.2,* we discovered a growing interest in adopting design methods as a product-service innovation strategy in the B2B manufacturing industry. Despite these developments, our analysis revealed a significant gap: the application of service design

methods in B2B manufacturing remains unexplored in design journals such as *Design Issues* and *Design Science*. This gap underscores the need for a new perspective—one that extends beyond conventional servitization models to include end-user considerations.

2.4.2 — Overarching Servitization — A Shift towards an End-User Lens of Value Creation in B2B Relationships

Overarching Servitization represents a fundamental shift in how B2B manufacturers create product-service value propositions and capture value across their supply chain. Unlike conventional servitization models, which primarily optimise operations for direct customers, this B2B2C approach expands the scope of value creation to include end-users. By designing solutions that address the needs of both immediate customers and their customers, manufacturers can unlock new market opportunities, strengthen competitive differentiation, and enhance long-term business resilience.

This shift is not merely an incremental improvement but a strategic necessity in an era where customer expectations and business ecosystems are becoming increasingly interconnected. Companies that fail to adopt an *overarching servitization* mindset risk being confined to transactional relationships, limiting their potential for innovation and sustained growth. Conversely, those that embrace this approach can pioneer integrated product-service solutions that reshape industries, drive customer loyalty, and redefine value chains.

The question is no longer whether B2B manufacturers should consider end-users in their solution design, but rather how they can effectively integrate end-user values into the design of product-service value propositions. *Overarching Servitization* strategies seek to provide a framework for this transition, enabling B2B manufacturers to shift from a product-centric mindset to a value-driven ecosystem approach.

3

The only source of knowledge is experience.

Albert Einstein

Chapter 3 — Research Design

3.1 — Introduction

The literature scoping review conducted in *Chapter 2* examined existing research to understand how and to what extent servitization processes are implemented in the B2B sector. This review revealed that *overarching servitization* remains an understudied area, particularly in relation to the design of servitization strategies and corresponding product-service value propositions that prioritise end-user values and needs. In response to the main research question (see *Section 2.3*), this thesis aims to investigate how B2B manufacturers develop *overarching servitization* strategies to transition into product-service providers. It seeks to enhance our understanding of the enablers and barriers, the end-user values, and the organisational processes that facilitate this transition. By studying a case of an industrial B2B manufacturer with a strong technological focus, I aim to contribute to both servitization theory and practice, offering insights into how B2B manufacturers can develop *overarching servitization* strategies and integrate end-user-centred approaches into their product-service portfolio.

As we progressed with the literature scoping review, I gained a clearer understanding of how to structure this doctoral study. As an industrial designer, I approached the research design as a design challenge. Like design projects, we industrial designers know that at the start of a project—the so-called fuzzy front end—it is impossible to fully determine the precise course of action. The research design approach takes shape and reveals itself through several iterative cycles. As I gained deeper insights throughout the project, I was able to further refine the main research question and its related sub-questions.

Section 3.2 outlines the research design which is based on sequential *ARCs*. *Section 3.3* examines the characteristics associated with the selected research methodology. Finally, *Section 3.4* provides a summary of the research design.

3.2 — Research Design

3.2.1 — Research Philosophy

Research philosophy refers to the underlying beliefs regarding how data about a phenomenon should be collected, analysed, and used. Since I engaged as a researcher and immersed myself in the focal manufacturer's organisation to study phenomena from within, I adopted *pragmatism* as my philosophical worldview to respond to the main research question. One of the key proponents of pragmatism as a scientific approach was John Dewey (1859–1952), who argued that *'a theory is true because it works.'* To determine whether a theory is valid, pragmatists use theories as instruments to test their practical effectiveness (Dewey et al., 1939). As Creswell (2014) noted, pragmatism is rooted in actions, situations, and consequences rather than in antecedent conditions or abstract cognition. Rather than adhering strictly to specific research traditions or methods, pragmatists prioritise solving the problem at hand, selecting or developing the most suitable research tools and methods for the task. This particular form of pragmatism,

known as *instrumentalism*, was influenced by Jean-Jacques Rousseau's progressivist educational philosophy, which emphasises learning through progressive experience (Dewey et al., 1939). Pragmatists use a variety of methods, tools, and approaches to understand problems and generate knowledge about specific situations. They follow a learning-by-doing strategy, acquiring insights progressively as actions unfold. This iterative process, which enhances both conceptual understanding and practical skills, aligns with Dewey's notion of *experiential learning* (Dewey et al., 1939). Pragmatists value methodological flexibility, selecting research methods and techniques based on what best fits the research context and objectives. This allows them to employ quantitative, qualitative, or mixed methods—choosing what is most effective to develop and refine theory (Creswell, 2014).

The central research question, ***'How can B2B manufacturers design overarching servitization strategies?'***, presupposes an answer in the form of a new or adapted design process. To explore this, I adopt process theory as a complementary philosophical orientation. Process theory, as articulated by Langley (1999), focuses on explaining *how* and *why* organisational change unfolds through sequences of events and activities over time, rather than through static causal relations. It provides strategies—such as temporal bracketing and narrative reconstruction—for structuring longitudinal data and capturing the dynamics of change. x process-theoretical stance resonates with the principles of action research, as both emphasise iterative cycles of action and reflection in which knowledge emerges through engagement with practice. By framing change as a temporal and context-dependent process (Langley et al., 2013; Pettigrew, 1996), process theory strengthens the pragmatic foundation of this dissertation and underlines the generation of actionable knowledge for guiding a servitization transition in manufacturing firms.

3.2.2 — Research Type — Qualitative Research

Based on the pragmatic worldview to which I adhere, I have the flexibility to select the research method that best aligns with the research question I seek to address. In this case, a *how* question is most effectively explored through a qualitative research approach (Creswell, 2014).

Qualitative researchers generate insights from non-numerical data, including researcher notes and reflections, documented observations, interview transcripts, and evaluation reports of implemented interventions. By analysing these qualitative data—often collected within a specific case context—qualitative research seeks to identify connections and patterns that contribute to new knowledge and insights (Eisenhardt, 1989). This type of research is considered *inductive*, as it builds theories from empirical observations rather than testing predefined hypotheses.

Qualitative research is particularly well-suited for longitudinal case studies, as it enables an in-depth analysis of diverse data sources, facilitating a thorough understanding of complex phenomena (Yin, 2012). This approach allows researchers to capture the richness and nuances of organisational dynamics, making it an appropriate method for studying servitization processes in B2B manufacturing contexts.

3.2.3 — Research Strategy — Action Research

Building upon the research philosophy outlined in *Section 3.2.1*, I selected the action research methodology due to its alignment with the pragmatic approach necessary for successfully implementing an *overarching servitization* transition within a B2B manufacturing context. This pragmatic approach aligns with my personal skills and experience as an industrial design practitioner and is also suitable for addressing the *'how'* research question as formulated in *Section 2.3*.

Herr & Anderson (2005) noted that action research is rarely used in doctoral studies, which may lead to missed opportunities to harness its potential for generating deep insights into evolving organisations. The method's iterative structure—comprising repeated cycles of *constructing, planning, taking, and evaluating action*—makes it particularly well-suited to capturing the complexities and dynamics of organisational change. As an action researcher immersed in the company over an extended period, I was able to study the dynamics of daily operations from the inside, rather than observing them from a distance through surveys or other external methods. This insider position provided access to tacit practices and subtle organisational dynamics, yielding insights that would have been far less visible through conventional research approaches. Through successive action cycles, I was thus able to respond to unfolding developments, producing knowledge that is not only academically robust but also contextually grounded and actionable.

Shani and Coghlan (2018) present four factors providing a structured approach to conducting action research, ensuring that both the process and its outcomes are systematically addressed: *context, quality of relationships, quality of the action research process itself,* and *outcomes*.

Context

Understanding an organisation's internal context is essential in action research, as it significantly influences the success of interventions and the applicability of findings. Elements such as organisational culture, history, structure, resources, skills, and knowledge shape behaviours and attitudes, affecting how change initiatives are perceived and adopted. A thorough understanding of these factors enables researchers to design and implement interventions that are both relevant and effective within the specific environment. This contextual sensitivity ensures that interventions are grounded in theory and practically viable, supporting sustainable organisational change (Shani & Coghlan, 2018).

Quality of relationships

In action research, researchers collaborate with participants rather than conducting studies about or for them. Maintaining a strong relationship with participants is essential. This can be achieved by involving them at every stage of the research and sharing the results. A participatory approach, grounded in ethical principles such as equality, respect, social inclusion, and democratic decision-making, enhances this collaboration. By considering participants as co-researchers and creating knowledge together, a deeper

connection is established, leading to more effective and contextually relevant interventions (Shani & Coghlan, 2018).

Quality of the action research process itself

In the context of action research, the quality of the process is predicated on a dual focus on both the inquiry process and the implementation process as these unfold and are executed at the same time (Shani & Coghlan, 2018).

Outcomes

The dual outcome of action research involves improved processes, skills, and competencies through interventions implemented, but also creating new knowledge from the inquiry (Shani & Coghlan, 2018).

3.2.4 — Action Research Framework

This dissertation employs David Coghlan's *Action Research Cycle (ARC)*, as outlined in *Doing Action Research in Your Own Organization* (Coghlan, 2019). The *ARC* provides a structured framework for conducting action research within an organisational setting. It consists of an initial *preliminary* step, followed by four iterative phases: *constructing action, planning action, taking action,* and *evaluating action*. These phases are not conceived as a linear sequence but as a cyclical and recursive process, enabling continuous learning and adaptation as the research unfolds. Coghlan (2019) distinguishes between *research on action*—an analytical stage focused on observing organisational processes—and *research in action*, in which the researcher actively initiates and implements interventions. Together, these complementary approaches constitute an integrated research design that combines diagnostic analysis with practical intervention.

This orientation aligns closely with the pragmatist philosophy underpinning this dissertation, as it emphasises inquiry through action, iterative reflection, and the generation of knowledge that is both contextually grounded and useful. In addition, the *ARC* resonates with a process-theoretical perspective (Langley, 1999), which highlights how organisational change unfolds through sequences of actions and events over time. By combining the cyclical logic of action research with the temporal and dynamic orientation of process theory, this study grounds its methodological approach in a framework that both engages with practice and captures the evolving nature of the servitization transition under study.

Preliminary-Step — Before initiating the formal *ARC*, Coghlan (2019) highlights the importance of a preliminary step in which the groundwork for collaborative inquiry is carefully established. This phase lays the foundation for mutual understanding, commitment, and methodological alignment between the researcher and the focal organisation.

In the context of this study, which examines the organisational transformation required for *overarching servitization* in a high-technology B2B manufacturing firm, the preliminary step involved a series of exploratory dialogues with senior managers and key internal stakeholders. These conversations clarified the broad focus of the inquiry, assessed

organisational readiness for change, and surfaced initial concerns and ambitions related to servitization. They also revealed shared interests and potential tensions, which subsequently informed the strategic orientation of the first *ARC*.

This phase further entailed mapping the organisation's cultural, structural, and political landscape to anticipate how existing dynamics might shape the progression of the research. Particular attention was given to identifying internal advocates for change, sources of resistance, and interdepartmental relationships relevant to the servitization journey. Developing this contextual awareness at the outset ensured that the research design was firmly embedded in the lived realities of the organisation, positioning the first ARC to be both practically grounded and strategically oriented.

As Coghlan (2019) observes, such preparatory work is essential for framing the inquiry, fostering trust, and establishing the conditions necessary for effective cycles of action and reflection. In this study, the preliminary step provided a bridge between the theoretical ambition of initiating a servitization transition and the concrete starting points for organisational transformation.

The preliminary step is followed by four main phases:

*1 — **Constructing Action*** — The development of interventions to address the purpose of the *ARC*. Within the research design, this initial phase involves close collaboration with key organisational stakeholders to identify the phenomenon to be examined. Such dialogue provides the foundation for constructing context-specific interventions that are embedded within the *ARCs*. The researcher engages directly with organisational members, who hold valuable tacit and procedural knowledge of the organisation's culture, structures, and operational dynamics. Collaborative engagement of this kind is essential to ensure that the interventions are not only theoretically informed but also practically viable within the organisational context. By co-defining the focus of inquiry and drawing on insider knowledge, the research design strengthens both the relevance and potential effectiveness of the interventions. This approach fosters participant ownership and enhances the likelihood that outcomes will be meaningful, sustainable, and aligned with the organisation's transformation objectives.

*2 — **Planning Action*** — This phase focuses on formulating a detailed plan for implementing the interventions. The objective of the *ARC* is first articulated, followed by a careful consideration of the methods and resources required to achieve it. Particular attention is given to aligning the intervention design with the overarching research goals, thereby ensuring methodological coherence within the action research framework. The interventions are developed collaboratively with the researchers responsible for their facilitation, and a detailed timeline is established to specify the sequence of activities, preparatory steps, and follow-up actions. Roles and responsibilities are distributed across the research team—including facilitation, observation, and data collection—to ensure clarity and coordination during implementation.

A participant list is then compiled to identify the organisational members to be engaged in the interventions. Locations and dates are confirmed in consultation with stakeholders,

taking account of logistical feasibility and participant availability. This thorough planning process contributes to the practical viability of the *ARC* and strengthens the rigour of the research design.

3 — Taking Action — In this phase, the planned interventions are implemented as part of the *ARC*. The interventions are executed in line with the established design and often involve multiple, parallel activities across different settings or participant groups. The phase is inherently dynamic, requiring the research team to manage a variety of simultaneous actions while remaining responsive to developments as they unfold in real time.

Drawing on Coghlan's (2019) framing, *Taking Action* represents the enactment of intentional change within the organisation. It is the moment where inquiry and practice converge planned actions are tested in practice while simultaneously serving as opportunities for generating experiential knowledge. This requires balancing adherence to the intervention plan with openness to adaptations in response to contextual contingencies and participant feedback.

Thorough preparation in the preceding planning phase ensures that all members of the research team are equipped to fulfil their roles. Facilitators are briefed on the intervention's objectives and structure, observers are prepared to document key moments and interactions and note-takers are instructed to capture detailed and accurate records for subsequent analysis. A shared understanding among the team fosters coordination and supports the smooth execution of the intervention, thereby enhancing the likelihood of generating valid, meaningful, and relevant insights.

4 — Evaluating Action — Following the implementation of the intervention, the *Evaluating Action* phase focuses on assessing its immediate effects and outcomes, both intended and unintended. This evaluation is essential for generating actionable insights and informing the design of subsequent *ARCs*. It involves systematic data collection and analysis to determine how the intervention has influenced organisational processes, behaviours, and underlying assumptions.

In line with Coghlan's (2019) framework, this phase emphasises critical inquiry into what happened, why it happened, and what it means in the context of the research objectives. The evaluation is not limited to measuring outcomes but also includes reflecting on the quality of the intervention process itself. This dual focus on results and process supports learning at multiple levels: individual, group, and organisational levels. Moreover, it constitutes a critical methodological element of each *ARC* conducted.

Data gathered from observations, participant feedback, visual artefacts, and recorded group discussions are analysed using qualitative methods (e.g. coding with *Atlas.ti™).* The principal researcher facilitates reflective sessions with the research team to interpret the findings, challenge assumptions, and surface emerging themes. These collaborative reflections serve as a basis for validating interpretations and enhancing the credibility of the insights generated.

Ultimately, the *Evaluating Action* phase closes the loop of the *ARC* by feeding the outcomes of the intervention back into the inquiry process. It enables refinement of research questions, adjustment of methods, and informed design of future interventions, thereby sustaining the iterative momentum of action research. As Coghlan notes, this includes *content reflection* (what happened), *process reflection* (how it happened), and *premise reflection* (why it happened and what it implies), see *Section 3.2.8*.

ARCs are iterative and closely align with the design processes typically employed in industrial design. Insights generated during the evaluation phase inform subsequent cycles of construction, planning, action, and evaluation. This continuous process of reflection and adaptation enables researchers and practitioners to implement organisational change in a systematic and collaborative manner. Coghlan (2019) also highlights the importance of *meta-learning*—learning about learning—which involves reflecting not only on the content and process of research, but also on the underlying assumptions and principles that shape the action. This deeper level of reflection fosters more profound understanding and supports the sustainable implementation of change within the organisation.

In action research, what Coghlan describes as *'inquiry from the inside'* refers to researchers engaging as active participants within the context they are studying. This involves immersing themselves in the organisational environment, thereby generating knowledge that is deeply embedded in the specific context and directly informed by lived experience. By adopting this insider perspective, researchers can develop nuanced insights and a more thorough understanding of organisational dynamics, which in turn inform the design of interventions that underpin meaningful and sustainable transformation.

3.2.5 — Sampling Strategy

To select an appropriate case for this study, two criteria were established in line with the research questions: (1) the organisation had to operate within a B2B manufacturing industry, and (2) it had to function in a complex business environment involving multiple stakeholders. A Dutch company—previously engaged in collaboration with *Delft University of Technology*—met these criteria and agreed to participate in this doctoral research. The company specialises in the development and production of intelligent logistics systems for the aviation industry, a sector marked by complexity due to the involvement of numerous stakeholders and the stringent international regulations governing safety and operations.

Importantly, three years prior to the start of this study, the company had strategically integrated user experience (UX) design and design thinking (DT) methods into its R&D organisation. Although these efforts were not directed at end-users in the market, but rather at the operators of the machines and operational installations, the initiative nevertheless reflected a clear commitment to adopting a more user-centred innovation approach. This user-centred orientation provided a strong rationale for selecting the company as the case in a longitudinal study on servitization, as it aligned closely with the research objective of examining how strategic design methods can shift product–service innovation towards *overarching servitization*.

The selection of the focal company constitutes a convenience sample, determined by its accessibility and willingness to participate in the study. While convenience sampling—a non-probabilistic approach in which participants are selected based on availability and readiness to engage (Miles et al., 2014)—may limit the generalisability of findings, its use is justified in this exploratory context given the practical constraints associated with identifying suitable organisations for an action research design.

3.2.6 — Action Research Cycles Along Longitudinal Study Timeline

This thesis presents the findings of a longitudinal study conducted from July 2018 to March 2023. *Figure 3-1* illustrates the timeline during which the four *ARCs* were conducted.
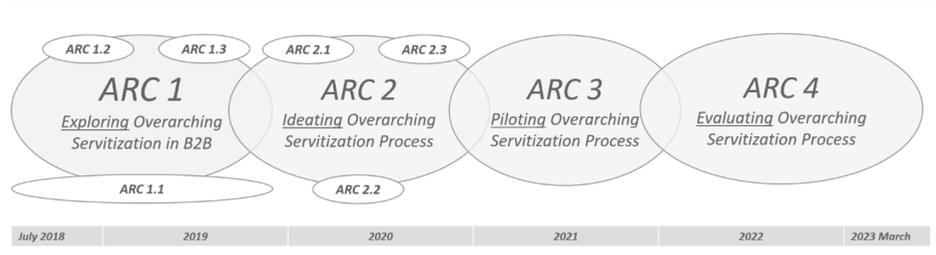
Figure 3-1 — Timeline of the Longitudinal Study on Overarching Servitization

As illustrated in *Figure 3-1*, the *ARCs* intertwined and unfolded from one another in an iterative and interconnected manner. Rather than proceeding in isolation or strict sequence, each *ARC* built on the insights, outcomes, and reflections generated in the preceding one. This recursive structure ensured that learnings were continuously carried forward, informing the design and direction of subsequent interventions. In this way, the *ARCs* collectively formed a coherent developmental trajectory, allowing for the refinement of research focus and the progressive understanding of designing *Overarching Servitization Strategies* across the *ARCs*.

ARC 1

In *ARC 1*, we explored ongoing servitization initiatives within the organisation. To do so, we designed three sub-*ARCs* within *ARC 1*, each addressing a distinct aspect of the organisational transformation. *ARC 1.1* examined the organisational structure and the configuration of product–service innovation processes, aiming to understand how these are currently shaped and operationalised. In *ARC 1.2*, we introduced knowledge and practices related to design methodologies into the organisation by engaging novice designers in developing product–service value propositions. These were created in response to a design brief provided by the focal manufacturer. *ARC 1.3* involved forming a mixed team of two R&D engineers and four external MSc student designers, who collaboratively developed and presented a new product–service concept.

ARC 2

ARC 2 concerned ideating and designing an *Overarching Servitization Design Process.* Similarly to *ARC 1*, it also consisted of three sub-*ARCs*. *ARC 2.1* focused on reviewing the manufacturer's service innovation processes. *ARC 2.2* outlined an enhanced product-service innovation process including an *Explore* phase. *ARC2.3* ideated interventions for designing an *Overarching Servitization process.*

ARC 3

In *ARC 3*, we implemented and piloted an *Overarching Servitization Design Process* within the *Airports* business units of the focal manufacturer. This involved a series of six *Strategic Design Interventions*—referred to as the *TLN* (*The Long Now)* process—through which we tested and refined interventions for developing *Overarching Servitization Strategies*.

ARC 4

In *ARC 4*, we focused on evaluating the application and outcomes of the *Overarching Servitization Design Process*. Building on the piloting activities conducted in *ARC 3,* this final cycle aimed to assess the validity, adaptability, and perceived value of the process across different organisational contexts. To this end, we extended the implementation of the design process to three business units of the focal manufacturer, each with varying levels of servitization maturity and different product–market combinations.

ARC 4 consisted of two key activities. First, we facilitated tailored *TLN* workshops and follow-up sessions in each of the three business units to guide teams through the *Overarching Servitization Design Process.* These interventions were used to both apply the methodology in practice and to gather structured feedback on its usability and relevance. Second, we conducted a series of validation interviews and reflective sessions with participants across all units involved (including those from *ARC 3*). These aimed to capture experiences, assess strategic alignment, and identify observed outcomes or shifts in mindset related to servitization. An example of an interview protocol, combined with the associated code table is provided in *Appendix BInterview protocol Workshop Participants and Management.*

By comparing the outcomes across the piloted business units, we identified patterns and contextual enablers that influence the successful adoption of the *Overarching Servitization Design Process.* Furthermore, the evaluation activities enabled us to formulate recommendations for embedding the process structurally within the focal manufacturer's innovation practices. *ARC 4,* therefore, played a critical role in consolidating our findings and in establishing both the relevance of the process and its contribution to the transition toward *overarching servitization strategies* in B2B industrial contexts.

3.2.7 — Data Collection Methods

This section outlines the data collected during our research. Prior to commencing the study, we had an initial plan regarding the types of data to gather. However, as summarised in *Table 3-1* the actual data collection and subsequent analysis evolved throughout the research process.

Before participation in the *TLN* interventions, all participants were asked to provide informed consent. They were assured that any data collected would be used exclusively for research purposes, stored and analysed in anonymised form, and would not be shared with company management in a way that could identify individuals. These ethical measures were taken to protect participants' confidentiality and to ensure that their contributions could be given openly and without concern for potential repercussions.

Given the *process design* nature of our study, we gathered a substantial amount of visual data, including process and flow diagrams.

In our research, we collected various types of data, including:

- Transcripts of semi-structured interviews and group discussions
- *One-page* descriptions of innovation projects
- Questionnaire results
- Visual representations of processes and organisational frameworks on *Miro™* boards
- Photographs of processes and flow diagrams captured from glass walls

Table 3-1 — Overview of Data Collection and Analysis

Action Research Cycle		Data Collection Number & Types of Data	Data Analysis Methods
ARC 1	ARC 1.1	15 Transcripts of semi-structured interviews with employees of innovation departments, including interview guides and consent forms 56 One-pagers of innovation projects	Principal researcher reflecting on notes captured from interview transcript. Categorising project results along servitization lenses
	ARC 1.2	5 Reports of product-service design cases, applying and demonstrating strategic design methods by (external) service design teams	Process, content, and premise reflection by principal researcher. Capturing insights and categorising along servitization lenses
	ARC 1.3	1 Report of product-service design case by a mixed In-House-Design-Team, exchanging strategic design knowledge and skills	Process, content, and premise reflection by principal researcher. Capturing insights and categorising along servitization lenses
ARC 2	ARC 2.1	Transcripts of 3 group discussions on process design Visual data: 3 whiteboard sketches	Process, content, and premise reflection by principal researcher in relation to generating process ideas and capturing insights based on discussions and related sketches
	ARC 2.2	Transcripts of 2 group discussions on process design Visual data: 2 whiteboard sketches	Process, content, and premise reflection by principal researcher in relation to generating process ideas and capturing insights based on discussions and related sketches, categorising along servitization lenses
	ARC 2.3	Transcripts of 4 group discussions process design Visual data: 20 glass wall pictures with Post-it's™ Visual data: 7 Miro™ boards	Process, content, and premise reflection by principal researcher in relation to designing and testing servitization process interventions and capturing insights based on discussions and generated visual data in Miro™ boards, categorising along servitization lenses
ARC 3		Visual data: 6 Miro™ boards, presenting 6 overarching servitization process interventions	Process, content, and premise reflection by principal researcher in relation to executing servitization process interventions and capturing insights based on discussions and generated visual data in Miro™ boards, categorising along servitization lenses
		Table presenting 10 participants' expectations before starting ARC 3	Coding with Atlas.ti™, principal researcher reflecting on expectations captured from participants prior to ARC 3
		Visual data: 6 Miro™ boards, presenting 6 process outcomes of end-user focused product-service value proposition design in the context of 'Future traveling in Europe'	Process, content, and premise reflection by principal researcher in relation to the outcome of overarching servitization process interventions, capturing insights based on generated visual data in Miro™ boards, categorising along servitization lenses. Coding with Atlas.ti™, principal researcher reflecting on ARC 3 content and process
		Transcripts of 10 semi-structured interviews with participants after finishing ARC, including interview guides and consent forms 3	Coding with Atlas.ti™, principal researcher reflecting on experiences and capturing insights from participants after finishing ARC 3
ARC 4		Results of an inquiry among 50 participants before starting ARC 4	Coding with Atlas.ti™, principal researcher reflecting on expectations captured from participants prior to ARC 4
		Visual data: 6 Miro™ boards, presenting 6 redesigned overarching servitization process steps. Visual data: 8 glass wall pictures with Post-it's™	Process, content, and premise reflection by principal researcher in relation to redesigning servitization process interventions and capturing insights based on discussions and generated visual data in Miro™ boards
		Visual data: 18 Miro™ boards, presenting 6 process outcomes of end-user focused and future-oriented servitization strategy in the business context of 3 business units.	Process, content, and premise reflection by principal researcher in relation to the outcome of overarching servitization process interventions, capturing insights based on generated visual data in Miro™ boards, categorising along servitization lenses. Coding with Atlas.ti™, principal researcher reflecting on ARC 4 content and process
		Transcripts of 14 semi-structured interviews with participants after finishing ARC 4, including interview guides and consent forms	Coding with Atlas.ti™, principal researcher reflecting on experiences, capturing insights from participants after finishing ARC 4
		Results of an inquiry among 50 participants after finishing ARC 4	Coding with Atlas.ti™, principal researcher reflecting on ARC 4 content and process, captured from participants after finishing ARC 4

To analyse the results, we consistently applied the reflective practice method as articulated by Mezirow (2003) and further developed by Coghlan (2019). This structured and deliberate process involves critically examining researchers' experiences to generate insights that inform subsequent *ARCs.* As a core element of action research, reflective practice enables continuous refinement of interventions through experiential learning. By engaging in systematic reflection after each ARC, we ensure that our approach remains responsive, effective, and aligned with the evolving research context.

Mezirow identifies three distinct forms of reflection:

Content Reflection: This entails examining the actual outcome, problem description, or experience that arose during the interventions in action. For instance, it involves considering what happened during a particular intervention or what was observed as a result of the action.

Process Reflection: This involves evaluating the strategies and processes of the evolving interventions in action. It includes assessing the effectiveness of problem-solving methods and decision-making processes.

Premise Reflection: This requires a critical assessment of the underlying assumptions, beliefs, and values associated with the interventions. It evaluates whether the actions undertaken have achieved their objectives.

Within each *ARC,* the principal researcher engaged systematically in all three forms of reflection—on content, process, and underlying premises. This reflective practice served to critically evaluate the effectiveness of the interventions, validate methodological choices, and ensure alignment between *ARCs* and the overall research objectives. By embedding iterative reflection into the research design, the study enhanced methodological rigour while simultaneously fostering transformative learning for both the researcher and the participating stakeholders. By systematically applying this reflective practice framework, we aimed to deepen our understanding of the phenomenon of *Overarching Servitization* and to derive strategically grounded directions for subsequent *ARCs*.

During the execution of each *ARC*, qualitative data—in both visual and textual formats—were collected as outcomes of the various design interventions. To support analysis and reflection, the principal researcher organised group discussions with the research team. In addition. to analyse the collected data, we utilised *Atlas.ti™*, a qualitative data analysis software, to systematically code the transcripts from participant interviews, group discussions, and inquiries. This process involved assigning codes to significant segments of text, which facilitated the organisation and retrieval of data pertinent to our research objectives. Through iterative coding, following Saldaña's (2014) coding and analysis strategies, we developed a hierarchical code structure, related code categories, and nascent themes, thereby enabling a thorough understanding of the qualitative data.

3.2.9 — Data Storage and Retention Period

All research data generated during this study is retained in the *4TU.ResearchData* repository for a minimum period of ten years, in accordance with the *TU Delft Research Data Framework Policy*. This retention period ensures compliance with national and institutional guidelines for good scientific practice, enabling future verification, reuse, and auditability of the data. After the ten-year period, the data will be evaluated for continued relevance and either securely archived or deleted, following TU Delft's data management protocols.

3.3 — Characteristics of Action Research

Herr et al. (2005) highlight a key characteristic of action research: its capacity to generate in-depth, situated insights into evolving organisational contexts. The method's iterative structure—comprising successive cycles of planning, action, observation, and reflection—is particularly well suited to examining the complexity, fluidity, and non-linearity of organisational change processes. This cyclical approach enables researchers and practitioners to engage with real-time developments, test interventions in situ, and continuously adapt strategies based on emerging insights.

Crucially, action research not only supports the development of academically robust knowledge, but also facilitates the co-creation of context-specific understanding that is directly applicable and meaningful to organisational stakeholders. By embedding inquiry within practice, it bridges the gap between theoretical abstraction and practical relevance, making it a particularly appropriate methodology for studying dynamic, practice-led transformations.

However, the very strength of action research—its focus on addressing challenges within a specific organisational setting—also constitutes its primary limitation. The close involvement of participants in the co-creation of knowledge ensures that interventions are tailored to the culture, structure, and dynamics of the organisation under study.

Limited Generalisability

While the specific organisational setting enhances contextual relevance and practical utility, it also constrains the generalisability of findings beyond the immediate research context as the outcomes are primarily valid within the studied environment (Coghlan, 2019). Nevertheless, the insights and methodological approach may offer relevance for other organisations, particularly those operating without direct interaction with end-users.

Subjectivity and Potential Bias

The collaborative nature of action research inherently introduces the potential for subjectivity, as researchers and participants may influence one another's perspectives, thereby increasing the risk of bias in both data collection and analysis. Moreover, the close involvement of participants gives rise to ethical considerations, including the need to ensure confidentiality and to navigate hierarchical dynamics within the research context. In this study, these challenges were addressed through careful planning and ongoing

critical reflection, which were systematically incorporated into group discussions with the research team to ensure the integrity and applicability of the research outcomes.

To mitigate potential bias and enhance the trustworthiness of the findings, triangulation was applied at multiple levels:

- *Data triangulation:* Multiple data sources—including interviews, observations, and both visual and textual materials—were used to capture diverse perspectives on the phenomenon under study.

- *Researcher triangulation:* Several researchers were involved in data collection, coding, and analysis, contributing complementary viewpoints and reducing the influence of individual bias.

- *Intervention triangulation:* Different types of design interventions were implemented and iteratively refined across successive *ARCs*, supporting the validation and robustness of the evolving insights.

Researcher's Role

Action research presents a potential risk of bias arising from the dual role of the principal researcher as both investigator and participant. This dual positioning can lead to role conflict, in which the objectives of rigorous data collection may be at odds with the practical demands of facilitating organisational change. Such embedded involvement may influence not only the researcher's interpretation of the data but also the interactions with participants, thereby challenging the objectivity and analytical distance traditionally associated with empirical inquiry (Coghlan, 2019; Herr & Anderson, 2005).

To mitigate this risk, the principal researcher secured triangulation and engaged in regular reflective practices, including structured group discussions with other members of the research team involved in designing and facilitating the *ARCs*. These collective reflections critically examined assumptions, surfaced potential blind spots, and validated interpretations, thereby enhancing the credibility and trustworthiness of the research process.

3.4 — Concluding Summary

This doctoral research investigated how B2B manufacturers develop *overarching servitization strategies* to transition into product-service providers. The study adopted a pragmatic research philosophy, emphasising experiential learning and methodological flexibility. Pragmatism, rooted in Dewey's (1939)instrumentalism, prioritises solving practical problems by selecting the most suitable research methods and techniques in a setting of a longitudinal research study.

A qualitative approach is employed, focusing on longitudinal case study within an industrial B2B manufacturer. The selected action research facilitated an in-depth exploration of servitization processes through analysing diverse data sources, including interviews, group discussions, textual and visual data representations. It involved iterative cycles of constructing, planning, action, evaluating, and reflection. Coghlan's (2019) *Action Research*

Cycle framework structures the research, ensuring systematic implementation and evaluation. This approach enabled researchers and practitioners to collaboratively refine servitization strategies while generating actionable knowledge within the organisational setting.

The case study was conducted within a Dutch high-technology manufacturer operating in a complex B2B environment. The company was selected through convenience sampling, based on its accessibility and its strategic relevance to the research objectives. Data collection involved multiple sources, including transcripts of semi-structured interviews, group discussions, process diagrams, and both textual and visual data captured on collaborative platforms such as *Miro™* boards. To support systematic analysis, *Atlas.ti™* was used to code the data and identify recurring patterns and emerging insights.

Reflective practice was integral to this research, drawing on Mezirow's (2003) framework of *content, process,* and *premise reflection*. This iterative mode of inquiry enhanced interpretive depth and supports informed strategic decision-making throughout the action research cycles.

Nevertheless, the study has certain limitations. The context-specific nature of the research—focused on a technology-driven B2B manufacturing firm—restricts the generalisability of findings beyond similar organisational settings. Additionally, the dual role of the principal researcher as both facilitator and investigator presents a potential source of bias. Ethical concerns, including the maintenance of objectivity and participant confidentiality, were addressed through continuous dialogue with research supervisors and structured group discussions involving key stakeholders.

To mitigate the risk of bias and enhance the trustworthiness of the findings, triangulation was applied at three levels: data triangulation (using interviews, observations, visual and textual data), researcher triangulation (involving multiple researchers in the process), and intervention triangulation (applying and iterating different design interventions across the ARCs).

By combining a pragmatic orientation with qualitative methods and an action research approach, this study generated contextually grounded insights into design *overarching servitization* strategies and the organisational transformation required for its successful implementation within the B2B manufacturing sector.

4

Though it may seem counterintuitive, organizations are sometimes trapped by their success.

They are trapped in what has been successful in the past but is no longer well suited to new circumstances of the marketplace or of society.

R. Buchanan (2015)

Chapter 4 — Action Research Cycle 1 – Exploring Overarching Servitization within the Focal Manufacturer

4.1 — Introduction

Chapter 3, Research Design, discussed the action research (AR) method and justified its use for the longitudinal case study conducted at the focal manufacturer. As an action researcher within the company, I immersed myself in the *Technology* business unit as one of the design engineers. This immersion enabled me to participate in the innovation team and engage with ongoing innovation projects and processes. I was able to move freely around the organisation and converse with staff involved in product-service innovation, despite not having a substantive role in their projects. My position was that of an observer, asking questions about their innovation processes, organisational structure, and decision-making regarding the initiation of new products and services. Next to that I was actively involved as a *Strategic Designer*, reflected on the insights gained from numerous conversations and observations to generate ideas on interventions for follow-up *ARCs* that support addressing my research questions.

This *Chapter* details my exploration phase from July 2018 to April 2020, focusing on my search for servitization within the organisation. It consists of one *ARC* with three *sub-ARCs: ARC 1.1, ARC 1.2,* and *ARC 1.3*. They explore the service design processes employed by the company to develop value propositions for physical products or installations linked to services. Specifically, I investigated *overarching servitization* initiatives within the focal manufacturer, which operates as a typical B2B company, to identify potential value propositions that encompass the manufacturer's direct customer relations and aim to create value for the customer-of-the-customer*:* the end-user. As noted in my literature review, research on *overarching servitization* represents a gap in the existing literature and warrants further investigation. Given the limited empirical studies on this topic in the B2B context, I explored how an industrial company that produces technologically advanced installations and products can organise and sustain an *overarching servitization* development process.

I employed action research as outlined by Coghlan (2019) as my research method, distinguishing between two approaches: *research on action* and *research in action*. During the exploration phase, I initiated three sub-ARCs, observing and analysing the organisation's innovation processes—an approach Coghlan (2019) categorises as *research on action*. This phase served a diagnostic function, providing the foundation for the subsequent *research in action* interventions.

Next *Section 4.2* introduces the preliminary step of Coghlan's (2019) framework, which precedes the three *ARCs*. It explains the purpose of the intended interventions and the context in which they occur.

Then, in *Sections 4.3, 4.4*, and 4.5, I discuss three *ARCs* based on the four phases: *Constructing Action, Planning Action, Taking Action and Evaluating Action.* The *ARCs* are

presented in a non-linear manner, as they sometimes occur in parallel rather than chronologically (see *Figure 3-1).*

Each *ARC* concludes with a summary of insights, including my reflections using Mezirow's (2003) framework.

Finally, *Section 4.6* summarises and clusters my insights related to the five lenses: *Business Models, Value Creation, Organisational Transformation, Network Collaboration* and *Servitization Strategies*. It concludes with eight design criteria for constructing *Overarching Servitization* within follow-up *ARCs* discussed in subsequent *Chapters 5, 6,* and *7.*

4.2 — ARC 1 — Preliminary Step — Defining Purpose and Context

The pre-step in Coghlan's (2019) framework establishes the purpose and context of *ARC 1* to explore and understand servitization practices within the B2B industrial context of the focal manufacturer. Servitization is becoming increasingly prevalent as B2B companies seek to enhance their strategic position and expand their portfolios with services linked to their products (Baines, 2015). *Chapter 1* introduced the idea that the fourth industrial revolution has brought new digital technologies to the B2B industrial landscape, including online platforms, IoT, and AI, enabling businesses to meet new customer values that were previously unattainable (Tzuo & Weisert, 2018; Vera, 2018).

For many B2B manufacturers, the rise of new internet technologies raises immediate questions about their knowledge and capability to implement such technologies. Since most B2B manufacturers primarily concentrate on technology development and lack a thorough understanding of customer and end-user needs and behaviours, they often struggle to create new services, customer experiences, and product-service offerings that align with these evolving customer values (Bluemink et al., 2020; Zolkiewski et al., 2017). Consequently, they risk becoming vulnerable to competitors who can respond more swiftly to latent customer needs, as well as to disruptors entering the market with innovative product-service propositions. These challenges compel companies to reassess their innovation strategies and consider acquiring new service capabilities, such as user-centric design skills and collaborations with partners who provide complementary service and IT knowledge to foster collaboration in a new ecosystem (Zolkiewski et al., 2017). Establishing *PSSs* can enhance resilience to unforeseen events, enabling companies to survive and continue operations (Adner & Kapoor, 2010). In the case I studied, the management of the focal manufacturer regarded servitization as a crucial strategy for building resilience for the future (Bluemink et al., 2020). This strategic direction prompted the focal manufacturer's research initiative to investigate broader servitization practices, seeking answers to guide the organisation towards a defined future state, as articulated in the main research question and associated sub-questions outlined in *Chapter 2*. These questions served as a foundation for exploring *overarching servitization* practices within the organisational context of the focal manufacturer. The objective was to engage with the innovation management team and engineers from the Technology business unit to gain a deeper understanding of how product-service innovation processes and initiatives can be designed, redesigned, and effectively organised.

4.3 — ARC 1.1 — Analysing the Manufacturer's Innovation Landscape

This section presents the internal analysis of the focal manufacturer's innovation landscape, conducted at the beginning of this research. The analysis explored how the organisation develops new product-service solutions, as well as the procedures and processes it employs to create value for its customers. Following this, I proposed targeted interventions to collect the necessary data.

ARC 1.1 outlines the organisational structure and identifies the specific context of the organisation that is the focus of this study. I describe the organisation of innovation, the processes through which the manufacturer develops its products and services, and the departments responsible for these activities. This is followed by my examination of 56 innovation projects carried out within the organisation between July 2018 and April 2020, during which I assessed the extent to which service-oriented and customer-oriented projects were realised.

4.3.1 — ARC 1.1 — Constructing

In the *Constructing* phase, I created interventions to develop new knowledge or build on insights gained from previous or parallel interventions. I divided *ARC 1.1* into two sub-interventions:

1) Conduct interviews with department heads and employees involved in the innovation process. With the interviews, I aimed to form a good picture of the innovation landscape for myself and to create a status quo of the innovation organisational structure, activities, and processes to make sense of the focal manufacturer's servitization maturity.
2) Analysing 56 innovation projects on the merits of *overarching servitization* and customer focus. I aimed to analyse whether we can recognise the five servitization lenses (see *Section 2.2.2*) in ongoing innovation projects.

4.3.2 — ARC 1.1 — Planning Action

From March 2018 to July 2020, I scheduled 15 interviews with department managers of the *Technology* business unit. I also planned five visits to the *Show & Tell* events during the period from July 2018 to April 2020, at which the content and progress of ongoing innovation projects were presented to the manufacturer's community.

4.3.3 — ARC 1.1 — Taking Action

From the *Taking Action* stage, I described the status quo concerning the innovation organisational structure, activities, and processes, and reflected on my conversations with the innovation management team.

The focal manufacturer was founded in 1949 as a machine factory initially focused on the textile industry in the province of Brabant in the Netherlands. The company gradually switched to internal transport systems for the manufacturing industry. Today, it provides automated smart logistics solutions for the internal transport and storage of baggage pieces, parcels, and retail goods. The *Airports* business unit is a world market leader in baggage handling solutions in the aviation business. The *Parcel* business unit is a leading

supplier of parcel sorting systems to parcel delivery services. The *Warehousing Solutions (WS)* business unit has built up a strong position in warehousing storage systems for fulfilment processes in distribution centres. The company owes its position to continuous innovation and the development and production of high-quality products that meet customer requirements. It is technology-driven and places great importance on being at the forefront of technological developments, as evidenced by its technology-related activities housed in a separate business unit: *Technology*. In 2020, the *Airports* and *Parcel* divisions merged to form the *Airport Parcel Solutions (APS)* business unit, combining their operations due to shared technology. Since then, the company has been organised into three business units: *Airport Parcel Solutions*, *Warehousing Solutions,* and *Technology*.
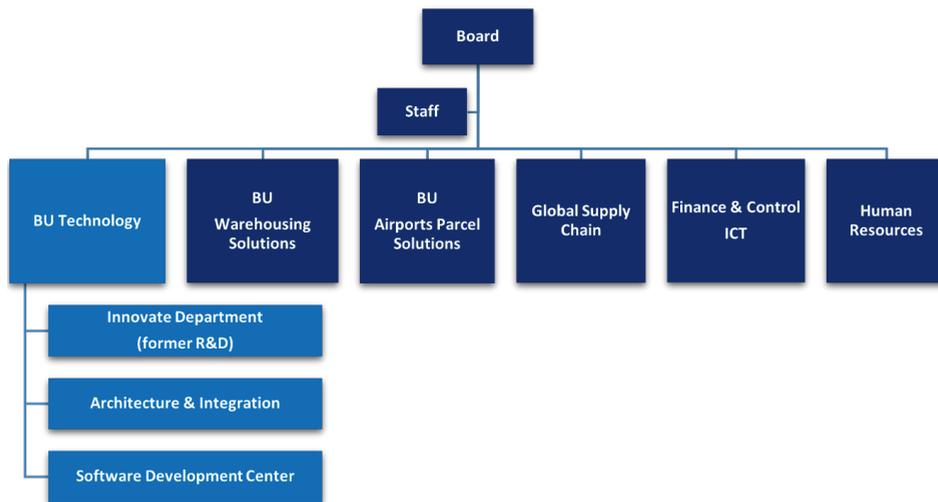
Figure 4-1 — Positioning of BU Technology in the Organisation

As this research focuses primarily on the *APS* business unit, and more specifically on Airports, the scope of analysis is confined to the innovation landscape of this unit. It should be noted, however, that all product–service development activities across the various business units are centralised within the Technology unit. This organisational arrangement implies that both the *APS* and *Technology* business units are integral to the present study of servitization.

The business unit *Technology* consists of three departments: *Innovate, Architecture & Integration (A&I)* and *Software Development Centre (SDC),* see *Figure 4-1.*

The *Innovate Department* describes its raison d'être as follows (the company's Vikipedia, 2021): 'To prepare our company for external trends, we have defined four technology areas we want to focus on: *Robotic Manipulation, Autonomous Vehicles, Artificial Intelligence* and *Smart & Connected Systems*. Our aim is to explore these topics and understand their technological readiness and the value they can bring to the company. Technology owners define technology roadmaps, coordinate activities with academia, support the development organisation in transitioning technologies as they mature and

ensure that new technology is embedded throughout the organisation. Technology Scouts find prospective strategic suppliers, track technology trends, and create the technology radar in close cooperation with technology owners. Innovation Project Leads are spotting new applications together with the business and lead innovation explorations with customers and partners. Innovation Engineers bring their expertise to the implementation of innovation explorations' (Case Company's Vikipedia page, 2021).

The *A&I* department acts as an intermediary between the commercial teams serving customer contacts and the development teams by creating an initial blueprint of integrated, platform-based concepts. Based on the designed product blueprint or architecture, new solutions are further developed by the *Innovate Department*.

The SDC team is responsible for developing a modular, extensible architecture for the company's software standards, developing functional modules in collaboration with the product development teams and integrating them into the existing product platforms. SDC's strategy is to develop integrated and standardised solutions based on the technical product requirements of the various development teams so that they can be configured according to customer needs.

In June 2019, management announced an organisational change within the *Technology* department. To implement their *Business Growth Strategy*, the management decided to start a *Continuous Acceleration Programme*. Part of this programme is the *Winning with Smart Platforms programme (WwSP)* to transform the company from an *engineer-to-order company* to a *configure-to-order company* (creating solutions with functional modules based on the platform principle developed by the A&I team). The development activities were divided into three phases: *Innovate, Deve*lop and *Maintain* to increase the company's effectiveness and innovativeness and accelerate development projects. The *WwSP* communication spoke only of physical products (hardware) and the controls needed for them (software) because the program aims to accelerate the development of product-service solutions. In developing standardised functional modules that enable a *configure-to-order* approach, I recognise the lens of *Creating Value* for customers. After all, if the company can deliver its projects faster, this creates added value for the customer. *Figure 4-2* shows these development phases with the most important activities for each phase. Note that the *Innovate* department (as part of BU *Technology*, see *Figure 4-1*) has the same name as the *Innovate* phase in *Figure 4-2.* We will, therefore, always refer to the department as the *Innovate Department* and to the phase simply as *Innovate*.

Innovate	Develop	Maintain
• Scout New Technology / Partners • Assess & Evaluate New Technology • Propose Technology Roadmap • Apply & Implement New Technology	• Develop Concept • Develop Module • Build & Test Module Prototype • Pilot Module • Prepare for Launch	• Monitor Module Lifecycle • Improve Module • Upgrade Module • Phase out Module • Update & Service Modules

Figure 4-2 — The Company's Process Phases Innovate, Develop and Maintain

In the *Innovate* phase, innovation engineers actively seek new technologies that may be applied either to the development of novel functional modules or to enhancements within the existing product and module portfolio. Their efforts focus on identifying new features in current products and leveraging emerging technologies as catalysts for new product–service offerings. Management characterises this phase as *'making the right things,'* emphasising the strategy of augmenting existing product modules by integrating innovative features. The *Innovate Department* thereby functions as a test laboratory, assessing and evaluating new technologies. Promising technologies and ideas for novel functionalities and product modules are subsequently developed into initial technical concepts, which are demonstrated through proofs-of-principle to assess feasibility. Concurrently, product managers from the *APS* business unit conduct viability tests to ascertain customer demand for the proposed value propositions. Once technical feasibility is established by the *Innovate Department* and viability confirmed by the APS business unit, the company's management determines the subsequent course of action. If the decision is positive, the Innovate Department transfers the idea to the Develop phase for further development.

In the *Develop* phase, the *R&D department* transforms the conceptual idea into a functional prototype under the guiding principle of *'making it right.'* Leveraging the technical feasibility established during the *Innovate* phase—which serves to mitigate risks during subsequent development—the R&D engineers refine the concept with precision. Often, this stage involves intensive collaboration with a launching customer to ensure that the new product–service offering generates the intended value and meets customer expectations.

The final stage in the development process is the *Maintain* phase, during which engineers focus on *'making it the right way.'* This phase aims to enhance the product's performance, quality, and reliability throughout its lifecycle while simultaneously reducing production costs. Additionally, the Maintain phase is dedicated to upgrading and updating the existing product portfolio, and it serves as a platform for expanding maintenance service propositions to modernise the installed base of products.

As part of my orientation into the focal manufacturer's innovation landscape, I analysed 56 innovative projects under the auspices of the *Innovate Department Manager*. *Table 4-1 — Type of Innovate Project* presents the outcome of the analysis, which I will discuss further in following *Section 4.3.4.*

Table 4-1 — Type of Innovate Project

Type of Innovate Project	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	Total
Adding Technical Features	4	4	10	8	2	28
Applying New Technology	6	8	2	3	5	24
Product-Service Systems	2	1			1	4
Sub Totals	**12**	**13**	**12**	**11**	**8**	**56**

In the organisation, any employee may initiate an *Innovate* exploration by submitting a *one-page* proposal that outlines the goal and scope of the proposed initiative. An *Innovation Lead* then conducts a thorough assessment of the submission and compiles a shortlist of Innovate exploration projects, which is presented to the *Innovate Department's MT* Following approval of the *one-page* proposal, the submitter and their team are authorised to allocate a pre-determined number of hours to the project. In a subsequent quarter, the team presents their progress and intermediate results, after which the *Innovate Department's MT* makes a go/no-go decision and determines whether the project will advance to the next quarter. *Figure 4-3* illustrates an example of an *Innovate One-Pager*, which defines a project designed to explore product–service value propositions for passengers and to design end-to-end passenger experiences within the *APS* business unit—thereby reflecting the primary purpose of our action research within the company.

Should a project prove successful, and the team demonstrate technical feasibility, the project is subsequently submitted to the *Flight Plan Team* for further approval. The *Flight Plan Team,* chaired by the *Market Leading Solutions Manager* and comprising the *BU APS Market Director*, commercial managers, the *Manager of Systems Concepting*, and the *R&D Programme Manager*, is responsible for presenting an overall *Airports R&D* development plan for the next five years. This presentation includes a detailed one-year *Airports R&D Flight Plan* that outlines specific development projects, complete with associated budgets and timetables. Ultimately, the *R&D Steering Committee (RDSC)* reviews these proposals and allocates the necessary R&D budgets.

4.3.4 — ARC 1.1 — Evaluating Action

In this evaluation phase, I reflect on the outcomes of my interventions, using the three forms of reflection from Mesirow's transformative learning framework: content reflection, process reflection, and premise reflection (Mezirow, 2003). In the content reflection, I reflect on the intervention in terms of results and what I observed happening. In the process reflection, I reflect on the strategies and processes of how the teams executed their assignments. Finally, in the premise reflection, I discuss underlying assumptions and perspectives, report my learnings, and ask myself questions to better understand the next steps in building knowledge on *overarching servitization* and product-service innovation within the company.

Show and Tell - Innovate

Creating End-to-End Passenger Experiences throughout the Customer Value Network

Designing product-service value propositions for end-customers, creating value upstream in the value network

WHAT

This project aims to create a *Product-Service Innovation Framework* which innovation project teams can apply to explore and create *End-to-End Passenger Experiences*

Creating *User Experiences* and *Product-Services* is a useful strategy for technology-focused industrial manufacturers like   to extend their current product portfolio with products combined with services.

This transition process from selling products to selling *Product-Service Systems*, also called *Servitization*, provides strategic opportunities for *Product-Service System Innovation*, bringing *Value Up-Stream* in the *Value Network*

WHY

Unexpected events (f.e. disrupters entering our market, Covid-19) *challenge*   *to explore opportunities* in a rapidly changing business context, creating resilience by designing product-service value propositions.

HOW

During a *Strategic Design Workshop* we explore trends and developments and create *Product-Service Concepts* for a *Future User Context*. We apply *Strategic Design Methods* that primarily focus on creating *Value Propositions* and *User Experiences*, starting at the last link of the value network: *the Passenger.*

THEMES
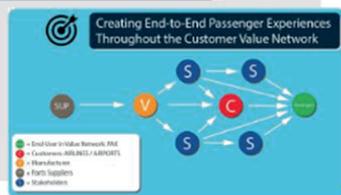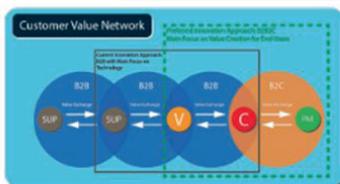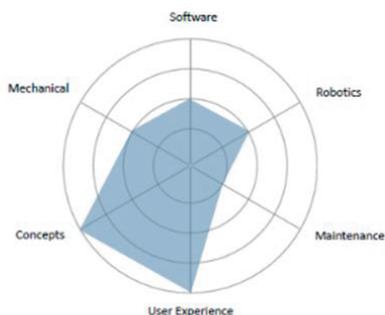
DELIVERABLES

| Q4 | Q1 |

Strategic Design Workshop Format for future exploration

In a *Pilot Strategic Workshop* we create a future oriented *Product-Service Concept*

Figure 4-3 — Example of an Innovate One-Pager

Content Reflection

The name of the *Technology* business unit already signals its strong technological orientation. Since its foundation, the company has positioned itself as a technologically proficient supplier of advanced transport systems for internal sorting, routing, storage, and goods handling (e.g. parcels, baggage). At the departmental level, the *Innovate Department* follows a pronounced R&D trajectory, with innovation activities concentrated exclusively on high-tech developments such as robotic manipulation, autonomous vehicles, artificial intelligence, and smart-connected systems. While this focus underscores the company's technological strength it also reflects a potential limitation when pursuing servitization, as organisational attention remains anchored in technology rather than in end-user value creation.

Conversations with the *Market Director, Systems Concepting Manager,* and *R&D Programme Manager* revealed that projects in the *Flight Plan* typically have a short-term horizon of one to two years. Commercial country managers bring in market requests, often for new product features within the platform portfolio or for extensions to existing installations under time pressure. When no standard platform solution is available, such requests are forwarded to the *Innovate Department* for exploration. Conversely, innovations still in development are sometimes matched with potential launching customers through the *Flight Plan Team*. In this way, customer requests and Innovate projects are linked, resulting in a focus on short-term, hit-and-run projects.

Insight 1: The Innovate Department focuses on short-term technology-driven projects.
Although the company has switched to a configure-to-order engineering model, where customer solutions are based on fully developed, functional standard modules, projects that deviate from this approach are still sold. This often results in customised solutions that have yet to be developed as an Innovate project, creating the risk of failing to deliver new customer value propositions on time due to delays in the associated Innovate projects. From conversations with Innovate engineers, I concluded that the commercial organisation is struggling to shift from a project-driven sales strategy to one based on configuring platform-based functional modules. This compels the *Innovate Department* to develop using the old engineer-to-order approach rather than the configure-to-order model.

Insight 2: Shifting from a project-based to a product platform-based sales strategy fosters the configure-to-order strategy in the Innovate department.

Process Reflection

As the Innovate Process Maps show, the Innovate Department's activities solely focus on exploring new technologies, developing them, and then applying them to their products. It shows the innovation processes of a technology-driven company with activities accordingly down to its capillaries. There is no mention of service innovation activities or processes.

Figure 4-4 and *Figure 4-5* give an impression of the process map for developing product concepts and modules. They show the detailed development steps of developing products, concepts, and modules, spread across six technology domains: *Electrical, Mechanical, IT Infra, Module Management, Software* and *Test & Integrate.* However, the process maps do not mention development avenues for services along with the associated concepts and modules.

Table 4-1 — Type of Innovate Project confirms our observation: only four of the 56 projects are about developing a *PSS*, i.e. product-service innovation. Of these four projects, three are a direct result of *Interventions 2* and *3* discussed in *Sections 4.4* and *4.5* respectively and were actually implemented independently of the procedures in the *Innovation Process Maps.* This means that only one of the 56 projects created through the *Innovation Process Maps* involves service innovation.
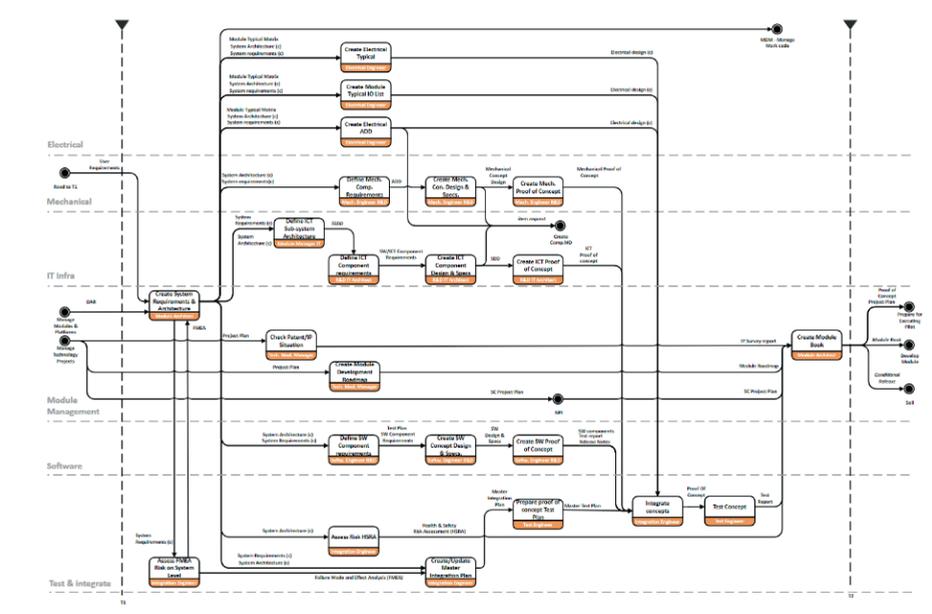
Figure 4-4 - Innovate Process Map for Developing Concepts (source: case company's process handbook)
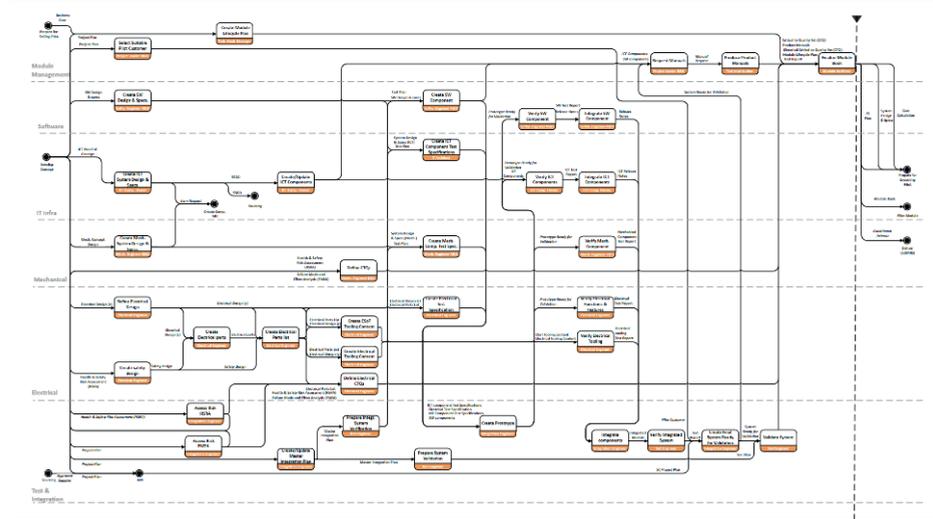
Figure 4-5 - Innovate Process Map for Developing Modules (source: case company's process handbook)

Insight 3: **The current Innovate Process Maps for concepts and modules do not facilitate service innovation avenues or activities and, therefore, cause a barrier for service innovation in the BU Technology.**

I observed a similar omission at the *Innovate* phase in the company's *Innovate Process Map*. In that map, four processes are defined for the *Innovate* phase:

- Assess and select innovations (based on the *one-page* proposals of *Section 4.3.3)*
- *Execute explorations* (of the chosen *one-page* proposals)
- Decide to propose for development roadmap (and submit for approval to the *Flight Plan* Team)
- *Execute Ideation* (delivering valuable input for a high-level, 2 to 5-year term innovation *Flight Plan*)

However, no process steps are defined for the final task, *Execute Ideation,* in either the *Innovate Process Map* for *Developing Concepts* (*Figure 4-4*) or the *Innovate Process Map* for *Developing Modules* (*Figure 4-5*). The ideation task is also not listed in the *Innovate* phase of Conversations with *Innovate Department* engineers and Project Leads confirm my perception that they hardly get around to *Execute Ideation*, if at all, because much time is spent on hit-and-run projects that have been given higher priority in the *Flight Plan* under the pressure of sold customer projects by the sales organisation.

Insight 4: **The practical absence of 'Execute Ideation' activities is a barrier to formulating and implementing longer-term servitization strategies.**

Premise Reflection

A key question is how we can enhance innovation processes to adopt a longer-term perspective. Furthermore, can we encourage the organisation to innovate by distancing

itself from the *Innovation Process Maps* that are deeply entrenched and appear to obstruct Execute Ideation? To develop a forward-looking *Flight Plan* that spans more than one to two years and incorporates service innovation strategies, it is crucial to explore a future business perspective. How can we integrate this function into the current organisation? Let's examine a future-oriented business perspective in our upcoming interventions.

Insight 5: **Our assumption is that exploring a forward-looking business perspective that includes service innovation leads to a Flight Plan for the longer term.**

The key question is how innovation processes can be enhanced without disrupting the existing structure. Organisational change will be more feasible once evidence demonstrates that an alternative innovation approach is more effective within a different framework. Since such evidence cannot be established in advance, the immediate aim is to design interventions that improve service innovation processes while leaving the current organisational structure intact—for the time being.

Insight 6: **It is a prerequisite to keep the current organisational structure unchanged when designing new interventions.**

4.3.5 — ARC 1.1 — Concluding Insights

To conclude *ARC 1.1*, I discovered enablers for product-service innovation within the company's organisation. Three insights concern *Organisational Transformation*, particularly rethinking the innovation process to improve service innovation processes. Another three insights focus on *Servitization Strategies,* implementing more future-oriented ideation activities to foster development for a longer time horizon. I gained six new insights about overarching service innovation and categorised them according to the five perspectives of servitization: *Business Models, Value Creation, Organisational Transformation, Network Collaboration,* and *Servitization Strategy,* and summarised them in *Table 4-2*

Table 4-2 – Summarising the Insights Identified in ARC 1.1

Insight #	Insights Identified in ARC 1.1	Servitization Lens
Insight 1	The Innovate Department focuses on short term technology-driven innovation projects.	Servitization Strategy
Insight 2	Shifting from a project-based to a product platform-based sales strategy fosters the configure-to-order strategy in the Innovate department.	Organisational Transformation (rethinking innovation process)
Insight 3	The current Innovation Process Maps for modules and concepts does not facilitate services innovation avenues or activities and, therefore, cause a barrier for service innovation in the BU Technology.	Organisational Transformation (rethinking innovation process)
Insight 4	The practical absence of 'Execute Ideation' activities is a barrier to formulating and implementing longer-term servitization strategies.	Servitization Strategy
Insight 5	Our assumption is that exploring a forward-looking business perspective that includes service innovation leads to a Flight Plan for a longer term.	Servitization Strategy
Insight 6	It is a requirement to leave the current Organisational Transformation structure untouched when designing new interventions.	Organisational Transformation (rethinking innovation process)

4.4 — ARC 1.2 — Applying and Demonstrating Strategic Design Methods

In *ARC 1.2*, we collaborated with students from *Delft University of Technology* to bring strategic design knowledge from academia into the B2B manufacturer. Drawing on theories, methods, and practices from the *Strategic Product Design (SPD)* master's curriculum, five student teams were assigned a strategic design task in collaboration with the head of the company's *User Experience Design (UX)* department. This task focused on developing a *Baggage-as-a-Service (BaaS)* product–service value proposition, illustrating how strategic design methods can be applied in practice. *ARC 1.2* is presented in the following subsections according to the four stages of Coghlan's action cycle:

Constructing, Planning Action, Taking Action, and Evaluating Action.

4.4.1 — ARC 1.2 — Constructing

The aim of *ARC 1.2* is to spark interest in product-service design within the organisation and to show how strategic design methods can be utilised to create innovative overarching product-service propositions, even when designers lack in-depth knowledge of the complex high-tech installations developed and manufactured by the company. To achieve this aim, I created a case assignment focused on designing an overarching product-service solution for baggage handling at an international airport, a business context familiar to the company. Below, I will explain the rationale behind this approach.

In *ARC 1.2,* I deliberately chose an outside-in approach and selected unbiased participants and, therefore, avoid being hindered by the existing organisational structure and innovation processes. I also aimed to bring knowledge and skills in product-service design into the organisation by involving novice designers from academia, engaging them in product-service innovation projects, and having them explore end-users' needs, values, desires, and behaviours in a future social context to create product-services and experiences that fit accordingly. I invited master's students from the *Delft University of Technology*, *Faculty of Industrial Design Engineering*, to demonstrate the value of using strategic design methods such as the strategic value of design (Calabretta et al., 2015, 2017), service design (Martinkenaite et al., 2017; Polaine et al., 2013), design roadmapping (Simonse, 2018), and design thinking (Stompff, 2018; Wrigley et al., 2020). Although strategic design master's students are not yet seasoned designers, they possess sufficient knowledge of standard strategic design methods and master the basic skills needed to carry out a design process for product-service innovation (Hekkert, 2014). They are accustomed to learning by doing, as expressed in Tom Peters' design thinking paper (Peters, 2014): *'Machines can automate a lot of things, but design is something humans do best. It's part of the way you play around with things – part of the relentless experimentation. You falter, you get back up, and eventually, you figure things out. That's the design process.'*

During our literature research described in *Chapter 2*, we identified a knowledge gap within the B2B industry regarding product-service design, focusing on end-user needs and behaviours. I positioned this gap as *Overarching Servitization.* My analysis of the

servitization literature indicated that B2B manufacturers tend to concentrate on the technological aspects of innovation rather than the end-user perspective when creating product-services (Bluemink et al., 2020). My analysis of current innovation projects within the *Innovate* department (described in *ARC 1.2*, *Section 4.3.3*) confirmed this conclusion. Therefore, in dialogue with the company's *UX Design Manager*, *ARC 1.2* was intentionally structured so that the teams had to take an *overarching view of* the end-user. In the briefing, I asked them to consider air travelling from the passenger's perspective (who is regarded as the company's end-user) and create service solutions to enhance the passenger experience.

4.4.2 — ARC 1.2 — Planning Action

During the planning of *ARC 1.2*, I worked closely with the company's UX Design Manager to formulate two Baggage-as-a-Service cases within an international airport context. The aim was to ensure that the cases were realistic and added value to the organisation's product–service portfolio. At a kick-off meeting, we introduced the company and presented both assignments to the student teams, who were free to choose which one to pursue.

The first case, *UX Innovation Strategy for the FLOW Concept*, focused on developing a new traveller experience using FLOW—an autonomous robot for baggage transport at airports—demonstrated through a proof-of-concept prototype. The second case, *UX Innovation Strategy for a Reclaim Area*, tasked the teams with developing a value proposition for the baggage reclaim area of an airport. Five teams participated, each choosing one of the two cases, enabling an evaluation of five results at the conclusion of *ARC 1.2*.

To prepare the teams to create ideas for *overarching* product-service value propositions during this *Planning Action* phase, I acted as a coach. I organised lectures on service design and servitization in the industry and guided them through a strategic service design process for product-service solutions for passengers in an air travel context. I discussed successful B2C cases (e.g. *Uber, Spotify, Stella Bikes*) and the *overarching servitization* case of *Rolls-Royce*.

As a closure of *ARC 1.2*, I planned and organised a *BaaS Inspiration Market* event at the company on 24 January 2019. In a presentation meeting, the teams took the opportunity to pitch their results to the management. To promote *strategic product-service design* knowledge exchange between novice designers and employees, the *BaaS Inspiration Market* event allowed attendees to visit the market stalls and engage in discussions with the teams about their presented product-service concepts and prototypes.

As a preparation for their presentations, I challenged the teams to sell their product-service idea with a good pitch to the company's management. Prior to this, the teams had received instructions on making an attractive, concise, and to-the-point pitch presentation using a proven pitch canvas (Pavlic, 2019). Of course, I had already invited the company's audience to the pitch presentations, but my idea was to also transfer knowledge and skills about pitching as well. Therefore, I attracted them with the idea that, in addition to gaining

valuable product-service ideas, they could also learn how to present them effectively to management.

4.4.3 — ARC 1.2 — Taking Action

During *ARC 1.2*, five teams worked on their cases, applying strategic design methods such as *Service Design*, *Customer Journey Mapping* and *Strategic Design Roadmapping*. In both cases, the teams had to imagine the future context of baggage handling during a passenger's journey and discover passengers' latent needs and behaviours. In weekly coaching sessions and during an interim presentation, the *UX Design Manager* and a second mentor (from TU Delft) coached the teams, gave them feedback on the results and encouraged them to create inspiring product-service value propositions.

As an action researcher in the *Taking Action* phase, I was an observer writing my field notes *in-action* (Coghlan, 2019). While the *UX Design Manager* and the second mentor provided coaching to the teams, guiding them through the strategic design process of inventing product-service solutions for passengers travelling in an air travel context, I acted as an observer, watching what was happening within the organisation during the design process and recording in short field notes my observations of the interactions between employees and the teams.

In the separate presentation meeting during the *BaaS Inspiration Market* event, the teams presented their results to fifty R&D engineers and managers. The teams pitched their final concept and demonstrated it with a video illustration. The team presentations lasted about 30 minutes (15 minutes pitch, 15 minutes Q&A). After the case presentations, a team of stakeholders (a senior commercial manager, a business unit manager and a market-leading solutions manager) evaluated the presented concepts and chose the best idea.

During the lunch break, around 40 employees from different departments visited the market and discussed their invented product-service concepts and prototypes with the teams. I saw engineers eager to learn from the teams and observed how they dealt with the new knowledge of strategic design offered by the teams.

4.4.4 — ARC 1.2 — Evaluating Action

In this evaluation phase, I reflected on the outcomes of the five team efforts and on my observations during the execution of the intervention, using the three forms of reflection of Mesirow's transformative learning framework: *content reflection, process reflection, and premise reflection* (Mezirow, 2003). In the *content reflection*, I reflect on the intervention in terms of results and what I saw happening. In the *process reflection*, I reflect on the strategies and processes of how the teams executed their assignment. Finally, in a *premise reflection*, I discuss underlying assumptions and perspectives, report my learnings, and ask myself questions to better understand the next steps in my quest for *overarching servitization* within the company along the lines of my research questions.

Content Reflection

I start with a *content reflection* on the results delivered by the teams in the form of a report, a pitch presentation for the company's management, a short video showing the devised product-service solution, and a concept prototype. I observed that two product-service solutions were based on the first case: a *UX-Innovation Strategy for FLOW*. Three product-service solutions were based on the second case: a *UX Strategy for a Reclaim Area*.

All five team results were presented and explained in an A1 poster, and I noticed that the end-user plays a central role in the product-service solution in all cases. *Figure 4-6* shows a poster example of it. The poster communicates that the end-user occupies a prominent place in the graphical explanation of the designed product-service value proposition, explained by a customer journey, and shows the end-user's position in the *PSSs'* business model.
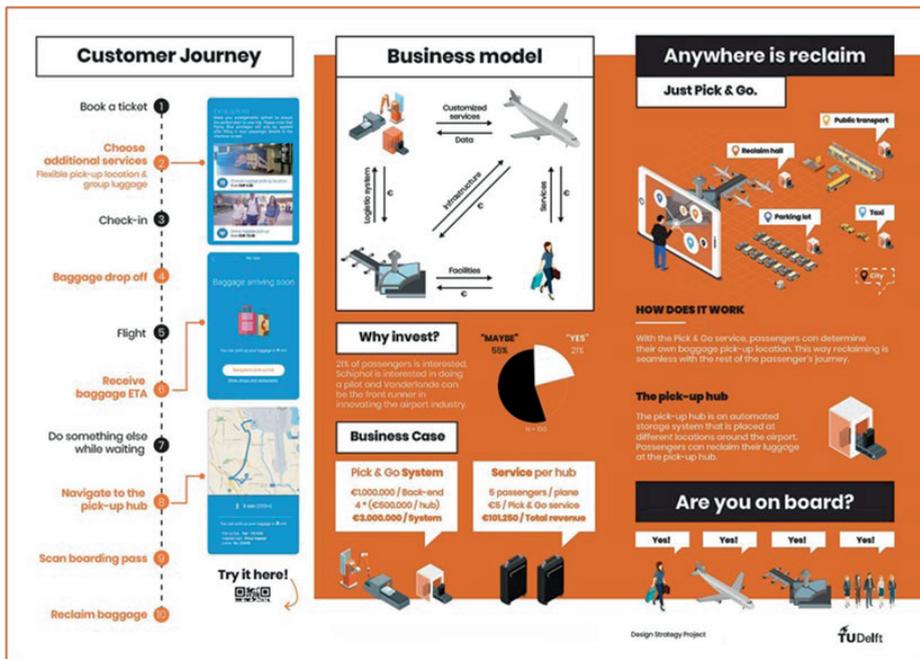
Figure 4-6 — An Example of a Team Result

Figure 4-6 — An Example of a Team Result explains a new *BaaS* product-service value proposition, illustrated with a customer journey, a business model design, and a visualisation of the '*Just Pick & Go*' service ecosystem.

This result is consistent with my underlying assumption in constructing *ARC 1.2;* if you task an unbiased design team with solving a problem (designing a better product-service solution for baggage handling at an airport) using strategic design methods combined with user-centred boundary conditions (*overarching servitization* to promote an end-user

focus), you will likely see *overarching servitization* reflected in the result. In *ARC 1.2,* the score on *overarching servitization* is 100% which led to the following insights.

Insight 7: **Using strategic design methods fosters overarching servitization strategies through envisioning of product-service solutions 'from the end-user's point of view' that goes beyond the company's current organised innovation processes, even if one does not have in-depth knowledge of the technology that goes with the company's manufacturing processes and mechanical products.**

Insight 8: **Fostering overarching servitization strategies creates product-service solutions beyond the company's current customer relationships, even if one does not have a deep understanding of the market or ecosystem in which it operates.**

In the literature scoping review of *Chapter 2*, I discovered that around servitization in the B2B manufacturing industry, five perspectives recurred repeatedly. According to servitization scholars, these perspectives are success factors of a servitization transition: *Business Models, Value Creation, Organisational Transformation, Network Collaboration* and *Servitization Strategy* (Bluemink et al., 2020). Could I recognise these perspectives in the team results of *ARC 1.2*? So, in *Table 4.1*, I indicate whether each of the five lenses, *Business Models, Value Creation, Organisational Transformation, Network Collaboration* and *Servitization Strategy*, was covered completely, partly, or not.

Table 4-3 — Five Lenses on Servitization

Design Project Case	1	2	3		4	5	
	Business Models	Organisational Transformation	Value Creation		Network Collaboration	Servitization Strategies	
			a for Customer	*b* for End-User		*a* Digital Platform	*b* Future Visioning
Just Pick & Go	√	√	±	√	√	√	√
Fleet PickUp	±	±	±	√	√	√	√
Gift Drop	±	±	±	√	√	√	√
Baggage Hotel	√	√	±	√	√	√	√
UX Strategy	±	√	√	√	⊗	⊗	√

√ = Completely covered in case deliverables

± = Partly covered in case deliverables

⊗ = Not covered in case deliverables

Based on the analysis of the case deliverables, I have made a subdivision for two of the five lenses (see columns 3 and 5 of *Table 4-3).* In *Value Creation* (column 3), with the

subcategories *Customer* and *End-User*, I indicate whether it is about value creation for the direct customer (B2B) or *overarching* value creation for end-users (B2B2C). In *Servitization Strategy* (column 5), I added two subcategories, *Digital Platform* and *Future Visioning,* because I detected a further distinction in the proposed servitization strategies.

Analysing the case deliverables, I found that I could subdivide two of the five lenses (see columns 3 and 5 of *Table 4-3*). Because the cases focused on *overarching* service delivery, I subdivided the *Value Creation* lens (column 3) into two subcategories: Customer and *End-user. Customer* (column 3a) is about recognising value creation for the company's direct B2B customers such as airlines and airports, while *End-user* (column 3b) is about recognising *overarching* value creation for the company's end-users: the passengers (B2B2C).

Insight 9:   Focusing on overarching servitization could create value for both customers and end-users (columns 3a and 3b)

In the *Servitization Strategy* lens (column 5), I discovered two strategic approaches in the team results. First, a strategy based on establishing *Digital Platforms* to manage the value transaction between the engaged stakeholders and end-users in the proposed *PSS* (column 5a). Second, a strategy that focuses on *Future Visioning* (column 5b)*,* envisioning a future business context and describing the needs and behaviour of end-users in that context. This means that in the results, a deeper layer has been tapped for both *Value Creation* and *Servitization Strategy* (columns 5a and 5b), and we can zoom in more precisely on the results with both lenses.

Insight 10: Digital Platforms knowledge and Future Visioning capabilities seem to be drivers for transitioning to servitization strategies.

The first column, *Business Models*, shows that two projects covered fundamental business model aspects, and three projects did so partly. *Organisational Transformation* (column 2) was thoroughly addressed in three projects. The overall analysis in the diagram shows that the teams cover these perspectives (columns 1 and 2) less extensively. An explanation could be that the novice designers had less experience in business practice and therefore had little exposure to *Organisational Transformation* of innovation. New business model creation needed to be sufficiently covered in the strategic design methods, as we did not see this reflected in the results. In my notes, I read that during the management presentation, there were several questions regarding the business model behind the presented concepts of product-service solutions (how are we going to make money with this?). There were also questions about *Organisational Transformation* (which department do you think should pick up this product-service idea?). The teams would have been better prepared for the questions posed and would have presented a richer concept if experienced engineers had been involved in thinking about business models and organisational transformation during the project.

Insight 11: By pairing unbiased designers with experienced engineers, practical knowledge of the business is brought into the innovation process of product-service concepts, leading to grounded outcomes.

The lens of *Value Creation* for *End-Users* (column 3b) also drew the most attention from managers (a senior commercial manager, a business unit manager, and a market-leading solutions manager), who assessed the final solutions. Column 3b shows that the five projects primarily deliver value to end-users (B2B2C) rather than the direct customer (B2B), as shown in column 3a. This is not surprising, as *overarching* was embedded in the teams' brief.

I found that the *Servitization Strategy* (column 5) perspective in the five projects had been recognised and acknowledged, and four teams focused on both subcategories *Digital Platforms* (column 5a) and *Future Visioning* (column 5b). The results show that four out of five teams proposed product-service solutions that go beyond the current airport business context. They either proposed *Collaboration in a Network* (column 4) with partners that bring complementary capabilities or extended the context of logistics operations (for example, outside the airport periphery). This led to the following two insights.

Insight 12: Involving unbiased strategic designers generates a broader and more future-oriented perspective on the B2B's strategic context.

Insight 13: Involving unbiased strategic designers challenges 'Collaboration in a Network' with partners adding complementary skills and competencies.

At the evaluation meeting after the teams' pitch presentations, three managers evaluated the five team results. I recorded a business solutions manager saying: *'FLOW Pick-Up was the most futuristic design we liked and would like to have today! Hitting our 'desirable' button!'.* I categorised this quote under the *Servitization Strategy* perspective since it illustrates someone's desire to (be able to) create solutions hidden behind a distant horizon and not yet discernible.

Based on the insights of the *content reflection*, I argue that innovative product-service solutions can be created within the same business context if you look through an *overarching* lens, apply strategic design methods, and bring in design skills and competencies .

Process Reflection

To reflect on the *process* level, I used the *Design Innovation Level* framework of Price et al. (2019) (see *Table 4-4*). This way, I could analyse how the solution evolved through the different levels of innovation.

The teams were assigned to create user experiences and services for end-users on at least the first level (*Integrated Product-services* indicated with a dark blue circle). All five teams were able to increase the innovation level during the project. Three teams designed solutions classified in the second innovation level (*Services, Processes, and Interactions,* indicated with a orange arrow, showing the direction to the final innovation level indicated with a light blue triangle). I observed them going beyond the current B2B context and shifting to the next level of innovation in Price's framework by creating solutions that entail an extended supply chain (Price et al., 2019). They built a business-to-business-to-customer (B2B2C) value chain: they were *overarching* the company's B2B customer, the airport, with their concepts, directly addressing end-users, the passengers, in the next step

of the value chain. Two teams, however, added complexity to their proposed value proposition by involving other stakeholders in a collaborative product-service platform, an ecosystem co-created with partners providing complementary capabilities. I categorised their solution into *Systems and Organisations*.

Table 4-4 — Shift of Innovation Levels of Innovation in Design Projects According to Design Innovation Level framework of Price et al. (2019)

Design Project Case	1st Coach / Principal	2nd Coach	Evaluating project outcome regarding addressing end-user needs, using the Innovation Levels Framework according Price et al. (2019)			Type of project outcome indicated by coaches	
			Integrated Product-Services	Services Processes and Interactions	Systems and Organizations	Experience Design	Future Visions and Strategy
Just Pick & Go	A	B	●	→	▲	☑	☑
Fleet PickUp	A	B	●	→ ▲		☑	☑
GiftDrop	A	B	●	→ ▲		☑	☑
Baggage Hotel	A	B	●	→	▲		☑
Strategy	A	B	●	→ ▲		☑	☑

● = Innovation level asked in the project assignment design briefing
▲ = Innovation level result at the end of the project
→ = Increase of innovation level during the project
☑ = Indicating the type of project outcome

During their product-service innovation process, the teams used two of Delft's strategic design methods: the *Vision-in-Product Design* method by Hekkert (2014) and *Strategic Design Roadmapping* by Simonse (2018). Both design approaches focus on creating a future vision and exploring new business contexts, each from a different angle. The first approach views the process from a human-centred design angle, while the latter takes a strategic design point of view. I categorised the project results in the column *Type of project outcome* in *Table 4-4*. The column *Experience Design* shows the project results with a human-centred angle. The column *Future Vision & Strategy* displays the more strategic and future-oriented solutions. I note that four of the five projects showed both approaches. I realised that using either approach, *Experience Design* and/or a *Future Vision & Strategy* may lead to answers for my research questions.

During the discussion round after the team presentations of the results, the engineers showed interest in the design process the teams went through. Posing their questions about the end-user-focused design approach, implementing a new product-service, creating platform-based business models, and setting up stakeholder network collaboration led to lively discussions and knowledge transfer between engineers and novice designers. I observed the engineers' audience showing interest and eagerness to learn a 'different' design approach. After their lunch break, about forty employees visited the *BaaS Inspiration Market* event, showed interest, and discussed the project outcomes with the teams. I found it encouraging to observe that the engineers showed enthusiasm for the teams' user-centred design approach because the company employees were

usually intensely focused on technology but may have been triggered by the different views of the novice designers on the end-user.

After the pitch presentations, the teams did very well according to the audience's reactions (fifty employees). In my field notes, I wrote to be proud of the teams that rocked the floor and engaged the audience with their convincing pitches.

Insight 14: Pitching skills are indispensable for convincingly presenting the value of new product-service concepts to management.

During *ARC 1.2*, the teams conducted research among arriving passengers. They found that passengers still consider the arrival experience at the airport to be the most disappointing part of their journey, despite the company's efforts to improve baggage transport for arriving passengers. A quality I noticed in the team's design approach was that they fearlessly went to Schiphol Airport and, at the use location, interviewed passengers about the discomfort surrounding baggage handling during their journey. With the *UX Design Manager*, I reflected on this, and she pointed out that engineers are not used to stepping outside their high-tech comfort zone and going out for an on-site end-user inquiry.

Insight 15: To know more about the needs and behaviour of end-users, B2B manufacturing companies will need to organise on-site meetings to engage in end-user conversations.

Despite this, an end-user focus could have been expected, since *'overarching'* was embedded in the assignment briefing and the coaches encouraged the teams to concentrate on end-user experiences. My deliberate intention was to prompt technology-oriented engineers to adopt this end-user perspective. Interestingly, the teams primarily developed product–service solutions for an airport context—a technology-driven business domain that represents the company's comfort zone—which came as a genuine surprise to the development engineers themselves.

Premise Reflection

In the following part—the *premise reflection*—I critically analyse the underlying assumptions and perspectives. During the presentation of the teams' results, company representatives repeatedly commented that they were pleasantly surprised by the quality of both the presentations and the project outcomes. Although the student teams lacked the product engineering expertise, knowledge, and experience of seasoned R&D engineers, their work nevertheless drew admiration from company employees. I found this remarkable, since one would expect a professional organisation to possess at least comparable innovation competencies and processes to achieve similar results. This intervention revealed that the success factors for overarching *PSS* innovation may include the team members' open-mindedness, their detachment from organisational structures, their lack of awareness of unwritten innovation conventions, and their freedom from prescribed innovation processes.

Insight 16: Open-mindedness, acting independently from an organisational structure, and unawareness of unwritten rules or habits are success factors for overarching servitization.

In my notes, I observed that the student team's qualities—particularly their end-user focus and open-mindedness—were crucial drivers of the surprising product–service solutions they presented. I also noted that their independence from the innovation department, with its prescribed development processes, as well as their unawareness of the organisation's unwritten rules and routines, contributed significantly to their success. On this basis, I argue that the company's organisational silos and its existing innovation processes—primarily rooted in physical product engineering—are ill-suited to the development of integrated product–service offerings that effectively address end-user needs.

Insight 17: The company's organisational silos and its current innovation processes are potential barriers to an overarching servitization process: developing products combined with services.

This raises the question of how company engineers might be detached from their organisational silos, daily processes, and routines to collaborate effectively with strategic designers and colleagues from other departments. In this intervention, I observed two distinct worlds coming together. On the one hand was the high-tech domain, where company engineers relied on their experience and technological expertise to address technical challenges through established engineering procedures, successfully developing products at a high technical level (see *Section 4.3.4).* On the other hand was the design domain, where strategic industrial design teams contributed knowledge of strategic and service design (Beltagui, 2018; Calabretta et al., 2015; Van Boeijen et al., 2014), and approached the challenge with proven innovation methods and processes such as strategic design, roadmapping, and service design (Harmon & Laird, 2012; Hekkert, 2014; Kim et al., 2015; Phaal & Muller, 2009; Simonse, 2018; Simonse et al., 2015).

I asked myself whether this relates to the development of soft skills, as described by Crosbie in her article distinguishing between soft and hard skills with reference to Maslow's learning stages model. In the first stage, individuals do not know what they do not know or cannot do and thus operate within the limits of their acquired knowledge and skills—Maslow describes this as *unconscious incompetence* (Crosbie, 2005). In the second stage, individuals become *consciously incompetent*, having encountered knowledge and skills that they have not yet mastered but which are accessible within the organisation. In *ARC 1.2*, I observed that the students moved the company engineers from stage one to stage two: they introduced them to the *consciously incompetent* domain by demonstrating how design methods—uncommon in the company's practice—could generate innovative solutions. The company engineers, with their scientific backgrounds and training in rational, abstract, and analytical reasoning, recognised this *conscious incompetence* in their own work, which I also observed in conversations with R&D engineers and in their technology-focused innovation processes for developing advanced products and systems. (see *Section 4.3.4*).

Cognitive scientists associate hard skills with the left hemisphere of the brain (Crosbie, 2005), which led me to assume that the thinking and behaviour of R&D engineers are predominantly left-hemisphere oriented. By contrast, soft skills are linked to the right

hemisphere (Crosbie, 2005) which is more attuned to holistic, associative, creative, and intuitive ways of thinking, imagining, and visualising. Industrial designers are trained to cultivate these qualities, making them more proficient in applying soft skills. They can generate end-user–centred solutions by empathising with users, observing them, considering (future) user contexts holistically, and employing associative, creative, and visualisation skills. Designers further contribute strategic and service design expertise by bringing established methods and tools—such as strategic design, service design, and roadmapping—consolidated in the *Delft Design Guide* (Hekkert, 2014; Simonse, 2018; Van Boeijen et al., 2014). From this analysis, three new insights emerge.

Insight 18: *The company engineers developing service design skills (bringing them into a conscious competent mindset) enable overarching servitization.*

Insight 19: *Adding seasoned strategic designers to the company's Innovate team will foster cross-pollination of strategic and service design competencies (soft skills) and enable overarching servitization.*

Insight 20: *Mixed teams of designers and engineers (combining soft and hard skills) foster end-user-driven product-service solutions.*

4.4.5 — ARC 1.2 — Concluding on Insights

The fourteen additional insights gathered during *ARC 1.2* form the foundation for subsequent interventions designed to generate further knowledge in response to the research questions introduced in *Section 4.2.* They suggest that combining soft and hard skills within multidisciplinary teams of designers and engineers enhances end-user–driven product–service innovation. As one business manager noted: 'The *Service Design Project* was very interesting for the company and fun as well. Let's do this more often because engaging design teams in creating new ideas is valuable for both.' This illustrates how service design began to take root within the teams and highlights managerial appreciation for the *'designerly'* approach.

These reflections point to the need for broader organisational support for user-centred design by engaging employees across silos. I argue that adopting a designerly orientation and developing strategic design capabilities will strengthen the firm's servitization processes. Accordingly, the next interventions aim to move the organisation through Maslow's stages three (consciously competent) and four (unconsciously competent) by embedding strategic design knowledge, service design capabilities, and servitization practices into organisational routines (Crosbie, 2005).

Insight 21: *Nurturing strategic design capabilities enable overarching servitization processes.*

The five servitization perspectives identified in the literature review—*Business Models, Value Creation, Organisational Transformation, Network Collaboration,* and *Servitization Strategy*—are clearly reflected in *ARC 1.2* (see *Table 4-3).* The fifteen insights suggest that servitization practices can only succeed when organisations develop strategic and service design competencies, which function as key enablers of *overarching servitization.* Consequently, future interventions should embed these methods and be organised in

multidisciplinary teams to balance soft and hard skills. The findings further indicate the value of releasing engineers from organisational silos and routines so they can collaborate effectively with strategic designers. This approach was tested in *Section 4.4.4,* where the integration of strategic and service design skills in mixed teams of industrial designers and company engineers was evaluated.

Table 4-5 — Summarising the Insights Identified in ARC 1.2

Insight #	Insights Identified in ARC 1.2	Servitization Lens
Insight 7	Using strategic design methods fosters overarching servitization strategies through envisioning of product-service solutions 'from the end-users' point of view' that goes beyond the company's current organised innovation processes, even if one does not have in-depth knowledge of the technology that goes with the company's manufacturing processes and mechanical products.	Organisational Transformation (new skills and knowledge)
Insight 8	Fostering overarching servitization strategies creates product-service solutions beyond the company's current customer relationships, even if one does not have a deep understanding of the market or ecosystem in which it operates.	Creating Value
Insight 9	Focusing on overarching servitization could create value for both customers and end-users (columns 3a and 3b)	Creating Value
Insight 10	Digital Platforms knowledge and Future Visioning capabilities seem to be drivers for transitioning to servitization strategies.	Servitization Strategy
Insight 11	By pairing unbiased designers with experienced engineers, practical knowledge of the business is brought into the innovation process of product-service concepts leading to grounded outcomes.	Organisational Transformation (new skills and knowledge)
Insight 12	Involving unbiased strategic designers generates a broader and more future-oriented perspective on the B2B's strategic context.	Servitization Strategies
Insight 13	Involving unbiased strategic designers challenges 'Collaboration in a Network' with partners adding complementary skills and competencies.	Network Collaboration
Insight 14	Pitching skills are indispensable for convincingly presenting the value of new product-service concepts to management.	Organisational Transformation (new skills and knowledge)
Insight 15	To know more about the needs and behaviour of end-users, B2B manufacturing companies will need to organise on-site meetings to engage in end-user conversations.	Organisational Transformation (enabler)
Insight 16	Open-mindedness, acting independent from an organisational structure, and unawareness of unwritten rules or habits are success factors for overarching servitization.	Organisational Transformation (rethinking innovation process)
Insight 17	The company's organisational silos and its current innovation processes are potential barriers to an overarching servitization process: developing products combined with services.	Organisational Transformation (barrier)
Insight 18	The company's engineers developing (service) design skills (bringing them into a conscious competent mindset) are enablers for overarching servitization.	Creating Value
Insight 19	Adding seasoned strategic designers to the company's Innovate team will foster cross-pollination of strategic & service design competencies (soft skills) and enable overarching servitization.	Organisational Transformation (enabler)
Insight 20	Mixed teams of designers and engineers (combining soft and hard skills) foster end-user-driven product-service solutions.	Organisational Transformation (rethinking innovation process)
Insight 21	Nurturing strategic design capabilities will enable overarching servitization processes.	Organisational Transformation (new skills and knowledge)

4.5 — ARC 1.3 — Setting Up an In-House Design Team

To transfer product-service design knowledge and practices within the organisation, the company's *UX Design Manager* proposed the establishment of an *In-House Design Team (IHD Team)*, a multidisciplinary group comprising company employees and five external participants (master's students from the *Delft University of Technology, Faculty of Industrial Design Engineering*). An *IHD Team* operates as a start-up under the auspices of the hosting company.

4.5.1 — ARC 1.3 — Constructing

Building on the insights of *ARCs 1.1, 1.2*, and *1.3,* an *IHD Team* was formed to foster cross-pollination by sharing and transferring strategic design knowledge and skills within the team while working closely together as a unified force. External participants were considered unbiased towards the business domain of the company's *Airports* business unit, so we invited them to join the *IHD Team*. They contributed knowledge and skills in strategic and service design, while the company staff provided technical expertise and insights into the current product-service portfolio by assigning a *UX Designer* and a product manager from the *Airports* business unit to the design team. In *ARC 1.3*, we briefed the *IHD Team* to *'design a viable and desirable concept that improves the passenger arrival experience at the airport.'* We deliberately structured *ARC 1.3* as a start-up for two reasons.

First, we aimed for *ARC 1.3* to remain unaffected by the company's existing organisational structure and processes. To achieve this, we sought to detach the team members from the company's organisation as much as possible, thereby mimicking a start-up environment. This intervention was designed to demonstrate to the company what occurs when operations are conducted outside the established processes and rituals, or at least without bias towards them. Start-ups, characterised by their short lifespan, cannot rely on established innovation processes from the past. While their organisational structure is not yet fully defined, start-ups have proven capable of driving innovative and disruptive product-services. They maintain an open-minded approach, unencumbered by previous knowledge or skills. As they have not yet developed fixed routines for primary processes, such as product-service development, they create their own set of rules and work culture. This freedom allows them to explore new avenues and experiment with various methods and innovative approaches. In contrast, large corporations, like the company, often struggle to change and adapt to market conditions and emerging customer needs (Christensen, 2013). Due to their lack of a long history and their unique perspective on existing markets, start-ups frequently identify value propositions that larger companies have yet to recognise (Godin, 2008; Tzuo & Weisert, 2018).

Second, we aimed for the company's organisation to showcase how *overarching* product-service solutions can be developed by a diverse team. This team would incorporate in-depth knowledge of the current product portfolio from company engineers and fresh perspectives from external participants. By blending hard skills, such as engineering, with soft skills in strategic and service design, we wanted to investigate whether an overarching

customer perspective could thrive in a team enriched by unbiased external input, potentially leading to disruptive product-service innovation.

4.5.2 — ARC 1.3 — Planning Action and Taking Action

ARC 1.3 commenced in February 2019 and concluded in July 2019. The *IHD Team* convened weekly for three working days, alternating between two locations: the academic environment of *Delft University* and the company's engineering practice at its head office. This arrangement aimed to foster cross-fertilisation of knowledge within the multidisciplinary team, facilitating scheduled presentations to share interim results and update project stakeholders, including the *Airports* business project sponsor. The students dedicated three days a week to the project, while employees committed one day each week on Fridays when the entire team collaborated at the company's head office. On the other days, the students worked from Delft. The *UX Design Manager* and I provided support during bi-weekly sessions.

The team engaged potential customers through idea workshops and implemented design sprints and iterations to assess the minimal viable products (MVPs) developed using strategic design methods. They presented interim results to Airports business management for discussion and evaluation. At the project's conclusion, the team showcased the project outcome in the form of a *Pick-HUB* concept (see *Figure 4-7*) during the company's Innovation Day, a market event where innovation teams can register to display their progress and results to business unit managers and R&D colleagues.

4.5.3 — ARC 1.3 — Evaluating Action

In this evaluation phase, I reflect on the outcomes of the *IHD Team* efforts and my observations during the execution of the intervention, utilising the three forms of reflection from Mesirow's transformative learning framework: *content reflection, process reflection, and premise reflection* (Mezirow, 2003)*.*

Content Reflection

The design activities of the *IHD Team* have resulted in the creation of a *Pick-HUB* (see *Figure 4-7 — Pick-HUB Concept on a Long-Term Airport Parking*). The fundamental idea of the *IHD Team* is to distribute arriving passengers' suitcases through a network of hubs. This approach aims to enhance passenger flow towards the heart of the airport, thereby alleviating congestion at the traditional baggage belts in the arrival and departure halls and reducing passenger inconvenience and frustration. Market research conducted by the aviation industry indicates that passenger flows are expected to increase in the coming years, leading to further congestion if airports do not implement alternative product-service solutions for baggage handling on their premises.

Figure 4-7 — Pick-HUB Concept on a Long-Term Airport Parking (Foppen et al., 2019)

The *Pick-HUB* is designed as a self-service platform for arriving and departing airport passengers. As the *Pick-HUBs* are situated on the periphery of the airport, for example, near various parking areas, exit roads, in hotel lobbies, or on the platforms of railway stations, they directly address passenger needs in various travel contexts. The *Pick-HUB* can also be realised as a mobile hub that provides temporary service at major events or trade fairs (e.g. RAI Amsterdam Conference Centre).

Although the *Pick-HUB* was initially designed to improve the passenger experience around baggage retrieval, the *IHD Team* identified an opportunity to broaden the original brief and extend the scope of the solution to include drop-off services. They pushed the boundaries of the brief and were able to create additional value for passengers, airlines, and airports by combining drop-off and pick-up services in one solution.

Reflecting on the result of the *IHD Team*, I noticed that the team developed a product-service value proposition with a clear focus on the passenger, or as I defined it, a focus on the company's *overarching customer*. The team designed a service that alleviates the passenger's burden regarding luggage management during their journey. This pick-up and drop-off baggage service can be offered directly to the passenger (which makes it *overarching*) or organised in cooperation with the airport or airlines (the company's customers). To illustrate the team's *overarching* perspective, I quote a sentence from the reflection notes of one of the team members after the final presentation on *Innovation Day*: *'During Innovation Day, many employees were surprised that the focus of our hubs was on the passenger experience and not on the technical aspects of the product. Employees felt we had truly ventured outside the company's comfort zone (the technical bubble).'*

Insight 22: *Creating interventions to escape from the company's current technology-focused bubble can lead to surprising end-user (read 'overarching') focused product-service value propositions.*

As a navigation guide for further development of the *Pick-HUB* service solution, the *IHD Team* delivered a 3-horizon roadmap using Simonse's method (2018) to guide the organisation and implementation of the *Pick-HUB* concept as part of the company's servitization strategy. The roadmap visualised future *Pick-HUB* scenarios with principal sketches across the three horizons, aligning with the vision statement formulated by the team and reflecting a clear passenger perspective: *'Every journey is a seamless and carefree experience.'*

Process Reflection

It is worth considering whether an overarching customer approach would have taken shape had the same assignment been carried out by a team composed solely of company engineers. After all, they are accustomed to focusing primarily on technological solutions, and I expect they would have taken a technical angle to address the problem of the airport arrival experience.

The *Pick-HUB* concept presented does not address the underlying technology needed to make it work. The team deliberately omitted *technical feasibility* because a) there were no mechanical engineers on the team, and b) they assumed that the company's R&D team would be better suited to solve this. In their report, the team wrote: *'The company asked the IHD Team to provide an understanding of product-services desired by passengers and solutions that are valuable for the company.'* The focus on customer value (for the company's customers) and passenger value (for the company's customers' customers) was clearly reflected in the *IHD Team's* project process, which firmly concentrated on passenger *desirability* and commercial *viability* of the service solution to be created rather than technical *feasibility*.

Insight 23: Shifting the technical feasibility focus to customer value focus creates in innovation teams fosters new service solution directions.

Reflecting on the *IHD Team's* design process, I observed the five servitization perspectives (Bluemink et al., 2020) reflected to varying degrees in the *Pick-HUB* service solution (see *Table 4-6 — Five Servitization Lenses on Pick-HUB Service Solution*).

In the service sector, customer satisfaction is a crucial measure of service quality. In the airline industry, customer satisfaction plays an increasingly important role in the pursuit of ever-improving passenger service. The company's customers are, on the one hand, the airports that purchase the baggage handling systems, and on the other hand, the baggage handlers who utilise these systems. Ultimately, every service action in the aviation industry must benefit the end customer, the passenger. In their design process, the *IHD Team* investigated which (latent) passenger needs exist and whether the solution provides added value that encourage the passenger to contribute value upstream into the stakeholder value network (see *Figure 4-8 — Extended Stakeholder Overview Related to the Passenger Arrival Experience*). In other words, the team considered how to construct a *Pick-HUB PSS* and *'servitize'* a service value proposition from which all stakeholders could derive value.

Insight 24: The company's IHD Team 'servitized' product-service solutions that create value for end-users by investigating (latent) end-user needs.

Table 4-6 — *Five Servitization Lenses on* Pick-HUB *Service Solution*

1	2	3		4	5	
Business Models	Organisational Transformation	Value Creation		Network Collaboration	Servitization Strategies	
		a	b		a	b
		for Customer	for End-User		Digital Platform	Future Visioning
±	√	√	√	√	⊗	√
√ = *Completely covered*		± = *Partly covered*			⊗ = *Not covered*	
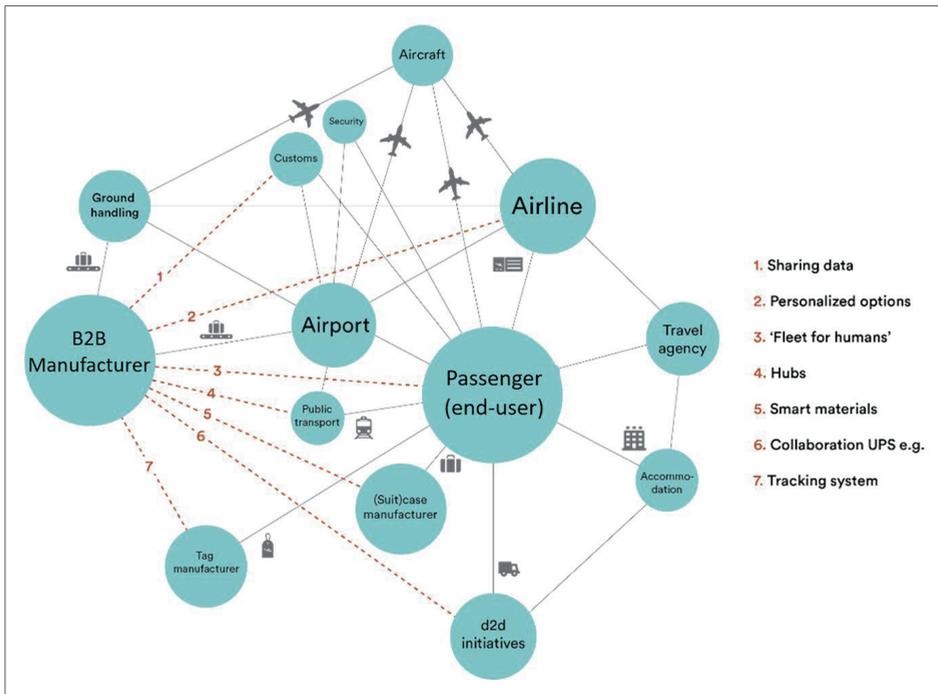
Figure 4-8 — *Extended Stakeholder Overview Related to the Passenger Arrival Experience (Foppen et al., 2019)*

The *Value Creation* perspective received significant attention from the start of the project. The team consistently focused on passenger behaviour and hidden needs, questioning what customer value the company should realise with the new service solution. Understanding passengers' needs was part of the company's briefing to the team; however, I observed that the team intuitively adopted an *overarching* approach due to their strong passenger focus from the outset.

In the final report (Foppen et al., 2019, p.12), the team concluded: *'In their current business model, the company barely considers the actual air travel end-users, who are facilitated by the company's baggage handling systems. This is a virtually unknown area for them.'* Consequently, the team began sending out surveys to travellers and conducted interviews with arriving passengers at the airport to identify the different types of passengers, their travel motivations, and their latent needs. Regarding Collaboration in a Network, the team performed a stakeholder analysis that extended beyond the usual company stakeholder relationships, such as airports and airlines. They examined a broader circle of stakeholders (public transport, customs, security, baggage carriers' competition) and potential stakeholders (hotel chains, travel agencies, and the event & trade fair business). They also identified potential cooperation partners with an overview of existing and competitive baggage services (door-to-door and door-to-airport, see

Figure 4-8). I concluded that this approach enlarged their solution space and anticipated product-service solutions that could be implemented in collaboration with network partners as confirmed in their final report (Foppen et al., 2019, p.6). They stated, *'As the aviation industry consists of a network of multiple stakeholders, the identified pain points and improvements in the passenger arrival process will therefore affect multiple - stakeholders. Therefore, the result delivered must add value to all stakeholders involved.'* This statement led to my insight that adopting a broader stakeholder perspective, beyond the company's obvious stakeholders, enables overarching service innovation within a *PSS*.

Insight 25: A stakeholder analysis that goes beyond the usual value chain relationships opens opportunities for overarching service innovation in a networked collaboration with new ecosystem partners.

The team has developed several *Pick-HUB* scenarios. However, for the Business Model, they focused on a scenario at P3 of Schiphol Airport. Due to confidentiality, the team was not permitted to analyse the revenue model of the Schiphol Parking Service and, therefore, could not produce a reliable calculation of the *Pick-HUB* business case. Based on the current parking tariffs (entry tariff € 80 + € 8.50/24 hours), the team expects a viable business case to be drawn up in which the baggage service is an integral part of the P3 parking service fee. By creating multiple product-service scenarios with various partners collaborating in an ecosystem, they demonstrated the business potential to the company, not by proposing one specific customer solution but by suggesting different *PSS* scenarios.

The *Pick-HUB* service solution assumes that the passenger books their baggage service through a smartphone app that, in the background, processes service bookings and transactions between the participating ecosystem partners. The app presumes the development of a *Digital Platform* (part of the *Servitization Strategy* perspective), but the team considered this outside its project scope.

Through the lens of *Organisational Transformation* and *Servitization Strategies*, the team created a *service innovation toolkit* for *Pick-HUB* that the company's account managers, as ecosystem orchestrators, can use as an *Overarching Servitization* conversation starter to inspire their customers and discuss customised baggage pick-up and drop-off service

concepts in the aviation business (current customers) and the hospitality, business, events, and trade fair sectors (new customers).

Premise Reflection

The project was set up as a start-up, separate from the formal organisational structure for innovation, with unbiased strategic designers as team members from outside the company. I observed that the team took a different approach than the company's *Innovate* department did. Moreover, five of the seven team members came from outside the organisation, were unbiased, and therefore were not hindered by the company's culture, development traditions, and airport business conventions. This led me to understand that unbiased thinking outside the current B2B ecosystem boundaries creates a broader solution space (like the *IHD Team* did as it described in *Section 4.5.3 - Content Reflection*) and fosters and enables *overarching* service innovation.

Insight 26: Unbiased thinking beyond the current B2B ecosystem boundaries creates a wider solution space and fosters and enables overarching service innovation.

On the downside, I recognised that the organisation viewed the *IHD Team* members as outsiders. This was the premise of *ARC 1.3* from the start: let's see if service innovation through a start-up approach delivers out-of-the-box solutions. Like an external agency, the team struggled to gain commitment for their proposals. One team member captured this well by writing: *'…the expectations from each other (BB: the company and the IHD Team) might have been too different. During the sprint meetings, it sometimes felt like we really had to win them over. I felt more like an outsider within the company.'* Every Friday, the team worked together in the company's head office. On the other days, the students worked from Delft. Spending just one day a week in the company's head office also meant that the team was not very visible within the organisation and, partly as a result, did not create enough buy-in for their results. My takeaway is to ensure the team, and its intermediate results are more visible throughout the entire project journey.

Insight 27: Although a start-up approach can deliver innovative service solutions, the project team needs to gain buy-in during the project by presenting intermediate results to create commitment in the organisation.

Reflecting on the composition of the team, I realised that the team members had not worked together before. Since they did not know each other well enough, the team started rather ad hoc and did not make a flying start. During the project, I discovered there was insufficient alignment within the team regarding the project goal. I also read this in the students' reflections. I learned from this that better team onboarding promotes team dynamics, ensures better communication and alignment with the rest of the organisation, and enables better team collaboration. As one student from the team put it: '*Next time in the project, I will make sure to understand everyone's expectations and desired approaches instead of assuming everyone is doing and thinking in the same way.'* I observed that the cooperation within the mixed team did not always run well because the expectations of what the project should deliver differed. It sometimes felt like I was looking at two teams. This observation was an important lesson for me. I underestimated the importance of carefully putting together a balanced multidisciplinary team and the team dynamics that

this could create. On the one hand, there were the students who wanted to prove themselves as designers of *PSSs* and were fighting for their position within an organisation that still needed to understand their way of working. On the other hand, I talked to the two company employees who sometimes felt excluded by the students' attitude and thought that the students were not making enough use of the expertise within the company. My lesson is that working with a multidisciplinary team can work well, provided the onboarding is better organised and the mutual expectations regarding the project goal and scope are better managed from the start.

Insight 28: The team onboarding process must be done carefully to assure a proper alignment of project goals, project scope and team member expectations.

What worked well were the intermediate sprint meetings in which the team presented the intermediate results of the design sprints, and the company stakeholders could give their feedback. Noteworthy in this context is an observation by one of the students who said: '*'the company is not a company that is really openly sharing its feedback. During the sprint sessions, we, therefore, did not gain the valuable insights and feedback we have collected.'* This may be because sprint meetings were new to the company, and people did not know what to expect. Or maybe they felt insecure towards the students regarding the product-service concepts presented. It may also have something to do with the company's work culture. At the company, I observed that everyone was busy and rushed from meeting to meeting. I can imagine that the company employees, because of their busy schedules, have not always been able to prepare appropriately for the sprint meetings and to give valuable feedback. The inexperience of the students in the *IHD Team* also played a role, which meant they did not manage the expectations of the sprint meetings well. However, a correct way of agile working during sprint meetings ensures that the mutual expectations of the project stay consistent. Therefore, I think we should build the agile principle into the projects and workshops by default because it enables mutual team alignment and synchronised project goals at each sprint interval.

Insight 29: An agile way of working fosters intermediate alignment on team expectations and project goals.

During the company's *Innovation Day,* the team enthusiastically presented the *Pick-HUB*. The idea behind organising the company's innovation day is that the entire organisation can learn about current innovation projects. During this day, the *IHD Team* harvested enthusiasm and appreciation for the *Pick-HUB* service solution. The director of *Airport Solutions*, the product manager and the *UX Design Manager* confirmed that the *Pick-HUB* has potential for an application at one of the company's key accounts. They planned to present the concept to Schiphol Airport at a next client meeting.

After the project's conclusion, I noticed that the project seemed to have fizzled out. Apparently, there was not enough traction and motivation within the organisation to take up the project result, further engineer it and commercialise it. This raised a number of questions for me that are worth exploring further in subsequent interventions.

- Could it be that we have not yet been able to effectively demonstrate, structure, and embed overarching product-service innovation within the organisation?
- Did the project lose attention because it was not yet included in the company's innovation agenda?
- Perhaps the project was seen as a one-off initiative with low priority, causing the organisation to return to its existing innovation routines and the demands of day-to-day operations. Did the organisation revert to its established structure because the project did not fit with the current innovation processes?
- Did the company lack a product champion—an individual who takes ownership of the product, advocates for its early concept, and is dedicated to ensuring its place on the innovation agenda and within the company's strategic plan?
- Could the company lack an action repertoire (Bergema, 2016)—a set of tools and procedures necessary to advance early-stage projects of this nature?
- Is there a significant gap between the company's domain and that of industrial designers that hinders effective communication and mutual understanding between the two?
- Perhaps the company viewed the project primarily as a student initiative and assigned it a priority as a result?

It was disappointing that the company did not advance the *Pick-HUB* project, leaving seven unanswered questions.

4.5.4 — ARC 1.3 — Concluding on Insights

To conclude *ARC 1.3*, I discovered enablers for overarching product-service innovation within multidisciplinary teams. The careful composition of a multidisciplinary team contributes to the project's quality and results. Agreement on project purpose and scope ensures better team and organisational alignment. The visibility of the team and its intermediate project results is essential for creating buy-in within the company's organisation.

I gained eight additional insights about overarching service innovation that contribute to answering my research question and categorised them according to the five perspectives of servitization: *Business Models, Value Creation, Organisational Transformation, Network Collaboration* and *Servitization Strategy,* and summarised them in *Table 4-7.*

Table 4-7 — Summarising the Insights Identified in ARC 1.3

Insight #	Insights Identified in ARC 1.3	Servitization Lens
Insight 22	Creating interventions to escape from the company's current technology-focused bubble can lead to surprising end-user (read 'overarching') focused product-service value propositions.	Organisational Transformation (rethinking innovation process)
Insight 23	Shifting the technical feasibility focus to customer value focus fosters new service solution directions.	Servitization Strategies
Insight 24	The company's IHD Team 'servitized' product-service solutions that create value for end-users by investigating (latent) end-user needs.	Creating Value
Insight 25	A stakeholder analysis that goes beyond the usual value chain relationships opens opportunities for overarching service innovation in a networked collaboration with new ecosystem partners.	Network Collaboration
Insight 26	Unbiased thinking beyond the current B2B ecosystem boundaries creates a wider solution space and fosters and enables overarching service innovation.	Organisational Transformation (rethinking innovation process)
Insight 27	Although a start-up approach can deliver innovative service solutions, the project team needs to gain buy-in during the project by presenting intermediate results to create commitment in the organisation.	Organisational Transformation (enabler)
Insight 28	The team onboarding process must be done carefully to assure a proper alignment of project goals, project scope and team member expectations.	Organisational Transformation (team alignment)
Insight 29	An agile way of working fosters intermediate alignment on team expectations and project goals.	Organisational Transformation (team alignment)

4.6 — ARC 1 — Concluding Insights & Design Criteria for Follow-Up ARCs

In this section, I conclude on ARC 1, which encompasses the three sub-*ARCs 1.1, 1.2,* and *1.3.* In line with Coghlan's (2019) methodology, these cycles represent the research *on action* phase of the study, in which the researcher observes and analyses existing organisational practices before moving to more intervention-oriented research *in action.* The purpose of *ARC 1* was therefore diagnostic: to investigate how innovation processes were currently organised within the focal firm, to surface underlying assumptions, and to identify both opportunities and constraints to pursue an *overarching servitization* transition.

Across the three *sub-ARCs*, 29 insights were generated that provide an empirical foundation for understanding the organisation's readiness and limitations in moving towards servitization. These insights were not considered in isolation; rather, they were systematically categorised into five servitization lenses—*Business Models, Value Creation, Organisational Transformation, Network Collaboration,* and *Servitization Strategy*. By framing the findings through these lenses, the analysis bridges empirical observations with theoretical constructs, thereby creating a structured basis for the subsequent design of interventions. This categorisation marks the transition from diagnostic observation to informed action: the insights distilled in *ARC 1* not only highlight the multi-dimensional challenges inherent in servitization but also guide the strategic orientation of the next action research cycles *(ARCs),* where targeted interventions will be designed and implemented.

This section presents insights related to the perspective of the end-user, focusing solely on those insights associated with the *overarching servitization* lens. *Table 4-8* presents our insights from the three *ARCs 1.1, 1.2,* and *1.3* and categorises them into servitization lenses. We use these insights as design criteria for developing interventions for the next *ARCs* discussed in the following chapters.

Table 4-8 — End-User Related Insights – Design Criteria Examined Through the Lens of Overarching Servitization

Insight #	Insights Identified in ARCs 1.1, 1.2 and 1.3	Servitization Lens	Overarching Servitization Lens
Insight 8	Fostering overarching servitization strategies creates product-service solutions beyond the company's current customer relationships, even if one does not have a deep understanding of the market or ecosystem in which it operates.	Creating Value	End-User related insights
Insight 9	Focusing on overarching servitization could create value for both customers and end-users	Creating Value	End-User related insights
Insight 15	To know more about the needs and behaviour of end-users, B2B manufacturing companies will need to organise on-site meetings to engage in end-user conversations.	Organisational Transformation (new skills and methods)	End-User related insights
Insight 18	The company's engineers developing (service) design skills (bringing them into a conscious competent mindset) are enablers for overarching servitization.	Creating Value	End-User related insights
Insight 20	Mixed teams of designers in addition to engineers foster end-user-driven product-service solutions.	Organisational Transformation (alignment of teams)	End-User related insights
Insight 22	Creating interventions to go beyond the technology-focused innovation context can lead to end-user focused product-service value propositions.	Organisational Transformation (rethinking innovation process)	End-User related insights
Insight 23	Shifting the focus from technical feasibility to end-user value fosters new service solution directions.	Servitization Strategy	End-User related insights
Insight 24	The company's IHD Team 'servitized' product-service solutions that create value for end-users by investigating (latent) end-user needs.	Creating Value	End-User related insights

The insights from *ARCs 1.1, 1.2,* and *1.3* highlight the necessity of an *overarching servitization* strategy that moves beyond technological innovation and internal expertise. Instead, it should prioritise end-user engagement, cross-disciplinary collaboration, and value creation. Two key insights were identified from *Table 4-8* regarding the *Overarching Servitization* lens:

1 — Deepening end-user engagement for developing product-service value propositions.

For servitization to be effective, organisations must develop a structured approach to understanding end-user needs beyond their immediate customers. The following insights highlight critical actions:

- Engaging with end-users directly: B2B manufacturing companies need to organise on-site meetings and direct conversations with end-users (*Insight 15*).

- Investigating latent needs: Proactively researching and identifying hidden user challenges leads to stronger *'servitized'* product-service solutions (*Insight 24*).
- Shifting from technology-driven to end-user-driven innovation: Moving beyond technical feasibility allows for service innovation that directly enhances end-user value (*Insight 23*).

2 — Enhancing organisational capabilities for overarching servitization.

To fully integrate servitization, companies must equip teams with new skills and adopt cross-functional collaboration:

- Developing service design skills among engineers in the Innovate department: Encouraging engineers to develop a conscious, competent mindset in service design enhances servitization potential (*Insight 18*).
- Fostering multi-disciplinary teams: Integrating designers alongside engineers enables the creation of user-driven product-service solutions (*Insight 20*).
- Expanding the strategic scope beyond current business contexts: Servitization should not be limited to existing customer relationships but extend into new business domains, even with limited prior knowledge (*Insight 8*).

A successful *overarching servitization* strategy requires a shift in mindset: from technology-driven innovation to value-driven, end-user-focused solutions. This transformation depends on deep end-user engagement, a conscious effort to integrate service design into engineering, and cross-functional collaboration to align innovation with real-world needs. By embedding these principles, the organisation can ensure sustainable servitization that delivers long-term value for both customers and end-users.

4.6.2 — ARC 1 — Future-oriented Overarching Servitization Strategies

We aim to position the company for the development of a strategic, overarching approach to servitization.

Table 4-9 summarises insights identified in *ARCs 1.1, 1.2,* and *1.3,* emphasising the need for a long-term, future-oriented approach to servitization, rather than focusing on short-term innovation projects. This requires the organisation to embed strategic foresight and adopt ecosystem and platform thinking to enhance its resilience against nascent or unforeseen future end-user context scenarios. Additionally, it calls for establishing long-term overarching strategies that prioritise future-oriented product-service value propositions for end-users.

Insight #	Insights Identified in ARCs 1.1, 1.2 and 1.3	Servitization Lens	Future Lens
Insight 1	The Innovate Department focuses on short term innovation projects.	Servitization Strategy	Future Strategy related insights
Insight 4	The practical absence of 'Execute Ideation' activities is a barrier to formulating and implementing longer-term servitization strategies.	Servitization Strategy	Future Strategy related insights
Insight 5	Our assumption is that exploring a forward-looking business perspective that includes service innovation leads to a Flight Plan for a longer term.	Servitization Strategy	Future Strategy related insights
Insight 7	Using Strategic Design Roadmapping fosters overarching servitization strategies through future visioning of product-service solutions 'from the end-users' point of view'. Going beyond the company's current organised innovation processes, even if novice strategic designers do not have in-depth knowledge of the technology that goes with the company's manufacturing processes and mechanical products.	Organisational Transformation (new skills and methods)	Future Strategy related insights
Insight 10	Digital platform knowledge and future visioning capabilities seem to be drivers for transitioning to servitization strategies (columns 5a and 5b).	Servitization Strategy	Future Strategy related insights
Insight 12	Involving novice strategic designers generates a more future-oriented perspective on the B2B industry's context.	Servitization Strategy	Future Strategy related insights
Insight 25	A stakeholder analysis that goes beyond the usual value chain relationships opens up opportunities for overarching service innovation in a networked collaboration with new ecosystem partners.	Network Collaboration	Future Strategy related insights

Three overarching insights arose from regarding the *Future Strategy* lens:

1 — Overcoming Short-Term Thinking in Innovation

A key barrier to effective servitization is the short-term focus of innovation efforts (*Insight 1*). The absence of *'Execute Ideation'* activities (*Insight 4*) prevents the organisation from formulating long-term strategies. To overcome this, companies must:

- Develop structured, long-term design roadmaps to support the *overarching servitization* process.
- Encourage forward-looking service innovation to guide business development (*Insight 5*).
- Expand the scope of innovation processes beyond immediate technological constraints, allowing for more radical transformations (*Insight 7*).

2 — Embedding Future Visioning in Organisational Transformation

- The organisation should integrate the *Strategic Design Roadmapping* method (*Insight 7*) to foster future-oriented servitization strategies. This approach ensures

that product-service innovation is developed from the end-user's perspective, rather than being driven solely by internal technological knowledge and expertise.

- Novice strategic designers can play a key role in challenging existing industry norms and introducing new perspectives on end-user needs and behaviours (*Insight 12*).

3 — Leveraging Digital Platforms and Ecosystem Thinking

The transition to servitization requires new digital capabilities and expanded stakeholder networks:

- Digital platform knowledge and future visioning capabilities are crucial for enabling servitization strategies (*Insight 10*).
- A broader stakeholder analysis that extends beyond traditional business relationships can unlock new service innovation opportunities through network collaboration (*Insight 25*).

To ensure *overarching servitization*, the companies must shift from a reactive, technology-driven approach to a proactive, ecosystem-driven strategy. This transformation depends on:

- Institutionalising long-term servitization planning,
- Embedding strategic foresight into organisational processes, and
- Leveraging digital tools and ecosystem collaboration to enable future-ready product-service innovation.

By integrating these principles, the company can develop resilient, forward-thinking *overarching servitization* strategies that extend beyond immediate market constraints and drive long-term value creation.

5

Knowing is not enough; we must apply.
Willing is not enough; we must do.

Johan Wolfgang von Goethe

Chapter 5 — Action Research Cycle 2 — Ideating and Designing an 'Overarching Servitization Strategy' Process

5.1 — ARC 2 — Introduction

Chapter 4 outlined our investigation of servitization within the focal organisation, a technology-driven B2B manufacturer. We examined how the organisation develops new products, services, and integrated offerings through its innovation processes within the existing organisational structure. To enhance our understanding of designing product-service value propositions, we conducted *ARCs 1.1, 1.2,* and *1.3*, which focused on interventions for *overarching servitization*—designing products or installations linked to services that generate value for end-users. As *ARC 2* built on the findings from *ARC 1, we synthesised 29 insights through servitization perspectives, which formed the basis for the criteria that guided the initiation of ARC 2*.

In *ARC 2,* I acted as a live reporter, conveying to the reader what we (as the action research team) experienced, how we reflect on the organisation's innovation processes, and what interventions we intend to design and test. I described the section *'Taking Action'* in the present tense to engage the reader in our experiences and findings as they occur (*in* the action).

Next *Section 5.2* begins with the *preliminary step* of defining the purpose and context of *ARC 2,* explaining why it is necessary. In the subsequent *Sections 5.3, 5.4, 5.5,* and *5.6),* I discuss successive phases of Coghlan's (2019) framework. *Section 5.7* presents our insights and conclusions.

5.2 — ARC 2 — Preliminary Step — Defining Purpose and Context of ARC 2

The purpose of *ARC 2* was to design an *Overarching Servitization Strategy* process that helps address the research questions as outlined in *Chapter 2*. During our preparation discussion for *ARC 2*, the *Strategic Design Manager* and I reviewed 29 insights presented in *Chapter 4*. We used these insights as a foundation for *ARC 2,* organising them into design criteria for the interventions we will implement: *Organisational Transformation, Strategic & Service Design Capabilities, Exploration & Future Visioning, Creating Value for End-Users, and Network Collaboration.* Below is a summary of the formulated design criteria.

5.2.1 Organisational Transformation

In our discussion about the organisation of the innovation process, we contended that any interventions should not disrupt the existing organisational structure (*Insight 6*). The *IHD Team* indicated that working outside established structures can provoke resistance from management (*Insight 27*). We wanted to avoid this, as debates over structure can hinder improvements in the service innovation process. Simultaneously, we observed that current organisational silos obstruct the cross-fertilisation of ideas (*Insights 17* and *19*). Nonetheless, fostering open-mindedness, moving beyond a solely technology-driven approach, breaking down organisational silos, and challenging unwritten rules and habits

within the innovation process are success factors for *overarching servitization* (*Insights 16* and *22*).

5.2.2 Strategic & Service Design Capabilities

Our observations indicated that the focal organisation's innovation processes did not adequately support strategic design and service innovation activities. It was therefore essential to integrate these activities into our interventions and to further develop the skills and capabilities of the innovation teams (*Insights 3* and *11*). As previously reported in *Chapter 4*, my analysis of 56 so-called *Innovate Projects* revealed that the majority were technology-driven, with only four projects showing any connection to service innovation. The use of strategic design methods enabled us to explore future business contexts from the end-user perspective (Bouman & Simonse, 2023; Simonse, 2018) and to formulate value propositions for the customer-of-the-customer (*Insights 7* and *21*).

We contended that, to better understand the behaviour and latent needs of customers and end-users in a future context, it was necessary to create interventions that actively engaged them in the product–service innovation process (*Insight 15*). This assumption was supported by how the organisation's innovation processes had evolved in the past. However, we concluded that the organisation was not, at that time, adequately equipped for service innovation and lacked sufficient service design capabilities. Through our interventions in *ARC 2*, we sought to increase the organisation's focus on service innovation by redesigning the existing innovation process and strengthening its service design capabilities.

Assembling multidisciplinary teams that combined designers with strong soft skills and tech-driven engineers with technical expertise fostered a multi-perspective approach to innovating end-user product–service value propositions (*Insight 20*). We contended that unbiased strategic designers could develop innovative product–service solutions, even without in-depth knowledge of the technologies embedded in the company's manufacturing processes and mechanical products. Including experienced strategic designers in the Innovate team promoted the cross-fertilisation of strategic and service design competencies and supported the advancement of *overarching servitization* (*Insights 7* and *18*).

A team comprising unbiased strategic designers and seasoned engineers successfully integrated practical service design knowledge into the innovation process for product–service concepts, resulting in solutions that extended beyond the boundaries of the existing business context. We concluded that open-mindedness, independence from organisational structures, and a disregard for unwritten rules and routines within the current business environment were essential success factors for enabling *overarching servitization* (*Insight 20*).

Given the multidisciplinary nature of the team, it was crucial to manage mutual expectations at the outset of the project and to develop a shared mental model regarding its goals and scope (*Insight 28*). We also argued that these principles applied equally to expectation management beyond the immediate team, as securing buy-in and

commitment from both management and the wider organisation was vital for the success and continuity of the servitization initiatives (*Insight 27*).

5.2.3 Exploration & Future Visioning

The manufacturer's organisation was primarily focused on short-term projects planned within a one- to two-year timeframe (*Insight 1*) and lacked established processes for long-term planning beyond a three- to five-year horizon (*Insights 4* and *5*). As demonstrated in Chapter 4, the implementation of strategic design methods encouraged a more forward-looking perspective, extending beyond immediate concerns and the company's current business context (*Insights 12* and *23*).

Through the interventions conducted in ARC 2, we sought to establish processes for identifying and analysing emerging trends and developments, and for constructing future-oriented scenarios covering longer timeframes. This approach enabled the organisation to uncover opportunities for new product–service offerings and to better prepare for an increasingly uncertain and dynamic future.

5.2.4 Creating Value for End-Users (Overarching Perspective)

As a typical B2B manufacturer, the organisation primarily focused on its direct customers, often overlooking the needs of the customer-of-the-customer. Although a *UX Design* department was established in 2017 and later integrated into the innovation department to enhance customer value, substantial progress remained limited. Our preliminary research indicated that strategic design methods had the potential to support *overarching servitization* strategies by revealing latent and unmet customer needs within future business contexts, and by articulating visions for product–service solutions from the end-user's perspective (*Insights 9* and *24*).

Strategic designers were able to develop solutions that extended beyond the company's immediate business context, even in the absence of deep technical knowledge of the manufacturing processes and mechanical products involved (*Insight 8*). Through the interventions conducted in *ARC 2,* we explored how service innovation processes could be designed in ways that better enabled the organisation to create value not only for its direct customers, but also for the customer-of-the-customer.

5.2.5 Network Collaboration

The interventions of *ARC 2.1* illustrated how unbiased strategic designers could facilitate *overarching servitization* by co-developing product–service solutions with business partners operating outside the organisation's current context—partners who contributed complementary skills and capabilities (*Insight 13*).

Collaboration within a networked structure enables all actors in the ecosystem to derive value from a shared revenue model. As no single partner possesses the full range of capabilities or resources required to deliver a compelling value proposition to end-users, participating organisations rely on their complementary strengths to unlock new business opportunities and strengthen their collective resilience. By extending stakeholder analysis

beyond traditional, dyadic business relationships, organisations can identify opportunities for developing service value propositions through networked collaboration with previously unengaged ecosystem partners (*Insights* 25 and 26).

Within *ARC 2*, we investigated how to design and implement interventions that support the organisation of such networked collaborations in the development of *PSEs*.

5.3 — ARC 2 — Constructing Action

ARC 2 was designed to examine and critically assess the existing innovation process, while also exploring alternative scenarios for organisational and procedural transformation to support the development of service design capabilities. The interventions conducted within this cycle were informed by four sets of design criteria that had been developed during the preliminary step (see *Section 5.2*), which served as the foundation for structuring the intervention design. *ARC 2* consisted of three interrelated sub-cycles (*ARCs 2.1, 2.2,* and *2.3*), each building on the findings and reflections of the previous one. This sequential structure enabled a cumulative learning process, in which each *ARC* generated new insights that were integrated into the design and implementation of the next. Through this iterative progression, *ARC 2* contributed to a nuanced understanding of the conditions necessary for embedding service design practices within the organisation.

5.4 — ARC 2 — Planning Action

In the *Planning Action* phase, we scheduled the following action research sub-cycles: *ARC 2.1, ARC 2.2, and ARC 2.3*.

- *ARC 2.1* – Reviewing the innovation process and identifying process gaps.

  - Participants**:** Action researcher and *Strategic Design Manager* (formerly *UX Design Manager*)[2].
  - *Intervention type:* Two whiteboard sessions.
  - *Tools*: A whiteboard to sketch and capture our thoughts to discuss, reflect and evaluate.
  - *Working method*: Analysing the current innovation processes during a question-and-answer conversation in which we reflect on the '*why'* and *'how'* of the focal manufacturer's innovation processes. We try to find out why these processes are the way they are, and what works well or does not work well. Inspired by the intervention design criteria of *Section 5.2*, we try to identify gaps in the current innovation process.
  - *Timing:* Q3 2019.

- *ARC 2.2* – Ideating and drawing outlines for an enhanced product-service innovation process.

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[2] As UX design activities became integrated into the innovation teams at the start of *ARC 2*, the *UX Design Manager's* role shifted towards a more strategic orientation, resulting in a redefinition of the position as *Strategic Design Manager*.

- o   Participants: Principal action researcher, *Strategic Design Manager*, and a *Strategic Designer*.
- o   *Intervention type:* One whiteboard session.
- o   *Tools*: A whiteboard to sketch and capture our thoughts to discuss, reflect and evaluate.
- o   *Working method*: We ideate on enhanced innovation processes to address the gaps we found during a question-and-answer conversation in which we reflect on the insights of *0*, inspired by the intervention design criteria of *Section* 5.2. Drawing our first ideas of about the activities taking place in the enhanced product-service innovation process
- o   *Timing:* Q4 2019.

- •   *ARC 2.3* – Experimenting and piloting interventions for an *Overarching Servitization Strategy Process* to embody the *Explore* phase.

  - o   Participants: Principal action researcher, *Strategic Design Manager*, a *Strategic Designer* and a *UX Designer*.
  - o   Intervention type: Four workshop sessions.
  - o   *Tools*: A glass wall, Post-it® notes and *Miro™* digital boards to set up the enhanced product-service innovation process and outline related activities for the different workshops.
  - o   *Working method*: We generate ideas and experiment with workshop interventions to enhance the *Explore* phase of the product-service innovation process, guided by the intervention design criteria outlined in *Section 5.2*.
  - o   *Timing*: Q2 & Q3 2020.

5.5 — ARC 2.1 — Reviewing the Innovation Process and Identifying Process Gaps

5.5.1 — ARC 2.1 — Taking Action

The *Strategic Design Manager* and I start by analysing the current innovation process and determining which departments and roles are involved. Practising Schön's (1984) *Reflection-on-Action*, we engage in reflective conversations about the manufacturer's innovation phases. In a question-and-answer format, we examine the *how* and the *why* of these innovation phases, exploring their nature and identifying what works and what does not. We challenge each other to consider new ways of thinking. For this, we use a whiteboard to outline our thoughts and ideas, discussing them *in action*—evaluating them in real time (see *Figure 5-1).*

In June 2019, management launched the *Continuous Acceleration Programme* to implement the manufacturer's growth strategy. This included a new phasing of the product-service innovation process and a revised division of roles among the involved departments. In a whiteboard session, the *Strategic Design Manager* explains how the current innovation process has evolved since the *Continuous Acceleration Programme*. She outlines the structure of the *Technology* business unit, which comprises three departments: *Systems Architecture*, *R&D,* and *SCITS* (see *Figure 5-1).*
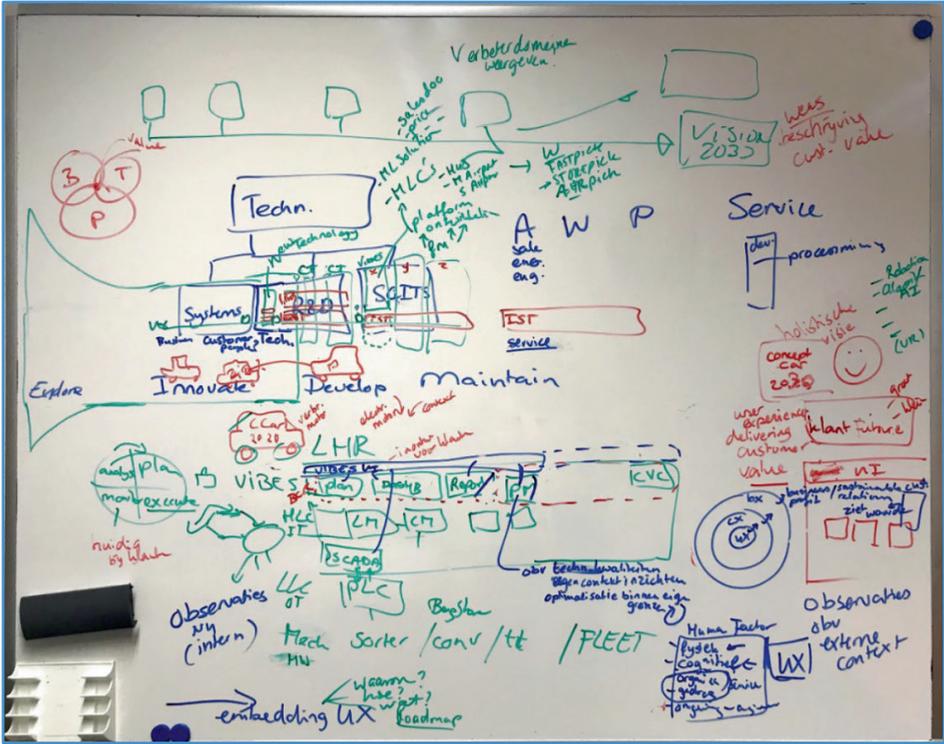
Figure 5-1 — Whiteboard Drawing to Explore Organisational Structure

The *Systems Architecture* department develops new product-service platform solutions. *R&D* is responsible for creating product configurations based on the product and platform architecture devised by *Systems Architecture*. The *Software Centre of Information Technological Solutions (SCITS)* develops operations technology *(OT)* that enables the logistics systems to operate and communicate utilising IT applications for data exchange. Implementing the manufacturer's *Business Growth Strategy*, rolling out the *Continuous Acceleration Programme*, and shifting the development strategy to configure-to-order led to changes in the innovation process, resulting in restructured departments and altered roles for employees.

The *Strategic Design Manager* explains how the three phases *Innovate*, *Develop*, and *Maintain* are conceived and should work (see *Figure 5-2*). In the Innovate phase, the R&D engineers develop new products, new features for existing products, and new technologies as catalysts for new product-services. The core of the Innovate process is 'making the right things,' which means designing new products by building on existing ones and adding new functions and modules. The role of the R&D department is to facilitate this process and act as a test lab where ideas for new functions and product modules are developed into an initial concept, demonstrated with a proof-of-principle. In parallel with the technical feasibility review, the product managers of the Airports business unit explain

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the benefits to customers and attempt to align the conceived value proposition with customer needs.

Once the *Innovate* phase has demonstrated technical feasibility and the *Airports* business unit has proven the viability of the conceived value proposition, *R&D* proceeds with its further development in the next phase: *Develop*. In this phase, the *R&D* department starts developing a technical solution by engineering the concept idea into a working prototype and should be able to *'making it right'* since the technical feasibility has been proven in the *Innovate* phase, lowering the risks of failure in further development. The final development phase often includes a customer launch to ensure that the new product-service delivers the desired value and meets customer expectations.

Maintain is the final phase in the development process and focuses on *'making it the right way'* to optimise the performance, quality, longevity, and reliability of products and services, along with reducing production costs. The *Maintain* phase involves updating the existing product portfolio and expanding maintenance service propositions for the installed base of products.

Innovate *'making the right things'*

Develop *'making it right'*

Maintain *'making it the right way'*

Figure 5-2 — Phases of the Current Development Process

Another point we are discussing is the role of UX (user experience) in relation to the product-service innovation process. The UX department was set up in 2017 to take more account of the (end) user interest during the product development process. To cover the user perspective in their projects, the *Strategic Design Manager* explains that UX designers can be consulted by the product development teams, especially regarding user interface design and testing. Product development is often already at an advanced stage whenever UX input is requested; making valuable adjustments from a UX perspective is often a bygone stage. As of April 2019, UX engineers jointly form the *UX Competency* team and are assigned as product development team members from the start of each project. However, the hardware engineers still need to get used to the added role of *UX Design* in their projects. Nevertheless, the *UX Design Manager* considers integrating the UX function into the development teams a good development because it better secures a broader user perspective during the product-service concept phase. With the integration of *UX Design* activities into the product development teams, the role of the *UX Design Manager* has also changed to that of *Strategic Design Manager*.

In the second whiteboard session of *ARC 2.1*, we continue discussing the three phases, *Innovate*, *Develop* and *Maintain* and come to a point that puzzles us both. After all, where are new product and service ideas born? Who or which department counts this as part of

its job? Which department is considering new products and services more than five years ahead? Who explores the *overarching* customer needs that may still be hidden but become relevant in future business contexts? Who defines a long-term vision and business strategy for the company? We discover that we are missing a phase with innovation activities that should precede the *Innovate* phase. Moreover, we conclude that today new projects come from within the organisation and are often related to customers who want *R&D* to solve an acute operational problem. These new projects often have a short-term time horizon. After consultation between *Airports'* and *Technology's* management, these product-service ideas end up in a so-called *Flight Plan*; this is the project's development roadmap to realise within a horizon of two years. These ideas mainly entail adding new features to existing products and are technology-focused (*Section 4.3.3*). We conclude that there is no phase yet with activities aimed at exploring ground-breaking innovations for the longer term. The innovation projects that do get on the *Innovate* agenda are short-term and formulated from the B2B customer perspective, not from the end-user and their far-future context perspective. The question that now comes to mind is how to create more future-oriented perspective and greater end-customer focus, and what phase(s) we should add to *Innovate*, *Develop* and *Maintain* to fill the identified gap.

5.5.2 — ARC 2.1 — Evaluating Action

Content Reflection

The *Strategic Design Manager* observed that the organisation was struggling to adapt quickly to the changes introduced by the *Continuous Acceleration Programme*. Employees were required to adjust to the newly defined innovation phases—*Innovate, Develop,* and *Maintain*—as well as to the evolving roles that different R&D staff members were expected to assume within the innovation process. She noted that the engineers faced a dilemma: on the one hand, they remained bound by the formal organisational structure of the R&D department; on the other, the introduction of the new phases was beginning to disrupt and reshape established engineering processes and procedures within the department.

Insight 30: Process changes in the R&D department require employee habituation time.
We discussed the R&D test lab, where ideas for new features and product modules were developed, and where their operation was demonstrated through a proof-of-principle. The *Strategic Design Manager* reported positive experiences with building so-called concept cars—early-stage demonstrators used to showcase innovative product–service solutions and assess their feasibility, viability, and desirability. She cited *VIBES* as an example of a software solution for which a demonstrator had been co-created with actual users on the shop floor, allowing the team to test and validate the system's intended functionality in a realistic setting. She noted that building a concept car for a particular innovative product-service value proposition had proven surprisingly effective in illustrating both the potential benefits and the practical challenges early in the development process. This approach facilitated quicker buy-in from both internal stakeholders and external customers. It also provided a more tangible and shared understanding of the future functional properties,

capabilities, and overall value of the product–service offering at an early stage of innovation.

Insight 31: Building a concept car of a particular product-service value proposition effectively demonstrates and communicates its operational benefits and challenges.

With the introduction of the *Innovate*, *Develop* and *Maintain* phases, the *UX Design* department was dissolved as a separate entity and integrated into the broader *Technology* organisation. To ensure that the *UX* perspective remained embedded in product development projects, *UX* designers were assigned to the development teams within the *Technology* business unit. Previously, project engineers had focused primarily on technological feasibility, often overlooking the exploration and analysis of end-user values and interactions during the development process. This narrow approach frequently resulted in suboptimal design outcomes and led to project delays due to *UX*-related repair activities that had to be carried out in later stages of the development cycle.

According to the *Strategic Design Manager*, the new organisational structure offered a significant advantage: the user perspective became an integral part of the development process from the outset of each project. As the organisation aimed to create value for both its customers and end-users, it was considered essential that UX design competencies be incorporated into the product–service innovation process—particularly in addressing aspects of desirability and viability. In doing so, the three core perspectives—*Business* (viability), *Technology* (feasibility), and *User* (desirability)—were more effectively balanced in decision-making throughout the innovation trajectory.

Insight 32: UX skills and capabilities must be embedded in the service innovation process and development teams to create value for customers and end-users.

In the second whiteboard session, we discovered that a distinct phase of innovation activity was missing—one that should precede the formal *Innovate* phase. This missing phase involved the development of early-stage ideas and the exploration of latent customer needs from a future-oriented perspective, extending beyond the current two-year horizon defined by the organisation's *Flight Plan*.

Insight 33: The focal manufacturer's innovation process lacks innovation activities aimed at exploring a future business context to identify unmet and hidden needs of customers and their end-users.

Process Reflection

The analysis of the existing product–service innovation process, conducted in collaboration with the *Strategic Design Manager*, yielded valuable insights into both its operational characteristics and the rationale behind its design. Engaging in mutual questioning of the current process facilitated the emergence of new ideas and alternative perspectives on how product–service innovation could be organised more effectively. The outcomes of *ARC 2.1* provided a foundation for the subsequent action cycle, *ARC 2.2*, which aimed to address deficiencies in the current innovation process and to develop a future-oriented end-user perspective.

Premise Reflection

In the preliminary step leading up to *ARC 2*, we defined a set of lenses to guide our interventions, based on the insights generated in *Chapter 4*. The findings from *ARC 2.1* confirmed the relevance of these lenses. During the reflection phase, we identified four insights that aligned with key themes across the servitization lenses: *Creating Value for End-Users* (representing the overarching perspective), *Exploration & Future Visioning, Strategic & Service Design Capabilities, Network Collaboration,* and *Organisational Transformation.*

5.5.3 — ARC 2.1 — Concluding Insights

ARC 2.1 resulted in four additional insights related to servitization lenses (see *Table 5-1).*

Table 5-1 — Summarising Insights Identified in ARC 2.1

Insight #	Insights Identified in ARC 2.1	Servitization Lens
Insight 30	*Process changes in the R&D department require employee habituation time.*	• *Organisational Transformation (rethinking innovation process)* • *Strategic & Service Design Capabilities*
Insight 31	*Building a concept car of a particular product-service value proposition effectively demonstrates and communicates its operational benefits and challenges*	• *Creating Value for End-Users (Overarching Perspective)* • *Exploration & Future Visioning* • *Organisational Transformation (new skills and methods)*
Insight 32	*UX skills and capabilities must be embedded in the service innovation process and development teams to create value for customers and end-users.*	• *Creating Value for End-Users (Overarching Perspective)* • *Organisational Transformation (new skills and methods)*
Insight 33	*The company's innovation process lacks innovation activities aimed at exploring a future business context to identify unmet and hidden needs of customers and their end-users.*	• *Exploration & Future Visioning* • *Creating Value for End-Users (Overarching Perspective)* • *Strategic & Service Design Capabilities* • *Network Collaboration* • *Organisational Transformation (rethinking innovation process)*

5.6 — ARC 2.2 — Drawing an Enhanced Product-Service Innovation Process

5.6.1 — ARC 2.2 — Taking Action

In a follow-up whiteboard session on *ARC 2.1*, the *Strategic Design Manager* and I further develop our ideas. We start sketching stand at a whiteboard and focus on the phase we are missing, which we believe precedes the *Innovate* phase, as discovered in *ARC 2.1*. We discuss what to name this phase and, based on the activities we expect to take place, decide to call it *Explore* (see *Figure 5-3*)
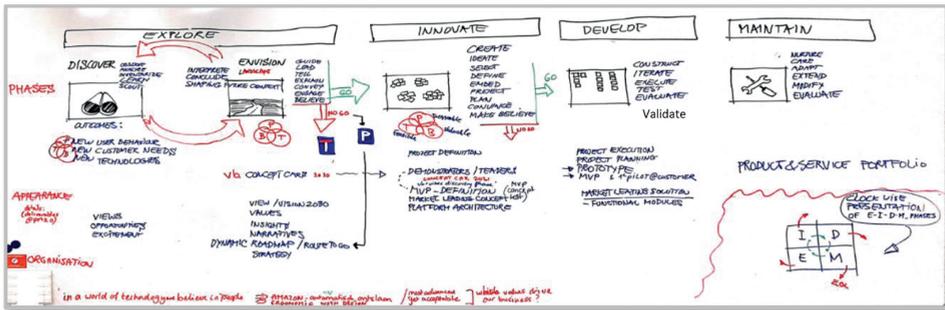
Figure 5-3 — Innovation Process Phases Innovate, Develop and Maintain Enhanced with an Explore Phase

Discussing *Explore* further and deepening it, we distinguish two types of activities: *Discover* and *Envision* (see *Figure 5-3*). During the *Discover* phase, we observe and analyse the external environment, scout emerging technologies, and examine trends and developments within the manufacturer's business context. Our aim is to identify latent and unmet customer needs, which are constantly evolving in response to a changing world. These dynamic needs require the innovation processes to be adapted accordingly, for example, by designing cyclical innovation activities and continuously monitoring external developments relevant to the manufacturer's customers and their subsequent end-users. We describe the *Discover* activities we distinguish with the following verbs that we consider part of it: *scout, observe, analyse, map, interpret, reflect, learn,* and *monitor* (see *Figure 5-4*). In *Explore*, we look at an unpredictable future. However, by exploring this future, we can better understand the different scenarios that are likely to unfold. We observe that the current phases *Innovate*, *Develop* and *Maintain* fail to respond well to unexpected situations and a constantly changing future business context, making the company less resilient. Although it is the right management decision to roll out the *Continuous Acceleration Programme* to get a better grip on the development processes and remove causes of disruptions in the innovation process, we miss the focus on the longer term and the customers and end-users in their future context. The *Explore* phase could be an answer to better respond to future, yet unknown, business opportunities.

Discover - Explore	Envision - Explore	Innovate	Develop	Maintain
Scout	Guide	Ideate	Develop	Improve
Observe	Lead	Create	Construct	Construct
Analyse	Tell	Conceive	Iterate	Iterate
Map	Explain	Try out	Execute	Execute
Interpret	Convey	Select	Build	Test
Reflect	Engage	Define	Test	Evaluate
Learn	Believe	Embed	Evaluate	Validate
Monitor	Differentiate	Project	Validate	Maintain
	Share	Plan		
	Select	Convince		
	Choose	Make believe		
	Map			

Figure 5-4 — Extended Innovation Process Explore (Discover & Envision) - Innovate - Develop - Maintain

We imagine what we can expect as an outcome at the end of *Discover*. Could it be a scenario description of a product-service value proposition that addresses new customer values and needs, supplemented by a description of the technology we need to build the value proposition? Should the outcome include identifying partners who bring complementary capabilities we do not yet possess? Should the outcome clarify how the value proposition aligns with our strategy and time plan? We imagine the outcome attributes being mapped onto a strategic design roadmap, according to Simonse (2018).

The second activity or sub-phase in *Explore* involves *Envision,* in which we engage the organisation in the strategic directions and scenarios we discovered in the *Discover* phase. We tell the organisation about the future business opportunities and challenges we foresee and how to turn them into an action plan. The verbs associated with the activities of the *Envisioning* action plan are *guide, lead, tell, explain, convey, engage, believe, differentiate, share, select, choose* and *map* (see *Figure 5-4*).

The results of *Envision* could be most effectively communicated within the organisation through a strategic roadmap. This roadmap outlines the corporate vision, product-service innovation strategy, product-service scenarios, and narratives. We stress the importance of ongoing interaction between the *Explore* activities—*Discover* and *Envision*—as the external environment and the manufacturer's business context are constantly evolving. To respond to these changes, it is crucial to monitor shifts in the external world and business context continuously and share these insights widely across the organisation. This is accomplished through a strategic design roadmap that delineates future product-service scenarios across three horizons.

5.6.2 — ARC 2.2 — Evaluating Action

Content Reflection

Our analysis revealed that certain innovation activities are insufficiently represented in the current product-service innovation process. In its former configuration, the *Innovate* phase primarily generated new product ideas internally within the organisation. *Section 4.3.3* outlined the procedure the manufacturer had established to evaluate, select, and develop these ideas.

Furthermore, the *Innovate Department* focused on projects driven by concrete customer demands. Typically, customers voiced these demands during the offer phase, either through discussions with key account managers or by requesting new features and functionalities that the focal manufacturer had not yet provided. Once a customer project was sold, it imposed time constraints on the innovation department, often resulting in delays in development and project commissioning. To address these constraints, the manufacturer launched its *Continuous Acceleration Programme* and shifted its development strategy from an engineering-to-order to a *configure-to-order* approach.

We observed that the manufacturer's development projects were primarily oriented towards incremental improvements and the further refinement of existing products. Rather than pursuing radical or disruptive innovations, developers tended to operate within the boundaries of the current customer and stakeholder contexts, existing technological frameworks, and system constraints. As a result, innovation efforts focused on extending and optimising the established product portfolio. This path-dependency limited the organisation's capacity to explore fundamentally new product–service value propositions or to respond proactively to nascent end-user needs beyond dyadic customer relationships.

Insight 34: Looking beyond the existing boundaries of customers, stakeholders, and systems broadens the view in search for innovative product-service value propositions.

Moreover, we could not claim that the company was underperforming, as its *Airports*, *Parcel* and *Warehousing* business units had been successful, consistently profitable over an extended period, and had established a strong global market presence. Internally, however, several engineers perceived the manufacturer more as a market follower than as a market leader—let alone a market disruptor. From their reactions, we sensed a degree of disappointment, as they believed they were not adequately equipped to address future challenges or to respond to disruptors offering end-user-focused service value propositions. We found that activities such as looking beyond the immediate horizon, exploring future business contexts, thinking outside existing system boundaries, and developing a future vision and product–service innovation strategy were not yet fully embedded within the organisation's innovation process. This observation was well captured in a quote by Buchanan (2015): *'Though it may seem counterintuitive, organisations are sometimes trapped by their success. They are trapped in what has been successful in the past but is no longer well suited to new circumstances of the marketplace or society.'*

Insight 35: Looking beyond the horizon, looking into the future business context, thinking outside existing system boundaries, and developing a future vision and product-service innovation strategy are not well-embedded activities in the innovation process.

We noticed that an *Explore* phase was missing in the existing innovation process. In response, we conceived an *Explore* phase consisting of two parts: *Discover* and *Envision* (see *Figure 5-4)*. In the *Discover* phase, we classified activities such as identifying emerging

trends, searching for new technologies, and uncovering hidden customer and end-user needs and behaviours within a future business context. Early product–service ideas were initiated and identified during this phase—often premature, yet promising enough to warrant further development. Based on the analysis and interpretation of the findings from Discover, we proceeded to the Envision phase. In this phase, we constructed plausible future business scenarios that addressed identified customer and end-user needs, formulated a servitization strategy for *PSSs*, and navigated these developments using a strategic design roadmap. This roadmap summarised the manufacturer's vision and its corresponding innovation activities, presented through a multi-layered visualisation aligned with the three-horizon framework.

We proposed to organise the *Explore* phase as a *'fluid'* and cyclical event, engaging participants from various departments (cross-silo) in multi-disciplinary teams These teams are supposed to work collaboratively on strategic design challenges with the aim of formulating *Overarching Servitization Strategies.*

At a higher level, we conceptualised the phases *Explore – Innovate – Develop – Maintain* as a recurring, cyclical innovation process operating on an annual rhythm. Given the continuous changes in the external environment, the product–service innovation strategy required regular monitoring and ongoing adjustment—both in the short and long term. To support this, and to address relevant organisational design criteria, we proposed organising the process as an annual strategic event. This event would engage cross-functional teams in jointly reflecting on emerging trends, evaluating progress, and (re)shaping the innovation roadmap. We decided to integrate this concept into the intervention design of a subsequent *ARC*, thereby incorporating strategic reflection and adaptive planning as part of the organisation's product-service innovation process (see *Figure 5-5 — Innovation Cycle: Explore - Innovate - Develop – Maintain*).

Because the process is cyclical in nature, the different phases may overlap in time and content. To effectively address the strategic challenges of the *Explore* phase, we envisaged participants in the annual strategic event as being temporarily disconnected from the formal organisational structure. By forming mixed, cross-functional teams, individuals from various departments would collaborate outside their routine roles on future-oriented design challenges. This *'fluid'* event structure was intended to foster open thinking, reduce organisational bias, and enable participants to jointly formulate Servitization Strategies that extend beyond the constraints of their day-to-day responsibilities. In doing so, we aimed to strengthen strategic alignment across silos and build shared ownership of long-term innovation goals.

Insight 36: By allowing employees to participate in multi-disciplinary teams, separate from the organisational silos, we create a 'fluid' organisation for the cyclical Explore process and promote cross-fertilisation and the leveraging of existing knowledge.
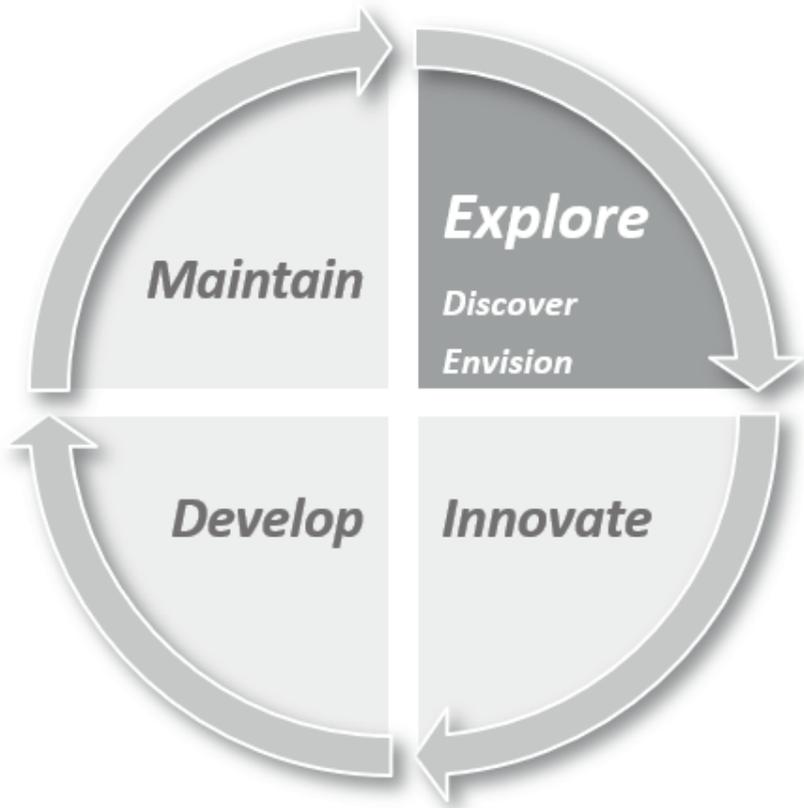
Figure 5-5 — Innovation Cycle: Explore - Innovate - Develop – Maintain

Process Reflection

The structure of *ARC 2.2,* organised as a three-stage approach—analysing, reflecting, and synthesising—proved effective in guiding the team through a structured exploration of the innovation process. In the first stage, we thoroughly analysed the existing product–service innovation process, identifying gaps and missing activities critical for enabling service-oriented innovation. In the second stage, we engaged in a reflective question-and-answer exercise, guided by the previously formulated design criteria and research questions. This dialogue allowed us to critically examine the current process and uncover overlooked elements that hindered a future-oriented and end-user-focused innovation approach.

In the final stage, we used the design criteria as a framework to synthesise initial ideas for the design of the subsequent action cycle. To support this process, we used a whiteboard to visualise, conceptualise, and iteratively refine our ideas for structuring a strategic design process. This collaborative visualisation helped align perspectives and foster shared

understanding among participants. Our aim was to set up a process for formulate *overarching servitization* strategies grounded in end-user value. The outcomes of the sessions were documented through photographs to capture the evolution of thinking and serve as a reference for future steps.

Premise Reflection

*ARC 2.*2 brought us closer to addressing our research questions. Reflecting on the current product–service innovation process led to the generation of ideas for organising it in a *'fluid'* and adaptable manner—one that would encourage collaboration between employees from both the *Airports Business Unit* and the *Technology Business Unit* in cross-silo, multifunctional teams. This cross-silo approach, supported by the application of strategic design methods, promoted knowledge exchange, skill development across departmental boundaries, and encouraged more innovative, out-of-the-box thinking.

As part of an annual cyclical event, these teams were envisioned to engage in activities that explored future business contexts with a particular emphasis on creating overarching value for both customers and end-users. This setup aimed to foster strategic alignment and collective ownership of servitization goals across organisational silos.

Insight 37: *The constantly changing customer needs call for 'exploring' innovation activities embedded in cyclical events where multi-disciplinary teams continuously monitor trends and developments in the outside world, enabling overarching service innovation that addresses yet hidden needs of customers and their end-users.*

We referred to the phase of the extended product–service innovation process as *Explore*, subdivided into two activities: *Discover* and *Envision*. During this phase, multidisciplinary teams are expected to scout and identify early-stage ideas for product–service solutions that respond to emerging user needs, technological trends, and shifts in future business contexts. These ideas are captured in a three-horizon roadmap that looks beyond the conventional five-year planning horizon.

Ideally, the roadmap spans a period of 10 to 15 years, enabling teams to explore long-term opportunities while maintaining flexibility. The specific timeframe may be determined by the teams themselves, depending on the strategic focus and the nature of the envisioned developments. The goal of the *Exploration* phase is to create a structured, future-oriented foundation for servitization strategies, informed by foresight and grounded in end-user value.

5.6.3 — ARC 2.2 — Concluding Insights

During the reflection phase of *ARC 2*, we identified four insights that aligned with key themes across the servitization lenses: *Creating Value for End-Users (representing the overarching perspective), Exploration & Future Visioning, Strategic & Service Design Capabilities, Network Collaboration, and Organisational Transformation.*

Table 5-2 — Summarising Insights Identified in ARC 2.2

Insight #	Insights Identified in ARC 2.2	Servitization Lens
Insight 34	*Looking beyond the existing boundaries of customers, stakeholders, and systems broadens the view in search for innovative product-service value propositions.*	• *Creating Value for End-Users (Overarching Perspective)* • *Exploration & Future Visioning* • *Organisational Transformation (rethinking innovation process)*
Insight 35	*Looking beyond the horizon, looking into the future business context, thinking outside the existing system boundaries, and developing a future vision and product-service innovation strategy are not well-embedded activities in the company's development process.*	• *Creating Value for End-Users (Overarching Perspective)* • *Strategic & Service Design Capabilities* • *Exploration & Future Visioning* • *Organisational Transformation (rethinking innovation process)*
Insight 36	*By allowing employees to participate in multi-disciplinary teams, separate from the Organisational Transformation silos, we create a 'fluid' organisation for the cyclical Explore process and promote cross-fertilisation and the leveraging of existing knowledge.*	• *Strategic & Service Design Capabilities* • *Exploration & Future Visioning* • *Organisational Transformation (rethinking innovation process)*
Insight 37	*The constantly changing customer needs call for 'exploring' innovation activities embedded in cyclical events where multi-disciplinary teams continuously monitor trends and developments in the outside world, enabling overarching service innovation that addresses yet hidden needs of customers and their end-users.*	• *Creating Value for End-Users (Overarching Perspective)* • *Strategic & Service Design Capabilities* • *Exploration & Future Visioning* • *Network Collaboration* • *Organisational Transformation (rethinking innovation process)*

5.7 — ARC 2.3 — Ideating Interventions for an Enhanced Product-Service Innovation Process

5.7.1 — ARC 2.3 — Taking Action

ARC 2.3 consists of two brainstorming sessions involving the *Strategic Design Manager*, a *Strategic Designer*, and myself. The first *ARC 2.3* brainstorm session starts with the idea we came up with in *ARC 2.2* to add a phase to the *Innovate*, *Develop* and *Maintain,* phases, which we called *Explore*. We divided this *Explore* phase into *Discover* and *Envision*, where *Discover* is mainly externally focused and concerns activities that are about exploring trends and developments in the outside world (see *Figure 5-6*). *Envision*, on the other hand, focuses primarily on internal activities that advance the results of the *Discover* process within the organisation. *Discover* and *Envision* influence each other in a continuous cycle, meaning they cannot be considered separately. This interaction is depicted by the triangular arrows, which represent the ongoing exchange between the two sub-phases.
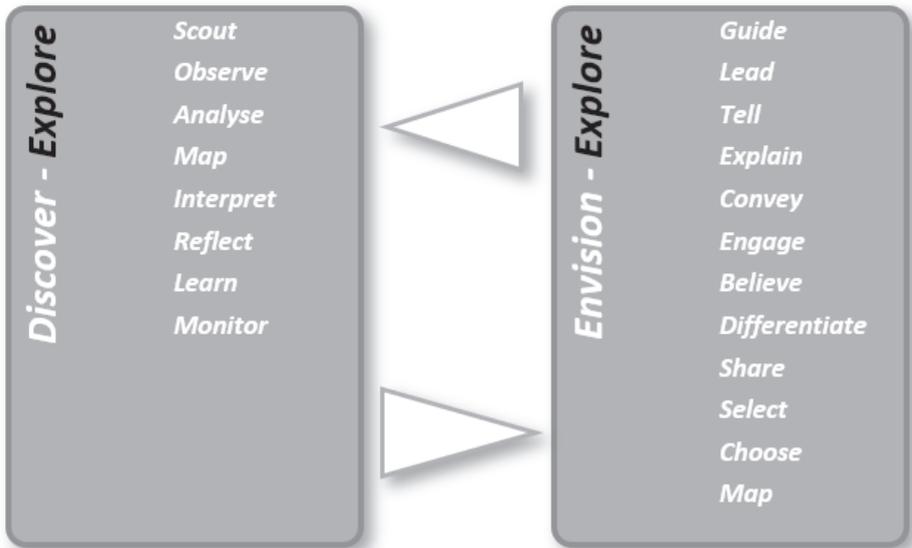
Figure 5-6 — Extended Innovation Process Explore (Discover & Envision)

During the brainstorming session, we begin to freely associate on the activities identified during *ARC 2.2* as essential for conducting a future-oriented, user-centric strategic exploration. We think aloud and discuss our ideas, explaining and describing them to each other while sticking Post-it© notes on the glass wall of the *UX Design* studio (see *Figure 5-7 — Glass Wall Containing First Ideas for Workshop Interventions*). As a result of this collaboration, the idea of implementing an *Explore* phase with several consecutive interventions took shape (the orange Post-it© notes in *Figure 5-7* and the blue ones in *Figure 5-8*). We describe these workshop interventions shortly:

- Introduction & Inspiration
- Identifying Trends & Developments
- Discover the Future World
- Creating Ideas
- Designing a Roadmap (how to get there?)

To give an idea of how our conversations about how we ideated the interventions unfolded, I provide a condensed and edited account of our conversations in the present tense.

Figure 5-7 — Glass Wall Containing First Ideas for Workshop Interventions
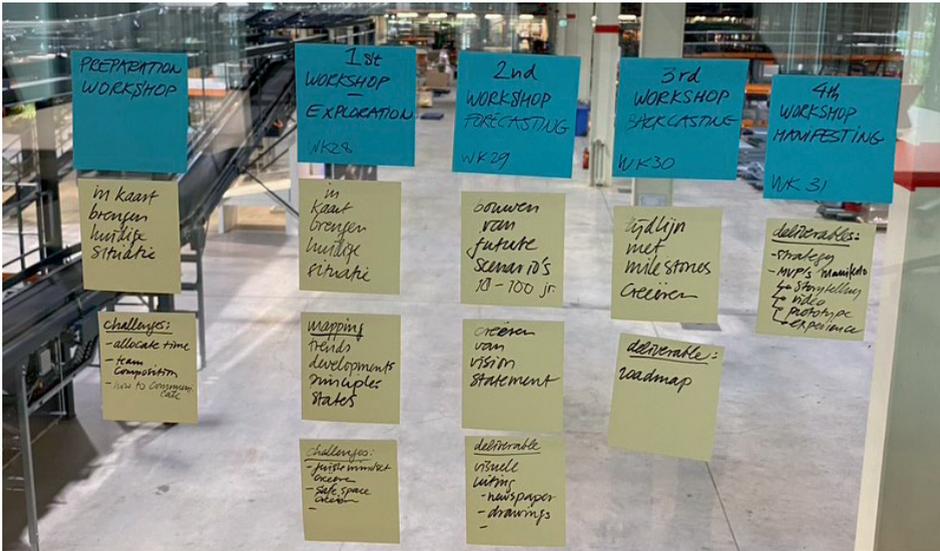
Figure 5-8 — First Consolidation of Ideas for Workshop Interventions

Figure 5-9 — Second Consolidation of Ideas for Workshop Interventions in a Miro™ Board

We discuss and ideate the first workshop intervention—*Introduction & Inspiration*—designed to prepare the participants for the workshop series. We assemble multi-disciplinary teams to promote cross-fertilisation among participants from different departments; we are, therefore, already compiling a list of potential participants (addressing *Insights 19 & 28*). Let us start our introduction session with an icebreaker to help participants from various departments and disciplines get to know each other and share something about their backgrounds and experience. They will also share their expectations at the beginning of the workshop series. The focal manufacturer is a large company where people have not yet worked together or may not know each other. The better the onboarding during these workshop interventions, the higher the chances of effective collaboration and positive outcomes. We aim to prepare the participants thoroughly for the workshops, so let us meet with them beforehand and explain our vision for the workshop series and what we expect from them. We emphasise that their contributions are desired to inform the manufacturer's servitization strategy (addressing *Insights 28 & 29*).

We limit ourselves in this workshop series to exploring the future context of the *Airports* business unit. As the central theme of the workshops, we propose '*Travelling in Europe'*, including exploration beyond the aviation context (consider public transport). We will demonstrate how air travel in Europe has evolved over the last century, as understanding the past is helpful when looking to the future. Let us find a historical timeline of travel and travel modalities. We should also seek inspiring videos about future travel. We plan to conduct and record interviews with visionaries in the field of future travel, showing these recordings to inspire our participants and warm up their creative muscles at the kick-off of the workshop series (addressing *Insight 26*).

The second workshop intervention—*Identifying Trends & Developments*—focuses on analysing external factors: *Trends and Developments*. For this, we ask the participants to use the DEPEST classification to ensure that all domains are covered (DEPEST stands for demographic, economic, political-legal, environmental, social-cultural, and technological factors). We consider asking participants to do homework in advance and collect trends and developments on *'Travelling in Europe'* in preparation for this workshop. However, we also know that few participants have design skills. We should prepare an overview of trends and developments ourselves and ask participants to reflect on it. They may be able to complement it before we start mapping trends and developments and then cluster and describe them with an overarching phrase.

We pilot the *Trend & Developments* workshop to check the workshop schedule and to find out whether the intervention would work online as we thought it should, and we capture the results in a *Miro™* board (see *Figure 5-10* and *Figure 5-11*).
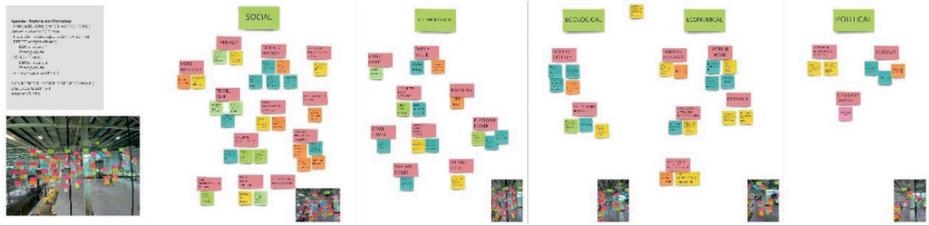
Figure 5-10 — Trends and Development Workshop Results captured in Miro™
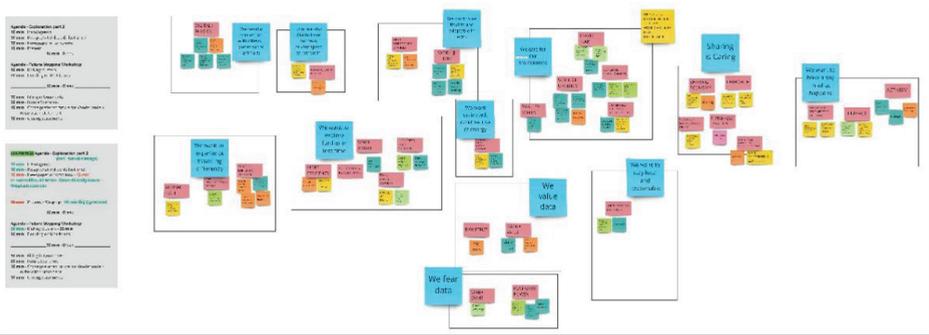
Figure 5-11 — Trends and Development Workshop Clusters captured in Miro™

During the third workshop intervention—*Discover the Future World*—we explore the future world. First, we come up with a name for the workshop interventions: *'The Long Now'*, suggesting that we bring the manufacturer's long-term future perspective into the present (the *'now'*). For readability, we will abbreviate *'The Long Now'* as *'TLN'* from now on. Since the *Strategic Designer* in our preparation team has some experience with it, we decide to use the *ViP Method* (Hekkert, 2014) and create a map in which we plot the clusters along two orthogonal axes with opposing ends. This results in a map with four contrasting worlds containing the plotted trend clusters (see *Figure 5-12*). We ask participants to describe and summarise each of the four clusters in one sentence. Next, we ask participants to adopt the end-user perspective and envision end-user behaviour and values in these contrasting worlds because we want to consider that future world from the customer and end-user perspective (addressing *Insights 7* and *21*). We want to understand what value they consider important in that future context, how they will behave, and what their needs and concerns are (addressing *Insights 33* and *37*). Indeed, to develop future product-service scenarios, we aim to make grounded predictions based on our understanding of human behaviour and needs driven by future context factors (such as trends and developments). The end-user determines which product-service value propositions should be introduced to address their values, needs, and behaviours.

During the fourth workshop intervention—*Creating Ideas*—we devise new product-service concepts based on the trend clusters in the four scenarios (see *Figure 5-12*).

Figure 5-12 — Four opposing Trend Clusters with Summarising Sentence

Participants will brainstorm overarching product-service value propositions in small groups (addressing *Insight 26*). Using various brainstorming methods, we encourage them to think outside the box, beyond the manufacturer's context, and not be constrained by the system boundaries of current product-service solutions and customer bases (addressing *Insight 35*). This approach will generate several product-service ideas within in the participant group, which we will discuss in plenary. Ideas that are still *'close-to-home'* will appear as extensions or improvements of existing product-service propositions. However, we hope the diverse participant team (designers and engineers) will also inspire and encourage each other to come up with innovative ideas that may not be feasible today due to technological limitations but could create new customer value in the long term (addressing *Insights 8* and *11*). We encourage the participants to look beyond the current stakeholders and collaborate with partners who can provide complementary capabilities or knowledge (addressing *Insights 25, 26, and 34*). We recognise that most participants lack the design skills needed to create new ideas. We address this by having these activities guided by experienced design facilitators. After the ideation phase, we discuss, review, potentially merge, and prioritise the product-service ideas. We conclude this intervention by asking participants to elaborate on the prioritised product-service ideas and create an investor pitch or a product brochure to present in the next session.

In the fifth workshop intervention—*Designing a Roadmap* ('*How do we get there?*')—we envision the participants presenting their ideas developed into product-service concepts

(addressing *Insight 14*). This can be an investor pitch or a brochure explaining the product-service concept. Following a discussion, participants will place the product-service concepts on a three-horizon multi-level timeline, creating a strategic roadmap based on the *Strategic Design Roadmapping Method* described by Simonse (2018). We encourage participants to adopt a long-term perspective (addressing *Insights 4, 5, 12, 23,* and *32Insight 32:*).

5.7.2 — ARC 2.3 — Evaluating Action

Content Reflection

During several workshop sessions, we discussed our initial intervention ideas for *TLN*. I began the content reflection by noting that we developed the workshop interventions during the lockdown caused by the Covid-19 pandemic—an unprecedented event for which few could have been adequately prepared. As a result, our planned *TLN* workshop interventions were disrupted, and we were forced to continue our preparations online. Anticipating that in-person meetings would not be feasible for the foreseeable future, we decided to conduct the workshop in a virtual format. In this regard, Covid-19 directly influenced the content and delivery of *ARC 2.3*.

Initially, we thought of running *The Long Now* workshops in one or two full weeks in a row, based on the idea that for four till eight working days, we could allow participants to work fully concentrated on the strategic workshop sessions and not be disturbed by day-to-day operational activities. In doing so, we also wanted the people we had taken out of the organisational silos to feel connected as a team: *The Long Now Team*. Because the better the bonding in the team, the better the end results of the endeavours *(addressing Insights 17* and *36*).

However, as we transitioned to an online format due to lockdown restrictions, it quickly became apparent that this approach would not be viable. Firstly, we recognised that it would be too exhausting for participants to engage in full-day online workshop sessions. Secondly, since participants were working from their own departments, they were regularly interrupted or distracted by ongoing operational responsibilities.

We therefore had to adapt both the structure and content of the workshop interventions to these new circumstances. This involved breaking the workshop into shorter, more manageable modules spread over time. Due to limited availability, participants could not complete all activities themselves; as a result, we conducted some preparatory sessions in advance and provided the outcomes as input for discussion.

To support the online workshop format, we adopted the digital collaboration tools *Miro™* and *Microsoft™ Teams*, and we gradually integrated and adapted these tools into our interventions. As most participants were unfamiliar with working online in this way, we paid special attention to onboarding. Specifically, we designed a *Miro™* icebreaker session to help participants become comfortable with the platform (addressing *Insight 30*).

During the question-and-answer exercise conducted in *ARC 2.3*, we focused on refining the content, structure, and timing of the workshop interventions. In the pilot workshops, we

discovered that the *ViP Method* (Hekkert, 2014) did not function effectively within the context of the focal manufacturer. The method required extensive explanation and conceptual understanding, which proved challenging for the participants—most of whom did not have a background in design.

Given the need to shorten the workshop sessions due to Covid-19-related constraints, we decided to omit the *ViP Method* and instead concentrated on applying the *Design Roadmapping Method*, as proposed by Simonse (2018). This method was better aligned with the time available and the participants' level of familiarity with design approaches.

Process Reflection

The pilot phase worked well in *ARC 2.3*, during which we trialled the workshop interventions as originally conceived. This allowed us to test the selected methods, the time planning, the consolidation and interpretation of intermediate results, as well as the use of the online collaboration tool Miro. Particular attention was given to the selection of workshop participants; we considered it essential that all relevant disciplines were represented in the *TLN Team* to maximise the exchange of existing knowledge and perspectives (addressing *Insight 36*). This approach enabled us to prepare thoroughly for the subsequent workshop series planned for the Airports business unit.

During our preparations for *ARC 2.3*, several projects within the *Airports* business unit were put on hold by the customer due to the Covid-19 pandemic. This led to significant uncertainty within the organisation, as the short- and long-term impacts of the global shutdown on air travel and related innovation initiatives were difficult to assess. The situation also exposed the company's vulnerability in not having explored alternative strategic scenarios in advance.

In retrospect, the Covid-19 crisis served as a catalyst for securing management buy-in and approval to proceed with the organisation of the *TLN* strategic design workshops. It was increasingly recognised that a strategic reorientation of the aviation business could open new pathways for innovation and strengthen the organisation's resilience in the face of future disruptions.

> **Insight 38: An unprecedented event with negative consequences can be seen from another perspective as an opportunity to undertake new initiatives for evaluating and revising the innovation strategy.**

Premise Reflection

Looking back at the preliminary step, I argue that the design of the workshop interventions was guided by the servitization lenses *Creating Value for End-Users, Exploration & Future Visioning, Strategic & Service Design Capabilities, Organisational Transformation*, and *Network Collaboration*. In setting up these interventions, we drew upon the insights generated in *ARC 2.1* and *ARC 2.2*, as well as those discussed in *Chapter 4*. These insights informed both the content and structure of the *TLN* interventions, ensuring their alignment with the broader objective of supporting designing *overarching servitization* strategies grounded by end-user values.

5.7.3 — ARC 2.3 — Concluding Insights

ARC 2.3 added *Insight 38,* covering servitization lenses *Exploration & Future Visioning* and *Organisational Transformation* (see *Table 5-3)*

Table 5-3 — Summarising Insights Identified in ARC 2.3

Insight #	Insight Identified in ARC 2.3	Servitization Lens
Insight 38	*An unprecedented event with negative consequences can be seen from another perspective as an opportunity to undertake new initiatives.*	• *Exploration & Future Visioning* • *Organisational Transformation (new skills and methods)*

5.8 — ARC 2 — Conclusion — Summarising the Identified Insights

This section reports the insights identified during sub-cycles *ARC 2.1, ARC 2.2,* and *ARC 2.3*. Starting with the observation in *ARC 2.1* that the current innovation process lacks an *Explore* phase, we used *ARC 2.2* to develop ideas to address this gap and proposed an enhanced product-service innovation process. Finally, in *ARC 2.3*, we refined the *Explore* phase into a proposal for a series of strategic design workshop interventions. *Table 5-4* summarises the insights identified during *ARCs 2.1, 2.2, and 2.3.*

An analysis of *Table* 5-4 reveals that the insights generated in this study can be categorised according to five servitization lenses: *Creating Value for End-Users*, *Exploration & Future Visioning*, *Strategic & Service Design Capabilities*, *Organisational Transformation*, and *Network Collaboration*. We concluded that the first three lenses are closely related to the product–service innovation process. Each of these lenses highlights the need for organisational adaptation and change to effectively structure and support the *overarching servitization* process. For this reason, all insights related to these three lenses were marked as relevant.

Given that the need for organisational transformation is inherently embedded within these three lenses, we chose not to treat *Organisational Transformation* as a separate analytical category in this context. In contrast, the *Network Collaboration* lens primarily concerns the outcomes of the *overarching servitization* strategy. It reflects how the process acted as a catalyst for initiating collaboration with new external partners, thereby extending the organisation's value creation beyond its traditional boundaries.

In conclusion, the successful implementation of *overarching servitization* strategies requires the company to embed three interrelated lenses within its innovation approach: *Creating Value for End-Users, Exploration & Future Visioning,* and *Strategic & Service Design Capabilities*. These lenses represent critical enablers for shifting towards a more future-oriented, user-centred, and design-led product-service innovation process. Their integration necessitates not only methodological changes, but also cultural and structural adaptation within the organisation.

Consequently, these three thematic areas will serve as guiding principles in the design of the *Overarching Servitization Strategy Process* in *ARC 3*. They will inform the development

of interventions aimed at institutionalising long-term value creation, enhancing strategic foresight, and building the internal capabilities required to support and sustain servitization at a strategic level.

Table 5-4 — Summarising Insights Identified in ARCs 2.1, 2.2, and 2.3

Insight #	Insights Identified in ARCs 2.1, 2.2, and 2.3	Creating Value for End-Users (Overarching Perspective)	Exploration & Future Visioning	Strategic & Service Design Capabilities	Organisational Transformation	Network Collaboration
Insight 30	Process changes in the R&D department and processes require employee habituation time.			✓	✓	
Insight 31	Building a concept car of a particular product-service value proposition effectively demonstrates and communicates its operational benefits and challenges. works.	✓	✓		✓	
Insight 32	UX skills and capabilities must be embedded in the service innovation process and development teams to create value for customers and end-users.	✓			✓	
Insight 33	The company's innovation process lacks innovation activities aimed at exploring a future business context to identify unmet and hidden needs of customers and their end-users.	✓	✓	✓	✓	✓
Insight 34	Looking outside the existing boundaries of customers, stakeholders, and systems broadens the view in search of innovative product-service value propositions.	✓	✓		✓	
Insight 35	Looking beyond the horizon, looking into the future business context, thinking outside the existing system boundaries, and developing a future vision and product-service innovation strategy are not well-embedded activities in Vanderlande's development process.	✓	✓	✓	✓	
Insight 36	By allowing employees to participate in multi-disciplinary teams, separate from the organisational silos, we create a 'fluid' organisation of the cyclical Explore process and promote cross-fertilisation and leverage of existing knowledge.		✓	✓	✓	
Insight 37	The constantly changing customer needs ask for 'exploring' innovation activities embedded in cyclical events where multi-disciplinary teams continuously monitor trends and developments in the outside world, enabling overarching service innovation addressing yet hidden needs of customers and their end-users.	✓	✓	✓	✓	✓
Insight 38	An unprecedented event with negative consequences can be seen from another perspective as an opportunity to undertake new initiatives.		✓		✓	

6

Vision is the art of seeing what is invisible to others.

Jonathan Swift

Chapter 6 — Action Research Cycle 3 – Piloting an 'Overarching Servitization Strategy Design' Process

6.1 — ARC 3 — Introduction

Chapters 4 and *5* discussed the insights identified in *ARC 1* and *ARC 2* which serve as the foundation for designing the interventions in *ARC 3* that we discuss in this chapter. These insights have been categorised into three key areas:

*1 — **Exploring the End-User Perspective — Creating value for end-users.***

*2 — **Exploring the Future Perspective.***

*3 — **Embedding Strategic and Service Design Capabilities in the Organisation.***

To strengthen the theoretical grounding of these insights, we integrated servitization literature, which highlighted the need for B2B manufacturers to expand their focus beyond technological feasibility and customer relationships towards a more end-user-centric and future-oriented servitization strategy—an *overarching servitization strategy*.

6.1.1 — Embedding the exploration of end-user perspective

One of the primary insights from *ARC 1* and *ARC 2* is the need to shift the focus from technology-driven innovation to end-user value creation. This requires:

- Developing end-user-focused interventions that move beyond purely technology-driven innovation.
- Promoting new directions for service solution innovation by prioritising end-user value over technical feasibility.
- Encouraging collaboration between designers and engineers to balance technological excellence with user needs.

This perspective aligns with servitization literature, which emphasises that B2B manufacturers traditionally lack direct links with end-users (Lievens & Blažević, 2021). Servitization strategies enable manufacturers to descend downstream in the value chain and create value beyond a one-off transaction (Wise & Baumgartner, 1999). By integrating service innovation into the product lifecycle, B2B manufacturers can learn from B2C practices, where product-service business models enhance end-user engagement and long-term revenue generation (Cruz et al., 2022).

For example, in the smartphone industry, although the physical product is purchased once, the associated services generate recurring value through subscription models (Baines, 2015). Applying similar service-oriented value propositions in a B2B context can create new opportunities for fostering long-term relationships with customers and end-users and ensuring sustainable business growth (Johansson et al., 2019).

6.1.2 — Embedding the Exploration of the Future Perspective

Future visioning is a useful capability for transitioning to servitization strategies. The insights from *ARC 1* and *ARC 2* indicate that:

- Involving novice strategic designers contributes to a more future-oriented perspective on servitization in B2B industry.
- Developing future visioning skills helps organisations anticipate unfolding trends and new service opportunities.
- Knowledge of digital platform technologies is a key enabler for transitioning to servitization strategies.
- Using the *Strategic Design Roadmapping* method fosters long-term servitization strategies by aligning product-service innovation with anticipated end-user needs.

The servitization literature supports these findings by emphasising that B2B manufacturers must extend their strategic horizon beyond current business relationships (Adrodegari, 2021; Bakir et al., 2021). Mapping future user scenarios and aligning innovation with expected end-user demands enables organisations to develop more resilient and adaptable business models.

Moreover, unbiased strategic designers play a crucial role in this transformation by challenging traditional innovation frameworks and proposing radical new service solutions (Bluemink et al., 2021). By embedding future visioning and ecosystem thinking in their strategic planning, B2B firms can evolve their servitization strategies to remain competitive in a rapidly changing market.

6.1.3 — Embedding Strategic and Service Design Capabilities in the Organisation

To ensure that servitization strategies are effectively embedded in the organisation, flexibility in implementation is essential. Insights from *ARC 1* and *ARC 2* highlight that:

- Learning-by-doing approaches facilitate service innovation and enhance capabilities of designing future end-user scenarios.
- Breaking down organisational silos promotes cross-fertilisation between business disciplines.
- Cross-departmental dialogues help align product-service ideas with strategic objectives.
- Establishing a *Living Design Lab* or recurrent *Strategic Design* event creates an experimental space to test interventions before full-scale implementation.
- Viewing unexpected events as opportunities fosters adaptive innovation and resilience.

Servitization literature confirmed that B2B firms needed to transition from rigid, linear business models to more flexible, customer-centric value networks(Baines et al., 2010). The shift towards service-driven business models required firms to move beyond traditional supplier–customer dynamics and to create overarching value networks in which multiple stakeholders collaborated to deliver integrated solutions (Johansson et al., 2019).

This transition is evident in the airline industry, where airports, airlines, and technology providers collaborate to offer seamless customer experiences beyond traditional service boundaries. By adopting similar network-based servitization strategies, B2B manufacturers can co-create value with ecosystem partners and better address the dynamic needs of their end-users.

6.1.4 — Towards an Overarching Servitization Strategic Design Process

By integrating insights from *ARC 1* and *ARC 2* with servitization and strategic design literature, we laid the groundwork for testing strategic design interventions in *ARC 3*. The findings reinforced our idea that a successful servitization strategy must balance end-user engagement, future-oriented visioning, and organisational adaptability. Therefore, *ARC 3* includes the following three criteria for designing and testing strategic design interventions within the *Airports* business unit of the focal manufacturer:

- Moving beyond technology-driven innovation by embedding end-user perspectives in servitization processes.
- Developing long-term servitization strategies through strategic foresight, digital platform knowledge, and unbiased design thinking.
- Implementing flexible interventions that allow organisations to experiment, learn, and iterate servitization strategies before full integration.

Ultimately, *overarching servitization* strategies enable B2B manufacturers to transition from product-centric business models to sustainable, service-driven ecosystems that generate long-term value for customers and end-users alike. *ARC 3* will further explore the phasing and implementation of this transition within the organisational context.

Section 6.2 describes Coghlan's (2019) preliminary step in which we formulate the principles for the design of strategic design interventions. In *Section 6.3*, we discuss how we constructed *ARC 3* using Simonse's (2018) *Strategic Design Roadmapping* process and argue why we applied this process to design interventions as part of the *Overarching Servitization Strategy Process* design. It continues with the architecture of the proposed *Overarching Servitization Strategy Process* design linked to the different design interventions. In *Section 6.4*, we discuss how we planned the *strategic design interventions* of *ARC 3*, how we selected the workshop participants, and some practical issues around organising *ARC 3*. *Section 6.5* deals with executing the strategic design interventions and focuses on the process we went through. Due to the confidential nature of the strategic considerations, we do not discuss the substantive results of the process here. However, with anonymised outcomes, we give an impression of what outcome qualities we achieved after finalising the successive interventions of the *Overarching Servitization Strategy Process*. *Section 6.7* summarises the results of *ARC 3*. In *Section 6.6*, we evaluate *ARC 3* by reflecting on the *Overarching Servitization Strategy Process* using Coghlan's (2019) evaluation framework. *Chapter 6* concludes with *Section 6.8*.

6.2 — ARC 3 — Preliminary Step

ARC 3 aimed to explore how technology-driven B2B manufacturers could develop an *overarching servitization* process to design product–service offerings targeted at end-users. In other words, the objective was to understand how the case company might create value propositions that would enable the establishment of business relationships with customers-of-the-customer in an overarching sense. This ambition was inspired by examples such as *Rolls-Royce*'s Power-by-the-Hour service proposition, which exemplifies how value can be delivered downstream in the value chain(Bluemink et al., 2020).

In *Section 5.8*, we summarised and clustered insights from *ARC 1* and *ARC 2* concluding with three focal points for embedding in an *overarching servitization* strategy process:

1 — Exploring the End-User Perspective — Creating value for end-users.

2 — Exploring the Future Perspective.

3 — Embedding Strategic and Service Design Capabilities in the Organisation

In constructing *ARC 3*, we incorporated these three focal points into the design of the *Overarching Servitization Strategy Process (TLN)*. Therefore, we rephrased the focal points as requirements that should be met:

A — The TLN process must explore end-user perspectives, identifying values and uncovered needs.

B — The TLN process must explore future end-user context scenarios.

C — The TLN process must be flexibly organised and employed in the operational context of the case company.

We want to mention that we established *ARC 3* shortly after the COVID-19 pandemic paralysed the organisation in the spring of 2020. As most of the projects within the Airports business unit are airport-related, many development projects (40%) were suddenly postponed, suspended, or cancelled, severely disrupting the organisation's current strategy. However, the disruption caused by the pandemic also provided an opportunity for the team to test our (work-in-progress) *Overarching Servitization Strategy Process* design. Through presentations of our process, we convinced the business unit management team and were allowed to pilot our process to design an *overarching servitization* strategy.

6.3 — ARC 3 — Constructing Action

First, ARC 3 aimed to design and implement an *Overarching Servitization* Strategy Process to cover the missing Explore phase in the case company's product-service development process. Based on our conclusions of ARC 2.2 (see Section 5.6), we added an Explore phase prior to the case company's Innovate-Develop-Maintain sequential development phases (see *Figure 5-4*)

Second, ARC 3 aimed to formulate an *overarching servitization* strategy for the Airports business unit by conducting a series of strategic design interventions, guided by the *Overarching Servitization Strategy Process*. The objective was to create a boundary object

in the form of a strategic design roadmap, complemented by a strategic design agenda. Together, these artefacts were intended to support the development of future-oriented product–service value propositions and to facilitate alignment across organisational stakeholders.

6.3.1 — ARC 3 — Constructing an Overarching Servitization Strategy Design Process

In this section, we construct the *Overarching Servitization Strategy Design process* by developing a series of six strategic design interventions. We explain our rationale for adopting Simonse's (2018) *Strategic Design Roadmapping* as the foundation for structuring the *Explore* phase within the case company's development process.

Due to the end-user's direct involvement through user interviews and observations, Kim et al.'s (2018) method appears more suitable for quickly transforming ideas into tangible prototypes to test new user values. As the original source of user needs, end-users are regularly asked for their opinions on updated prototypes, presented as MVPs (minimum viable products). The method seems more appropriate for short-term innovation on the first horizon, where the roadmap timeline reflects multiple incremental innovations. We, therefore, chose Simonse's method. as it is suitable for designing strategic servitization interventions focused on exploring end-users' behaviour in future use case scenarios and contexts. The method involves three critical activities: *Value Mapping, Idea Mapping,* and *Pathway Mapping* (see *Figure 6-1*). As these activities examine future worlds and end-user value drivers that could arise more abstractly, it is better suited to longer-term and radical innovations. Conducting creative trend research to determine value drivers fosters an end-user-oriented mindset among participants. Value Mapping is the first activity that identifies future values based on trend research and concludes with the company's vision that addresses these values. The second activity—Idea Mapping—explores new technologies, combines them with previously identified end-user values, and generates ideas for product-service value propositions arranged on a timeline. Finally, the third activity—Pathway Mapping—focuses on articulating necessary development activities, establishing a detailed innovation plan, and adjusting any final constraints.
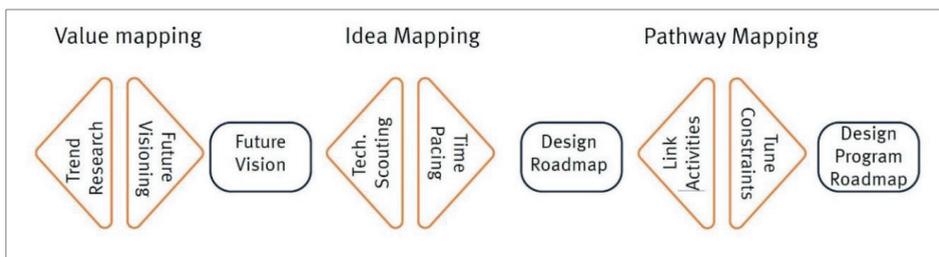
Figure 6-1 — Process of Design Roadmapping – Three Critical Stages (Simonse, 2018; p.18)

Chapter 5 concluded that interventions for designing an *Overarching Servitization Strategy Process* are more likely to succeed if they meet the following three conditions:

1)	*The design interventions explore an end-user-oriented perspective.*

Design interventions to create new product-service value propositions must be end-user-focused, as the end-user at the end of the value chain determines if they are willing to return value upstream in the value supply chain.

2)   The design interventions explore a future-oriented perspective.

Our insights from *Chapters 4* and *5* have shown that the case company's product-service ideas often focus on the short term and address problems in the current B2B tech-driven industry (airports) precisely because they are familiar with it. Many of their product-service innovations overlook the end-user perspective, leading to incremental rather than very ground-breaking product-service value propositions. From a strategic viewpoint, we argue that design interventions require a focus on exploring, discovering, and envisioning value propositions in a future and still unknown end-user context.

3)   The design interventions can be implemented and conducted within the current organisational structures.

Organisational process change is inherently sensitive. Therefore, before the *Overarching Servitization Strategy Process* can be embedded as a formal strategizing approach, it must first demonstrate its effectiveness through successive design interventions. During this phase, departments were invited to take co-ownership of the strategy-making process and actively contribute to its development. Since the process was not yet part of the formal organisational structure or budgeting procedures, a *designerly* implementation approach was adopted—characterised by iterative exploration and improvisation. To embed an Explore phase within the company's innovation process and uncover future end-user needs, a six-step *Overarching Servitization Strategy Design process* was developed (see *Figure 6-2).*

1	2	3	4	5	6
Kick-Off	**Creative Trend Research**	**Empathizing with End-Users**	**Envisioning Future Contexts**	**Ideating End-User Value Propositions**	**Roadmapping & Connecting Dots**
Onboarding Participants in the OSSD Process	*Exploring Trends & Signals of Change*	*Understanding Customers and End-Users & their Value Drivers*	*Envisioning Future Contexts End-User Context Scenarios & Company Role*	*Ideating Product-Service Value Propositions to address End-User Needs in Future Contexts*	*Mapping the Ideated Product-Service Value Propositions into a 3 Horizon Strategic Roadmap*

Figure 6-2 — The Overarching Servitization Strategy Design Process – Six Design Interventions (after Simonse, 2018; Three Critical Stages, p.18)

The *Overarching Servitization Strategy Design process* supports long-term product-service innovation for 2035. We have named this process *'The Long Now'*, indicating that we aim to connect to the *'now'* through exploration, discovery, and envisioning the future context of end-users *'Travelling in Europe'.*

In the remaining chapters, for the sake of readability, we will refer to the *Overarching Servitization Strategy Design process* as *'TLN'*.

6.3.2 — ARC 3 — Constructing Action of Design Intervention 1 — Kick-Off

During the *Kick-Off,* we will introduce the scope of the strategic design process series and explain Simonse's (2018) *Strategic Design Roadmapping* method of which serves as the basis for our successive design interventions. From *ARC 1* and *ARC 2,* we learned that there is considerable knowledge about technology and market developments within the various company departments. However, the rigid siloed departmental structure often hinders knowledge sharing across the organisation. For the design interventions, we therefore plan to select employees from different departments and disciplines and bring them together outside the siloed structure. Although they are colleagues, they may not know each other well. Thus, the kick-off intervention also aims to introduce participants to one another through an icebreaker game, provide a brief overview of Simonse's (2018) *Strategic Design Roadmapping* method and take additional time to explain the successive *TLN* design interventions.

Participants might expect the strategic design interventions to focus on baggage handling systems, as these are the core products of the *Airports* business unit. However, in this *ARC 3* we deliberately adopt an *overarching* perspective to encourage participants to consider the end-user perspective, as the passenger ultimately is the *overarching* customer of the aviation business. We have decided to explore strategic directions and scenarios that extend beyond the current airport-centric strategy. Our scope will be *Traveling in Europe,* and we will consider the perspectives of future travellers. The *overarching* scope will not be limited to the current *Airport's* business scope as a provider of capital goods to airport customers only. It will also include various (even future) travel/transport modalities such as high-speed trains, autonomous cars, hyperloop, and drones. We argue that the company should not limit itself to the current business context but should look beyond it when exploring new product-service opportunities.

In conclusion, the *Kick-Off* session introduces participants to six strategic design interventions, aligning their expectations regarding the exploration and mapping of future context scenarios. These scenarios form the foundation for ideating product-service value propositions and developing a future-oriented innovation strategy aimed at delivering value to both customers and end-users. Additionally, the *Kick-Off* facilitates team introductions by bringing together participants from various departments who may not typically collaborate.

6.3.3 — ARC 3 — Constructing Action of Design Intervention 2 — Creative Trend Research

The creative trend research intervention aims to heighten participants' awareness of societal changes and trends that shape customer and end-user behaviours and needs. Participants analyse and discuss these signals and trends, ranking them according to their impact and likelihood of occurrence within their business domain. Based on this ranking, they can forecast and develop future scenarios and strategies for the company. The goal is to identify new directions for creating product-service propositions that deliver value to

future travellers. The primary objective of *Design Intervention 2* is to identify trends relevant to the company that may serve as key drivers for future service innovation. Since conducting trend research requires specialised design skills and would take too much time for participants without such expertise, two experienced designers have prepared the creative trend research (Tesselaar, 2021) in advance. During the intervention, these results serve as a foundation for discussion with the participants. We encourage them to identify trend categories, patterns, and user values that will shape the future end-user context and to position them on a timeline. The insights gained from exploring and interpreting trends serve as the foundation for visualising future end-user travel scenarios in Europe [3].

6.3.4 — ARC 3 — Constructing Action of Design Intervention 3 — Empathising with End-Users

The *Strategic Design Roadmapping* method by Simonse (2018) focuses on creating a future vision based on trend research results and the uncovered needs and value drivers of future end-users. It requires a deep understanding of end-users' behaviour and needs in their future life context. It calls for developing a clear and shared vision of the desired end-user experience that the intended product-service solutions should deliver (Kim et al., 2018). B2B companies have little affinity with end-users (the customers-of-their-customers), including the case company, which primarily focuses on business customers such as airports and airlines. To ensure end-user thinking and *identifying end-user values* are embedded in the *Overarching Servitization* Strategy Process, designers and engineers must empathise with travellers and understand what drives them. While *Design Intervention 2* focuses on discovering trends that align with the company's new servitization strategy, *Design Intervention 3* aims to identify value drivers for future travellers. To achieve this, participants engage in dialogue with end-users in their future environment. They empathise with end-users, explore their future behaviour, needs, and concerns, and examine how changing user values and beliefs drive future context scenarios. In this case, they empathise with future travellers and discuss future personas. Creating future personas during *Design Intervention 3* would take too much time for non-designer participants. To save time, two experienced strategic designers prepare a set of future personas before *Design Intervention 3* and present the results during the design intervention.

6.3.5 — ARC 3 — Construction Action of Design Intervention 4 — Envisioning the Future Context

This intervention explores possible and plausible future context scenarios. Encouraging participants to envision the future and become aware of potential future context scenarios enable them to navigate towards a preferable one. As visualising potential changes in advance can be challenging, this intervention offers exercises to describe and visualise how

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[3] As the participants were responsible for the European business domain, we limited the scope to *'people travelling in the European continent.'*

the context scenarios affect the B2B domain. For the focal manufacturer, we invite the participants to explore the desired future of '*travel in Europe*' and what the company could contribute to it. We ask participants to develop a future vision that captures the value aspirations of travellers in a future context and then translate those aspirations into a vision for the company. The company's future vision is visualised and articulated in a future vision statement, expressing its desired future state. We assign participants to create a newspaper for 2050 based on '*travel in Europe*' relevant trends by writing articles on issues that will be current by then, accompanied by aspirational images they can find online. This newspaper acts as a boundary object, illustrating the future and how travellers might be motivated in such a world. As a future vision simultaneously serves as a call to action for developing of innovative product-service value propositions that also consider the values of end-users in a future business context, participants use the following format for formulating the future vision statement: *We [the company] want to…[verb]+[an unmet need, desire] for… [a specific persona or target group] in… [the context of] by [verb]+[the object: a mechanism, service, product, experience, value].*

6.3.6 — ARC 3 — Constructing Action of Design Intervention 5 — Ideating End-User Value Propositions

In *Design intervention 5* participants ideate new product-service value propositions for their business domain's most likely future user scenarios. They prioritise the ideated *PSS* and *PSE* value propositions, determine their impact on the current product-service innovation portfolio, and assess the manufacturer's role in realising them. The focal manufacturer's case engages the participants in a brainstorming session to generate new ideas and scenarios that would be valuable in the future context of travel. To accomplish this, they need to use the outcomes of the prior design interventions as a source of inspiration. We employ brainwriting techniques to help participants think creatively about the future and encourage them to consider long-term perspectives. Teams of four participants conduct several rounds of two-minute brainstorming sessions. A subsequent round involves each participant iterating for a minute and adding a new item to the list. At the end, ideas for product-service value propositions will be generated, discussed, and clustered into different categories. We place them on the third horizon of our roadmap since these ideas were conceived for end-users in a far-future context. In today's setting, these ideas may not be achievable due to insufficient technology, knowledge, resources, or partnerships needed to realise them. During the ideation phase, participants from cross-functional departments discussed ideas from different perspectives, enhancing the richness of the conceived future value propositions.

6.3.7 — ARC 3 — Constructing Action of Design Intervention 6 — Roadmapping & Connecting Dots

After discussing and selecting the end-user value propositions resulting from the preceding design interventions, the participants refine, combine, consolidate, and map them into a three-horizon strategic design roadmap. As discussed in *Section 6.3,* a three-horizon strategic design roadmap contains essential aspects and envisioned activities. The

participants place the trends, value drivers, and future value propositions onto *Horizon 3*, which extends to 2050. We deliberately chose the perspective of 2050 to challenge the participants to explore far beyond the time horizon they are accustomed to in their current innovation context (two to five years).

In a subsequent activity, participants perform a back-casting of possible value propositions developed in the previous design interventions. Back-casting involves projecting from a future horizon to the present and analysing how those value propositions impact the current innovation activities on *Horizon 1* and *Horizon 2*. To develop the product-service value propositions of *Horizon 3*, participants discuss and explore which intermediate steps need to be planned and executed in *Horizon 1* and *2* (prior to the longer-term *Horizon 3*) to realise the conceived product-service value propositions of *Horizon 3*. By creating a long-term roadmap, the company's participants gain a common understanding of the company's strategic directions and scenarios; a strategic roadmap aligns each participant with the envisioned *overarching servitization* strategy. The strategic design roadmap acts as a boundary object, triggering dialogue to substantiate, discuss, and communicate company-wide the value of the product-service intended for development. It helps monitor progress within the organisation by tracking the implementation plans associated with the product-service value propositions. Additionally, the strategic design roadmap serves as a filter to select only those ongoing innovation projects that contribute value to the envisioned future value propositions. *Figure 1-2* shows an example of a schematic overview of the strategic design roadmap as an intended result. It contains four *'swimming lanes'* along a timeline: *User Values, Market Segmentations, Product-Service Innovations,* and *Technology Applications* describing the various related activities required to realise the intended product-service value propositions (Simonse, 2018) within a predefined time frame.

6.4 — ARC 3 — Planning Action

In the *Planning Action* phase, we detailed the following planning aspects for designing an *Overarching Servitization Strategy Process:*

Aim

The aim of *ARC 3* was to design and implement an *Overarching Servitization Strategy Process,* consisting of a series of strategic design interventions that would lead to an *overarching servitization* strategy for the Airports business unit. We made this strategy tangible through the development of a strategic design roadmap, which formulated a strategic design agenda containing service value propositions for the future traveller. This roadmap outlined the necessary steps for the case company's *Airports* business unit to implement an *Overarching Servitization Strategy* and its corresponding strategic design agenda.

Our objective was to develop a product–service strategy that was all-encompassing and aligned with the *overarching servitization* design agenda. To that end, we incorporated the overarching theme of *Travelling in Europe* as the guiding context for the *TLN* strategic design interventions. This theme directly related to two focal points discussed in

Section 6.2, both of which involved exploring the end-user perspective in a future context, with the end-user defined as a traveller.

Participants

Based on three criteria—role, experience, and domain expertise—the *Strategic Design Manager* and I selected the participants and formed two teams, A and B. We aimed for a balanced composition in each team to maximise opportunities for cross-fertilisation across disciplines and functions. Introductory interviews were scheduled with each selected participant to explain the purpose of the forthcoming strategic design interventions. During these interviews, we assessed whether participants demonstrated an open-minded attitude, had secured managerial approval, and were willing to prioritise the interventions within their day-to-day responsibilities. This helped us gauge their commitment and readiness to engage meaningfully in the process.

We compiled a list of 18 employees with diverse roles, domain knowledge, and levels of experience—more than strictly required to carry out the interventions. This surplus was intentional, as we anticipated that some participants might encounter scheduling conflicts or be unable to attend all sessions. Having a small pool of additional participants ensured continuity and flexibility in the execution of the strategic design interventions.

Since we had two experienced designers available to facilitate the design interventions, we were able to set up each session with both teams and conduct the interventions simultaneously *Table 6-1* lists the anonymised participants of teams A and B, along with their roles and areas of expertise.

Table 6-1 — TLN Participants

#	Participant	Business Domain	Participating in Team
1	Participant A	Technology	A
2	Participant B	Market	A
3	Participant C	Market	A
4	Participant D	Market	A
5	Participant E	Technology	A
6	Participant F	Technology	A
7	Participant G	Technology	A
8	Participant H	Market	B
9	Participant I	Technology	B
10	Participant J	Market	B
11	Participant K	Technology	B
12	Participant L	Technology	B
13	Participant M	Technology	B
14	Participant N	Technology	B
15	Participant O	Technology	A
16	Participant P	Market	B
17	Participant Q	Market	A
18	Participant R	Market	B

Facilitation

The design intervention facilitators were the *Strategic Design Manager* and a *Strategic Designer,* both of whom had extensive experience in leading strategic design interventions

within the area. The *Action Researcher* observed the sessions, supported the facilitators as needed. And acted as a backup facilitator when required.

Intervention Type

Initially, we intended to conduct the strategic design interventions in person. However, due to the circumstances brought about by the COVID-19 pandemic in 2020, we were compelled to shift from in-person to online delivery. As a result of the limitations associated with remote collaboration, we had to shorten the duration of each intervention to a maximum of two hours. In some cases, we spread a single intervention across two sessions to ensure the intended outcomes could still be achieved.

At the outset, we planned a total of six online strategic design interventions. In retrospect, we recognised that working online also offered certain advantages. It eliminated travel time and made it easier to involve participants from the case company's international locations, thereby broadening the range of perspectives represented in the sessions.

Tools

Because of working online, we used the *MS Teams™* communication tool and *Miro™* digital whiteboards to facilitate the activities during the interventions.

Intervention location

Online meetings in *MS Teams™*.

Timing

Six interventions averaging two hours each at three-week intervals, started in the second quarter of 2021 (1 April, 20 April, 10 May, 31 May, 21 June, and 15 July).

Preparatory Work

Before the *TLN* interventions could begin, a series of preparatory activities were scheduled to generate input materials for use during the sessions. These activities involved collecting trend information from various departments within the organisation, consolidating the data, and preparing it in a presentable format on a *Miro™* board. Some of these preparatory tasks required considerable time and effort, as they formed an integral part of the strategic design process.

Key activities included conducting creative trend research, developing user personas, and mapping customer journeys. To support these efforts, we also conducted interviews with specialists in the field of multimodal mobility and travel and produced a summarising video to communicate key insights. These preparatory activities were carried out during the first quarter of 2021, prior to the start of the design interventions.

6.5 — ARC 3 — Taking Action

In *ARC 3—Taking Action*, the six strategic design interventions were implemented as outlined in *Section 6.3*, following the structure of the *Overarching Servitization Strategy Process*. These interventions served to explore, develop, and articulate end-user-centric and future-oriented product–service value propositions within the context of the *Airports* business unit. To ensure transparency and rigour, the reader is referred to a detailed

account of the data retrieved from the substantive outcomes and supporting materials generated during these interventions: *Appendix C — ARC 3 — Taking Action — Piloting an 'Overarching Servitization Strategy Design' Process* on page 277.

6.6 — ARC 3 — Evaluating Action

6.6.1 — ARC 3 — Content Reflection

Reflecting on Participants' Expectations about Process Outcomes

After introducing the strategic design intervention series during the *Kick-Off* session, the facilitators asked the participants (11) how they thought they could contribute to the *Overarching Servitization Strategy Process*, what they could learn, and what outcomes they expected. We inquired about the significant challenges faced by the case company in starting this process. We also wanted to know what they perceived as the success factors for the outcomes. Participants shared their expectations regarding their learnings and the results of the upcoming interventions on the kick-off *Miro™* board. After coding their data using *Atlas.ti* coding software, we identified six codes with a supported by nine quotes and more (G ≥ 9). We then consolidated the codes into two code categories (see *Table 6-2*):

1) **Learning** — *New Skills & Methods and Cross-Pollination*
2) **Expected Outcome** — *Future Vision & Servitization Strategy linked to Actionable Roadmaps*

The interview data indicate that the participants expected to gain a common understanding of the company's product-service innovation strategy, future values, and end-user requirements shared across all departments by the end of the *TLNs* strategic design interventions. The participants anticipated insights into future contextual scenarios, as well as the behaviour and latent needs of potential end-users in those scenarios (16 quotes).

Participants hoped the strategic design intervention series would yield tangible results through innovative product-service solutions. They were eager to begin with an executable roadmap outlining an *overarching servitization* strategy, along with guidance for organising follow-up activities to realise the conceived product-service ideas (9 quotes) and align with the case company's current roadmaps, innovation projects, and initiatives (13 quotes).

They considered the strategic design interventions successful if it resulted in an action-oriented roadmap linked to a servitization strategy, in which several new product-service solutions were listed and plotted on a distinct timeline. Moreover, they expected that the
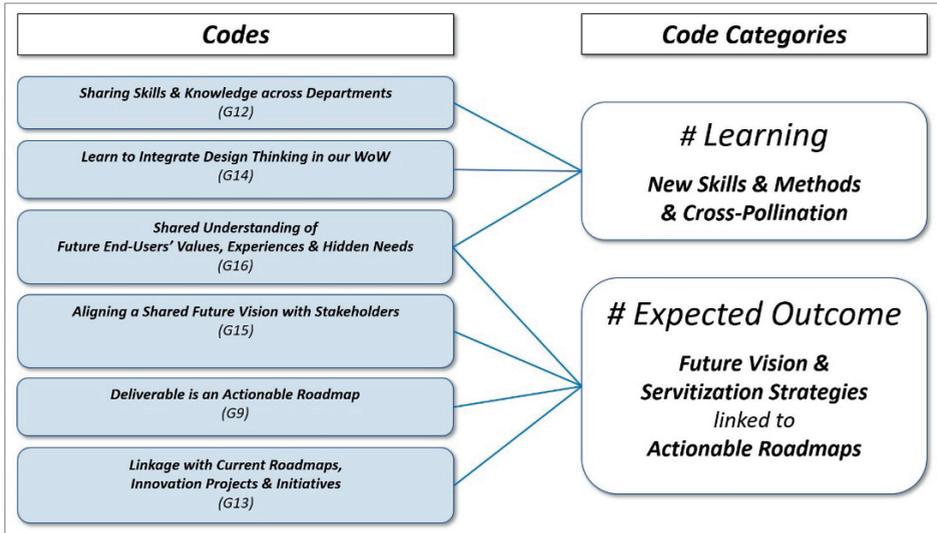
action-oriented roadmap would incorporate existing product-service innovation projects and could effectively facilitate strategic alignment among internal stakeholders regarding the company's future vision (15 quotes).

Notably, participants expressed eagerness to share their knowledge and skills with colleagues from other departments. They were keen to learn from each other's input and expertise and to look beyond their departmental boundaries (12 quotes).

In our conversations with a few participants, we found that they are eager to master new competencies, skills, and knowledge. However, due to a lack of time, they missed the opportunity to act on this. They viewed participation in the *TLN* strategic design interventions as a chance to gain new learning experiences in strategic design and servitization strategies. Regarding learning opportunities, they expressed interest in understanding the strategic design intervention we presented during the kick-off and applying proven strategic design methods and design thinking techniques (14 quotes).

Reflecting on the Process Outcomes — Learnings from Participants' Feedback

After the strategic design interventions of *TLN*, we conducted ten semi-structured interviews. We reflected with participants on the entire strategic design intervention series, focusing on the interventions' outcomes, process, and organisation. For this, we used reflection methodology as outlined by Coghlan (2019). Using *Atlas.ti*, we analysed the participants' interview data and created a summary of the codes that stood out (with ten or more quotes), along with their *Code Categories* and *Themes*. This information is presented in *Table 6-3* and includes 18 codes derived from participant quotes related to the strategic design intervention*s*.

Table 6-3 — Code Tree of Participants' Feedback Interviews

Codes	Code Categories	Themes
• Exploring the Future Perspective (29 quotes) • End-User Focus - Overarching Servitization (35 quotes) • Exploring Customer Values (21 quotes) • Creating PSS Value Propositions (32 quotes)	Exploring the Future End-User Context	DISCOVER Future Contexts & End-User Values
• Involving Business Partners & External Experts (24 quotes) • Organizing TLN Follow-Up (17 quotes) • Co-creation with Customers & End-Users (18 quotes)	Designing Overarching Servitization Strategies	
• Feedback on Outcomes TLN – Deliverables (19 quotes) • Feedback on Organising TLN – Ideas (21 quotes) • Feedback on Organising TLN – Likes (19 quotes) • Feedback on Organising TLN – Dislikes (18 quotes) • Learning from Others & Cross-Pollination (14 quotes)	Organisational Takeaways & Learning	ENVISION Future End-User Scenarios & CREATE End-User Values
• Hit & Run for Customers – Short-Term Perspective (31 quotes) • Strategizing PSS Innovation (21 quotes)	Aligning Current PSS Innovation Program	ADAPT & ALIGN Innovation Processes to Address Servitization Challenges
• Technology Oriented Innovation Culture (44 quotes) • Organisational Challenges (20 quotes) • Creating commitment (20 quotes) • Overcoming Servitization Barriers (14 quotes)	Servitization Challenges	

Table 6-3 shows the codes we distilled from the participants' feedback interviews conducted after *ARC 3*. We consolidated them into three themes based on the coded interview data. The three themes, drawn from participants' feedback and shown in the third column of *Table 6-3*, are:

1) *Discover Future Contexts & End-User Values*
2) *Envision Future End-User Scenarios & Create End-User Values*
3) *Adapt & Align Innovation Processes to Address Servitization Challenges*

The following sections evaluate whether the intervention of the *TLN* has met participants' expectations regarding the *ARC 3* objective of formulating an *Overarching Servitization Design Strategy* and capturing it in a *Strategic Design Roadmap*. We gathered feedback to improve next *ARCs* for testing strategic *overarching servitization* interventions. We interviewed the participants some weeks after completing the strategic design intervention series and discussed the *TLN* interventions and their results.

The interview data provided feedback on the *TLN* interventions series. We received participants' thoughts on the outcomes. One participant provided a quote that perfectly summarises the outcome: *'The output of* the *TLN initiative is, I think, mainly a roadmap that you can put on the table as a discussion document. That already has value. But I'm also thinking as inspiration to build a concept car, a product concept you can walk around, with a video showing how it works'* (19 quotes – *Feedback on TLN – Deliverables*, see *Table 6-3*). Notably, the interviewees stressed the importance of exploring the different end-users and customers and identifying the values that drive them. We collected feedback about the *end-user focus* (*overarching strategies* for *customers-of-the-customer*) and concluded that designing *Overarching Servitization Strategies* is recognised as having gained importance within the organisation. To illustrate this with an evidence quote, *'I'm*

curious, for example, if we ever think about our customer's customer, so basically ourselves. What do I expect when I order from Amazon five or ten years from now? What experience do I expect then? And how does that impact our systems and how we do business with the customer?' (35 quotes – *End-User Focus – Overarching Servitization*, see *Table 6-3*).

Discover Future Contexts & End-User Values

In our preliminary studies described in *Chapters 4* and *5*, before we embarked on the strategic design interventions of *ARC 3*, we concluded that B2B manufacturing companies in general (and the case company specifically) are not accustomed to thinking from the end-user perspective, as they primarily deal with their business customers and therefore do not maintain a close relationship or have a strong affinity with those end-users. However, we also argued that it is precisely the end-user who brings value back upstream in the value chain and thus plays an essential role in the business viability of future product-service value propositions. Reflecting on these insights led to the design of the *TLN,* which enables B2B manufacturers to descend further down their value chain by implementing six strategic design interventions. These interventions encourage B2B manufacturers to think beyond their current business context and focus on designing product-service value propositions for end-users in future contexts. the *TLN interventions* address our research sub-question about how to explore and respond to end-users' behaviour, latent interests, and needs in future context scenarios. As a participant put it: *'I think, yeah, I think we from technology should be the ones to ensure that we also bring a longer-term perspective on the discussion table because our sales is quite focused on existing business'* (29 quotes – *Exploring the Future Perspective*, see *Table 6-3*).

However, they also recognised the organisation's *hit-and-run* culture and short-term perspective, as one interviewee expressed, *'Look, we obviously come from a company that is really very project- and revenue-driven, immediately addressing customer demands of today'* (31 quotes – *Hit & Run for Customers*). This relates to whether the current Innovate department is paying enough attention to the customer-of-the-customer illustrated with the quote, *'I am curious to know whether we consider the customer-of-the-customer perspective enough.'*

Envision Future End-User Scenarios & Create End-User Values

The persona exercise during strategic design intervention 3, Empathising with Future Users, may have encouraged this thinking, as participants were asked to create user personas to understand the needs and behaviours of both the customer and end-user before brainstorming and developing product-service solutions. Instead of focusing on technical solutions, participants learned to define the intended end-user by creating a user persona as a starting point for the Ideation process (21 quotes – *Exploring Customer Values*, see *Table 6-3).*

Through analysing and discussing user personas, the participants gained valuable insights into the wants, needs, and behaviours of passengers *'Travelling in Europe,'* enabling them to tailor their brainstorming for the fourth and fifth strategic design interventions of *ARC 3,* which concerned *Envisioning Future Contexts* and *Ideating End-User Value Propositions.*

The facilitators asked the participants to envision future end-user travel needs, concerns, and behaviours in the context of *'Travelling in Europe.'* They executed exercises to ideate and create new product-service solutions and end-user scenarios that address future travel needs and desires.

The fourth strategic design intervention tasked the participants with creating a newspaper front page for the year 2050. The exercise, called *Newspaper,* was well-received and enjoyed by all. During this exercise, the participants creatively incorporated insights from the trend analysis and future persona exercise. Working in small groups, they solidified the results of previous sessions. They also gained inspiration to develop a *future vision statement* for the company, focusing on *'Travelling in Europe.'* The purpose of creating this future vision statement was to inspire them to create a narrative that communicates the company's values and purpose, as illustrated with the quote, '*we need to build a purpose-driven service innovation strategy.'* The newspaper front page served as a boundary object, facilitating group discussions on the anticipated future context and end-user scenarios. Additionally, the newspaper deliverable inspired idea generating during the ideation sessions of the fifth strategic design intervention*,* where participants used brainstorming techniques to develop ideas for new product-service solutions. The three teams involved in the ideation session produced a list of 42 ideas. They employed clustering techniques and assessed viability and desirability criteria to generate nine compelling product-service concepts. The number of 32 quotes on *Creating PSS Value Propositions* indicates that the interventions paid off. We wish to summarise the feedback with this evidence quote: *'Yes, we very often talked about what a passenger wants. But actually, you have to consider that whole chain—B2B2C. You need to know what the passenger values and what the airline and airport want. The passenger just wants no hassle. The airline wants no delays, and the airport wants to reduce congestion around its reclaim area during peak hours. You have to create value for all those stakeholders'* (32 quotes – *Creating PSS Value Propositions*, see *Table 6-3*).

Adapt & Align Innovation Processes to Address Servitization Challenges

In the feedback on the process outcome, participants expressed surprise at the results because two of the three concepts were new to them. Some had already considered the third concept during the company's selection process. However, the selection committee rejected it based on the selection matrix, citing the lack of a viable business case. Despite this, the participants chose the third concept, confirming that the *TLN* provided them with new insights into evaluating and selecting product-service ideas. Nonetheless, they expressed clear disappointment that *'no radical solutions among the generated ideas'* had taken shape. This response indicates that some participants expect brainstorming sessions to always produce unconventional ideas. It may also suggest that intriguing ideas were overlooked due to time constraints or the limited scope of the session. Additionally, the team may have missed different perspectives from external stakeholders. These uncertainties raised the valid question of whether the generated ideas could be biased due to insufficient input from external parties. The facilitators and researchers recognised that the intervention for *Ideating End-User Value Propositions* should be viewed as the first

attempt at organising such a brainstorming process. Therefore, the outcomes cannot be considered absolute or final at this stage, as they still require multiple iterations, stakeholder validation, and the involvement of customers, end-users, and external experts. A critical insight regarding the organisation of the fourth and fifth strategic design interventions involves including end-users, key customers, and external specialists in the interventions and co-creation activities during the *TLN*, as this provides a richer *outside-in* perspective on new product-service innovation initiatives. This insight is supported with two evidence quotes: *'Regarding that external, outside-in perspective, I am sure there are aviation consultants who would be happy to share their views on this. We have hired many consultants in recent years, so why not also for* the *TLN? I am sure experts and consultants are talking to airlines and airports about what they will need in 10 years'* and *'Why not install a customer panel of 100 frequent travellers?'* (24 quotes – *Involving Business Partners & External Experts,* see *Table 6-3).*

The interviewees shared several ideas and pieces of advice on how to involve external stakeholders in co-creating product–service value propositions. This is illustrated by the following quote: *'It is important to position ourselves as a thought leader and convince our aviation customers that we can put ourselves in the shoes of the customer's customers—the passengers—and that we might be able to co-develop new services together'* (18 quotes – *Co-Creation with Customers & End-Users*, see *Table 6-3*).

They also adopted new insights and ideas from the strategic design interventions, as evidenced by the following quote: *'In addition to technical feasibility, we are also trying to explore viability and desirability because this is also what the user wants, right? Asking what the user expects from this solution and whether it aligns with what we deliver. We are trying to include this part more and more in our explorations and the things we do and not just do the technical feasibility because, in the end, yes, it has been the focus, but we are trying to shift.'* (21 quotes on *Feedback Organising TLN – Ideas*).

The fifth intervention, *Ideating End-User Value Propositions,* resulted in nine product-service ideas. The *Overarching Servitization Strategy Process* concluded with *Roadmapping & Connecting Dots*, for which we conceived a rough outline of a strategic design roadmap. In this intervention, the facilitators instructed three teams to share their concepts developed in *Ideating End-User Value Propositions*. The facilitators then conducted a thorough discussion on the proposed concept ideas and invited the participants to vote for their top three choices using a *dot-voting* method. After careful consideration, the participants identified three outstanding product-service concepts to incorporate into the strategic design roadmap.

Unfortunately, we ran out of time during our discussion on various concepts and could not complete our concept roadmap. However, we divided the various concepts into three teams. We assigned each team to create a brochure elaborating on the chosen concept, explaining the end-user value and the relevant product-service properties and features. This activity resulted in three product-service brochures. In a separate session, the facilitators completed *Horizon 3* by mapping out the three chosen concepts on the

strategic design roadmap, according to Simonse (2018), including preliminary service innovation activities for *Horizons 1* and *2*. As a result of the six interventions we carried out for the *Airports* business unit, the facilitators created a strategic design roadmap, a critical document that delineates all the imperative activities to be executed throughout the three timeframes—*Horizons 1, 2,* and *3*—to achieve the ultimate situation described in the future vision statement. After completing this, the facilitators presented the *Strategic Design Roadmap* in a separate meeting with the participants. The discussion reflected the purpose of a *Strategic Design Roadmap*: the start of a conversation about the newly formulated servitization strategy. A *Strategic Design Roadmap* facilitates discussions about aligning *overarching servitization* strategies among management levels. It also helps to align activities between the innovation and commercial departments within the business unit at the operational level. Several participants mentioned that the *Strategic Design Roadmap* serves as a *talking piece* and an excellent medium for communicating strategic innovation decisions. Simonse (2018) considers a strategic design roadmap as a boundary object for framing and aligning strategic innovation pathways. This was also reflected in the interview data, with the evidence quote: *'How can we ensure that we do the right things in the long term? We learned about strategic roadmaps related to this long-term initiative. So, there are multiple initiatives within our company that complement each other. And yes, for me, from my current position, it was good to be involved in the TLN and learn from it. So, there were multiple reasons why I thought it was good for me to be part of the journey and contribute to new strategy and learn from it'* (21 quotes – *Strategising PSS Innovation,* see *Table 6-3).*

Table 6-4 summarises the content reflections into four categories with key insights into factors enabling or hindering the implementation of *TLN.*

Categories	Key Insights Identified in Content Reflection ARC 3

Addressing End-User Values	• *Three 'overarching' themes were identified in participants' reflections*
	  1. *Exploring future contexts and end-user values*
	  2. *Envisioning future scenarios and creating end-user value*
	  3. *Adapting and aligning innovation processes to address servitization challenges*
	• *Recognised the importance of an end-user focus, marking a paradigm shift from solely considering direct business customers to serve end-users.*
	• *Persona exercises and future vision assignments helped understand end-user behaviours and identify latent needs, serving as a foundation for ideation processes.*

Incorporating the Future Perspective	• *The strategic design roadmap was seen as a valuable discussion tool for future-oriented servitization strategies and innovation decision-making.* • *Participants acknowledged that utilising strategic design methods provide a long-term perspective, which contrasts with the organisation's short-term, revenue-driven culture.* • *Participants feedback revealed the need for structural organisational changes in how overarching servitization strategies are developed and implemented.*
Participants' Expectations of TLN	• *Expected a shared understanding of the company's product-service innovation strategy, future values, and end-user needs across all departments.* • *Anticipated concrete outcomes, including an actionable roadmap for an overarching servitization strategy and guidelines for follow-up activities.* • *Defined success as an action-oriented roadmap linking new product-service solutions to strategic objectives.* • *Expressed strong interest in cross-departmental knowledge exchange and developing new competencies in strategic design, service design and design roadmapping.*
Lessons Learned and Areas for Improvement	• *The interventions generated 42 ideas, clustered into nine product-service concepts, yet some participants felt a lack of radical innovation.* • *Recognised the need for multiple iterations and validation with external stakeholders.* • *Highlighted the necessity of involving customers, end-users, and external experts in co-creation processes to gain a broader, outside-in perspective.* • *A strategic design roadmap was developed, but time constraints prevented its full completion. It served as a 'boundary object' for strategic alignment and communication within the organisation.*

6.6.2 — ARC 3 — Process Reflection

All participants found the interventions fun, inspirational, and meaningful, as they contributed to the company's *Overarching Servitization Design Strategy*. The interview data provided valuable insights into how the *Strategic Overarching Servitization Design Process* can be effectively organised. This is illustrated by the following quote: *'Overall, I have a very good impression. I feel that every time we sat together with the team, we looked at the subject matter with all kinds of new methods, so at least that makes sure that we highlighted, well, whole new things again, so I really liked that.'* Interviewees appreciated the bottom-up approach of the interventions, which involved employees from lower management levels in formulating the servitization strategy. This approach was seen as a recognition of the value of their practical experience and operational knowledge (19 quotes on *Feedback Organising TLN – Likes,* see *Table 6-3*).

Adapt & Align Innovation Processes to Address Servitization Challenges

The interviewees found the interventions well prepared, organised and conducted, especially given the constraints faced during the COVID-19 pandemic in spring 2020. Shortly beforehand, we had to decide to conduct all interventions online, while preparations were geared towards in-person sessions on the company campus. Suddenly, we found ourselves needing to adapt to using various online tools. With Microsoft Teams™, we became skilled in utilising breakout rooms and facilitating small group brainstorming. Additionally, we familiarised ourselves with new online tools such as *Miro™* whiteboards. The interviewees indicated that there were both advantages and disadvantages to working online. First, although most participants perceived the online sessions as heavy and sometimes too long, the interview results showed that 50% preferred online sessions because they saved time and made international work more accessible due to reduced travel time. Second, online sessions allowed participants to address urgent operational issues while attending.

However, the other 50% preferred face-to-face meetings on the company campus for three main reasons. First, they felt it was more enjoyable and effective to get to know each other in person rather than online — especially since some participants had never worked together before and came from different departments, business units, or international offices. A face-to-face introduction is therefore less distant, puts people at ease, and facilitates cooperation during creative sessions. Second, they found it disturbing when colleagues went offline (at their desks) without informing the team when they would return. Finally, being in a separate environment, away from day-to-day operations during strategic sessions, is crucial. Shifting from an operational to a strategic mindset is challenging for most people because the two mindsets do not readily coexist.

The interviews clarified that some participants preferred to schedule interventions in shorter succession, perceiving the interval between the six interventions as too long. As we had to organise the interventions outside the regular organisational structure and alongside regular staff tasks, we depended on the simultaneous availability of participants. This situation resulted in intervals of two to three weeks between interventions. The facilitators asked the participants to carry out the interventions alongside their daily jobs, which was different from their usual experience with regular innovation projects (where they could log their project hours). Some participants had to choose between attending sessions and completing their operational tasks and priorities. We had to accept this trade-off because the interventions had not yet been formalised in the organisation (*TLN* was not an official project, meaning participants could not '*write off*' their hours). Moreover, we acknowledged that not everyone could attend all six interventions.

In addition, the interventions were perceived as time-consuming. Several interviewees reported feeling under pressure and raised concerns about the potential impact on the quality of the strategic design interventions. They noted that having to cut short brainstorming sessions and follow-up discussions due to time constraints could lead to valuable — and potentially brilliant — ideas being overlooked.

The above insights were supported with the following evidence quote: '*I prefer three full days of on-campus pressure cooker meetings. And let's make sure people are really available so they can focus on this for three full days and come up with a result. the TLN with its multiple short meetings at one or two-week intervals allowed some people to get out and not participate in some workshops. So, to create more commitment, it is better to have three full days in a row*' (18 quotes on *Feedback Organising TLN – Dislikes*, see *Table 6-3*).

The three product–service value propositions were developed without undergoing multiple design iterations or in-depth reflection. As such, they were regarded as initial concepts that still require further development and validation with key stakeholders and end-users.

During the interviews, the issue of these unfinished concepts was raised, along with suggestions for how to proceed. This is illustrated by the following quotes: '*Let's finalise the roadmap containing these three final concepts and make them more tangible*' and '*If I may give my advice. I think you should try to take an agile approach to share with key stakeholders. Even if the concepts are not finished yet, they will give you valuable feedback, and based on this feedback, you then do the next round. That way, you have feedback pretty quickly, don't have to wait for a fully developed concept or story, and avoid a viability risk*' (17 quotes on *Organising TLN Follow-Up* (see *Table 6-3*).

The interviewees shared reflections on their learning experiences related to the *TLN process*, the design of product–service value propositions, and how these aligned with their ongoing product–service innovation projects. Collaboration with colleagues from other departments fostered cross-pollination and cross-functional learning. Participants inspired one another and gained fresh perspectives, which sparked discussions and led to new insights and ideas for product–service value propositions. This is supported by quotes such as: '*In ideation, for example, with a diverse team, we now try more and more to find out the real customer problem and solution value*' and '*I think it would be instructive to have a chat with colleagues from Warehousing*' (14 quotes – *Learning from Others & Cross-Pollination*, see *Table 6-3*).

In addition, interviewees viewed overcoming the dominant technology-focused innovation culture as a significant challenge, best expressed by the following quote: '*Our company still has a long way to go to become fit for selling something-as-a-service. It just takes time to learn and adapt the organisation to it. But I think there are long-term opportunities there*' (44 quotes – *Technology Oriented Innovation Culture*, see *Table 6-3*).

The interviewees also offered implicit suggestions for adapting the company's current product–service innovation strategy to align with the newly formulated product–service scenarios outlined in the *Strategic Design Roadmap*. At the same time, they acknowledged several organisational challenges. One interviewee expressed it as follows: '*Do we have the ability within our organisation to find out from different potential customers what they really need? To identify common customer needs that we can serve with platform solutions. We recently started working with the configure-to-order principle. We work with functional*

modules that allow us to configure fine solutions for most customers. But that is not something we are always used to, as we still want to create customer-specific solutions in our hunt for projects. The tendency remains to mainly meet that very specific customer demand and develop yet another special' (20 quotes – *Organisational Challenges*).

On the other hand, several interviewees pointed to a key barrier hindering changes to the company's current innovation strategy. Unexpectedly, they identified the company's increasing sales revenues and strong profit margins as the main obstacle to a servitization transition. This commercial success reduces the perceived urgency to adapt or pursue innovation.

This servitization barrier is illustrated by the following quote: *'Given the economic situation, we have an excellent order book, so above all, let us not take risks and spend money on innovations that we have yet to determine whether we will succeed. After all, there is low-hanging fruit that we have plenty of work to do over the next five years'* (14 quotes – *Overcoming Servitization Barriers*).

Envision Future End-User Scenarios & Create End-User Values

During the *ARC 3* interventions, while designing an *Overarching Servitization Strategy Design process*, we applied the roadmapping principles of Phaal & Muller (2009) and Simonse (2018). In *Appendix C-6, Figure C 17* we presented a preliminary version of the case company's *Strategic Design Roadmap* as a result of the *TLN process*. However, we noticed that the preliminary version did not include a *Future Vision Statement*, even though the facilitators mentioned that it should guide the *Overarching Servitization Strategy Process*. It was intended to be included, but due to time constraints during the final phase of the process, it may have been overlooked. The frameworks of Simonse (2018) and Phaal & Muller (2009) position the *Future Vision Statement* at the endpoint of the timeline as the proverbial dot on the horizon. Unlike Phaal & Muller, Simonse adds a connecting theme to each of the three horizons to explain and focus on the product-service innovation activities in that horizon (see *Figure 1-2).* Thus, the timeline ends with a *Future Vision Statement* that provides an aspirational goal for the B2B company. Similar to a motorist's road map, the vision statement outlines the final destination of the service innovation journey.

Discover Future Contexts & End-User Values

As the *TLN process* identified three distinct future contexts and corresponding end-user value perspectives within the associated *Strategic Design Roadmap* (see *Figure C-7 in Appendix C-6)*, these perspectives were incorporated into the development of a novel *Strategic Design Roadmap* framework. This new framework builds upon the existing roadmap models proposed by Simonse (2018) (see *Figure 1-2,* Phaal & Muller (2009) (see *Figure 1-1)*, A defining characteristic of these roadmap frameworks is their use of a timeline structured around three successive horizons.

Horizon 1 of the roadmap framework focuses on short-term goals and ongoing innovation projects based on proven technologies. This includes small improvements, optimisations, and incremental innovations related to the current product-service portfolio.

Horizon 2 focuses on mid-term goals and near-future opportunities to address unfolding trends and technologies. It explores new suppliers and business partners with complementary capabilities.

Horizon 3 focuses on far-future possibilities but remains vague and not very concrete. It depicts visionary ideas, aspirational product-services, radical innovations, and disruptive technologies.

As a result of the *TLN process*, we prominently displayed three separate layers across the three *Horizons 1, 2,* and *3*: the *Value Context Perspective,* the *Value Exchange Perspective,* and the *Value Creation Perspective* layers.
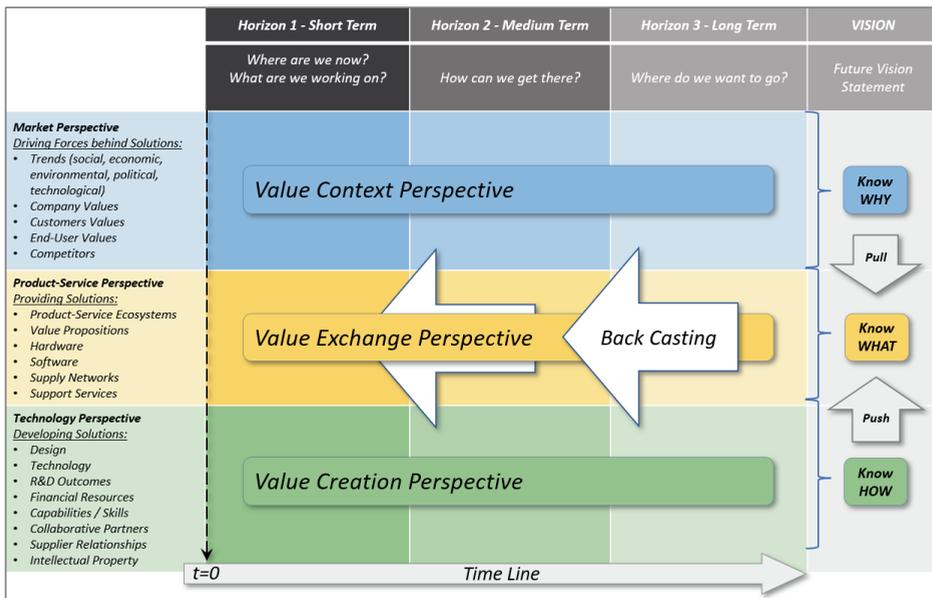
Figure 6-3 — Value-Driven Strategic Design Roadmap

Figure 6-3 shows this framework visualising three coloured horizontal *Value Perspective* layers. The blue horizontal top layer provides and maps the context-relevant trends and values across time *Horizons 1, 2,* and *3*. It represents the driving forces behind the future world context and the evolving values of end-users and customers in the current, adjacent, and future business contexts. This layer provides the rationale for the future vision statement and answers the *'Why'* question: *'Why do we go in this direction?'* We have termed the blue layer the *Value Context Perspective* (see *Figure 6-3*)*.

The yellow layer in the centre of the roadmap maps the product-service solutions that the B2B manufacturer needs to provide to exchange values with its customers and end-users.

It represents the supply network and outlines the product-service value propositions to be introduced on the projected launch dates. This layer answers the *'What product-services do we need to innovate?'* question to meet customer needs and achieve the company's future vision. By supplying and co-creating product-service value proposition for customers and end-users, the company captures value in return. Since there are values exchanged between the B2B manufacturer, customers, and end-users, we have designated the yellow layer as the *Value Exchange Perspective* (see *Figure 6-3*). This perspective indicates *'What'* the company needs to deliver to meet customer needs and values while achieving its the future vision. Phaal & Muller (2009) argue that an imaginary *'Pull'* force from the blue *'Why'* layer influences the solutions from the yellow *'What'* layer (see the last column of *Figure 6-3*). This *'Pull'* force from the blue layer is always present but not consistently recognised by B2B manufacturers, who tend to focus primarily on technical solutions (technology-push) and have not (yet) correctly tuned their antennas to collaborating service providers and overarching end-users. To address this challenge, spark discussions, and promote a greater focus on value creation for future end-users and collaborating service providers, we have given the *Value Exchange Perspective* a prominent place in the *Value-Driven Strategic Design Roadmap* (see *Figure 6-3*).

Finally, the green bottom layer—termed the *Value Creation Perspective*—relates to the question *'How to create overarching end-user value propositions?'* It contains the innovation efforts and reflects the project activities needed to research, develop, or acquire new technologies, partnerships, skills, and capabilities, and the necessary investments to make it all happen. It depicts the collaborating service suppliers that provide complementary capabilities, staff, and skills, as well as the financial resources needed to turn the envisioned value propositions into reality. The green layer functions analogously to the *'Pull'* force in the blue layer, but it also embodies what Phaal & Muller (2009) describe as an imaginary *'Push'* force. This *'Push'* force drives new, technology-enabled, end-user-driven value propositions from the green *'How'* layer towards the yellow *'What'* layer, which typically encapsulates the end-user values. Observations within the focal B2B manufacturer indicate that while there is a significant focus on introducing technological solutions, greater attention is needed for overarching end-user values. Addressing this gap involves thoroughly answering the question of *'How do we create overarching end-user value propositions?'* to ensure that innovation efforts align with and effectively meet end-user needs and expectations (see *Figure 6-3*).

In conclusion, *Table 6-5* summarises the key insights gained from our reflection on the *TLN process*. This reflection has deepened our understanding and provided guidelines for creating overarching value for end-users in the focal B2B manufacturer. We contributed to roadmapping theory and refined existing roadmap frameworks (Phaal & Muller, 2009; Simonse, 2018) by distinguishing three distinct value perspectives: the *Value Context, Value Exchange,* and *Value Creation Perspective* (see *Figure 6-3*).

Table 6-5 — Summarising Key Insights and Categories Identified in Process Reflection ARC 3

Categories	Key Insights Identified in Process Reflection ARC 3
Participants' Experiences of TLN	• *Participants found the TLN interventions enjoyable, inspirational, and meaningful, as they contributed to the company's overarching servitization strategy.* • *The bottom-up approach was appreciated, involving employees from lower management levels in formulating the strategy, acknowledging their expertise in daily operations.*
Challenges in Product-Service Innovation Strategy	• *Organisational silos hinder strategic change, despite strong financial performance.* • *The preference for customer-specific solutions over platform-based solutions slows innovation progress.*
Strategic Roadmapping	• *TLN's Strategic Design Roadmap incorporated three value perspectives: Value Context, Value Exchange, and Value Creation.* • *These layers structure how companies explore future trends, end-user values, define product-service solutions, and determine innovation efforts.* • *The strategic design roadmap serves as a tool to guide long-term innovation aligned with servitization objectives.*
Organisation of TLN Interventions	• *Interventions were well-prepared and executed despite constraints posed by the COVID-19 pandemic.* • *The time gaps between interventions (2–3 weeks) were considered too long, making it difficult to maintain momentum.* *Participants had to balance interventions with their daily job responsibilities, as TLN was not an official project.* *Some participants preferred intensive, short-term sessions (e.g., three full days) to increase commitment and focus.* • *The shift to online sessions required adaptation, but Microsoft Teams™ and Miro™ facilitated participation.* • *Some participants found online sessions beneficial due to reduced travel time, while others preferred in-person meetings for better collaboration and engagement.*
Technology-Oriented Innovation Culture	• *The company's strong technology-focused culture presents a barrier to overarching servitization.* • *Participants recognised the need for long-term adaptation to a service-oriented business model.*
Cross-Departmental Learning	• *Participants gained new insights by collaborating with colleagues from different departments.* • *Cross-pollination fostered discussions, new perspectives, and novel product-service ideas.*
Concept Development and Validation	• *Product-service value propositions lacked multiple design iterations and stakeholder validation.* • *Some participants suggested an agile approach to gather early stakeholder feedback before fully developing concepts.*
Online vs. In-Person Sessions	• *Online sessions were preferred by 50% of participants for time efficiency and accessibility, while the other 50% favoured in-person sessions for better interaction.* • *Participants found it easier to establish relationships in face-to-face settings and reported distractions in online meetings when colleagues went offline unexpectedly.*

6.6.3 — ARC 3 — Premise Reflection

This section reflects on the purpose of *ARC 3* as formulated during the preliminary step (see *Section 6.2*). During *ARC 3,* we aimed to test *TLN* for designing *overarching servitization* strategies in response to our research questions.

We turn back to the preliminary step of *ARC 3 (Section 6.2)* in which we formulated three underpinning principles of the *TLN process:*

1 — Exploring the End-User Perspective — Creating value for end-users.

2 — Exploring the Future Perspective.

3 — Embedding Strategic and Service Design Capabilities in the Organisation

We used these principles in the preliminary step of *ARC 3* to formulate requirements to be met by the *TLN process*, namely:

A — The TLN process must explore end-user perspectives to identify values and unmet needs.

B — The TLN must explore future end-user context scenarios.

C — The TLN process must be flexibly organised and employed in the operational context of the company.

Firstly, the data obtained from the content and process reflection demonstrates that *TLN* addresses the end-user perspective **requirement A***. TLN* explicitly includes *exploratory* design interventions to gain a better understanding of the uncovered needs, concerns, and value- drivers of end-users.

Secondly, demonstrates that *TLN's* strategic design interventions include exploring and defining future contexts and user scenarios. This directly addresses **requirement B**, enabling the involved B2B manufacturers to inform a future-oriented servitization strategy.

Thirdly, the data from show that we have designed and organised a new process flexibly, in relation to the existing innovation process and organisational structure. Through the action research approach, we successfully implemented and tested *TLN* within the existing organisational and personnel constraints, without disrupting the current innovation process formulated by **requirement C**. This necessitated an iterative design approach, as the *TLN process* was still in the pilot phase while we were testing strategic design interventions that might require adjustments after the implementation and evaluation of *TLN.*

As a result, *Table 6-6* aligns the insights gained from the content and process reflections with the aforementioned *TLN* requirements *A, B* and *C*.

Table 6-6 — Validation of TLN

Theme Categories	Insights from Content and Process Reflection of the TLN process	Requirements Met as a Result of Premise Reflection
Addressing End-User Values	• *Three 'overarching' themes were identified in participants' reflections* • *Exploring future contexts and end-user values* • *Envisioning future scenarios and creating end-user value* • *Adapting and aligning innovation processes to address servitization challenges* • *Recognised the importance of an end-user focus, marking a paradigm shift from solely considering direct business customers to serve end-users.* • *Persona exercises and future vision assignments helped understand end-user behaviours and identify latent needs, serving as a foundation for ideation processes.*	*A — The TLN process must explore end-user perspectives to identify values and unmet needs.* *B — The TLN must explore future end-user context scenarios.* *C — The TLN process must be flexibly organised and employed in the operational context of the company.*
Lessons Learned and Areas for Improvement	• *The interventions generated 42 ideas, clustered into nine product-service concepts, yet some participants felt a lack of radical innovation.* • *Recognised the need for multiple iterations and validation with external stakeholders.* • *Highlighted the necessity of involving customers, end-users, and external experts in co-creation processes to gain a broader, outside-in perspective.* • *A strategic design roadmap was developed, but time constraints prevented its full completion. It served as a 'boundary object' for strategic alignment and communication within the organisation.*	*A — The TLN process must explore end-user perspectives to identify values and unmet needs.* *C — The TLN process must be flexibly organised and employed in the operational context of the company.*
Strategic Roadmapping Insights	• *TLN's Strategic Design Roadmap incorporated three value perspectives: Value Context, Value Exchange, and Value Creation.* • *These layers structure how companies explore future trends, end-user values, define product-service solutions, and determine innovation efforts.* • *The strategic design roadmap serves as a tool to guide long-term innovation aligned with servitization objectives.*	*A — The TLN process must explore end-user perspectives to identify values and unmet needs.*
Incorporating the Future Perspective	• *The strategic design roadmap was seen as a valuable discussion tool for future-oriented servitization strategies and innovation decision-making.* • *Participants acknowledged that utilising strategic design methods provide a long-term perspective, which contrasts with the organisation's short-term, revenue-driven culture.* • *Participants feedback revealed the need for structural organisational changes in how overarching servitization strategies are developed and implemented.*	*B — The TLN must explore future end-user context scenarios.*
Technology-Oriented Innovation Culture	• *The company's strong technology-focused culture presents a barrier to overarching servitization.* • *Participants recognised the need for long-term adaptation to a service-oriented business model.*	*B — The TLN must explore future end-user context scenarios.*
Participants' Expectations of TLN	• *Expected a shared understanding of the company's product-service innovation strategy, future values, and end-user needs across all departments.* • *Anticipated concrete outcomes, including an actionable roadmap for an overarching servitization strategy and guidelines for follow-up activities.*	*C — The TLN process must be flexibly organised and employed in the operational context of the company.*

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	• Defined success as an action-oriented roadmap linking new product-service solutions to strategic objectives. • Expressed strong interest in cross-departmental knowledge exchange and developing new competencies in strategic design, service design and design roadmapping.	
General Experience	• Participants found the TLN interventions enjoyable, inspirational, and meaningful, as they contributed to the company's overarching servitization strategy. • The bottom-up approach was appreciated, involving employees from lower management levels in formulating the strategy, acknowledging their expertise in daily operations.	C — The TLN process must be flexibly organised and employed in the operational context of the company.
Challenges in Product-Service Innovation Strategy	• Organisational silos hinder strategic change, despite strong financial performance. • The preference for customer-specific solutions over platform-based solutions slows innovation progress.	C — The TLN process must be flexibly organised and employed in the operational context of the company.
Organisation of TLN Interventions	• Interventions were well-prepared and executed despite constraints posed by the COVID-19 pandemic. • The time gaps between interventions (2–3 weeks) were considered too long, making it difficult to maintain momentum. Participants had to balance interventions with their daily job responsibilities, as TLN was not an official project. Some participants preferred intensive, short-term sessions (e.g., three full days) to increase commitment and focus. • The shift to online sessions required adaptation, but Microsoft Teams™ and Miro™ facilitated participation. • Some participants found online sessions beneficial due to reduced travel time, while others preferred in-person meetings for better collaboration and engagement.	C — The TLN process must be flexibly organised and employed in the operational context of the company.
Cross-Departmental Learning	• Participants gained new insights by collaborating with colleagues from different departments. • Cross-pollination fostered discussions, new perspectives, and novel product-service ideas.	C — The TLN process must be flexibly organised and employed in the operational context of the company.
Concept Development and Validation	• Product-service value propositions lacked multiple design iterations and stakeholder validation. • Some participants suggested an agile approach to gather early stakeholder feedback before fully developing concepts.	C — The TLN process must be flexibly organised and employed in the operational context of the company.
Online vs. In-Person Sessions	• Online sessions were preferred by 50% of participants for time efficiency and accessibility, while the other 50% favoured in-person sessions for better interaction. • Participants found it easier to establish relationships in face-to-face settings and reported distractions in online meetings when colleagues went offline unexpectedly.	C — The TLN process must be flexibly organised and employed in the operational context of the company.

6.7 — ARC 3 — Summarising the Results

Table 6-7 provides a summary of the results generated from design interventions 1 to 6 conducted during *ARC 3*.

Table 6-7 — Summarising the Results of ARC 3 Interventions

Interventions	Summarising the results of ARC 3
1 – Kick-Off	*Participants' expectations after kicking-off ARC 3 Interventions:* • *Learning **New Skills & Methods / Cross-Pollination across Departments*** • *Expected Outcome: **Future Vision & Servitization Strategy** linked to **Actionable Roadmaps***
2 – Creative Trend Research	*During the intervention, the participants:* • *Identified **107 Trends*** • *Clustered them in **37 Trend Categories*** • *Selected **7 Trend Categories** in the scope of **'Travelling in Europe'***
3 – Empathizing with End-Users	• *Identified **12 User Value Drivers** behind the selected Trend Categories related to 'Travelling in Europe'*

4 – Envisioning the Future Context	*During the intervention, the participants:*
	• *Created **3 Better Times Newspaper** front pages, issued in the year 2050*
	• *Formulated **1 Future Vision Statement:** 'Our passion for People-in-Travel and Smart Logistics drives us to orchestrate sustainable product-service ecosystems by delivering seamless, personalised and predictable travel experiences'*
	• *Discussed **4 Future World Context Scenarios** visualised in mood boards:*
	  • *Our Conscious Future*
	  • *Our Personalised Future*
	  • *Our Connected Future*
	  • *Our Data-Driven Future*

5 – Ideating End-User Value Propositions	*During the intervention, the participants:* • *Generated **26 Product-Service Ideas** leading ….* • *to **6 Concept Canvasses** describing **6 Product-Service Value Propositions***
6 – Roadmapping & Connecting Dots	*During the intervention, the participants:* • *Discussed **6 Product-Service Value Propositions*** • *Selected **3 Final Product-Service Concepts*** • *Created an **Overarching Servitization Strategy** manifested in **1 Strategic Design Roadmap** for the Airports Business Unit*

6.8 — ARC 3 — Conclusion

Through *ARC 3*, we gained valuable insights into preparing and organising an *Overarching Servitization Strategy Process*, referred to as *TLN*, while considering participants' time and organisational constraints within a large corporate setting. These findings play a pivotal role in addressing our research sub-questions. The kick-off intervention of *ARC 3* introduced *its* purpose to the case company's participants and set the stage for the subsequent strategic design interventions of *TLN*. In the *Creative Trend Research* intervention, the participants identified and described 107 relevant trends in the context of European travel and categorised them into 37 trend categories. In the successive interventions *Empathising with End*-Users and *Envisioning the Future* Context, they envisioned four end-user scenarios in a future world context and formulated a future vision statement for the case company's business unit Airports. The fifth intervention *Ideating End-User Value Propositions* tasked participants with ideating and conceiving product-service value propositions for end-users in a future world context. In the final intervention, *Roadmapping & Connecting Dots*, participants selected three product-service value propositions using selection criteria inspired by the case company's vision statement. Finally, they considered the activities, resources, partnerships, and a roadmap needed to realise the three selected value propositions. Based on this, the facilitators created a preliminary *Strategic Design Roadmap* that embodies the case company's *Overarching Servitization Strategy*.

We evaluated *TLN's* content and process according to Coghlan's (2019) methodology.

The three themes that resulted from the coded interviewees feedback, are:

1) *Discover Future Contexts & End-User Values*

2) *Envision Future End-User Scenarios & Create End-User Values*

3) *Adapt & Align Innovation Processes to Address Servitization Challenges*

In addition, the premise reflection concluded that *ARC 3* led to a successful pilot of the *TLN process* consisting of six strategic design interventions for the B2B focal manufacturer, thereby achieving the purpose of *ARC 3*:

A — The TLN process must explore end-user perspectives to identify values and unmet needs.

B — The TLN must explore future end-user context scenarios.

C — The TLN process must be flexibly organised and employed in the operational context of the company.

The evaluation of *TLN* in deepened our insights into creating value for end-users living in a future world context. Using these insights, we contributed to the theory of *Strategic Design Roadmapping*. We refined existing roadmap frameworks by approaching product-service innovation from three different value perspectives: the *Value Context, Value Exchange,* and *Value Creation Perspective*.

7

Neo, sooner or later you're going to realize just as I did that there's a difference between knowing the path and walking the path.

Morpheus tot Neo in the movie 'The Matrix'

Chapter 7 — Action Research Cycle 4 — Evaluating — an 'Overarching Servitization Strategy Design' Process

7.1 — ARC 4 — Introduction

Our world is evolving faster than ever, with new challenges and opportunities constantly unfolding. Recent unforeseen events, such as the COVID-19 pandemic, geopolitical shifts, and technological advancements, have profoundly impacted businesses across all industries. Organisations that can adapt to these changes avoid falling behind their competitors and losing their competitive edge. With this premise in mind, the *Strategic Design Manager* and I asked ourselves how we could prepare the case company for various future scenarios that we do not yet know about. We attempted to find an answer to this and formed our initial ideas on *TLN*.

In *Chapter* 5, we laid the foundation for *TLN* by adding an exploration phase to the case company's innovation process. In this phase, our objective was to explore and research future user context scenarios so we could prepare the company for a rapidly changing environment. Based on our conclusions, we designed an *Overarching Servitization Strategy Design process* consisting of six strategic design interventions. We explained this process in *Chapter 6* and called it *TLN*. It examines trends and signals of change that could impact the organisation and facilitates brainstorming solutions that will help the case company succeed in a future lifeworld of customers and end-users. We conducted an initial pilot test in the case company's *Airports* business unit to test *TLN*.

In the *TLN* pilot of the *Airports* business unit, we learnt to address latent or still hidden needs and concerns of customers and end-users living in a future lifeworld context that we do not yet understand. We discovered that employees collaborating across corporate silos generate groundbreaking ideas. We found that involving employees in formulating a (bottom-up) servitization strategy fosters enthusiasm and creates a sense of shared responsibility. It also increases the likelihood of employees taking ownership of implementing a strategy that arises from the bottom up (rather than being imposed top-down by management). With these pilot insights, the *Strategic Design Manager* convinced the case company's board management to start a new action research cycle and implement *TLN* interventions for three of its business units.

This *Chapter* describes the fourth action research cycle *ARC 4*. We organised strategic design interventions with participants from various corporate departments and business units to create a future-oriented *overarching servitization* strategy for the case company. To prepare for the future, we applied strategic design methods to co-create new ideas for product-service value propositions, which we outline in the following sections.

Section 7.2 discusses the preliminary step and principles of *ARC 4*. In *Section 7.3*, we explain how we conducted *TLN* according to the six design interventions described in *Section 6.3* and visualised in *Figure 6-2*. In *Section 7.4*, we examine the organisational and

planning aspects of *TLN's* strategic design interventions. *Section 7.5* discusses the implementation of *TLN* within three of the case company's business units, referred to as *A1, B2* and *C3. Section 7.6* summarises the results of *TLN* interventions. We evaluate *ARC 4* in *Section 7.7* and conclude the *Chapter* in *Section 7.8.*

7.2 — ARC 4 — Preliminary Step — Purpose and Context

The aim of *ARC 4* was twofold. First, *ARC 4* sought to investigate whether *TLN* offered a robust process for formulating a long-term, *overarching servitization* strategy for the company, which operated in a high-tech, B2B environment. Specifically, we explored how *TLN* could be implemented and made actionable by using a strategic design roadmap as the foundation for developing the company's multi-year product–service innovation strategy.

Second, through the execution of *ARC 4*, we aimed to compare and evaluate the outcomes of *TLN* across the three business units to determine whether it yielded qualitatively similar results in each context. Additionally, *ARC 4* enabled us to gather insights into how *TLN* might be effectively embedded within the organisation's structures and routines.

7.3 — ARC 4 — Constructing Action — Tailoring TLN for Three BUs

ARC 4 is based on Simonse's (2018, p.18) three critical process stages: *Value Mapping, Idea Mapping,* and *Pathway Mapping* (see *Figure 7-1*). Because the interventions of *ARC 4* involved a repetition of *TLN*, the structure corresponds to that of *ARC 3* (see *Section 6.3*). However, we adapted the interventions slightly to meet management's request to lay a foundation for formulating a servitization strategy within a limited three-month timeframe. Due to time constraints and the availability of participants, we asked the *Organising Team[4]* to execute the final critical intervention—*Pathway Mapping*—in which a detailed roadmap with three horizons is developed.

Like *ARC 3*, *ARC 4* consists of six strategic design interventions. However, we made minor changes to the order. First, we added a preparation intervention for the *Trend Team* (before the *Kick-Off)*, and a consolidating intervention for the *Organising Team* (*between Interventions 3* and *4*). Second, we changed the original order of *Interventions 3* and *4* because the *Organising Team* found it more logical to consider future user scenarios after envisioning future contexts. Third, after *Interventions 1, 2,* and *3*, *the Organising Team* will conclude and consolidate the results of these interventions. Finally, due to time constraints, we decided not to conduct the sixth and final intervention—*Roadmapping & Connecting Dots*—with the participants. Instead, the *Organising Team* did take care of it.

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[4] This team, consisting of the *Strategic Design Innovation Lead*, two *Strategic Designers* and the principal researcher, is responsible for organising the strategic design interventions.
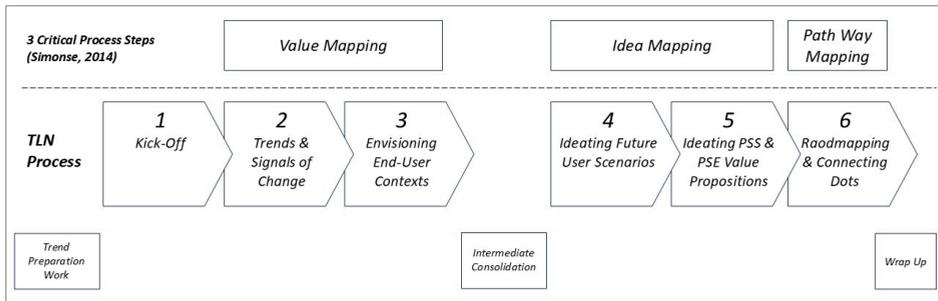
Figure 7-1 — Critical Process Steps with 6 Underlying strategic design interventions

Chapter 6 already discussed the purpose of the six strategic design interventions of *TLN.* We briefly repeat them here.

Preparation Intervention: In this intervention, the Trend Team collects, discusses, maps, and clusters trends and signals to generate input for the Intervention 1 – Kick-Off and Intervention 2 – Trends & Signals of Change workshop.

Kick-Off: In the *Kick-Off* intervention, we onboard the participants to *TLN* and manage their expectations. The facilitators explain that the six workshop interventions aim to explore and map future context scenarios as a basis for formulating a future-oriented innovation strategy for product-services that bring value to customers and their end-users. The *Kick-Off* also serves as an introduction to one another, as we have assembled a mix of participants from different departments who do not always work directly with each other.

Trends & Signals of Change: This workshop intervention aims to sensitise participants to signals for change and trends that impact customer and end-user behaviour and needs. During the intervention, participants discuss trends and signals and rank them according to their impact and certainty of occurrence in their business domain.

Envisioning Future Context Scenarios: This intervention facilitates a deep dive into future context scenarios. As we cannot precisely predict the future, it explores possible and plausible future context scenarios. Encouraging participants to envision the future and making them aware of future context scenarios allows them to navigate towards a preferable one. Moreover, visualising potential changes in advance can be challenging. Therefore, this intervention offers exercises to describe and visualise how certain events lead to context scenarios that affect the business domain.

Intermediate Intervention – Consolidating the Results: In this intermediate intervention, the *Organising Team* processes the results *Interventions 1, 2,* and *3,* and consolidates them into a presentable format as input for *Interventions 4, 5,* and *6*

Ideating Future User Scenarios: In this intervention, participants engage in a dialogue with users in their future environment. They imagine how users will behave in the context of future scenarios. They explore future users' needs and concerns, and how changing user values and beliefs drive these scenarios.

Ideating Product-Service Value Propositions: Participants develop ideas for new *PSS* and *PSE* value propositions for their business domain's most likely future user scenarios. They prioritise the proposed *PSS* and *PSE* value propositions, assess their impact on the current product-service portfolio, and evaluate the case company's role in realising them.

Roadmapping & Connecting Dots: After concluding the five interventions, the *Organising Team* elaborates on the results and maps the future-oriented *PSS* and *PSE* value propositions onto a three-horizon strategic roadmap. This roadmap contains essential aspects and envisioned activities to discuss with management, innovation, and account teams to realise the proposed value propositions. The strategic roadmap serves as a conversation document to initiate cross-departmental discussions. It acts as a *boundary object* that provides the rationale for the organisation's strategic choices. It fosters a common understanding and directs the approach to achieving the strategy. It answers the *Why*, *What* and *How* questions (see *Figure 6-3 — Value-Driven Strategic Design Roadmap*). In a wrap-up session, the *Facilitator Team* presents the overall results of the *TLN Interventions* series*.*

7.4 — ARC 4 — Planning Action — Organising TLN

This section discusses the planning of the *TLN* workshop interventions.

Aim

ARC 4 evaluates *TLN* as a process that enables the case company to develop a consolidated servitization strategy for its three business units: *A1, B2,* and *C3*. This servitization strategy forms the basis for designing product-service value propositions, allowing the individual business units to establish a forward-looking, long-term product-service innovation agenda in the form of a three-horizon strategic roadmap.

Organising TLN

To effectively organise *TLN* workshop interventions, we set up four teams.

Organising Team: This team, which includes the *Strategic Design Innovation Lead,* two *Strategic Designers*, and myself as a researcher, created the workshop materials on *Miro™* boards. After the workshop interventions, the *Strategic Designers* organised the results obtained into a presentable format for the wrap-up. Due to time constraints and the required design skills, the *Strategic Design Innovation Lead* and the two *Strategic Designers* carried out *Intervention 6*. They categorised and grouped the generated ideas, then analysed and reflected on the outcomes.

Steering Committee: The *TLN* steering committee comprised the business unit managers, supplemented by the project leader. They jointly defined the objectives of *TLN*, set planning and priorities, and allocated personnel and budgets. They monitored progress and assessed whether objectives were being met. They helped clear organisational obstacles and made final decisions.

Facilitator Team: This team of six facilitators, chaired by the *Strategic Design Innovation Lead,* facilitated the *TLN* workshop interventions. We hired facilitators from an external

agency due to insufficient capacity within the organisation. Internal and external facilitators worked in pairs, each assigned to one of the business units. All facilitators had backgrounds as strategic designers or business consultants and had experience in leading workshop interventions.

Trend Team: We tasked this team with collecting trends and signals of change in preparation for the first two interventions of *TLN.* The team gathered, discussed, mapped, and clustered trends and signals to generate input for the *Intervention 1 – Kick-Off* and *Intervention 2 – Trends & Signals of Change* workshop. The team comprised eight market researchers, mechanical engineers, and industrial designers from *A1*, *B2*, *C3* and *Technology* business units.

Interventions Employed in TLN

We conduct all six *TLN* interventions through online workshops. Initially, we intended to carry out *Interventions 4* and *5* in person, but this was not feasible due to budget constraints.

Intervention Location

Online meetings in *MS Teams™*.

Intervention Tools

To facilitate the activities during the interventions, we use the *MS Teams™* communication tool and *Miro™* digital whiteboards.

Timing

The *TLN* strategic design interventions (averaging two to four hours) began in calendar week 26 of 2022. *Intervention 1* and *Intervention 2* in calendar week 26, and *Intervention 3* in calendar week 27. We continued after the holiday break with *Intervention 4* and *Intervention 5* in calendar week 36, and *Intervention 6* combined with a *Wrap-Up* in calendar week 37.

Participants

After a presentation to secure management buy-in for *TLN*, the *Strategic Design Manager*, in consultation with the *Steering Committee*, selected *TLN* participants. We aimed to assemble a balanced team for each business based on *role* (function) and *domain* (technology or market). Given the differing business contexts of the three business units, and to optimise the use of knowledge and experience within their own business units, we implemented *TLN* interventions for each business unit in parallel and independently. However, we do not rule out the possibility that the future user context scenarios and the conceived value propositions may exhibit some similarities, as the three business units originated from a common technology. *Table 7-1* lists the anonymised participants per business unit.

Table 7-1 — TLN Participants

Business Unit A1		Business Unit B2		Business Unit C3	
Participant	Domain	Participant	Domain	Participant	Domain
Participant 1	Market	Participant 16	Market	Participant 32	Market
Participant 2	Market	Participant 17	Market	Participant 33	Market
Participant 3	Market	Participant 18	Technology	Participant 34	Market
Participant 4	unknown	Participant 19	Technology	Participant 35	Technology
Participant 5	Technology	Participant 20	Market	Participant 36	Market
Participant 6	Market	Participant 21	unknown	Participant 37	Market
Participant 7	Technology	Participant 22	Market	Participant 38	Market
Participant 8	Technology	Participant 23	Technology	Participant 39	Market
Participant 9	Technology	Participant 24	Market	Participant 40	Market
Participant 10	Technology	Participant 25	Market	Participant 41	Technology
Participant 11	Market	Participant 26	unknown	Participant 42	Technology
Participant 12	Market	Participant 27	Market	Participant 43	Market
Participant 13	Market	Participant 28	Market	Participant 44	Market
Participant 14	Technology	Participant 29	Technology	Participant 45	Market
Participant 15	Market	Participant 30	Technology	Participant 46	Market
		Participant 31	Technology	Participant 47	Technology
				Participant 48	Technology
				Participant 49	Market
				Participant 50	Market

	Refering to a Participant in *Technology* Domain
	Refering to a Participant in *Market* Domain
	Participant's Domain Unknown

7.5 — ARC 4 — Taking Action — Executing TLN

In *ARC 3—Taking Action*, the six strategic design interventions were implemented as outlined in *Section 7.4*, following the structure of the *Overarching Servitization Strategy Process*. These interventions served to explore, develop, and articulate end-user-centric and future-oriented product–service value propositions within the context of four business units of the focal manufacturer. For a detailed account of the substantive outcomes and supporting materials generated during these interventions, please refer to *Appendix D — ARC 4 — Taking Action — Executing TLN* on page *299.*

7.6 — ARC 4 — Evaluating Action

7.6.1 — ARC 4 — Reflection on Actions

In this section, we reflect on *TLN* and engage with the data gathered during its implementation. As the *Organising Team* for *ARC 4*, we created and executed a second *TLN* intervention series aimed at teaching three business units within the case organisation to develop product-service value propositions for users in a future living world context. As an action researcher, I used the preliminary iterations of action cycles *ARC 1*, *ARC 2*, and *ARC 3* to inform the design requirements for the process design of *ARC 4*. With this foundation, the *Organising Team*, of which I was a member, set to work on establishing and implementing *ARC 4*. During its implementation, I assumed an observational role and engaged in reflective discussions with *Organising Team* members both between and after the various interventions. These discussions occurred individually and as a whole team. During these conversations, I shared my observations and sought to interpret what transpired during the *ARC 4* interventions. These discussions stimulated my thinking and enriched my understanding of the process steps of *TLN*. As an *Organising Team*, we collectively iterated through an improvement process, refining the design of *TLN* and

applying our learnings to subsequent workshop interventions. Consequently, I consistently use the first-person plural form *'we'* in this reflection, as the insights and learnings derived are not solely based on my individual reflections but rather the outcome of a collaborative reflection and learning process. The reflective interviews with *Organising Team* members yielded a rich dataset, resulting in 160 codes categorised into nine categories. In addition to these interviews, we analysed data collected and coded during and after *TLN*. Feedback from participants immediately following the workshop interventions provided further valuable insights, along with two inquiries conducted with participants. Finally, we carried out semi-structured interviews at the conclusion of *TLN*.

Participant Feedback After Workshop Interventions

During *ARC 4*, we asked participants to provide feedback at the end of each workshop intervention. They were requested to complete four sentences on the *Miro™* board: *'I liked...,' 'I learned...,' 'I wonder...,'* and *'I wish....'* This approach allowed us to capture 'fresh' feedback that might otherwise have been lost as participants transitioned back to their daily operations. After coding this immediate feedback, we identified 113 in vivo codes, which were then categorised into nine code groups.

Inquiries Among Participants during Interventions

Following both the initial three and the final three interventions of *ARC 4*, we conducted an inquiry among the participants. This consisted of three open-ended questions and seven statements, for which we asked participants to indicate their level of agreement. A five-point Likert scale was used *(strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree),* and participants were invited to elaborate on their responses. Together, the two rounds of inquiry generated a total of 286 codes.

Semi-Structured Interviews After TLN

Following *ARC 4*, we conducted semi-structured interviews with ten *TLN* participants. During these interviews, we reflected on *ARC 4* and gathered participants' views on the steps of the *TLN process* and their outcomes. After completing the intervention series, we were interested in what they had learned from *TLN*. We asked about the biggest challenges the organisation faced in transitioning to a service-oriented company. We sought to understand whether employees could articulate the current servitization strategy of the relevant business unit and how it is created and communicated within the organisation. Additionally, we aimed to determine if employees from various departments shared a common understanding of the company's strategy. Naturally, we were curious about the experiences of *TLN* users and eager to hear their suggestions for adapting and improving the workshop interventions. After transcribing, coding, and analysing the interview recordings, we generated 259 codes, which we consolidated into seven code categories, as shown in *Table 7-2*. We used these categories as the foundation and guide for our reflection.

Table 7-2 — Code Table – Code Categories related to Content & Process

Codes related to Content

Reflecting on the Outcomes of The Long Now
- "I Liked..." – Participants feedback (51-30)
- TLN delivered quantity and quantity - lots of ideas for discussion (innovativeness, quality, technology, partnerships, capabilities & our role to play in the PSS ecosystem) (17-8)
- TLN outcome is food for thought - it challenges the current servitization strategy, recognizes platform technologies, OT & IT, and tech partnerships (13-2)

The Long Now Created Insights, Strategic Opportunities & Directions
- TLN creates space & setting for long-term thinking and creating ground-breaking concepts - end2end- stepping in the shoes of end-users in future context scenarios $ (96-13)
- TLN fosters co-development & strategic partnerships / multi-cultural & cross-functional collaboration / we need cross-departmental discussions / cross-silo $ (89-6)
- TLN is a valuable initiative as it catalysed & aligned strategic business perspectives (3H) – We dove into people's future world contexts – We made it actionable (78-2)
- "I Wonder..." – Participants feedback (26-34)

The Long Now Achievements
- TLN offers a creative framework to think out of the box to push business boundaries - to develop a future-oriented business strategy - looking at the bigger picture (75-2)
- TLN helps us think & decide strategically about possible future product-service solutions & directions and prepare for it (74-3)
- TLN helps us to scout and prioritise (mega) trends, explore future needs, value drivers and behaviour of customers and end-users (57-6)

Codes related to Process

Reflecting on The Long Now Process
- Think about how to plan, capture, visualise, report and update selected scenarios and 'moving targets' and intermediate results (trends, scenarios, concepts) of TLN (50-11)
- Selecting the right participants (profile!), manage their expectations, composing the right teams in the right TLN phase are key (strategic, open-minded thinkers) (40-6)
- "I Wish..." – Participants feedback (35-24)
- Visualising, visual storytelling and describing selected concepts are key for follow-up and backcasting (16-6)
- "I Learned..." – Participants feedback (8-15)

Reflecting on Organising The Long Now Process
- TLN was well prepared and organised - professional and knowledgeable facilitators (34-0)
- TLN should be an embedded, continuous, cyclical (bi-annual) process – face-to-face workshops – thinking about the future is an everyday activity that should be monitored (23-7)
- Install a virtual TLN team/project/yearly event – a federated, floating, multifunctional cross-departmental team to manage and execute TLN (18-5)

Next Steps
- Involve and validate with key customers, specialists, business partners, researchers and future thinkers (27-7)
- For a future-oriented business strategy, we need strong leadership to direct and navigate (22-3)
- Select & introduce new tools to align, communicate, and update the servitization strategy by means of a dynamic roadmap (1-10)

Biggest Challenge
- Changing mindset from 'tech-focused innovation', 'project-oriented sales' to 'value-for the customer' – 'dare-to-innovate-in-a-playful-way' (67-7)
- Embedding TLN and synchronising with current innovation processes. Share / devide responsibilities and ownership across different departments – establish a 'TLN culture' (23-5)
- Communicate TLN as a source of inspiration. Understanding the 'why', 'what' & 'how' of the business strategy – Visualise TLN results and execute it (26-12)

In our reflection, we follow Coghlan's (2019) structure, which involves a sequential examination of the content, the process, and the preliminary principles of *TLN*. The categorisation of our reflections into these sections was sometimes overlapping; at times, a reflection may seem better suited to the process section rather than the content section, or vice versa. We use code *Table 7-2* as a reference for articulating our reflections.

7.6.2 — ARC 4 — Content Reflection

Reflecting on the Outcomes of TLN

We noted that participants were impressed by the outcomes of *TLN* and how it was organised.

'I liked TLN – Compliments to the preparation team and facilitators, well done' (grounded 24-5).

The participants appreciated the structured approach that led to concrete results. They were enthusiastic about the outcomes, which can be attributed to the efforts of the *Organising Team* and the support from the facilitators. The creative exercises offered to

the participants resonated well with them and were inspiring and eye-opening. They enjoyed the group work, transcending departmental boundaries and exchanging ideas with colleagues from other disciplines. *'I liked to hear thoughts from other colleagues about how the future might look,' 'I liked the open discussion and fun in the session,'* and *'I liked the team interaction and discussions. Good preparation. Good cross-section of people from different areas of business*.'

'I liked the format for describing future concepts' (grounded 7-8).

They praised the facilitators for guiding them throughout the exercises and workshop sessions. The content and activities of the workshops inspired the participants, who looked forward to continuing the discussions. Overall, participants showed enthusiasm and actively engaged in the sessions, as evidenced by the following quotes: *'I liked the energy and involvement of all the participants,'* and *'I liked the creative way of structuring the discussions; it is energising.'*

Many were surprised by the quantity and quality of results they delivered at the end of each workshop. Although most participants were experiencing a strategic design process for the first time, *TLN* has proven to be an effective method for formulating servitization strategies. We support this with the quote:

'I love the format of the workshops as they generate so many ideas in a short time, each time over again' (grounded 20-16).

We experienced this ourselves as an *Organising Team*. In *ARC 1*, we analysed the development projects within business unit *A1* and concluded that only four out of 56 innovation ideas involved a product-service value proposition (see last column of *Table 7-3*) How different is this after we implemented *TLN*? In addition to 137 (pure) product ideas, participants generated 117 (pure) service ideas and 131 ideas combining a product and a service. *Table 7-3* (second, third, and fourth columns) shows how these ideas were distributed across the three business units. All participants considered this a promising starting point for further exploration.

The participant's quote *'Amazing what we have achieved in such a short time!'* confirmed what the workshop results showed. The different exercises worked well, and the resulting content led to many high-quality ideas and inspired cross-departmental discussions. The *TLN* workshops aimed to tap into participants' creativity. The exercises led by the facilitators resonated with the participants and helped them envision themselves in a future context. One exercise that worked particularly well was writing the front pages of two newspapers issued in the year 2050. One newspaper was entitled *'Better Times,'* while the other was called *'Daily Doom.'* This proved to be an effective way to familiarise participants with a yet-unseen future world, presenting both positive and negative developments. The exercise involved combining images and text, encouraging participants to select visuals that supported the narrative they wished to create about that future scenario. As evidenced with the following participant quote: *'I liked the newspaper*

exercise. It triggers your creativity and makes you think about the impact of the trends in a more concrete way.'

When the *Organising Team* analysed the selected ideas for further development in the strategic design roadmap, they noticed significant overlap among the ideas from the three business units. One idea from business unit A1 could complement those from business units *B2* and *C3*. The *Organising Team* consolidated the ideas in a separate session and documented them in canvasses. Rows 5 and 6 of *Table 7-3* show that the input from different business units merged into integrated outcomes, yielding 12 canvasses for *PSS* and 13 for *PSE*. Reflecting on this with the *Organising Team*, we explained that the three business units had gradually evolved from a single company, while maintaining a shared technological foundation. *TLN* catalysed cross-silo thinking and encouraged cross-departmental communication and collaboration between the business units. *TLN* also facilitated knowledge sharing, cross-pollination of ideas, and building on each other's ideas to innovate product-service value propositions. From the 12 *PSSs* and 11 *PSEs*, the *Organising Team* identified 13 as *overarching servitization* (see row 7 of *Table 7-3*).

Table 7-3 — Numbers of Generated Ideas

Summarising the generated Ideas in The Long Now				Analysis of Innovation Project in A1
1 **137** Product Ideas	*55* in A1	*44* in B2	*38* in C3	**56** in A1
2 **117** Service Ideas	*37* in A1	*38* in B2	*42* in C3	**-**
3 **131** Product-Service Ideas	*66* in A1	*36* in B2	*35* in C3	*4* in A1
4 **53** Concept Clusters	*13* in A1	*16* in B2	*24* in C3	-
After selection in Roadmapping & Connecting Dots				
5 **12** (combined) PSS Idea Canvasses	*8* in A1	*11* in B2	*10* in C3	*4* in A1
6 **11** (combined) PSE Idea Canvasses	*11* in A1	*11* in B2	*10* in C3	**-**
7 **13** Overarching Servitization	*13*			**-**

'The TLN outcome is food for thought – it challenges the current servitization strategy, recognises platform technologies, OT & IT, and tech partnerships' (grounded 13-2).

The interviews with participants revealed that *TLN* encouraged them to reflect on their daily work. It prompted them to examine their business unit's current service innovation strategies and compare them with past strategic choices, offering new perspectives. The workshop series helped them step back and consider the bigger picture. Through *TLN*, the interviewees gained insight into evolving themes and technologies that will play a crucial role in their field. They realised that understanding key technologies and mastering essential competencies, such as incorporating platform technologies, is vital for successful service innovations. They recognised that strategic collaboration with new partners is

essential for creating service value propositions and orchestrating sustainable *PSEs*. They discussed and reflected on the various business models associated with *'something-as-a-service'* value propositions. *Figure 7-2* shows the *'thought clouds'* regarding evolving themes, technologies, and business models discussed in *TLN* interventions.
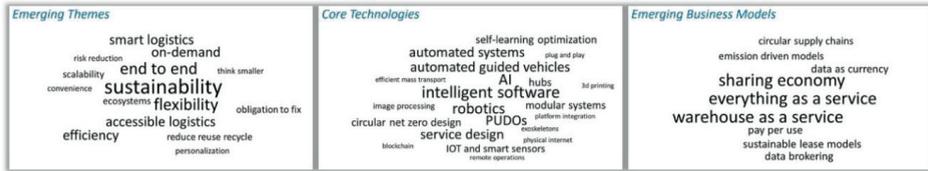
Figure 7-2 — *'Thought Clouds' Regarding Evolving Themes, Technologies, and Business Models.*

'TLN delivered quantity and quantity—lots of ideas for discussion—level of innovativeness, quality, role in ecosystem, technology, partnerships, capabilities' (grounded 17-8).

Besides the many ideas that *TLN* generated, it provided a platform for participants from different disciplines to exchange views on critical aspects of the new ideas, inspire one another, and build on each other's contributions. Gradually, a consensus developed, leading to a shared and widely supported idea. While some parts were unclear to participants at the beginning of *TLN*, they gradually saw everything coming together. *Figure 7-3 — TLN Phasing with Increasing Concreteness* shows the phasing of *TLN* in increasing concreteness. As illustrated by a participant's quote: *'We are really getting somewhere now.'*
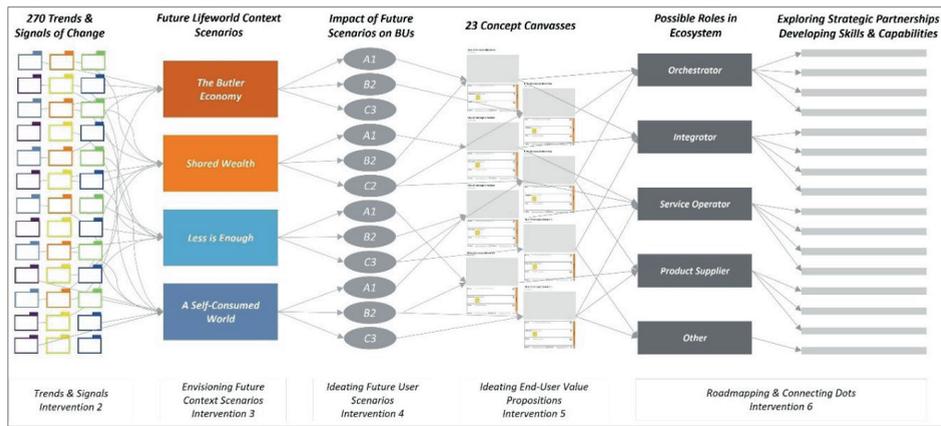
Figure 7-3 — *TLN Phasing with Increasing Concreteness*

TLN Developed Insights, Strategic Opportunities & Directions

After completing *TLN*, we conducted interviews with ten participants to reflect on the six *TLN* workshop interventions. After coding and categorising (see *Figure 7-3 — TLN* Phasing with Increasing Concreteness*)* we obtained additional insights:

'TLN creates space and a setting for long-term thinking and creating ground-breaking concepts—end-to-end—by stepping into the shoes of end-users in future context scenarios' (grounded 96-13).

This code category shows that participants understood the intent of *TLN*. The exercises helped them envision the distant future and empathise with end-users in that future world context. The interviews further revealed that participants developed a better understanding of value chain dynamics. The term end-to-end was explicitly mentioned, indicating that they had gained deeper insight into all the interconnected elements of the value chain — up to and including the end-user. This broadened perspective may be referred to as *overarching*. The exercises stimulated participants' creativity and challenged them to generate out-of-the-box ideas and break boundaries. The facilitators provided a setting in which all ideas, no matter how unconventional or premature, could be presented and discussed. To the surprise of many participants, this environment produced numerous useful and even ground-breaking ideas. We discussed with the Organising Team and concluded that the specific setting of *TLN* is one of its success factors.

'TLN fosters co-development and strategic partnerships / multicultural & cross-functional collaboration / we need cross-departmental discussions / cross-silo' (grounded 89-6).

The combination of working in small groups with colleagues from other departments and international locations brought new perspectives to the discussion. This cross-departmental collaboration enriched the ideas and provided better consideration of, at times, conflicting interests, allowing the team to make informed choices. As challenges become increasingly complex and, therefore, difficult to solve alone, several participants suggested that collaborating with multiple strategic partners in an ecosystem makes sense. Collaboration with colleagues from other departments, strategic partners, or even competitors is a suggestion we frequently heard in the interviews and read about in the participant feedback. Therefore, we consider 'cross-silo' collaboration a second success factor of *TLN*.

'TLN is a valuable initiative as it catalysed and aligned strategic business perspectives (3H) – We dove into people's future world contexts – We made it actionable' (grounded 78-2).

The interviewees expressed surprise at the outcomes of *TLN*. They gradually became enthusiastic about the new strategic perspectives they discovered by stepping into the shoes of end-users in their future environment. To create an overview of the concepts conceived, the *Organising Team* placed these on a three-horizon timeline of a strategic roadmap and presented them to the participants for discussion. The 23 concept canvases on the roadmap included a brief description but also mentioned the role assigned to the relevant business unit, the associated business model, the necessary technology, the strategic partners involved, and the actions to be taken to realise the concept.

'I wonder - Very valuable information needs to be transformed into a roadmap and associated actions.' (grounded 11-13).

During the discussion of this element from the strategic roadmap, several participants raised questions about integrating new concepts with ongoing innovation projects. They emphasised the importance of mapping existing initiatives onto the strategic roadmap as well. Recognising this feedback, the *Organising Team* acknowledged the necessity of enhancing the alignment of current innovation initiatives with the strategic roadmap for *TLN*.

The quotes *'I wonder if we can make sure we keep time to revisit what we've done in case there are any new ideas'* and *'I wonder if we can add missing topics later'* highlight the need to digest the number of ideas and reflect on the generated content with colleagues. In hindsight, the process for some participants (most of whom are doing this for the first time) may have been too quick to allow for adequate processing of the content and its relation to their daily jobs. Nevertheless, there appeared to be a need to dedicate more time to discussing and exchanging ideas about the valuable content generated.

Furthermore, we discovered that, aside from participating in the strategic workshop sessions, participants also had to manage their operational tasks. This dual responsibility occasionally posed challenges in balancing and transitioning between a strategic and operational mindset. Moving forward, we must address this aspect more attentively in future action cycles.

Yet, there were reservations expressed during the first three workshops, as indicated by these quotes: *'I wonder how this will be used in the end,' 'I wonder how our work gets consolidated, e.g. how to get from six to one newspaper,'* and *'I wonder how the prioritised trend will be used in the next steps.'* Being introduced to new methods was exciting but left some participants uncertain and sceptical. Nevertheless, these doubts were addressed through subsequent workshop interventions.

A few interviewees expressed concerns about what would happen to the generated content, particularly the ideas that had been eliminated after the various selection rounds. The idea selection process is a snapshot in time, and it is plausible that, due to changing perceptions influenced by dynamic lifeworld contexts, participants will assess the rejected ideas differently in the future. As evidenced with the quote: *'It will be interesting to see how our perceptions change when we reconvene in September based on what else has changed in the world by then (i.e. it's difficult to separate your thinking from what is happening right now!).'*

We observed that some participants felt disappointed when their favourite ideas were rejected, as evidenced by quotes such as: '*I wonder how we can capture the ideas that 'fell off the table' as there was no time to discuss them more thoroughly,'* and *'I wonder how we are going to ensure we 'remember' this work and don't redo all discussions next year. How can we retain knowledge and thinking?'* These quotes prompted us to consider how to capture the content of the workshop on a timeline in a shared digital space, thereby preserving the associated data for future use and discussion. Our goal is to integrate all generated content into a strategic design roadmap. It would be advantageous for participants to start drafting ideas on a strategic roadmap during *TLN* interventions.

'I wonder how we can capture all the ideas that arose during the sessions and ensure they have enough grounding' (grounded 9-11).

Some interviewees questioned whether the results obtained through the *TLN process* were sufficiently well-founded, suggesting that critical trends or signals of change may have been overlooked, or valuable ideas missed. This concern is illustrated by comments such as: *'I wonder if we captured the rationale of people when allocating trends,'* and *'I wonder if we have sufficient outside-in perspective to prevent tunnel vision.'* These reflections indicate that the design skill of trend identification and interpretation is either not yet widely practiced within the company or may still be underdeveloped.

To ensure the success of *TLN,* we argue that our observations indicate the need for further development of this design skill within the innovation departments. Strategic designers excel at trend research; they are adept at forecasting the future, navigating uncertainties, and understanding and describing the subtleties and nuances between extremes. They can look 'behind' trends in a holistic way, considering the bigger picture. However, design outcomes are *unique* and inherently *subjective*; they depend on the individual conducting the design activity, as they are shaped by their personal interpretation of the perceived context.

Trend research and ideation are inherently creative processes influenced by time and context—they capture a snapshot. This can be likened to the practice of artists: what they create today on a particular subject will inevitably differ from their work tomorrow, yet their unique style remains recognisable. The way artists approach their craft is intimately connected to their personal identity and artistic DNA. Similarly, when a team of painters collaborates on a large canvas, today's painting will differ from yesterdays.

This analogy also applies to strategic designers. Their observations today may be interpreted differently tomorrow, reflecting the subjective nature of their results. Therefore, design teams benefit from diversity, with individuals from various backgrounds and perspectives. This diversity enables discussions about observations and evaluations of differing opinions. Engaging in dialogue about diverse perspectives enhances objectivity, grounding discussions and fostering broader support among colleagues who share in the design outcomes. As a result, ideas and proposals extensively discussed by teams will gain wide acceptance within the organisation.

This contrasts with the practice of hard-core engineers in an innovation department, who perform their calculations with mathematical exactness. Calculations by two different engineers should lead to the same outcome and be objective. Although the appearance of a bridge may differ, the construction principles and calculations are based on physical and mathematical laws. When these engineers are tasked with developing a servitization strategy, strategic design skills become crucial. As discussed in the previous chapters, it is not possible to calculate a servitization strategy with precision. Instead, it relies on interpretive observations of future end-user perspectives and lifeworld contexts. These interpretations, as we have argued, are subjective, time-dependent, and unique as they are influenced by corporate history and embedded in the corporate DNA. Consequently, a

competing company examining the same future end-user context will inevitably arrive at a different conclusion.

To foster creativity, cross-pollination, and a shared understanding within the business units, we facilitated the exchange of ideas and perspectives by intentionally forming teams of individuals from various departments. Our approach proved effective, as evidenced by the remark: *'I wonder if cross-pollination was the goal when predefining the breakout teams.'*

TLN Achievements

We conclude the content reflection by discussing the impact of *TLN* on the case company, drawing from the analysis of coded data obtained from participant interviews, feedback, and reflective discussions with the *Organising Team*. This approach allowed us to systematically address the outcomes, organised in descending order of the frequency of substantiated codes. By analysing these data sources, we gained insights into how *TLN* has influenced various capabilities of the organisation, including but not limited to innovation processes, employee engagement, and strategic foresight. Our structured examination provided a nuanced understanding of *TLN's effectiveness* in fostering creativity, enhancing strategic thinking, and addressing servitization challenges within the company.

'TLN offers a creative framework to think outside the box and push business boundaries, developing a future-oriented service innovation strategy - looking at the bigger picture' (grounded 75-2).

According to this quote, *TLN* has enhanced the organisation's creative capacity. By using design methods and creativity techniques, *TLN* has tapped into employee creativity, potentially awakening dormant creativity and fostering growth within the organisation. Through these design methods and exercises, participants developed the capability to expand their perspectives beyond current business boundaries. They explored and assessed unfolding trends and developments that directly influence their servitization strategy, thereby enhancing their strategic foresight and understanding of potential future scenarios.

'TLN helps us think & decide strategically about possible future product-service solutions and directions and prepare for them' (grounded 74-3).

Once employees have identified potential future scenarios, they can proactively prepare as a company by developing multiple product-service value propositions that align with the most likely future scenarios. *TLN's* proactive approach enables the organisation to systematically evaluate various scenarios and corresponding product-service value propositions, allowing for informed strategic decisions based on this analysis.

'TLN helps us scout and prioritise (mega) trends, explore future needs, value drivers, and behaviour of customers and end-users' (grounded 57-6).

TLN assists the innovation department in identifying trends and signals of change, as well as developing and describing future scenarios based on these insights. These scenarios

enable the exploration of potential end-user behaviours and the values that drive them. To achieve this, employees must be able to immerse themselves in the future lifeworld context of the end-users. This process requires imagination and design skills to accurately describe and interpret that lifeworld, and *TLN* provides the necessary methods for doing so. Through *TLN*, employees can explore and visualise future user behaviours, allowing them to address both current and unmet end-user needs with meaningful product-service value propositions.

Table 7-4 summarises the content reflections into five categories, highlighting key insights into the factors related to the implementation of the *TLN process*.

Table 7-4 — Summarising Key Insights and Categories Identified in Content Reflection ARC 4

Categories	Key Insights Identified in Content Reflection ARC 4
Reflecting on the Outcomes of TLN	• *Participants praised the structured approach, well-prepared, effective facilitation, and engaging exercises.* • *TLN workshops fostered creativity and cross-departmental collaboration, inspiring participants to think beyond their own discipline.* • *The newspaper front-page exercise for envisioning 2050 was particularly effective in stimulating creativity and future-oriented thinking.* • *TLN generated a high volume of ideas, including 137 product ideas, 117 service ideas, and 131 combined product-service concepts.*
TLN Created Insights, Strategic Opportunities & Directions	• *TLN encouraged long-term thinking and stepping into the shoes of end-users in future contexts.* • *Cross-functional collaboration was a key success factor, fostering knowledge sharing and broadening perspectives across business units.* • *The structured framework enabled participants to generate innovative, out-of-the-box ideas and explore value chain dynamics.* • *The creation of a strategic roadmap with concept canvasses helped structure and visualise strategic ideas for future implementation.*
TLN Achievements	• *TLN provided a creative framework to push business boundaries and develop a future-oriented service innovation strategy.* • *Participants recognised TLN's role in preparing the organisation for servitization, helping them explore trends, value drivers, and emerging technologies.* • *TLN facilitated the identification of strategic partnerships and ecosystem collaboration as essential for future service value propositions.* • *Participants acknowledged the importance of mastering platform technologies and new business models to ensure successful service innovations.*
Challenges and Considerations	• *Some participants felt overwhelmed by the volume of ideas and the fast-paced nature of the workshops.* • *Concerns were raised about how to integrate TLN outputs with ongoing innovation projects and ensure long-term follow-up.* • *Participants questioned how rejected ideas could be captured for future reconsideration, given the dynamic nature of strategic thinking.* • *Balancing operational tasks with strategic exercises was challenging for some participants, highlighting the need for better time management.*
Future Steps	• *The need for a structured follow-up process to integrate TLN insights into ongoing projects and decision-making frameworks.* • *Establishing a shared digital space for storing and revisiting generated ideas was suggested to maintain continuity.* • *Strengthening strategic design capabilities within the organisation to enhance trend identification and scenario planning.* • *Encouraging diverse, cross-functional teams to enhance objectivity, foster discussion, and support broad organisational buy-in for new ideas.*

Reflecting on the TLN process

'Think about how to plan, capture, visualise, report, and update selected scenarios, 'moving targets', and intermediate results (trends, scenarios, concepts) of TLN' (grounded 50-11).

TLN employs design methods and interventions where quick manual sketches, drawings, and photos are essential for pinpointing trends, outlining scenarios, and visualising ideas. The adage *'a picture is worth a thousand words'* aptly applies here. In the context of the company's high-tech environment, participants needed to make a personal effort to become comfortable with this design language and express themselves through it. Occasionally, participants felt uneasy starting with a method that required design skills. Despite this discomfort, *TLN's* output (see *Diagram 7-1 — Summarising the Results of TLN after ARC 4*) was not adversely affected. During reflection discussions with the *Organising Team*, we considered how to effectively organise and record intermediate results, ideas, and scenarios to ensure they are preserved. Participants often felt the need to briefly refer to previous results or revisit earlier interventions to recall ideas, selections made, or discussions held. During the workshops, we used *Miro™* as a digital board. This tool was effective, particularly since we were working online, but *Miro™* is unsuitable as a database that allows participants to filter and search functions to unlock data sets. Additionally, regarding the traceability and justification of choices made during the process, capturing visualisations, creating progress reports and product-service canvases, and storing the dynamic data generated by *TLN* remains a concern. Given that *TLN* involves a timeline and certain layering (from vague assumptions to concrete facts and solutions) and must accommodate different statuses of intermediate outcomes (e.g., *idea, concept, proposal, final*), effectively capturing and communicating the *TLN* results is a critical success factor.

'Selecting the right participants (profile!), managing their expectations, and composing the right teams in the right TLN phase are key' (grounded 40-6).

Selecting the right participants is a critical success factor. During the execution of *TLN*, we found that not everyone is equally suitable as a participant. The most important qualities participants should ideally possess are creativity, open-mindedness, and a collaborative attitude. Additionally, it is advantageous if the participant enjoys engaging in team-based exploration of product-service innovation strategies and brings specialised expertise to the table. A successful aspect of our approach was assembling teams with a diverse mix of genders, ages, specialisations, and departmental backgrounds.

Given busy schedules and ongoing projects, we engaged participants in the *TLN process* in a timely manner. A good onboarding process explaining the entire *TLN* procedure is necessary to effectively manage participants' expectations and secure their full commitment. *TLN* requires employees to balance their operational tasks with the demands

of the *TLN process*, which necessitates a strategic and contemplative mindset. Our experience has shown that this balancing act can be challenging for some employees.

'I wish that we had taken more time to reflect on the results of the first session and improve them' (grounded 17-4).

Participants expressed a strong desire for additional time across various exercises of the workshop interventions. They suggested increasing the total time commitment to 60 hours and incorporating more opportunities for self-reflection within joint meetings. Many participants wanted more time to explore multiple topics in breakout rooms, to comment on and iterate each other's ideas, and to thoroughly read and discuss the presented information. They also recommended conducting high-level reviews of ideas and findings from previous workshops to track progress and refine their thinking.

Participants felt that time pressure often hindered extensive discussions, which they considered a missed opportunity for deeper exploration. They suggested allowing more time between workshops for reflection and ensuring continuity in participation. Overall, participants believed that extending the time allocated for exercises and discussions would significantly enhance the quality of the outcomes.

'I wish all participants would actively join all sessions. If not, we lose valuable input' (grounded 9-7).

Participants provided valuable feedback on improving the workshop sessions. Many expressed a strong preference for face-to-face sessions, acknowledging the budget challenges that made this difficult. There was a concern that not all participants attended every session, leading to a loss of valuable input and making it harder to maintain a consistent understanding among all members. Participants noted that ideas often lost momentum when their originators were absent, and that irregular attendance disrupted the flow and team cohesion.

There was a consensus that encouraging more active participation was crucial. Reiterating the importance of speaking up at the beginning of each session could enhance the value of brainstorming activities. Participants also emphasised that attending a workshop should be more engaging than merely attending a meeting and suggested assigning homework before or after the workshops to improve overall quality.

Participants felt that more plenary sessions would be beneficial, as discussing each other's ideas often leads to new perspectives and insights. As noted, *'I wish there had been a bit more plenary interaction. Building upon each other's ideas is often very valuable.'* This feedback highlights the importance of allowing sufficient time for cross-pollination, consistent attendance, active participation, and more interactive, face-to-face sessions to enhance *TLN 's* effectiveness.

'I wish to set up a structure and agenda for recurring strategic workshops like The Long Now' (grounded 5-7).

Participants appreciated the time dedicated to the *TLN* workshops and emphasised the importance of holding them regularly. They expressed a strong desire to continue the *TLN* programme to maintain momentum and foster strategic thinking and cross-departmental collaboration on product-service innovation. Suggestions included establishing a structure and agenda for recurring strategic workshops like *TLN* and setting up a *Strategic Design Team* to facilitate these sessions.

'Visualising, visual storytelling, and describing selected concepts are key for follow-up and back casting' (grounded 16-6).

Throughout the workshops, we utilised the digital platform *Miro™*. As the workshops were conducted online, *Miro™* proved to be a suitable tool. The *Organising Team* prepared the interventions using this platform, and participants captured their ideas through sketches and images. *Miro™* thus became an essential tool for storing data related to the *TLN* workshop formats and process history. The *Miro™* boards provided an extensive overview of selection and decision-making moments, progressive insights, and the evolution of ideas into chosen concepts.

However, during reflection discussions with the *Organising Team*, we identified a significant drawback of *Miro™*: it is not designed as a database and lacks smart query and filter functionalities. This limitation hinders the ability to create the layers needed to effectively communicate and monitor the product-service innovation strategy and its subsequent development activities across different departmental silos within the company. Management is primarily interested in a high-level definition of the servitization strategy, whereas innovation teams require detailed descriptions of concepts, including progress updates, background, and the rationale behind the selected value propositions. To address these diverse informational needs, multiple layers must be integrated into the strategic roadmap, allowing stakeholders to filter and access the most relevant content. To address these concerns, the *Organising Team* needs to explore additional tools or methods that complement *Miro™*, ensuring that all ideas, regardless of their initial stage of development, are captured and easily accessible. This approach will help bridge the gap between high-level management perspectives and the detailed focus required by innovation teams, fostering a more integrated and efficient process for product-service innovation.

'I learned we still have a lot more to consider for our future product-service offerings' (grounded 8-15).

Participants highlighted several key learning experiences from the *TLN* workshops. They emphasised the benefits of cross-sharing between segments to stimulate new ideas and improve concepts. They noted significant overlaps in concepts related to the business units *A1, B2,* and *C3*, recognising this overlap as a strategic advantage for creating competitive product-service value propositions. Participants learned effective methods for structuring brainstorming sessions and organising ideas and trends, which they found to be highly valuable. During *TLN*, they experienced the value of multidisciplinary teams for strategic

product-service innovation, involving participants from different departments and backgrounds. The participants appreciated cross-departmental collaboration for its ability to promote discussions from diverse perspectives, reinforce collective insights, and enhance individual commitment.

Reflecting on Organising TLN

'TLN was well-prepared and organised – professional and knowledgeable facilitators (grounded 34-0).

The *TLN* workshops were well-prepared and facilitated, with the inclusion of various disciplines being a particularly strong point. The sessions were thoughtfully designed, balancing discussions with forward progress. This approach was crucial for formulating a shared vision among all business units, with back casting playing a key role in navigating the servitization journey. As underscored with the famous quote from Morpheus to Neo in the movie *The Matrix: 'Neo, sooner or later you're going to realise just as I did that there's a difference between knowing the path and walking the path.'*

Participants appreciated the exercise's focus on looking into the future and exploring end-user scenarios, noting the great interaction and exchange of ideas. The method of collecting and summarising ideas into a clear future path was seen as very interesting, demanding, but rewarding. *Strategic Design* was highlighted as beneficial for informing various strategies and roadmaps at all levels, including the *technology*, *business*, and *user* perspectives.

The *TLN* format, particularly the use of *Miro™*, was a significant advantage. It was clear that considerable thought had been put into the workshop structure beforehand to maximise the use of time and gather valuable insights. Participants were encouraged to think beyond current roadmaps and explore and assess future trends and signals of change, a challenging but rewarding process.

The *TLN* approach and journey were engaging, providing participants from different departments providing an opportunity to think outside the box and consider the unthinkable. The *TLN* workshops were well-structured, generating many valuable insights and fostering future thinking, which can help keep the company leading the market for a long time.

Despite time pressure, the sessions were well conducted, with participants suggesting that more time for quiet reflection could enhance the experience. The *TLN* initiative was acknowledged as strong, with a solid structure, though it required a significant investment of time and money. Selecting the participants involved and obtaining management approval proved to be more challenging than expected.

'TLN should be an embedded, continuous, cyclical (bi-annual) process—face-to-face workshops—thinking about the future is an everyday activity that should be monitored' (grounded 23-7)'.

The participant's quote, 'I would have preferred the workshops to be scheduled closer together. Now, with a holiday in between, I found it somewhat difficult to get back into the flow,' indicates that we need momentum in the *TLN process*. Perhaps we could explore how to organise and plan a complete *TLN* workshop series within a short but intentional period. The format of the workshops should be maintained, and it should ideally become a cyclical process that is updated periodically. We could also consider organising it as an annual event or mini conference, perhaps in September ahead of the new budgeting round. This timing would allow us to incorporate the strategic insights gained directly into the planning and financial decisions at the business unit level.

The advantage of such an approach is that the delegated participants can fully concentrate on the *TLN process* without worrying about their operative tasks, which, as we have experienced, are often prioritised. Additionally, this dedicated time away from daily operations would enable deeper engagement and more thorough exploration of ideas. By establishing *TLN* as a regular, cyclical event, we can ensure continuous monitoring and updating of the strategic design roadmap, keeping it aligned with evolving trends, end-user scenarios, and the dynamic external environment. This would help business units stay ahead in their strategic planning and enhance their ability to respond proactively to future challenges and opportunities.

We argue that *TLN* should regularly monitor, revisit, and update the evolving future context of the end-user, as the external world is constantly changing. This could involve a light update once a year and a full update every two years. To achieve this, we need a digital relational database capable of containing both visual and textual formats, including a layered strategic roadmap to document and communicate the servitization strategy. The *Organising Team* has already considered how we can implement this within the company.

Perhaps we could explore how to organise and plan a complete *TLN* workshop series within a short but focused period. The format of the workshops should be maintained, ideally establishing a cyclical process that is updated periodically. We could also consider organising it as an annual event or mini conference, perhaps in September ahead of the new budgeting round. This timing would allow us to incorporate the strategic insights gained directly into the planning and financial decisions at the business unit level.

'Install a virtual TLN team/project/yearly event – a federated, floating, multifunctional cross-departmental team to manage and execute TLN (grounded 18-5).

As was suggested: *'I think it is important to establish a permanent department for TLN.'* This proposal raises an interesting question about how the *TLN process* could be embedded within the organisation. One possible option would be to position *TLN* within the *Strategic Design Department*. However, this approach carries a potential drawback: it may reduce the involvement of colleagues from other departments and undermine the cross-pollination that was identified as a key success factor of the *TLN process*.

An alternative option is to make the *Strategic Design* department responsible for organising *TLN*. They could invite employees from various departments to participate in a

TLN event or mini conference, allowing them to focus fully on *TLN* activities, free from the distractions of daily operations. The *Strategic Design* department could establish a *community of practice* built around colleagues who regularly participate in *TLN* workshops and gain experience with the interventions and methods used. This approach would create a stable and experienced group that enjoys strategic thinking, possesses a creative mindset, and can think outside the box. Furthermore, ensuring that team members bring their unique expertise to the table could create a diverse team. This team would be allocated time to participate in these workshops alongside their regular duties within their respective departments. This approach ensures a diverse range of perspectives and fosters greater engagement across the organisation. It mirrors the way the *Organising Team* has previously structured and organised *TLN*. By involving staff from different departments, they ensured that participants could dedicate their time and attention to strategic thinking and planning, away from their usual operational responsibilities. This method not only enhances collaboration but also maintains a dynamic and inclusive environment essential for *TLN*'s success.

We learned from the participants' feedback that they find it particularly important to bring people together physically, face-to-face, preferably in a dedicated space away from their usual operational environment. This setup ensures that participants are truly committed to attending and actively engaging in the strategic workshops.

We propose a more fluid and virtual organisational structure for *TLN*: not confined to a single department but spread across various departments. *TLN* would then be executed by a federated team of delegates from different departments. This federated approach would maintain a continuous flow of fresh perspectives and ideas while fostering a collaborative environment that drives the servitization strategy. By integrating *TLN* into the broader organisational framework in this manner, we ensure that it remains dynamic, inclusive, and effective in executing the company's servitization strategy and achieving its goals.

Next Steps

'Involve and validate with key customers, specialists, business partners, researchers, and future thinkers' (grounded 27-7).

Now that we have completed *TLN*, the *Organising Team* has been considering the next steps. Several team members view *TLN* as a snapshot of the current situation. This means that the outcomes heavily depend on the interpretations made by participants at a specific moment in time. We believe the next step should be to validate these results with specialists from various fields, including end-users, key accounts, futurists, business partners, researchers, and consulting firms. This validation will help determine if the *TLN* findings resonate with them as well.

In the feedback, participants questioned how we plan to involve (future) end-users, key accounts, and external experts in *TLN*. There is some concern about the limited role of these external parties, as they will only be involved in the final stages of the process. As stated, *'Key account input is the most critical part of developing a strategy.'* We propose

to first establish a team of key accounts that we can consult throughout our process. Additionally, we believe it is important to assemble a team of external experts who can be consulted at specific points in the *TLN process*.

We also recognise that large consultancy firms conduct sector and trend analyses, and we would like to integrate this data into our process. This highlights the importance of having a robust database where we can store, access, and analyse these external data points. Furthermore, we realise the need to involve our internal organisation and demonstrate what *TLN* has achieved.

In summary, our next steps involve validating the *TLN* results with external specialists, creating teams of key accounts and external experts for consultation, incorporating data from consultancy firms, and ensuring internal stakeholders are informed and engaged with *TLN's* outcomes. This approach will help ensure the servitization strategy is well-rounded, inclusive, and grounded in both internal insights and external validation.

'For a future-oriented business strategy, we need strong leadership to direct and navigate' (grounded 22-3).

As remarked, '*We need visionaries who see the big picture and understand where the world is going - leaders who comprehend how the future will affect the behaviour of end-users and customers.*' However, during evaluation discussions with participants, concerns were raised about how the *TLN* results would be received by senior management, expressed by the concern: *'I don't think the outcome will change our view of the future. We are too blinded by demanding customers and short-term projects. Although we have shown we can formulate a servitization strategy in a few sessions, it requires strong leadership to turn this into actions and get the whole organisation on board. We invested hundreds of hours with TLN in formulating a future strategy for the company. Therefore, it would be a waste of time and resources if the board does not take action on it.'*

It is crucial to identify who the creative thinkers are and who has good ideas. However, strategy ultimately belongs to the board of directors. While we can propose a servitization strategy, the board decides the direction of that strategy. This echoed the sentiment of, *'Given the expectation that the board will decide on some future concepts, if the Thought Leadership Workshops do not result in a clearer, more focused strategy, we will not future-proof ourselves.'*

We also need to adapt our current way of acting to stay in sync with future-proofing, which is not something we are accustomed to. There is curiosity about how these strategies will be implemented or used in our company or BU strategy. As another participant noted, *'I see no other way. We have to prepare ourselves; otherwise, we are too late.'*

In summary, while there is a strong belief in the visionaries within the organisation and the potential of the *TLN* sessions, there is also a clear need for decisive leadership and strategic alignment from the board to ensure these efforts are not wasted. This will require adapting current practices to align with future goals, thus ensuring the company's long-term success.

'Select and introduce new tools to align, communicate, and update the servitization strategy by means of a dynamic roadmap' (grounded 1-10).

We need to select a digital relational database capable of containing both visual and textual formats, including a layered strategic roadmap to document and communicate the servitization strategy. We discussed this above.

Success Factors (grounded 54)

We asked each participant to name three success factors of the *TLN process*. We clustered them and list them below in a random order without further explanation.

- Applying *Strategic Design Roadmapping* in *TLN*: Utilising strategic design roadmapping effectively within the *TLN* framework.
- Awareness of Own Limitations and Weaknesses: Recognising and understanding personal and organisational limitations and weaknesses.
- Communicating and Visualising *TLN* Results: Professionally communicating and visualising the results from *TLN* activities.
- Creating Engaging Interventions and Events: Developing fun and interesting events that attract participation.
- Intrapreneurship and Goodwill: Encouraging intrapreneurship where individuals take initiative without needing specific budgets, processes, or procedures.
- Multidisciplinary Multicultural Teamwork: Emphasising the importance of teamwork across different disciplines and cultural backgrounds, breaking down silos, and fostering cross-pollination.
- Thinking Outside the Operational Bubble: Encouraging participants to adopt an outside-in, holistic view, moving beyond their operational confines.
- Sustainability and Circularity: Recognising sustainability and circularity as potential drivers for servitization.
- Teaming Up the Right Couples: Forming effective teams with the right pairings.
- Creating Space for Ground-breaking Concepts: Providing an environment within *TLN* that fosters the development of innovative ideas that participants previously hesitated to propose.
- Boldness in Change: Encouraging a bolder approach to change product-service innovation processes.

Biggest Challenges

We asked each participant to name three challenges related to the *TLN process*. We clustered them into three challenges and list them below in the order of grounded quotes number.

1 — 'Changing mindset from tech-focused innovation and project-oriented sales to value-for the customer—dare-to-innovate-in-a-playful-way' (grounded 67-7).

In our questionnaire, we asked participants about the biggest challenge related to *TLN*. It was remarkable how often the tech-driven mindset was mentioned as a barrier to a

servitization strategy. The case company's business units have traditionally focused on selling large projects and serving their clients comprehensively. However, their innovation departments have struggled to keep up, leading to slower progress. One of the biggest challenges the company faces is balancing both the push and pull dynamics in their operations. As noted, *'With push, we tend to sell our high-tech products by focusing mainly on technology and functionality, without considering the value we can offer to the customer or the customer-of-the-customer. With pull, we ask the customer what they need without questioning whether this is the real problem behind their request.'* This *TLN process* was the first attempt to shift from a tech-focused innovation mindset to an end-user and customer value-driven innovation mindset. It aimed to unleash creativity in participants to make them feel comfortable in generating many unconventional ideas, and it appeared to be successful. The biggest challenge now is to perpetuate this success throughout the organisation.

2 — 'Communicate TLN as a source of inspiration. Understanding the 'Why,' 'What' and 'How' of the business strategy – Visualise TLN results and execute it' (grounded 26-12).

As discussed, multiple times in the reflection chapter, communication of the servitization strategy is a crucial factor in ensuring a successful transition. One of the most striking challenges was summarised as: *'Internal communication! That's the biggest problem.'* During the interviews, it became evident that none of the participants were able to clearly articulate the current servitization strategy of their own business unit in just a few concise sentences. In fact, we encountered multiple interpretations from employees within the same unit. This suggests that there is no shared understanding of the strategy; instead, each individual appears to explain it in their own way.

This lack of alignment likely stems from unequal involvement in the strategy formulation process, which poses a risk to effective implementation. After all, if interpretations vary, whose version should be followed.

To address this, the Strategic Design Roadmap is considered a boundary object (*see Section 6.3.1*)—a shared reference in which the strategy is clearly defined in terms of the *'Why', 'What',* and *'How',* and which can guide communication and alignment across the entire organisation. organisation.

3 — 'Embedding TLN and synchronising with current innovation processes. Share/divide responsibilities and ownership across different departments—establish a TLN culture (grounded 23-5).

In the above, we have discussed suggestions for embedding *TLN* in the organisation and how employees could be involved. We have also emphasised the importance of including ongoing innovation projects in the strategic design roadmap. *Table 7-5* summarises the content reflections into seven categories, highlighting key insights into the factors related to embedding the *TLN process*.

Table 7-5 — Key Insights and Categories Identified in Process Reflection ARC 4

Categories	Key Insights Identified in Process Reflection ARC 4
Participant Engagement and Team Composition	• *Selecting participants with open-mindedness, creativity, and strategic thinking skills is key.* • *A diverse mix of participants across genders, departments, and expertise areas improves cross-pollination.* • *Onboarding and expectation management help ensure commitment and balance between operational and strategic tasks.*
Organising TLN as a Recurring Process	• *Participants suggested making TLN a recurring bi-annual or annual event to maintain strategic momentum.* • *A structured, cyclical TLN process would help integrate insights into organisational planning.* • *A federated, cross-functional team could oversee TLN to ensure engagement across business units.*
Challenges and Considerations	• *Overcoming the tech-driven mindset is a major barrier to adopting a customer-value-focused approach.* • *Internal communication must improve to ensure alignment in servitization strategy understanding.* • *Embedding TLN into current innovation processes is essential for long-term success.*
Success Factors	• *Applying strategic design and design roadmapping methods effectively.* • *Encouraging multidisciplinary teamwork and collaboration across business units.* • *Creating a TLN culture that fosters bold thinking and an outside-in perspective.*
Reflecting on TLN process Catalysts	• *Effective planning, capturing, and visualising end-user scenarios and intermediate results is crucial.* • *Miro™ proved a useful tool. However, it lacks search and filter functionalities needed for structured tracking of TLN results.* • *Establishing a more comprehensive documentation system is necessary to ensure accessibility and traceability of TLN outcomes.*
Time Management and Workshop Structure	• *Participants wished for more time to reflect on prior discussions and iterate ideas.* • *Time pressure often limited deeper exploration of topics, affecting discussion quality.* • *Regular attendance is essential to maintaining momentum and avoiding loss of valuable input.*
Future Steps and External Validation	• *Involving key customers, specialists, researchers, and business partners is necessary for validation.* • *Concerns were raised about how TLN outputs will be integrated into broader business strategies.* • *Strong leadership is required to ensure TLN insights are acted upon and not lost in daily operations.*

7.6.4 — ARC 4 — Premise Reflection

This section reflects on the purpose and intended outcomes of *ARC 4*, as introduced in *Section 7.2,* and evaluates to what extent they were achieved. *ARC 4* aimed to address two central questions:

1) Does *TLN* provide a robust process for formulating a long-term *overarching servitization* strategy for the company?
2) Does *TLN* deliver qualitatively similar results across the three business units?

Drawing on the results from both the content and process reflections, we argue that *ARC 4* has successfully fulfilled its purpose. The evidence suggests positive answers to both questions, while also highlighting important considerations for further embedding and institutionalising *TLN*.

Assessing TLN as a Robust Process for Servitization Strategy Formulation

A key aim of *ARC 4* was to evaluate the effectiveness of *TLN* as a structured, actionable approach to developing a long-term servitization strategy within a high-tech, B2B environment. The workshops conducted under *ARC 4* yielded a substantial number of innovative ideas—137 related to products, 117 to services, and 131 combining both. This volume of output indicates a high level of engagement and creativity among participants.

Moreover, *TLN's* strategic design methods enabled participants to transcend departmental boundaries and engage more meaningfully with future scenarios. The use of a strategic design roadmap proved particularly valuable. It offered a structured means of organising and prioritising servitization initiatives, helping to translate the diverse range of generated ideas into a coherent, multi-year innovation strategy.

Nevertheless, some challenges were encountered. Participants raised concerns about how the strategic roadmap would be maintained and integrated within existing corporate strategy processes. Additionally, the process reflection identified shortcomings in how intermediate results were captured and tracked. While tools such as *Miro™* supported collaboration effectively, they lacked the traceability and search capabilities required for long-term strategic monitoring. These observations underline the need for a more formalised, digital documentation system to ensure the continuity and accessibility of *TLN* outputs.

In summary, *ARC 4* demonstrated that *TLN* provides a viable and effective framework for formulating a long-term servitization strategy. However, to be fully robust, the process would benefit from improved structuring, especially in relation to documentation and integration with existing strategic practices.

Comparing TLN's Effectiveness Across Business Units and Embedding it in the Organisation

The second aim of *ARC 4* was to determine whether *TLN* delivers consistent results across different business units and to explore its potential for becoming embedded within the organisation. The findings suggest that *TLN* generated qualitatively similar outcomes across the three units. The analysis revealed numerous overlapping themes and opportunities for cross-silo innovation, underscoring *TLN's* potential to foster strategic alignment and integration rather than fragmented, unit-specific approaches. The consolidation of ideas by the *Organising Team* further reinforced the notion that *TLN* facilitates organisational coherence.

Embedding *TLN* more deeply within the organisation, however, presents a distinct set of challenges. Several key enablers were identified: the establishment of recurring strategic workshops (ideally on a bi-annual or annual basis); the formation of a federated, cross-

functional team to oversee *TLN* implementation; and the inclusion of external stakeholders—such as key customers, partners, and academic experts—for validation and input. Most importantly, strong and sustained leadership is essential to ensure that the strategic insights generated through *TLN* are effectively translated into actionable corporate initiatives.

Despite these recommendations, several barriers to institutionalisation persist. Chief among them is the required shift in mindset—from a technology-centric innovation model to one grounded in customer value and service orientation. Communication gaps were also observed, particularly in how the servitization strategy was interpreted and conveyed across different parts of the organisation. Furthermore, some participants questioned whether *TLN's* outcomes would gain sufficient traction at the executive level, signalling a need for stronger leadership alignment.

In conclusion, *ARC 4* showed that *TLN* is capable of producing comparable and strategically valuable results across business units, as summarised in *Table 7-6*. Nonetheless, embedding the process within the organisation's structures and culture remains an ongoing challenge, necessitating adjustments in team composition, governance, tooling, and leadership commitment.

Summarizing the Premise Reflection

Table 7-6 — Summarising the Premise Reflection

Evaluation Criterion	Outcome
Proving TLN as a robust process for formulating overarching servitization strategies	Partially achieved — TLN provided structure, though improvements in documentation and integration are needed.
Making TLN actionable utilising a Strategic Design Roadmap	Achieved — The Strategic Design Roadmap offered a strong foundation, though sustaining it requires further effort.
Comparing TLN's effectiveness across business units	Achieved — TLN fostered consistent results and cross-unit collaboration.
Embedding TLN within the organisation	Partially achieved — Clear recommendations for embedding TLN were identified, yet significant barriers persist.

7.7 — ARC 4 — Summarising the Results of TLN

This section provides a quantitative summary of the results of the ARC4 interventions.

A total of 385 ideas were generated during the *TLN* workshops, comprising 137 product ideas, 117 service value proposition ideas, and 131 combined product–service ideas. Based on this ideation phase, participants developed 23 concept canvases, which were clustered into five strategic portfolio themes. From these canvases, participants formulated 12 *Product–Service Systems (PSSs)* and 11 *Product–Service Ecosystems (PSEs),* which were subsequently embedded in a strategic design roadmap. Of the 23 concept canvases, 13 were classified by the participants as examples of *overarching servitization*. An overview of the results corresponding to each of the six steps of the *TLN process* is presented in *Diagram 7–1* on pages 208 and 209.

These results demonstrate that the *TLN process* serves as an effective method for devising *overarching servitization* within the context of the focal B2B manufacturer.

7.8 — ARC 4 — Conclusion — Reflections and Future Directions

ARC 4 largely achieved its objectives by demonstrating the potential of *TLN* as both a strategic framework and a catalyst for innovation across the three business units. The approach has significantly influenced how the case company envisions and formulates its *overarching servitization* strategy—shifting from fragmented, short-term initiatives towards a more holistic, end-user-focused, and future-oriented perspective. *TLN* has established itself as a valuable process for product-service innovation, fostering alignment across departments and management layers while enabling the company to explore its evolving strategic role in *PSSs* and *PSEs*—whether as orchestrator, integrator, supplier, or partner.

Nonetheless, the long-term success of *TLN* hinges on its effective embedding within the company's strategic innovation routines. While the initial interventions demonstrated strong engagement and generated a wide range of innovative concepts, embedding the process within the existing organisational structure remains challenging. Particularly, the follow-up and execution of selected strategies require stronger integration with ongoing strategic product-service innovation and decision-making cycles.

To secure the continuity and effectiveness of *TLN*, several structural measures are essential. First, a digital system should be established to track and document product-service innovation initiatives systematically, ensuring traceability and accessibility of insights over time. Second, *TLN* should be embedded as a recurring, cyclical process— rather than a one-off intervention—thus becoming a regular component of the organisation's annual strategic planning process. Third, a cross-functional governance team should be formed to maintain alignment and ensure the execution of outcomes across business units. Fourth, consistent leadership engagement is required to translate strategic insights into concrete, long-term actions and activities.

As a change management intervention, *TLN* has already triggered important shifts in mindset. By introducing long-term scenario thinking and incorporating end-user perspectives, the process encourages reflection beyond the immediate horizon. The iterative, design-driven nature of *TLN* fosters experimentation and learning, underscoring that transformation is achieved not in a single step, but through iterative cycles of exploration, synthesis, validation, and implementation.

Moreover, *TLN* has proven effective in building internal cohesion. The workshops have brought together representatives from diverse departments and hierarchical levels, strengthening team bonds and promoting shared ownership of strategic direction. Although *TLN* has thus far only been implemented in two action cycles (*ARC 3* and *ARC 4),* it has generated considerable momentum, and plans are underway to integrate it as a structural component of the company's annual strategic planning process.

To embed *TLN* as a core capability, it is recommended that the process be managed by the Strategic Design Department, under the leadership of the Innovation Manager for Strategic Design. This governance model would recognise the role of strategic design expertise in guiding innovation processes and provide the continuity needed to maintain *TLN* as an integral part of the company's strategic and product-service innovation efforts.

In conclusion, *TLN* has laid the foundation for a future-oriented, end-user-centric approach to servitization. Its embedding requires deliberate structural and cultural changes, but the groundwork established through *ARC 4* offers a promising basis for long-term strategic transformation.

1 Kick-Off	2 Trends & Signals of Change			3 Envisioning Future Context Scenarios
Learnings: • New Skills & Methods • Collaboration across Departments & BU's	*Analyse & Discuss* **270** *Trends and* **111** *Trend Clusters*			**24** *User Value Drivers behind the identified Trend Clusters*
Expected Outcomes: • Future Vision • Servitization Strategy • Actionable Roadmaps	**107** *Trends relevant for business unit A1*	**114** *Trends relevant for business unit B2*	**101** *Trends relevant for business unit C3*	**7** *'Better Times'* year 2050 based on user value drivers and impactful Trend Clusters
				2 in A1 / *3 in B2* / *2 in C3*
50 *Participants engaged across 3 business units*	**38** *Trend Clusters* Impacting business unit A1	**35** *Trend Clusters* Impacting business unit B2	**39** *Trend Clusters* Impacting business unit C3	**7** *'Daily Doom'* year 2050 based on user value drivers and impactful Trend Clusters
	9 Critical Impact	*8 Critical Impact*	*9 Critical Impact*	*2 in A1* / *3 in B2* / *2 in C3*
Presentation of **270** **Trends & Signals of Change** *categorised into 6 categories:* • Demographic • Economic • Political & Legal • Ecological • Socio-Cultural • Technological	*7 Major but stable*	*10 Major but stable*	*9 Major but stable*	**Translated into 4 Future World Context Scenarios:** 1 – The Butler Economy 2 – A Shared Wealth 3 – A Self-Consumed World 4 – Less is Enough
	22 Medium Low Impact	*17 Medium Low Impact*	*21 Medium Low Impact*	
	Business Boundary Mapping to examine in-scope trends clusters in the business domain **Impact Matrix** to assess the impact & likelihood of trend clusters			
26 *Trend Clusters are critical and worth exploring and monitoring*	*7 Trend Clusters Impactful & Certain for A1*	*10 Trend Clusters Impactful & Certain for B2*	*5 Trend Clusters Impactful & Certain for C3*	
26 *Significant emerging but stable Trend Clusters*	*5 Trend Clusters Impactful & yet Uncertain for A1*	*3 Trend Clusters Impactful & yet Uncertain for B2*	*4 Trend Clusters Impactful & yet Uncertain for C3*	
59 *Significant Trend Clusters with medium or low impact*				

Diagram 7-1 — Summarising the Results of TLN after ARC 4

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4 *Ideating Future User Scenarios*	**5** *Ideating User Value Propositions*	**6** *Roadmapping & Connecting Dots*

Discussing **4** **Future World Context Scenarios**	The 'How Might We' exercise generated **137** **Product Ideas**	**Servitization Strategy** *manifested in a* **Strategic Design Roadmap** *with a* **3** **Horizons Perspective**
	55 *in A1* / **44** *in B2* / **38** *in C3*	

Discussing Future World Context Scenarios generated **108** **'What-if' Questions**	The 'How Might We' exercise generated **117** **Service Ideas**	**12** **Product-Service Systems** *(Described by* **PSS** *Concept Canvases)*

43 *in A1* / **30** *in B2* / **35** *in C3*	**37** *in A1* / **38** *in B2* / **42** *in C3*	**8** *in A1* / **11** *in B2* / **10** *in C3*

Answering 'What-if' Questions resulted in a selection of **23** **Future User Scenarios** *for Ideating Product-Service Value Propositions*	The 'How Might We' exercise generated **131** **Product-Service Ideas**	**11** **Product-Service Ecosystems** *(Described by* **PSE** *Concept Canvases)*

	66 *in A1* / **36** *in B2* / **35** *in C3*	**11** *in A1* / **11** *in B2* / **10** *in C3*

6 *in A1* / **9** *in B2* / **8** *in C3*	**53** **Concept Clusters** *generated*	*Of which* **13** *are* **Overarching Product-Service Value Propositions**

| | **13** *in A1* / **16** *in B2* / **24** *in C3* | |

	4 **Role Definitions** *discussed for each concept cluster:* **20** x **Product Supplier** **21** x **Service Supplier** **16** x **Integrator** **12** x **Orchestrator**	**10** **Business Models** *were identified (of which* **5** *are BM shifts!)*

		17 **Critical Technologies** *were identified and PSEs (***13** *gaps!)*

	Potential collaborating **Business Partners** *identified and discussed*	**10** **Critical Knowledge, Skills & Capabilities** *(of which* **4** *are insufficient available &* **4** *gaps!)*

| | **23** **Concept Canvases** *formulated and summarised in:* | |

| | **5** **Strategic Portfolio Clusters** 1) ICL Portfolio Cluster 2) SSD Portfolio Cluster 3) SMF Portfolio Cluster 4) AAS Portfolio Cluster 5) DLM Portfolio Cluster | |

Diagram 7-1 — Continued

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Change is the process by which the future invades our lives, and it is important to look at it closely, not merely from the grand perspectives of history, but also from the vantage point of the living, breathing individuals who experience it.

Alvin Toffler

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Chapter 8 — Conclusion and Discussion

8.1 — Introduction

This *Chapter* presents the discussion and conclusions of a doctoral study that explored how a technology-driven capital goods manufacturer in the B2B sector can leverage servitization as a strategic approach to sustain and strengthen its competitive position.

The objective of this doctoral research was to understand servitization—the transition from product-centricity to service-centricity—within the innovation practices of a B2B manufacturer of capital goods. The design and implementation of such a transition in the B2B industry has not been extensively studied in the existing servitization literature. This research aimed to address that gap by designing and implementing a servitization transition.

Over a period of three years, I immersed myself in a B2B industrial manufacturer and applied the action research methodology outlined by Coghlan (2019) to explore the concept of servitization from an insider's perspective. While I served as the principal researcher, I collaborated closely with designers and engineers from the company's innovation departments in a series of hands-on design interventions. Through this collaboration, I was able to reflect critically on the manufacturer's innovation processes and their capacity to integrate services into product offerings. Grounded in these joint efforts, we collectively generated new knowledge about how to design and implement a servitization transition in the context of B2B manufacturing.

Throughout this research, we examined enablers and barriers, as well as organisational challenges and opportunities associated with a servitization transition within the B2B manufacturing industry. Our literature review revealed a gap in the existing body of knowledge regarding how to address the values and needs of the *customer's customer*. Given that this perspective was previously unexplored, this doctoral research made addressing end-user needs and behaviour in their future lifeworld a focal point. Specifically, we explored in-depth how a B2B manufacturer can organise and adapt its innovation processes to better address end-user and customer values in future contextual scenarios. To this end, we formulated the main research question:

'How can B2B manufacturers design overarching servitization strategies?'

Alongside with three sub-questions:

1) ***'What are the enablers and barriers for servitization within a technology-driven B2B manufacturer?'***

2) ***'How can a technology-driven B2B manufacturer explore end-users' values?'***

3) ***'How can a technology-driven B2B manufacturer organise a servitization transition?'***

Our research focused on various aspects of servitization, including reflecting on internal product-service innovation processes, designing strategic design interventions, exploring

new product-service value propositions, and investigating end-users value drivers along with future end-user scenarios. Additionally, we analysed how the designed interventions contributed to the success of servitization for the focal B2B manufacturer and proposed process and organisational changes for effectively implementing a servitization strategy.

Section 8.2 reveals the principal findings of our research. In *Section* 8.3, we address the three research sub-questions and, consequently, the main research question. *Section* 8.4 highlights the significance of these findings and links them to various related knowledge domains. *Section* 8.5 outlines avenues for future investigation, discusses the limitations of our research and concludes with practical implications for educators, strategic designers, engineers, and management within the B2B manufacturing industry.

8.2 — Principal Findings

This section reveals the principal findings of this doctoral research.

8.2.1 — Discovering the Novel Lens of 'Overarching Servitization'

Chapter 2 reports on the results of a literature review on servitization in the context of the B2B manufacturing industry. After coding and analysing servitization literature related to the initial research question, we identified five distinct servitization lenses:

1) **Business Models** – Business model transition as a result of a servitization process.
2) **Organisational Transformation** – The impact on the organisation associated with a servitization transition.
3) **Value Creation** – Creating value for customers through servitization.
4) **Network Collaboration** – Innovating product-services through in cooperating networks.
5) **Servitization Strategies** – Strategic frameworks and practices to support the servitization process.

However, we discovered a additional lens of servitization after being prompted by the research article by Visnjic et al. (2017). Manufacturing industries typically operate in a B2B market, focusing primarily on the direct needs of their customers. Most research on servitization in the B2B domain has focused on a one-to-one relationship between a manufacturer and its customer, typically examining how a product-service value proposition is developed within that specific context. However, Visnjic et al. (2017) highlighted an alternative perspective on servitization through their analysis of the *Rolls-Royce* case. In this example, we observed that the *Power-by-the-Hour* value proposition transcended the conventional B2B relationship, evolving into a B2B2C configuration. By engaging simultaneously with both the aircraft manufacturing sector and airline operators, *Rolls-Royce* addressed the specific needs of multiple stakeholders while co-creating value across an extended collaborative network. This servitization strategy fostered the creation of a *Product-Service Ecosystem (PSE)*, in which all actors participate in bidirectional value exchange and collectively work towards a sustainable value equilibrium.

The *Power-by-the-Hour* case revealed a novel lens on servitization—one that focuses on building sustainable partnerships further downstream in the B2B value chain. We

conceptualised this approach as *'overarching servitization'* and contributed to the academic discourse by publishing four peer-reviewed conference papers on the topic. (Bluemink et al., 2020, 2021, 2023a ,2024a).

This novel lens on *overarching servitization* has not yet been effectively explored in the existing literature. Similarly, previous research on servitization in the B2B industry has predominantly adopted an outside-in perspective. Through surveys and interviews with multiple companies, many qualitative and quantitative data have been collected, yet often without intensive interventions in the organisations themselves.

In contrast, our research focused on a single company where the principal researcher immersed himself in the organisation over an extended period. By employing action research, we were able to implement interventions that not only facilitated qualitative data collection but also enabled the study of organisational dynamics from the inside. This immersive position yielded much deeper insights into day-to-day practices and the complexities of organisational change than would have been possible through external observation alone. To focus the doctoral thesis, *overarching servitization* was adopted as the focal point and action research was selected as the methodology to study it within a B2B manufacturer from this insider perspective.

Our literature review revealed that common B2B2C service innovation practices are still in their early stages within the B2B domain. While B2B manufacturers maintain strong relationships with their customers within their business domain and focus on delivering services linked to their products, they often lack direct relationships with the end-users— the customers of their customers (Lievens & Blažević, 2021). As we argued in our study, it is the end-user—being the final link in the value chain—who determines whether value flows back upstream. If the end-user (or, in other words, the customer-of-the-customer) does not perceive value in the provided product-service proposition, they will not buy it. Consequently, no value will flow back upstream into the value chain. This reinforces our argument that for B2B manufacturers seeking to expand their product-service portfolio, adopting an overarching perspective towards B2B2C can be beneficial in exploring and identifying new product-service opportunities aimed at end-users. This strategic approach can enable them to design innovative value propositions, develop sustainable business relationships with end-users and collaborating partners, discover additional revenue streams, and collect user data throughout the product-service lifecycle.

8.2.2 — Enablers and Barriers for Servitization

As a result from our longitudinal action research, *Chapter 4* presents the findings from the first *Action Research Cycle (ARC 1)*, where we investigated the extent to which the innovation department integrates service development with its high-technology products. Our analysis revealed that the focal B2B manufacturer often failed to incorporate the end-user's value perspective into its product-service innovation process. This oversight led to instances where new developed product-services did not align with the expectations or needs of customers and end-users. This highlighted a gap in the organisation's approach to value creation. Through our observations, we identified 20 enabling factors that support

the transition towards servitization, as well as 11 barriers that hinder it. While several of these enablers and barriers are consistent with findings reported in the servitization literature (Adner & Kapoor, 2010; Baines et al., 2020; Baines & Lightfoot, 2014; Bakir et al., 2021; Huikkola et al., 2022; Kowalkowski et al., 2013), this thesis also revealed nine contextual enablers and four barriers that were specific to the case (see *Table 8-1*).

Table 8-1 — Enablers and Barriers Related to Overarching Servitization Strategies

Servitization Enablers		Lens
1	An Inhouse Design Team within the B2B manufacturer, consisting of engineers and strategic designers, creates value for end-users by applying design methods for investigating latent end-user needs.	Creating Value
2	Shifting the innovation focus from technical feasibility to end-user desirability and customer value fosters new product-service solution directions in the B2B manufacturer.	Creating Value
3	Involving unbiased strategic designers in a B2B product-service innovation process challenges network collaboration with business partners that add complementary skills and competencies .	Network Collaboration
4	Using strategic design methods in the B2B industry fosters servitization strategies through future visioning of product-service solutions from end-user's perspectives.	Organisational Transformation
5	Unbiased thinking outside the current B2B ecosystem boundaries fosters a broader solution space and enables creative product-service solutions.	Organisational Transformation
6	Organising on-site meetings to engage engineers from B2B industry in dialogues with end-users facilitates an understanding of end-user needs and behaviours.	Organisational Transformation
7	It is crucial to create strategic design interventions that go beyond a focus solely on technology. This approach leads to innovating product-service value propositions that are focused on customers and end-users, ensuring that the end result is tailored to their needs and experiences.	Organisational Transformation
8	Digital platform knowledge and future visioning capabilities of the B2B manufacturer drive the transition to servitization strategies.	Servitization Strategy
9	Focusing on overarching servitization strategies creates value for both customers and end-users.	Servitization Strategy
Servitization Barriers		Lens
1	A lack of deep market understanding regarding trends and signals of change hinders the development of compelling product-service value propositions from the B2B manufacturer.	Creating Value
2	The lack of strategic design capabilities within the B2B manufacturer, such as exploration, envisioning, and ideating skills, is a barrier to creating long-term servitization strategies.	Organisational Transformation (knowledge)
3	Current innovation processes within the B2B manufacturer create a barrier to service innovation because service design activities are lacking, making it difficult to adapt the organisation to changing market demands.	Organisational Transformation (process)
4	Focusing on short-term innovation projects and priorities impedes the development of a long-term servitization strategy and future-oriented product-service value propositions.	Servitization Strategy

To provide a focused overview, *Table 8-1* highlights the nine most significant enablers and four key barriers identified in our study. These were analysed in relation to *overarching*

servitization strategies aimed at enhancing value creation for end-users. This nuanced understanding offers actionable insights for practitioners in the B2B industry seeking to navigate the complexities of servitization transitions. *Table 8-1* answers the first sub-question: *'What are the enablers and barriers for servitization within a technology-driven B2B manufacturer?'* By identifying and contextualising the enablers and barriers within our case study, we have illuminated the key factors that either facilitate or hinder a successful servitization transition. This insight not only addresses the research sub question but also extends existing knowledge in the field, providing a foundation for future research and practical guidance for organisations pursuing servitization.

8.2.3 — TLN — an Overarching Servitization Strategy Design Process[5]

Engaging with customers and addressing end-users' values have become increasingly challenging within servitization strategies (Adrodegari, 2021; Bakir et al., 2021; Bluemink et al., 2021, 2023b). Wise and Baumgartner (1999) argue that manufacturing companies adopt servitization strategies because these strategies allow them to transcend their traditional role as suppliers of products that provide only a one-time value transaction at the point of sale. By moving downstream in the value chain, companies can generate sustainable revenue streams through the provision of services and customer experiences that add value throughout the entire product-service lifecycle. Additionally, they can collect data on user experiences to enhance or extend their product-service offerings. This practice of moving downstream in the value chain and cultivating loyal customers who generate revenue throughout the product lifecycle is common in B2C markets (Cruz et al., 2022; Wise & Baumgartner, 1999). For instance, in the case of smartphones, although the product itself is purchased only once, the associated services generate the majority of the value as end-users utilise them throughout the product's lifecycle. The monetised value stream from these services significantly surpasses the initial transaction value of the smartphone many times over. With service contracts based on subscription business models, smartphone users are often tied to their providers for extended periods. This arrangement enables providers to collect data on service usage. Through data analytics, they can enhance existing service value propositions or introduce new services that address nascent needs. Consequently, the smartphone itself has been reduced to a means of delivering services. In some subscription models, smartphones are offered at or below cost to entice consumers into committing to long-term service contracts.

ARC 2 led to the development of the *Overarching Servitization Strategy Design process*, provisionally titled *'The Long Now' (TLN).* This process supports the focal B2B manufacturer in exploring diverse end-user scenarios within future contextual environments. This framework facilitates the creation of comprehensive product-service value propositions that address nascent user needs. The *TLN process* consists of six

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[5] *Section* 8.2.3 was derived from a peer-reviewed conference paper (Bluemink et al., 2023b) presented at the *Spring Servitization Conference 2023* in Helsinki

sequential workshop interventions, as illustrated in *Figure 6-2* and elaborated upon in *Chapter 6*:

1 — Kick-Off

2 — Creative Trend Research

3 — Empathising with End-Users

4 — Envisioning Future Contexts

5 — Ideating End-User Value Propositions

6 — Roadmapping & Connecting Dots

These interventions explore future contexts and generate actionable insights into end-user behaviour and latent needs. In contrast, interventions *1 (Kick-Off), 2 (Creative Trend Research),* and *6 (Roadmapping & Connecting Dots)* build on established strategic design practices documented in prior research, such as those by Phaal & Muller (2009) and Simonse (2018). Among these six interventions, numbers *3, 4* and *5* are new contributions to the servitization literature with regard to developing servitization strategies by means of *Design Roadmapping* in the B2B manufacturing industry. They introduce design methods into this context and, in addition, address the perspective of *overarching servitization*, which has thus far received little systematic attention in B2B research.

The *TLN process* provides a structure for technology-driven B2B manufacturers of capital goods to design *overarching servitization* strategies. It maps end-user behaviours and anticipates latent needs by contextualising them within plausible future user scenarios. The theoretical foundations and practical design processes are discussed extensively in *Chapters 5* and *6*.

ARC 3 and *ARC 4* tested and validated the *TLN process* against the three guiding principles, namely:

A — The TLN process must explore end-user perspectives to identify values and unmet needs.

B — The TLN must explore future end-user context scenarios.

C — The TLN process must be flexibly organised and employed in the operational context of the company.

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Table 8-2 — Alignment of TLN Guiding Principles with Empirical Evidence from ARC 3 and ARC 4

TLN Guiding Principles	Empirical Evidence Captured from ARC 3 and ARC 4
A — The TLN process must explore end-user perspectives to identify values and unmet needs.	• TLN explores future contexts and end-user values. • TLN includes persona exercises and future vision assignments help understand end-user behaviours and identify latent needs, serving as a foundation for ideation processes. • TLN fosters the importance of an end-user focus, marking a paradigm shift from solely considering direct business customers to serve end-users. • TLN promotes 'overarching' thinking. • TLN interventions contribute to the company's overarching servitization strategy.
B — The TLN must explore future end-user context scenarios.	• TLN utilises strategic design methods and provides a long-term perspective, which contrasts with the organisation's short-term, revenue-driven culture. • TLN helps envisioning future scenarios and creating end-user value. • TLN structures how companies explore future trends, end-user values, define product-service solutions, and determine innovation efforts. • TLN interventions contribute to the company's overarching servitization strategy. • TLN revealed the need for long-term adaptation to service-oriented business models. • TLN's Roles & Relationships framework facilitates discussions about role to play in PSSs and PSEs. • TLN's Strategic Design Roadmap has proven to be a valuable facilitation tool for guiding discussions on future-oriented servitization strategies and supporting informed decision-making. • TLN's Strategic Design Roadmap serves as a tool to guide long-term innovation aligned with servitization objectives. • TLN's Strategic Design Roadmap incorporates three value perspectives: Value Context, Value Exchange, and Value Creation.
C — The TLN process must be flexibly organised and employed in the operational context of the company.	• TLN interventions foster and align product-service innovation to address servitization challenges. • TLN promotes interest in cross-departmental knowledge exchange and developing new competencies in strategic design, service design and design roadmapping. • TLN revealed the need for structural organisational changes in how overarching servitization strategies are developed and implemented. • The time gaps between interventions (2–3 weeks) were considered too long, making it difficult to maintain momentum. • Online sessions beneficial reduce travel time, however in-person meetings foster collaboration and engagement. • TLN fosters cross-pollination by encouraging the exploration of new perspectives and the development of novel product-service ideas. • TLN actively involves employees from operational management levels in the strategy formulating process, acknowledging their expertise in day-to-day operations. Challenges: • Embedding The Long Now and align with current innovation processes. • Organisational silos hinder strategic change, despite strong financial performance. • The preference for customer-specific solutions over platform-based solutions slows innovation progress. • The company's strong technology-focused culture presents a barrier to overarching servitization. • Participants have to balance interventions with their daily job responsibilities, as TLN is not incorporated yet.

Table 8-2 provides empirical evidence for the three guiding principles underlying the *TLN process* and demonstrates its effectiveness in addressing the second research sub-question: **'How can a technology-driven B2B manufacturer explore end-users' values?'** By bridging strategic foresight with servitization practices, the *TLN process* supports the design and implementation of servitization strategies, including product–service value propositions centred on end-users. In doing so, it enables organisations to explore future end-user contexts, navigate the complexities of servitization, and create offerings that align with evolving needs and expectations.

The structured approach offered by the six strategic design interventions represents a practical method for integrating strategic design within the innovation process, without necessitating changes to the organisational structure. These interventions are particularly well-suited for establishment as an annual event, for instance, under the leadership of the innovation department or a strategic design team. By institutionalising these interventions as part of the organisational routine, the *TLN process* facilitates the systematic and collaborative development of strategic product-service value propositions. This approach not only embeds interdisciplinary collaboration into the innovation process but also ensures sustained focus on aligning product-service offerings with evolving market and end-user needs. In this way, the *TLN process* effectively addresses the third research sub-question: **'How can a technology-driven B2B manufacturer organise a servitization transition?'** It demonstrates how a manufacturer can structure and institutionalise strategic design practices to drive servitization strategies effectively.

8.2.4 — Roles & Relationships Framework Facilitating Overarching Servitization Discussions[6]

The *TLN process*, outlined in *Section 8.2.3,* offers valuable insights into the roles and relationships between B2B manufacturers and their stakeholders concerning *overarching servitization*. In the fifth intervention of *ARC 3* and *ARC 4—Ideating End-User Value Propositions*—we utilised the *Roles & Relationships framework* to examine overarching stakeholder relations. This framework prompted participants to critically reassess the manufacturer's role in co-creating product-service value propositions in collaboration with actors throughout the wider value network. This viewpoint aligns with the argument posted by Baines & Lightfoot (2014), who highlight that such collaboration enhances the competitiveness and resilience of industrial manufacturers operating within complex ecosystems.

Traditionally, in a linear value chain, a B2B manufacturer acts as an *orchestrator*, sourcing materials and components from suppliers and co-creating a product-service value proposition with its direct customer. However, this model usually neglects a direct relationship between the manufacturer *(M)* and the ultimate customer—the end-user *(E)*.

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[6] *Section* 8.2.4 was derived from a peer-reviewed conference paper (Bluemink et al., 2024) presented at the *IMP Conference 2024* in Oulu

Consistent with the perspective of Aarikka-Stenroos and Jaakkola (2012), we classify such a *PSS* as the result of co-creation within a linear relationship, as illustrated in the lower-left cell of *Figure 8-1*. As indicated by the dashed lines representing the system boundaries of the *PSS*, the end-user *(E)* is excluded from the relationship with the manufacturer *(M)*.
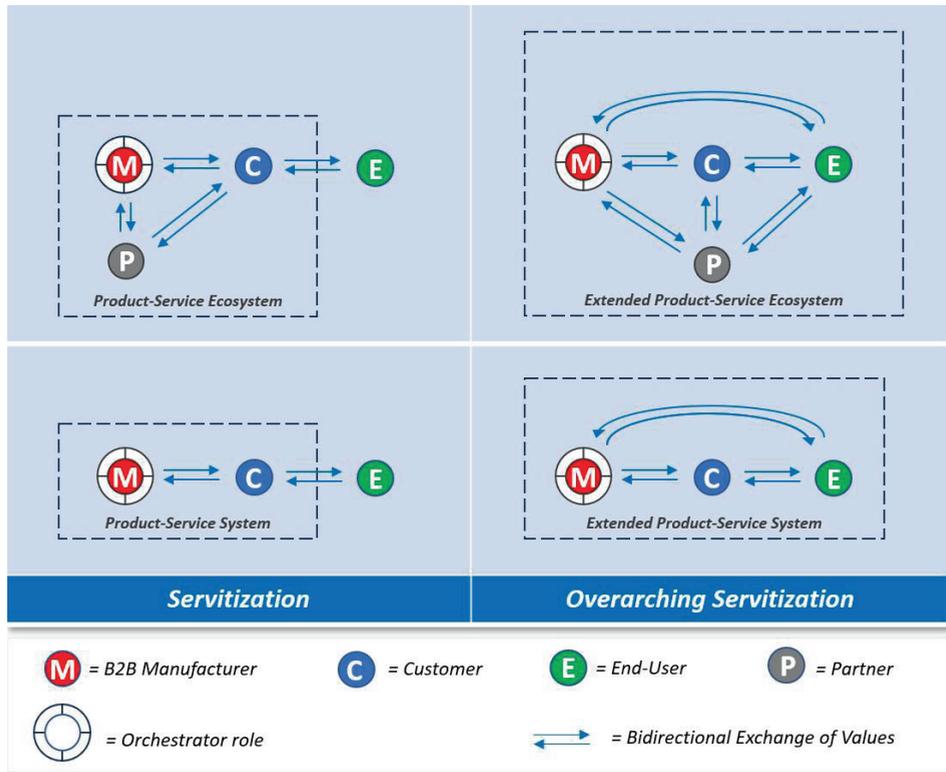
Figure 8-1 — Roles & Relationships Framework for PSS & PSE Innovation

The relationship between a manufacturer *(M)* and its direct customer *(C)* becomes increasingly complex as cooperating partners *(P)* become involved in the value creation process. Together, they co-create product-service value propositions with customers *(C)* that none of the participants could achieve on their own. This dynamic is classified as two linear relationships (Aarikka-Stenroos & Jaakkola, 2012), as illustrated in the top-left cell of *Figure 8-1*. In this configuration, the manufacturer *(M)* in its role as *orchestrator* co-creates with the customer *(C)*, while the partner *(P)* co-creates with the manufacturer/orchestrator *(M).* All actors derive value from the system through their interactions within a *PSE* that encompasses these two linear relationships.

In contributing to the theoretical conceptualisation of *PSEs,* the findings of this doctoral study indicate that when examining roles and relationships within *PSEs* unfolding from the *TLN process*, the end-user *(E)* becomes a key actor. At this stage, the *linear* relationship evolves into an *overarching* configuration comprising three linear relationships, as the manufacturer *(M)* in its role as *orchestrator* establishes direct connections with both the

customer (C) and the *end-user (E)*. These relationships enable all actors to exchange value bidirectionally and collaboratively create a *PSS*. This transformation is depicted in the lower-right cell of *Figure 8-1*.

A similar transformation takes place within a *PSE*, where multiple actors—such as the manufacture/orchestrator, customers, and various collaborative partners—jointly co-create value propositions with the end-user *(E)*. In these overarching configurations, traditional linear relationships are restructured into two interlinked triangular arrangements, as illustrated in the top-right cell of *Figure 8-1*. This shift highlights how value creation extends beyond dyadic interactions, becoming a distributed process embedded within a broader network of interdependent actors.

The *Roles & Relationships framework* significantly contributes to addressing the second sub-question: **'How can a technology-driven B2B manufacturer explore end-users' values?'** It enables B2B manufacturers to reassess and reconfigure their position within the broader value network, placing greater emphasis on collaboration with end-users and other ecosystem partners.

In conclusion, the *Roles & Relationships framework* offers a methodological foundation for technology-driven B2B manufacturers seeking to navigate complex value creation networks. By providing actionable insights into how roles and interdependencies can be structured to inform *overarching servitization* strategies, the framework enhances the organisation's capacity for resilience and long-term, end-user-centred innovation.

8.2.5 — A Value-Driven Strategic Design Roadmap for Visualising a Servitization Strategy[7]

In *Section* 6.6, we reflected on the strategic design interventions of *TLN*, which produced a Value-Driven Strategic Design Roadmap consisting of three value perspectives: the Value Context, the Value Exchange, and the Value Creation Perspective. These perspectives offer a novel contribution to the roadmap frameworks proposed by Simonse (2018) and Phaal (2009), providing a foundation for mapping the intended product-service value propositions across a timeline that spans three horizons.

Figure 8-2 illustrates the Strategic Design Roadmap framework, which features three coloured horizontal layers: the Value Context, the Value Exchange, and the Value Creation Perspective. Perpendicular to these layers are three vertical columns aligned with a horizontal time axis, representing *Horizon 1, Horizon 2,* and *Horizon 3*.

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[7] *Section 8.2.4* was derived from a peer-reviewed conference paper (Bluemink et al., 2024) presented at the *Spring Servitization Conference 2024* in Tilburg. The paper was honoured with the conference's *'Best Paper Award.'*
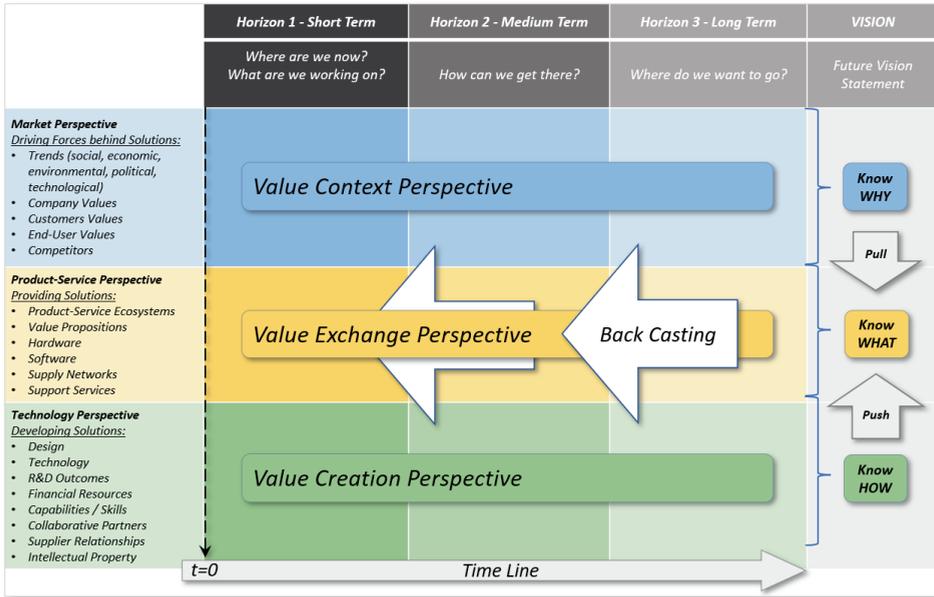
Figure 8-2 — Outline of an End-User Value-Driven Strategic Design Roadmap Connected to the TLN process [added to Phaal & Muller (2009) and Simonse (2018)]

The *Value-Driven Strategic Design Roadmap* has proven to be a valuable framework for the focal B2B manufacturer, serving as a catalyst for cross-departmental discussions and facilitating a shared understanding of the intended servitization strategy. For B2B manufacturers that primarily focus their innovation efforts on short-term objectives (*Horizon 1*), the *TLN process* encourages a broader perspective by addressing all three value layers within *Horizon 3*. A *back casting* process—indicated by the white arrows— then defines *Horizon 2,* followed by *Horizon 1*. This approach ensures that all three horizons and their respective value layers are equally considered when developing a servitization strategy. The *Value-Driven Strategic Design Roadmap* represents the culmination of the *TLN process*, providing a balanced and multifaceted strategy for mapping an *overarching servitization* approach while designing value propositions for *PSSs* and *PSEs*. By integrating various dimensions of value creation, it offers a structured framework that aligns strategic objectives with end-user needs and future contextual scenarios.

In this context, the Strategic Design Roadmap directly contributes to answering the second research sub-question: *'How can a technology-driven B2B manufacturer explore end-users' values?'* It illustrates how a systematic approach to strategic design can enable organisations to effectively navigate the complexities of servitization and develop innovative, user-centred value propositions.

8.2.6 — Interconnected Frameworks of TLN

This section outlines the interconnections between the three frameworks. The *TLN process* offers a structured approach for developing an *overarching servitization* strategy through six sequential steps. In the final stages of the *TLN process*, specifically interventions *5* and *6*, the *Roles & Relationships framework* plays a pivotal role in analysing and discussing the relationships among all actors involved in co-creating *PSS* and *PSE* value propositions.

By employing the *Roles & Relationships framework* at this critical stage, organisations can gain a thorough understanding of stakeholder dynamics, ensuring that each actor's role is clearly defined and aligned with the *overarching servitization* strategy. This analysis supports informed decision-making regarding designing *overarching servitization* strategies. The results from this analysis are subsequently captured within the *Value-Driven Strategic Design Roadmap*, which organises the strategy into actions to be implemented across three horizons. This roadmap ensures that the strategy is not only forward-looking but also systematically aligned with long-term value creation goals, using *back casting* to bridge the immediate, intermediate, and future innovation activities for servitization strategy implementation.

Together, the three frameworks—the *TLN process*, the *Roles & Relationships framework*, and the *Value-Driven Strategic Design Roadmap*—provide B2B manufacturers with a cohesive methodology for designing *overarching servitization* strategies. This integrated approach enables organisations to formulate, evaluate, and implement servitization strategies that are both robust and responsive to the complex dynamics of *PSS* and *PSE* development.

8.3 — Answers to the research questions

This thesis addresses the main research question, **'How can B2B manufacturers design overarching servitization strategies?'** by exploring three interconnected sub-questions through its principal findings.

8.3.1 — Answering the Research Sub Questions

1 — 'What are the enablers and barriers for servitization within a technology-driven B2B manufacturer?'

We addressed the first sub-question by identifying factors that either support or hinder servitization transitions. The study revealed nine key enablers (see *Table 8-1),* including the integration of strategic design methods, interdisciplinary collaboration, and the establishment of a strategic design team. These factors drive innovation by focusing on end-user desirability alongside technical feasibility. Conversely, four key barriers were identified: limited market foresight, a lack of strategic design capabilities, underdeveloped service design processes, and an organisational focus on short-term priorities. These obstacles impede the development and implementation of long-term servitization strategies. Collectively, these findings underscore the critical role of organisational change management in creating the conditions necessary for successful servitization. Effective

change management is essential not only for activating key enablers but also for removing structural and cultural barriers that constrain the servitization transition.

2 — 'How can a technology-driven B2B manufacturer explore end-users' values?'

We addressed the second sub-question by developing the *Overarching Servitization Strategy Design* framework, also referred to as the *TLN process*. This framework includes six strategic design interventions—such as empathising with end-users, envisioning future scenarios, and ideating value propositions—that enable B2B manufacturers to anticipate and respond to evolving end-user needs.

By systematically integrating end-user insights into the innovation process, *TLN* supports the design of future-oriented and user-centric *PSSs* and *PSEs*. As a forward-looking methodology, the *TLN process* ensures that product-service value propositions remain relevant and resilient within dynamic and uncertain business environments.

3 — 'How can a technology-driven B2B manufacturer organise a servitization transition?'

The third sub-question was examined using two key frameworks: the *Roles & Relationships framework* and the *Value-Driven Strategic Design Roadmap*. The *Roles & Relationships framework* transforms traditional linear supply chains by integrating ecosystem thinking, which promotes collaboration among various stakeholders and encourages direct engagement with end-users to co-create value propositions. On the other hand, the *Value-Driven Strategic Design Roadmap* presents a structured approach to aligning short- and long-term objectives across different value perspectives. Together, these frameworks provide practical strategies for embedding *overarching servitization* into organisational processes while nurturing sustainable partnerships.

8.3.2 — Answering the Main Research Question

In conclusion, this research demonstrates that a technology-driven B2B manufacturer can develop effective product-service value propositions for future contexts by adopting an *overarching servitization* perspective. This approach requires the deliberate integration of several interrelated strategies.

First, manufacturers must identify and activate key enablers—such as strategic design capabilities and enhanced market foresight—to align innovation efforts with nascent end-user needs. At the same time, it is essential to address persistent organisational and procedural barriers, including the tendency to prioritise short-term goals, which often impede servitization progress.

Second, the use of structured frameworks plays a critical role in institutionalising the exploration of end-user values. The *TLN process*, combined with the *Value-Driven Strategic Design Roadmap*, provides practical tools for exploring future end-user contexts and embedding *overarching servitization* strategies within organisational innovation processes.

Third, fostering collaborative ecosystems is vital. The *Roles & Relationships framework* supports the reconfiguration of traditional value chains into dynamic networks that facilitate the co-creation of sustainable product-service value propositions among diverse stakeholders, including end-users.

By integrating these strategies, B2B manufacturers can move beyond conventional linear supply chain relations, proactively address future-oriented challenges, and sustain success through a servitization transition. This thesis provides a foundation for navigating the complexities of an *overarching servitization* journey.

8.4 — Discussion

This section explores the significance and contributions of the findings presented in this thesis, positioning them within the context of relevant knowledge domains related to the research questions answered in this thesis. It highlights how the results advance understanding, address gaps in existing research, and offer new insights that contribute to the ongoing discourse in these fields.

8.4.1 Introduction

This research has shed light on the perspective of *overarching servitization*—a perspective not yet addressed in the servitization literature, and which therefore formed the core motivation for this dissertation. Existing studies offered little guidance on how a B2B manufacturer might initiate such a transition, nor how this process could lead to broader organisational transformation. To address this gap, we adopted an action research approach and co-created a series of interventions. These allowed us to identify barriers and enablers in real time and to generate insights through iterative, practice-based learning.

The research revealed how difficult it is for large B2B industrial enterprises to break free from entrenched processes, rigid procedures, and the structural inertia of established organisational cultures. For a B2B manufacturer, embracing a fundamentally different, *designerly* approach to product–service innovation proved particularly challenging—especially as it required stepping outside the familiar boundaries of a technology-driven comfort zone. Transitioning from a company rooted in technological excellence to one that actively orchestrates product–service ecosystems demands more than incremental change; it requires a fundamental transformation in mindset, organisational structure, and innovation practice. This is especially demanding for engineers trained in the rigour of the exact sciences and accustomed to operating within narrow solution spaces, with limited exposure to the open-ended, exploratory logic of design thinking.

Yet this dissertation has shown that such a transition is not only possible, but can be decisive in transforming innovation practices. Through deep organisational immersion, the action research enabled the introduction of structured methods that helped employees meaningfully engage with end-user perspectives—perspectives that had previously been absent from their work. As a result, the focal manufacturer made a significant leap—not only in the quantity and quality of product–service propositions addressing downstream customer and end-user needs, but also in its strategic capability to explore and navigate alternative futures with greater confidence.

The significance of these findings extends beyond the focal case. They point to a broader recommendation: action research offers B2B manufacturers a powerful pathway for embedding end-user perspectives and orchestrating product–service ecosystems as part of their servitization journey.

At the same time, the contribution of this dissertation extends beyond the *TLN frameworks* it introduced. The insights gained lay the foundation for further scholarly action research

in the B2B domain, offering both academia and industry a viable path toward placing end-user value at the heart of servitization. I consider these findings not as a final outcome, but as a stepping stone—evidence that, even in the most established industrial contexts, a transition toward *overarching servitization* is not only conceivable, but achievable.

8.4.2 — Contribution to Servitization Theory

Servitization, the shift from offering solely products to combining products with services, or even providing pure services, has garnered increasing attention in the B2B industry. The findings of this thesis contribute to the academic discourse on designing servitization strategies, providing insights into the novel lens of *overarching servitization* within the B2B industry. As discussed in our literature review, servitization researchers have emphasised the success of B2B companies that have undergone a servitization process. Their studies indicate that these companies have become more resilient and have experienced growth in profitability and revenue streams as a result of the servitization transition. However, our literature review revealed that there is limited research on how to implement and execute a servitization transition process within B2B industrial manufacturing.

Servitization strategies, which focus on integrating products with services to enhance customer value, increasingly recognise the importance of co-creation with customers and addressing their values (Adrodegari, 2021; Bakir et al., 2021; Bluemink et al., 2021). Delivering product-service value propositions through digital platforms combined with outcome-based business models fosters customer loyalty over longer periods (Baines & Lightfoot, 2014; Huikkola et al., 2022; Kowalkowski et al., 2014). Barquet et al. (2013) proposed a framework for employing a business model concept during product-service development. Their study clarified that product-service innovation in manufacturing industries (B2B) impacts the business model. They argued that servitization inherently changes the interaction between manufacturers and customers because services are fundamentally co-created with customers (as opposed to products). Baines and Lightfoot (2014) discuss business models for advanced services, defining an advanced service as 'a capability delivered through product performance and often featuring relationships over an extended lifecycle, extended responsibilities and regular revenue payments.' As Baines et al. (2024) stated: 'advanced services are centred on your customer's success. As a B2B manufacturer, ask yourself, how can we help our customers become more successful?' Story et al. (2017) add that advanced services follow outcome-based business models and involve bundling products and services into complex offerings that are crucial to the customer's core business processes.

Going downstream in the value chain to create loyal customers who generate revenue streams over the product life cycle is already commonplace in the B2C practice (Cruz et al., 2022; Wise & Baumgartner, 1999). Wise and Baumgartner (1999) argue that manufacturing firms adopt servitization strategies to elevate their traditional role as mere suppliers of products that yield one-off value transactions upon sale. This strategy enables them to generate continuous revenue streams by moving downstream in their value chain

and offering services and customer experiences that add value throughout the product life cycle.

A study closely aligned with the *Roles & Relationships framework* is that of Kreye and van Donk (2021), who investigate how B2B manufacturers can more effectively address end-user value by involving partners across the entire supply chain. Their findings demonstrate that engaging multiple actors in collaborative value creation not only enhances information exchange and alignment of service offerings but also builds the trust and coordination required to serve end-users more effectively. In this respect, the study reinforces the central premise of the *Roles & Relationships framework*: that value creation in servitization depends on reconfiguring inter-organisational roles and fostering collaboration across the network.

Baines et al. (2020) introduced a *Servitization Roadmap framework* that outlines servitization processes, the main phases of a servitization transition, and the forces influencing these processes. Their framework is based on 14 servitization case studies within multinational manufacturers. They discovered that manufacturers typically progress through four stages of servitization maturity: *exploration, engagement, expansion,* and *exploitation*. They identified five driving forces of change: *customer pull, technology push, value network positioning, organisational readiness,* and *organisational commitment*.

The *TLN process* and the *Value-Driven Strategic Design Roadmap* resulting from this thesis resonate with Baines et al.'s (2020) *Servitization Roadmap framework*. Their research involved observing and interviewing stakeholders from a wide range of industrial B2B companies. In contrast to our action research approach within a specific industrial B2B manufacturer, they collected valuable data and insights through case studies, surveys, and interviews focused on servitization maturity, significantly enhancing the understanding of servitization processes in large industrial companies.

Recently, Baines et al. (2024) theorised on *servitization strategies* and thoroughly discussed the '*What', 'Why',* and *'How'* questions related to a servitization journey. By analysing industry cases and developing various frameworks, they assist practitioners in understanding and addressing the challenges associated with a servitization transition. Their work explores advanced services enabled by digital platforms, with an emphasis on the transformation towards service-oriented business models as the foundation for new product-service value propositions. This approach contrasts with the frameworks presented in this thesis, which prioritise the end-user as the final link in the B2B2C value chain. In line with recent studies of Kowalkowski et al. (2024), Paiola et al. (2024), Iriarte (2023), and Vandermerwe & Erixon, (2023), this thesis emphasises the creation of overarching end-user value, positioning it as the central focus, with the business model developing organically as a derivative of the resulting product-service value proposition. In doing so, they introduce a novel approach to designing future-oriented servitization strategies.

The cited servitization scholars have laid a robust theoretical foundation for understanding servitization and provided valuable insights and practical guidance for implementing a servitization process in B2B industrial contexts. However, exploring and designing *overarching servitization* strategies, including organisational embedding within the B2B manufacturing industry, have received significantly less attention. In addition to the existing body of knowledge on servitization, this doctoral thesis contributes in three ways.

First, it presents an *overarching servitization* perspective that challenges designers and engineers in the B2B industry to explore and address the behaviours and latent needs of end-users within future contextual scenarios, as explained in *Chapters 5, 6,* and *7*. With the *overarching* perspective, we introduced a novel lens to servitization theory in the B2B industry.

Second, it introduces the *TLN process*, which entails interactive design interventions with multidisciplinary teams to co-create product-service value propositions. We generated empirical evidence by evaluating the application of the *TLN process* in four cases within the innovation practices of a B2B manufacturer of industrial capital goods. These cases involved designing an *overarching servitization* strategy with participants from various departments, uncovering the value of service design methods, fostering cross-departmental collaboration, and securing multi-level buy-in by formulating strategies from the organisation's grassroots. Notably, we did not identify a similar approach to that prescribed by the *TLN process* in the existing literature on servitization strategies in the B2B industry. Therefore, the *TLN process* makes a novel contribution to existing servitization theory.

Furthermore, the *TLN process* offers an innovative approach for technology-focused B2B industries by providing practitioners with guidance on incorporating end-user insights into the product-service innovation process. This approach enhances end-user engagement and improves the effectiveness of sustainable, end-user-focused strategies.

8.4.3 — Contribution to Service Design Theory

Industrial designers traditionally create products that deliver value to users through their usage or consumption. For these products to be used effectively, the interaction between the product and the its user must support a positive user experience. With the advent of the internet and digital platforms, the design field has gradually shifted from designing *tangible products* to *intangible products*, commonly referred to as service design. As services become an integral part of product offerings, industrial designers are now required to focus on designing seamless interactions that enhance the overall user experience. This shift emphasises the importance of understanding user behaviour and the dynamic environmental contexts in which users interact with services. It is not surprising, therefore, that service design as a discipline initially developed in the B2C industry. The transition to service design involves not only a change in the type of output but also in the methodologies and approaches employed by designers. This change was recognised by Delft's Faculty of Industrial Design, which incorporated service design as a regular part of its curriculum (Sleeswijk Visser & Stappers, 2012). Service design requires a deep

integration of user-centred design principles, where empathy and a thorough understanding of user journeys play a crucial role. By addressing these intangible aspects, designers can create holistic solutions that provide greater value and satisfaction to users.

How different this is in the B2B industry, where manufacturers are not directly linked to end-users. Instead, their customers typically act as intermediaries between the B2B manufacturer and the end-user, resulting in the manufacturer having no direct relationship with the latter. This doctoral thesis identifies several factors explaining why service design has not yet gained traction in the B2B manufacturing industry. First, the complexity and specificity of high-tech industrial capital goods necessitate a focus on technical performance and reliability rather than user-centred service design. B2B manufacturers are accustomed to working with technical specifications and functional requirements from their B2B customers rather than concentrating on the needs and experiences of end-users. Second, there is a strong emphasis on technology development, with the primary goal being the successful commissioning of high-quality, reliable industrial capital goods. Transitioning to a service-oriented innovation mindset requires significant changes in business models, organisational structure, innovation culture, and processes. These changes present barriers to adopting *overarching servitization* strategies. Additionally, mastering service design capabilities – more prevalent in B2C contexts – poses a further challenge for tech-oriented innovation teams. Lastly, because B2B manufacturers do not have direct contact with end-users, they lack insights into end-user behaviour, needs, and preferences. This gap makes it difficult for the innovation department to design for end-users, as it must rely on feedback from intermediaries who may not fully represent the end-user's perspective. While service design research primarily focuses on the B2C context, there have been valuable contributions to its application in the B2B industry recently that align with the results articulated in this thesis.

The study by Magistretti et al. (2025) demonstrates that the early application of service design and design thinking techniques, combined with rapid iterations and experimentation in the development of digital technologies as enablers of product–service value propositions, enhances both effectiveness and efficiency. Costa et al. (2018) introduced service design to the industry as a method for creating *PSSs*, while Lievens et al. (2021) investigated ways to involve stakeholders in the four phases of product-service innovation: *discovery, ideation, experimentation,* and *implementation*. Vink et al. (2020) describe service design as a valuable strategy for fostering service innovation strategies among collaborating organisations within a network. Moreover, recent literature increasingly emphasises data-driven approaches to the design and governance of data-driven *PSSs* (Dijck, 2021; Paliyenko et al., 2025) and highlights service design methodologies focused on developing digital service propositions (Iriarte et al., 2023). They emphasise its potential to drive co-creation and strategic alignment among collaborative partners. However, they also highlight the significant implementation challenges associated with product-service value propositions that involve multiple interdependent actors, particularly in navigating competing priorities and ensuring equitable value distribution in proportion to their contribution. Their research provides

important insights into the principles of *service ecosystem design*, underscoring the need to connect actors within a sustainable and collaborative network. This approach aims to achieve balanced value creation while fostering resilience and adaptability in complex systems. The *TLN process* and the *Roles & Relationships framework* align closely with these perspectives by addressing the practical challenges of embedding collective service innovation processes across different organisations. They offer actionable methods to enable diverse actors to co-create value in a structured manner. Furthermore, the frameworks build upon Vink et al.'s (2020) call for advancing practical, embedded service innovation processes by providing methods that integrate end-user insights and foster a shared future vision for sustainable innovation within service ecosystems.

To address the shortcomings in the B2B manufacturing industry, the *TLN process* contributes to the theory and practice of applying service design in B2B contexts. By utilising the *TLN process*, service design methods, knowledge, and skills can be effectively transferred and embedded within the organisation, facilitating a transition toward more end-user-centred and service-oriented innovation strategies.

The *Roles & Relationships framework*, utilised in the *TLN process*, makes several contributions to service design theory. First, it builds on the foundational work of Sampson (2000), Sampson & Froehle (2006), and Adner (2017), who explored service theory in relation to customer-supplier duality and bidirectional value exchange within supply chains. Second, it provides a more detailed lens on actor roles and interrelations than Tukker's (2004) framework, which primarily classifies eight *PSSs*. Third, the framework aligns with the classification proposed by Aarikka-Stenroos and Jaakkola (2012), who view a *PSS* as a co-created outcome within a linear value chain. Beyond theoretical alignment, the framework also serves practical purposes: it supports service innovation teams— across both B2B and B2C contexts—in analysing and understanding the configuration of value networks in both *PSSs* and *PSEs.* Finally, the *Roles & Relationships framework* complements Osterwalder et al.'s (2011) *Business Model Canvas* by enabling a more nuanced mapping of value exchanges between actors, particularly within complex, multi-actor *PSEs.*

8.4.4 — Contribution to Strategic Design and Design Roadmapping Theory

The end-user *Value-Driven Strategic Design Roadmap* connected to the *TLN process* contributes to the body of knowledge in strategic design and enhances the roadmap frameworks established by Dissel et al. (2009), Phaal et al. (2008), Phaal & Muller (2009), and Simonse (2018). The layers of *Value Context, Value Exchange,* and *Value Creation Perspective* visualise the activities necessary to develop value propositions based on the servitization strategy chosen by the B2B manufacturer throughout the product-service innovation process. This doctoral research introduces these three value perspective layers to existing frameworks, transforming the strategic roadmap into an end-user value-driven tool for conceptualising, visualising, communicating, and evaluating a servitization strategy that meets the future needs of customers and end-users: the end-user *Value-Driven Strategic Design Roadmap*. Unlike technology-driven roadmaps, we argue that it is

ultimately the B2B customer and end-user who determine whether value is delivered back upstream into the value delivery network. This strategic roadmap serves as a decision-making tool, enabling informed choices. Similar to a motorist's roadmap, it is a valuable resource for monitoring, evaluating, and potentially exploring alternative strategic routes when contextual conditions or unforeseen circumstances necessitate a change in direction.

By developing the strategic roadmap from the end-customer perspective, this doctoral thesis makes a novel contribution to strategic design and roadmapping theory, specifically for application in the B2B manufacturing industry. It encourages B2B manufacturers to engage in cross-departmental discussions about the *what*, *why*, and *how* of their future business aspirations and to reach consensus on the product-service value propositions to be developed. In relation to the end-user *Value-Driven Strategic Design Roadmap*, the *Roles & Relationships framework* prompts manufacturers to consider and define their role in product-service (eco)system innovation, fostering discussions about forming alliances with strategic partners and understanding relationships with competitors.

By connecting the *TLN process* to the *End-User Value-Driven Strategic Design Roadmap* as a means of discussing and communicating *overarching servitization* strategies, this roadmap serves as a structured guide for implementing servitization strategies. It ensures alignment and coherence in strategic objectives and initiatives across various departments and business units of an industrial B2B manufacturer. Additionally, it facilitates a shared understanding of how end-user values in potential future contexts can be explored, clarifying the rationale for the intended product-service value propositions.

In line with the *TLN process*, an interesting study by Comi and Whyte (2018) examines the role of visual artefacts in *'future making'*, whereby sketches, models, concept cars, and short films are employed to envision potential futures and to chart a strategic course. Through the use of such artefacts, practitioners are able to make sense of end-user lifeworld scenarios that do not yet exist but may eventually emerge in some form. The study demonstrates how visualisation methods can support practitioners in orienting themselves towards the future and in developing actionable strategies.

Recent studies in the field of strategic design support the findings of this thesis. Bouman & Simonse (2023) reveal the importance of involving end-users in service innovation practices within a multi-stakeholder environment. They present a *service engagement loop* framework for exploring and addressing unmet user needs and values. Simonse et al. (2023) reveal the abilities and role of communities in developing a shared future vision and foresight. Both studies align with the *TLN process*, which empowers cross-departmental communities within a company to collaborate in exploring unmet end-user needs and values in future contexts. By bringing together employees from diverse disciplines, the *TLN process* fosters a holistic approach to understanding and addressing the evolving needs, values, and expectations of end-users.

The *TLN process* addresses *Organisational Transformation* in two ways. First, it demonstrates how to formulate a strategy from the bottom up within the organisation. By applying action research and implementing of organisational design interventions, we initiated an innovation change process that actively involves employees from operational departments. B2B manufacturers are often characterised by hierarchical structures that reflects the architecture of their products. This alignment between organisational structure and product architecture enables efficient management of complex systems, where different departments or dedicated teams are responsible for specific functional product modules. This structure is typically marked by top-down management directives, a focus on short-term objectives, and the pursuit of efficient business processes. However, this hierarchical structure can also present challenges, especially when transitioning to end-user-driven servitization strategies. It may inhibit cross-functional collaboration and slow the adaptation of existing innovation processes, as the flow of information and decision-making often remains siloed within departments.

In contrast, the *TLN process* operates on the principle that the valuable knowledge resides at the grassroots level of the organisation, particularly with employees closest to customers and end-users. In line with a recent study of Burke (2023), who emphasises the role of leadership guiding a cultural change, *TLN process* is designed to leverage the insights, expertise, and skills of those directly engaged in operational customer interactions. It provides a clear structure for management to initiate, guide, and embed a service innovation change process within the organisation. By fostering collaboration across departments and empowering front-line employees to engage in product-service innovation, the *TLN process* helps create a more responsive organisation that is customer- and end-user-driven, better equipped to meet the evolving demands and values of end-users in future contexts.

Second, B2B manufacturers face a complex, and rapidly changing environment where they risk being outperformed by new entrants who are reshaping the rules of business. Their hierarchical organisational structures are designed for operational efficiency, emphasising stability and the elimination of threat. However, these structures are not well equipped to handle unprecedented events and unexpected shifts in the external world. The disruptive impact of the COVID-19 pandemic has highlighted the consequences for companies lacking alternative strategic scenarios. Kotter et al (2021) describe this situation in their research: '*There is a growing gap between the state, amount, and complexity of change outside the organization and the ability of the hardwired enterprise and our human capacity to keep up. This gap presents both a danger and an opportunity as Organisations work to agilely adjust, adapt, and get ahead of these contextual realities.*'

If companies prepare for inevitable changes in the external environment, they may be able to close this gap. Developing alternative strategic scenarios enables them to quickly anticipate shifts in their current and future business contexts. This process fosters the development of individual, team, and organisational capabilities to address contextual

business challenges and accelerate organisational change to enhance stakeholder value in the value network. In this regard, the *TLN process* has similarities with the recent work of Kotter et al. (2021), Kohtamäki et al. (2021), and Graça (2021), which strongly advocate for creating stakeholder value and advise B2B manufacturers to prepare for different strategic scenarios that address future uncertainties.

Finally, the *TLN process* was developed and refined through action research, following the methodological approach outlined by Coghlan (2019). This approach offers a practical means of both examining operational processes and facilitating meaningful organisational change. The dual function of the *TLN process*—supporting both analytical reflection and the initiation of new actions—embodies the iterative cycle of inquiry and implementation that is central to action research practice.

Furthermore, this approach aligns with Kurt Lewin's well-known assertion, '*If you really want to understand something, try to change it.*' It reinforces the idea that transformative action serves not only as a vehicle for change but also as a powerful lens through which for gaining deeper insight into complex organisational dynamics and human behaviour.

Together, the *TLN process* and the *Roles & Relationship framework* enable B2B manufacturers to drive product–service innovation around future end-user contexts while fostering organisational transformation, positioning them as structural enablers of the transition towards *overarching servitization*.

8.4.6 — Contribution to Ecosystem Innovation Theory

PSEs, unlike *PSSs*, are a relatively under-researched concept in the academic literature. Porter (1980), with his five competitive forces model, contributed to ecosystem theory by providing a framework to analyse the competitive forces among cooperating companies and their competitors within a value network, aiming to develop a competitive strategy. The goal of this competitive analysis is to identify a strategic position for the company within its business domain, utilising the five fundamental competitive forces: the threat of new entrants, the bargaining power of buyers, the rivalry among existing competitors, the threat of substitutes, and the bargaining power of suppliers. It is then the company's responsibility to determine its strategic position. This may involve adopting a defensive stance, seeking cooperation with strategic partners such as key suppliers, knowledge institutions, and even competitors, or taking an offensive position where the B2B manufacturer act as orchestrator, engineering and maintaining an ecosystem that enables each participant within the *PSE* to extract value.

In recent work, numerous scholars in the field of servitization have shed light on the concept of service innovation ecosystems in the context of servitization strategies of the *Roles & Relationship framework* (Adner, 2006, 2017; Adner et al., 2013; Adner & Euchner, 2014; Adner & Kapoor, 2010; Cenamor & Frishammar, 2021; Gawer & Cusumano, 2014; Story et al., 2017). However, we would like to highlight the work of the following researchers, as it is both relevant to and aligned with the principal findings of this thesis.

Jacobides et al. (2018) made significant contributions to ecosystem theory by investigating the conditions under which service ecosystems take shape and the factors that drive their development. They proposed a research agenda focused on key aspects of ecosystem dynamics, including governance and regulation, collaboration and coordination, and mechanisms of value creation and distribution among participants. Their work emphasises the importance of understanding how ecosystems are structured and sustained over time, as well as the roles and interdependencies of various actors within these systems. The *Roles & Relationships framework* aligns closely with this agenda by addressing the practical dimensions of ecosystem dynamics. It provides a structured approach to analysing and designing the roles, responsibilities, and interactions of actors within service ecosystems. By doing so, it supports the exploration of governance mechanisms and collaborative strategies that facilitate equitable value co-creation. Furthermore, the framework advances Jacobides et al.'s (2018) agenda by offering actionable insights into the coordination and integration of diverse ecosystem actors, ensuring that ecosystems remain adaptive and resilient in response to changing contexts and future scenarios.

West et al. (in Kohtamäki et al., 2018, page 363) established a theoretical foundation for *PSEs*. Their approach is based on a six-step framework designed to understand service ecosystems and drive the innovation of new services. The framework aids in identifying the capabilities of actors within the ecosystem and uncovering ways to integrate digital services into existing value propositions, thereby enhancing value for the end-user. It encourages manufacturers to uncover latent end-user needs, identify gaps in the portfolio of value propositions, and conceptualise disruptive innovations. Moreover, the framework serves as a tool to unravel the complex web of value transactions that underpin the overall process of value creation within the ecosystem.

Graça (2021) investigates the impact of collaborative B2B partnerships on value creation. The findings suggest that a service strategy offering both functional and social benefits to participating partners facilitates greater information exchange and mutual collaboration, which in turn strengthens trust and satisfaction within the collaborative ecosystem. Although some differences were observed in the process of commitment building, the study provides evidence that complementary service capabilities play a critical role in fostering long-term, sustainable B2B partnerships within value networks.

Through their framework, Graça (2021) and West et al. (in Kohtamäki et al., 2018, page 363) reinforce the principles underlying the *TLN process* and the *Roles & Relationships framework*, highlighting their shared emphasis on facilitating service innovation processes and fostering collaboration within service ecosystems.

As discussed in *Section 8.4.3 — Contribution to Service Design*, Vink et al. (2020) examine the relationship between service innovation and the creation of service ecosystems. They call for practical methods and frameworks to be embedded across network partners to support the design and governance of these service ecosystems. Adner (2017) conceptualises service co-creation within a collaborative network as an ecosystem—a structure in which multiple actors engage in bidirectional value exchange and collectively

work towards maintaining value equilibrium. He defines an ecosystem as *'a configuration of activities defined by a value proposition,'* thereby emphasising the interdependence among actors in the joint creation and delivery of value.

The foundational idea of a *business ecosystem* was introduced earlier by Moore (1996), who framed it as a collaborative strategy that encourages firms to look beyond the boundaries of their own capabilities and systems. Drawing an analogy with natural ecosystems, Moore emphasised the importance of dynamic equilibrium and mutual adaptation among interdependent stakeholders. He defined it as *'an economic community supported by a foundation of interacting organisations and individuals – the organisms of the business world. This economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they co-evolve their capabilities and roles and tend to align themselves with the direction set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions, align their investments, and find mutually supportive roles.'* Moore's (1996) ecosystem definition suggests that when an *orchestrator* interacts with a collaborative partner*,* both parties independently contribute complementary value through their skills, resources, or knowledge.

Chen (2023) argues that an innovation ecosystem consists of multiple actors whose interdependent goal is to jointly create value. These actors complement each other with their respective competencies and capabilities. He stresses the importance of research related to innovation ecosystems in enhancing innovation practices, as the innovation ecosystem is central to improving the innovation capabilities of organisations. An innovation ecosystem is established to generate value for the participating actors through collaborative innovation. The success of an organisation hinges on its ability to create value in collaboration with actors that provide complementary products or services within the ecosystem. An innovation ecosystem guides the organisation's innovation activities, serves as a foundation for service innovation strategy, facilitates the allocation of engineering resources and assets, and aids in assessing associated risks. It prompts discussions and considerations regarding the role the company wishes to play within the innovation ecosystem. Chen's perspective on the evolution of *PSEs* highlights the value of the *Roles & Relationship framework* in discussing the organisation's role within an innovation ecosystem.

Jonas et al. (2018) identify various drivers of actor engagement in the co-creation of ecosystems within a B2B context. Empirical data from related engagement studies reveal that stakeholder involvement in an innovation ecosystem is strongly influenced by eight key factors: friendship, shared experiences, trust, a common goal, resource dependency, hierarchical level, institutional agreements, and local proximity. The article contributes to knowledge on the dynamics of stakeholder engagement, particularly from the perspective of time and the hierarchical relationships between actors. The *Roles & Relationships framework* aligns with the findings of Jonas et al. (2018) as it identifies and facilitates

discussions around the individual drivers of various actors within the ecosystem. By doing so, it enables a deeper understanding of the motivations and behaviours that influence ecosystem dynamics. Furthermore, the framework can play a pivotal role in monitoring stakeholder engagement within an innovation ecosystem over time, providing a structured approach to assess changes in involvement and collaboration. This makes it a valuable tool for fostering sustainable partnerships within the innovation ecosystem.

Plugge & Nikou (2024) provide a global business perspective on ecosystems, particularly focusing on the orchestration of digital global business services (GBSs) within complex enterprise ecosystems. They define an enterprise ecosystem as: *'A socio-technical environment in which individuals within organisational units, supported by digital interactions, collaborate in co-creating, implementing, and orchestrating GBSs to create business value.'* This definition emphasises the dynamic and interconnected nature of enterprise ecosystems, where both technological and human elements converge to drive organisational goals. A key contribution of Plugge & Nikou's work is their focus on how digital service ecosystems enable collaboration across organisational boundaries. These interactions facilitate the integration of diverse expertise, resources, capabilities, and processes, thereby fostering service innovation and enhancing the delivery of global business services. By aligning technical infrastructures with social dynamics, enterprise ecosystems not only optimise internal operations but also respond more effectively to external market demands. In this context, the *Roles & Relationships framework* becomes an essential tool for navigating complex enterprise digital ecosystems. This framework aids business service developers in disentangling and understanding the complex interplay of stakeholders, roles, and responsibilities within the ecosystem. By providing a structured approach, it enables organisations to identify key actors, define their roles, and establish effective mechanisms for collaboration and value exchange.

Furthermore, the *Roles & Relationships framework* facilitates the orchestration of global business services by providing a lens through which organisations can visualise and manage the interdependencies between different organisational units, businesses, and digital platforms. This structured understanding supports the seamless integration of business functions, enhances scalability, and fosters organisational transformation to adapt to shifting global business environments.

Expanding on Plugge and Nikou's work, the application of such frameworks is critical for organisations aiming to remain competitive in an increasingly digitalised and interconnected world. As enterprise ecosystems grow in complexity, tools like the *Roles & Relationships framework* not only support operational clarity but also empower strategic decision-making, ultimately enabling organisations to enhance value within the entire business ecosystem.

In the *TLN process* and *Roles & Relationships frameworks*, we define a *PSS* as a value proposition that a B2B manufacturer delivers independently, leveraging its own capabilities and expertise within its organisational boundaries, without relying on external partners. Conversely, a *PSE* is a value proposition co-created in close collaboration with

partners possessing complementary skills and knowledge. Both frameworks align with the significant contributions of the aforementioned scholars.

Our frameworks represent a novel contribution to ecosystem service innovation theory by emphasising the importance of exploring future business contextual scenarios, with a particular focus on the evolving needs and behaviours of end-users. This forward-looking approach contrasts with existing research and ecosystem frameworks, which predominantly centre on the current business and stakeholder context as the foundation for product-service innovation.

The *Roles & Relationships framework* as an outcome of the *TLN process* examines the formation and dynamics of system boundary-crossing collaboration clusters. These clusters bring together B2B manufacturers, suppliers, partners, and institutions with specialised knowledge to collectively orchestrate, govern, and sustain innovation ecosystems. By addressing the complexities of coordinating diverse actors and integrating their unique capabilities, both frameworks provide valuable insights into the mechanisms that enable successful ecosystem innovation.

In addition to advancing theoretical understanding, the frameworks contribute to the practical application of innovation ecosystem theory (Möller et al., 2020; Plugge & Nikou, 2024; Russell & Smorodinskaya, 2018). They offer structured methodologies for fostering collaboration, ensuring goal alignment, and maintaining the adaptability and resilience of ecosystems. By prioritising multi-actor engagement and shared value creation, the frameworks equip practitioners with actionable strategies to effectively harness ecosystem dynamics, drive novel product-service innovation strategies, and create organisational resilience to prepare for uncertain future scenarios and contexts.

The *Roles & Relationships framework,* along with the *TLN process*, provides a lens to explore collaborative clusters that transcend traditional system boundaries. These clusters unite B2B manufacturers, suppliers, partners, and knowledge institutions to jointly orchestrate, govern, and sustain innovation ecosystems. By encouraging organisations to reframe their position within broader value networks, both frameworks contribute to the strategic organisation of product-service innovation in complex environments.

First, the *Roles & Relationships framework* prompts a re-evaluation of traditional linear relationships among ecosystem actors. In conventional value chains, B2B manufacturers typically assume the role of orchestrator in collaboration with direct customers, often without any direct engagement with end-users. The framework challenges this model by introducing the concept of complex, multi-actor ecosystems. It provides a strategic foundation for design interventions that actively engage orchestrators, customers, collaborative partners, and end-users in co-creating value. This reconsideration of roles and relationships is essential for structuring and designing *PSEs.*

Second, the *Roles & Relationships framework* promotes ecosystem thinking as a basis for product-service innovation. It highlights that the development of *PSSs* and *PSEs* relies on continuous interactions and mutual dependencies within a shared value network, rather than occurring in isolation. These collaborative relationships enable the development of

value propositions that exceed the capacity of any single actor. Grounded in the perspectives of Moore (1996) and Adner (2017), the framework encourages B2B manufacturers to build strategic design approaches around broader partnerships—an increasingly vital aspect of contemporary innovation practices.

Third, the *Roles & Relationships framework* places the end-user at the centre of the product-service innovation process. It supports a shift from linear to triangular relationships, where manufacturers engage not only with immediate customers but also directly involve end-users. This user-centric approach ensures that product-service value propositions are informed by insights from all relevant stakeholders. By integrating end-user perspectives early in the design process, organisations can better align their innovation activities with future needs and expectations.

Finally, the *Roles & Relationships framework* offers practical guidance for flexibly reconfiguring roles within PSEs and thereby initiating pathways for organisational transformation. By accommodating both linear and triangular relationship structures, it enables B2B manufacturers to adapt their design processes to increasingly complex value networks. Such adaptability is essential for systematically organising product–service innovation projects in environments where collaboration, agility, and strategic alignment are critical to success. In this way, the framework not only supports product–service innovation but also drives broader organisational transformation, serving as a structural enabler of the transition towards overarching servitization.

Together, these dimensions establish a conceptual and practical foundation for rethinking how B2B manufacturers position themselves within evolving ecosystems. In doing so, they enable the embedding of servitization strategies that are both resilient in the face of disruption and oriented towards long-term future value creation.

8.5 — Limitations and Future Research

This *Chapter* highlights the limitations of the action research methodology used. We discuss the implications for design and development engineers, management, and educators. We conclude with avenues for further research.

8.5.1 — Limitations

This doctoral research was conducted through four *ARCs* following Coghlan's (2019) methodology. This approach addresses organisational challenges by implementing interventions within an operational environment. Our method involved embedding the principal researcher in the organisation for three years to conduct four *ARCs*, which included a series of design interventions with participants from various departments. This enabled us to collect data and gain in-depth insights to answer our research questions. Throughout the research, we shared insights and outcomes with the participants, allowing them to benefit directly and acquire new knowledge and skills. Each *ARC* aims to initiate systemic change by improving existing business processes and established practices. Given the nature of intervening in an existing organisation, each successive *ARC* necessitates

thorough preparation, particularly emphasising planning, implementation, and reflection on intermediate results—characteristic components of *ARCs*.

The research questions guiding this doctoral study were designed to generate a deep understanding of the corporate culture and operational innovation processes of the focal B2B manufacturer. As our interventions directly impacted the organisation and operational processes in the involved departments, we secured the necessary buy-in, allowing us to implement our interventions, initiate the intended changes, and learn through practical application. Although the research findings are based on four in-depth case studies within a B2B manufacturer of industrial capital goods, this specific setting is a primary limitation of our study, as the results cannot be immediately generalised. Consequently, our study holds validity in this specific context. Further research is needed to determine its applicability in other business contexts.

A second limitation of action research is the subjectivity of the researchers, who designed, implemented, observed the cases, and subsequently analysed and interpreted the data. This subjectivity can lead to a tendency to collect data that aligns with desired outcomes, existing beliefs, or personal agendas. Additionally, the principal researcher's prior experience in product-service innovation and strategy in other business domains may have influenced the research results. Moreover, in selecting and composing the participant teams for *TLN*, we may have primarily chosen individuals who were already open to change.

A third limitation lies in the time factor. Our research was structured as a longitudinal study, with four major *ARCs* succeeding one another, each further subdivided into several smaller *ARCs*. These cycles took place over a defined period from April 2019 to January 2023. Each *ARC* can be regarded as a snapshot of a process that occurs and is valid within a specific context and time frame. The dynamic nature of a constantly changing organisation and external environment was beyond our control. Unlike a stable laboratory setting, we could not maintain a controlled environment throughout the study. During our research, several departments underwent reorganisation, operational processes changed, new people joined the company, and participants in our study either changed roles or left the organisation. Additionally, the impact of the COVID-19 pandemic on our research must be considered. These organisational and external dynamics may have influenced our research findings. However, *ARCs* are iterative and adaptive, allowing interventions to be adjusted as new insights or circumstances arise. This flexibility enables an response to changing conditions. Given these dynamics, using *ARCs* as a methodology was advantageous, allowing us to tailor each *ARC* to the prevailing environmental factors.

8.5.2 — Avenues for further Research

This doctoral research was conducted within the specific context of a B2B manufacturer specialising in industrial capital goods. While the study included an in-depth analysis of four case studies, these alone do not warrant broad generalisability. Nevertheless, the insights derived from the *TLN process*, the *Roles & Relationships framework*, and the *Value-Driven Strategic Design Roadmap* represent significant contributions to the

academic discourse on *overarching servitization* and the design of product-service (eco)systems.

Moreover, this research establishes a foundation for follow-up studies in other business domains, which are critical for assessing the replicability of these findings. Future studies could adopt *overarching servitization* as a central research design criterion, ensuring sustained emphasis on value creation for both direct customers and end-users (the customer's customer). This approach would enable a broader exploration of the frameworks' applicability and scalability.

The *TLN process*, *Value-Driven Strategic Design Roadmap*, *and Roles & Relationships frameworks* demonstrate potential for application across diverse sectors. These include industrial enterprises, non-profit organisations, government services, non-governmental organisations, and the healthcare industry. Such cross-sectoral studies would provide valuable insights into how these frameworks can be adapted to varying organisational structures, operational models, and end-user needs, further enriching the academic and practical understanding of servitization journeys.

By expanding the scope of research, these frameworks may not only validate their utility but also reveal sector-specific nuances that can inform their refinement. This could enhance their relevance and effectiveness in facilitating servitization transitions, fostering sustainable value creation across a variety of organisational contexts.

8.6 — Practical Implications

8.6.1 — Implications for Engineers and Designers

The findings from this doctoral research have significant implications for engineers and designers, particularly in the context of B2B manufacturing of industrial capital goods. The study introduces the *TLN process*, the *Roles & Relationships framework*, and the *Value-Driven Strategic Design Roadmap* as critical tools for understanding and implementing *overarching servitization* in *PSSs* and *PSEs* innovation processes. These frameworks encourage engineers and designers to look beyond technical products and their associated technologies, considering the broader servitization ecosystem in which their designs will operate.

For engineers, the research highlights the importance of integrating *overarching servitization* principles into the product-service innovation process. Traditional engineering approaches often focus on optimising a product's technical performance, but the shift toward *PSSs* and *PSEs* requires a more holistic approach. The three frameworks challenge engineers and designers to develop product-services that create value not only for the customer but also for the customer's customer—the end-user. This necessitates a thorough understanding of the interconnected roles and relationships among actors within a *PSE*, as well as the ability to design systems that are flexible and adaptable to the changing needs and behaviours of end-users. The frameworks equip engineers with the necessary knowledge and skills to achieve this.

Strategic designers, on the other hand, are encouraged to reimagine and visualise the end-user experience within future contextual scenarios. The *Value-Driven Strategic Design Roadmap*, for instance, prompts them to focus on the entire customer journey of the product-service offering, from initial design to end-of-use. More importantly, the process of developing the *Value-Driven Strategic Design Roadmap* itself significantly enhances the understanding of product-service value propositions within an organisation. It facilitates mutual understanding and collaboration among different departments, breaking down silos and ensuring that all stakeholders are aligned in their servitization strategies and objectives. This approach necessitates a shift from designing discrete products for the short term to creating integrated product-service solutions that deliver sustained value from a future perspective over a three-horizon timeline. The frameworks encourage strategic designers to collaborate closely with other stakeholders in the ecosystem, including engineers, customers, and strategic partners, to ensure that their designs align with *overarching servitization* principles.

In conclusion, the three frameworks illustrate the potential for a more integrated and collaborative approach in engineering and design practices across different departments and external partners to create end-user-focused product-service value propositions. Essentially, the frameworks empower designers and engineers to assume a more strategic role within the organisation. By engaging in the 'making-of' the *Value-Driven Strategic Design Roadmap*, they contribute not only to the design of the product-service but also to the broader strategic decision-making process within the company. By adopting the frameworks introduced in this study, engineers and designers can better navigate the complexities of *overarching servitization* and contribute to the development of more effective and sustainable *PSSs* and *PSEs* across various sectors.

8.6.2 — Managerial Implications

The findings of this doctoral research, conducted within a B2B manufacturer of industrial capital goods, carry important implications for managers across sectors who aim to place greater emphasis on addressing end-user value through collaborative value networks. Although the empirical setting of this study is specific, the developed frameworks—namely the *TLN process framework*, *the Roles & Relationships framework*, and the *Value-Driven Strategic Design Roadmap framework*—offer transferable methods and tools that extend beyond the immediate context. Together, these frameworks provide a structured means of understanding and implementing *overarching servitization* strategies, with particular emphasis on the design, implementation, and utilisation of PSSs and PSEs.

Adopting these frameworks can help managers better understand value creation for customers and end-users. By focusing on both groups, managers can align their servitization strategies with a broader value supply network and collaborative strategic partners. This approach enhances the organisation's ability to meet current business opportunities while positioning it to uncover, anticipate, and address end-user needs and behaviours in future contexts.

The *TLN process*, in particular, encourages managers to think beyond traditional product-centric models and consider the broader value network ecosystem in which their products and connected services operate. This shift in perspective may help organisations innovate and remain competitive in increasingly complex and interconnected markets. The *TLN process* aligns with the Rhineland organisational model, where knowledge is developed from the operational level upwards to support informed strategic decision-making by management. Implementing this process requires leadership to integrate it alongside or in place of existing innovation processes within organisations rooted in the Anglo-American organisational model.

Furthermore, the *Value-Driven Strategic Design Roadmap* serves as a practical tool for managers to make informed decisions and evaluate potential strategic scenarios. It enables the identification of alternative pathways that can be pursued in response to changing environmental conditions or unforeseen challenges, thereby maintaining resilience in a complex and dynamic business environment.

Finally, the *Roles & Relationships framework* underscores the importance of strategic partnerships and alliances. Managers are encouraged to critically assess their organisation's role within the broader ecosystem and to establish relationships that complement their core competencies. This collaborative approach drives product-service innovation to achieve sustainable growth in a rapidly evolving and competitive business landscape.

By integrating these frameworks into their strategic planning processes, managers across diverse sectors can enhance their organisation's capacity for product-service innovation, resilience, and long-term value creation.

8.6.3 — Implications for Educators

The findings from this doctoral research offer valuable insights for educators involved in teaching design strategy, innovation, and *overarching servitization*, particularly within B2B contexts. The study, conducted within a B2B manufacturer of industrial capital goods, highlights the importance of applying frameworks like the *TLN process*, the *Roles & Relationships framework*, and the *Value-Driven Strategic Design Roadmap* to understand and design *overarching servitization* strategies, as well as *PSSs* and *PSEs*. These frameworks can be integrated into educational curricula to provide students with a thorough understanding of how value creation can be enhanced across various sectors.

Educators could consider incorporating these frameworks into courses focused on strategic design, product-service design, and orchestrating *PSS* and *PSE* innovation processes. The *TLN process*, for instance, can be used to teach students how to analyse, structure, design, and orchestrate complex *PSSs* and *PSEs*, ensuring they grasp the intricacies of value creation not just for the direct customer, but also for the customer's customer. The *Roles & Relationships framework* offers a structured approach to analysing stakeholder dynamics in servitization initiatives. It facilitates the disentanglement of complex *PSEs* and supports students in critically evaluating and articulating the roles of orchestrator, collaborative partner, supplier, or integrator within a given *PSE*. By fostering

a deeper understanding of stakeholder interactions, the framework equips students with the analytical skills necessary for careers in industries where cross-functional collaboration and strategic partnerships are fundamental.

Given the non-generalisability of this research, educators should encourage students to critically assess the applicability of these frameworks in different or specific contexts. This can be achieved by formulating graduation projects for various sectors, including industrial companies, non-profit organisations, government services, and healthcare, and asking students to critically evaluate the frameworks' effectiveness in each context. This approach will help students develop the ability to adapt theoretical knowledge to real-world challenges, which is an essential skill in today's dynamic environment.

Lastly, this doctoral study underscores the need for further research to verify the replicability of the findings across different sectors. Educators could motivate students to engage in research projects that explore the application of these frameworks in diverse settings, thereby contributing to the ongoing academic discussion on servitization strategies and orchestrating product-service ecosystems. This not only enhances the students' research capabilities but also fosters a deeper understanding of how to drive value creation for end-users across various industries.

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List of Publications

Conference Articles

Bluemink, B., Santema, S., & Simonse, L. (2024), <u>Are you being served?</u> *In P. Ulkuniemi (Ed.), IMP Conference Proceedings; IMP 2024Conference, Oulu*

Bluemink, B., Simonse, L., & Santema, S. (2024), <u>*Overarching Service Innovation: Redefining OEM-Service Provider - Customer Interactions.*</u> [8] *In A. Z. Bigdeli, T. Baines, & H. Akkermans (Eds.), Digital Service Innovation: Redefining Provider-Customer Interactions* (pp. 170–180); *Spring Servitzation Conference 2024, Tilburg*

Bluemink, B., Simonse, L., & Santema, S. (2023), <u>Ask the end user: The effect of overarching servitization on the OEM innovation organisation.</u> *IMP 2023 Conference Manchester*.

Bluemink B, Simonse L, & Santema S. (2023), <u>*Designing and Implementing Overarching Servitization Strategies in B2B Manufacturing Industry*</u>. *The Role of Servitization in Grand Challenges*, 178–184; *Spring Servitzation Conference 2023, Helsinki*

Bluemink, B., Simonse, L., Santema, S., & Lenior, O. (2021), <u>*Designing Overarching Servitization Strategies in B2B Manufacturing Industry*</u>. *Conference Proceedings Spring Servitization Conference 2021, Linköping*.

Bluemink, B., Simonse, L., Santema, S., & Lenior, O. (2020), <u>*Overarching Servitization processes in industrial manufacturing–a scoping review.*</u> *Conference Proceedings SERVDES 2020*; *SERVDES 2020, Melbourn*

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the conference dinners inevitably ended in loud singing of songs from the home countries of the participants, where enthusiasm usually outweighed musical talent.

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Albert Plugge – your *Digital Ecosystems* course introduced me to the world of digital platforms, where multiple actors engage in strategic collaboration to create customer value that none of them could achieve individually, but can realise together. These insights significantly deepened my understanding of the strategic value of long-term collaborative partnerships, particularly as they take shape in product–service ecosystems. I am especially grateful for how you managed to make such a complex topic both accessible and engaging – proving that even ecosystems full of competing actors can be explained with clarity (and a good sense of humour).

Christine De Lille – I look back with great pleasure on our joint supervision of graduation student Luc. Through that collaboration, I came to know you as someone with a sharp eye for organisational challenges and networked collaboration. Your enthusiasm at the time encouraged me to embark on my PhD journey – thank you for that. Looking back, I realise that without those discussions (and the occasional lively debate about what Luc really meant in his thesis drafts), I might never have taken the step towards a PhD myself.

Frido Smulders – first and foremost, you are a wonderful colleague to work with, but above all you have been a valuable sounding board with a wealth of experience – someone I could always turn to when facing challenges. Your creative perspective on organisational issues helped me move forward on more than one occasion, and for that I am truly grateful. I also want to thank you for reading through my draft chapters and for the thoughtful suggestions you shared. Looking back, I sometimes wonder whether your red pen ever ran out of ink – but your critical comments always helped me to sharpen my thinking. Highly appreciated!

Erik-Jan Hultink – thank you kindly for being willing to chair the doctoral ceremony. My academic career started with you ten years ago, when you were looking for a design practitioner to join the faculty and decided to give me a chance as a teacher of design practice. I still clearly remember the spark when our conversation turned to bicycle graduation projects. And to this day, I continue to enjoy working with students just as much.

I also owe a great deal of thanks to many of my colleagues at the faculty, and in particular those within the Department of Design, Organisation & Strategy (DOS). It is a real pleasure to be part of such a talented and dedicated group of educators and researchers. Many of you sparked thought-provoking conversations about my research and teaching, helping to

challenge and enrich my thinking. Some of my favourite memories are the informal ones: the lively discussions in the IDE-Kaffee, the quick chats by the coffee machine, and the big lunch table where ideas mixed easily with stories about life beyond work. Those moments of humour, curiosity, and genuine interest made the department feel like more than just a workplace. It's a privilege to work alongside such motivated and gifted colleagues, conducting meaningful and innovative design research and education, shaping future designers who can help make society more beautiful, sustainable, and inclusive. And yes, I'm already looking forward to many more coffees and conversations together.

This PhD research would not have been possible without the support of the case company, which gave me the opportunity to immerse myself in the organisation and establish the foundations for an action research project. Because action research is carried out by and with people inside the organisation, I owe many colleagues there my sincere thanks for their active involvement in the numerous interventions we conducted. I would like to express particular appreciation to a few individuals.

Vincent Kwaks – first of all, I wish to thank you for the warm and insightful conversation we had at the very start of my research. From the outset, I felt welcome in your remarkable company. You understood the importance of preparing the organisation for an uncertain future – of exploring new directions, challenging existing assumptions, and sharpening the product-service innovation strategy. That first conversation gave me both confidence and inspiration for the journey ahead.

Odeke Lenior – I would like to thank you for the vital support you provided throughout my research. You were a key anchor point in this journey: welcoming me into your team, guiding me through the organisation, introducing me to colleagues, and working alongside me to pave the way for the implementation of the design interventions central to our action research. I greatly admire your drive and deep commitment to the company. I look back fondly on our collaboration during this PhD project and on the many long conversations – often after working hours – where we shared our observations and tried to make sense of them together (sometimes realising only then how quickly the evening had slipped away). I would also like to thank you for your guest lectures and the knowledge you shared with our Master's students, giving them a valuable opportunity to gain hands-on experience in designing servitization strategies and related product–service value propositions within the real-world context of a large industrial firm.

Christianne Francovich – you played a vital role in conceptualising and executing the design interventions that formed part of the action research cycles. A wonderfully creative designer, you brought energy and enthusiasm to every step and were central to the development of the interventions. Together with Odeke, you were indispensable in facilitating the many workshops we conducted – even when the Post-its seemed to take on a life of their own. I especially valued your ability to take the flood of ideas generated in these sessions and, in no time, categorise and summarise them, making it possible to quickly share the outcomes with participants and management – an invaluable contribution to the project's progress.

Ruud Görtz also contributed his insights alongside Odeke and Christianne. Ruud, I deeply admire the calm and professionalism you bring. You were a thoughtful and reliable sparring partner, always able to interpret events from a different and valuable perspective – often bringing clarity just when the rest of us were tangled in the details.

Finally, I would like to thank intern and graduation student Celine Tesselaar, whom I threw into the muddy waters of industrial practice during her Master's graduation project at the case company. Celine – of course you made it through. Your project showed not only your strong design talent but also the communication skills essential for designing and successfully executing the interventions that became part of my PhD. Thank you for your dedication and perseverance – and for proving that even in muddy waters, good design can stay afloat.

Like Celine, several other students contributed to my PhD research through their course assignments and graduation projects. The *In-House Design Team*—Rosanne Foppen, Ferkan Metin, Edda van Triet, Daan van der Valk, and Verena Vredeveld—demonstrated, as novice service designers, how to develop an improved pick-up and drop-off service for airport passengers.

In addition, I had the pleasure of supervising graduation students who dedicated their thesis work to specific challenges drawn from my own research. Zoe Vos, Luc van Wanroij, Verena Vredeveld, Chèr van Slobbe, Laura van Overhagen, Pascalle van Hemert, Celine Tesselaar, Itamar Bukai, Aliex van Wingerden, Ynhi Nguyen, Jarmo Ruiter, Valentin Bufler, Eneko Ayerza Insausti, Hendrik Hasenaar, Teun van Wakeren, Nora Pfaff, and Lotte Boekestijn – supervising your Master graduation projects gave me the chance to explore new directions for my PhD and to gain valuable insights into designing services in a B2B environment. I learned a great deal from each of you, and I hope you learned something from me in return. At the very least, I trust you have by now become well trained in navigating the twists and turns of both research and practice – sometimes with more Post-Its™ and iterations than you probably expected!

I want to express my gratitude to my amazing paranymphs:

Paula Melo Signerez – as a fellow PhD candidate, you know exactly what this journey entails. I truly appreciated being able to turn to you when things got tough – your support meant a great deal. Thank you for your friendship and for being there along the way. I am especially grateful that you will be standing by my side as paranymph during the defence – proof that shared struggles can also lead to shared celebrations.

Aniek Toet – I first got to know you as a committed and creative student in one of my courses – ambitious, talented, and full of energy. It came as no surprise when you moved straight into a PhD after your Master's, and you are now close to completing it yourself (though I must admit I am glad I managed to cross the finish line just ahead of you!). Thank you for being my paranymph on this special day – it means a lot to share this milestone with you.

I want to thank all my friends for their support during my PhD journey. Looking back, I realise how often I disappeared into my PhD bubble and forgot to stay properly connected – so thank you for bearing with me along the way.

Two friends in particular deserve a special mention. Geert Streppel – you were one of the first to cheer me on when I considered starting this adventure. I'll never forget how your 'multi-faceted creativity' could completely turn a discussion upside down and suddenly open up a whole new perspective. Somehow, you always made me wonder whether I was writing a PhD or auditioning for a philosophy café. Especially when you casually dropped a Cruyff-style statement like: *'If you don't yet know what the problem is, there's no need to worry about it.'*

And then Jorrit Schoonhoven – our paths have crossed many times throughout our business careers, and during my PhD you often gave me a much-needed boost. Looking back at the award-winning *Bike of the Future* we designed together in 1994, I now realise it was a perfect early example of what I would later call *Overarching Servitization*, the central theme of this thesis. Many of the features we imagined for cyclists back then can now be seen in today's e-bike designs – clear proof that we were well ahead of our time, nothing less than visionary designers (though perhaps we should have patented it!). Your boundless energy, creativity, and humour make even tough situations feel lighter. I'm still not sure whether it's three clones or just your coffee (with five sugar cubes!) that keeps you unstoppable.

Last but most importantly, I am very grateful to my family.

To my beloved children – Marieke, Jan, and Bas – and their partners, Martijn, Aaf, and Marit. Thank you for your unconditional love, support, and genuine curiosity about my work as a lecturer and researcher. I know I was sometimes impatient – perhaps asking one question too many about when you would finally finish your studies. With my PhD, it was clearly payback time, and you had every right to chase me to the finish line (though I'm still not sure who was more competitive!). Fair enough – and thank you for doing it with such good humour.

To my beloved grandchildren – Sim, Mies, and Joes. You are the most wonderful gifts to have come into my life during this PhD journey. What a joy to know that, now the dissertation is complete, I can spend far more time with you – and I promise, from now on there will be more building blocks and playgrounds than books and papers.

To my beloved wife, Maaike. I feel truly blessed to have you by my side. Without you, I could never have completed this PhD. Your unwavering support and unconditional love have meant the world to me. I know this journey came at a cost—you made real sacrifices, and I often failed to give you the time and attention you deserved. That makes it all the more special that you still encouraged me to follow this path. Thank you, from the bottom of my heart – and now that this thesis is finally finished, I promise there will be more evenings for us and fewer spent with my laptop.

Appendices

Title	First Author	Citation Sec	Institute	Originating Country	Year of Publication	Type of Study	Journal	Research Subject	Overall Perspective
The servitization of manufacturing: A review of literature and reflection on future challenges	Baines, T.S.	667	Cranfield University	United Kingdom	2009b	Literature Review	Journal of Manufacturing Technology Management	Reporting state-of-the-art of servitization research	SERVITIZATION STRATEGIES
Towards an operations strategy for product-centric servitization	Baines, T.S.	227	Cranfield University	United Kingdom	2009a	Literature Review	International Journal of Operations and Production Management	Operating principles, structures and processes that guide the manufacturer in servitization	SERVITIZATION STRATEGIES
Servitization Disentangling The Impact of Service Business Models Innovation on Manufacturing Firm Performance	Visnjic, Ivanka	191	ESADE Business School, dept. of Operations, Innovation and Data Sciences	Spain	2013	Qualitative study among 44 national subsidiaries	Journal of Operations Management	Discussing the servitization paradox: implementation hurdles impact the performance and the value creation	VALUE CREATION
Product-Service-Systems (PSS) Business Models and Tactics - A Systematic Literature Review	Reim, Wiebke	183	Lulea University of Technology, Entrepreneurship and Innovation	Sweden	2015	Literature review 67 articles	Journal of Cleaner Production	Providing a framework of well established categories of PSS BMs	SERVICE BUSINESS MODELS
Servitization: revisiting state-of-the-art and research priorities	Baines, T.S.	119	Aston University, Aston Business School, Operations and Information Management Dept.	United Kingdom	2017	Literature Review	International Journal of Operations and Production Management	Provide state of the art in servitization research topics	ORGANISATIONAL IMPACT
Service innovation in product-centric firms: a multidimensional business model perspective	Kindström, Daniel	106	Linköping University	Sweden	2014	Qualitative study	Journal of Business and Industrial Marketing	Specific resources and capabilities identified for business model creations of service innovations. Combining resource and capability perspective	SERVICE BUSINESS MODELS
Mastering the transition to product-service provision: insights into business models, learning activities, and capabilities	Parida, V	56	Lulea University of Technology	Sweden	2014	Survey among Finnish manufacturing companies	Research Technology Management		SERVICE BUSINESS MODELS
Servitization, digitization and supply chain interdependency	Vendrell-Herrero, Ferran	54	University of Birmingham, Birmingham Business School	United Kingdom	2016	Explorative study how digital disruption has effected B2B	Industrial Marketing Management		SERVICE BUSINESS MODELS
The business model dilemma of technology shifts	Tongur, Stefan	52	KTH Royal Institute of Technology, Industrial Economics and Management	Sweden	2014	Case study Business Model	Technovation	Studying the dynamics of intersection between technology and BM's Technology shifts is difficult without innovating	VALUE CREATION IN NETWORK
Servitized Manufacture: Practical Challenges of Delivering Integrated Product and Services	Baines, T.S.	52	Cranfield University	United Kingdom	2009	Case study	Journal of Engineering Manufacture	Exchange of Values; UX-proces model illustrating interactions	SERVICE BUSINESS MODELS
Servitization in Contract Manufacturing: Evidence from Polar Business Cases	Eloranta, Ville	46	Aalto University, School of Science, dept. of Industrial Engineering and Management	Finland	2015	Literature review	Journal of Service Management	Creating competitive advantage with service infusion	SERVICE BUSINESS MODELS
Product service system: a conceptual framework from a systematic review	Annarelli, Alessandro	44	University of Bolzano, faculty of Science and Technology	Italy	2016	Literature review	Journal of Cleaner Production	Categorization framework for PSS literature Ideas for future research directions	SERVITIZATION STRATEGIES
Servitization and competitive advantage: the importance of organizational structure and value chain position	Bustinza, O.F.	37	University of Granada, Strategy and Operations Management Aston Business School, Centre for	Spain	2015	Quantative/Qualitative study	International Journal of Production Economics	Analysis among 102 senior executives to measure the level of transition to service oriented innovation	SERVICE BUSINESS MODELS
The adoption of servitization strategies by UK-based manufacturers	Baines, T.S.	36	Cranfield University	United Kingdom	2010	Survey among manufacturers in UK	Journal of Engineering Manufacture	Adoption of servitization strategies by UK manufacturers	SERVITIZATION STRATEGIES
Meta-Model of Servitization: The Integrative Profiling Approach	Brax, S. A.	35	Aalto University, School of Science, dept. of Industrial Engineering and Management	Finland	2017	Literature review	Industrial Marketing Management	Framework for comparison of value constellations in servitization	SERVICE BUSINESS MODELS
Strategy Map of Servitization	Rabetino, Rodrigo	30	University of Vaasa, Dept. of Management	Finland	2016	Qualitative study, Multiple Cases (3) Servitization Strategy	International Journal of Production Economics	Examining strategic actions, tools, processes behind the implementation of servitization to extend the debate on service based BM's of	SERVICE BUSINESS MODELS
A Decision Methodology to Support Servitisation of Manufacturing	Dimache, Aurora	24	Galway-Mayo Institute of Technology	Ireland	2013	Decision support methodology	International Journal of Operations and Production Management	Development of a decision methodology to support servitization	SERVICE BUSINESS MODELS
Motivations for Servitization: The Impact of Product Complexity	Raddats, Chris	23	University of Liverpool, Management School	United Kingdom	2016	Qualitative study	International Journal of Operations and Production Management	Identify commonalities and differences in manufacturer's drivers to servitize	SERVICE BUSINESS MODELS
Resource realignment in servitization: a study of succesful service providers explores how manufactures modify their	Huikkola, T.	16	University of Vaasa, Networked Value Systems Research Program	Finland	2016	Multiple case study (9 companies) Organization	Research Technology Management	Realign and reallocate sources to support the new business model Creating new organizational structures to	SERVICE BUSINESS MODELS
Constructing A Sustainable Service Business Model: An S-D Logic-Based Integrated Product Service System (IPSS)	Liu, Chun Hsien	15	Mingshin University of Science and Technology, dept. of International Business Management	Taiwan	2014	Framework based on literature review	International Journal of Physical Distribution and Logistics Management	About sustainable service dominant BM's; niet relevant	SERVICE BUSINESS MODELS
The performance impact of industrial services and service orientation on manufacturing companies	Kohtamäki, Marko	14	University of Vaasa, dept. of Management	Finland	2015	Quantitative study	Journal of Service Theory and Practice		VALUE CREATION

Title	First Author	Citation Score	Institute	Originating Country	Year of Publication	Type of Study	Journal	Research Subject	Overall Perspective
Organizational Capabilities for Pay-Per-Use Services in Product-Oriented Companies	Gebauer, Heiko	13	BAWAG, Environmental Social Sciences, Business Innovation for Sustainable Infrastructure Services Group	Switzerland	2017	Case study Organization	International Journal of Production Economics	Case study regarding organizational capabilities necessary for pay-per-use services	SERVICE BUSINESS MODELS
Industrial Services - The Solution Provider's Stairway to Heaven or Highway to Hell?	Kohtamäki, Marko	13	University of Vaasa, Networked Value Systems Research Program	Finland	2015	Literature review	Benchmarking: An International Journal	Maturity levels of servitization recognized, providing a typology to analyze the level of servitization	SERVICE BUSINESS MODELS
Challenges of servitization: a systematic literature review	Zhang, Wanrong	10	University of Warwick, Warwick Manufacturing Group	United Kingdom	2017	Literature review	Industrial Marketing Management	Identified Challenges: organizational structure, bm, development process, customer management, risk management	SERVICE BUSINESS MODELS
What Brings The Value to Outcome-Based Contract Providers? Value Drivers in Outcome Business Models	Visnjic, Ivanka	10	ESADE Business School, dept. of Operations, Innovation and Data Sciences	Spain	2016	Case studies (4) Value Creation Business Model	International Journal of Production Economics	Studying the value drivers of outcome based BMs among 4 industrial companies Bombardier, Caterpillar, Hitachi and Rolls Royce	SERVICE BUSINESS MODELS
The Digitalization and Servitization of Manufacturing: A Review on Digital Business Models	Martin-Peña, Maria Luz	9	Rey Juan Carlos University, dept. od Business and Management	Spain	2018	Review	Strategic Change	Review of digital BM's Definition of key PSS-concepts	SERVICE BUSINESS MODELS
PSS Business Model Conceptualization and Application	Adrodegari, F.	9	University of Brescia, dept. Mechanical and Industrial Engineering	Italy	2017	BM Framework	Production Planning and Control	Developing a 2-level hierarchical framework for BMs	SERVICE BUSINESS MODELS
Business Models for the Service Transformation of Industrial Firms	Adrodegari, F.	9	University of Brescia, dept. Mechanical and Industrial Engineering	Italy	2017	Literature review	Service Industries Journal	Framework for BMs for industrial companies	SERVICE BUSINESS MODELS
Driver Configurations for Successful Service Infusion	Forkmann, Sebastian	9	University of Alabama, Culverhouse College of Commerce and Business Administration	USA	2017	Qualitative study	Journal of Service Research	Interplay study of different services aspects (i.a. pricing, capabilities, offerings) on success or failure of service infusion	SERVICE BUSINESS MODELS
Government policy implications of intellectual capital: an Australian manufacturing case study	Roos, Göran	9	Swinburne University of Technology, Melbourne	Australia	2015	Qualitative study	Journal of Intellectual Capital	intellectual capital deployment at servitization	ORGANISATIONAL IMPACT
The Path to Outcome Delivery: Interplay of Service Market Strategy and Open Business Models	Visnjic, Ivanka	8	ESADE Business School, dept. of Operations, Innovation and Data Sciences	Spain	2018	Case studies (12) Business Model	Technovation	Studying the interplay between service market strategy/change and BM-change	SERVICE BUSINESS MODELS
Capabilities for advanced services: a multi-actor perspective	Story, Vicky M.	8	School of Business and Economics, Loughborough University	United Kingdom	2017	Theoretical Framework Literature study	Industrial Marketing Management	Co-creation in network of stakeholders	COLLABORATIVE NETWORKS
Identifying tensions in the servitized value chain	Jamie, J.B.	7	Alliance Manchester Business School, Customer Management Leadership Group	United Kingdom	2016	Qualitative study, based on interviews	Research Technology Management	Tensions between service network actors Nurturing network relationships to maximize value of PSS	SERVICE BUSINESS MODELS
Network positioning and risk perception in servitization: evidence from the UK road transport industry	Ziaee Bigdeli, A	7	Aston University, Aston Business School, Operations and Information Management Dept.	United Kingdom	2018	Qualitative study based on interviews	International Journal of Production Research	Risk perception and servitization implications for strategic partnerships and network positioning	COLLABORATIVE NETWORKS
Knowledge Sharing Dynamics in Service Suppliers' Involvement for Servitization of Manufacturing Companies	Ayala, Nestor Fabian	6	Universidade Federal Rio Grande do Sul, dept. of Industrial Engineering	Brazil	2017	Multiple case study (9 companies) Collaborative Network	International Journal of Production Economics	Business Model Innovation by integrate knowledge of service suppliers	SERVICE BUSINESS MODELS
Two strands of servitization: a thematic analysis of traditional and customer co-created servitization and future research directions	Green, Maxwell H.	6	University of Warwick, Warwick Manufacturing Group	United Kingdom	2017	Literature review Thematic analysis of servitization	International Journal of Production Economics	A thematic analysis of traditional and customer co-created servitization, including future research directions	SERVICE BUSINESS MODELS
Organisational Change towards Servitization: A Theoretical Framework	Ziaee Bigdeli, A	6	Aston University, Aston Business School, Operations and Information Management Dept.	United Kingdom	2017	Literature review	Competitiveness Review	Studying organisational transformation processes towards servitization	ORGANISATIONAL IMPACT
Do Outcome-Based Contract Exist? The Investigation of Power-by-the-Hour and Similar Result-Oriented Cases	Grubic, Tonci	5	Liverpool Hope University, Business School	United Kingdom	2018	Literature review around case studies Business Model	International Journal of Production Economics	Outcome based contracts OBC eOBC and a OBC	SERVICE BUSINESS MODELS
Service transitions of product-centric firms: an explorative study of service transition stages and barriers in Germany's energy market	Lütjen, Heiner	5	Kiel University, Institute for Innovation Research	Germany	2017	Explorative study of serv. in energy market	International Journal Product Economics		SERVICE BUSINESS MODELS
The Transition towards Service-Oriented Business Models: a European Survey on Capital Goods Manufacturers	Adrodegari, Frederico	3	University of Brescia, dept. Mechanical and Industrial Engineering	Italy	2017	Survey	International Journal of Engineering Business Management	Transition toward service oriented BM's Capital goods industry BM-configurations	SERVICE BUSINESS MODELS
A Design-Thinking Perspective on Capability Development: The Case of New Product Development for Service Business Model	Beltagui, Ahmad	2	Aston University, Aston Business School, Operations and Information Management Dept.	United Kingdom	2018	Design Thinking Case Study	International Journal of Operations and Production Management	Design capabilities as facilitator of the servitization process	SERVICE BUSINESS MODELS

Title	First Author	Citation Score	Institute	Originating Country	Year of Publication	Type of Study	Journal	Research Subject	Overall Perspective
Modeling Manufacturer's Capabilities for the Internet of Things	Hasselblatt, Mathias	2	University of Vaasa, School of Management	Finland	2018	Qualitative study	Journal of Business and Industrial Marketing	Modeling capabilities for IoT	SERVICE BUSINESS MODELS
Lessons Learned from a Successful Industrial Product Service System Business Model: Emphasis on Financial Aspects	Oliveira, Maicon Gouvea	2	Federal University of Alenas, Institute of Science and Technology	Brazil	2018	Case study Business Model Servitization Strategy	Journal of Business and Industrial Marketing	Discussing PSSBM and financial aspects Business Model Canvas	SERVICE BUSINESS MODELS
The Development of a Generic Servitization Systems Framework	Weeks, Richard	2	University of Pretoria, dept. of Engineering and Technology Management	South Africa	2015	Case study analysis Servitization	Technology in Society	Developing servitization strategy and generic servitization systems framework	SERVITIZATION STRATEGIES
A QFD-based evaluation method for business models of product service systems	Li, Tianyang	2	School of Computer Science and Technology	China	2016	Value oriented evaluation method for PSS BM's	Mathematical Problems in Engineering	Value oriented evaluation method for PSS BMs	VALUE CREATION
Servitization as reinforcement, not transition	Salonen, Anna	2	University of Turku, dept. of Marketing and Int. Business	Finland	2017	Qualitative study	Journal of Service Management	Servitization as reinforcement	SERVITIZATION STRATEGIES
Organisational change towards servitization: a theoretical framework	?	2	?	?	2017	Theoretical framework Literature study	Competitiveness Review		ORGANISATIONAL IMPACT
Servicizing Solutions for Manufacturing Firms: Categorizing Service Ideas from Product-Service Integrated Examples	Ryu, H	1	Hanyang University, dept. of Arts & Technology	South Korea	2018	Literature review	Design Journal	Categorizing service models based on 80 examples Ideas to help companies to servitize	SERVITIZATION STRATEGIES
Uncovering the Topic Landscape of Product-Service-System Research: From Sustainability to Value Creation	Lee, Hakyeon	1	Seoul National University of Science, dept. of Industrial Systems Engineering	South Korea	2018	Literature review	Sustainability	Identification of the thematic landscape of PSS-research. Top 10 topics identified	SERVICE BUSINESS MODELS
Conceptual Approach for Value Driven Performance in Servitising Companies	Adeil, R.	1	Arab Academy of Science, Technology and Maritime Transport & Universität Bremen, Bremer Inst. Für Produktion und Logistik	Egypt	2015	Literature Review Value Creation Case studies (4)	International Journal of Services and Operations Management	Case studies, showing that companies can create higher value by co-creation with stakeholders.	SERVICE BUSINESS MODELS
Financial Performance of Servitized Manufacturing Firms: A Configuration Issue between Servitization Strategies and Customer-Oriented Organizational	Ambroise, Laure	1	University of Lyon, COACTIS	France	2018	Quantitative study	Industrial Marketing Management	Quantitative research supporting a positive relationship between servitization and business performance	SERVICE BUSINESS MODELS
Exploring the Dynamic Capabilities Required for Servitization	Kanninen, Tiina	1	Aalto University, School of Science, dept. of Information and Service Management	Finland	2017	Exploratory study based on 14 industrial multiple cases	Business Process Management Journal	Dynamic capabilities identified in 5 steps of servitization. Organization change needed to servitize	SERVICE BUSINESS MODELS
Cost-efficient Co-Creation of Knowledge Intensive Business Services	Kuula, Seppo	1	University of Oulu, Dept. of Industrial Engineering and Management	Finland	2018	Literature review Co-Creation in Network	Service Business	Mainly focused on service dominant logic. Knowledge driven services	SERVICE BUSINESS MODELS
Value Logics for Service Innovation: Practice-Driven Implications for Service-Dominant Logic	Lindhult, Erik	1	Mälardalen University, Design and Engineering, School of Innovation	Sweden	2018	Study based on 2 company cases Value Creation	Service Business	About understanding value creation process in product centered companies A theoretical model explaining value logics for	SERVICE BUSINESS MODELS
Servitization as a Business Model Contestation: A Practice Approach	Palo, Teea	1	Lancaster University Management School	United Kingdom	2018	Case study Business Model	Journal of Business Research	Discussing struggle to change BM within large manufacturer	SERVICE BUSINESS MODELS
Enhancing The Design And Management of Product-Service Supply Chain: An Application to The Automotive Sector	Resta, B	1	University of Studi Bergamo, CELS-Research Group	Italy	2017	Literature review and 4 case studies Value chain	Service Science	Study highlighting the linkage between value proposition and supply chain providers Summarized into 11 propositions with	SERVICE BUSINESS MODELS
Servitization in Contract Manufacturing: Evidence from Polar Business Cases	Viitamo, E	1	Aalto University, School of Science, dept. of Industrial Engineering and Management	Finland	2016	Comparative case study Business Model	Strategic Outsourcing	Servitization in contract manufacturing	SERVICE BUSINESS MODELS
Servitization Intent as a Factor in the Servitization Process	Crowley, Edward	1	University of Manchester	United Kingdom	2018	Qualitative study based on interviews	Journal of Business and Industrial Marketing	Identifying obstacles in the organization that inhibits the servitization process	ORGANISATIONAL IMPACT
The environment strategy-structure fit and performance of industrial servitized SMEs	Ambroise, Laure	1	University of Lyon, COACTIS	France	2018	Quantitative study	Journal of Service Management	Performance of servitized SMEs	VALUE CREATION
Extending the functional products definition with additional through-life-cycle aspects	Lindström, J	0	Lulea University of Technology, Process IT Innovations	Sweden	2016	Overview of literature of life cycle aspect	International Journal of Product Development		SERVITIZATION STRATEGIES
Prioritization of product-service business model elements at aerospace industry using an analytical hierarchy process	Salomon, M.F.B.	0	Instituto de Engenharia de Producao e Gestao	Brazil	2019	Qualitative study	Acta Scientiarum		SERVICE BUSINESS MODELS
Business model innovation: process and tools for service transformation of industrial firms	Androdegari, F.		University of Brescia, dept. Mechanical and Industrial Engineering	Italy	2017	Framework voor BM design	ScienceDirect	Framework to design BM's for industrial companies	SERVICE BUSINESS MODELS
Exploring technology-driven service innovation in manufacturing firms through the lens of Service Dominant logic	West, S		Lucerne University of Applied Sciences and Arts	Switzerland	2018	Case studies (10)	ScienceDirect	Technology driven service innovation in manufacturing companies, service dominant logic	VALUE CREATION

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Appendix B ARC 3 — Interview Protocol Used to Prepare TLN Interventions & Associated Code Table

Introduction

First, I want to thank you for taking time to have this interview. My name is Bart Bluemink. Currently, I am conducting a research project within your organisation about servitization; trying to answer the following question:

How can your organisation create product-service solutions that address the latent needs, interests, and behaviour of our end-users in a future context?

Together with your colleagues of *Systems Architecture* and *Strategic Design*, we set up a set of strategic design workshops (called *The Long Now*) to create a better understanding of our end-users. And more specific, end-users in a far future context. We carry out these workshops within Airports, involving participants from different departments (*Innovate, Architecture & Integration, Marketing & Strategy*).

During the project we became aware of the different notions of the words and business terms we use in our workshop conversations. Therefore, the aim of this interview is two-fold:

1) getting a better understanding of your organisation's business language and jargon.
2) getting ideas for understanding our customers and end-users.

[discussing and signing off the consent form that I have sent in advance of the interview]

This interview will last a maximum of 60 minutes. Before we begin, do you mind if I record the conversation? The recording will be used solely for transcription purposes, and all recordings will be deleted after the interviews have been transcribed.

1) Well, could you introduce yourself shortly? *[prompts: background, #Y experience, department, function, responsibilities and (business/private) interests?]*
2) Tell me about your first acquaintance with your organisation. *[prompts: what made you decide to get on board? what makes working for* your organisation *so exciting, special, difficult, interesting, attractive?]*

With *The-Long-Now* project we try to a better understanding of our customers and end-users in a future context. Therefore, it is important that we all speak the same language.

When I started to work at your organisation, I recognized that our colleagues in the different departments use a different language or have different connotations of the words they use. Also, I realized that the language could differ with the one we are used to in academia.

Before I ask you some questions about *The Long Now* workshops, I will ask your notion of several words or terms used within your organisation.

1) Let's start with CUSTOMER. Who do you consider your organisation's CUSTOMER? *[prompt: client]*
2) What is your connotation of USER *[prompt: end-user]*
3) If you talk about SERVICE, can you describe what you mean with that word? *[prompt: can you give examples?]*
4) What is your notion of a PRODUCT-SERVICE within your organisation? *[prompt: can you give examples?]*
5) What do you mean with a SOLUTION? *[prompt: product-service solution?]*
6) The same for FLIGHT PLAN? *[prompts: business roadmap, an innovation strategy, an execution program?]*
7) Could draw a time scale for me and put in the SHORT TERM/MID TERM/LONG TERM on that time scale?
8) What is your notion of a PLATFORM STRATEGY?
9) What is your notion of a BUSINESS MODEL?

Thanks so far about the notions and language within your organisation.

Now I will ask a few questions about *The Long Now* project.

1) Could you tell me what current procedure or approach your organisation carries out to explore future product? *[process? Is it right process?]*
2) Tell me, what triggered you to take part in *The Long Now* workshops?
3) What do you think about the way we carried out the workshops? *[prompt: what is your feeling about it?]*
4) What would you advise your organisation to undertake for understanding the end-user? *[prompts: latent needs, behaviour, needs, interests, concerns]*
5) What would you advise your organisation to understand the end-user in a *future* context? *[prompts: future will change, future lifeworld scenarios?]*
6) What initiatives does your organisation already have in place to create an end-user understanding? *[prompt: which department, colleague, outsourced company?]*
7) What barriers within your organisation could hold us off understanding end-users? *[prompt: your organisation culture, high-tech focus?]*
8) How can we improve the quality of the Long Now workshops? *[prompts: time schedule, duration, homework, online tools, team composition?]*

Thank you for your time!

Example of (a Part of) a Code Table Derived from ARC 3 Interviews

Code	Subcode	Grounded	Density	Code Groups
Business Perspective		**12**	**0**	
Business Perspective	● Exploring new business models incl new revenue models	9	0	_Ecosystem Innovation & Business Perspective
Business Perspective	● Start-ups discover new business opportunities (BaaS)	3	0	_Ecosystem Innovation & Business Perspective
Customer-of-the-customer - *Overarching Servitization*		**26**	**2**	**_*Overarching Servitization***
Customer-of-the-customer - *Overarching Servitization*	● Complex solution space - Solving complex customer-oriented PSS challenges	11	0	_*Overarching Servitization* _Service Innovation Strategy _Ecosystem Innovation & Business Perspective
Customer-of-the-customer - *Overarching Servitization*	● Customer-of-the-customer - I am curious to know whether we think of the customer-of-the-customer	17	0	_*Overarching Servitization* _Exploring End-User Values - Perspective
Exploring end-user values and experiences		**12**	**1**	**_Exploring End-User Values - Perspective**
Exploring end-user values and experiences	● Designing valuable 'user experiences' iso 'service'	3	0	_Exploring End-User Values - Perspective
Exploring end-user values and experiences	● Exploring customer opportunities - We talk a lot with (potential) customers	5	0	_Exploring End-User Values - Perspective
Exploring end-user values and experiences	● Technology is only an enabler of end-user values	4	0	_Exploring End-User Values - Perspective
Feed forward on TLN - Participants' Expectations	● We offer our skills and open-mindedness	1	0	_Competencies - Skills, Experience, Function & Background _Feed forward TLN Participants' Expectations
Feedback on TLN - Outcome (content)		**41**	**2**	**_Feedback on TLN Outcome (content)**
Feedback on TLN - Outcome (content)	○ I am missing the more radical innovations - after all, we are biased by our own context	1	0	_Organising the service innovation process
Feedback on TLN - Outcome (content)	● TLN inspired to....	8	0	_Feedback on TLN Outcome (content) _Learning from TLN
Feedback on TLN - Outcome (content)	● TLN should result in....	33	1	_Feedback on TLN Outcome (content) _Learning from TLN

Feedback on TLN - Process		144	2	_Feedback on TLN Process
Feedback on TLN - Process	o Formulating the vision statement is a valuable exercise	1	0	_Feedback on TLN Process
Feedback on TLN - Process	● How can we improve or add the TLN process?	44	0	
Feedback on TLN - Process	● How do we follow up the TLN process?	29	0	
Feedback on TLN - Process	o Provide a management summary before next WS starts	1	0	_Feedback on organising TLN workshops
Feedback on TLN - Process	o We should think about CaseCompany's values too! Our inner believe. What drives us?	1	0	_Feedback on TLN Process
Feedback on TLN - Process	● What should we keep from the TLN process?	104	1	
Future Perspective		11	2	_Exploring Future Perspective
Future Perspective	● H3 Activities Determine which Technology will be Key for Our Innovations	1	0	_Exploring End-User Values - Perspective _Exploring Future Perspective
Future Perspective	● Hit & Run for customers: If we talk with customers, we don't talk with visionairs but people responsible for operations	3	0	_Service Innovation Strategy _Organising the service innovation process _Short-Term Perspective - Hit & Run _Exploring End-User Values - Perspective _Exploring Future Perspective
Future Perspective	● Mindset about 'service' has been changed over time, today passengers expect a smooth operation in reclaim area	1	0	_Service Innovation Strategy _Exploring Future Perspective
Future Perspective	● Today, we look too little from end-user perspective	5	0	_Exploring End-User Values - Perspective _Exploring Future Perspective
Future Perspective	● We use 3 horizons 60-30-10 incremental adjacent radical	1	0	_Organising the service innovation process _Exploring End-User Values - Perspective _Exploring Future Perspective
Integrate System Competences of Technology and Sales		30	0	
Integrate System Competences of Technolgy and Sales	● We live and eat technology	30	0	_Competencies - Skills, Experience, Function & Background
Organising the service innovation process		22	5	_Organising the service innovation process
Organising the service innovation process	● In the Business new product managers will be assigned to manage the PSS portfolio	2	0	_Organising the service innovation process
Organising the service innovation process	● Increasing of product-service development scope	1	0	_Service Innovation Strategy _Organising the service innovation process
Organising the service innovation process	● Increasing service business - additional service	1	0	_Service Innovation Strategy
Organising the service innovation process	● Passenger journey	1	0	_Organising the service innovation process _Feedback on TLN Outcome (content)
Organising the service innovation process	● Reorganise and invest in people	1	0	_Organising the service innovation process
Organising the service innovation process	● Separate from Org / Managed as an isolated innovation project	1	0	_Organising the service innovation process
Overarching ecosystem innovation		12	0	
Overarching ecosystem innovation	● Building an ecosystem	7	0	_Overarching Servitization _Service Innovation Strategy _TLN Challenges _Ecosystem Innovation & Business Perspective
Overarching ecosystem innovation	● Exploring new markets - potential growth oppotunities	6	0	_Ecosystem Innovation & Business Perspective
Overcoming TLN barriers		18	1	_TLN Barriers

Overcoming TLN barriers	o Barrier for strategy change - We still do well as CaseCompany - increasing revenues and profit	3	0	_TLN Barriers
Overcoming TLN barriers	o Most customers in aviation are not TCO oriented	1	0	_TLN Barriers
Overcoming TLN barriers	o Responsibilities for innovation decision are split in the organisation	1	0	_Organising the service innovation process
Overcoming TLN barriers	o Reverse the inside -->outside perspective	1	0	_TLN Barriers
Overcoming TLN barriers	o Service organisation today is focused on external stakeholders, not internal ones	1	0	_TLN Barriers
Overcoming TLN barriers	o Siloed / Isolated Decisions	1	0	_TLN Barriers _Organising the service innovation process
Overcoming TLN barriers	o We are not ready for ready yet for Something -as-a-Service	1	0	_TLN Barriers _Service Innovation Strategy _Competencies - Skills, Experience, Function & Background
Overcoming TLN barriers	o We are too big for agile / start-up like approach	1	0	_TLN Barriers _Service Innovation Strategy
Overcoming TLN barriers	o We do not focus on the end-user	3	0	_Exploring End-User Values - Perspective
Overcoming TLN barriers	o We listen too much to the Voice-of-sales related to services for passengers	2	0	_TLN Barriers _Service Innovation Strategy
Platforming		**9**	**1**	**_Service Innovation Strategy**
Platforming	● Our market is starting to commoditize the solutions	4	0	_Service Innovation Strategy
Platforming	● Platform - Suite of software tools or standardization components	1	0	_Service Innovation Strategy
Platforming	● Platform Technology	5	0	_Service Innovation Strategy
Platforming	● Platforming is a way to standardize our solutions and reduce components	1	0	_Service Innovation Strategy
Platforming	● Winning with smart platforms part of CA-program	2	0	_Service Innovation Strategy
Servitization Strategy		**8**	**2**	**_Service Innovation Strategy**
Servitization Strategy	● Service driven innovation	4	0	_Service Innovation Strategy
Servitization Strategy	● Service Innovation Strategy	5	0	_Service Innovation Strategy
Short-Term Perspective - Hit & Run		**47**	**2**	**_Short-Term Perspective - Hit & Run**
Short-Term Perspective - Hit & Run	● Project-Driven Innovation	43	0	_Short-Term Perspective - Hit & Run
Short-Term Perspective - Hit & Run	● We need to focus since we are successful	7	0	_Short-Term Perspective - Hit & Run
Strategize scalable PSS technology innovation	● Technology (push) driven Innovation	30	0	_Technology Perspective
Taking TLN challenges		**31**	**1**	**_TLN Challenges**
Taking TLN challenges	o Managing change and uncertainties	22	0	

Appendix C   ARC 3 — Taking Action — Piloting an 'Overarching Servitization Strategy Design' Process

C-1 — ARC 3 — Taking Action of Design Intervention 1 — Kick-Off

The kick-off started with an icebreaker to help the team get to know each other. As part of the onboarding, participants were asked to create a character of themselves on the *Miro™* board and share some traits, trivia, and fun facts. The facilitators explained that the purpose of the kick-off intervention was to lay the foundation for the upcoming intervention series. During the kick-off, the two facilitators introduced *TLN* by summarising the topics they would address and explaining the intended outcome of each separate *TLN* intervention. The participants had the opportunity to ask questions about the various intervention components, align their agendas, and resolve any conflicting agreements.

In the *TLN* strategic design interventions, we explore the subject of *'People Travelling in Europe'*, and we wanted to focus the mindset of the participants on the *overarching* customers (passengers in the case of the *Airports* business unit). Therefore, we began by presenting the *Personas Framework* and a Customer (*Passenger) Journey Map* as results of our preparatory work.

Personas

Personas are archetypical representations of intended users, describing and visualising their behaviours, values, and needs. They help the participants to understand real-life behaviours, values, and needs, bring qualitative user research to life, and enable us to make decisions based on grounded information (Mulder & Yaar, 2006). Above all, personas are a valuable design tool for sharing a typical image and understanding of users. They provide designers with a clearer picture of the end-users for whom they are designing product-services.

In the preparation activities, the *Strategic Designer* gathered end-user information previously generated in company projects. For example, the Airports Business Unit distinguished internally between the *business* and *leisure* traveller (holiday and free time). For one customer, they used three different personas. In *Intervention 3* of *ARC 3*, which focused on designing passenger services to improve the airport arrival experience, the project group identified another three types of travellers. Due to overlaps in these definitions, the strategic designers summarised them into six personas presented at the kick-off: the *Business Traveller*, the *Family Traveller*, the *Luxe Traveller*, the *Relaxed Traveller*, the *City Tripper, and the Conscious Traveller. Figure C-1* shows the selected personas with their value drivers to consider in the future travel context.
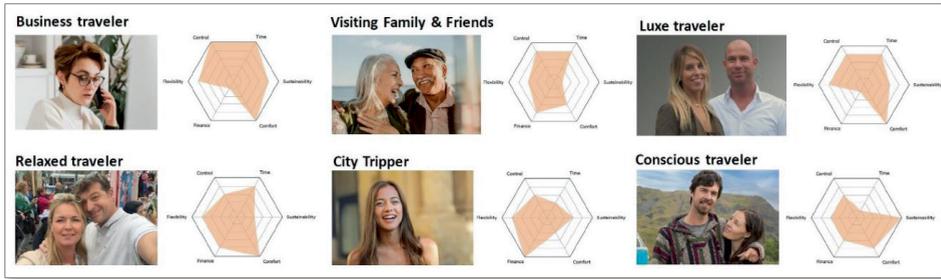
Figure C-1 — Illustration of Six Personas in Future in the Context of Future Travelling

Customer Journey Mapping

Customer Journey Mapping is a method strategic designers use to create *passenger journey maps* that provide an impression of the *passenger persona in action in context.* It helps us map the traveller's experiences and understand their behaviour (Rosenbaum et al., 2017). *Figure C 2* shows an example of a *customer journey map*.

In subgroups, the facilitators then discussed with participants the goals of the intervention series and the challenges faced by the team during the *TLN* interventions. Participants were asked what they would like to contribute and what they hope to learn from the intervention events. At the end of the kick-off, the facilitators summarised the discussion outcomes of the different teams.
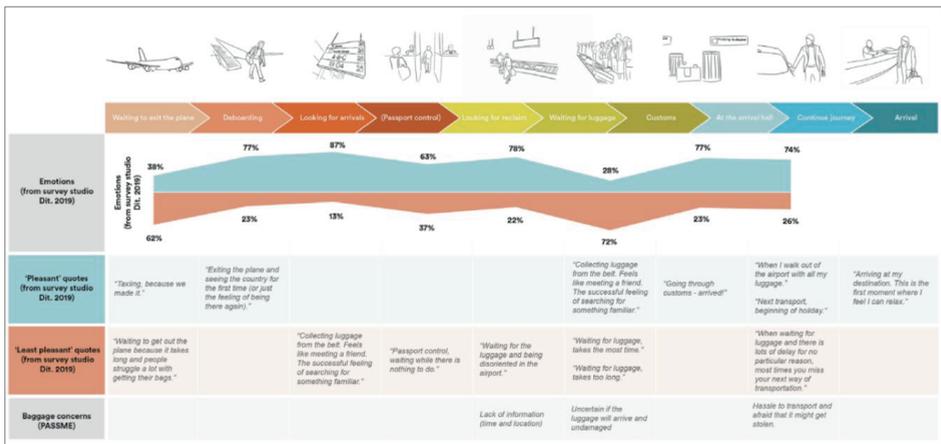
Figure C-2 — Example of a Customer Journey Map (Passenger Arrival Experience)

Explaining the goal

In the kick-off, the facilitators explained the goal of the *TLN* strategic design interventions, which focus on future thinking and creating valuable experiences for end-users. We conduct *TLN* interventions to design product-service value propositions to prepare for yet uncertain future scenarios. Through the *TLN* intervention series, we create a shared and supported vision of the future business context of travel in Europe, explaining and

understanding future needs and behaviours from the end-user perspective. This will ultimately lead to a product-service strategy manifested in a strategic design roadmap according to Simonse (2018).

In sub-group discussions with the participants, the facilitators emphasised that *TLN* aims to create a shared understanding of the future context and value drivers for the case company's customers (airlines and airports), as well as for end-users (travellers/passengers). Summarising the participants' expectations at the end of the *TLN* kick-off (see *Figure C-3*, bottom right quadrant), they anticipated tangible results from the *Overarching Servitization Strategy Process,* including executable roadmaps that will drive forward-looking, end-user value-driven product-service innovation projects. The *TLN* results should inspire the Airports business unit's long-term *Overarching Servitization* Strategy to create new value propositions linked to ongoing innovation initiatives and aligned with relevant stakeholders. We concluded that the facilitators successfully established unified expectations among participants about the purpose of *TLN*.

Figure C-3 — Summary of Participants Expectations after the TLN Kick-Off

Challenges

The facilitators started by explaining strategic design as a method of applying future-oriented design principles to enhance the innovative and competitive qualities of the company while addressing uncertainties in future contexts. What challenges do we foresee, and when is *TLN* deemed a success? Success and challenges are closely linked, as overcoming challenges is essential for achieving success, serving as the first step towards it. The participants highlighted the importance of creating a future-oriented vision that stakeholders and decision-makers can recognise as a significant and guiding outcome. Only if it is acknowledged and gains buy-in from management can the introduction of an *Overarching Servitization Strategy* succeed (see *Figure C-3*, bottom left quadrant). Another

challenge raised was making outcomes tangible. How do we prevent a formulated vision statement from being mere words? How can we transform a vision of the future into market-leading product-service value propositions? These questions align with what participants expressed they would like to learn during the *TLN* strategic design interventions, discussed in the next paragraph.

Learn

The participants expressed a desire to easily shift to future thinking and link it to a vision of the future, which can inspire new initiatives and create a coherent roadmap. To address this, the facilitators explained that we will apply Simonse's (2018) *Strategic Design Roadmapping* process in the *TLN* design interventions.

The participants also valued learning from others (see *Figure C-3*, top left quadrant). They acknowledged that the *TLN* setup was based on the concept of sharing ideas between departmental silos, which provided a rare opportunity to observe the inner workings of neighbouring departments and gain different perspectives on customers and end-users. As a result, they could capture new insights and expand their understanding. Moreover, the participants mentioned learning and implementing design methods in their daily practice of product-service innovation.

Contribute

In the preliminary interviews, we asked participants what value they could add to the *TLN process*. At the end of the kick-off, participants were asked to write down how they could contribute. They identified their specific knowledge of the current market context and new technologies as valuable contributions to the *TLN process*. After gathering feedback, we found that participants felt heard in sharing their perspectives on valuable market opportunities and emerging technologies. Moreover, they appreciated being asked to bring an open mind and an out-of-the-box mentality.

C-2 — ARC 3 — Taking Action of Design Intervention 2 — Creative Trend Research

The main goal of the *Creative Trend Research* Intervention is to identify trends relevant to the case company that align strategically and can serve as key value drivers for designing future product-service value propositions. Additionally, we aim for the intervention to explore what the future of travel could look like, specifically *'Travelling in Europe.'* To ensure the desired impact, the facilitators and the action researcher first tested the trend research intervention in three preparatory sessions for two reasons. First, conducting an intensive trend survey in one online session would take too long. Second, these design activities require the necessary experience and skills that the *TLN* participants do not (yet) possess. *Figure C-4* provides an overview of the number of trends and trend categories resulting from the preparatory work used as input for strategic design intervention *2.*

To prepare the participants for strategic design intervention *2* and allow them time to digest various trends and trend categories, the trend presentation was sent in advance. This enabled the participants to review the trend research results and reflect on them

before the intervention began. In the previous strategic design intervention *1 – Kick-Off*, the facilitators asked the participants to review the trend research results to ensure completeness and, if necessary, to provide any missing trends as input for the second strategic design intervention *Creative Trend Research.*

Initially, the facilitators presented and discussed the trends and trend categories outlined in the preparatory work. They then showed a summary video in which the interviewed specialists addressed the potential effects of the trends to inspire and enrich the participants' insights. The facilitators also highlighted trends that appeared less relevant, outside the current scope, or of lesser impact on the company. Indeed, these trends can be valuable as they may prompt the search for promising value propositions in new or adjacent market segments.

After the presentation, the facilitators formed two groups and asked the participants to categorise the trends from the preparatory work into a framework with three trend levels: trends, trend themes, and trend maps. This framework serves two purposes:

1) *To help participants form an opinion so they can explain it to each other in later discussion, and*
2) *To gather input on the trends based on their domain-specific knowledge— 'Travelling in Europe' Context—for further use in follow up strategic design interventions.*
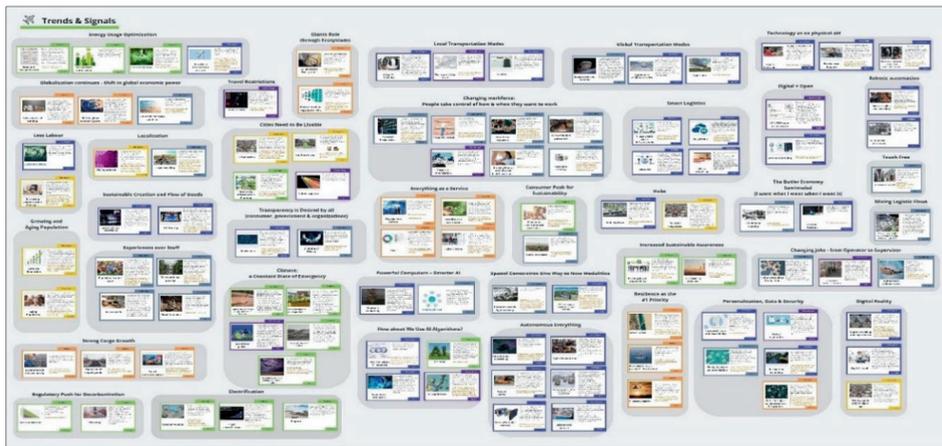
Figure C-4 — Overview of Trends and Trend Categories

The first exercise involved writing down initial thoughts on the trend themes to help participants remember and form individual opinions on them. The second exercise initiated and stimulated group discussions about the identified trends, exposed individual barriers to these trends, and created a shared understanding through dialogue and consensus-building on significant trends. Participants were asked to discuss the trends within their groups and rank them in terms of importance. These discussions helped participants form opinions on the *end-user value, impact,* and *strategic fit* (Simonse, 2018)

for the case company's *Airports* business unit. During the intervention, facilitators used neutral instructional language to avoid typical design roadmapping jargon that might intimidate participants, ensuring they focused only on trends and *end-user values* that were already aligned with the current business scope rather than on new opportunities outside it.

In the third step, the group was divided into two smaller groups of four to five people. The facilitators asked each participant to rank the trends individually and present their top three to their colleagues. This approach helped initiate discussions and provided an overview of the differences in participants' interests. This step aimed to reveal pragmatic barriers and different levels of specific interests.

The participants in the two groups used the *dot-voting* method (participants stick a small dot on their preferred options) to determine which trend categories they considered most relevant for future passengers *'Travelling in Europe'*. The facilitators included this exercise to gain insights into smaller trends and trend categories that stand out more than others or are of potential interest to the case company. From both the individual and group rankings, a total of seven trend categories were identified as relevant for the case company in the context of future travel. We have listed them below in order of importance as indicated by the participants.

1) Seamless End-to-End Experiences (*Figure C-5*)
2) Being in Control (*Figure C-5*)
3) New Sustainable Modalities (*Figure C-5*)
4) Corporate Connectivity - Ecosystem Collaboration (*Figure C-5*)
5) Meaningful Travel Time (*Figure C-6*)
6) Personalised Experiences (*Figure C-6*)
7) Focus on Locality - Local for Local Production (*Figure C-6*)

Figure C-5 and *Figure C-6* consolidate the outcome of the discussions of both subgroups.
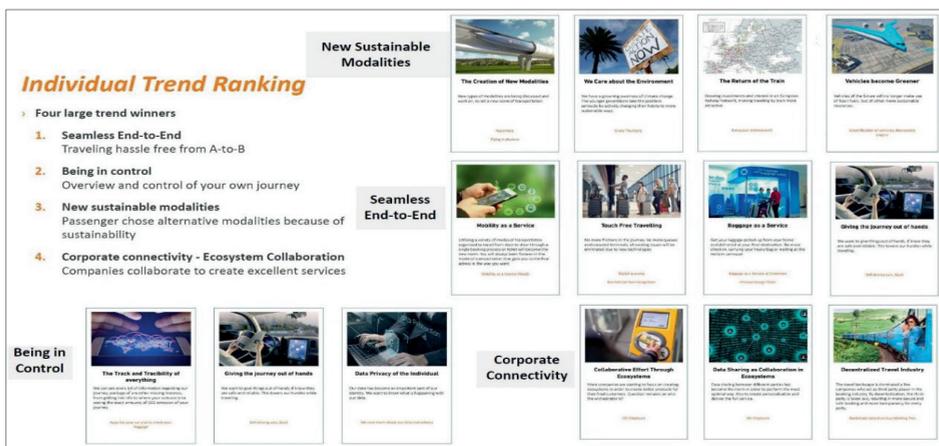
Figure C-5 — Resulting Top Trends 'Travelling in Europe'
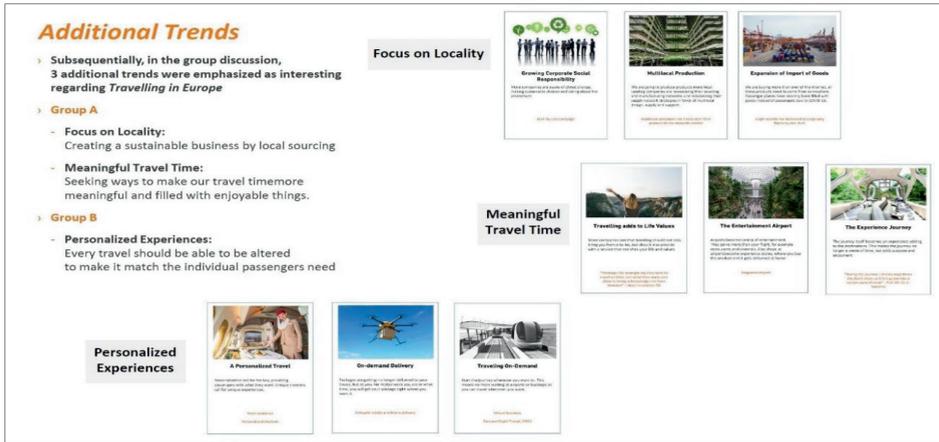
Figure C-6 — Additional Trends 'Travelling in Europe'

The seven selected trend categories will be used by participants in the next strategic design intervention in an exercise to empathise with end-users.

C-3 — ARC 3 — Taking Action of Design Intervention 3 — Empathising with End-Users

strategic design intervention *3* began with a recap of the previous strategic design intervention *2,* briefly explaining the relevant trends for *'Travelling in Europe'*. Based on the outcomes of the creative trends, the facilitators asked participants to identify the value drivers behind each trend, as each value has a value driver that motivates end-users to act in a future context, thus setting the trend in motion. Without revealing the trend details, *Figure C-7* provides an impression of the value factors behind the trends identified by the participants.

Figure C-7 — Value Drivers behind the Identified Trends

In the next step, the facilitators asked the participants to create a future user context of *'Travelling in Europe'* and consider the value drivers of travellers in that future context. *Figure C-8* shows the future context constructed by group A on the left and that of group B on the right. The groups share two overlapping values (Being in Control and Excellence). These two worldviews on the future context were based on extreme interpretations of how the world could look if the identified user values drive the future. Based on these worldviews and their driving values, participants ranked the values that future travellers in Europe will prioritise. In two smaller subgroups of three participants, they ranked the values that could be considered fundamental values and driving forces for future generations.

The participants selected the following user value drivers:

Nature – Sustainability

In today's world, sustainability is becoming an increasingly important factor in determining which mode of transport people choose for travelling. Environmentally conscious travellers are familiar with the term '*flight shame*,' which refers to the embarrassment over the emissions generated by air travel.

Being in Control

Being in control refers to how much influence travellers prefer over their journey. They want to shape the trip's course and easily manage any changes to their itinerary.

Freedom – Flexibility

Flexibility refers to how easily travellers can choose between different transport modes, their connections, and route options.

Convenience

The time we spend travelling partly influences how we wish to travel. For some, it is crucial to reach their destination as quickly as possible (efficiency). For others, the journey itself is the destination (slow travelling – enjoying the journey).

Excellence – Comfort

Some travellers value comfort and, therefore, choose modes that offer both comfort and excellent service.

Monetary Value

Price is a significant factor in travel choice. Trip availability, trip duration, number of transfers, and optional services influence the journey's cost.

The six value factors mentioned mainly explain why we choose certain modes. However, we identified four motivations for why people feel an urge or need to travel.

Escaping Routines

People want to escape their daily grind from time to time to relax in a different environment or be inspired by other cultures.

Discover New Experiences

Those who actively visit different destinations may wish to stay longer to gain new experiences.

Social Connections – Visiting Family and Friends

Travelling to visit family or friends helps maintain relationships and bonding.

Professional Motivations

Travelling for business purposes.

The facilitators continued the strategic design intervention *3* by introducing and presenting an exercise with *Future Personas* (see *Figure C-1 — Illustration of Six Personas in Future in the Context of Future Travelling*). Based on previously identified value drivers, we asked participants to reflect on their current personas and develop future ones. Through dot voting, participants indicated which personas would disappear in a future context and which would remain. In the next step, they determined how the personas would evolve based on the identified value drivers. Finally, participants were asked to identify any missing persona types they envisioned for the future.
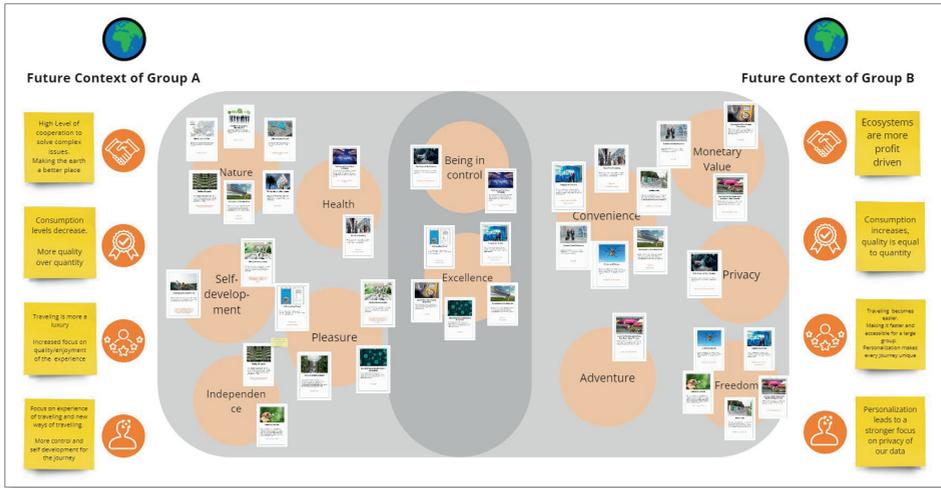
Figure C-8 — Future Context and Value Drivers of the two Participant Groups A & B

Participants found it easy to explain why they believed personas would change, disappear, or remain. The persona framework facilitated discussion among the participants. Through the *dot-voting* method, they expressed their individual opinions and prompted one another to justify their choices and discuss their value drivers. This exchange revealed conflicting views and enriched the debate. We used the persona framework to build consensus on selecting the three types of passengers that best reflect the values essential for future passengers. *Figure C-9* provides an overview of the persona discussion among the participants.
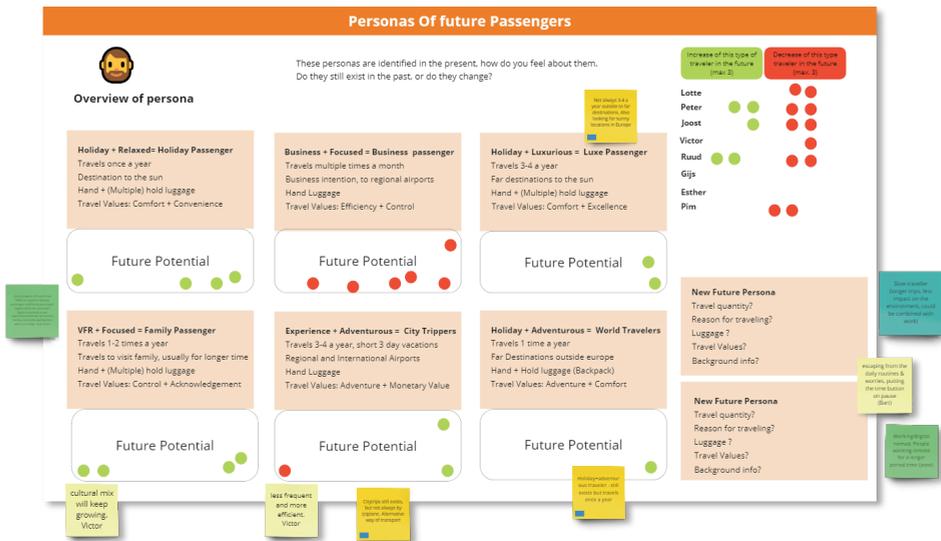
Figure C-9 — Miro™ Board Impression of the Discussion on Persona Framework

C-4 — ARC 3 — Taking Action of Design Intervention 4 — Envisioning the Future Context

In strategic design intervention *4*, the facilitators explained that a company's strategic design roadmap is guided by a clear vision of the future that encompasses its current values and aspirations. To create valuable product-service propositions for end-users in far-future scenarios regarding *'Travelling in Europe'*, we must first envision a plausible and desirable future and design a strategic roadmap to guide our company towards it.

We began the intervention by reviewing the results and findings from the previous strategic design interventions *1, 2* and *3*. This involved discussing the latest trends, values, and personas, which helped the participants to create new or updated personas for the envisioned future end-user context.

To gather all perspectives on future trends and value drivers, the facilitators tasked the participants with creating a front page of a newspaper from the year 2050. The exercise aimed to stimulate discussion within the group about potential future scenarios and, ultimately, to develop a shared future vision. Participants were asked to develop a title and subtitle and create visual representations for the articles they believed should appear on the front page. The newspaper had four guidelines:

1) At least one article should focus on the case company's role in the future.
2) The newspaper should incorporate the trends and values discussed earlier.
3) The scenarios presented must be far-future-oriented.
4) The newspaper should draw upon the entire domain of 'Travelling in Europe.'

Initially, it was suggested that the participants each create their own newspaper. However, they preferred working together in pairs and started making a list of ideas and headlines for the paper, which they quickly discussed to reach consensus. They then continued to work individually on creating the articles and had small intermediate discussions. To ensure that they also addressed the impact on future travellers in the articles, the facilitator had to intervene in some instances. The final front pages were a good combination of visual and textual information (see *Figure C-10 — Impressions of two Newspaper Front Pages*).

Figure C-10 — Impressions of two Newspaper Front Pages

In *The Editorial Meeting* exercise, participants created a newspaper front page by selecting each contributor's compelling and noteworthy articles. Initially, the duos presented their articles and identified common themes., which were then used to select suitable articles for the consolidated newspaper (see *Figure C-11*). Due to time constraints, the participants could not modify the editorial newspaper or engage in extensive discussions about missing articles or future concepts.

Better Times

10th anniversary EU zero-emission mobility network

Scan here to experience your seamless EU travel

10 year ago the first seamless EU-trip between Eindhoven and Barcelona took place. Travelers from Eindhoven were able to travel to Barcelona as they were used to travel to Amsterdam. Now, 10 years later this network is extended to all main cities in Europe, being completly zero-emission .

Traveling from EIN-BCN is like traveling from EIN-AMS

Baggage service from door to door

Seamless connected EU mobility system

EU ID Card

Train rails EU unified

One mobility system with multiple type of transport

Emission free/net zero

Toyota PAP Mirai

The new Toyota PeopleAirPod Mirai is hydrogen driven and can transport up to 5 adults and can carry up to 1,000 kg of cargo. The PAP can be rented on a daily basis starting from 0.5 bitcoin/day. All self-driving features are included to comply with SAE 5 level.

Vanderlande launches smart baggage logistics ecosystem handling door-to-door services in Major European cities.

Vanderlande is opening SmartBaggage Logistics EcoSystem handling door-to-door services.

Unified Travel going bankrupt due to security bridge - Passenger data was stolen from the server and the company couldn't recover user trust

Unified TRavel docs Provider (the company that is getting all travellers docs, tickets, at one central spot) is bankrupted. Due to security bridge

Figure C-11 — Impression of a News Paper 'Better Times' Front Page of a third Team

In the next exercise, participants formulated a vision statement inspired by the combined future worlds depicted in the newspapers and incorporated the value drivers they identified and agreed upon. To assist them in crafting a future vision statement, the facilitators provided the following format to complete: '*We … [the company] **want to…**[verb] + [an unmet need, desire] **for…** [a specific persona or target group] **in…** [the context of] **by…** [verb]+[the object: a mechanism, service, product, experience, value].'* The three participating teams created the following vision statements:

Team 1

We want to enable multi-modal sustainable travel experiences to become great memories by providing smooth, seamless, and value-adding services for baggage travel.

Team 2

We want to enable a comfortable journey for all travellers by offering sustainable and connected services.

Team 3

We want to facilitate seamless and personalised travel experiences by orchestrating sustainable travelling ecosystems into a one-stop platform enabling 'Mobility-as-a-Service' value propositions.

Due to time constraints, the facilitators were unable to collaborate with the teams to finalise a comprehensive vision statement. Consequently, they took the initiative to create one after strategic design intervention *4* and discuss it with the Airports management team. They then formulated the following vision statement:

Our passion for People-in-Travel and Smart Logistics drives us to orchestrate sustainable product-service ecosystems by delivering seamless, personalised, and predictable travel experiences.

Participants were asked to provide feedback on the vision statement by adding comments to the *Miro™* board (see *Figure C-12 — Snapshot of Miro™ Board with the Vision Statement and Feedback Comments*). People can interpret thoughts, ideas, and concepts differently, as words can have varying connotations. As a result, crafting a concise and precise vision statement was challenging during the session, as selecting the right phrasing and vocabulary was crucial. We therefore view the right formulation of the vision statement as an ongoing process, continually through various iteration.
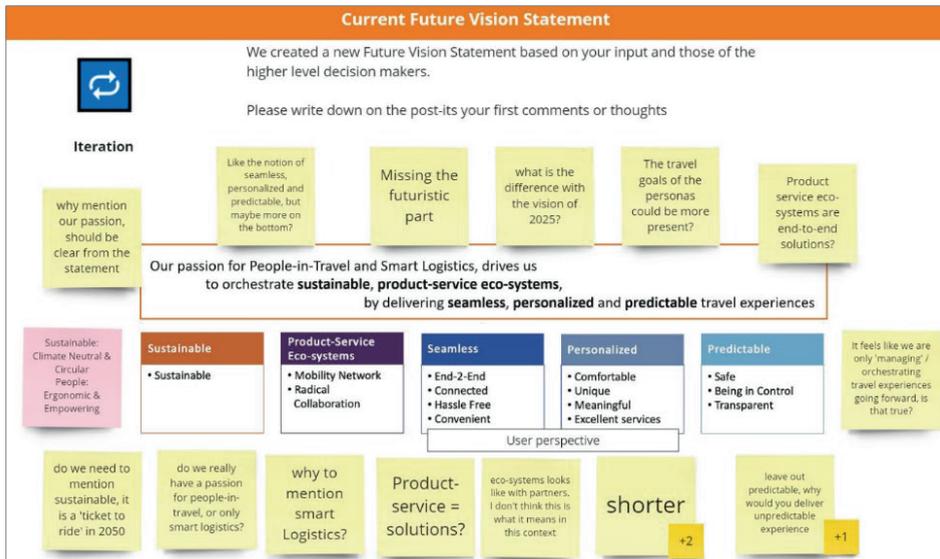
Figure C-12 — Snapshot of Miro™ Board with the Vision Statement and Feedback Comments

In the next intervention activity, the participants explored various future contexts that align with the future vision statement. In this case, a future world context scenario outlines how the landscape of *'Traveling in Europe'* could evolve based on the previously identified trend clusters and value drivers. The facilitators prepared four different future world contexts scenarios for travelling. In the previous strategic design intervention *3*, (*Empathising with Future Users*), we identified multiple types of passengers and multiple types of transport modes for the participants to consider. Due to the complexity *'Travelling in Europe'* scope, the facilitators opted to create four distinct future world context scenarios.

Furthermore, the facilitators recognised that there is no single dominant stage in the passenger journey to which the company should limit itself. Through an iterative clustering process, the participants examined all potential future world context scenarios. Their initial focus was on identifying contradictions within trends, value drivers, personas, airport values, and newspaper articles. Although they discovered multiple contradictions (such as personalised versus standardised), they could not position any two contradictions on a matrix to form four different worlds due to the inability to fit their insights. As a result, they clustered similar values with personas as advocates and matched all other materials to these personas. They combined specific personas as their spider wheel provided similar values. *Figure C-13* presents four potential future world context scenarios that they identified through an analysis of trends, news articles, and the values of the *Airports'* business unit. Each scenario represents a unique future context, which can either exist independently or coexist with others. These scenarios are distinguished by the value they offer to end-users, the experiences they provide, the stakes involved, and the responses

from businesses and governments. The facilitators explained that each scenario requires a unique elaboration of the underlying plans and activities.

1 — Our Conscious Future

In this scenario (see upper left quadrant of *Figure C-13*), companies work together in an ecosystem to create improved travel experiences and offer sustainable forms of travelling. Cities and governments strive to reduce emissions and meet climate targets. We travel more slowly and more consciously, aiming for a better world. Travellers are aware that their journeys contribute to an increased carbon footprint and therefore radically avoid polluting modes of transport.

2 — Our Connected Future

We focus on efficient and seamless global travel in this scenario (see lower left quadrant of *Figure C-13*)**.** Passengers want to enjoy better-connected experiences and hassle-free travelling. Companies and governments collaborate closely to develop integrated and finely meshed mobility networks of connected hubs. Local cities and governments encourage the use of public transport networks. Autonomous vehicles are extensively employed for passenger transport and goods logistics. New modalities like the *Hyperloop* are common.

3 — Our Personalised Future

In this scenario (see upper right quadrant of *Figure C-13),* most travellers prefer individual, personalised travelling experiences. This scenario offers exclusive travel experiences, with travellers receiving more personalised and on-demand travel services. However, privacy is a significant concern. A few companies have a monopoly on travel, driving new technology and creating new travel modalities. Governments promote a free-market economy, and urbanisation is occurring on a large scale.

4 — Our Data-Driven Future

Data is an essential driver for optimised and personalised transport services in this scenario (see lower right quadrant of *Figure C-13*. Services are accessible to a broad group of people at an affordable price due to automation and the use of personal data. A few large companies handle the data to create excellent services, while governments encourage smarter use of data systems. Airports are transforming into multi-modal hubs connected through data platforms and new technologies. Sustainable and personalised travel is evident in new aircraft types, focusing more on sustainable user experiences.
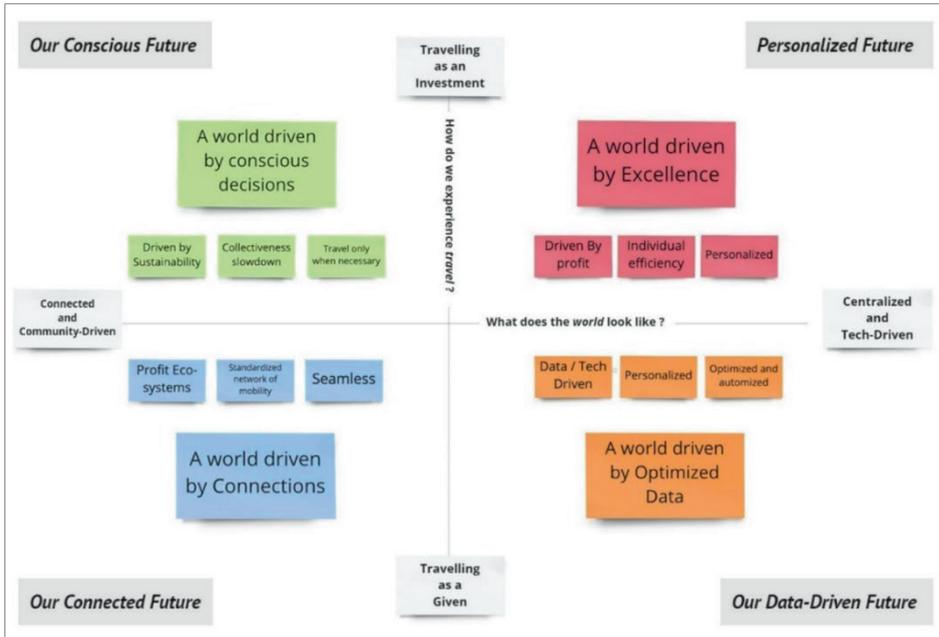
Figure C-13 — Four Future World Context Scenarios for Travelling

In *Figure C-14*, the facilitators visualised the four future world scenarios to establish a visual language as a reference for group discussion.

Figure C-14 — Future World Context Scenarios for Travelling Visualised in Mood Boards

C-5 — ARC 3 — Taking Action of Design Intervention 5 — Ideating End-User Value Propositions

strategic design intervention *5* asked participants to develop product-service value propositions for the long-term future, i.e. ideas intended for *Horizon 3* of the strategic roadmap according to Simonse (2018). The facilitators challenged participants to consider radical innovations that address the latent needs of end-users in a future world context, which are innovative for both the market and the case company. For engineers without strategic design skills, this is a challenging task. The facilitators encouraged participants to empathise with future end-users and understand their perspectives. We urged them to focus on the long-term future. For inspiration, the results of previous strategic design interventions were presented again, including the latest version of the *Future Vision* statement and the identified trends and values. Furthermore, the facilitators referred to the six personas and the four future world context scenarios.

To get participants to start ideating ideas, facilitators began with a brain-writing exercise. They asked the participants to respond to *'How might we?'* questions with innovative ideas. Three teams of four participants each answered eight questions to generate ideas for a posed problem. After four different two-minute brainstorming rounds, the participants produced 48 potential product-service solutions.

In a second creativity exercise called *'The Crazy Eight'*, participants were asked to generate solutions to eight extreme scenarios that might occur. For example, what value could the case company provide if *'the digital world is broken'?* With eight questions and twelve participants, this exercise yielded twelve solutions per *'crazy'* question. Both creativity exercises intend to spark creativity and, above all to demonstrate how to generate numerous solutions with your team in a short time.

Following the creativity exercises, the three teams were asked to group their ideas into clusters and identify a common theme for each cluster (see *Figure C-15*). Through discussions, they reached a consensus on a unifying theme. The teams employed *dot-voting* to select three themes they deemed promising and worth further ideation and iteration.
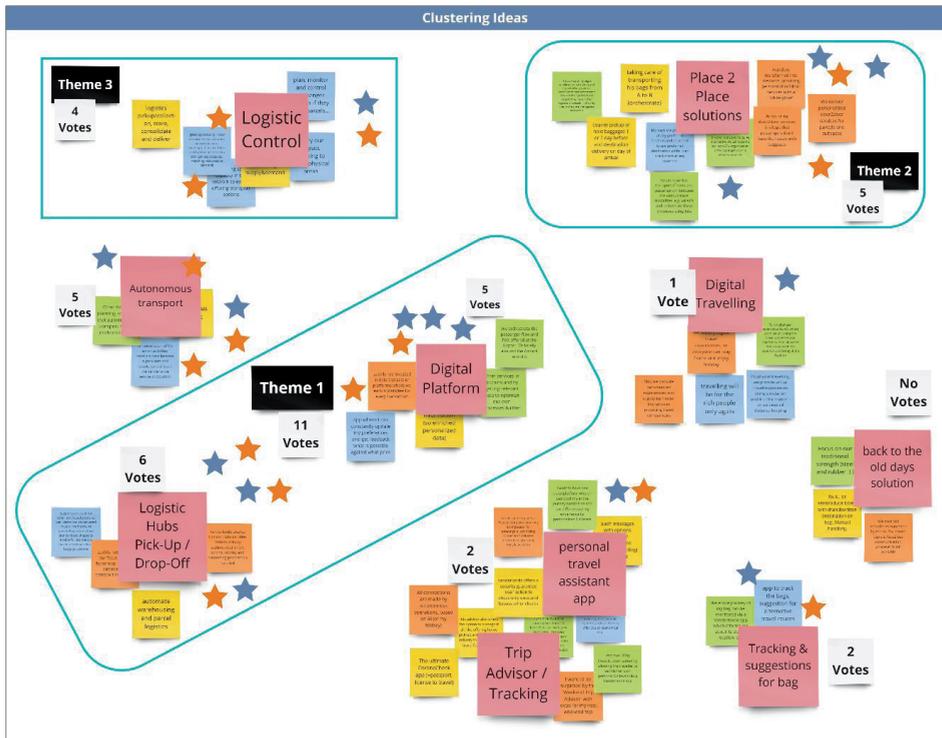
Figure C-15 — Clustering Ideas into Themes

Guided by a provided concept canvas (see *Figure C-16*), each team was asked to concisely detail six fundamental aspects of the three product-service themes:

1) A concise description of the problem or opportunity from an end-user perspective.
2) A description of the solutions that could address the problem or opportunity.
3) Identification of the underlying trends that participants believe are occurring.
4) A description of the technology as a necessary means to create the intended product-service value proposition.
5) A description of the role the company should play to foster the future concept idea.
6) Finally, identification of potential business partners to collaborate with and build a new ecosystem.

Table C-1 — Summary of Selected Themes after Voting

| Nr.	Identified Themes for Ideas Clusters	Selected Themes	Number of Votes
1	*Digital Platforms to Support Logistics Hubs combined with*	*Theme 1*	*11*
2	*Pick-Up / Drop-Off solutions*		
3	*Place-2-Place Solutions — Transporting Goods from A to B*	*Theme 2*	*5*
4	*Logic Control — Managing Logistics Operations*	*Theme 3*	*4*
5	*Autonomous Transport*	*Not selected*	*5*
6	*Personal Travel Assistant — Trip Advisor & Tracking*	*Not selected*	*2*
7	*Digital Travelling*	*Not selected*	*0*
8	*Back to the Old Days Solutions*	*Not selected*	*0*
9	*Tracking and Suggestions for Bags*	*Not selected*	*0*

295
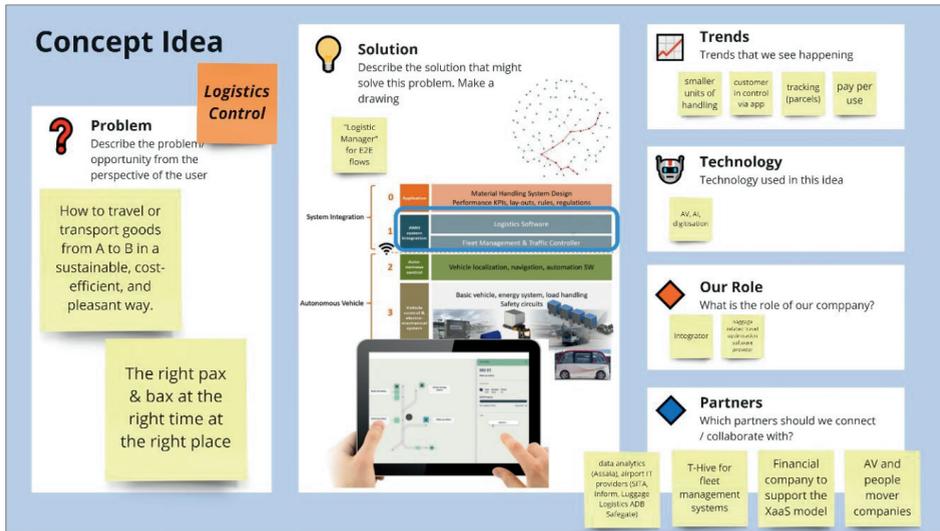
Figure C-16 — Example of a Concept Canvas — Describing 'Logistics Control' Product-Service Idea

The three teams developed nine original and innovative ideas for product-service value propositions (see *Table C-1).* They then presented their ideas to one another, discussing and discovering that some concepts were similar. A second voting round was conducted, in which three promising concepts were chosen through majority votes. These three product-service concepts were selected as the foundation for the strategic roadmap of strategic design intervention *6, Roadmapping & Connecting the Dots.*

C-6 — ARC 3 — Taking Action of Design Intervention 6 — Roadmapping & Connecting Dots

A strategic design roadmap for a company is guided by a clear future vision that encompasses customer values and articulates the company's core values and aspirations. It provides directions for the company to navigate towards its desired future state and fulfil its aspirations. With this desired future in mind, in strategic design intervention *6,* we aimed to create a roadmap that delivers significant value to the case company's customers and end-users. More specifically, the case company's goal was to provide value to travellers in a potential future setting, focusing on a scenario likely to occur in the distant future. In this intervention, we explored the specifics of the formulated future vision statement and its potential impact. Additionally, we discussed how this vision could shape the *Overarching Servitization Strategy* design roadmap and assist the company's *Strategic Design* team in prioritising tasks to achieve the desired outcome. The facilitators took the three selected product-service concepts from strategic design intervention *5* to compose a strategic design roadmap. In a follow-up meeting, they evaluated the success of the vision and strategic design roadmap with the participants, reviewed the three

Horizons 1, 2, and *3* to ensure alignment with the company's objectives, and identified any gaps or areas for improvement. Finally, the facilitators drew up the final strategic design roadmap and proposed a plan of action and tasks needed to realise the vision of the future. *Figure C-17* shows the strategic roadmap containing the core elements of innovation roadmap frameworks (Phaal & Muller, 2009; Simonse et al., 2015).
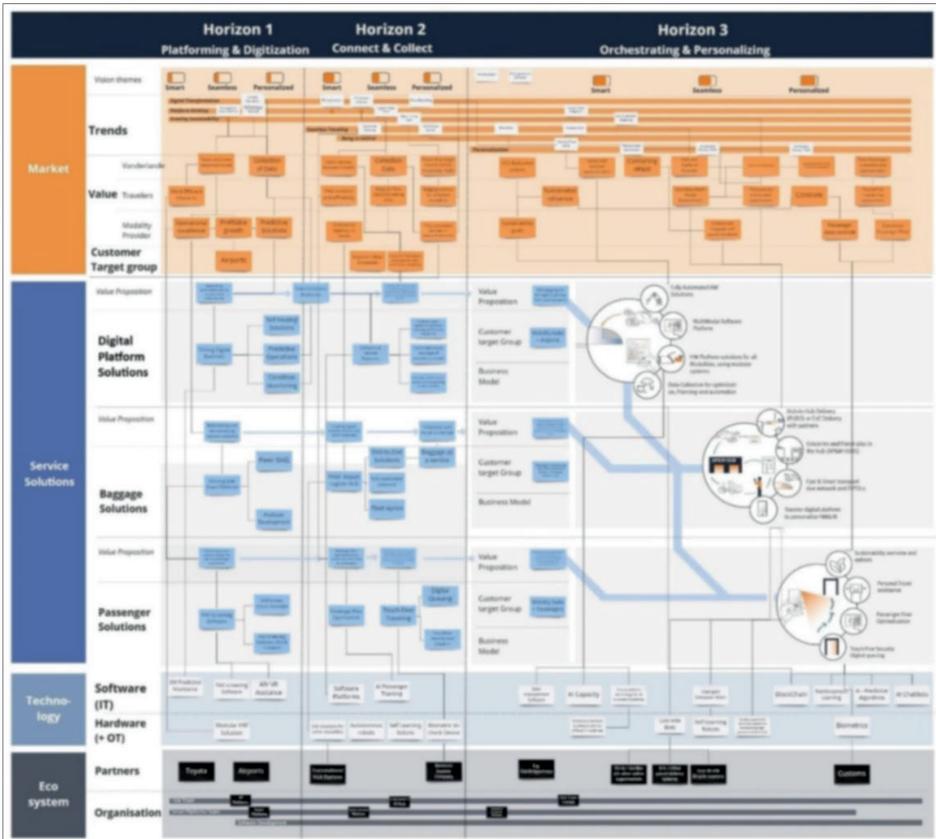

Figure C-17— A Preliminary Version of the Case Company's Strategic Design Roadmap (blurred)

Appendix D   ARC 4 — Taking Action — Executing TLN

D-1 —   ARC 4 — Taking Action in Design Intervention 1 — Kick-Off

In the *TLN* project, we engaged 50 participants and formed mixed teams for each business unit, comprising employees from various functions, business sections, and disciplines, as indicated in *Table 7-1 — TLN Participants*. With this approach, we achieved two goals of *TLN.*

- We believe that creating a product-service innovation strategy should be a collective effort involving all departments of the company. Therefore, we engaged both the internal environment (including the innovation and development departments from the technology domain) and the external environment (such as the sales, product, and account managers from the customer or market domain) in the strategic process.
- Organisational scholars (Hussain et al., 2018; Kotter, 2012) argue that involving employees in change processes is essential. This fosters commitment and ensures acceptance of new innovation processes and strategies. Through their connections, employees are closely involved in the daily lives of customers, users, and suppliers, making it easier for them to empathise with these groups. As they are engaged in daily operational processes and connected to the outside world, unlike board management, they play a crucial role in ensuring that new strategies are well-informed, being formulated 'bottom-up' rather than 'top-down'.

With the statement, *'As no one can predict the future, we can only plan for it'*, the *Strategic Design Innovation Lead* began the kick-off by explaining the purpose of *TLN*. She elaborated as follows:

1) Driving the future by defining the case company's future vision and ambition regarding product-service value propositions.
2) Identifying, mapping, and assessing future trends and change signals.
3) Exploring future user scenarios to inform the long-term product-service innovation strategy.
4) Generating ideas for future *PSEs* and deploying emerging technologies.
5) Proposing product-service value propositions and their associated innovation project priorities.

TLN aims to explore future user context scenarios and design a product-service innovation strategy to navigate towards a plausible and preferable future. It seeks to provide the components for creating actionable strategic roadmaps for business units *A1, B2* and *C3* as drivers for designing product-service value propositions. Consequently, it will push the boundaries of current product-service portfolios and encourage cross-fertilisation among different departments, disciplines, and business units, opening up new perspectives.

During the *Kick-Off* meeting, the *Organising Team* and the three *Facilitator Teams* introduced themselves as the teams guiding the *TLN* interventions. The meeting continued with the presentation of results from the extensive trend analysis conducted by the *Trend Team* in preparation for this *Kick-Off* session and *Intervention 2*: the

Trends & Signals of Change workshop. As trend research requires design skills that most participants do not (yet) possess, we assigned the *Trend Team* to organise this preparatory trend research ahead of *TLN*. An additional advantage was that it saved time by allowing participants to get a head start and focus on analysing and discussing the relevant trends for their business domain.

The *Trend Team* identified a total of 270 trends and signals of change according to a DEPEST classification (refer to *Table D-1*). These were validated through interviews with 11 external experts, analysis of industry reports from banking and consultancy businesses, and interviews with key accounts. Each trend was briefly described, visualised with a trend card, and posted on a *TLN Miro™* board (see *Figure D-1).* Additionally, the *Trend Team* grouped similar or related trends into 111 trend clusters and created a classification with three categories (see third row of *Table D-1*).

1) Strongly developing trends that experts consider critical and may have a major impact on the three business domains, and therefore are worth exploring and closely monitoring (purple-coloured clusters, 26 in total, see *Figure D-1*)
2) Significant trends that are nascent and have an impact on the three business domains. They are stable in their development but too important to ignore (blue-coloured clusters, 26 in total, see *Figure D-1*).

Significant trends that have been present for some time but have a medium or low impact on the three business domains (grey-coloured clusters, 59 in total, see *Figure D-1*).

The *Kick-Off* meeting concluded by asking participants to share their expectations regarding the learnings and outcomes *of TLN* on a *Miro™* board.

Table D-1 — Summarising Trends & Trend Clusters

Summarising Trends & Signals of Change		
270 Trends & Signals of Change categorised into 6 categories: • *Demographic* • *Economic* • *Political & Legal* • *Ecological* • *Socio-Cultural* • *Technological*		
Divided into *111 Trend Clusters*		
26 Trend Clusters are critical and worth exploring and monitoring	*26 Significant Trend Clusters emerging but stable*	*59 Significant Trend Clusters with medium or low impact*

D-2 — ARC 4 — Taking Action in Design Intervention 2 — Trends & Signals

The second intervention—*Trends & Signals of Change*—provided the trends prepared in advance by the *Trend Team*. Participants could add to trends or signals if they thought

some were still missing. *Figure D-1* displays the results from the extensive trend analysis conducted by the *Trend Team.*
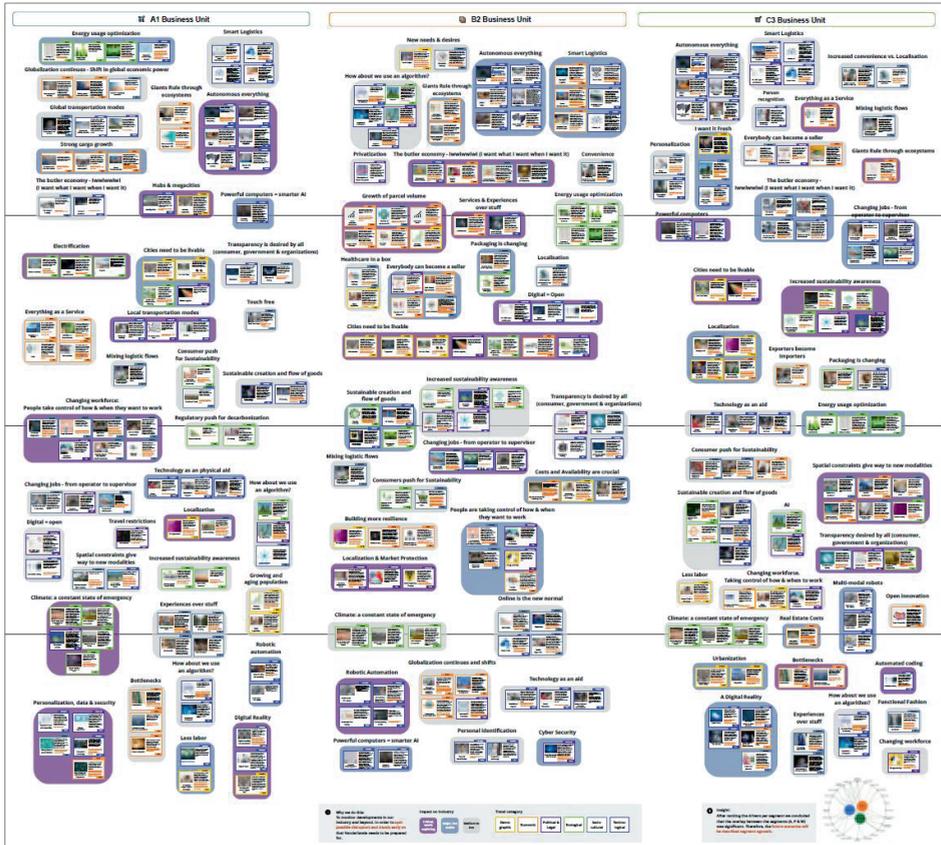
Figure D-1— 270 Trends divided into 111 Trend Clusters

In the first exercise, *Business Boundary Mapping,* participants examined which trends and signals affect their business domain. By broadening the scope of work to encompass the area in which they believe their business unit should operate, they extended the boundaries of research and identified what would remain outside its scope. *Figure D-2* shows an example of business unit *A1's* focal area along with its adjacent business areas and subcategories. It also indicates the out-of-scope research areas.
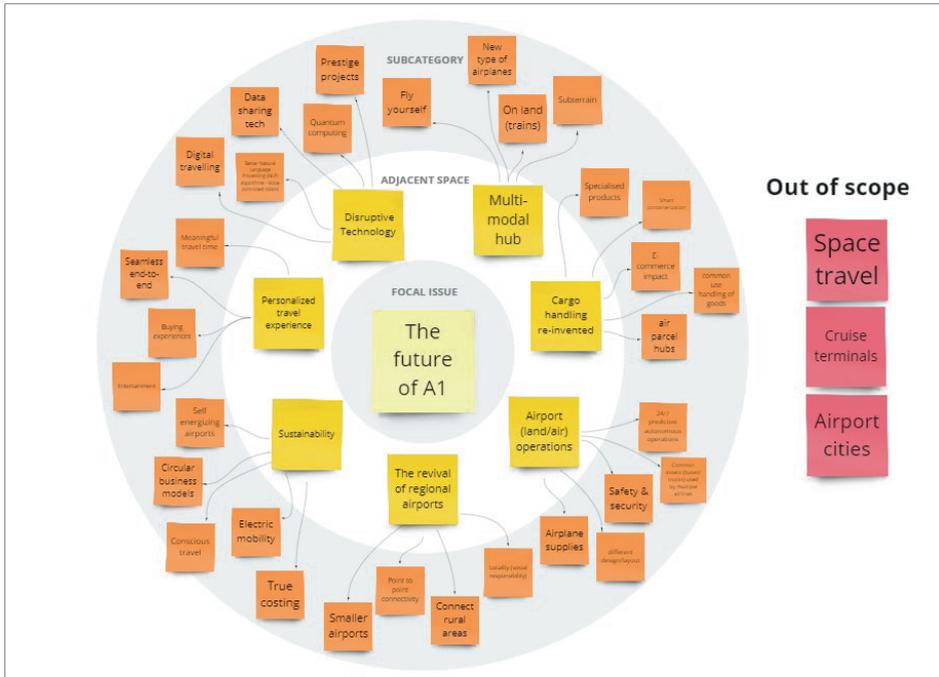
Figure D-2 — Example of a Business Boundary Map of Business Unit A1

In the next task, participants ranked the trends and signals in an *Impact Matrix* with the vertical axis representing the degree of impact on their business domain (medium or high) and the horizontal axis indicating the uncertainty (medium or high) of trends and signals occurring over an extended period. This task aimed to raise awareness and focus among participants regarding the impact of the identified trends and signals and their likelihood of occurrence. The *Impact Matrix* is a sense-making tool that provides participants with a clear overview of critical trend clusters for their business domain. Below, we summarise the conclusions for the business units *A1, B2* and *C3.*

Business Unit A1 Impact Matrix Conclusions

Most impactful and certain trends: Energy Usage Optimisation, Automation, AI, Reduced Labour, the Need for Liveable Cities, Personalisation, and Data and Security.

Most impactful yet uncertain trends: Strong Cargo Growth, Local Transportation Modes, Climate Disasters, Digital Reality, and Hubs.

Business Unit B2 Impact Matrix Conclusions

Most impactful and certain trends: changing jobs, AI, Data and Security, Sustainability, Robotics and Automation, Changing packaging, Smart Logistics, the Rise of Individual Sellers, Dominance of Ecosystems by Major Players, and the Importance of Cost and Availability.

Most impactful yet uncertain trends: the Need for Liveable Cities, Prioritisation of Services and Experiences over Material Goods, and the Butler Economy.

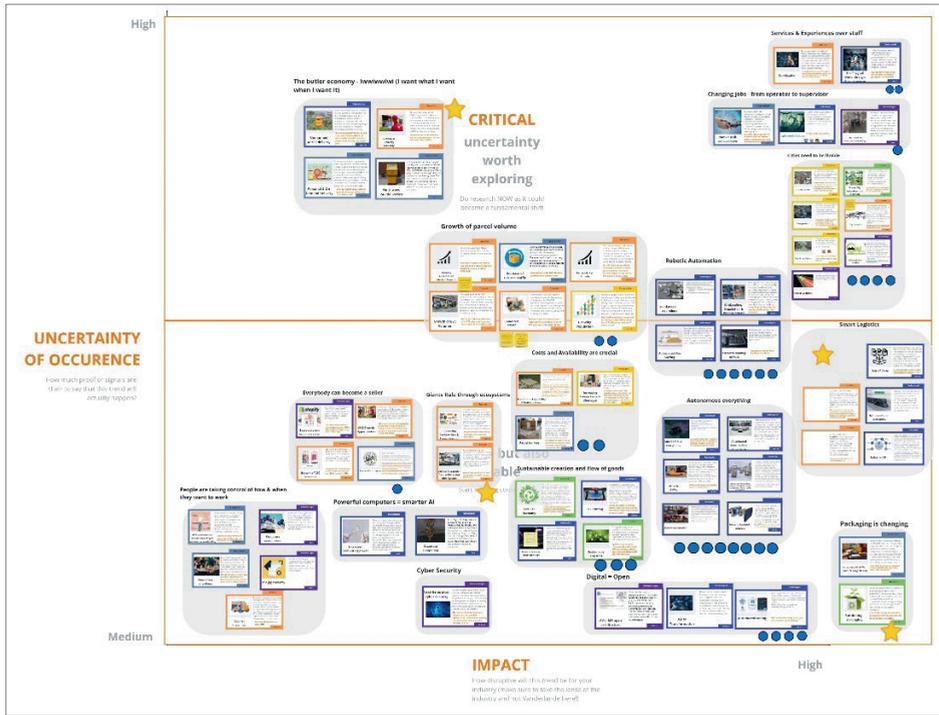As an example, *Figure D-3* shows the Impact Matrix of business unit B2.

Figure D-3 — Example of an Impact Matrix for Business Unit B2

Business Unit C3 Impact Matrix conclusions

Most impactful and certain trends: the Butler Economy, Hanging Jobs, Automation, Spatial Constraints, and Sustainability Awareness.

Most impactful yet uncertain trends: Localisation, a Digital Reality, Everybody Can Become a Seller, and Servitization.

Table D-2 summarises the number of impactful certain and uncertain trend clusters for each of the three business units.

Summarising Intervention 2 – Trends & Signals		
111 Trend Clusters identified		
Business Boundary Mapping examining in-scope trend clusters		
38 Trend Clusters impacting business unit A1	**35 Trend Clusters** impacting business unit B2	**39 Trend Clusters** impacting business unit C3
Impact Matrix assessing the impact & likelihood of trend clusters		
7 Trend Clusters Impactful & Certain for A1	**10 Trend Clusters** Impactful & Certain for B2	**5 Trend Clusters** Impactful & Certain for C3
5 Trend Clusters Impactful & yet Uncertain for A1	**3 Trend Clusters** Impactful & yet Uncertain for B2	**4 Trend Clusters** Impactful & yet Uncertain for C3

D-3 — ARC 4 — Taking Action in Design Intervention 3 — Envisioning Future Context Scenarios

Intervention 2 – Trends & Signals engaged participants in analysing the impact and likelihood of trend clusters relevant to their business unit. *Intervention 3 – Envisioning Future Context Scenarios* encouraged the participants to imagine, describe, and visualise a future lifeworld based on the relevant trend clusters within their business domain. They began with an exercise to identify the user value drivers behind the identified trend clusters. Based on the exercise results, the *Organising Team* compiled an overview of user value drivers, including the overlapping drivers across the three business units *A1, B2* and *C3* (see *Figure D-4*).
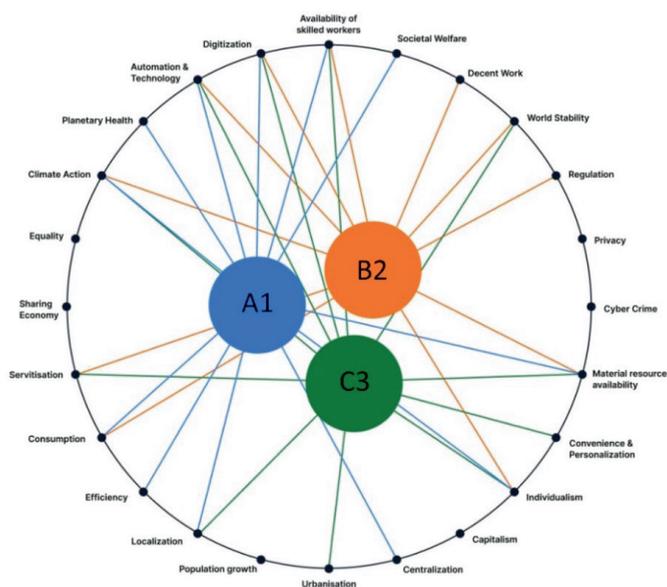

Figure D-4 — User Value Drivers Across Trend Clusters of Business Units A1, B2 and C3

Using the *Newspaper Front Page* exercise, the participants (working in pairs) created two newspaper front pages issued in 2050: one for the *Better Times* featuring primarily positive news, and one for the *Daily Doom* with negative news. Both front pages outline a 2050 worldview that includes news items affecting the business unit's product-service portfolio. This exercise engaged participants in future lifeworld contexts to explore different scenarios and better empathise with future customers and end-users. It inspired the development of new *PSSs* in subsequent exercises. *Figure D-5* shows two front page examples from the *Better Times* and *Daily Doom* created by participants from business unit *C3*.
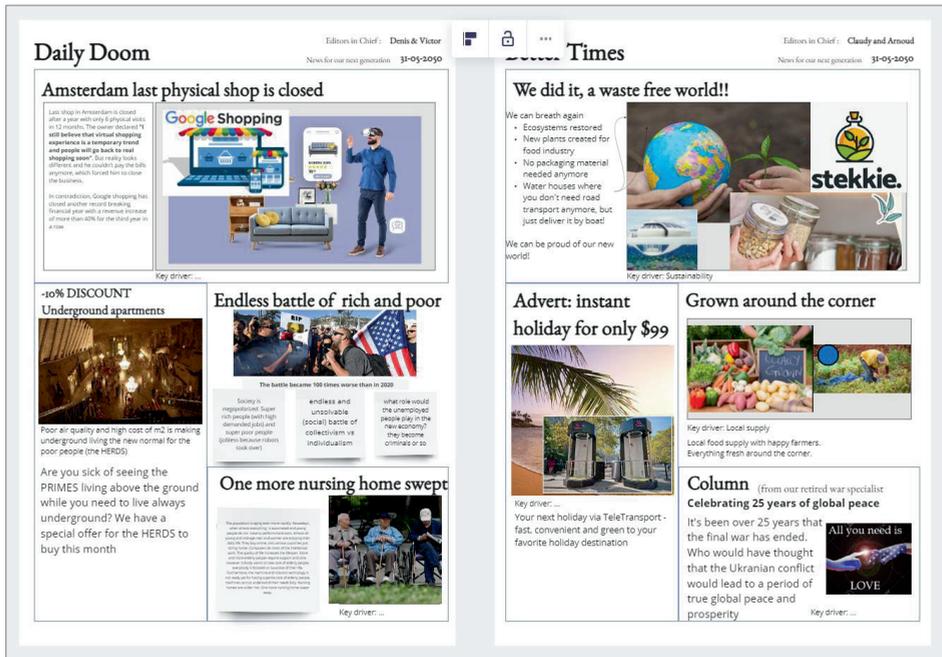

Figure D-5 — Example of Newspaper Front Pages of Better Times and Daily Doom (Business Unit C3)

We summarised the number of *Newspaper Front Pages* written by participants from the three business units in *Table D-3*

Table D-3 – Summarising the Newspaper Front Page Exercise

Summarising Intervention 3 – Envisioning Future Context Scenarios		
24 User Value Drivers *identified behind Trend Clusters*		
Editing the **'Better Times'** *front page anno 2050 inspired by user value drivers of impactful trend clusters*		
2 'Better Times' front pages for business unit A1	**3** 'Better Times' front pages for business unit B2	**2** 'Better Times' front pages for business unit C3
Editing the **'Daily Doom'** *front page anno 2050 inspired by user value drivers of impactful trend clusters*		
2 'Daily Doom' front pages for business unit A1	**3** 'Daily Doom' front pages for business unit B2	**2** 'Daily Doom' front pages for business unit C3

Intermediate Consolidation Intervention by the Organising Team

Processing the results from the *Trends* & *Signals*, *Impact Matrix,* and *Newspaper Front Page* exercises for the three business units requires design skills that only some participants possess. To address this and save participants' time, the *Organising Team* held a separate intermediate consolidation workshop during the summer break to interpret, consolidate, and conclude the outcomes of *Interventions 1, 2,* and *3*. They used these results to create four future world context scenarios, which served as input for *Intervention 4 – Ideating Future User Scenarios.* The team visualised (see *Figure D-6)* and briefly described the four future world context scenarios.
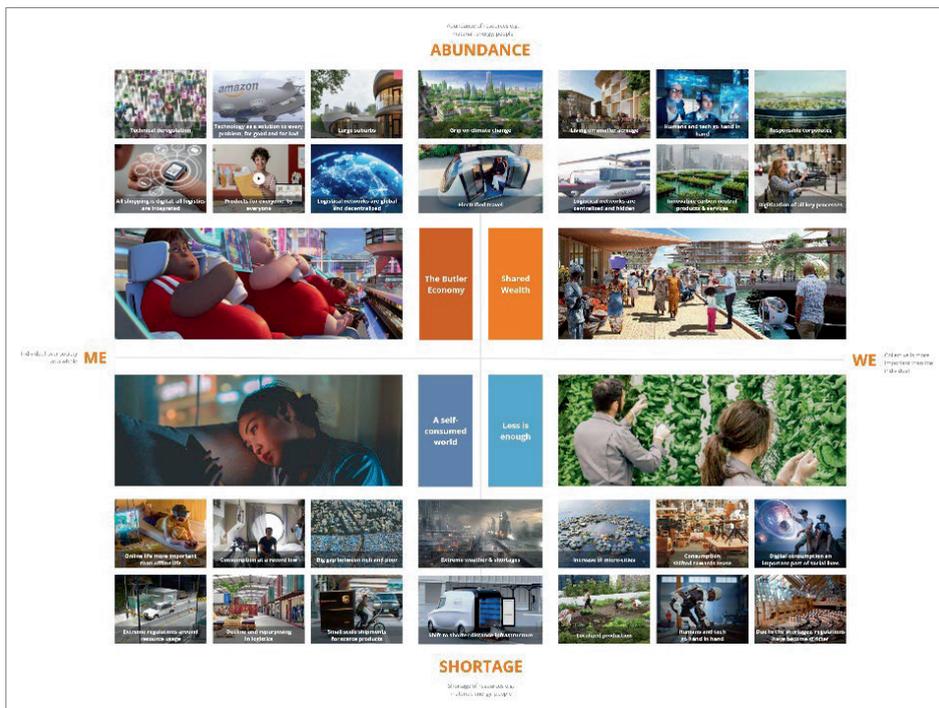

Figure D-6 — Future Lifeworld Context Scenarios

The Butler Economy

In this world, the rapid pace of technological advancements satisfies our ever-increasing hunger for convenience and promises a brighter, more efficient future. We strive to bring wealth to all, fostering a society with a solution for everything. By removing regulations, we promote technological solutions to prevent or adapt to climate change. We utilise our technologies for personal progress and comfort. Nothing is too ambitious to achieve the human goal of progress. Due to automation and digitisation, you can obtain anything you want anytime, anywhere. Individual comfort is paramount if you're willing to pay and are one of the fortunate few who can afford it. Material resources are abundant for all those solutions as we extend our resource extraction to other planets like Mars. Unhealthy

working conditions for humans no longer exist as robots take over most of the workforce. Companies are on an acquisition spree, buying organisations to expand their networks and provide integrated and complex services. Corporate giants such as Amazon and Alibaba dominate this world.

Shared Wealth

In this world, we strive to bring wealth to all, fostering a society where everyone can thrive. By becoming more aware of our impact, we can live in harmony with our surroundings, inspiring hope for a more equitable future. We exist in a collaborative world where people work together to achieve the best results. The threat of global warming and political instability has compelled global economies to rethink their operations entirely. Instead of solely relying on the worldwide supply chain, local production methods such as 3D printing make communities self-sufficient. We focus on short, localised, and decentralised networks that offer the highest level of resilience. Personal vehicles have been banned in city centres, leading to a rise in shared logistics and transportation methods. The ageing population has compelled us to be prudent with our resources, and we have turned towards social healthcare systems where the young care for the elderly. Technology assists us with tasks we prefer to avoid through robotic automation. A push for transparency has urged companies to become responsible contributors to planetary health. In this world, economic success is measured by the overall health of the community and the planet.

A Self-Consumed World

As we navigate this world, let us remember that the depletion of natural resources may lead to declining consumerism. However, this scarcity can also shift our focus towards the short term and increase our individualism. Let us embrace this shift as an opportunity to innovate and find sustainable solutions for our benefit and that of future generations. There is extreme unrest. It is every human for themselves. Natural disasters occur daily, causing disruptions and creating bottlenecks for logistics. In major cities, the air quality is so poor that you can only go outside with an air-filtering mask. The depletion of natural resources makes day-to-day life difficult. People have adapted by moving their lives online and into the Metaverse. Privatised organisations have found a way to profit from this unrest and insecurity. The gap between rich and poor is greater than ever. The haves live in small, closed-off, and well-maintained communes, whereas the have-not's resort to living in the remnants of what our world has become.

Less Is Enough

In this world, scarcity has brought us closer together, highlighting the power of collective responsibility and the potential for greater achievements. It serves as a reminder that we are all in this together, fostering a sense of unity and shared purpose. The world is in trouble. Due to climate disasters and geopolitical unrest, there are severe shortages. However, we know that with collective responsibility, we can achieve more than we could alone. The world has become highly regulated as a solution to combat climate change and ensure fair distribution of resources. Trees, rivers, and oceans have been granted human rights. Polluting them is akin to killing a person and results in lengthy prison sentences. We

have been compelled to adopt a reduce, reuse, and recycle mindset. The availability of energy and material resources is shared equally within our local communities. Some neighbourhoods have already achieved a 100% circular economy, and many others are progressing towards it. Housing is small and shared, accommodating many in limited space. Circular hubs maximise the utility of every material we have. We source what we need locally. We measure the world economy using Gross Domestic Purpose instead of Gross Domestic Product.

TLN's Organising Team developed the four scenarios by considering the tensions between value drivers identified by participants in their *Trends & Signals* exercises. On the vertical axis, the team noted a tension between *'Abundance'* and *'Shortage.'* Meanwhile, on the horizontal axis, the team recognised a tension between an individualistic society, *'Me,'* and the collective *'We.'* This resulted in four future world context scenarios, as shown in the quadrants of *Figure D-6,* which participants explored in the next intervention *Ideating Future User Scenarios.*

D-4 — ARC 4 — Taking Action in Design Intervention 4 — Ideating Future User Scenarios

Before starting, the facilitators presented the outcomes of the *Organising Team's* workshop results. In this workshop, the *Organising Team* consolidated the result of *Interventions 1, 2, and 3* into four future world context scenarios as input for creative exercises.

We engaged participants engaged in an exercise to find answers to *'What If'* questions. This exercise is drawn from the work of Voros (2017), who distinguish six types of scenarios to explore and assess: *Preposterous, Possible, Plausible, Projected, Probable, and Preferable Future Scenarios* (see *Figure D-7).* They argue that increased speculation—about everything—makes reality more malleable. The ideas generated by speculative design enhance the chances of achieving desirable futures. While we cannot predict the future, we can explore possible and plausible scenarios. Being aware of these scenarios also allows us to steer the future towards a preferable outcome. As it is challenging to envision change before it occurs, especially on a global scale, we engaged participants in exercises exploring *Future Lifeworld Context Scenarios* (depicted in *Figure D-6* and described in *Section D-3*) to understand how certain events might alter the existing values and beliefs of end-users living in plausible future scenarios and how this impacts the service innovation strategy of the three business units.

Voros' framework offers a structured approach for exploring different potential futures. As the Preposterous and Projected futures are not applicable to *ARC 4*, we focus on four relevant future scenarios for *ARC 4*:

Possible Futures

These scenarios explore what could happen based on known scientific principles and technological advancements. They are not constrained by current limitations but instead push the boundaries of what might become feasible in the long term. In our creative

exercise, participants examined radical innovations, emerging technologies, and disruptive trends that could redefine industry standards. For instance, advancements in AI-driven automation, bioengineering, or space-based manufacturing could lead to entirely new business models and user expectations. While not all possible futures will materialise, considering them allows organisations to identify early signals of change.
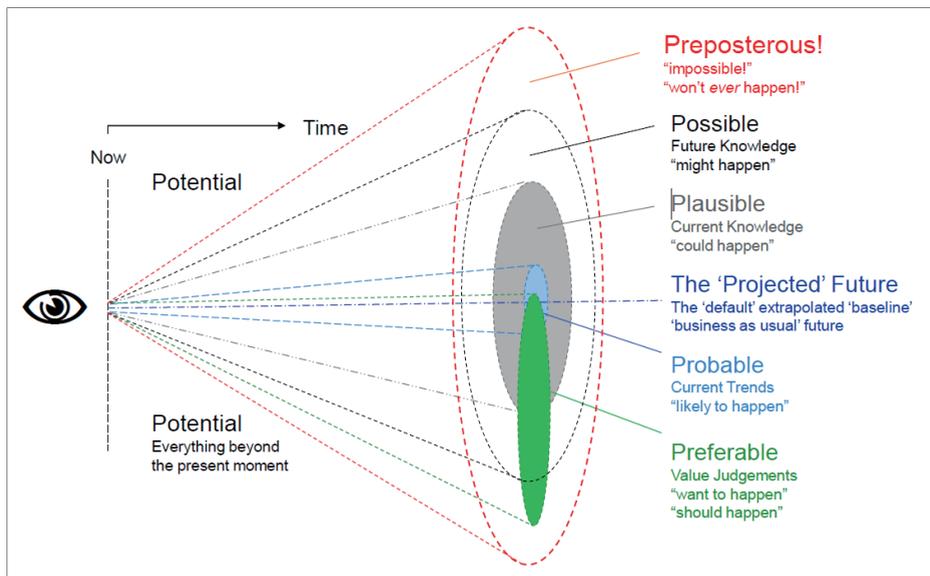

Figure D-7 — Cone of Future Scenarios (Voros, 2017)

Plausible Futures

These scenarios consider what might happen based on extrapolations from current trends, policies, and societal shifts. Unlike possible futures, plausible scenarios remain within the realm of likelihood given today's trajectory. Participants explored shifts in regulatory landscapes, consumer behaviours, and global market dynamics that could significantly impact service innovation. For example, the increasing emphasis on sustainability and circular economy principles might reshape business practices, influencing *PSEs*. This scenario planning helped participants anticipate challenges and opportunities within foreseeable contexts.

Probable Futures

These scenarios reflect what is likely to happen based on historical patterns, existing constraints, and momentum in technological and economic development. While probable futures tend to align closely with present trajectories, they also highlight areas where disruptive forces could reshape industries. Participants analysed market data, competitor strategies, and technological adoption rates to assess probable future states. This exercise helped identify risks, stability factors, and potential inflection points that could accelerate or hinder servitization strategies.

Preferable Futures

These scenarios focus on what should happen—outcomes that align with organisation's or society's aspirations and values. Preferable futures represent strategic goals, such as fostering inclusive innovation, ensuring environmental sustainability, or enhancing end-user-centricity. Participants envisioned ideal outcomes for their business units, outlining actionable steps to transition towards these goals. They considered how strategic partnerships, policy interventions, and ethical design principles could shape a more desirable future for end-users. By aligning preferable futures with company strategy, organisations can work proactively to influence long-term change.

By engaging in scenario-building, participants broadened their perspectives on product-service innovation. The interplay between these four scenario types encouraged them to think critically about how *PSEs* might evolve and how their organisation could remain adaptive and resilient. This exercise of exploring future end-user contexts fostered an agile approach to creating an *overarching servitization* strategy—one that is responsive to uncertainty, informed by strategic foresight, and driven by visionary yet achievable goals.

During the exercise, participants formulated *'What If'* questions based on the *Newspaper Front Page* and *Impact Matrix* formats. To stimulate creativity, the facilitators provided several example questions and encouraged participants to expand the list. For example, participants from the A1 business unit added 43 *'What If'* questions (see *Figure D-8*). From these questions, the participants selected six questions with the most impact on their business unit for further elaboration. In breakout rooms, participants worked in pairs to map out the consequences of their selected *'What If'* questions into technological, demographic, economic, ecological, political, and socio-cultural dimensions. *Figure D-9* shows an example of how a single *'What If'* question from business unit *A1* generated 36 future user scenario ideas. At the end of the exercise, participants selected the most promising scenarios through voting.
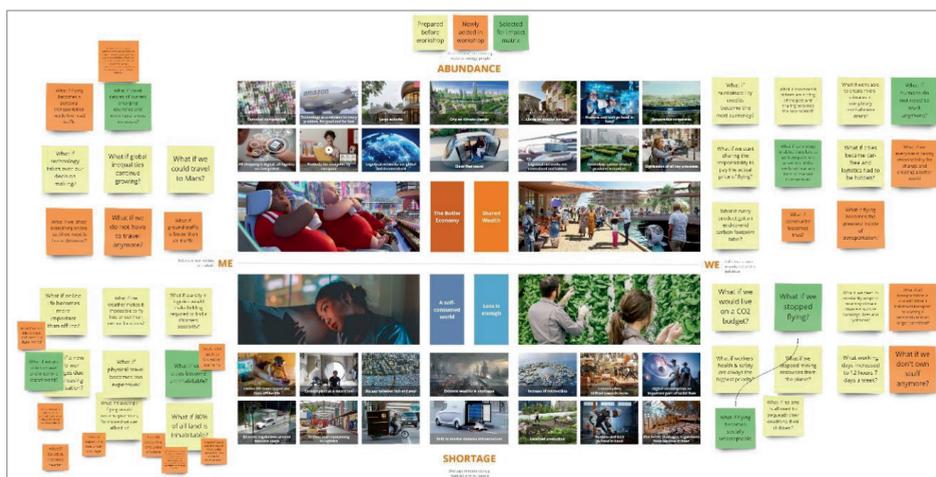

Figure D-8— Illustrating 43 ''What If'' Questions from Participants A1 Business Unit

Figure D-9 — Illustrating the Impact of a Single 'What If' Question

Table D-4 Summarises the results of intervention 4, *Ideating Future User Scenarios.*

Table D-4 — Summarising the Results of Intervention 4– Ideating Future User Scenarios

Summarising Intervention 4 – Ideating Future User Scenarios		
Discussing **108** **'What-if' Questions**		
43 *Questions in business unit A1*	**30** *Questions in business unit B2*	**35** *Questions in business unit C3*
Answering 'What-if' Questions resulted in a selection of **23** *Future User Scenarios* for Ideating Product-Service Value Propositions		
6 *Future User Scenarios selected in A1*	**9** *Future User Scenarios selected in B2*	**8** *Future User Scenarios selected in C3*

D-5 — ARC 4 — Taking Action in Design Intervention 5 — Ideating End-User Value Propositions

This intervention was built on the selected future user scenarios from the *'What If'* exercise in *Intervention 4.* In *Intervention 5 – Ideating End-User Value Propositions* we engaged the participants in the *'How Might We'* exercise and challenged them in groups of two or three to develop different solutions for each of the selected future user scenarios. *Figure D-10* shows an example of how the participants concretised *'How Might We'* questions.
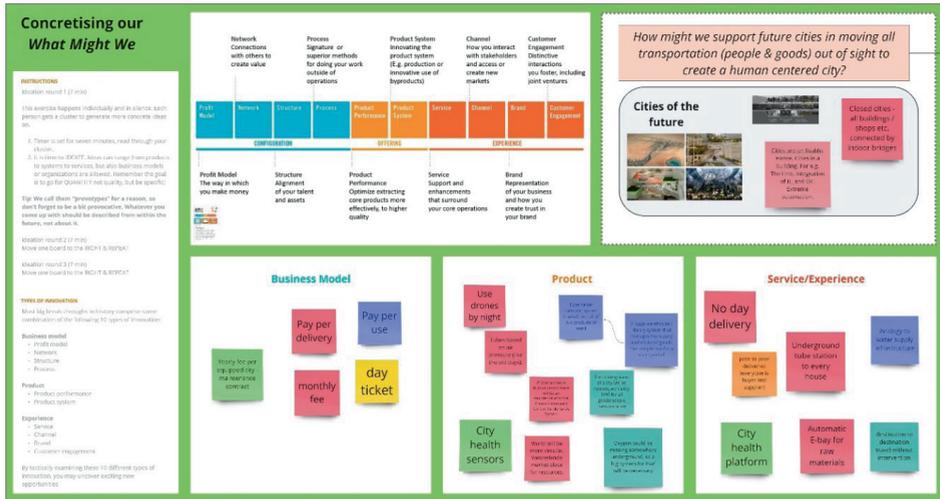

Figure D-10 — Example of Concretising a 'How Might We' Exercise

In the *'How Might We'* exercise, participants created 137 product ideas, 117 service ideas, and 131 combined product-service ideas. The participants developed 53 concept clusters, which they further elaborated by providing a description and a simple visualisation in a *Concept Canvas* (see *Figure D-11*). The facilitators explained how the participants could use the canvas and challenged them to fill in all the boxes, as this helps understand and communicate the idea within the participants' group. Additionally, using the concept canvas as a template makes it easy to compare different ideas. The *Concept Canvas* consists of three horizontal layers:

1)   The *Market* perspective describes the target market, perceived trends, and the values that drive customers and end-users. This layer provides the reasoning behind the *'Why'* question (see *Figure 6-3 — Value-Driven Strategic Design Roadmap* in *Section 6.6.2*).

2)   The *Product-Service* perspective which outlines the value proposition of the product or service and the problem it addresses. This layer answers the *'What'* question (see *Figure 6-3 — Value-Driven Strategic Design Roadmap* in *Section 6.6.2*).

3)   The *Technology & Network* perspective describes the technology needed to realise the value proposition, while the ecosystem perspective identifies potential partners

for cooperation in developing and marketing it. Both perspectives form the layer that answers the *'How'* question (see *Figure 6-3 — Value-Driven Strategic Design Roadmap* in *Section 6.6.2*).

Figure D-11 illustrates an example of a *Concept Canvas* completed by one of the teams. In small groups of two to three participants, they worked on concept clusters and completed concept canvases for presentation. At the end of the exercise, each team presented their developed canvases. During these presentations, they were encouraged to answer and explain the *'Why', 'What',* and *'How'* questions. The participants then engaged in a plenary discussion, during which we encouraged them to reflect on the various roles their business unit envisioned for the value proposition of the concept canvas in question. Would the company act as an *Orchestrator*, organising and directing an ecosystem where multiple parties collaborate to deliver value propositions that they cannot achieve individually? Or do they see their role more as an *Integrator* of functional modules, a *Product Supplier*, or a *Service Operator*, whether or not as part of a broader ecosystem? They also discussed the relevant business models that should be applied to the various concepts. Following the presentations, participants from the three business units engaged in a voting process to identify and select 23 concepts deemed the most likely scenarios for the development of a strategic design roadmap outlining the servitization strategy.

Figure D-11 — Example of a Concept Canvas Consisting of Three Horizontal Layers

During the discussion of concept canvases, we applied the *Roles & Relationships framework* presented in *Figure D-12*, which facilitated the deconstruction and characterisation of these concepts. The lower-left cell of *Figure D-12* illustrates a linear supply chain within a *PSS*, where the *B2B manufacturer (M)* delivers a *PSS* to its *Customer (C)*. In this role, the B2B manufacturer functions as an *Orchestrator (O)*, exclusively managing value exchange and maintaining a direct business relationship with the customer within the system boundaries, as indicated by the dashed lines. However, the B2B

manufacturer does not engage in a direct relationship with the *End-user (E),* placing the latter outside the system boundaries of the *PSS*. This model exemplifies how B2B companies take their initial steps in their servitization journey by offering services that enhance their product value propositions. For instance, a company may provide maintenance and spare parts services, ensure operational continuity and extend the product's lifecycle. Additionally, by incorporating service-level agreements throughout the equipment's operational lifespan, the company establishes a sustainable revenue stream, reinforcing its transition towards servitization.
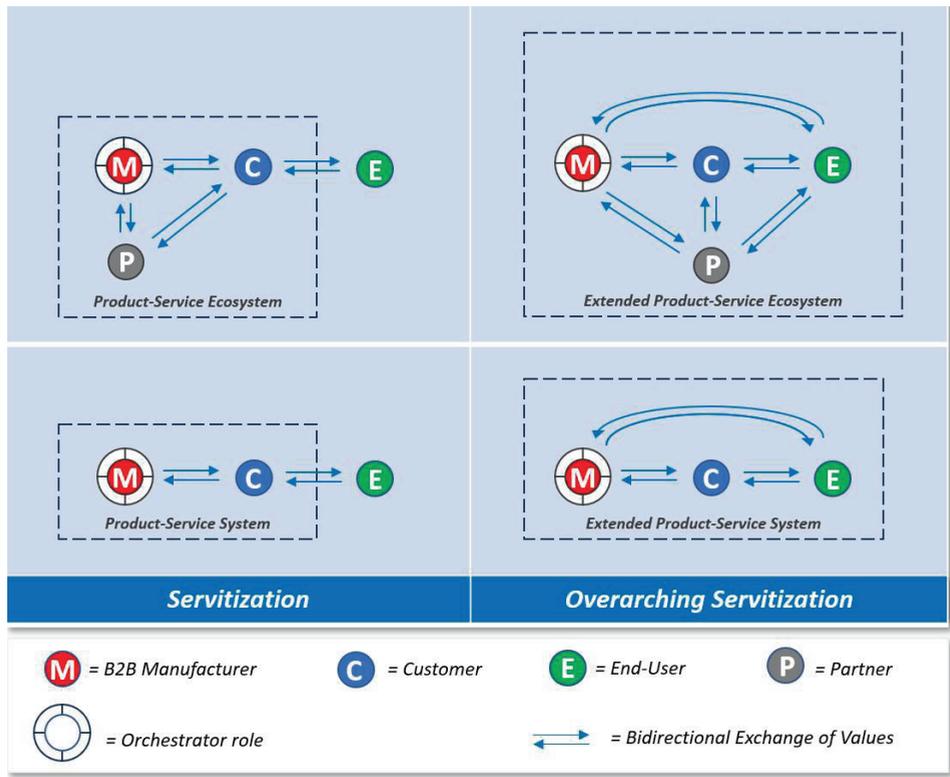

Figure D-12 — Roles & Relationships Framework for PSS and PSE Innovation

In contrast, the lower-right cell illustrates a broader relational structure that forms the core focus of our research, as outlined in *Section 2.2.8*. In this configuration, the *B2B manufacturer (M)* maintains relationships with both its direct *Customer (C)* and *the End-user (E).* Unlike the traditional linear model, this relationship extends the boundaries of the *PSS*—represented by the dashed lines—beyond the immediate B2B exchange to include the end user in the supply chain and value exchange. By engaging in direct value exchange with both its direct customer and the end-user, the B2B manufacturer expands its role beyond that of a conventional supplier and promotes deeper integration and interaction within the *PSS*. This expanded relational structure enables greater responsiveness to end-user needs and promotes a value-driven servitization approach.

Roles & Relationships for Product Service Ecosystem Innovation

The participants examined 11 *PSEs* in which multi-actor collaboration was envisioned. They acknowledged that they cannot realise these value propositions independently and must therefore establish partnerships with actors who contribute complementary knowledge and skills. In this context, we argue that *PSEs*, unlike *PSSs*, represent a collaborative effort to develop a value proposition for end-users that none of the partners can achieve individually. The top-left corner of *Figure D-12* illustrates the value exchange within the collaborative relationships between the *B2B Manufacturer (M)*, the direct *Customer (C)*, and a *Partner (P)* who offers additional expertise or knowledge necessary to establish the *PSE*. However, this model lacks an overarching approach that extends value creation downstream in the value chain, ultimately reaching the end-user.

The top-right cell of *Figure D-12* depicts a *PSE* within an *overarching servitization* constellation. In this scenario, the *End-user (E)* is also incorporated into the extended boundaries, where the *B2B Manufacturer (M),* serving as the *Orchestrator (O),* facilitates value exchange among all actors in the *PSE*.

Table D-5 Summarises the results of intervention 5, *Ideating User Value Propositions.*

Table D-5 — Summarising the results of Intervention 5

Summarising Intervention 5 – Ideating User Value Propositions		
The 'How Might We' exercise generated **137** Product Ideas		
55 in A1	**44** in B2	**38** in C3
The 'How Might We' exercise generated **117** Service Ideas		
37 in A1	**38** in B2	**42** in C3
The 'How Might We' exercise generated **131** Product-Service Ideas		
66 in A1	**36** in B2	**35** in C3
The participants consolidated the ideas into **53** Concept Clusters		
13 in A1	**16** in B2	**24** in C3
Integrated into **23** Concept Canvases		
6 in A1	**9** in B2	**8** in C3

D-6 — ARC 4 — Taking Action in Design Intervention 6 — Roadmapping & Connecting Dots

The third critical step of Simonse's (2018) *Strategic Design Roadmapping Method* is *Pathway Mapping,* which involves *Roadmapping & Connecting Dots.* We did not have participants carry out this intervention because not every participant possessed the necessary design skills for this step. Additionally, the process of elaborating, categorising, and reflecting on all generated ideas would have taken too much time for participants without design experience. Therefore, we decided to have *Intervention 6* carried out by the *Organising Team*. Based on their analysis, the *Organising Team* created a detailed roadmap with three horizons. *Figure D-13 — Three Horizons Strategic Servitization Roadmap* shows the results and is discussed in *Section 7.6.2*.

In this intervention, the *Organising Team* mapped 23 concept canvases onto a three-horizon strategic roadmap.
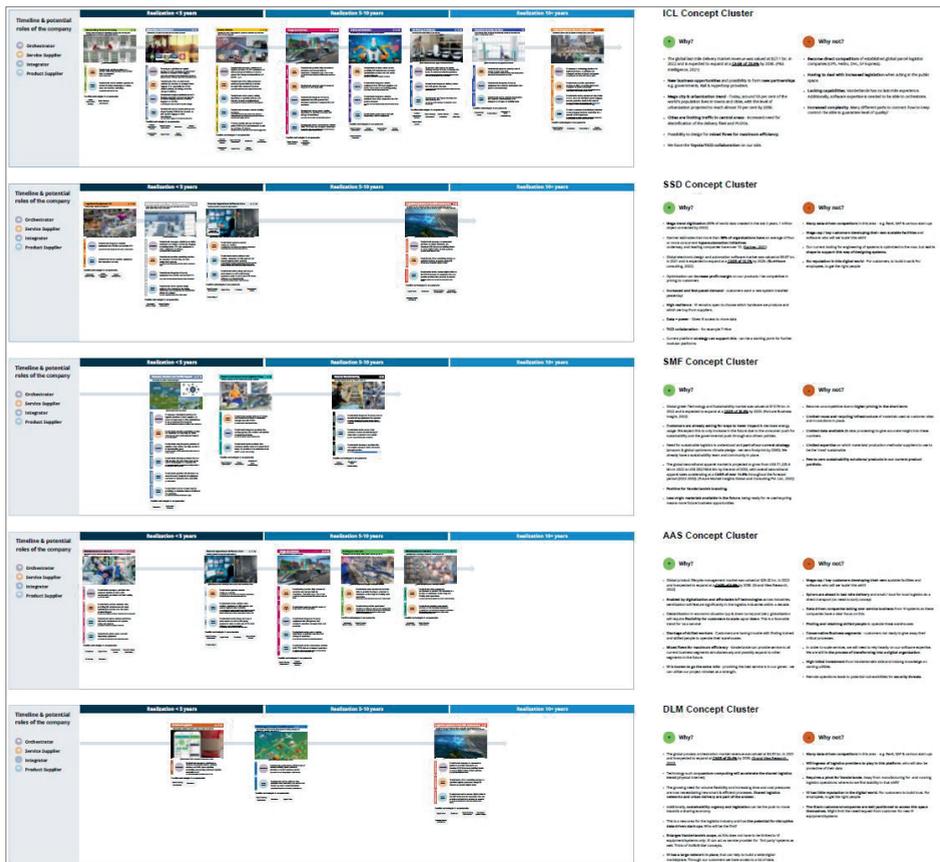

Figure D-13 — Three Horizons Strategic Servitization Roadmap

How can B2B manufacturers thrive when products alone are no longer enough?

This dissertation explores how B2B manufacturers can transition from product-centric business models to integrated product–service strategies that create value across the value network. Introducing the concept of *overarching servitization*, it highlights the end-user as the ultimate source of value. Key contributions include *The Long Now process* and the *Roles & Relationships framework*, which guide firms in orchestrating product-service ecosystems to co-create value and prepare for uncertainty.

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