Opening up embedded insurance

The impact of the adoption of open APIs on the embedded insurance business model

Master Thesis

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by

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Preface

Working on this master's thesis has been a journey full of ups and downs, but I'm excited to finally present it. Over the past months, I've experienced moments of intense focus, periods of doubt, and plenty of learning along the way. This process has pushed me to grow not only as a researcher but even more as a person.

The thesis, titled "Opening up embedded insurance: The impact of the adoption of open APIs on the embedded insurance business model", dives into a fascinating topic at the intersection of technology and business. It's been a rewarding challenge to explore how open APIs could reshape the (embedded) insurance industry and what that means for companies and customers.

I'm incredibly grateful to my supervisors, Mark de Reuver and Zenlin Roosenboom-Kwee, for their advice, feedback, and patience throughout this process. A big thank you also goes to Ruben van den Goorbergh at INNOPAY for his excellent guidance and the inspiring and thoughtful conversations we've had. I'm also thankful for the management and employees working at INNOPAY, for providing me the chance of the thesis internship and their help. I'm also thankful for my friends who supported me in my ups and downs. I couldn't have done this without you all.

I'd also like to thank the industry experts who participated in the brainstorming sessions and interviews. Their insights were invaluable and gave me a deeper understanding of the practical side of this topic.

Looking back, this has been an intense but fulfilling experience. I'm proud of the work I've done and hope it sparks meaningful conversations about the future of (embedded) insurance and technology.

Wesley Kool
Utrecht, December 2024

Summary

This research investigates the influence of adopting open APIs on the embedded insurance business model within the context of non-life, business-to-consumer insurance provided by incumbent insurers. The central research question, “How does the adoption of open APIs impact the embedded insurance business model for non-life, business-to-consumer insurance offerings from insurance incumbents?” is explored through three sub-questions:

1. What are the defining characteristics of the embedded insurance business model for non-life, business-to-consumer insurance offerings?
2. Which potential future scenarios can be envisioned for the adoption of open APIs in the context of embedded insurance?
3. How would the embedded insurance business model for non-life insurance offerings be impacted under these scenarios?

The research employs a structured methodology based on the Business Model Stress Testing framework developed by Haaker et al. [22]. This approach incorporates scenario planning to evaluate the robustness of business models under uncertain conditions. Data was collected through desk research, expert brainstorming sessions, and interviews, yielding comprehensive insights into the interplay between embedded insurance and open APIs.

The findings define the embedded insurance business model as the offering of a personalised insurance product at the point of need, seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms. This model is distinguished by its reliance on partnership-driven distribution, technological capabilities, and tailored product development, while balancing cost structures and revenue streams.

he study develops three scenarios that explore the future adoption of open APIs in embedded insurance. The first scenario anticipates regulatory mandates for data-sharing, presenting two outcomes: a compliance-focused approach or a proactive strategy exceeding compliance requirements. The second scenario considers artificial intelligence (AI) as the foundational technology in insurance, with divergent outcomes based on successful or failed integration. The third scenario examines rising consumer expectations for personalised insurance, with outcomes influenced by the insurer’s ability to establish effective third-party partnerships for external data integration.

The findings reveal that under regulatory-driven data-sharing, a compliance-based approach results in a non-viable business model due to strained resources and cost structure issues, while a beyond-compliance approach strengthens most components but retains vulnerabilities in cost structures and customer relationship dynamics. In the context of AI integration, a failure to adopt AI disrupts key business model components, whereas successful integration enhances operational capabilities but introduces challenges in balancing investments and returns. Lastly, consumer demand for personalisation highlights the critical role of robust third-party connections, with well-established partnerships significantly strengthening business model components, albeit with persistent cost structure concerns.

Across all scenarios, the cost structure emerges as a recurring vulnerability, underscoring the need for strategic investments in IT infrastructure, advanced open APIs, and strong third-party partnerships. Insurers exhibit heightened risk awareness compared to non-insurers, particularly regarding IT adaptation, customer relationship shifts, and ethical considerations like balancing personalisation with solidarity principles.

The study provides actionable guidance for insurance incumbents to enhance the robustness of their embedded insurance business models, highlighting strategies such as adopting advanced open APIs, leveraging AI effectively, and strengthening partnerships. The differentiated perspectives of insurers and non-insurers further provide practical insights into addressing industry-specific challenges.

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Nomenclature

Abbreviations

Abbreviation	Definition
AI	Artificial intelligence
API	Application programming interface
BMC	Business model canvas
BMI	Business model innovation
BMST	Business Model Stress Testing
CX	Customer experience
FIDA	Framework for Financial Data Access
GDPR	General Data Protection Regulation
IoT	Internet of Things
PSD2	Payment Service Directive 2
STOF	Service, Technology, Organisation, Finance
VC	Venture Capital

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Introduction

The financial services industry is currently experiencing a transformative shift towards a data-driven economy, driven primarily by digital innovation, enhanced data accessibility, and a customer-centric approach. This movement, collectively referred to as Open Finance, emphasises open data access and sharing, reshaping traditional financial services models [40][41]. Historically, financial institutions, including those within the insurance sector, have closely guarded customer data as a competitive advantage [3]. However, recent trends toward openness and collaboration could disrupt these models, possibly leading to significant changes in financial services, including insurance.

The concept of Open Insurance is emerging [12], encouraging data sharing between insurers, third-party providers, and customers [48]. Open Insurance represents a paradigm shift in the insurance industry by promoting digital innovation, open data sharing, and a customer-centric approach, aimed at enhancing value creation in financial services, fostering competition, and driving data-driven business model innovation, potentially disrupting the broader financial services industry [40][41][3][23]. The key drivers of this shift include regulatory changes, evolving market dynamics, and technological innovations [48].

Embedded insurance, a smaller but rapidly growing segment, involves integrating insurance products into the purchase processes of other products and services, enabled by digital platforms and (open) Application Programmable Interfaces (APIs) [13]. APIs are information technology interfaces that enable data-sharing between two or more parties. In particular, open APIs are web-based APIs based on open data standards and make it technically possible for any developer to access and use the providers' information. Open APIs are the key enabler of Open Insurance and embedded insurance [35]. The rapid growth of embedded insurance across industries such as automotive, travel, and e-commerce underscores its alignment with the principles of Open Insurance and the broader shift towards open data sharing [50][32].

1.1. Problem statement

Open Insurance has the potential to substantially alter the way incumbent insurance companies deliver services, create customer value, and interact with both customers and partners. This development emphasises open data sharing between insurers, third-party providers, and customers, fostering innovation, customer engagement, and competition while challenging traditional business models. In this context, embedded insurance is gaining traction. Enabled by digital platforms and (open) APIs, embedded insurance offers personalised, seamless solutions at the point of need. According to recent studies [12][47], Open Insurance is expected to serve as a catalyst for embedded insurance. The collaborative ecosystems fostered by Open Insurance and embedded insurance could provide an ideal platform for insurers, technology firms, and service providers to co-create tailored embedded insurance solutions.

Globally, embedded insurance aligns with customer-centric trends observed in platform ecosystems, such as Amazon's extended warranties [2] and AppleCare [26]. These examples illustrate how embedded insurance supports a shift towards integrated, seamless customer experiences. Amazon's

extended warranties simplify the insurance process by embedding protection plans directly in the purchase process, reducing friction and improving customer accessibility. Similarly, AppleCare exemplifies how embedded insurance can offer highly tailored solutions that align with specific product ecosystems, delivering value through convenience and seamless integration. Despite its rapid growth, embedded insurance has received limited academic attention, particularly regarding its operationalisation through Open Insurance principles and APIs.

From a theoretical perspective, several knowledge gaps emerge. Open Insurance lacks a clear and universally accepted definition, and its implications for insurance business models remain insufficiently explored [48][20]. There is limited understanding of what precisely characterises Open Insurance, how it differs from previous innovations, and whether it represents a truly disruptive force within the insurance industry. Similarly, while embedded insurance is recognised as an innovative market development, no theoretical framework seems to exist yet. The relationship between embedded insurance and Open Insurance has not yet been studied theoretically. Questions remain about how Open Insurance enables embedded insurance through open APIs and what the implications are for value propositions, operational models, and customer relationships. There is insufficient research on how Open Insurance will specifically impact insurance business models. Furthermore, there are limited insights regarding the challenges and risks associated with implementing Open Insurance, such as data privacy concerns and regulatory compliance issues [20].

1.2. Research objective and scope

This thesis addresses these gaps by defining the business model of embedded insurance and exploring how different Open Insurance scenarios might impact it. Specifically, the research investigates how regulatory changes, technological innovations, and evolving consumer behaviour influence the embedded insurance business model for non-life, business-to-consumer insurance offerings. The objective of this study is to explore the impact of Open Insurance, specifically through the adoption of open APIs, on the business model of embedded insurance within the consumer non-life insurance sector. The adoption of open APIs facilitates data-sharing and collaboration between insurers and external stakeholders, fostering a more seamless and integrated insurance experience for consumers. This research analyses how the integration of these open APIs affects the robustness and sustainability of the embedded insurance business model. This study seeks to offer insights in how insurance incumbents can navigate digital innovation, regulatory challenges, and evolving market dynamics. Ultimately, the research aims to contribute to academic discussions surrounding open API adoption, open data sharing, and the implications for emerging business models in the insurance industry.

The deliverables of this study are:

1. A detailed description of the embedded insurance business model, based on desk research and expert views.
2. Three potential scenarios for the adoption of open APIs within embedded insurance, based on a brainstorm session.
3. Six business model stress tests, based on interviews, where all three scenarios are assessed to evaluate the robustness of the embedded insurance model for non-life, business-to-consumer insurances.

This research does not address every aspect of Open Insurance or open APIs, as the scope is specifically limited to consumer non-life insurance within the embedded insurance context, as depicted in Figure 1.1. Non-life consumer insurance covers various risks that are not related to the life or health of individuals. The focus is on open APIs as an enabling technology within Open Insurance, rather than a broader exploration of all technologies or strategies encompassed by Open Insurance. The drivers of Open Insurance, regulatory changes, technological advancements, and evolving consumer expectations, align closely with those of embedded insurance and will therefore guide this research.

1.3. Research question

The central research question is:

How does the adoption of open APIs impact the embedded insurance business model

for non-life, business-to-consumer insurance offerings from insurance incumbents?

To address this, the following research sub-questions will be examined:

1. What are the defining characteristics of the embedded insurance business model for non-life, business-to-consumer insurance offerings?
2. Which potential scenarios can be envisioned for the adoption of open APIs in the context of embedded insurance?
3. How would the embedded insurance business model for non-life insurance offerings be impacted under these scenarios?

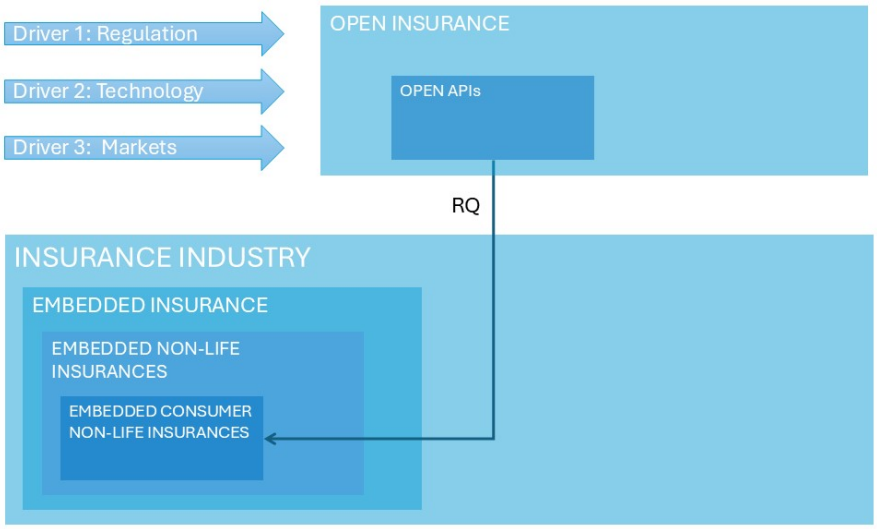

Figure 1.1: Research scope

1.3.1. Method: Business model stress testing

To evaluate the impact of Open Insurance on the embedded insurance business model, this study employs the Business Model Stress Testing method developed by Haaker et al. [22], which assesses the impact of potential future scenarios on a business model. This method combines the principles of business model innovation with scenario planning, providing a practical, six-step approach to evaluate the robustness of a business model against future uncertainties related to changes in digital technologies, regulation, and markets [22]. The six steps include: (1) describing the business model, (2) identifying and selecting stress factors, (3) mapping these factors to business model components, (4) creating a heat map to assess the impact of each factor on the business model components, (5) analysing the results, and (6) formulating improvements and actions [22]. This method enables a thorough assessment of the impact of adopting open APIs on the embedded insurance business model, providing valuable insights into the opportunities and challenges associated with the adoption of open APIs in the context of embedded insurance.

1.4. Personal motivation

As a researcher, I am particularly interested in how traditionally slow-moving industries, like insurance, can be transformed by new innovations. The limited academic exploration of embedded insurance, despite its growing importance in the industry, has captured my attention. Additionally, I am fascinated by initiatives that seek to open up industries and data, and I aim to examine both the potential benefits and risks of Open Insurance. Through this research, I hope to explore how these innovations may influence the future of the insurance industry and its business models.

1.5. Relevance Management of Technology

This research is highly relevant to the Master Management of Technology (MoT) programme, as it aligns with the core objectives of the curriculum by investigating how technological innovations, such as open APIs, influence business models within the insurance industry, specifically embedded insurance. The study contributes to understanding how firms, particularly insurance incumbents, can leverage emerging technologies to design and develop innovative services that enhance customer satisfaction, operational efficiency, and competitive positioning in an evolving market.

In alignment with the MoT criteria, this research represents a scientific study in a technological context by examining the intersection of technology and strategy through the adoption of open APIs by insurance incumbents. Open APIs serve as technological enablers of both Open Insurance and embedded insurance. By investigating their potential impacts on business models, this study contributes to broader discussions on how firms utilise technology to adapt to regulatory changes and consumer demands, while engaging with innovation processes and the evolution of business models.

The research also highlights the role of technology as a corporate resource. Open APIs enable insurers to share data, collaborate with partners, and deliver more integrated, customer-focused products. The study explores how open API technology influences competitiveness, particularly as firms navigate the challenges of digital transformation. It focuses on the implications of open APIs for the embedded insurance business model, highlighting their strategic value in fostering collaboration and innovation.

Lastly, the study employs scientific methods to ensure a rigorous approach. Business Model Stress Testing, a recognised method, evaluates the robustness of business models under varying conditions, including technological, regulatory, and market uncertainties. Combined with scenario planning, the methodology enables a structured analysis of how open APIs may shape the embedded insurance landscape.

1.6. Context of the research

This research is conducted as part of a Master's thesis within the MoT programme, in collaboration with INNOPAY, a consultancy firm specialising in digital transformation, open finance, and data-sharing ecosystems. The thesis aligns closely with INNOPAY's expertise in fostering innovation through the adoption of open banking, open insurance, and embedded financial services. Conducted as part of an internship at INNOPAY, the research benefits from practical exposure to the latest developments in Open Insurance and embedded insurance markets. INNOPAY's active involvement in these emerging sectors provides access to industry insights, ongoing projects, and expert interviews, enabling a thorough understanding of the current challenges and opportunities.

The collaboration facilitates a focus on the specific challenges insurance incumbents face in adopting open APIs within the embedded insurance context. This dual academic-industry approach ensures that the research contributes meaningfully to discussions on technology management and business model innovation, while also delivering actionable insights for practitioners in the insurance and financial sectors. By bridging the gap between theory and practice, the thesis offers valuable perspectives on how the adoption of open APIs can drive business model innovation in the embedded insurance industry.

1.7. Structure of the report

The report begins with a literature review, which includes a description of key definitions relevant to the study. This is followed by the methodology section, which details the application of Business Model Stress Testing and scenario planning to evaluate the impact of open API adoption on the embedded insurance business model. These methods are supported by desk research, an expert brainstorming session, and interviews. The results section presents the findings, including a detailed description of the embedded insurance business model, the three scenarios for the adoption of open APIs in the context of embedded insurance, and an analysis of the stress tests conducted based on these scenarios. The discussion section interprets the results, addresses the research sub-questions, and outlines the study's limitations while offering directions for future research. Finally, the report concludes with a summary of the findings and their implications.

2

Literature review

This chapter synthesises prior research on Open Insurance, open APIs, and embedded insurance, situating these concepts within the broader context of digital transformation in the insurance industry. It identifies both theoretical and empirical gaps in understanding these areas while integrating relevant frameworks such as platform ecosystems, business model innovation, and (API-driven) digital transformation. By summarising existing knowledge and clarifying the definitions used in this study, the chapter establishes the foundation for addressing the research questions. An overview of the literature review is presented in Table 2.1.

2.1. Open Insurance

Open Insurance is increasingly recognised as a transformative development in the insurance sector, facilitating structured data sharing and enabling collaboration through open APIs and regulated frameworks. It aligns closely with the broader Open Finance movement, which prioritises interoperability, innovation, and customer-centric solutions [40]. Despite its prominence in industry reports and online sources, Open Insurance has received limited academic attention yet. Most notable is the work by Standaert & Muylle [48], who have developed a framework to understand Open Insurance and describe it as a transformative approach to the insurance sector to promote interoperability and the development of more tailored products and services, prioritising transparency and customer-centricity. Interoperability is the capability of different systems to exchange and use data seamlessly, enabling collaborative functionality across platforms and organisations while adhering to standard protocols [57]. As part of the broader evolution of Open Finance, Open Insurance is anticipated to drive innovation in data-driven business models, foster competition, and enhance customer experiences [40][41]. However, a universally accepted definition of Open Insurance has yet to emerge [48] [20].

Drivers of Open Insurance

Standaert & Muylle [48] identify three key drivers of Open Insurance: regulation and standards, digital technology innovations, and changing market conditions. Regulatory developments play a significant role in shaping Open Insurance, much like their impact on Open Banking. Existing regulations such as the General Data Protection Regulation (GDPR) influence how insurance data is shared and protected, while upcoming frameworks like the Framework for Financial Data Access (FIDA) aim to establish standardisation and interoperability across Europe, facilitating easier data sharing and innovation in the insurance sector [40]. Although PSD2 does not directly address Open Insurance, it serves as the regulatory foundation for Open Banking and forms the basis for forthcoming FIDA regulations targeting Open Finance in Europe [41].

Technological advancements also drive Open Insurance by enabling secure and efficient data exchange. APIs, in particular, play a central role by facilitating interoperability between insurers and third-party providers. Emerging technologies such as artificial intelligence (AI), the Internet of Things (IoT), cloud computing, and blockchain further enhance Open Insurance by improving data analytics capabilities and enabling new models such as on-demand and usage-based insurance.

Market dynamics are the third driver, reflecting changing customer expectations and increased competition. Consumers now demand personalised, transparent, and integrated insurance solutions that offer greater control over their data. This shift pushes the industry towards more open architectures to enhance customer experiences and service offerings. Additionally, incumbent insurers face growing competition from new entrants, including InsurTech and Big Tech companies, which accelerates the adoption of Open Insurance frameworks and innovations.

2.1.1. Open Banking

Open Banking provides the foundational framework for Open Finance, with its principles driving the expansion of interoperability across financial sectors, including insurance. These principles, established under the PSD2 regulation in Europe, enable innovation and competition within financial services by promoting open data sharing and collaboration [41]. Open Insurance builds on these principles, extending the interoperability and openness fostered by Open Banking into the insurance sector [48]. The evolution of Open Banking further supports the development of Open Insurance models, as seen in the adoption of APIs in China's insurance industry, which enhance service delivery but also present challenges related to data security and regulatory compliance [23].

Research focused on Open Banking and APIs

Open Banking has been more extensively studied in academic research, with particular emphasis on the role of APIs in enabling interoperability and driving innovation. APIs are pivotal in granting access to financial data, fostering collaborative ecosystems, and supporting the development of customer-centric, value-driven service models. Research highlights their transformative impact on banking services by facilitating data sharing and integration across platforms, while also addressing critical challenges such as governance, security, and regulatory compliance [30][42][7]. An overview and definition of Open Banking is provided, highlighting the role of APIs as the means to facilitate access to financial data [30]. APIs facilitate the transformation of banking services through interoperability and innovation, with robust governance and security protocols playing a role in ensuring the effectiveness of API-driven Open Banking ecosystems [42]. The transformative potential of Open Banking and data sharing in the financial services sector is enabled by APIs and collaborative ecosystems, offering benefits such as innovation and customer-centric services while also highlighting challenges related to data privacy, security, and regulatory compliance [7].

2.2. (API-driven) digital transformation

Open Insurance is positioned as a component of the broader digital transformation within the insurance sector, with an emphasis on open APIs and data-sharing capabilities [48]. This perspective is supported by research examining the impact of digital transformation, including Open Insurance, on European insurance incumbents, with a focus on changes in operational strategies and customer engagement [18]. Digital transformation in the insurance industry has received considerable attention in academic literature, particularly regarding its technological and organisational implications.

API-focused research in digital transformation

The role of open APIs in driving digital transformation across the financial services industry, particularly in Open Banking, has been explored with an emphasis on their foundational role in the API economy, which facilitates innovation, fosters collaboration, and supports ecosystem growth. The necessity of standardisation and robust governance is highlighted as essential to optimising the strategic potential of APIs [56]. These insights could be directly applicable to the insurance context, where the lack of standardised API protocols may hinder the seamless integration among diverse stakeholders.

Research focused on digital technologies in insurance

Within the insurance sector, research has expanded to include the integration of emerging technologies such as IoT, AI, and blockchain. These technologies are shown to enhance operational efficiency, service delivery, and customer engagement while transforming risk management practices. For example, IoT and AI are analysed for their role in improving operational processes and customer interactions, with interoperability and data governance identified as key challenges to their adoption [34][43]. Technological advancements are further explored for their potential to enhance customer engagement and streamline operations within the insurance industry [39].

Industry reports also provide valuable insights into this digital transformation. A report highlights the strategic adoption of digital tools, particularly for underwriting, claims management, and customer engagement in post-pandemic markets [33]. It emphasises the importance of customer-centric strategies while addressing significant risks, such as cybersecurity and regulatory uncertainty, which align with the barriers identified by Pjanić et al. [39].

Insurance value chain and digital transformation

The insurance value chain has also been studied in digital transformation research. Digitalisation's impact on the insurance value chain and the insurability of risks has been explored, with key technologies such as IoT, AI, and blockchain identified for their potential to enhance efficiency and innovation across underwriting, claims management, and product design, while also addressing challenges in data privacy and regulatory compliance [31]. Similarly, the role of AI within the insurance value chain has been examined, showing its ability to enhance efficiency and enable new product development while raising concerns about the accuracy of risk assessments and adherence to evolving regulatory frameworks [21].

Together, these studies highlight that while APIs and digital technologies offer significant opportunities to transform the insurance sector, their successful implementation is dependent on addressing challenges such as standardisation, governance, cybersecurity, and scalability. Furthermore, the academic exploration of digital transformation in insurance connects closely to the three key drivers of Open Insurance: regulation and standards, digital technology innovations, and changing market conditions. While all three drivers are relevant, research tends to concentrate more heavily on digital technology innovations and regulatory frameworks. Studies frequently address regulatory frameworks such as PSD2 and anticipated regulatory frameworks like FIDA, highlighting their role in shaping data-sharing practices and promoting interoperability. Research also extensively explores digital technology innovations, with significant attention given to APIs, AI, IoT, and blockchain. These technologies are examined for their role in enhancing efficiency, risk management, and operational processes within the insurance sector [43][31]. APIs are emphasised as essential tools for fostering innovation and collaboration within the financial services industry [56].

Changing market conditions, such as evolving customer expectations and competitive pressures, receive comparatively less attention in academic research. However, they are acknowledged in a study that explores how technological advancements enhance customer engagement and personalisation [39].

2.3. Embedded insurance

Embedded insurance is a concept within the insurance industry that involves integrating insurance products into the purchase process of other goods or services, providing coverage at the point of sale [50][11]. This approach offers customers seamless and personalised protection precisely when and where they need it, often as an add-on to their primary purchase [25]. Traditionally, embedded insurance has been seen in scenarios such as purchasing travel insurance while booking a flight or adding an extended warranty to an appliance purchase [54]. With advancements in technology, this model has evolved to include digital solutions, enabling insurance offerings through online platforms and apps to enhance customer convenience and experience [13][25]. These developments position embedded insurance as a key element of the digital transformation occurring within the insurance industry.

Academic literature focused on embedded insurance

Embedded insurance has received limited attention in academic literature, with only a few studies specifically addressing this topic. One notable example is a study examining its role in expanding financial inclusion in India, particularly through technological innovation [5]. The research highlights the integration of microinsurance products into digital platforms, such as mobile wallets and e-commerce apps, as a means of reaching underserved segments. Key findings indicate that while embedded insurance can address gaps in access to financial services, it requires significant investment in technology and partnerships to be effective. The study concludes that embedded models have the potential to transform insurance distribution but emphasises the need for robust regulatory support. It also emphasises the importance of aligning embedded insurance initiatives with broader financial inclusion objectives.

Industry reports focused on embedded insurance

Industry reports have also provided insights into embedded insurance, with one notable example examining its role in enhancing accessibility and creating value for customers within digital ecosystems [9]. The report identifies platform-based models as key drivers of embedded insurance, utilising APIs for seamless integration and delivery. Findings indicate that embedded insurance improves customer experience by offering real-time, contextual coverage tailored to specific needs. However, the report also highlights challenges related to scalability and profitability, especially in fragmented markets. It concludes that insurers must adopt ecosystem strategies to remain competitive in an increasingly digital environment.

2.3.1. Embedded finance

Similarly to Open Insurance, embedded insurance is part of the broader concept of embedded finance, which integrates financial services into non-financial platforms. The evolution of embedded finance has been evaluated, with its benefits, practical use cases, and challenges being highlighted. While embedded finance offers significant potential to enhance user engagement and convenience, its success hinges on addressing data security and regulatory barriers [37]. A related report examines the transformative potential of embedded finance within the payments industry, focusing on the integration of financial services into non-financial platforms. It discusses the roles of key stakeholders, such as technology providers and financial institutions, in driving this transformation [17].

Another relevant article explores the transition from Open Banking to embedded finance, emphasising the role of APIs and digital transformation in creating integrated solutions. The study highlights the importance of interoperability, customer-centricity, and strategic partnerships in fostering ecosystem-based innovation [24].

2.4. Platform ecosystems

Platform ecosystems play an important role in facilitating collaboration and value co-creation across industries. Platform ecosystems are characterised as structures that facilitate collaboration and value co-creation among diverse participants, typically through digital platforms. Digital platforms are defined by their ability to integrate and align the activities of multiple stakeholders, such as businesses, technology providers, and end-users, within a shared infrastructure [14][15]. Key characteristics of platform ecosystems include scalability, interoperability, and network effects, which enable rapid expansion and increased value as more participants join the ecosystem [14].

In the context of insurance, digital platforms enable insurers, third-party platforms, and technology providers to deliver integrated and personalised customer experiences. Regarding data openness, research highlights the importance of transparency, interoperability, and governance in data platforms. It proposes redefining platform openness to address the challenges unique to data-specific contexts, such as ensuring proper data governance and fostering trust among participants [44].

Industry reports on platform ecosystems in the insurance industry

In the context of insurance, platform ecosystems have been examined extensively in various reports, focusing on their transformative potential and the role of technology in enabling ecosystem-based models. One report explores how insurers can transition from traditional models to ecosystem-based platforms, emphasising the importance of technological enablers, strategic partnerships, and customer-centric innovation. It outlines a strategic framework for creating value across three stages: strategy, enablement, and execution [8]. Another report highlights embedded finance as a key driver of ecosystem-based innovation, focusing on the integration of financial services into non-financial platforms. It identifies APIs as critical enablers of seamless customer experiences, while addressing the challenges of partnerships and regulatory compliance [16]. Additionally, digital platform ecosystems are shown to transform insurance practices by enabling insurers to reach customers more effectively and foster innovation. This includes partnerships with tech companies and the development of platforms to enhance customer engagement and expand market reach [27].

2.5. Business model innovation

Business model innovation is defined as the process of reconfiguring an organisation's foundational structure for creating, delivering, and capturing value [36][51]. An overview of the literature on business models, business model innovation and scenario planning is provided, and business model innovation as referred to as a strategic response to shifts in external conditions, such as technological advancements, regulatory changes, or evolving market demands [22]. Interestingly, these are similar to the drivers of Open Insurance [48].

In the insurance sector, business model innovation could become increasingly significant as insurers could question the viability of their traditional business models. Particularly relevant is the six-step framework for evaluating the resilience of business models against disruptions such as technological changes or regulatory shifts, as introduced by Haaker et al. [22]. It combines concepts from business model frameworks and business model innovation with scenario planning methodology.

Business model frameworks

Various frameworks exist for describing business models, with two relevant ones considered in this study: the Business Model Canvas (BMC) and the STOF model [36][6]. The BMC is a widely recognised strategic management tool that simplifies business model design by breaking it into nine interconnected building blocks: Customer segments, Value propositions, Channels, Customer relationships, Revenue streams, Key resources, Key activities, Key partnerships, and Cost structure [36]. The aim of the model is provide for a holistic understanding of how an organisation creates, delivers, and captures value.

The STOF model is a strategic management tool for conceptualising and analysing business models, particularly in the context of platform ecosystems [6]. It structures platform-based business models around four key dimensions: Service, Technology, Organisation, and Finance, focusing on the interplay between these elements. The model aims to ensure that these dimensions are aligned and mutually reinforcing to create customer value and achieve business objectives [6].

Scenario planning methodology

elevant academic literature on scenario planning methodology is predominantly found in books that offer comprehensive frameworks and insights. A foundational methodology for developing scenarios to anticipate and prepare for future challenges outlines an eight-step process to explore uncertainties, alternative outcomes, and strategic integration, highlighting the value of scenario planning in navigating complexity and improving organisational adaptability [46]. Scenarios are also described as tools for organisational learning, strategic foresight, and decision-making, with an emphasis on integrating scenario planning into existing processes and evaluating its effectiveness using defined metrics [10]. The integration of scenario planning into organisational strategy is further explored through structured conversations, focusing on aligning scenarios with strategic objectives to foster shared understanding and improve decision-making [53]. Scenario analysis is also examined as a decision-making tool, balancing qualitative and quantitative methods to provide structured insights into potential outcomes and enhance decision quality [55].

2.6. Research gaps embedded insurance and the adoption of open APIs

The literature review reveals several theoretical and empirical gaps in understanding Open Insurance, Open Banking, API-driven digital transformation, embedded insurance, platform ecosystems, and business model innovation. These gaps are identified based on the synthesis of academic studies and industry reports in the previous sections.

Embedded insurance, despite its growing significance in industry practices, remains underexplored in academic literature. There is currently no standardised definition or theoretical framework for embedded insurance, limiting the ability to systematically study its characteristics and evolution. Existing studies primarily address its operational benefits and market potential, often relying on insights from industry reports. However, theoretical perspectives on embedded insurance are scarce, which restricts its conceptual clarity and generalisability. Furthermore, while open APIs have been extensively studied in the context of Open Banking, their application within the insurance sector, particularly for enabling

embedded insurance, has not received comparable academic attention. Research on APIs tends to focus on their technical and operational features, rather than on their broader implications for insurance business models.

Theoretical research on the embedded insurance business model is limited. Empirical studies primarily exist of industry reports. While these empirical studies provide valuable insights into specific use cases and market trends, they do not offer structured theoretical models that could be used to evaluate or adapt embedded insurance practices more broadly. Additionally, although the drivers of Open Insurance, regulatory developments, technological advancements, and shifting market dynamics, are well-documented, their influence on the embedded insurance business model has not yet been examined. The relationship between these drivers and the scalability, sustainability, and development of embedded insurance requires further investigation.

The connection between embedded insurance and Open Insurance is also not fully understood. While embedded insurance is often positioned as an outcome of Open Insurance principles, the academic literature lacks detailed exploration of how open APIs specifically enable and shape embedded insurance practices. Existing studies do not seem to examine how open APIs facilitate integration between insurers and third-party distributors, enable personalisation, or improve operational efficiency. Furthermore, challenges such as data privacy concerns, the need for interoperability, and regulatory compliance issues remain underexplored in the context of open API adoption within embedded insurance.

Most research in this area is empirical, focusing on industry reports and case studies rather than theoretical frameworks. This has resulted in limited understanding of how embedded insurance models might adapt to the adoption of open APIs under various regulatory, technological, and market scenarios. The absence of structured frameworks also limits the ability to predict the implications of such adaptations.

Scenario planning, a widely used methodology for examining potential future developments, has not been applied extensively to the study of embedded insurance in the context of Open Insurance. The development of scenarios that account for varying regulatory, technological, and market-driven outcomes could provide valuable insights into how embedded insurance might evolve and how insurers might respond to these changes.

2.7. Definitions in this research

To interpret the results produced in this research, definitions have been created based on the literature review. An extensive desk research including expert feedback has been executed to propose a definition for embedded insurance (Chapter 4).

Open Insurance

No uniform definition of Open Insurance exists yet [20][48]. For this research, the following definition will be used, as it aligns closely with the definition provided by EIOPA [20], which emphasises the openness of APIs. Additionally, the term ”leveraging” has been incorporated to reflect the definition proposed by Standaert & Muylle [48].

> **Open Insurance is the sharing and leveraging of insurance-related data, including customer data, typically through open APIs.**

(Open) APIs)

APIs enable data-sharing interoperability, meaning that the software systems of parties are able to access and use different types of data and data-based services, including raw data, processed data, algorithms, and trained models [3]. Three types of APIs with different levels of data interoperability exist, each reflecting a different level of data openness: closed, partner and open APIs [3].

In this research, the following definitions will be used. These definitions are inspired from Awrey & Macey [3] and have been adapted based on the feedback of the brainstorm participants, as can be seen in Appendix F.

> **Application Programmable Interfaces (APIs) are information technology interfaces that enable the sharing of data between two or more parties.**

Open APIs are web-based APIs based on open data standards and make it technically possible for any developer to access and use information of the provider.

Embedded insurance

During the process of defining embedded insurance, the following final definition has been developed:

Embedded insurance is the offering of a personalised insurance product at the point of need, seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

This definition has been developed by comparing the definitions of eight online sources from a variety of companies and organisations, which led to a initial definition of embedded insurance. The eight sources including their definition of embedded insurance can be found in Table 2.2.

Adaptations to final definition

The preliminary definition has been validated at the start of the brainstorm with the participants, which led to a few adaptations and the definition as seen in Appendix F. The final definition stated above is a rewritten version of this definition, where grammar, readability and clarity has been improved. The part "(non-life business-to-consumer)" referred to the scope of this research but has been removed as no conducted source or expert mentioned a difference between the type of insurance or stated that embedded insurance is limited to non-life business-to-consumer insurance. The words 'customer journey' have been changed to 'sales process' to emphasise the specific point where the insurance product is introduced and integrated.

Non-life consumer insurance

Non-life consumer insurance, also known as general or property and casualty insurance for individuals, covers various risks that are not related to the life or health of individuals. These policies provide financial protection against losses and damages to property and liability for accidents, disasters, and other events. It includes a wide range of products such as property insurance (home, rental, and auto), travel insurance and liability insurance. It protects consumers against financial losses from unexpected events like accidents, theft, natural disasters, and legal liabilities. The policy duration typically involves short-term contracts, often renewable annually. Non-life insurance is crucial for managing everyday risks and providing financial stability for individuals. It is a significant segment of the insurance market, driven by consumer needs for protection against various non-life events and liabilities [1][19][28].

Different definitions and scope exist in practice, like the in- or exclusion of personal health insurance. In this research, the following definition will be used.

Non-life consumer insurance covers various risks that are not related to the life or health of individuals.

Focus area	Key aspects	Relevant sources
Open Insurance	Regulation, data-sharing frameworks, interoperability, customer-centricity, governance, Open APIs, data privacy, transparency	Standaert & Muylle [48], EIOPA [20], Van Praag & Muçi [41], He, Liu & Xiao [23]
Open Banking	API adoption, standardisation, interoperability, customer trust, regulatory compliance, governance, scalability, data sharing, collaboration	Laplante & Kshetri [30], Premchand & Choudhry [42], Brodsky & Oakes [7], He, Liu & Xiao [23], Zachariadis & Ozcan [56]
(API-driven) digital transformation	API economy, interoperability challenges, digital technologies (AI, IoT, blockchain), scalability risks, governance, innovation, operational efficiency, data analytics, insurance value chain, underwriting, risk management, product innovation	Oliveira e Sá et al. [34], Radwan [43], Pjanić et al. [39], McKinsey [33], Zachariadis & Ozcan [56], Duane [18]
Embedded insurance	Personalised insurance products, integration with non-insurance services, real-time contextual coverage, insurability, customer engagement, scalability	Bhatia [5], Catlin et al. [8]
Embedded finance	Financial inclusion, integration with non-financial platforms, transformative potential of APIs, interoperability, partnerships, customer-centricity	Ozili [37], Dresner et al. [17], Hensen & Kötting [24]
Platform ecosystems	Digital platforms, collaboration across stakeholders, value co-creation, network effects, ecosystem governance, scalability, customer-centricity, interoperability	Cusumano et al. [14], De Reuver et al. [44], Catlin et al. Dresner et al. [17], Ruo [27]
Business model innovation	Scenario planning, business model frameworks (BMC, STOF), business model resilience, alignment of organisational and technological goals	Haaker et al. [22], Osterwalder & Pigneur [36], Bouwman et al. [6], Teece [51], Schwartz [46], Chermack [10], Van der Heijden [53], Wright & Goodwin [55]

Table 2.1: Overview literature review

Table 2.2: List of definitions of embedded insurance found in desk research

Nr	Source	Title	Definition embedded insurance
1	[13]	Embedded insurance is poised for exponential growth	”Embedding large-scale insurance at the point of sale.”
2	[50]	Embedded insurance: a brief overview	”Any insurance that can be purchased within the commercial transaction of another product or service.”
3	[25]	Embedded insurance: Definition, examples, benefits	”Embedded insurance seamlessly integrates insurance coverage into the customer journey or the purchase process for non-insurance products or services.”
4	[54]	Embedded insurance: de klant achterna	”The seamless integration of their products and services into the customer experience offered by trusted third parties (translated).”
5	[11]	What is embedded insurance?	”Embedded insurance is an innovative way for businesses to integrate relevant risk protection into their customers’ purchase journeys, allowing them to include or add on coverage when buying their products or services. The customer does not have to leave their journey to do additional research or to buy insurance — personalized protection at a competitive rate can be made available seamlessly to customers when and where they need it most.”
6	[32]	What is Embedded Insurance?	”The integration of insurance coverage into the purchase of products or services from non-insurance entities.”
7	[35]	Open and Embedded Insurance 2024 Insight Report	”The embedded insurance model, that by adopting the lens of an insurance provider we have renamed B2P2C distribution (Business-To-Partner-To-Consumer).”
8	[45]	What Happens When Every Company Is an Insurer?	”The blending of insurance into non-insurance products or services.”

3

Methodology

The purpose of this chapter is to outline the research methodology employed to evaluate the impact of adopting open APIs on the embedded non-life consumer insurance business model. This study adopted an exploratory and qualitative approach to addressing the research questions and achieving its objectives. As described in Chapter 2, limited existing research and established theories are available due to the emerging nature of Open Insurance and embedded insurance. Consequently, a flexible approach has been adopted, with the methodology adapted during the study in response to new insights and developments. This flexibility enabled a focused exploration of the most relevant aspects of the adoption of open APIs in the context of embedded insurance. Qualitative insights from desk research, an expert brainstorming session, and expert interviews were combined to provide a nuanced understanding of the research problem. The methodology builds on the principles of the Business Model Stress Testing method developed by Haaker et al. [22]. However, due to the individualised approach of this research, significant modifications were made, and new materials were developed, which are described in detail.

This chapter is structured as follows: First, the research design is discussed, followed by a detailed explanation of the chosen methodology. Next, the research strategy for each research sub-question is presented. Finally, the chapter addresses the Human Research Ethics guidelines and quality standards applied throughout the research process.

3.1. Research design

3.1.1. Research method: Business Model Stress Testing

Central to this research is the Business Model Stress Testing (BMST) method developed by Haaker et al. [22], which is employed to evaluate the robustness of the embedded insurance business model under potential future scenarios involving the adoption of open APIs in the context of embedded insurance. The BMST method combines the principles of business model innovation and scenario planning, providing a structured six-step framework to assess the impact of specific scenarios on business model components. These six steps include describing the business model, identifying and selecting stress factors, mapping these factors to business model components, creating a heat map to evaluate the impact of each factor, analysing the results, and formulating improvements and actions [22].

3.1.2. Relationship with research sub-questions

Each research sub-question corresponds to specific steps of the BMST method. The first sub-question, ”What are the defining characteristics of the current embedded insurance business model for non-life business-to-consumer insurance offerings?” aligns with the first step, which involves describing the business model in a structured manner using a business model framework. The second sub-question, ”Which potential future scenarios can be envisioned for the adoption of open APIs in the context of Open Insurance?” relates to the second step, focusing on identifying and selecting stress factors or potential extreme scenarios associated with the adoption of open APIs in the context of embedded insurance. The third sub-question, ”How would the embedded insurance business model for non-life

insurance offerings be impacted under these scenarios?" is addressed through the final steps of the methodology, including mapping the envisioned scenarios to business model components, creating heat maps, analysing the results, and formulating strategic improvements and actions. This can be seen in Table 3.1.

3.1.3. Justification for choosing BMST over other methods

The BMST method is particularly justified in this context due to its structured approach to understanding and preparing for future uncertainties. By integrating business model innovation with scenario planning, BMST provides a framework for systematically evaluating the impact of adopting open APIs on the embedded insurance business model. This approach enables a detailed examination of how external drivers, such as regulatory changes, technological advancements, and shifting market dynamics, might influence the embedded insurance business model. Additionally, BMST offers practical tools for identifying potential opportunities and challenges, making it valuable for generating insights that could be relevant for both academic research and practical applications. Lastly, the drivers of Open Insurance are similar to the themes related to business model robustness as mentioned by Haaker et al. [22]. The BMST is designed in response due to the lack of an approach to assess the impact of a business model to changes in these specific themes.

Several alternative methodologies were considered before selecting BMST. BMST was chosen over these alternatives for several reasons. Traditional scenario planning, for example described by Schwartz [46], focuses on envisioning plausible future developments based on key uncertainties and constructing narrative scenarios. However, this method does not explicitly map these scenarios to specific components of a business model. Dynamic business modelling, such as the system dynamics approach proposed by Sterman [49], uses quantitative simulations to explore interactions within a business model over time. While this method is useful for long-term trend analysis, it relies heavily on empirical data and mathematical modelling, which makes it less suitable for the qualitative nature of this research and the emerging topic of embedded insurance. Another alternative, integrating scenario planning with SWOT analysis, assesses strengths, weaknesses, opportunities, and threats in different scenarios. It can be applied in strategic analysis, as seen in the research of Pickton, David & Wright ([38]. Although straightforward, this combined method provides only a surface-level evaluation and lacks the depth needed to assess the impact of uncertainties on specific business model elements.

3.2. Research strategies

For each research sub-question, a specific research strategy is employed. Each strategy outlines the methodological steps followed to address the respective sub-question. By systematically applying these steps, this research provides an in-depth understanding of how the embedded insurance business model for non-life insurance offerings is impacted under different scenarios. This structured approach ensures a thorough analysis, enabling well-founded discussions and conclusions. A detailed overview where the research questions are linked to the corresponding BMST steps, methods and data sources can be found in Table 3.1.

3.2.1. Research strategy sub-question 1

The first research sub-question, "What are the defining characteristics of the current embedded insurance business model for non-life business-to-consumer insurance offerings?", is addressed by describing the embedded insurance business model using a business model framework. As outlined in the Introduction, the focus is on non-life business-to-consumer insurance offerings from the perspective of traditional insurance incumbents. While the findings may also be relevant to InsurTech companies, the primary focus remains on traditional insurers. In line with the research scope, incumbents are assumed to retain all activities from the insurance value chain except for sales, which are executed by third-party distributors.

Currently, embedded insurance has not been explicitly described within a business model framework in the academic literature, highlighting the need for a structured approach to accurately define this model. To address the first research sub-question, the following steps are executed:

Table 3.1: Overview research questions, BMST steps, methods and data sources

Research question	Alignment with BMST Steps	Methods	Data sources
Sub-question 1: What are the defining characteristics of the embedded insurance business model for non-life, business-to-consumer insurance offerings?	BMST Step 1: Describe business model. (Haaker et al. [22])	Desk research, data synthesis, qualitative analysis, BMC framework (Osterwalder & Pigneur [36])	Industry reports, blog posts, expert opinions
Sub-question 2: Which potential future scenarios can be envisioned for the adoption of open APIs in the context of embedded insurance?	BMST Step 2: Identify stress factors and define extreme scenarios. (Haaker et al. [22])	Scenario planning (Schwartz [46], Van der Heijden [53], Chermack [10], Wright & Goodwin [55])	Brainstorming session with industry experts, academic literature on Open Insurance (Standaert & Muylle [48])
Sub-question 3: How would the embedded insurance business model for non-life insurance offerings be impacted under these scenarios?	BMST Steps 3–6: Map stress factors to BMC components, create heat map, analyse results, propose strategic improvements and actions. (Haaker et al. [22])	Mapping scenarios to BMC components, heat maps, data synthesis, qualitative analysis	Interviews with industry experts and insurance incumbents

A. Selection of an appropriate business model framework

Selecting a suitable business model framework is essential for obtaining useful and representative results. The framework should offer the ability to describe a clearly defined value proposition in a structured way to allow for high-quality input [22]. As several frameworks meet this criteria, the selection process additionally considered suitability, practicality, and the research scope. Two frameworks seem to stand out as particularly well-suited for studying the impact of open APIs in the context of embedded insurance: the STOF (Service, Technology, Organisation, Finance) framework [6] and the Business Model Canvas (BMC) [36].

After careful consideration, the Business Model Canvas (BMC) has been selected for this research due to several key reasons. Firstly, the BMC is particularly well-suited to describe the unique aspects of embedded insurance. Its structure effectively captures the complex interactions between insurers, distributors, and customers, while clearly depicting third-party collaborations, which are essential for embedded insurance models. Additionally, the BMC provides a holistic and structured framework for presenting complex business model elements, offering the adaptability needed to align with the scope of this research.

The BMC's widespread recognition as a widely used tool in the industry is another advantage, as it ensures that stakeholders and participants are familiar with its layout. This familiarity could facilitate understanding and encourage high-quality input during the research process. Furthermore, its intuitive design allows for an accessible presentation, enabling stakeholders to engage with the business model components even if they are unfamiliar with business model frameworks.

The BMC also provides a holistic view of critical aspects and dynamic interactions between various business model components, such as customer segments, revenue streams, and value propositions. This holistic approach offers the flexibility to address the most relevant aspects as they emerge during the research. Lastly, the BMC enhances generalisability by allowing its components to be analysed both individually and collectively, potentially increasing the broader applicability of the findings.

B. Data collection
To accurately describe the nine components of the BMC framework, data collection is necessary since no existing literature offers a suitable description of the embedded insurance business model in any framework. In this research, data is collected through desk research. Due to the lack of academic research, use is made of online sources, such as blog posts, industry reports, and expert opinions, discussing embedded insurance. These sources are considered valid for this research because they originate from reputable industry experts, established organisations, and thought leaders actively involved in the development and implementation of embedded insurance solutions. Their practical insights and analyses are grounded in real-world applications and market dynamics, providing a valuable complement to the limited academic literature on the topic. By drawing on such authoritative sources, the research ensures that its findings are informed by contemporary industry practices and expert perspectives, enhancing the relevance and applicability of the proposed definition and business model description. Through this approach, multiple data sources can be examined and compared to propose a definition of embedded insurance and develop a description of each BMC component. The data collection process continued until saturation was reached, and no new insights emerged, ensuring diverse perspectives are reflected in the view of each component.

C. Data synthesis
The collected data was synthesised to construct an initial description of the nine components of the BMC for embedded insurance. This process involved a systematic qualitative analysis of the information gathered from various sources. Each data point was examined for its relevance, credibility, and alignment with the research objectives.

For the proposed definition of embedded insurance, the sources were reviewed for their definition or description of embedded insurance, followed by a comparative analysis. The different perspectives were compared to identify similarities, contradictions and unique viewpoints. Consistent themes across multiple sources were prioritised, as they suggested widely recognised practices or insights in the industry. When conflicting interpretations or perspectives were encountered, an in-depth evaluation was carried out to determine their validity. This involved considering the credibility of the source, the context of the perspective, and its alignment with the broader trends in embedded insurance. The most relevant and representative viewpoints were selected based on their logical coherence, industry recognition, and potential to contribute to a robust understanding of the business model. This led to one description, which has been reviewed and refined in collaboration with industry experts.

For the development of the BMC description of embedded insurance, a similar approach was adopted. Here, the sources have been scanned for viewpoints that were linked to one or more appropriate components of the BMC, and again followed by a comparative analysis. Relevant data points were integrated into a cohesive description for each component of the BMC. Care was taken to ensure that this synthesis captured a holistic view of the embedded insurance business model. The reasoning behind key decisions during the analysis has been documented, including the discussion with an industry expert who reviewed the descriptions.

D. Validation
To ensure the accuracy, relevance, and suitability of the business model description used during the interviews, validation rounds were conducted with an industry expert. An expert from INNOPAY, with extensive experience in Open Insurance, API integration, and embedded insurance, provided valuable feedback. This expert's involvement in advising financial institutions on innovative business models and digital transformation strategies ensured reliable insights. The validation process continued until no further adjustments were proposed. The final Business Model Canvas (BMC) description was then used during the interviews to address research sub-question 3, where it underwent additional validation to ensure alignment with interviewees' perspectives and further refinement for future research.

3.2.2. Research strategy sub-question 2
To address the second research sub-question, "Which potential future scenarios can be envisioned for the adoption of open APIs in the context of Open Insurance?", this research develops scenarios that capture the potential impacts of open API adoption within embedded insurance, focusing on key drivers of change. This approach aims to provide an in-depth understanding of how various factors might shape the future landscape of embedded insurance.

To develop these scenarios, the scenario planning methodologies of Schwartz [46], Van der Heijden [53], Chermack [10], and Wright & Goodwin [55] were compared. This comparison revealed a consensus on the essential steps for scenario development. Based on these methodologies, the following steps were undertaken:

A. Definition of scope and objectives
The scope of this sub-question focuses on envisioning potential future scenarios or developments related to the adoption of open APIs in the insurance industry, specifically within the context of embedded insurance. The emphasis is on identifying anticipated future trends related to Open Insurance. The aim is to develop scenarios that provide a deeper understanding of potential impacts and are suitable for use in business model stress testing.

According to scenario planning methodologies, scenarios can be based on the uncertainties themselves or defined using extreme outcomes for each uncertainty. While Haaker et al. [22] suggest defining extreme outcomes, they do not provide explicit reasoning. Schwartz [46] and Van der Heijden [53], however, argue that defining extreme outcomes is particularly valuable in contexts marked by high levels of uncertainty and potential impact. Additionally, defining extreme outcomes can clarify the boundaries of each scenario and focus the research during the interviews.

Thus, the objective is to describe three scenarios addressing different aspects, each including two opposing extreme outcomes related to the adoption of open APIs. These extreme outcomes are defined in detail to improve the clarity and generalisability of the interviews, which are conducted separately.

B. Identification of driving forces
Identifying key drivers of change focuses on the primary factors likely to shape the future landscape of embedded insurance. Schwartz [46] highlights this step as essential for developing plausible and challenging scenarios, ensuring the scenarios are grounded in the most relevant and impactful trends and uncertainties. Haaker et al. [22], while not explicitly mentioning this step, suggest using frameworks to cover a wide range of aspects. By concentrating on key drivers, the scenario development process becomes more structured and aligned with the research scope, while still accommodating a variety of uncertainties and outcomes. For this research, this step is included as part of the scenario development process.

The scenario development process is strongly influenced by the selection of driving forces. While key drivers can be identified by the researcher or stakeholders, this approach may introduce biases. To minimise blind spots and ensure a broad perspective, this research selects key drivers from independent trend analyses. Drivers are derived from existing literature on the forces shaping Open Insurance, as these are likely to influence the adoption of open APIs within embedded insurance. The key drivers identified are changing regulation, digital technology innovation, and evolving markets [48]. These drivers align with themes related to business model robustness as mentioned by Haaker et al. [22], which, although not explicitly considered, reinforce the application of the BMST methodology designed to address these themes. These three areas form the focus for scenario development, with all drivers considered equally significant.

Although Standaert & Muylle [48] rank these drivers by importance, the evolving Open Insurance landscape, particularly with the emergence of new regulations, reduces the applicability of their prioritisation. For instance, regulation was not considered a primary driver in their study due to the lack of clear regulatory frameworks affecting Open Insurance in Europe at the time. However, recent regulatory developments have shifted this dynamic, highlighting regulation as a more significant driving force in this context.

C. Data collection: Creation of scenarios
The scenarios can be derived from existing trend analyses or developed through a brainstorming session [22]). Since existing scenarios and extreme outcomes related to the adoption of open APIs were either unavailable or unsuitable for the specific focus of this research, they were developed through a brainstorming session with industry experts. Brainstorming was an effective method for generating data on potential scenarios, as it incorporated diverse perspectives while maintaining a focus on the key driving forces identified in the previous step. This approach was well-suited to creating scenarios and extreme outcomes tailored to the scope and objectives of the research.

The brainstorming session involved four industry experts with diverse roles, including consultant and partner. These participants were selected for their extensive knowledge and experience in Open Insurance, API integration, embedded insurance, open banking, and broader industry trends. This selection ensured a broad pool of expertise and diverse viewpoints. All participating experts were employed at INNOPAY, leveraging their availability and relevant expertise to effectively inform the brainstorming process.

The brainstorming session began with an introduction to the research, including the scope and objectives of the session. The session was facilitated by the researcher, who was most familiar with the study's scope and goals. Lasting 1.5 hours, the session followed a structured, semi-open format guided by the three key drivers identified in the research. A Miro board was used to facilitate visual collaboration and organise ideas. Participants were guided through each driver with equal emphasis to shape the scenarios and corresponding outcomes.

The session began with a discussion on the definitions to be used in this research for "(open) APIs" and "embedded insurance." These definitions were refined and directly applied during the brainstorming session. Changes to the definition of "embedded insurance" are described in more detail in Section 2.7. Following this, the requirements for the scenarios and the extreme outcomes were explained (Appendix F). Once the objectives, definitions, and requirements were clarified, participants engaged in an open brainstorm to generate scenarios and corresponding outcomes based on the three themes.

The final step involved selecting the scenarios and outcomes to serve as the results of the brainstorming session. The session produced intermediate results for the scenarios, each including two extreme outcomes (Figure 4.2). These results were further developed during a concluding discussion around the three themes. A detailed outline of the brainstorming session can be found in Appendix E, and the final whiteboard results are included in Appendix F.

While brainstorming offers a dynamic and interactive platform for generating insights, it also carries risks of participant biases and blind spots that may remain unaddressed. To mitigate these risks, several strategies were implemented. The brainstorming session included a diverse group of industry experts with varying backgrounds in embedded insurance, Open Insurance, and API integration. This diversity ensured a wide range of perspectives was incorporated, minimising the influence of individual biases. The session was facilitated using a semi-structured approach that focused on the key drivers while allowing flexibility for exploration. Following the initial session, the scenarios were reviewed and refined in collaboration with participants to identify any overlooked areas or potential biases, ensuring a more robust and balanced outcome.

D. Selection of final scenarios by participants

At the end of the brainstorming session, participants reviewed the generated scenarios for each key driver in an open discussion and selected one scenario per key driver, each accompanied by two opposing extreme outcomes. The selection criteria focused on the plausibility of the scenarios and their expected level of impact. To ensure the selected scenarios were suitable for addressing research sub-question 3, participants were familiarised with the BMST method during the session.

E. Refinement of selected scenarios by the researcher

Following the brainstorming session, the researcher reviewed and refined the raw scenarios selected by participants to ensure their coherence and feasibility for the subsequent phases of the research. This step was essential to align the final scenarios with the overarching research objectives and to ensure their practical applicability.

F. Validation

The refined scenarios were sent back to the participants for feedback to ensure accuracy and relevance. This step allowed participants to address any potential overlooked areas or biases from the brainstorming session. Similar to the final BMC, the scenarios were validated during the interview phase by the interviewees. This additional validation ensured alignment with industry insights and relevance for further exploration, providing a solid foundation for investigating the strategic implications of open APIs in the context of embedded insurance.

By systematically following these steps in the scenario planning process, the research explored how the adoption of open APIs could influence the future of embedded insurance within the context of Open Insurance. This structured approach facilitated a detailed and forward-looking analysis, leveraging the strengths of scenario planning methodology.

3.2.3. Research strategy for sub-question 3

The third sub-question, "How would the embedded insurance business model for non-life insurance offerings be impacted under these scenarios?" is addressed through the final steps of the methodology. These steps include mapping the envisioned scenarios to the business model components, creating heat maps, analysing results, and formulating strategic improvements and actions. The BMST method was originally designed to be executed in a facilitated group session, enabling dynamic discussion and collective reasoning [22]. However, due to the limited availability of the targeted participants, individual interviews were conducted instead. Since the BMST method is not typically designed for individual execution, the steps were carefully adapted, and new tools and documents were developed to support this approach.

The adapted approach includes several steps aligned with steps 3-6 of the BMST method:

A. Impact assessment

Objective and goals

The objective of the impact assessment was to evaluate how the extreme outcomes of each scenario affect the various components of the embedded insurance business model. The first aim was to identify which business model components are most vulnerable or most likely to benefit under different scenarios. This corresponds to step 3 of the BMST methodology, which focuses on mapping the extreme outcomes of scenarios to specific business model components to assess their direct impact. The second aim was to describe these potential impacts, including the underlying reasoning, and to produce heat maps. This aligns with step 4 of the BMST methodology, which involves describing and visually representing the impact on business model components to identify patterns, vulnerabilities, and opportunities.

Semi-guided interviews

The impact assessment was conducted through semi-guided interviews, during which each interviewee identified the business model components directly impacted by the scenarios. Semi-structured interviews were chosen for their flexibility, allowing for the exploration of diverse opinions and unanticipated views while maintaining a focus on key areas and the research scope [4]. This interactive approach enabled immediate discussion and reasoning, ensuring that the participants' insights were thoroughly explored.

Each interview lasted between 30 and 90 minutes and was conducted online, either in English or Dutch. All interviews and accompanying documents were available in both Dutch and English. Participant preparation varied; some did not complete it at all, while others fully filled out the templates. The time spent on preparation is unknown. Each interview began with a brief discussion of the research scope and the provided definitions for embedded insurance and (open) APIs. Once these were clarified, the interview's goal was explained using an example unrelated to the research. Participants were then asked whether they agreed with the provided BMC and what they considered the most important aspects of the scenarios.

The main part of the interview focused on the impact assessment, which was conducted or clarified for each scenario. In some interviews, all scenarios were addressed, while in others, only certain scenarios were discussed. The outcome of each interview was a heat map.

The basic BMC (without explanations) was shared with every interviewee. In the preparation document and interview materials, the description of each component was provided as background information. However, it is unclear whether all interviewees reviewed the full description, as it was only addressed during interviews if questions arose, and no verification was conducted to confirm whether interviewees studied the full description during their preparation.

Interviewee profile description

Participants were selected based on their expertise in areas such as the embedded insurance busi-

ness model, regulatory frameworks, digital technology innovation, the insurance market, and open API technology. Ideally, participants were key stakeholders directly involved in business strategy and innovation, with the capability to evaluate the potential impact of various scenarios on embedded insurance business model components. The selection aimed to include individuals who could provide diverse perspectives on the adoption and use of open APIs within the context of embedded insurance. This diversity was reflected in their roles, which included strategy managers, heads of innovation, heads of technology, business or innovation consultants, venture capitalists, and industry experts.

The six participants were divided into two groups: employees of insurance incumbents and recognised industry experts. The non-insurer group included employees from an international strategy consultancy firm, an international venture capital firm, and the Dutch pension fund federation. Participants from the insurance group were employed at two different insurance incumbents. For this research, an insurance incumbent is defined as a company holding at least 10% market share in the non-life insurance industry in the Netherlands. These incumbents in 2020 were Achmea (23.6%), NN Group (20.4%), and ASR Nederland (17.9%) [29]. Although this data is three years old, no recent sources suggest significant changes in the composition of these incumbents.

To ensure a high-quality and relevant pool of participants, individuals were approached through INNOPAY's extensive network. This approach utilised their connections to identify and engage suitable participants, which was particularly valuable given the small potential pool of employees at ASR, Achmea, and NN who met the interview criteria.

Description of the participants
The first template is from a consultant with over 30 years of experience in banking, insurance, technology, and digital transformation. His current focus includes embedded and open insurance models, AI, data, and API integration.

The second template is from a manager at a pension fund who is responsible for innovation, data lab, and research. With over 25 years of experience in digitalisation and innovation, he has no specific expertise in insurance but possesses extensive knowledge of PSD2's introduction in the banking sector. He is currently working on creating a data-sharing scheme for the pension sector and is part of a European Commission committee focused on the Financial Data Space, where he has observed several API-related use cases, including those for insurers.

The third template is from an analyst at a venture capital firm, where he has been working for 1.5 years. The firm focuses on early-stage investing, corporate innovation, and connecting corporates with startups across various domains. While the analyst has not directly participated in embedded insurance startups, it is a focus area for the firm, and he is aware of discussions surrounding the topic.

The fourth template is from an employee at an insurance incumbent in the Netherlands. She has extensive knowledge of embedded insurance and Open Finance and is responsible for researching the opportunities these areas present for her firm. She notes that the firm currently has no established viewpoint on these topics.

The fifth template is also from an employee at an insurance incumbent. He has extensive experience in consulting, particularly in strategic marketing and innovation. Currently, he works as a strategy consultant within the firm, focusing on the distribution of its insurance policies. Approximately 50% of his time is dedicated to Open Finance.

The sixth template is from an employee who has been with an insurance incumbent for over 15 years, working on the banking side of the firm. He has a background in informatics, business analytics, and data analytics, with extensive experience in revenue models combined with technology, particularly regarding PSD2 regulation. While not directly involved in the insurance practices of the firm, he is experienced in embedded finance and innovation within the insurance context.

Data collection: Heat map creation

During the interviews, participants were guided through a process in which they mapped each scenario's extreme outcomes to the business model components and described the expected impact for each relevant mapping, including the reasoning behind their assessments. The extreme outcomes

of the envisioned scenarios were evaluated against the components of the Business Model Canvas (BMC) to determine how each scenario influenced key elements of the business model. This process produced heat maps structured as matrices, with business model components listed along the vertical axis and uncertainty outcomes arranged across the horizontal axis [22]. An example is provided in Appendix G.

To create the heat map, a colour scheme based on Haaker et al. [22] was used:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

Due to the individualised approach, it was not feasible to first reach consensus on which components were most relevant, as originally proposed by Haaker et al. [22]. Consequently, step 3 (mapping scenarios to business model components) and step 4 (describing the impact of the selected mappings) were combined in this methodology. Instead of generating a single heat map during a group session, each interview produced its own heat map, reflecting the interviewee's unique assessment of the impact of the scenarios and extreme outcomes on the business model components. This individualised approach allowed for the possibility of different components being identified as significant by each interviewee, potentially broadening the range of components considered across all interviews or leading to the inclusion of all components.

Interview questionnaire
A semi-structured questionnaire was developed to guide the interviews. The interviews began with an introduction to establish the participant's expertise level and background, providing context for their responses. To ensure alignment and consistency in understanding the concepts and scenarios, participants were asked about the scope and definitions used in the research, the detailed Business Model Canvas, and the envisioned scenarios. The core of the interview focused on the impact assessment, examining the specific effects of each scenario's extreme outcomes on the business model components. This segment was designed to allow flexibility for exploring insightful observations in greater depth. The interviews concluded with an opportunity for participants to offer final comments, ensuring that the most important insights were captured.

The interview questionnaire was refined through multiple rounds of feedback with thesis supervisors and tested during a trial interview to ensure its effectiveness. The final questionnaire, including a rationale for each question, can be found in Appendix H.

Interview document including impact assessment template
An interview document containing slides was utilised during the interviews to standardise data collection, ensuring that each interview addressed the same key areas while allowing flexibility for discussion. The document included an overview of the research scope and definitions, the BMC with detailed descriptions, the envisioned scenarios and their extreme outcomes, an unrelated impact assessment example using Uber's business model, and a template for mapping impacts.

The template, which was central to the interview process, was based on the example heat maps provided by Haaker et al. [22]. It featured a matrix table, with the top row listing the three scenarios and their extreme outcomes, and the row headings representing the BMC components. To ensure clarity and organisation during discussions, a separate table was provided for each scenario. Additionally, the colouring scheme described earlier was included to guide interviewees in mapping and categorising impacts.

The interview document was refined through multiple rounds of feedback with thesis supervisors and tested during a trial interview to ensure its usability and alignment with the research objectives. The final interview document is included in Appendix I.

Preparation document
A preparation document was provided to participants at least a week before their interview to help them

prepare and consider the potential impacts. The preparation document contained the same content as the interview document, except for the impact assessment template, which was presented as a single table. Participants were encouraged to complete the template as thoroughly as possible before the interview to ensure they arrived with initial thoughts and considerations. This approach was designed to facilitate a more focused and productive discussion during the interview.

By having participants prepare in advance, the interviews could explore specific areas of impact and reasoning in greater depth, making the sessions more efficient and insightful. The content of the completed template was integrated into the interview document prior to each session. If a participant was unable to prepare adequately, rescheduling was suggested; otherwise, the interview proceeded as planned.

The preparation document underwent multiple rounds of feedback with thesis supervisors and was tested during a trial interview to ensure its clarity and effectiveness. The final version of the preparation document is included in Appendix G.

Trial interview
A trial interview was conducted to test the interview process and identify any necessary adjustments before proceeding with the full set of interviews. The trial involved an INNOPAY industry expert, chosen for their availability and extensive knowledge of key aspects relevant to the impact assessment. To closely replicate the actual interview environment, the participant was someone who had not been involved in any part of the research.

The full interview process was simulated, including the use of the preparation document. Following the trial interview, feedback from both the participant and the researcher was thoroughly reviewed and discussed. This feedback was incorporated to refine the interview document, questionnaire, and preparation document, ensuring their effectiveness and alignment with the research objectives.

Following the online trial run, several adjustments were implemented to enhance the clarity and flow of the interview process. The content structure of both the interview document and the interview questionnaire was revised. It became clear that the concept of the impact assessment was initially challenging for participants to grasp. To address this, the illustration of the impact assessment, which effectively demonstrated the interview's goal and guided participants in completing the template, was moved to the forefront of the interview materials.

To improve focus and readability, the template table was split into separate tables for each scenario within the interview document. This adjustment provided clearer focus during discussions and enhanced readability, especially for online interviews. The specific scenario being addressed was repeated on each template slide, reducing the need to switch between slides, which had previously created confusion and slowed the process. Additionally, text on the filled-in template, which was difficult to read due to its small size, was made more accessible through these changes.

To ensure participants were continuously reminded of the research context, the scope and the definition of ”embedded insurance” as used in this research were added to the BMC slides. Furthermore, participant guidance was improved by refining the text boxes designed to guide them through the process. The description of the colour scheme was also revised to improve understanding, particularly to help distinguish between the colours ”red” and ”orange.”

The interview questionnaire was refined based on insights from the trial interview. The introduction was shortened by reducing the number of questions to save time, as some information, such as the interviewee's experience with embedded insurance and open APIs, was expected to emerge naturally during the conversation. Additionally, the wording of several questions was revised to improve clarity and ensure they elicited more precise responses. These adjustments aimed to streamline the interview process while maintaining its effectiveness.

B. Analysing results

The individual heat maps generated from each interview are analysed to evaluate the impact of various scenarios and their extreme outcomes on the components of the embedded insurance business model. As the interviews were conducted individually rather than in a group setting, each heat map captures the unique perspectives of the interviewees. These heat maps are analysed both individually and in

combination, with a key comparison focusing on the division of participants into two groups: employees of insurance incumbents and recognised industry experts.

The specific methods of analysis depend on the nature of the data collected, particularly the level of consistency or diversity in responses among participants. While Haaker et al. [22] do not provide detailed guidance on analysing multiple individual heat maps, the analysis follows two main sub-steps informed by their methodology:

Subview analysis
The heat maps are examined using subviews to structure the analysis and gain deeper insights. This approach involves focusing on specific aspects of the business model (BM) and analysing why certain components appear more robust or vulnerable than others [22]. For example, one method accumulates the impact of all scenarios on a single BM component to assess its overall robustness [22]. Alternatively, another method evaluates the impact of a single scenario across all BM components to identify which scenario exerts the most significant overall influence, whether positive or negative [22].

The heat maps from the two participant groups, insurance incumbents and industry experts, are also compared to identify similarities and differences in their perspectives. Consistency in their assessments may indicate strong trends or universally acknowledged risks and opportunities. Conversely, diversity in their responses could highlight differences in viewpoints shaped by distinct roles, organisational priorities, or areas of expertise.

Pattern analysis
The heat maps are analysed for patterns in the colourings to uncover critical insights about the business model. Haaker et al. [22] describe several patterns to consider in this analysis. One pattern involves identifying preferred outcomes on stress factors, where scenario outcomes consistently benefit multiple business model components. These insights can guide strategic actions, such as advocating for specific regulatory changes or prioritising technological investments. Another pattern is the detection of potential inconsistencies between business model choices, where different components are favoured by opposing scenario outcomes. Such discrepancies may indicate misalignment or a lack of cohesion within the business model. A third pattern focuses on identifying business model choices that are not feasible in any future environment, highlighted by ”double-red” outcomes where a component is marked as unviable under all scenarios. These critical issues require further investigation or root-cause analysis to develop viable solutions.

These patterns are integrated with subview analyses to provide a more detailed evaluation of the BM’s robustness. The analysis also examines the consistency of these patterns across the two participant groups. Consistent patterns strengthen the findings, while divergence in perspectives may reflect differences rooted in organisational roles or priorities, offering a broader understanding of risks and opportunities.

3.3. Human Research Ethics

This research adheres to the ethical guidelines established by the Human Research Ethics Committee (HREC) of the TU Delft. All interactions with participants, including interviews and workshops, prioritise participant safety, voluntary participation, and GDPR-compliant data protection measures. Data management follows a structured plan reviewed and approved by the faculty data steward, ensuring compliance with ethical and legal standards. Before data collection began, the research protocol, including consent forms and a risk assessment checklist, was submitted for HREC approval to confirm the ethical integrity of the study.

To encourage open and honest participation, all responses are anonymised, allowing participants to share insights freely without concerns about personal attribution. This approach is intended to enhance the depth and quality of the data collected. Participants are fully informed about the research objectives, how their data will be used, and the methods employed to store and protect their information. Their consent is documented through a detailed informed consent form, which also ensures that participants retain the right to withdraw from the study at any time. The HREC documents, including the informed consent forms, are included in Appendix J.

3.4. Research context

This research is geographically focused on insurance incumbents operating within the Netherlands. While this scope may limit the applicability of findings to other regions, it allows for a more focused and detailed analysis tailored to the Dutch non-life insurance industry. However, not all consulted experts are based in the Netherlands due to constraints in availability. Furthermore, data collected from desk research originates from a range of international sources. The inclusion of international experts introduces diverse perspectives, which may enrich the research by providing insights that extend beyond the Dutch market context.

The research is conducted within the professional environment of INNOPAY, a consultancy firm specialising in digital transactions. INNOPAY's extensive expertise in Open Insurance and its strong industry network offer significant advantages, including access to potential interview candidates and expert feedback throughout the research process. However, proximity to INNOPAY also presents potential challenges, such as the risk of biases influencing the researcher's focus areas or the perspectives of interviewees. To mitigate these risks, careful measures are taken to maintain objectivity and ensure the credibility and reliability of the research findings.

3.5. Quality standards

To ensure the robustness of this research, several strategies were employed to enhance its validity, reliability, and generalisability. These strategies aimed to produce findings that are accurate, consistent, and applicable beyond the immediate research context, contributing valuable insights to both academic and practical fields.

Data triangulation was used by incorporating multiple data sources, including academic literature, industry reports, expert views, brainstorming sessions, and interviews, to cross-verify information and enhance the reliability of the findings. Pilot testing was conducted on the interview questionnaire, preparation document, and interview materials, initially reviewed by thesis supervisors and further refined through a pilot interview to ensure clarity, relevance, and effectiveness. After the brainstorming session, data checking was carried out by validating the findings with participants to confirm that the data accurately reflected their views and intended meanings. Detailed descriptions of the research context, methodology, processes, and findings were provided to enable other researchers to assess the applicability of the results to different contexts and facilitate potential replication of the study. Finally, the research process and findings were regularly reviewed and discussed with members of the thesis committee as part of a peer review process, further ensuring the credibility and rigour of the study.

4

Results

This chapter presents the findings of this research, focusing on the business model canvas description of embedded insurance business model for non-life consumer offerings, the development of potential scenarios related to the adoption of open APIs and the impact assessment of these scenarios on the business model canvas. The section is organised into three main parts corresponding to the three research sub-questions. It starts with the description of the embedded insurance business model, followed by the development and selection of scenarios and concludes with the impact assessment.

4.1. Business model canvas

This section presents the characteristics of the embedded insurance business model for non-life insurance offerings from the perspective of insurance incumbents. This description is structured using the Business Model Canvas (BMC) framework, which includes nine components: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structures.

The final detailed BMC can be found in Appendix A. In this thesis the focus is on the part where the insurer keeps the whole value chain except for sales, which is an important factor that influenced the development of the business model canvas. For each component, the most important aspects are given including a detailed explanation. The goal has been to provide a description of the embedded insurance business model by breaking it down into showing the most important aspects of the specific components of the business model canvas, including a detailed description of each aspect. It should be noted the business model is described from the perspective of the insurance incumbent, who maintains all activities from the insurance value chain except for the sale of the consumer non-life insurance policy. Important sources are the eight sources given in Table 2.2, especially their definitions, the final definition and scope as provided in Section 2.7 and expert feedback rounds. In addition, undocumented conversations have guided the process. In the following paragraphs, each component will be described in detail including the process of developing the specific description.

Key partners

The description of this component is derived by accessing the eight sources and searching for sentences mentioning directly or indirectly partnerships, collaborations, stakeholders and transactions. Importantly, the eight definitions of embedded insurance have been compared on the aspect of key partners. In addition, undocumented conversations with INNOPAY experts and documented feedback rounds with an INNOPAY expert have been used in the process.

I found that the key partners for an insurer to enable embedded insurance are distributor partners and technology providers. The result of distributor partners as key partners has very high certainty, as many sources mention distribution partners as necessary partners. To offer insurance at the point of sale of non-insurance products or services, it is necessary to find partners willing to integrate the offering of insurance in their product or service sale processes. This is related to the distribution channel

for embedded insurance offerings [13]. Some sources mention distributor partnerships directly, like Deloitte [13], BCG [45] and The Future of Commerce [25]. Other sources mention that the insurance is integrated in the customer journey [11] or commercial transactions [50] of other non-insurance products or services, indirectly referring to the need of a third-party who offers these products or services.

The result of technology providers has a lower certainty, because it is not strictly necessary to have as an insurer, but it is very common. Of the online sources, only BCG [45] directly mentions that insurers either need to improve their technology and provide for technology platforms themselves or should partner with technology providers. KPMG [54] mentions that technology, primarily API integration and data quality, is a challenge. The Future of Commerce [25] and Chubb [11] mention that advancements in technology make it possible to integrate and personalise insurance offerings. Especially in the undocumented conversations it became clear that technology plays a huge role in successfully embedding insurances, and while insurers could develop all the technology themselves, it is more common that they collaborate with technology providers to build and maintain the necessary technological infrastructure. The description of technology providers is based on the undocumented conversations.

The results of the key partners component have been validated with the consulted INNOPAY expert, who did have one comment on the naming of 'distributor partners'. First, they were called carrier partners, but as indicated by the expert, in the insurance industry the carrier is the risk bearer, which is the incumbent. Therefore, the name has been changed to 'distributor partners', as similarly described by Deloitte [13].

Key activities

The aspects of the component of key activities are primarily based on the insurance value chain as described by Eling & Lehmann [31] and on the comments of the expert feedback. Some online sources do describe some key activities, but not in much detail. The insurance value chain as described by Eling & Lehmann has been used as the primary source. The insurance value chain (Figure 4.1) describes the primary and supporting activities of how insurance products or services are delivered to the customer [31].

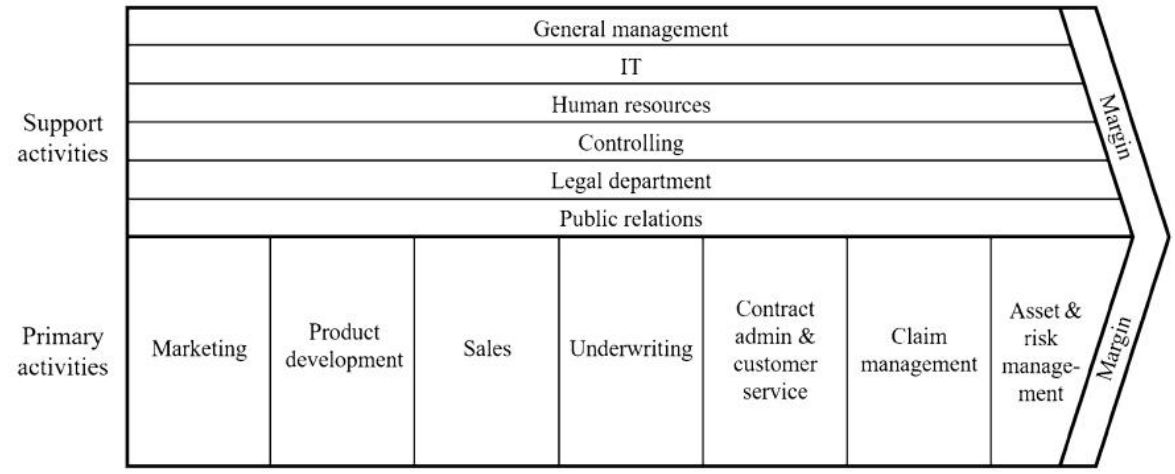

Figure 4.1: Insurance-specific value chain based on [31].

Most primary activities will be considered key activities for the embedded insurance business model, as without these primary activities the insurance product cannot be developed and brought to the customer. The primary activities that have been taken over are called 'product development', 'policy administration & servicing', 'underwriting' and 'claims handling'. The primary activities 'marketing' and 'sales' have not been directly included as the insurer does not have to do marketing and sales activities to the insurance customer anymore as the sale is embedded at the sales processes of third-party digital platforms (key partner). However, although the insurer does not have to do marketing and sales to the customer anymore, it is important to establish partnerships with third-party digital platforms who are willing to integrate the insurance products or services from the insurer. Therefore, 'partnership management' has

been added as a key activity in the embedded insurance BMC. This aspect also refers to partnerships with technology partners, as these are the other key partners of the insurer incumbent.

As technology is an important and necessary aspect to collaborate with third-party digital platforms to integrate the insurance offerings, the aspect 'technology development' has also been considered a key aspect.

From the support activities mentioned by Eling & Lehmann [31], 'IT' and 'Public relations' cover activities that are described as key activities in the BMC. The remaining support activities are considered to be necessary but more general aspects an incumbent insurer executes centrally overarching all the incumbents' insurance activities.

The key activity 'balance sheet provision' has been added based on the feedback of the expert. This aspect refers to the financial activities needed to sell and manage insurances sold. This aspect is not directly mentioned in the insurance value chain by Eling & Lehmann [31] but has been added because without managing the balance sheet, there is a huge risk of negative consequences for the insurer and customers. In addition, as indicated earlier, key activities could become separate capabilities to be offered to third-party digital platforms if they take over more activities of the insurance value chain. In that case, providing the balance sheet could be a separate capability which could be integrated in the digital environment of the third-party distributor.

Value propositions

This component is based on the online sources, mainly the provided definitions, and on the comments of the brainstorm participants while drafting the final definition used in this research. Focused on the insurance customer, embedded insurance has two main propositions that create value for the customer.

The first value proposition is convenient customer experience made possible by integrating the insurance seamlessly in the sales process at the point the customer needs it. According to KPMG [54], integrating insurance products at the sales processes of non-insurance products or services removes the burdens customers normally see when buying insurance offerings, which are complexity, inflexibility and difficulties to acquire. Deloitte [13] and InsurTech [32] also mention that interacting with customers at the time they are in need of a specific insurance enhances the customer experience. It eases the process of buying insurance [32] and offers the customer a peaceful mind [25].

The second value proposition is offering tailored personalised insurance. Embedded insurance enables third-party digital platforms and insurance incumbents to customise and personalise the insurance for the customer [25]. The insurance can be customised to the customer' needs and to the product or service that is being sold, which leads to tailored insurance offerings [11][32]. In addition, the third-party digital platforms often are personalised environments for the customer [54]. The difference between 'tailored' and 'personalised' is not entirely clear from the online sources. Based on the undocumented conversations and the meaning of the words, I would say 'tailored' refers to modifying an existing insurance policy to the specific needs of a customer and 'personalised' refers to the possibility to also use personal data to create unique insurance policies.

During the discussion on the definition of embedded insurance, the brainstorm participants emphasised the importance of including the terms 'seamless customer experience' and 'personalised' or 'tailored,' as they believe these characteristics are key to the success of embedded insurance. In the final definition, 'seamless' and 'personalised' have been included. There I have chosen not to mention 'tailored' because the words 'personalised' and 'tailored' are sometimes used interchangeably and 'personalised' refers in my opinion more to the possibility that every customer could get a unique offering for the same product or service.

The validation expert did not have comments on this component.

Customer relationships

This component is based primarily on undocumented conversations and expert feedback. Most online sources from Table 2.2 do not mention customer relationships directly, apart from Deloitte [13], who mentions that consumer relationships could play a significant role in obtaining customer loyalty and mentions that the direct relationship between a consumer and an insurer may not be as strong as with traditional distribution channels. Like in the other components, the customer is defined as the person

who buys an insurance policy, the consumer. There are different possibilities in describing the customer relationships. It seems that the form of the partnership between the incumbent and the distributor plays an important role.

The first form of customer relationship, the direct form, is the simplest one. In this form, the distributor is just a place where, during its sales process, the insurance policy of the incumbent is offered as an option. The policy can either be bought on the digital platform of the distributor or the customer is referred to the website of the insurer. After the sale, all interactions between the consumer and the insurer will directly be handled by the insurer. It is possible that the consumer first interacts with the platform at the place where the consumer bought the insurance, then the consumer will be referred from the platform to the insurer.

The other form of customer relationship is the indirect form, and this form exists and could exist in many different variations. In this form, the relationship between the customer and the insurer is more indirect. The digital platform of the distributor is the place of interaction, and the customer will not leave the digital environment of the platform, for example when a claim needs to be submitted and handled. I have found two main indirect forms, either with or without white-label agreement. With a white-label agreement, the platform distributes the insurance of the incumbent under its own name. Without white-label agreement, the customer is aware the insurance is from a particular insurer, but most interactions take place within the environment of the digital platform of the distributor.

In this business model canvas, the digital platform itself is not seen as a customer of the insurer. According to the expert, in most cases the digital platform is a channel for passing information and a place that sells the insurance for which it receives a fee, according to the scope of this research. In the case that the digital platform takes over more parts of the insurance value chain and outsources the remaining parts to the insurer, the digital platform could also be seen as a customer. This is outside the scope of this research, but an interesting view to keep in mind in the remaining part of the research.

The possible forms of partnerships and the various agreements associated with them are complex and case-specific. To gain a clearer understanding of the potential relationships with customers, extensive use was made of expert feedback on this topic.

Customer segments

The description of this component is based on online sources and undocumented conversations. There are different ways to segment, for example age, type of insurance, behaviour, geography. I found that although some segments are more suitable for embedded insurance, there is no reason to say that it is limited to certain segments of any type. The argument for this component is based on inductive reasoning for the online sources and confirmed by undocumented conversations. Every source consulted did not mention a reason for the description to be untrue, which is supported by undocumented conversations and the expert feedback. Therefore, it is likely that embedded insurance could be available for all customer segments and for any type of insurance.

Based on the online sources mentioned in Table 2.2, there is no source that states that embedded insurance is limited to certain types of insurances or limited to certain customer segments, but there are sources that state it is beneficial for the customer segments in general. According to Chubb [11], embedded insurance increases the accessibility and inclusivity of insurances worldwide. According to InsurTech [32], embedded insurance provides insurers the opportunity to access new customer segments and evolve their product offerings through innovation.

Probably, some segments will be impacted more due to embedded insurance than others. A sector mentioned often is the automotive industry, which, according to Deloitte [13], is the sector that could be impacted most.

A possible limiting factor for including all customer segments is regulation. Although not described in detail, some sources mention obstacles that could impact the adoption of embedded insurance, and so the availability of customer segments and types of insurances. According to Deloitte [13] and InsurTech [32], compliance with regulation is the most important factor to consider, though they see it as a challenge that needs to be addressed.

Based on the informal discussions, it has been confirmed that, in principle, any customer can purchase

any insurance product or service, particularly non-life insurance, during the sales process of another product or service.

The expert did not have comments on this description while verifying the result.

Key resources

This component is based on logical thinking in relation to the component ‘key activities’ to know what is needed, inspired by the online sources from Table X and undocumented conversations, and on some comments of the expert feedback.

The aspect ‘technological infrastructure’ is, based on the undocumented conversations and online sources [54][45], an important resource required to successfully integrate insurances within the environment of third-party digital platforms and to accommodate the internal insurance operations. According to BCG [45], technological infrastructure is a necessary resource to enable seamless integration with partners, to support real-time data processing for risk assessment and claims management, and to provide the flexibility and scalability needed for operations. Other sources mention that due to advancements in technology, embedded insurance is becoming more accessible, enabling insurers to integrate their offerings directly into non-insurance platforms, streamline processes, and deliver personalised protection in real time [50][11][25][54].

The aspect of ’insurance product development’ is based on logic and online sources. To offer tailored or personalised insurances to the customer, they first need to be developed or innovated by the insurer, in collaboration with the digital platform [32][54].

The aspect ‘operational capabilities’ is added based on logic and undocumented discussions. Operational capabilities are necessary to perform the tasks of the insurance value chain and to integrate insurance products efficiently and seamlessly within the digital platforms of third parties. According to BCG [45], the current insurer operating model is developed for efficiency, while for embedded insurance a more agile approach would be needed to support scalability.

The aspect ‘risk models development’ is added based on the expert feedback. The expert highlighted that since embedded insurance products are tailored or personalised to each individual customer, new risk models must be developed or existing ones enhanced to account for the wide range of unique options within the same type of insurance, ensuring accurate risk assessment and financial stability for insurers.

Initially, an aspect called ‘partnerships’ was included as a key resource for the embedded insurance business model, as embedded insurance cannot be distributed without well-founded partnerships with both distributors and technology partners. This aspect is left out based on the feedback of the expert, who pointed out that ‘partnerships’ are already described in the component ‘key partnerships’, which the researcher agreed with. The expert did not have comments on the other aspects.

Channels

This component is based on the final definition of embedded insurance as described in Section 2.7. The result is highly supported by online sources, which describe digital platforms as the primary distribution channel of embedded insurance [13][25][54][11][45].

Although other (offline) channels are possible, the result is in line with the research scope, which only focuses on the primary distribution channel of embedded insurance, as described by online sources.

The expert did not have any comments on this component.

Cost structure

This component is primarily based on the relationship with the component ‘key activities’, logically resulting in costs. The aspect ‘commissions to distributors’ is dependent on the form of partnership between the insurer and distributor, and is based on online sources, on undocumented conversations and the expert feedback.

The first five aspects are directly related to the component ‘key activities’. No aspect of ‘key activities’ is without costs, though one aspect could have more impact than the other. The key activity aspect

'product development' is not included in the cost structure, however in hindsight this is deemed a mistake by the researcher, as the costs related to developing tailored and personalised insurance offerings including accurate risk models should have been considered significant.

The cost aspect 'pay-out of successful claims' is considered the logical result of handling claims.

The last aspect 'commissions to distributors' is a direct result of the form of partnership that is in scope of this research, which should be kept in mind while interpreting the results. In the scope of this research, the insurer retains the whole insurance value chain except for sales. According to the undocumented conversations and the expert, it is common in this case that the distributor receives a commission for each insurance sold, hence the result of this aspect. Another possibility for this aspect is the case that the distributor takes over more activities of the value chain and also collects the premiums sold for the insurances. In that case the distributor will pay a fee to the insurer for each service used, and this aspect will not be present here. However, that is outside the scope of this research.

The expert had comments about this last aspect related to the different partnership models and resulting costs and revenues structures. A discussion explained the different partnership model possibilities, including cost structures and revenue streams.

Revenue streams

This component is based on the undocumented conversations and the expert feedback.

The first aspect 'revenue from insurance premiums' is a direct result of selling insurance products. For each insurance sold, the insurer receives the premium paid by the customer. This component is based on the form of partnership and scope in this research, as explained in the previous paragraph. If the partnership is different, this aspect could be changed to 'fees from distributors' for each service used.

The second aspect is related to the common revenue streams for insurers after they have sold a policy. The insurer often offers additional services to the customer for the same policy for which it could receive additional revenue.

The last aspect is also related to the common revenue streams for insurers, in this case selling additional insurances. If the customer needs insurance for something else and knows the insurer by name or could be directed to the insurer, the customer could buy the additional policy directly.

The expert had comments about all aspects. A discussion explained the different partnership model possibilities, including cost structures and revenue streams. The other comment focused on describing the two other aspects more distinctly by highlighting that cross-selling refers to customers buying separate insurances and that value-added services refers to generating additional revenue from the basic embedded insurance sold.

4.2. Results scenario planning

This section presents the outcomes of the scenario planning exercise conducted to address the drivers of open insurance and their implications for open API adoption. The brainstorming session focused on three primary drivers: regulation, technology, and markets, as outlined in the Methodology (Chapter 3) and the work of Standaert & Muylle [48]. These drivers appear to be similar to the themes related to business model robustness as mentioned by Haaker et al. [22], which have not been explicitly considered but strengthen the application of the BMST methodology, which is designed to respond to these themes.

4.2.1. Presentation of the brainstorm results

The brainstorm session produced intermediate results for the scenarios, each including two extreme outcomes (Figure 4.2).

The participants quickly agreed on the scenario related to the first driver, Regulation. The focus was on new regulations currently being developed by the EU, specifically the FIDA. Participants expect other regulations, such as the Data Act and AI Act, to also influence the adoption of open APIs, but they anticipate that FIDA will be the most impactful. They believe that FIDA will have a significant impact, especially for incumbent insurers. FIDA is expected to mandate data-sharing for all types of financial

data, although it remains unclear which specific types of financial data, including insurance data, will be subject to the regulation [40]. However, participants expect that insurance data, particularly non-life insurance data, will be included. While they are uncertain about the exact scale of the impact, participants foresee various consequences for incumbent insurers and their embedded insurance business models. They also identified two possible strategic responses for incumbents: either to meet only the minimum requirements for compliance or to go ”beyond compliance.” In the first outcome, insurers would develop open APIs, allowing third parties to access financial data as required, potentially with customer consent. This outcome is not expected to drive much innovation. In the second outcome, several ideas emerged. For example, the insurer might invest in advanced open APIs to create new propositions based on its financial and customer data, or it could unbundle the insurance value chain and offer individual components as stand-alone capabilities. In line with the EU's objectives for FIDA, this approach could foster innovation and increase competition [40].

The scenario centred around Technology included a wider range of topics raised during the brainstorming session, though the selected scenario was agreed upon fairly quickly. Topics that emerged included the development of AI, web3/crypto, and ”Micro-Service Architecture Trends.” These topics and their outcomes primarily revolved around two themes: decentralisation and technical legacy/debt. Decentralisation refers to the idea that insurance may no longer remain a stand-alone product mainly offered by incumbent insurers; instead, it could be combined or integrated with other financial services or provided by societal groups or FinTechs through web3 solutions. The theme of technical legacy or debt relates to incumbent insurers' existing IT infrastructure, which is often seen as outdated, complex, and both difficult and costly to modify. Participants noted that this infrastructure could act as a bottleneck for developing and implementing open APIs. Emerging technologies, such as AI, might either worsen these infrastructure limitations or improve them, depending on how they are applied. The selected scenario centres on AI becoming a critical factor in developing new insurance propositions, with technical debt identified as the most important and interesting theme to investigate. This decision is made by the participants due to their views about the current state of the IT architecture of insurance incumbents in The Netherlands, which they view as complex and outdated. They expect that technical debt is the most important factor to consider to assess the impact of integrating AI as an important, new technology and should be conisered by insurers to potentially adapt their strategy. The outcomes focus on the potential for increased competition, as new entrants like InsurTechs are expected te be not hindered by complex IT infrastructure. Alternatively, AI could resolve some of the challenges posed by legacy infrastructure, easing the transition and adaptation of open API solutions. In this case, they view that integrating AI is the solution to decrease the complexity and size of the current IT infrastructure.

Whereas the themes for scenarios 1 and 2 were clearly defined and straightforward for participants, this was not the case for the theme of scenario 3, Markets. One participant described this theme as ”everything else.” It was clarified that this theme encompasses any factors influencing market dynamics on either the customer or business side. Ideas included emerging risk categories, shifting consumer expectations for insurance, whether always at the point of need (embedded insurance) or tailored to specific needs (personalisation), and market fragmentation with the rise of FinTech or reduced monopoly for incumbents in customer trust relationships. The selected scenario and outcomes represent a combination of these ideas. The scenario itself blends changing customer expectations and emerging risk categories, with an emphasis on the insurer's limited access to data. The first outcome centres on personalisation and the growth of new insurance providers (potentially InsurTech), while the second outcome focuses on the insurer offering comprehensive, personalised insurance through APIs.

4.2.2. Presentation of the final scenarios

Since the brainstorm results did not fully meet the predetermined criteria or were not considered entirely suitable for the impact assessment, the researcher developed final results (Figure 4.3). On the left side of the figure, the three final scenarios are titled with the foreseen development and a short description has been provided. On the right side, for each scenario two opposite extreme outcomes are defined, which take the insurer incumbent's perspective and focus on open API development. These results were verified and agreed upon by the participants. The figure outlines a scenario for each driver of open insurance, and thus open API adoption, with two opposing extreme outcomes defined for each scenario from the insurer's perspective. The final scenarios were developed with a focus on the strategic choices and technological adoption of insurance incumbents within the embedded insurance

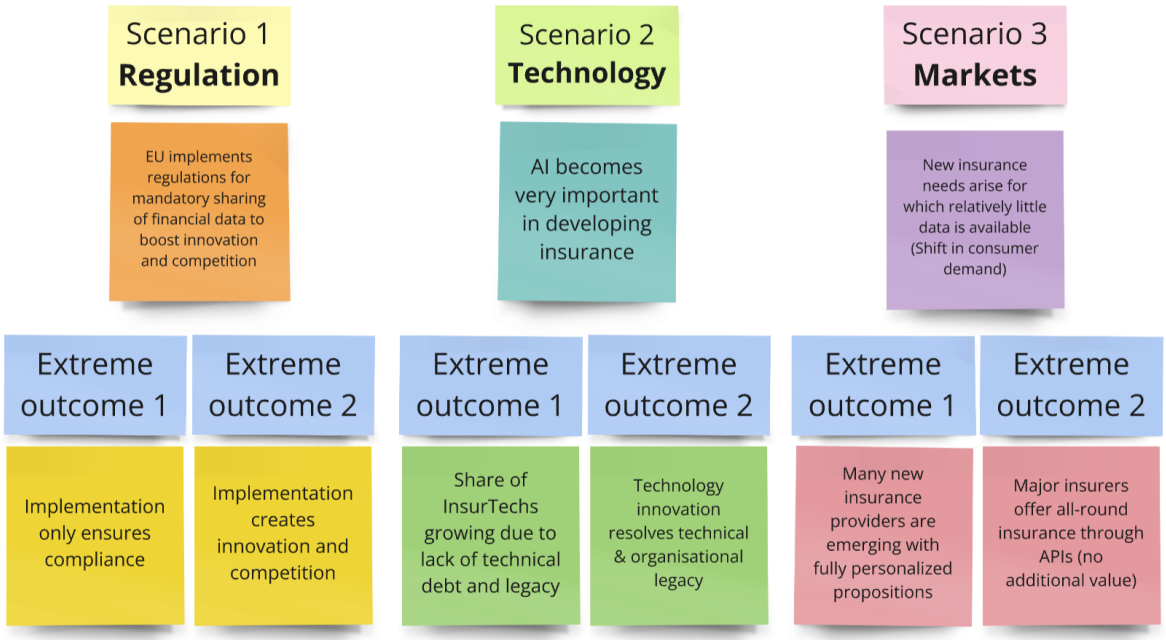

Figure 4.2: Selected scenarios and outcomes brainstorm

context. This approach diverges from traditional scenario planning methodologies that often explore broader macroeconomic or geopolitical factors. Instead, the scenarios aim to provide a structured analysis of how incumbents might navigate industry-specific challenges and opportunities related to Open APIs and embedded insurance. This focus aligns with the research's objective to assess strategic robustness, offering applicable insights for incumbents. The researcher aimed to remain as close to the original brainstorm results as possible. The adjustments are detailed below.

The final scenario A remains closely aligned with the brainstorm results. The primary trade-off centred on the specificity of regulatory frameworks. Initial ideas included fragmented implementations or regulations targeting the insurance industry specifically, however it is not clear how these should be defined as no relevant regelation regarding mandatory data-sharing exists yet in the EU. Instead, the final scenario concentrated on general regulations regarding mandatory data-sharing. Given that the EU is currently working on the FIDA regulation, which mandates data sharing, this term is referenced, and the explanation now aligns more closely with the EU's objectives for FIDA [40]. This is chosen to increase the likelihood of the scenario to develop in the coming years while still providing boundaries to remain specific enough to discuss meaningfully. The extreme outcomes have been adjusted to reflect the insurer's perspective, focusing on open API development. Since the precise impact is still unclear and it is uncertain whether innovation and competition will increase due to this regulation, these potential effects mentioned in the brainstorm result were removed or rephrased to maintain a neutral description.

The final scenario C has been restated to add more depth. Here, trade-offs involved the scope and depth of AI integration within the insurance ecosystem. Although other digital technologies could have been chosen, it has been chosen to stay close to the brainstorm result. The role of AI in insurance is mentioned frequently in literature, making it a relevant technology to discuss. The original extreme outcomes were removed, as they did not involve open APIs and focused only on technical debt readiness, which may not be directly relevant to the embedded insurance business model. The theme of technical debt, or in a broader term organistional readiness, related to the insurers' existing IT infrastructure, is considered to be an internal factor which may not be the case for each insurer, and has therefore not been considered in the final extreme outcomes. Additionally, the first outcome leaned toward changing market dynamics, which is more related to theme 3. The revised outcomes now take the insurer incumbent's perspective, focus on open API development, and are presented in a neutral manner to allow interviewees to explore more factors beyond technical debt, aligning better with the exploratory nature of this research.

The final scenario B is largely consistent with the brainstorm results, however specific aspects have been shifted. Trade-offs focused on consideration of the extent of ecosystem integration and consumer-driven personalisation. In the literature focused on Open Insurance / Finance and embedded insurance / finance, platform ecosystems appeared to be a relevant theory. Therefore, it has been chosen to centre this scenario around the topic of platform ecosystems, focusing on connections with third parties to make it directly applicable. The scenario itself directly incorporates personalisation and new market entrants, to align with the outcomes selected by participants and with market demands related to embedded insurance. The outcomes emphasise the role of acquiring data through external open APIs, framed from the insurer's perspective, as open data access is an important aspect of Open Insurance according to literature.

Figure 4.3: Final scenarios and outcomes

4.3. Impact assessment adoption open APIs in the embedded insurance context

This section presents the outcomes of impact assessments conducted during six interviews with three employees working at an insurer incumbent and three employees working for a consultant, a pension fund and a venture capital firm. During the interviews, the participants have been asked to confront the components of the business model canvas as given in Section A with the extreme outcomes of the three scenarios as given in the previous section. No efforts have been made to quantify the findings, as the quality preparation and the depth of discussions varied substantially throughout the research.

To interpret the heat maps, the following colour scheme is used based on the colour scheme provided by Haaker et al. [22]:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

The methods of analysis are based on the framework outlined by Haaker et al. [22] and include three key approaches. The first is subview analysis focused on business model (BM) components, where each row of the heat map is examined to assess the robustness of individual components across all scenarios. The second is subview analysis centred on stress factors, analysing each column to evaluate the robustness of the BM canvas against a single outcome. The third method is pattern analysis, which involves examining double colourings of both outcomes within a scenario to determine the robustness of the BM regardless of the specific scenario outcome. These approaches collectively provide a structured way to evaluate the resilience of the business model under varying conditions.

4.3.1. Analysis single heat maps

In this part, for each scenario, the individual heat map will be analysed. The individual heat maps including detailed descriptions can be found in Appendix B. The analysis is not exhaustive as only the key findings in the opinion of the researcher are mentioned.

Analysis heat map 1: Consultant

The analysis of heat map 1, representing the consultant's perspective, is summarised in Figure B.1 and detailed further in Section B.1.

In the subview analysis of business model (BM) components, most components are marked predominantly with white or green, indicating that the business model components can generally sustain without requiring significant attention under most scenarios. However, the cost structure component is primarily marked orange, suggesting that the insurer should monitor expenditures in all scenarios if the business model is to continue. To address this, the insurer should maintain liquidity reserves.

In the subview analysis of stress factors, the primary concern is the lack of connection with third parties if consumer expectations shift towards new, personalised insurance products. This outcome shows some unprofitable impacts, particularly affecting customer relationships, customer segments, and cost structure. To mitigate these risks, the insurer should prioritise acquiring customer knowledge through partnerships with embedded insurance providers.

The pattern analysis highlights several insights. Notably, the consultant observed no differences between developing open APIs that are compliant versus those that are very powerful, as both outcomes were assessed identically. The reasoning behind this was not explored in-depth during the interview, as the focus was on other scenarios. Additionally, the insurer should prioritise integrating AI and building connections with third parties, as these outcomes positively influence the overall business model compared to their opposing scenarios. Finally, the insurer should adapt its key resources proactively if new data-sharing regulations are considered, regardless of the specific regulatory outcome.

Analysis heat map 2: Pension fund

The analysis of heat map 2, based on the pension fund expert's perspective, is presented in Figure B.2 and detailed in Section B.2.

In the subview analysis of business model components, the cost structure is identified as the only component that will not be strengthened under any scenario outcome. Continuing with the business model will incur high costs, which the insurer should carefully consider. Conversely, the technology partners aspect of key partners will not experience a negative impact under any scenario outcome. However, this is not the case for distributor partners, which remain more vulnerable to changes.

In the subview analysis of stress factors, all first outcomes, particularly in scenarios A and B, present potentially infeasible impacts for certain components, posing a threat to the robustness of the business model. In contrast, the opposite outcomes of these scenarios strengthen the business model. To mitigate risks and capitalise on opportunities, the insurer should prioritise realising the second outcomes: developing powerful open APIs beyond compliance, successfully integrating AI, and establishing strong connections with third parties to acquire external data.

The pattern analysis indicates that for most components, the impact will either be positive or unprofitable, potentially rendering the component infeasible if it is not neutral. This pattern does not apply to the cost structure, which never experiences a positive impact. Therefore, the insurer must again weigh the risks against the opportunities and consider its ability to achieve the second outcomes: developing powerful open APIs beyond compliance, successfully integrating AI, and successfully connecting with third parties to acquire external data.

Analysis heat map 3: Venture capital

The analysis of heat map 3, reflecting the venture capital analyst's perspective, is summarised in Figure B.3 and elaborated in Section B.3.

In the subview analysis of BM components, some components are marked red, indicating potential infeasibility of the business model. For instance, if AI integration is unsuccessful, the insurer should

consider revising its value propositions by exploring alternative ways to personalise the customer experience without AI. Similarly, if there is a lack of connection with third parties, the insurer should re-evaluate key partners, channels, and revenue streams. Acquiring external data through open APIs would be critical to sustaining the business model in such a scenario. However, the insurer does not need to modify customer relationships, as the impact is neutral across all outcomes, provided the current (indirect) relationships remain strong.

In the subview analysis of stress factors, the business model is not robust if AI becomes the foundational technology and the insurer fails to integrate it successfully. Furthermore, the model is also vulnerable if consumer preferences shift towards personalised insurance offerings and the insurer lacks third-party connections. In such cases, strained relationships with digital third-party platforms could lead to the infeasibility of several components.

The pattern analysis reveals no instances of double red or orange colouring within the heat map. This indicates that no scenario would simultaneously negatively impact a component under both outcomes. However, the insurer should aim for successful AI integration and robust third-party connections in scenarios B and C. If achieved, most components of the business model will be strengthened. Conversely, failure in these areas would necessitate changes in most components, particularly under scenario C.

Analysis heat map 4: Insurer 1

The analysis of heat map 4, reflecting the perspective of Insurer 1, is summarised in Figure B.4 and detailed further in Section B.4. Scenario B, involving AI becoming the underlying technology, was not addressed due to insufficient time caused by a lack of preparation, despite the 90-minute interview duration.

In the subview analysis of business model components, it is notable that key activities and cost structure were unaddressed in both scenarios, as the interviewee deemed them the least important to consider. Additionally, no component is consistently strengthened across all outcomes of any scenario.

In the subview analysis of stress factors, significant risks were identified. If scenario A unfolds and the insurer develops APIs that are only compliant, the business model will face challenges in the short term and may become infeasible in the long term. Strong APIs are expected to become critical around 2030, when the demand for embedded insurance in the Dutch market is projected to grow. In scenario C, if the insurer lacks connections with third parties, the business model will not be robust. Higher prices compared to competitors and insufficient product development will limit access to distribution channels. Combined with high customer churn, this will ultimately lead to a loss of profitability, making it difficult for the insurer to sustain the business model. This outcome represents the highest risk and should be prioritised.

The pattern analysis reveals that double colouring appears only in scenario A. For value propositions and customer relationships, the impact is unspecified but remains the same in both outcomes. For key resources, particularly the technological infrastructure, attention is required in scenario A as it is negatively impacted in both outcomes. The insurer must prioritise the development of its technical infrastructure, particularly for the strategic decision to build strong open APIs, should scenario A unfold.

Analysis heat map 5: Insurer 2

The analysis of heat map 5, reflecting the perspective of Insurer 2, is summarised in Figure B.5 and detailed further in Section B.5.

In the subview analysis of business model components, all components are at risk, with one or more orange or red outcomes present. Notably, revenue streams are the most threatened, as they could be negatively impacted in almost all outcomes across scenarios. This highlights a critical issue for the insurer, as profitability is at risk in every scenario. To sustain the business model, the insurer must address this challenge carefully, as multiple components will require attention regardless of the scenario or outcome.

In the subview analysis of stress factors, the business model components are primarily robust only if AI is successfully integrated and scenario B unfolds. However, if scenario B develops without successful AI integration, the business model will not be robust, with channels as the only component avoiding unprofitable or infeasible outcomes. Scenario B thus presents a high-reward or high-loss situation,

leaving little room for neutral outcomes. In scenarios A and C, multiple components show weak or unclear robustness depending on factors such as organisational readiness and customer relationships, regardless of the outcome. These uncertainties necessitate careful consideration of whether pursuing the business model is worthwhile.

The pattern analysis reveals a significant number of (potentially) double orange-coloured components in scenario A. This suggests that the robustness of the business model is threatened regardless of the strategy adopted, highlighting numerous areas requiring attention. The insurer must carefully evaluate its capacity to address multiple issues simultaneously. Additionally, the analysis highlights that revenue streams are threatened in both outcomes of scenario B. To mitigate this risk, the insurer must not only successfully integrate AI but also differentiate its products to remain competitive, as both existing and new market players are likely to adopt AI integration.

Analysis heat map 6: Insurer 3

The analysis of heat map 6, reflecting the perspective of Insurer 3, is summarised in Figure B.6 and detailed further in Section B.6.

In the subview analysis of business model components, almost all components, except for customer segments and channels, are at risk, with one or more orange or red outcomes. Customer relationships are the most threatened, frequently showing a negative impact. To sustain the business model, the insurer must address this issue carefully, as multiple components require attention under any outcome of any scenario.

In the subview analysis of stress factors, business model components are primarily robust only when the insurer successfully establishes connections with third parties and scenario C unfolds. However, if scenario C develops and the insurer lacks third-party connections, several components will lack robustness. This makes scenario C a high-reward or high-loss situation, offering little room for moderate outcomes. For scenario B, the business model becomes unfeasible if the insurer fails to integrate AI, as no single component is strengthened. Even with successful AI integration, more components are threatened than strengthened, leaving the business model unviable. This highlights that scenario B presents significant challenges, and the insurer must carefully assess its ability to address multiple vulnerabilities simultaneously. Scenario A follows a similar rationale but with less severe negative impacts.

The pattern analysis reveals numerous instances of double orange or red-orange colourings across all scenarios, indicating that the robustness of the business model is consistently threatened. This is particularly evident in scenarios A and B, where multiple points of attention emerge. The insurer must carefully evaluate its capability to revise several issues simultaneously to improve robustness across components.

4.3.2. Results integrated heat maps

The heat maps can be integrated and analysed in several ways. It is chosen to map each outcome directly on the business model canvas. For each outcome of each scenario, the results of all separate heat maps have been put together to create a subview of each outcome. The integrated heat maps can be found in Appendix C. The same analysis methods will be executed, but now all answers will be considered within a certain outcome. First, for each scenario, the outcomes will be analysed seperately (Subview analysis: Stress factors). Then, again for each scenario, the two outcomes will be compared (Patterns analysis). Lastly, the scenarios will be combined to examine the robustness of specific BM components (Subview analysis: BM components). Most explanations will not be mentioned as they have already been discussed separately in the previous section or in the detailed descriptions provided in the Appendices B and C.

Results integrated heat map scenario A: New regulation data-sharing

Subview analysis: Compliance

The robustness of nearly all components, and thus the overall business model, is significantly challenged if scenario A unfolds and the insurer adopts a compliance-focused approach. While some participants see certain components strengthened, the consensus is that this outcome leads to predominantly unprofitable impacts across most business model components. This is especially evident

when excluding the consultant's responses, as they were the only participant to indicate primarily positive impacts. Under these conditions, the business model is considered unviable, and insurers would need to address a wide range of issues to improve robustness.

Participants broadly agree that customer relationships, key resources, and cost structure are most negatively impacted, as these components predominantly feature orange cells with no green cells. The threats to customer relationships stem from suboptimal product development, transparency and trust issues, and a reactive approach. Key resources are at risk due to increased costs and the complexity of IT infrastructure adaptations. Cost structure faces challenges from higher IT investment costs.

The group of insurers identifies slightly more threats to business model robustness compared to the non-insurer group, with a particular emphasis on IT infrastructure readiness. However, the differences between the two groups are not substantial.

Subview analysis: Beyond compliance
If scenario A unfolds and the insurer strategically develops powerful open APIs beyond compliance, most components, and the business model overall, are predominantly strengthened. However, cost structure remains a recurring concern due to the combination of compliance-related costs and additional investments required for the beyond-compliance strategy.

While both groups of participants generally view this outcome positively, insurers identify significantly more threats than non-insurers. Insurers highlight high costs and complexities associated with upgrading existing IT infrastructure and express concerns about customer relationships evolving into a business-to-business-to-consumer (B2B2C) model, as well as risks related to positioning based on price or value. Non-insurers, on the other hand, do not perceive these potential issues.

Patterns analysis
Cost structure emerges as the most double-coloured component, consistently deemed unprofitable regardless of the outcome. Customer relationships also exhibit double-colouring but primarily within the insurer group. To a lesser extent, this pattern applies to key resources, again primarily noted by the insurer group. These findings highlight persistent challenges in these areas, regardless of the scenario outcome.

Results integrated heat map scenario B: AI becomes the underlying technology behind insurance
Note: Insurer 1 did not address this scenario.

Subview analysis: Unsuccessful integration of AI
This outcome leads to an unfeasible business model, with seven out of nine components predominantly marked as unprofitable or infeasible. Participants indicate that failing to integrate AI under scenario B would result in a significant loss of competitiveness. Key activities, value propositions, and customer relationships would become misaligned with market demands, costs would increase due to failed investments, and revenue streams would decline.

No cells are coloured green, highlighting that unsuccessful AI integration does not strengthen the business model in any way. Interestingly, one non-insurer participant sees no impact at all from this scenario. Excluding this outlier, both groups, insurers and non-insurers, identify widespread unprofitable or infeasible impacts across components, with the exception of customer segments (one negative but unspecified cell) and channels. Insurers identify a higher proportion of components as infeasible compared with non-insurers, reflecting a more pessimistic view.

Subview analysis: Successful integration of AI
If scenario B unfolds and the insurer successfully integrates AI, most components, along with the business model as a whole, are strengthened. Participants broadly agree that all components, except for cost structure and revenues, are positively impacted by the integration of AI. The non-insurers perceive cost structure as unprofitable, primarily due to the costs associated with implementing and maintaining AI. By contrast, insurers view cost structure as strengthened, suggesting they see potential efficiencies outweighing initial investment costs.

Opposing views emerge regarding revenue streams. Insurers express concerns about their ability to differentiate from new market entrants and the balance between investments and returns, whereas

non-insurers do not raise such concerns. Similarly, the groups hold differing opinions on key activities. While both agree AI will transform these activities, insurers do not view this transformation as inherently strengthening the business model.

Patterns analysis
No components exhibit double colouring, indicating the absence of consistent trends across both outcomes of scenario B. This suggests the impacts are highly dependent on whether AI integration is successful or unsuccessful.

Results integrated heat map scenario C: Consumers expect new, personalised insurance policies

Subview analysis: Lack of connection with third parties
If scenario C unfolds and the insurer lacks connections with third parties to access external data, most components, and the business model overall, are not robust. While this scenario is not as clearly unviable as scenario B, it is still more challenging than scenario A. For key activities, key resources, and revenue streams, only one participant indicated a negative or infeasible impact, which suggests that the risks are significant but not unanimous.

Only one cell received a green colour, reflecting a lower risk of uninsurability in this outcome compared to the other outcome. However, controlling this factor is complex for an individual insurer and is dependent on external market conditions. When comparing the groups of insurers and non-insurers, the results do not differ substantially, indicating general agreement on the challenges posed by this scenario.

Subview analysis: Successful connections with third parties
If scenario C unfolds and the insurer establishes successful connections with third parties to access external data, all components except for the cost structure, and thus the business model overall, are predominantly strengthened. Under these circumstances, the business model is broadly considered robust.

When comparing both groups, insurers highlight more risks, particularly concerning the balance between personalisation and the principles of uninsurability or solidarity. These concerns are not as prominent among non-insurers, indicating a difference in perspective based on industry roles.

Patterns analysis
Similar to scenario B, no components exhibit double colouring. This absence of double colouring indicates a lack of consistent trends regarding the outcomes of scenario C, suggesting that impacts depend heavily on the specific outcome achieved.

Subview analysis all scenarios: BM components

A detailed subview analysis regarding the business model components can be found in Appendix D.

5

Discussion

In this chapter, the results will be discussed how the adoption of open APIs impact the embedded insurance business model for non-life, business-to-consumer insurace offerings from insurance incumbents. The research sub-questions will be answered and discussed, implications and limitations will be reflected on and directions for future research will be provided.

The following research sub-questions will be answered:

1. What are the defining characteristics of the embedded insurance business model for non-life, business-to-consumer insurance offerings?
2. Which potential scenarios can be envisioned for the adoption of open APIs in the context of embedded insurance?
3. How would the embedded insurance business model for non-life insurance offerings be impacted under these scenarios?

5.1. Discussion of the defining characteristics embedded insurance

The findings of this study supporting the research sub-question are twofold: a proposed academic definition of embedded insurance, and a structured description of the embedded insurance business model. Although the scope of this research is limited to non-life, business-to-consumer insurance offerings, no reason has been found which would exclude life and health insurance policies from these results. The findings will be discussed and an answer the first research sub-question will be given.

5.1.1. Proposed academic definition of embedded insurance

Embedded insurance is the offering of a personalised insurance product at the point of need, seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

5.1.2. Defining components of the embedded insurance business model canvas

The embedded insurance business model has been described using the nine components of the Business Model Canvas (BMC) framework, which can be found in Appendix A. The components will be briefly discussed. If components seem to be related, they have been grouped.

Key partners and Channels

The distribution channel, facilitated by distributor partners, emerges as the defining feature of embedded insurance, distinguishing itself from traditional insurance models. Third-party digital platforms integrate insurance products directly into their customers' purchase journeys, enabling insurers to reach end-users at the point of need. This integration makes distributor partnerships essential, as they provide access to customers who would otherwise remain unreachable. Technology providers are also important partners, offering open APIs and other infrastructure required for seamless integration. Together with insurers, these partners form an platform ecosystem.

Key activities and Resources

The operational characteristics of embedded insurance are by key activities and key resources required to execute them. Activities include the primary activities from the insurance value chain, except for sales. Some secondary activities have become more important, which are partnership and technology management. These activities are supported by a robust technological infrastructure, which is important for integrating insurance into third-party platforms. Advanced (open) APIs, product development, and operational and risk modeling capabilities form the foundation for delivering personalised insurance products. Together, these activities and resources seem to complement each other, making them interconnected.

Value propositions

Value propositions stand alone because they represent the core benefit offered to the customer, distinct from the operational or financial components of the business model. These propositions fulfil modern consumer expectations for convenient and tailored solutions, establishing embedded insurance as a consumer-centric model. This does not mean that this component is not related to other components. On the contrary, they seem to drive the design of other components, such as the development of APIs (Key resources) or the choice of digital distribution platforms (Channels).

Customer segments and Customer relationships

Embedded insurance provides insurance for a broad spectrum of customer segments without significant restrictions on for example demographics or insurance types. Customer relationships could be direct or indirect (with or without white-label agreement), based on the specific partnership model with distributors. These components are not considered unique compared to traditional insurance models.

Cost structure and Revenue streams

Cost structure and revenue streams are grouped together because they both relate to the financial aspects of the business model. Key costs stem from executing the Key activities and from paying fees to distributors. These costs are offset by revenue streams, which are direct revenues from premiums and indirect revenues from selling value-added services and cross-selling. These components are also not considered unique compared with traditional insurance models.

5.1.3. Different forms embedded insurance

Based on the online sources, undocumented conversations and expert feedback rounds, it is clear that embedded insurance can take form in multiple ways. Primarily, there are differences in the way how an insurance policy is integrated into the sale of a product or service, and there are differences in the way the partnership is given shape between the distributor and the insurer, especially who is responsible for which part of the insurance value chain. The developed BMC is not applicable to all forms of embedded insurance, as will be discussed.

Two ways of integration

There are at least two ways in how the integration takes place in the sales process. The insurance either needs to be actively added by the customer during the sales process, or is already included in the price, sometimes even without the customer being aware of it. Both ways of integrating fit into the proposed definition and the BMC description.

Partnerships and the insurance value chain

Less evident is the way partnerships are shaped between the insurer and the distributor. These partnerships seem to be primarily dependent on who is responsible for which part of the value chain. Traditionally, insurance incumbents were responsible for the whole insurance value chain, as has been considered in this research. Insurance policies were bought either directly from the insurer or indirectly via agents or boutiques. One form of embedded insurance partnership is a digital extension. Here, the insurer keeps the whole value chain and the sale of the insurance policy is offered at the point of need at a distributor partner. However, an important development is that businesses could see offering insurance as a new part of their core business, like AppleCare and Amazon waranties, leading to businesses taking over parts of the insurance value chain. The remaining activities can be performed by partners, which can be insurance incumbents but also new players like InsurTech entering

the insurance market. This is referred to as the Business-For-Business-To-Consumer or the Business-To-Partner-To-Customer distribution model, as seen from the perspective of the insurance provider. This would indicate that embedded insurance is not limited to just selling insurance at a digital platform, but extends to the breakdown and integration of different parts of the insurance value chain leading to offering personalised insurances at the point of need. This seems to influence the way embedded insurance partnerships are structured between platforms and incumbent insurers, on the topics of compensation, technological infrastructure, governance, capabilities and strategy. This would probably lead to different descriptions of almost all BMC components. Therefore, the BMC description is only valid if the insurer retains the whole insurance value chain except for the sales.

5.1.4. Answer to research sub-question 1

The first research sub-question, "What are the defining characteristics of the embedded insurance business model for non-life, business-to-consumer insurance offerings?" is answered as follows. The defining characteristics of embedded insurance lies in its seamless integration into the sales process of non-insurance products or services through third-party digital platforms. This integration, facilitated by distributor partners, sets embedded insurance apart from traditional models by leveraging unique distribution channels to offer personalised insurance products at the point of need.

5.2. Discussion of the developed scenarios for open API adoption

This research identifies three distinct scenarios that illustrate the potential pathways for the adoption of open APIs in embedded insurance: the introduction of new regulations for data sharing, the widespread integration of artificial intelligence (AI) in insurance processes, and the shifting expectations of consumers towards personalised insurance products. These scenarios highlight both expected trends and unexpected dynamics in the industry. Below, the broader implications of these scenarios are discussed, focusing on notable patterns, surprising elements, and key observations.

Scenario A: New regulation data-sharing

This scenario explores the introduction of financial data access (FiDA) regulations, requiring financial institutions to share customer data with third parties based on customer consent. The outcomes envision two possibilities: minimal compliance with regulatory requirements or going beyond compliance by developing powerful open APIs to achieve seamless integration with diverse financial services.

What stands out in this scenario is the dual nature of regulation as both an enabler and a potential limiter of innovation. Regulations can act as a catalyst for digital transformation [48], potentially motivating insurers to embrace open APIs and transparent data-sharing practices. However, a compliance-driven approach could limit the scope for innovation, as insurers may focus solely on meeting regulatory requirements without fully leveraging APIs for competitive differentiation.

Remarkable is the potential for regulations to position insurers not just as data owners, but also as data consumers and potential enablers of a broader ecosystem. By adopting open APIs that exceed compliance, insurers can integrate their services with a wide range of digital platforms, increasing cross-industry collaboration and innovation, rather than viewing new regulation as restrictive. However, whether this is indeed the case remains uncertain, as the brainstorm participants occasionally referred to what they viewed as the unrealised ambitions and prospects of the PSD2 regulation, which enabled open banking and serves as the basis for the upcoming FiDA regulation, both of which promised to foster innovation, drive new business models, and increase competition [40][12].

Scenario B: AI becomes the underlying technology in insurance

The second scenario envisions a future where AI is the backbone of insurance processes, with open APIs serving as the infrastructure for integrating AI-driven capabilities. The outcomes range from unsuccessful AI integration, which limits the utility of open APIs, to seamless integration, where AI drives advanced personalisation and operational efficiency.

A key insight from this scenario is the reciprocal relationship between AI and open APIs. While APIs enable data exchange and external connectivity, their effectiveness is assumed to be significantly enhanced when coupled with AI-driven analytics and decision-making capabilities. Important aspects

for the incumbent insurer seem to be technological readiness and organisational adaptability, based on the comments of the brainstorm participants.

An interesting observation is the extent to which the brainstorm participants view that successful open API adoption depends on AI integration, as APIs are often perceived as independent enablers. This view has not been directly found in the accessed online sources.

Scenario C: Consumers expect new, personalised insurance

The third scenario reflects a shift in consumer expectations, with increasing demand for personalised insurance products tailored to specific needs. The outcomes include either a lack of successful third-party collaborations or the ability to establish robust connections with external data providers through open APIs.

What stands out in this scenario is the assumption of growing influence of consumers in the development of embedded insurance policies. Traditionally, insurers dictated the nature of insurance products, but this dynamic could shift if consumers demand tailored solutions. The reliance on open APIs to access third-party data highlights the interdependence between insurers and external ecosystems.

Interestingly, the brainstorm participatns referred a view times to the potential for new market entrants to challenge traditional insurers by leveraging open APIs to deliver innovative insurance products. This could create urgency for incumbents to adopt open APIs and develop strategies to maintain competitiveness. However, according to the brainstorm participants, incumbent insurers currently adopt a wait-and-see approach.

5.2.1. Answer to research sub-question 2

The second research sub-question, ”Which potential scenarios can be envisioned for the adoption of open APIs in the context of embedded insurance?”, is answered as follows. The findings reveal three potential scenarios including two opposing extreme outcomes related to the drivers of Open Insurance: changing regulation, digital technology innovation, and evolving markets. The first scenario envisions new (FIDA) regulation for required sharing of financial data. The insurer could respond by developing open APIs that just comply with this regulation, or it develops powerful open APIs beyond compliance. The second scenario envisions that AI becomes the underlying technology behind insurance. Here, the capability of the insurer to integrate AI successfully or unsuccessfully is posed as extreme outcomes. The third scenario envisions that consumers expect new, personalised insurances. The extreme outcomes consider whether the insurer connects with third parties to get external data trough open APIs.

5.3. Discussion of the scenarios' impact on the business model canvas

The impact of the scenarios has been described in the Results section. The findings will be discussed, after which the third research sub-question will be answered.

Scenario A: New regulation data-sharing

The compliance outcome leads to a non-viable business model, with most components negatively impacted, particularly customer relationships, key resources, and cost structure. Customer relationships face challenges from trust issues and suboptimal product development, while IT infrastructure adaptation costs threaten key resources and cost structure. Insurers perceive more threats, particularly regarding IT infrastructure readiness, compared to non-insurers.
Conversely, the beyond compliance outcome strengthens most components through strategic open API development, though cost structure remains at risk due to high compliance and additional investment costs. Insurers express concerns about customer relationships shifting toward a B2B2C model and challenges with price/value positioning, which are not shared by non-insurers.
An observed trend is that cost structure consistently shows unprofitability, regardless of the outcome, and insurers highlight additional concerns about customer relationships and key resources.

Scenario B: AI becomes the underlying technology in insurance

The first outcome, unsuccessful integration of AI results in an infeasible business model, with seven out of nine components predominantly unprofitable. No positive impacts are identified, underscoring

lost competitiveness, misaligned activities, and high costs due to failed investments. Insurers perceive the impacts as more severe than non-insurers.
The second outcome, successful AI integration, strengthens most components, except for cost structure and revenues. Insurers express concerns about their ability to differentiate from competitors and balance investments with returns, which contrasts with non-insurers' perspectives. The groups also differ in their views on cost structure, with insurers seeing it strengthened, while non-insurers view it as unprofitable. Similarly, insurers do not perceive key activities as strengthened, whereas non-insurers do.
Notably, no components exhibit double colouring in this scenario, indicating no clear trends across outcomes.

Scenario C: Consumers expect new, personalised insurance

The lack of third-party connections results in a non-viable business model, though it is less clear than Scenario B. Negative impacts are identified for key activities, key resources, and revenue streams, and only one positive impact, related to reduced uninsurability risk, is observed.
In contrast, successful third-party connections predominantly strengthen all components except cost structure, resulting in a robust business model. Insurers still identify more risks than non-insurers, particularly regarding the balance between personalisation and the solidarity principle.
Similar to Scenario B, no components exhibit double colouring, indicating a lack of consistent trends across outcomes.

Patterns observed across the scenarios

A key pattern across scenarios is the consistent challenge to cost structure. Costs increase across all scenarios, with higher investments required in the second outcomes, while revenue streams remain uncertain, depending on successful implementation and differentiation. Additionally, insurers generally perceive more risks than non-insurers, particularly in areas such as IT infrastructure, customer relationships, and balancing personalisation with solidarity principles. While Scenario A shows consistent unprofitability in cost structure regardless of outcome, Scenarios B and C do not reveal double colouring trends, indicating limited overlap in outcome-specific impacts. Furthermore, distribution partners are more affected than technology partners, with positive relationships enabling scalability and personalisation but with perceived risks of exclusion in the case of negative relationships. Customer relationships are strengthened through personalisation but face difficulties with communication and data acquisition.

5.3.1. Answer to research sub-question 3

The third research question, "How would the embedded insurance business model for non-life insurance offerings be impacted under these scenarios?", is answered as follows. The embedded insurance business model for non-life insurance offerings is significantly impacted by the scenarios examined, with distinct outcomes depending on the scenario and strategic approach adopted.

In Scenario A, New regulation data-sharing, a compliance-driven approach leads to a non-viable business model, with customer relationships, key resources, and cost structure severely impacted. Challenges arise from transparency and trust issues, high IT adaptation costs, and increased operational complexity. Conversely, a beyond-compliance approach strengthens most business model components through strategic open API development, though cost structure remains a persistent risk due to higher compliance and investment costs. Insurers express additional concerns about the potential shift to a B2B2C customer relationship model and challenges in price/value positioning, which are not shared by non-insurers.

In Scenario B, AI becomes the underlying technology behind insurance, failure to integrate AI results in an infeasible business model, with seven out of nine components being predominantly unprofitable or unfeasible. Key activities, value propositions, and customer relationships are misaligned, while high costs from failed investments exacerbate the impact. Conversely, successful AI integration strengthens nearly all components except for cost structure and revenues. While non-insurers view cost structure as unprofitable, insurers see it as strengthened but raise concerns about differentiation from competitors and balancing investments with returns. Insurers and non-insurers also hold differing views on key activities, with insurers perceiving less benefit from AI transformation.

In Scenario C, Consumers expect new, personalised insurance policies, a lack of strong third-party

connections results in a less robust business model, with minimal negative impacts indicated for key activities, key resources, and revenue streams. The primary positive impact lies in reduced uninsurability risk, though this is complex to control. Establishing strong third-party connections, on the other hand, results in a predominantly robust business model, with all components except cost structure strengthened. Insurers identify more risks than non-insurers, particularly regarding the balance between personalisation and the solidarity principle.

Across all scenarios, the cost structure emerges as a recurring risk due to high investment costs. However, strategic investments in the development of strong open APIs, the successful integration of AI, and successful connections with third-parties to access external data, will strengthen the business model. As a last note, insurers consistently perceive more risks than non-insurers, especially concerning IT infrastructure, customer relationships, and balancing personalisation with the insurance solidarity principle.

5.4. Limitations and directions for future research

The study has various limitations. The results have not been compared and reflected upon with existing literature, which reduces the reliability and validity of the findings. Without this comparison, it is harder to see how the findings align with or differ from existing knowledge, which could help strengthen or challenge the conclusions. Future research could include a detailed review and comparison with relevant studies to improve the conclusions.

The transferability of this study may be limited due to the scope of this research. This study primarily focuses on non-life, business-to-consumer insurance offerings within the context of embedded insurance. Considering the type of insurances, as earlier explained, it is not expected that the developed embedded insurance BMC would be different for life or health insurances, as the sources in the desk research did not focus on non-life insurances. It is also not expected that the developed scenarios would be different, as they have been developed as general trends in the insurance industry. Still, they may be less relevant to life and health insurances, as for example regulation in development such as the FIDA, health and life insurances are expected to be out of scope. The impact assessment is not expected to be applicable to most life and health insurances, as these insurances have different characteristics and are considered to be more complex, and the participants only focused on non-life insurances in their answers. Considering business-to-consumer versus business-to-business partnerships, the results are limited to the first. Business-to-business insurances have different characteristics, which have not been addressed in this research. There is also a relatively new type of partnership, which is business-to-partner-to-consumer business models. This is the case if the insurer is does not execute all activities of the insurance value chain, but only specific parts, which is called 'unbundling'. This has been out of scope in this research, and other results are expected. The components of the business model would be different, and so would be the impact and applicability of the scenarios. Future research could therefore focus on a different scope, either for life and/or health insurance policies, or for business-to-business or business-to-partner-to-business partnerships and unbundling of the insurance value chain.

The development of scenarios in this study prioritised scenarios inside the insurance industry, and extreme outcomes on strategic choices and succes in adoption, over external drivers like global economic conditions or multiple regulatory changes. While this focus aligns with the research objective of providing actionable insights for incumbents, it inherently limits the breadth of the analysis. Broader external factors may still significantly influence the robustness of the embedded insurance business model, and their exclusion represents a key limitation. Future research could address this by integrating a wider range of uncertainties, balancing the strategic focus on incumbents with external macroeconomic and regulatory developments to provide a more holistic evaluation of the robustness of the embedded insurance business model.

Another possible limitation is that the research is geographically focused on Dutch insurance incumbents. However, international perspectives are included through desk research and some expert interviews. In terms of technology, AI is globally available and being adopted in the industry, which is not expected to be limited to one country. The other drivers are at least applicable to the EU region, and align with global challenges. Therefore, it is not expected that expanding the geographical focus would

lead to opposing results. Still, the conclusions may not fully apply to certain regions depending on (local) developments in terms of regulation, AI adoption and consumer demands. Therefore, readers should interpret the results considering their own regulatory and market environment. Future research could verify whether differences apply to different geographical areas.

The generalisability of the findings is limited due to the explorative nature of this research [52]. Semi-structured interviews are susceptible to interviewer bias; however, this risk was mitigated through the development of a structured interview guide and the careful documentation of all responses. Despite these measures, conducting more extensive and in-depth interviews would have provided richer insights. This was not feasible due to time limitations and the availability of participants. Future research could employ quantitative methods to validate the findings of this thesis. Surveys or statistical analyses could provide more generalisable insights into the robustness and adaptability of the embedded insurance business model under different scenarios.

The intended methodology as developed by Haaker et al. [22] has been adapted as it was not feasible to gather all the interview participants in one room to develop one heat map. This research obtained six different heat maps, which could be analysed in different ways, introducing several possibilities for researcher' bias in drawing conclusions. Due to the existence of opposing views and focus on different aspects in the answers given, complexity was introduced in analysing the results. Quantification of the answers could lower the complexity of the analysis, but this has been considered infeasible in this research due to the variety in attention and preparation by the participants. In addition, there was one positive answer possible compared to two negative answers, which makes it harder to for example give a % of (dis)agreeability to each answer. Future research could focus on validating and improving the adapted methodology as developed in this research. Future research could also focus on quantifying the developed methodology, which would decrease the complexity of analysis and drawing conclusions.

Another limitation is that the findings depend on certain assumptions. Most importantly, the drivers of open API adoption have been assumed to be similar to the drivers of Open Insurance, and although experts agree that these drivers are important factors for open API adoption, there may be other factors which have a bigger influence. The development of the scenarios and extreme outcomes depends on this assumption, and are assumptions in itself as these outcomes and scenarios may not materialise. In future research, a longitudinal approach could assess the long-term impacts of adopting open APIs on the embedded insurance business model and validate the assumptions.

The interviews in this research have not been documented. This has the result that only the heat maps and the memory of the researcher could be used to describe the results and draw conclusions. This way, information and interesting insights may have been missed, no direct quotes could be used to strengthen the results and no context of answers could be given. This limits the validity of the findings. It is not expected that the results would be very different as the first description, be it without explanation, has not been changed often during the interviews with participants who prepared well. In future research, more attention can be given to documentation to improve contextual clarity.

The preparation of the interviewees was uncontrolled, which resulted in a variety in the effort of preparation. Some heat maps were already prepared in detailed, others were half filled and in one case the preparation has not been executed. Therefore, in some interviews an in-depth discussion was possible, in others this was not possible. In the unprepared interview, scenario 2 was therefore not addressed. This had an influence in the results, as the comparative analysis between the insurers group and the non-insurers group could not be executed the same way as in the other scenarios. Furthermore, the variety in preparation has led to results which are harder to interpret and compare, as answers to the same question could have been given with a detailed reasoning, with no reasoning or something in between. Especially in the case of scenario 2, other results could be expected as this participant, Insurer 1, often had views which were different from the other insurers and the experts, which could have led to different results and conclusions. In future research, the preparation could be executed by the participants in a controlled manner.

The collaboration with INNOPAY may have influenced the results. Not only were all brainstorm participants employees of INNOPAY, though participating on own titles, the experts conducted during interviews have also been invited by making use of the network of INNOPAY.

6

Conclusion

This study investigates the impact of open API adoption on the embedded insurance business model for non-life, business-to-consumer insurance offerings, addressing a significant knowledge gap in the intersection of embedded insurance and Open Insurance. This study addresses the research question: ”How does the adoption of open APIs impact the embedded insurance business model for non-life, business-to-consumer insurance offerings from insurance incumbents?” The findings reveal how the adoption of open APIs influence this model through its defining characteristics, potential scenarios, and the outcomes under these scenarios.

The defining characteristic of embedded insurance lies in its seamless integration into the sales processes of non-insurance products or services via third-party digital platforms. This integration, enabled by distributor partners, distinguishes embedded insurance from traditional models by leveraging unique distribution channels to offer personalised insurance products at the point of need. These characteristics form the foundation for understanding how embedded insurance operates and how it is influenced by the adoption of open APIs.

The study identifies three potential scenarios that may shape the adoption of open APIs in embedded insurance. The first envisions regulatory changes mandating data-sharing, posing two possible outcomes: a compliance-driven approach or the development of advanced open APIs beyond compliance. The second scenario involves artificial intelligence becoming the underlying technology in insurance, with outcomes depending on whether insurers successfully integrate AI or fail to do so. The third scenario anticipates rising consumer expectations for personalised insurance, with outcomes shaped by the insurer’s ability or inability to establish strong connections with third parties for external data access.

Under the context of new regulation requiring data-sharing, a compliance-focused approach leads to a non-viable business model, with challenges including transparency and trust issues, strained key resources from IT adaptation costs, and an unsustainable cost structure. A beyond-compliance approach strengthens most components by leveraging powerful open APIs, but the cost structure remains a persistent challenge, and insurers express concerns about shifting customer relationships and risks of price or value-based competition.

In the context of AI adoption, failure to integrate AI causes the business model to become infeasible, with misaligned key activities, value propositions, and customer relationships, coupled with high costs from failed investments. In contrast, successful AI integration strengthens nearly all components, except for cost structure and revenues. Insurers see opportunities in strengthened operations but raise concerns about differentiation and the trade-off between investments and returns. Insurers and non-insurers also hold differing perspectives on the benefits of AI, with insurers perceiving less transformation in key activities.

When consumers demand personalised insurance products, a lack of strong third-party connections results in a less robust business model, with limited negative impacts on key activities, key resources, and revenue streams. However, establishing strong third-party connections significantly strengthens

the model, with all components except cost structure becoming robust. Insurers note risks related to balancing personalisation with the solidarity principle, concerns not shared by non-insurers.

Across all scenarios, the cost structure consistently emerges as a critical vulnerability. Strategic investments in robust open APIs, successful AI integration, and effective third-party partnerships are essential to strengthen the business model. Insurers also consistently perceive more risks than non-insurers, particularly regarding IT infrastructure, customer relationships, and balancing personalisation with broader principles like solidarity. These findings underscore the importance of a proactive, strategic approach by insurance incumbents to ensure the sustainability and robustness of the embedded insurance business model in an evolving open API landscape.

This thesis makes significant contributions to both academic research and practical applications for insurance incumbents. Academically, it provides a clear theoretical framework for embedded insurance. The proposed structured definition fills a gap in the literature by establishing a foundation for further studies. Additionally, the thesis links the role of open APIs with business model components, illustrating how these technological innovations enable embedded insurance. The use of Business Model Stress Testing (BMST) as a methodology to assess the robustness of business models under different regulatory, technological, and market-driven scenarios, adapted to accomodate an individualised interviewee approach, is another key academic contribution. This scenario-based analysis highlights the drivers of Open Insurance, including regulation, digital technology innovation, and evolving market demands, thereby connecting theoretical discussions to industry challenges. The thesis also bridges the gap between the concepts of Open Insurance and embedded insurance, providing insights into their interdependencies, particularly in the context of data sharing, integration, and personalisation.

From a practical perspective, the thesis offers actionable guidance for insurance incumbents. It emphasises the importance of adopting proactive strategies, such as developing advanced open APIs, integrating AI successfully, and forming strong third-party partnerships, to ensure embedded insurance business model robustness. Additionally, the thesis highlights key risks, such as transparency and trust issues, IT infrastructure adaptation challenges, and the balance between personalisation and the solidarity principle, offering insurers practical advice on risk mitigation. By presenting three potential scenarios, ranging from regulatory changes to technological and market-driven shifts, the study supports incumbents with a framework to navigate uncertainties and align their strategies with evolving consumer, technological and regulatory trends. Furthermore, the differentiated perspectives of insurers and non-insurers in the study provide valuable insights for addressing specific industry concerns, such as market positioning and customer relationship dynamics. Together, these contributions advance academic understanding and provide a practical roadmap for insurance incumbents to adapt to the evolving landscape of embedded insurance and Open Insurance.

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A

Business model canvas embedded insurance

Business Model Canvas

Designed for:	*Designed by:*	*Date:*	*Version:*
Thesis Wesley Kool	Wesley Kool	April 2024	3

Key Partners

Distributor partners
Third-party digital platforms that integrate insurance products at the point of need during the customer purchase process, providing access to a broad insurance customer base.

Technology providers
Partners who develop and maintain IT infrastructure, including a developer portal and (open) APIs, facilitating integration with distributor partners.

Key Activities

Technology development
Developing the IT infrastructure to facilitate integration with distributors.

Product development
Designing insurance products that integrate seamlessly with third-party platforms and offer value to both partners and customers.

Policy administration & servicing
Managing the lifecycle of insurance policies.

Underwriting
Assessing risk and determining insurance premiums and terms.

Claims handling
Managing the claims process from initiation to settlement.

Balance sheet provision
Managing financial reserves to cover future claims, maintaining solvency and compliance with capital requirements.

Partnership management
Establishing and maintaining relationships with sales and technology partners to enhance distribution channels and technological capabilities.

Value Propositions

Convenient customer experience through seamless integration at the point of need
Insurance products are seamlessly integrated at the point of need during the purchase process of another non-insurance product or service.

Tailored personalised insurance
Policies are tailored to the consumer and/or the specifics of the product or service, ensuring relevant and adequate coverage.

Customer Relationships

Customer relationships are either:

- *Direct*
  The customer will be linked through by the distributor.
- *Indirect (potentially white label)*
  The customer will engage with the distributor, and the distributor with the insurer. This could be with a white label agreement.

Customer Segments

All segments included
A purchaser can be any consumer adding and buying any insurance product during the purchase of a non-insurance product or service via the digital platform of a distributor from any industry.

Key Resources

Technological infrastructure
Robust IT systems are needed to handle integrations, data analysis, policy management and customer interfaces.

Insurance products development
Insurance offerings that can be integrated seamlessly should be well-developed.

Risk models development
Advanced risk modelling capabilities are essential for accurately assessing and pricing risks.

Operational capabilities
Robust operational capabilities are needed to manage and execute their insurance processes efficiently.

Channels

Digital third-party platforms
Sales are integrated in the sales processes of third-party digital platforms of distributors.

Cost Structure

Technology development and maintenance
Costs of building and maintaining IT systems.

Partnership management
Costs of building and managing relationships with partners.

Policy administration & servicing
Costs of managing the lifecycle of policies.

Claims handling
Costs of handling and reviewing claims.

Pay-out of successful claims
Costs of paying out approved claims.

Commissions to distributors
Costs of commissions or fees paid to distributors for each policy sold.

Revenue Streams

Revenue from insurance premiums
Revenue from premiums paid by the purchasers of the integrated insurance products.

Selling of value-added services
Revenue from offering additional services, such as extended coverage or personal assistance options.

Cross-selling of insurance products
Indirect revenue from selling other insurance products to the purchaser of the embedded insurance product.

B

Individual heat maps

In this appendix, the individual heat maps results are provided and described. To interpret the heat maps, the following colour scheme is used [22]:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

B.1. Description heat map 1: Consultant

The template can be found in Figure B.1. A descriptive text is given below.

Figure In the first scenario, New regulation data-sharing, he sees no difference between the two outcomes, with positive impacts on most components except Component 4 (Customer relationships), which he views as neutral, and Components 6 (Key resources) and 8 (Cost structure), which he finds unprofitable. He believes Open Insurance (OI) will enable new business models, easier engagement with partners and improved data sharing, customer experience, segmentation, and revenue, though costly and complex to implement.

In the second scenario, AI becomes the underlying technology behind insurance, he expects no impact for Outcome 1 but anticipates positive effects on all components except Component 8 (Cost structure). He believes AI will enhance decision-making, customer data use, and revenue, despite increased IT and compliance costs.

In the third scenario, Consumer expects new, personalised insurance policies, he sees no impact on any components in Outcome 1, except Components 4, 5, and 8, which he considers unprofitable due to the lack of client data from embedded partners and no increase in premiums. In Outcome 2, he expects positive impacts across all components except Component 8. The rationale aligns with Scenario 1, with specific differences for Components 4, 5, and 6. Component 4 would now have a positive impact, as embedded insurance partners hold valuable client data for personalization. Component 5 would benefit from real-time data access, and Component 6 would enable a more efficient and agile IT and business organisation.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalized insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners	Open Insurance (OI) promotes new business models and easier engagement with key partners.	OI promotes new business models and easier engagement with key partners	Business as usual	AI enables for faster, smarter, and more accurate decisions.	Business as usual	OI promotes new business models and easier engagement with key partners
Component 2: Key activities	OI enables more and easier data sharing to ingest into insurance processes and decisions.	OI enables more and easier data sharing to ingest into insurance processes and decisions.	Business as usual	AI enables for faster, smarter, and more accurate decisions.	Business as usual	OI enables more and easier data sharing to ingest into insurance processes and decisions.
Component 3: Value propositions	OI promotes new business models, with better CX and convenience. Data driven model.	OI promotes new business models, with better CX and convenience. Data driven model.	Business as usual	AI enables for faster, smarter, and more accurate decisions.	Business as usual	OI promotes new business models, with better CX and convenience. Data driven model.
Component 4: Customer relationships	Most insurance is distributed today. No changes expected.	Most insurance is distributed today. No changes expected.	Business as usual	AI allows to better use customer data.	Insurers fail to take advantage of client knowledge from embedded insurance partner.	Embedded insurance partners hold client data and insights that make personalization easier.
Component 5: Customer segments	Customer data enables more granular customer segmentation and better CX	Customer data enables more granular customer segmentation and better CX	Business as usual	AI allows to better use customer data for more granular customer segmentation and behavioral analysis.	Insurers fail to take advantage of client knowledge from embedded insurance partner	Real time customer data enables more granular customer segmentation and better CX
Component 6: Key resources	Most insurers face cost/complexity of adapting for OI.	Most insurers face cost/complexity of adapting for OI.	Business as usual	AI enables for faster, smarter, and more accurate decisions.	Business as usual	Insurer has an efficient and agile (IT and business) organization.
Component 7: Channels	Open Insurance (OI) promotes easier engagement with new partners.	Open Insurance (OI) promotes easier engagement with new partners.	Business as usual	AI enables for faster, smarter, and more accurate decisions.	Business as usual	Open Insurance (OI) promotes easier engagement with new partners.
Component 8: Cost structure	Expected higher cost of IT and commercial (commissions).	Expected higher cost of IT and commercial (commissions).	Business as usual	Expected higher cost of IT and compliance	Cost to adapt doesn't bring higher revenues (premium).	Expected higher cost of IT and commercial (commissions).
Component 9: Revenue streams	Premium increase, new revenue streams, new products, new client segments.	Premium increase, new revenue streams, new products, new client segments.	Business as usual	AI enables for faster, smarter, and more accurate decisions. This should improve revenue and margins.	Business as usual	Premium increase, new revenue streams, new products, new client segments.

Figure B.1: Heat map Consultant

B.2. Description heat map 2: Pension fund

The template can be found in Figure B.2. A descriptive text is given below.

Scenario 1, outcome 1. He sees a negative or potentially infeasible impact on all components, except for the Component 1 Key partners, part Technology partners which will be strengthened due to the application of extra technology. For the other part of Component 1, distribution partners he sees a negative impact because distributors will not have an interest in distributing due to lack of rich functionalities. In only complying, he sees limited product development as the main reason for almost all components to become unprofitable, or even potentially unfeasible for components 2 to 7 due to non-optimal product offering. Customers could drop out or not use it, in which he sees a link with PSD2. Component 8 would be unprofitable because of high costs. In outcome 2, he sees a positive impact on all components except for Component 8, due to higher costs and even higher than in outcome 1 due to additional investments. The reasoning for all other components is the opposite of that in outcome 1, because of optimal product development, better customer journeys and richer functionalities. This will yield higher revenues because distributors are now willing to distribute.

Scenario 2, outcome 1. He sees neutral impact for components 1, 4, 5 and 7. For component 1, he makes the notion that a FinTech or other party could join as main partner if the integration of AI would be outsourced. He sees unprofitable impact for the other components, focused on development of insurance products, risk modelling and claims handling. Higher costs will also not lead to higher revenues. Component 3 is also potentially unfeasible, as customers could drop out if AI is not integrated. In outcome 2, the reasoning is similar but opposite, except for the neutral impact which is the same. Extra additions are that the integration of AI offers valuable functionalities that can meet customer needs (Component 3), which will lead to higher revenues despite higher costs than in outcome 1.

Scenario 3 has not been addressed in much detail during the interview. For Component 1, for the part distributor partners he sees a negative impact, because distributors only want to distribute feature-rich products that require third-party connectivity (similar rationale with scenario 1). Neutral impact for technology partners. Component 5 would be unprofitable as customer expectations could be less met due to lack of third-party data. Component 7 would be unprofitable with the same line of reasoning as Component 1, distribution partners, because he sees it as important to use data from third-party platforms. For outcome 2, similar but opposite reasoning, except for Component 1, technology partners, which is also neutral.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI	Scenario C: Consumer expects new, personalised insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalised insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners	ORANGE: Distribution partners, if it sticks to laws and regulations, you will not have the richer functionalities where distributors have an interest in distributing GREEN: Technology partners, technology is the tool that will be extra applied	Distribution partners, because of the richer functionalities they will distribute them faster Technology partners, technology is the tool that will be additionally applied	If outsourced, a FinTech or other party joins as main partner	If outsourced, a FinTech or other party joins as main partner	ORANGE: Distribution partners, distributors only want to distribute feature-rich products that require third-party connectivity WHITE: Not decisive for technology partners	GREEN: Distribution partners, distributors only want to distribute feature-rich products that require third-party connectivity WHITE: Not decisive for technology partners
Component 2: Key activities	ORANGE: In particular due to limited product development RED: Potentially due to not optimally offering products to the end user	Strengthening due to better product development and offering richer functionalities	Much negative impact on 2. product development, 4. risk management and 5. claims handling in case of unsuccessful implementation	Strengthening 2. product development, 4. risk management and 5. claims handling in implementation		
Component 3: Value propositions	ORANGE: Mainly because of limited product development RED: Potentially due to non-optimal product offering	Strengthening through optimal product development and offering richer functionalities	ORANGE: AI integration is crucial to create prediction models to quickly fill in forms RED: Potentially, customer drops out if AI is not integrated	Valuable functionalities that meet needs can be offered		
Component 4: Customer relationships	ORANGE: Customer journeys are not optimally supported due to limited product development RED: Potentially, people are not going to use it, few use cases, compliance alone is not enough. Link PSD2	Strengthening by optimally supporting customer journeys and richer functionalities (PSD2)				
Component 5: Customer segments	Same as above	Same as above	Covers all segments	Covers all segments	Without third-party data, you can do less to meet end-user expectations	With third-party data, you can better achieve end-user expectations
Component 6: Key resources	Same as above	Same as above	AI will become important for development of 2. insurance products and 3. risk models	AI will strengthen development of 2. insurance products and 3. risk models		
Component 7: Channels	Same as above	Same as above			Similar to component 1, distribution partners. It is important to be present and use data from third-party platforms	Similar to component 1, distribution partners. It is important to be present and use data from third-party platforms
Component 8: Cost structure	High costs due to investments to become compliant	Higher costs than in outcome 1 due to additional investment in product development	High cost of attempted implementation	Higher costs than outcome 1 for successful implementation		
Component 9: Revenue streams	Customers may drop out because of limited product development	Offering attractive products to distributors and end users will ensure higher revenues	Lower revenues	Higher revenues by fulfilling customer needs		

Figure B.2: Heat map Pension fund

B.3. Description heat map 3: Venture capital

The template can be found in Figure B.3. A descriptive text is given below.

In Scenario 1, outcome 1, he sees little or neutral impact on all components except for Component 1. Component 1 would be strengthened as both tech and distributor partners would benefit from compliant open APIs developed by the insurer. For Component 2, he adds the notion that there will be an impact on key activities but will not drive profitability. In outcome 2, he sees a positive impact on Components 1, 2, 3, 6 and 9. For component 1, the rationale is the same. Components 2, 3, 6 and 9 could be strengthened because of the integration with other financial services beyond compliance, as it is beneficial for a wide array of insurance activities, customer journey and CX, and revenue. He sees a negative impact on Component 8 due to additional costs for technology maintenance, and little impact for components 4, 5 and 7.

Scenario 2, outcome 1, he sees negative impact on Component 1, distributor partners, and Components 2 and 9, and unfeasible impact for component 3. According to him, not integrating AI would decrease partnership potential and not benefit key activities such as underwriting and claims, and customer journeys and CX (due to hyper-personalisation). For other components, the impact is neutral or depends on the customer relationship, customer perception and amount of investments. In outcome 2, the impact is positive on all components, as the integration of AI would benefit key partners, key activities (AI-driven automation capabilities), customer journeys and CX (e.g. hyper-personalisation), customer segments and some resources, leading to increased revenues. The impact is neutral for components 4, for which the rationale is the same with outcome 1, and 7 and 8, for which the impact could be positive, depending on the current state of the component and on the way the insurer adopts AI.

Scenario 3, outcome 1, the impact is negative for components 2, 3 and 8, as the lack of external data does not benefit some activities, customer journey and CX, and keeps processes manual. The impact is unfeasible for components 1, 7 and 9, as due to the lack of external data, the relationship with key partners and third-party digital platforms will be difficult or impossible, because the insurer is not able to offer the best service possible, missing out on additional revenue. The impact is neutral for component 4, similar rationale as scenario 2, and components 5 and 6, depending on the current state of the infra and customer perception, but could also be negative. In outcome 2, the impact is positive on all components except for component 4, which is neutral with the same rationale as in outcome 1. Connecting with third parties would lead to successful integration capabilities and improved CX, personalisation, risk model development, infrastructure, automated or streamlined processes and additional revenue.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalized insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners	In this scenario tech partners and distribution partners benefit from open APIs created by insurance companies that are compliant	In this scenario tech partners and distribution partners benefit from open APIs created by insurance companies that are compliant	Negative impact as partnership with key partners are limited in terms of potential	If the insurance company successfully adopts AI, distribution partners and tech partners benefit from it	If the insurer is not able to get external data through open APIs this won't benefit partners to provide the best service possible	Partners benefit from insurance integration capabilities
Component 2: Key activities	The fact that the open APIs are compliant do have an impact on key activities but this alone won't drive profitability	The integration with other financial services, besides compliance, could be beneficial for a wide array of isnurance activities (e.g. underwriting)	Negative impact as the insurer won't benefit from the impact of AI on activities linked for example to underwriting and claims	Key activities benefit from AI adoption in terms of AI-driven automation capabilities in the insurance company	If the insurer is not able to get external data through open APIs this doesn't benefit some activities such as underwriting	Key activities in the insurance company benefit from succesful integration capabilities
Component 3: Value propositions	Little impact	The integration with other financial services can be beneficial for improving the customer journey and experience	AI brings to the table notable improvements in customer experience and journeys by hyper-personalising the experience	Customer journeys and experience are improved thanks to AI capabilities (e.g. hyper-personalisation)	If the insurer is not able to get external data through open APIs the insurer will miss opportunities in terms of improving CX and journey	CX and personalisation should benefit from integration with third-parties
Component 4: Customer relationships	Little impact	Little impact	Impact depends on the current state of customer relationship specifically in the case of indirect relationship	Impact depends on the current state of customer relationship specifically in the case of indirect relationship	Impact depends on the current state of customer relationship specifically in the case of indirect relationship	Impact depends on the current state of customer relationship specifically in the case of indirect relationship
Component 5: Customer segments	Little impact	Little impact	Impact depends on perception on the customer end	Customer segments benefit from the fact that the insurer successfully adopts AI	Impact depends on perception on the customer end. Generally this should be negative impact	Customer segments benefit from this point in the sense that they will have a more personalised offering
Component 6: Key resources	Little impact	Integration with other financial services can impact positively insurance product development, operational capabilities, etc.	Infrastructure remains as is	Adoption of AI should benefit some of the insurer's resources (e. g. tech infra and risk models should improve)	In a relevant share of cases, infra remain as is. This can be negative in terms of risk models development	Infrastructure and risk model development / operations benefit from integrations with third parties
Component 7: Channels	Little impact	Little impact	Infrastructure remains as is. Digital third-party platforms continue collaboration with insurers as is	Impact depends on the state of the channels which are involved in partnerships with the insurer. In general, they should benefit from AI adoption	If the insurer is not able to get external data through open APIs the relationship with digital third-party platforms won't be possible or will be difficult	Digital third-party platforms should benefit from this point
Component 8: Cost structure	Little impact	Besides compliance, integration with other financial services could represent an additional cost in terms of technology maintenance	Cost structure doesn't benefit from AI adoption. The impact here depends on the investment that the specific insurance company has made in AI	Here it depends. AI can bring to the table $M in value but the development represents a cost. It depends on how the insurer adopts AI. Generally positive	No integration can represent an additional cost for insurers as they will keep some processes manual	If the insurer is successful at leveraging the integrations, it should also be able to automate / streamline certain processes improving costs
Component 9: Revenue streams	Little impact	Besides compliance, integration of other financial services can represent an opportunity to increase revenue	Insurance company will miss the additional revenue opportunities arising from AI adoption	There is proof that AI integrated in insurance distribution should increase premiums (e.g. cross-selling / upselling)	Insurers will miss on additional revenue opportunities	Same as above. The insurer should be able to access additional revenue (e.g. data used for cross-selling / upselling)

Figure B.3: Heat map Venture capital

B.4. Description heat map 4: Insurer 1

The template can be found in Figure B.4. A descriptive text is given below.

In Scenario 1, outcome 1, she sees negative impact for components 1, 6 and 7. For component 1, she notes that in order to become successful with embedded insurance, the insurer needs to become an ecosystem player. In the case of only complying, she thinks the open APIs, which are expensive to develop, will not be scalable enough to become an ecosystem player. Component 6 is lightly unprofitable, as she notes that the big NL insurers will be able to make this step well. However, she comments that the embedded insurance market in the NL is currently small, too expensive, that fringe deals are closed via tenders and not so much via open APIs and that price is the leading factor. Component 7 will become unprofitable or even unfeasible in the future if embedded insurance will manifest in the NL market. She thinks that strong open APIs will become essential around 2030. For components 3 and 4, she sees impact but it will be similar for both outcomes. The components left are not that important. For outcome 2, she now sees a positive impact for components 1 and 7, as the insurer is now able to become an ecosystem player by being able to offer a valuable, effortless and seamless experience to distributor partners, which will be important not in the short run but in the long run if embedded insurance will manifest itself with strong demand also in the NL market (around 2030). Component 6 is also unprofitable here, as the development of powerful open APIs requires hefty development of the technology infrastructure by the NL incumbent insurers.

Scenario 2 has not been discussed nor prepared. This participant did not prepare the interview. Therefore, the template has been filled in during the interview, but there was not enough time to address all scenarios. The scenarios 1 and 3 were deemed more interesting and relevant to this participant, as they would impact the business model components more in her view.

Scenario 3, outcome 1, she sees one component with a positive impact, component 5 due to a low risk of uninsurability, which will be discussed later on. The components 1 and 4 will become unprofitable because she thinks that third-party data is needed to personalise, which is a big challenge for incumbent insurers. Without the offer of personalised products, the insurer is likely to be excluded by the distribution partners. Components 6, 7 and 9 become unfeasible, as product and risk model development will be insufficient, leading to higher prices and less good products than competitors, ultimately leading to a high customer churn. Component 3 has the comment “Same as other components, but it did not become clear which components she referred to. In outcome 2, she sees a positive impact on all discussed components, except for component 5. With third-party data, an insurer could develop sufficient risk models and offer personalised, well-priced products to distributors. By fulfilling customer expectations, the insurer could become an ecosystem player and all revenue opportunities will increase, especially as the perception of price is more important than personalisation for the customer. However, the access to data leads to a high risk of uninsurability (component 5) as the insurer will be able to assess the risk of customers with high certainty, potentially leading to high premiums on higher-risk customers, without them being able to do something about it.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalized insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners	Distribution partners: expensive open APIs are not scalable enough to become an ecosystem player for embedded insurance.	You become a strong embedded insurance ecosystem player by being able to offer valuable, effortless, seamless experience to distribution partners.			Opposite. You are likely to be excluded by distribution partners	In order to do business with distribution partners, you need to connect with third parties. Are often smaller specific products. Offer personalised product to right distribution partner (fit)
Component 2: Key activities						
Component 3: Value propositions	Little difference in impact between 1 and 2, which can be controlled at the back in both cases	Little difference in impact between 1 and 2, which can be controlled at the back in both cases			Same as other components	
Component 4: Customer relationships	Little difference in impact between 1 and 2, which can be controlled at the back in both cases	Little difference in impact between 1 and 2, which can be controlled at the back in both cases			Additional data is needed to personalise, which is a very big challenge for established insurers. InsurTech can better address this.	Offer personalised, especially well-priced products then you win the direct and indirect customer
Component 5: Customer segments					Opposite	High risk of uninsurability. Potentially high premiums on higher-risk customers who can do little about it themselves.
Component 6: Key resources	Light orange 1., the big NL insurers will be able to make this step well. (Comments: few NL embedded insurance, are too expensive, lots of fringe deals in tenders, everything is important but in the end it's about money)	1. Technology infrastructure requires hefty further development of NL incumbent insurers to develop powerful open APIs			Insurance product development and risk models are not sufficient, mainly because of pricing vs competitor. Retail is mainly price product.	Potential on ecosystem player, right insurance prodcuts and risk models
Component 7: Channels	ORANGE/RED: not a problem in the short term, but if embedded insurance mainfests you need strong open APIs. Not yet a strong demand from the NL market but will eventually (2030) become essential	Not relevant in the short term, but if embedded insurance mainfests you need strong open APIs. Not yet strong demand from NL market but will eventually (2030) be essential and then strong open APIs strengthen integration across platforms.			You will not get into this because you cannot offer the right products / prices as an insurer.	Potential on ecosystem player
Component 8: Cost structure						
Component 9: Revenue streams					No longer profitable because churn is higher, people walk away.	All opportunities are increasing due to fulfilling consumer expectations, which in particular makes the perception of price and responding to new fast-changing customer needs decisive over personalisation.

Figure B.4: Heat map Insurer 1

B.5. Description heat map 5: Insurer 2

The template can be found in Figure B.5. A descriptive text is given below.

In Scenario 1, outcome 1, components 1, 7 and 9 (partly) will be strengthened. For component 1 it would only be IT adaptations for complying with legislation. Component 9 will be strengthened due to a profit margin on making customer data available and a fee to use the APIs. He makes the comment however that it is questionable whether it is a revenue model or that you give away the unique position you currently have. For component 7 no explanation is given. Components 2, 4, 6 and 8 will have a negative impact. For component 2, IT will be the biggest bottleneck for data quality. For component 4, if brand value and customer relationship is important for the insurer, these will be negatively affected due to being slower to respond than competitors. In addition, obligated data-sharing will require extra commitment to transparency and trust. Component 6 becomes unprofitable due to required IT changes and the '360 customer view' based on accumulated data will be less unique compared with competition. For component 8, the increase in costs will probably not outweigh the extra revenues. Also link with PSD2: new obligations but few use cases and revenues. In outcome 2, the impact is directly strengthened for components 2, 3, 5 and 7, for of which only component 2 is explained with the notion that new opportunities arise to share and receive data competitively. Component 4 is the only component with clear unprofitable impact, as in this case the insurer should go "full steam" and should think about its positioning on competing either on price or on customer value. Component 1 has impact, but could either be positive or negative depending on the specific insurer. Components 6 and 8 are in principle negatively impacted as the internal change costs a lot of time and money, but with the use of open APIs and third-party services and a high volume, the impact could be positive. Component 9 is threatened by a less strong customer relationship. The impact is dependent on whether the insurer could counter sufficiently with more expensive products based on brand and customer relationship.

In Scenario 2, outcome 1, the impact is negative for components 3, 5, 6 and 8 and unfeasible for components 1, 2, 4 and 9, based on the view that the insurer will lose competitiveness on price, speed, and AI applications if it is unable to integrate AI, and should distinguish on other elements. In outcome 2, the impact is positive on components 1, 3, 4, 5, 6, 7 and 8, due to applications (6) and cheaper core operations (8) based on AI. However, he notes that differentiation will be limited for component 3 because everyone integrates AI, which causes the impact for component 9 to be unprofitable because in addition new players will enter the market. Component 2 is also negatively impacted but not commented on.

In Scenario 3, outcome 1, he sees a negative impact on the components 5 and 7. Due to changing customer needs, the insurer needs to shift its focus on focus groups which are not dynamic families for proper serving, in which case the channels also need to change to appeal to these other audiences. The last component that is commented on, is component 3 with neutral impact, in which he makes the notion that personalisation is hard without obtained data. In outcome 2, the components directly strengthened are 1, 2, 3 and 5. Third-party solutions limit the necessary internal change (2) and enhance customer segments (5) and value propositions (3). Components 4, 6 and 8 are directly negatively impacted. For component 4, the shift to faster, more relevant communication may enhance engagement but risks intrusiveness, complicating the transition and data-sharing for personalisation. For component 6, a large organisation is less agile to make the internal change, but can again be limited with third-party APIs and tooling. Component 8 is not commented on. At components 3 and 6, he does make the notion that personalisation (3) and proper risk assessment (6) bite the solidarity principle. For components 7 and 9, the impact could either be negative or positive. Unbundling (of the insurance value chain) could lead to new distribution opportunities which will be positive in the short term, but in the long term could threaten brand and customer relationships. Finally, the question remains to what extent an insurer will be able to personalise.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalized insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners	Mainly IT adaptations to comply with legislation	GREEN/ORANGE: Depending on organisation vision/ambition, adoption rate and competition	Loss of competitiveness			
Component 2: Key activities	IT biggest bottleneck to data quality and IT readiness	New opportunities to share and receive data competitively	Competition does have essential AI applications			Internal change is limited by third-party APIs and tooling
Component 3: Value propositions	Not much changes when only complying		Distinguish on other elements	Although differentiation will be limited because everyone is integrating AI	You can hardly personalise if you have not been able to obtain data	Enhanced by connecting to third-party solutions. Personalised offer does bite the solidarity principle
Component 4: Customer relationships	Obligation to share data requires extra commitment to transparency and trust. My company finds value on brand and customer relationship, being reactive affects your customer relationship negatively. You age compared to innovative competitors	Seizing opportunities requires going full steam ahead with this. This has an impact on positioning. Risk between competing on price or customer value (trust, relationship, quality)	If digital insurer no longer up to date			Customers need to get used to possibly new ways of communicating. Marketing/product changes too, you are faster and more relevant but can also be intrusive. Staying low-tech also provides some degree of stability. Transition will be messy which could negatively impact customer relationship. Also threshold to share data to personalise properly
Component 5: Customer segments				Segment of one	Due to changing customer needs, you will have to look at focus groups other than dynamic families for proper serving	Strengthened by connecting to third-party solutions
Component 6: Key resources	Because of IT changes. And accumulated data position of 360 customer view decreases in value vs competitors	DARK ORANGE/GREEN: Dependent on whether the change is feasible. Internal change costs a lot of time and money. Potentially ease with open APIs and third-party services, then green.	Staying competitive requires adjustment	Applications to e.g. automation and fraud detection		Less agile as a large organisation but internal change can be limited by third-party APIs and tooling. External data allows you to properly assess a customer's risk, but bites with solidarity principle
Component 7: Channels					Other audiences are in different places so your channels (e.g. media) need to change to appeal to other audiences	GREEN/ORANGE: Unbundling can create many new distribution spots in the short term but erode brand and customer relationships in the long term
Component 8: Cost structure	Increase costs vs revenues (PSD2: obligations but few use cases, revenues, good IT). Chance of high traction on APIs also limited with only compliance	ORANGE/GREEN: Internal change costs a lot of time and money, can be alleviated with third-party services. Green at high volume		Integration AI makes for cheaper core operations		
Component 9: Revenue streams	GREEN/ORANGE: Making customer data available + profit margin. Fee for use APIs. The question is though, is it a revenue model or are you giving away your unique position?	GREEN/ORANGE: less customer relationship = risk of less % return. Can you counter sufficiently with a more expensive product based on brand and customer relationship?	Lost competitiveness because others, including new players, are faster and cheaper	Differentiation will be limited because everyone is integrating AI. And there will be new players		GREEN/ORANGE: To what extent can you personalise? And smaller specialised players are entering the insurance process through 'unbundling'. Unbundling can create many new distribution spots in the short term but erode brand and customer relationships in the long term

Figure B.5: Heat map Insurer 2

B.6. Description heat map 6: Insurer 3

The template can be found in Figure B.6. A descriptive text is given below.

In Scenario 1, outcome 1, he describes a negative impact on the components 1, 4, 6 and 8. For component 1, he raises the question whether the existing IT partners are still suitable. For component 4, the customer relationship will move more to the background. There will be an impact on IT (6) and the cost structure (8). Referring to the FIDA, a compensation model may be introduced. Component 7 has a neutral impact, but he makes the notion that other channels may arise. In outcome 2, the same components will have a negative impact, with similar reasoning, with the extra notes that the customer relationship will become more B2B2C but the direct relationship could still exist (4) and this outcome will introduce additional investments to become compliant and set up IT (8). The components 2, 5, 7 and 9 are now strengthened. Core activities could evolve into standalone products via APIs (2), new customer segments and channels such as platforms or super apps like the Chinese WeChat become available (5 and 7), leading to additional revenue (9). Component 3 will in principle also be strengthened with new propositions becoming possible, also because of new access to third-party data due to the FIDA, but privacy should be weighed against value and the customer will only share data if it will influence him or her positively.

In Scenario 2, outcome 1, the impact will be unfeasible for components 1, 2, 3, 8 and 9. According to him, the partners and suppliers are not suitable to integrate AI (1), the core activities cannot be performed properly anymore (2) and the propositions can no longer be delivered (3). The costs will rise due to failed investments and a more expensive workforce (8), and revenues will fall (9). The components 4 and 6 will become unprofitable due to strained customer relationships related to brand loyalty (4) and the need for special resources due to changing IT and workforce. In outcome 2, the components 1, 3 and 8 will now be strengthened due to a strong relationship with (new AI) partners (1), (new) propositions that deliver more value (3) and the cost structure is expected to be more efficient, although it comes with a more expensive workforce. Components 2, 4, 6 and 9 are unprofitable. The core activities need to shift to incorporate AI (2). Communicating with AI will be introduced, raising questions about customer appreciation, ethics, the solidarity principle and whether different target groups should be approached differently (4). Component 6 has the same rationale as in outcome 1. For component 9, the question is raised whether the revenues will outweigh the necessary hefty investments.

In Scenario 3, outcome 1, component 1 will be infeasible due to a lack of proactive partners who could solve the need for additional data. Components 3 and 4 will become unprofitable, as without data, the insurer is less able to provide personalised insurance, which will strain customer relationships and value propositions. The question is however raised how the solidarity principle could be reconciled with personalisation. Component 8 will also become unprofitable due to higher costs compared with competitors. In outcome 2, components 1, 2, 5, 6, 7 and 9 are now strengthened. Component 1 is strengthened because the insurer has future-proof partners who unlock open APIs. The use of open data will strengthen core activities (2) and risk models and IT (6). Components 5 and 7 are strengthened because personalised offers are better to embed. This could include offering customers specific offers based on data or risk factors (5). This outcome could lead to more revenue, though a question mark is added (9). Component 3 will be unprofitable with the same rationale as in outcome 1. Component 8 will also be unprofitable, as integrating open data will require investments.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalized insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners	The question is whether your existing partners are still suitable in terms of IT architecture	The question is whether your existing partners are still suitable in terms of IT architecture	Unsuitable partners and suppliers to integrate AI	Strong relationship with partners, new AI partners desirable	Proactive partners should have helped with need.	Partners are future-proof and unlock Open APIs
Component 2: Key activities		Core activities can evolve into standalone products (via APIs)	Core activities can no longer be performed properly	Shifting activities. Analysing risks more by AI, focus on developing AI models and connecting new sources		Use of Open data in core activities
Component 3: Value propositions		GREEN/ORANGE: New propositions possible. Also through access to third-party data by FIDA. But always weigh privacy versus value. The customer himself only shares data if it is positive	Propositions can no longer be delivered	More value from propositions, new propositions	More data is more opportunity for personalisation. Insurance is based on solidarity principle, how to reconcile with personalisation?	More data is more opportunity for personalisation. Insurance is based on solidarity principle, how to reconcile with personalisation?
Component 4: Customer relationships	The customer relationship is still present here but somewhat more in the background	More B2B customer relationship. B2C becomes more B2B2C. Although direct relationship can remain in my view	Customer relationship (loyalty with brand) will be severely strained	The question is whether all customers will appreciate this way, e.g. communication with AI. Attention required to ethics (bias and solidarity principle) with focus on 'explainable AI'. And perhaps approach different target groups differently	Relationship strained by failure to provide personalised insurance	
Component 5: Customer segments		New customer segments are possible to tap into, such as well-known platforms or a new super app like WeChat in China				Personalised offers are more embeddable. Personalisation through specific offers based on customer data or on risk factors
Component 6: Key resources	IT impact, depending on past investments	IT impact, depending on past investments	Some special resources needed, though. IT is changing, like computing power. And workforce is changing, fewer acceptors but more highly skilled	Some special resources needed, though. IT is changing, like computing power. And workforce is changing, fewer acceptors but more highly skilled		Integration of open data in risk models and IT
Component 7: Channels	Other kinds of channels may arise though (via orchestrators, for example)	Platform/ecosystem distribution				Personalised offers are better to embed
Component 8: Cost structure	Substantial impact will be needed, FIDA dictates that compensation model may be in place	Costs are mainly in becoming compliant and setting up IT infrastructure. Still need additional investment	Lots of depreciation on failed investments. More expensive workforce	The expectation is higher efficiency. The workforce is more expensive though	Higher costs compared to competitors	Integrating open data requires investment
Component 9: Revenue streams		If done properly, new revenue can be generated here	Income falls away	Can revenues potentially stand up to hefty investments?		New revenue?

Figure B.6: Heat map Insurer 3

C

Integrated heat maps and detailed description for each scenario

C.1. Integrated heat map and description scenario A

Component 1: Key partners
In outcome 1, participants highlighted mixed views on the robustness of the key partners, primarily for the distributor partners. For technology partners, the views were more positive except for one insurer who raised questions about the suitability of the existing partners. In outcome 2, the views now generally reflect positive impact on both types of key partners, except for one insurer who mentions that the impact depends on the organisation and the same other insurer still questioning the suitability of the current partners. The group of non-insurers is more positive than the group of insurers in both outcomes.

Component 2: Key activities
In outcome 1, the group of non-insurers sees mixed impact and one insurer sees a negative impact on key activities. One non-insurer potentially sees an infeasible impact besides the negative impact. In outcome 2, now all participants see a positive impact for different reasons, except for one insurer who did not describe any impact.

Component 3: Value propositions
The views of the non-insurers are almost exactly similar with *Component 2: Key activities* for both outcomes. One insurer describes that not much changes in outcome, and sees a positive impact in outcome 2 without explanation. The insurer who did not describe any impact for *Component 2: Key activities* now mentions that there is little difference in impact between both outcomes. The last insurer does not go into outcome 1 and sees a positive impact in outcome 2, while raising one concern.

Component 4: Customer relationships
Two non-insurers see little impact in both outcomes. The last non-insurer describes negative and potentially infeasible impact in outcome 1, and positive impact in outcome 2. Two of the insurers describe negative impact in both outcomes. The last insurer describes again that the differences in impact are little between both outcomes.

Component 5: Customer segments
The group of non-insurers view mixed impact in outcome 1, and neutral or positive impact in outcome 2. The group of insurers did not describe any impact in outcome 1. In outcome 2, two now see a positive impact but only one provides an explanation.

Component 6: Key resources
Two non-insurers and all insurers see negative impact in outcome 1. In outcome 2, two non-insurers change their view to positive impact, but all insurers still see (even more) negative impact. One mentions that it could be positive if the insurer would use open APIs and third-party services.

Component 7: Channels
Both groups view mixed impact in outcome 1, either positive, neutral or negative, and eventually infeasible. In outcome 2, all participants view positive impact now, except for one non-insurer who still sees neutral impact.

Component 8: Cost structure
In both groups, two out of three describe a negative impact on the cost structure in outcome 1. In outcome 2, differences are that the last non-insurer now also sees a negative impact and one insurer sees a possibility for positive impact if the volume is high.

Component 9: Revenue streams
In outcome 1, the group of non-insurers have mixed views about the impact on the revenue streams and one insurer sees a positive impact on revenues but questions whether the currently unique position will be threatened. In outcome 2, all non-insurers now see a positive impact. One insurer sees a positive impact if the execution of changes is done properly. Another could either see a positive impact if the insurer that focuses on brand and customer relationship is able to counter sufficiently if the customer relationship becomes less direct.

	Consultant	Pension fund	VC	Insurer 1	Insurer 2	Insurer 3		Consultant	Pension fund	VC	Insurer 1	Insurer 2	Insurer 3
Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance							Scenario A: New regulation data-sharing Outcome 2: Beyond compliance					
Component 1: Key partners	Open Insurance (OI) promotes new business models and easier engagement with key partners.	ORANGE: Distribution partners, if it sticks to laws and regulations, you will not have the richer functionalities where distributors have an interest in distributing GREEN: Technology partners, technology is the tool that will be extra applied	In this scenario tech partners and distribution partners benefit from open APIs created by insurance companies that are compliant	Distribution partners: expensive open APIs are not scalable enough to become an ecosystem player for embedded insurance.	Mainly IT adaptations to comply with legislation	The question is whether your existing partners are still suitable in terms of IT architecture		OI promotes new business models and easier engagement with key partners	Distribution partners, because of the richer functionalities they will distribute them faster Technology partners, technology is the tool that will be additionally applied	In this scenario tech partners and distribution partners benefit from open APIs created by insurance companies that are compliant	You become a strong embedded insurance ecosystem player by being able to offer valuable, effortless, seamless experience to distribution partners.	GREEN/ORANGE: Depending on organisation vision/ambition, adoption rate and competition	The question is whether your existing partners are still suitable in terms of IT architecture
Component 2: Key activities	OI enables more and easier data sharing to ingest into insurance processes and decisions.	ORANGE: In particular due to limited product development RED: Potentially due to not optimally offering products to the end user	The fact that the open APIs are compliant do have an impact on key activities but this alone won't drive profitability		IT biggest bottleneck to data quality and IT readiness			OI enables more and easier data sharing to ingest into insurance processes and decisions.	Strengthening due to better product development and offering richer functionalities	The integration with other financial services, besides compliance, could be beneficial for a wide array of isnurance activities (e.g. underwriting)		New opportunities to share and receive data competitively	Core activities can evolve into standalone products (via APIs)
Component 3: Value propositions	OI promotes new business models, with better CX and convenience. Data driven model.	ORANGE: Mainly because of limited product development RED: Potentially due to non-optimal product offering	Little impact	Little difference in impact between 1 and 2, which can be controlled at the back in both cases	Not much changes when only complying			OI promotes new business models, with better CX and convenience. Data driven model.	Strengthening through optimal product development and offering richer functionalities	The integration with other financial services can be beneficial for improving the customer journey and experience	Little difference in impact between 1 and 2, which can be controlled at the back in both cases		GREEN/ORANGE: New propositions possible. Also through access to third-party data by FIDA. But always weigh privacy versus value. The customer himself only shares data if it is positive

Component 4: Customer relationships	Most insurance is distributed today. No changes expected.	ORANGE: Customer journeys are not optimally supported due to limited product development RED: Potentially, people are not going to use it, few use cases, compliance alone is not enough. Link PSD2	Little impact	Little difference in impact between 1 and 2, which can be controlled at the back in both cases	Obligation to share data requires extra commitment to transparency and trust. My company finds value on brand and customer relationship, being reactive affects your customer relationship negatively. You age compared to innovative competitors	The customer relationship is still present here but somewhat more in the background		Most insurance is distributed today. No changes expected.	Strengthening by optimally supporting customer journeys and richer functionalities (PSD2)	Little impact	Little difference in impact between 1 and 2, which can be controlled at the back in both cases	Seizing opportunities requires going full steam ahead with this. This has an impact on positioning. Risk between competing on price or customer value (trust, relationship, quality)	More B2B customer relationship. B2C becomes more B2B2C. Although direct relationship can remain in my view
Component 5: Customer segments	Customer data enables more granular customer segmentation and better CX	Same as above	Little impact					Customer data enables more granular customer segmentation and better CX	Same as above	Little impact			New customer segments are possible to tap into, such as well-known platforms or a new super app like WeChat in China
Component 6: Key resources	Most insurers face cost/complexity of adapting for OI.	Same as above	Little impact	Light orange 1., the big NL insurers will be able to make this step well. (Comments: few NL embedded insurance, are too expensive, lots of fringe deals in tenders, everything is important but in the end it's about money)	Because of IT changes. And accumulated data position of 360 customer view decreases in value vs competitors	IT impact, depending on past investments		Most insurers face cost/complexity of adapting for OI.	Same as above	Integration with other financial services can impact positively insurance product development, operational capabilities, etc.	1. Technology infrastructure requires hefty further development of NL incumbent insurers to develop powerful open APIs	DARK ORANGE/GREEN: Dependent on whether the change is feasible. Internal change costs a lot of time and money. Potentially ease with open APIs and third-party services, then green.	IT impact, depending on past investments

Component 7: Channels	Open Insurance (OI) promotes easier engagement with new partners.	Same as above	Little impact	ORANGE/RED: not a problem in the short term, but if embedded insurance mainfests you need strong open APIs. Not yet a strong demand from the NL market but will eventually (2030) become essential		Other kinds of channels may arise though (via orchestrators, for example)		Open Insurance (OI) promotes easier engagement with new partners.	Same as above	Little impact	Not relevant in the short term, but if embedded insurance mainfests you need strong open APIs. Not yet strong demand from NL market but will eventually (2030) be essential and then strong open APIs strengthen integration across platforms.		Platform/ecosystem distribution
Component 8: Cost structure	Expected higher cost of IT and commercial (commissions).	High costs due to investments to become compliant	Little impact		Increase costs vs revenues (PSD2: obligations but few use cases, revenues, good IT). Chance of high traction on APIs also limited with only compliance	Substantial impact will be needed, FIDA dictates that compensation model may be in place		Expected higher cost of IT and commercial (commissions).	Higher costs than in outcome 1 due to additional investment in product development	Besides compliance, integration with other financial services could represent an additional cost in terms of technology maintenance		ORANGE/GREEN: Internal change costs a lot of time and money, can be alleviated with third-party services. Green at high volume	Costs are mainly in becoming compliant and setting up IT infrastructure. Still need additional investment
Component 9: Revenue streams	Premium increase, new revenue streams, new products, new client segments.	Customers may drop out because of limited product development	Little impact		GREEN/ORANGE: Making customer data available + profit margin. Fee for use APIs. The question is though, is it a revenue model or are you giving away your unique position?			Premium increase, new revenue streams, new products, new client segments.	Offering attractive products to distributors and end users will ensure higher revenues	Besides compliance, integration of other financial services can represent an opportunity to increase revenue		GREEN/ORANGE: less customer relationship = risk of less % return. Can you counter sufficiently with a more expensive product based on brand and customer relationship?	If done properly, new revenue can be generated here

C.2. Integrated heat map and description scenario B

In this scenario, the group of non-insurers consists of three and the group of insurers consists of two participants, since this scenario is not discussed with one insurer. Furthermore, the comments of one non-insurer will be omitted in the following subview analysis for outcome 1, since he did not see any impact on all components.

Component 1: Key partners
In outcome 1, the insurers see this component becoming infeasible if they fail to integrate AI. One non-insurer sees a negative impact, and the other two see a neutral impact, with one mentioning that a FinTech or another party would become a key partner if AI integration is outsourced. In outcome 2, all participants see a positive impact, except for one non-insurer who repeats that a FinTech or another party might still play a key role in outsourced AI integration. One insurer also states that new AI partners would be desirable.

Component 2: Key activities
In outcome 1, the two non-insurers observe (much) negative impact, while the insurers view the component as infeasible. In outcome 2, all non-insurers now see a positive impact, whereas the insurers remain negative, with one providing no explanation.

Component 3: Value propositions
Both non-insurers and insurers see a negative or (potentially) infeasible impact in outcome 1. In outcome 2, all participants now see a positive impact.

Component 4: Customer relationships
The non-insurers see neutral impact in outcome 1, with one mentioning that it depends on the current customer relationship. The insurers observe a negative or infeasible impact. In outcome 2, one non-insurer now sees a positive impact, while another repeats that the neutral impact depends on the current relationship. One insurer sees a positive impact, without explanation, while the other raises concerns regarding new communication strategies with AI, ethical considerations, and varied strategies for targeting different groups.

Component 5: Customer segments
The non-insurers view neutral impact in outcome 1, with one stating that it depends on customer perceptions. One insurer sees a negative impact but provides no explanation. In outcome 2, two non-insurers and one insurer now see a positive impact. The non-insurer who sees no change repeats their explanation that all segments are already covered.

Component 6: Key resources
In outcome 1, the insurers and one non-insurer observe a negative impact. In outcome 2, all participants see a positive impact, except for one insurer who repeats their negative impact, explaining that special resources are needed and that IT and workforce transformations are required.

Component 7: Channels
In outcome 1, all participants see neutral impact, with two non-insurers noting that things remain unchanged. In outcome 2, one non-insurer and one insurer see a positive impact. One non-insurer marking the impact as neutral comments that it depends on the channels involved, which could generally benefit from AI adoption.

Component 8: Cost structure
In outcome 1, one non-insurer and one insurer see a negative impact, while the other insurer marks the component as infeasible. One non-insurer who views the impact as neutral states that the cost structure would not benefit from AI adoption and that prior investments would influence the impact. In outcome 2, two non-insurers foresee higher costs. One marks the component neutral but notes that the impact depends on whether revenues outweigh costs, generally predicting a positive outcome. Both insurers see a positive impact.

Component 9: Revenue streams
In outcome 1, the two non-insurers see a negative impact, while the insurers view the component as infeasible. In outcome 2, all non-insurers now see a positive impact, whereas the insurers see a negative impact.

	Consultant	Pension fund	VC	x	Insurer 2	Insurer 3		Consultant	Pension fund	VC	x	Insurer 2	Insurer 3
Business model components	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI							Scenario B: AI becomes the underlying technology behind insurance Outcome 2: Successful integration of AI					
Component 1: Key partners	Business as usual	If outsourced, a FinTech or other party joins as main partner	Negative impact as partnership with key partners are limited in terms of potential		Loss of competitiveness	Unsuitable partners and suppliers to integrate AI		AI enables for faster, smarter, and more accurate decisions.	If outsourced, a FinTech or other party joins as main partner	If the insurance company successfully adopts AI, distribution partners and tech partners benefit from it			Strong relationship with partners, new AI partners desirable
Component 2: Key activities	Business as usual	Much negative impact on 2. product development, 4. risk management and 5. claims handling in case of unsuccessful implementation	Negative impact as the insurer won't benefit from the impact of AI on activities linked for example to underwriting and claims		Competition does have essential AI applications	Core activities can no longer be performed properly		AI enables for faster, smarter, and more accurate decisions.	Strengthening 2. product development, 4. risk management and 5. claims handling in implementation	Key activities benefit from AI adoption in terms of AI-driven automation capabilities in the insurance company			Shifting activities. Analysing risks more by AI, focus on developing AI models and connecting new sources
Component 3: Value propositions	Business as usual	ORANGE: AI integration is crucial to create prediction models to quickly fill in forms RED: Potentially, customer drops out if AI is not integrated	AI brings to the table notable improvements in customer experience and journeys by hyper-personalising the experience		Distinguish on other elements	Propositions can no longer be delivered		AI enables for faster, smarter, and more accurate decisions.	Valuable functionalities that meet needs can be offered	Customer journeys and experience are improved thanks to AI capabilities (e.g. hyper-personalisation)		Although differentiation will be limited because everyone is integrating AI	More value from propositions, new propositions

Component 4: Customer relationships	Business as usual		Impact depends on the current state of customer relationship specifically in the case of indirect relationship			If digital insurer no longer up to date	Customer relationship (loyalty with brand) will be severely strained		AI allows to better use customer data.		Impact depends on the current state of customer relationship specifically in the case of indirect relationship			The question is whether all customers will appreciate this way, e.g. communication with AI. Attention required to ethics (bias and solidarity principle) with focus on 'explainable AI'. And perhaps approach different target groups differently
Component 5: Customer segments	Business as usual	Covers all segments	Impact depends on perception on the customer end						AI allows to better use customer data for more granular customer segmentation and behavioral analysis.	Covers all segments	Customer segments benefit from the fact that the insurer successfully adopts AI			Segment of one	
Component 6: Key resources	Business as usual	AI will become important for development of 2. insurance products and 3. risk models	Infrastructure remains as is			Staying competitive requires adjustment	Some special resources needed, though. IT is changing, like computing power. And workforce is changing, fewer acceptors but more highly skilled		AI enables for faster, smarter, and more accurate decisions.	AI will strengthen development of 2. insurance products and 3. risk models	Adoption of AI should benefit some of the insurer's resources (e.g. tech infra and risk models should improve)			Applications to e.g. automation and fraud detection	Some special resources needed, though. IT is changing, like computing power. And workforce is changing, fewer acceptors but more highly skilled
Component 7: Channels	Business as usual		Infrastructure remains as is. Digital third-party platforms continue collaboration with insurers as is						AI enables for faster, smarter, and more accurate decisions.		Impact depends on the state of the channels which are involved in partnerships with the insurer. In general, they should benefit from AI adoption				

Component 8: Cost structure	Business as usual	High cost of attempted implementation	Cost structure doesn't benefit from AI adoption. The impact here depends on the investment that the specific insurance company has made in AI			Lots of depreciation on failed investments. More expensive workforce		Expected higher cost of IT and compliance	Higher costs than outcome 1 for successful implementation	Here it depends. AI can bring to the table $M in value but the development represents a cost. It depends on how the insurer adopts AI. Generally positive			Integration AI makes for cheaper core operations	The expectation is higher efficiency. The workforce is more expensive though
Component 9: Revenue streams	Business as usual	Lower revenues	Insurance company will miss the additional revenue opportunities arising from AI adoption		Lost competitiveness because others, including new players, are faster and cheaper	Income falls away		AI enables for faster, smarter, and more accurate decisions. This should improve revenue and margins.	Higher revenues by fulfilling customer needs	There is proof that AI integrated in insurance distribution should increase premiums (e.g. cross-selling / upselling)			Differentiation will be limited because everyone is integrating AI. And there will be new players	Can revenues potentially stand up to hefty investments?

C.3. Integrated heat map and description scenario C

Component 1: Key partners
In outcome 1, both groups include participants who see neutral impact, negative impact for distribution partners, and infeasible impact for both partners. In outcome 2, all participants see a positive impact on distributor partners. For technology partners, the impact is described as either neutral, uncommented, or positive. One insurer focuses on the role of partners in unlocking open APIs, while another considers what actions the insurer itself should take.

Component 2: Key activities
In outcome 1, the insurers see a neutral impact without providing explanations. Two non-insurers also see a neutral impact, with one describing it as “business as usual.” One non-insurer sees a negative impact due to the lack of external data via open APIs, which does not benefit some activities. In outcome 2, two non-insurers and two insurers now see a positive impact, while the remaining two participants view the impact as neutral.

Component 3: Value propositions
For non-insurers, the described impact is similar across both outcomes, focusing on customer experience, convenience, and personalisation. In outcome 1, one insurer sees a neutral impact and another a negative impact, both noting that data is essential for personalisation, which they consider positive. One raises the question of how personalisation aligns with the solidarity principle foundational to insurance. The third insurer sees neutral impact, commenting “same as other components,” though it is unclear to which components they refer.

Component 4: Customer relationships
In outcome 1, one non-insurer and two insurers see a negative impact. One insurer and two non-insurers see a neutral impact, with one explaining that it depends on the current state of the customer relationship. In outcome 2, one non-insurer repeats this comment. One insurer and one non-insurer see a neutral impact but do not provide further explanation. Another insurer and non-insurer see a positive impact due to personalisation, while the last insurer describes a negative impact for four specific reasons.

Component 5: Customer segments
In outcome 1, two non-insurers and one insurer see a negative impact. One non-insurer sees a neutral impact, explaining that it depends on customer perception but will generally be negative. One insurer sees a positive impact, citing reduced risk of uninsurability. In outcome 2, all participants see a positive impact except for one insurer, who raises concerns about a high risk of uninsurability in this case.

Component 6: Key resources
In outcome 1, two insurers and the non-insurers see a neutral impact, though one notes that it could be negative for risk model development. One insurer views the component as infeasible, arguing that product and risk model development would be insufficient to compete. In outcome 2, two non-insurers and two insurers see a positive impact. One non-insurer sees a neutral impact, while one insurer sees a negative impact, highlighting that incumbent insurers are less agile but could leverage third-party APIs and tooling. The same insurer notes that properly assessing customer risk conflicts with the solidarity principle.

Component 7: Channels
In outcome 1, participants in both groups report neutral, negative, or infeasible impacts. In outcome 2, all participants see a positive impact. One insurer, however, warns that this positive impact may be short-term as unbundling could erode brand and customer relationships over time.

Component 8: Cost structure
In outcome 1, two non-insurers and one insurer see a negative impact, while the others see a neutral impact without providing explanations. In outcome 2, one insurer and one non-insurer see a neutral impact without explanations. One non-insurer now sees a positive impact, while another non-insurer and two insurers see a negative impact, with one not providing an explanation.

Component 9: Revenue streams
In outcome 1, all participants see neutral impact except for one insurer, who views the component as infeasible due to higher churn and unprofitability. In outcome 2, two non-insurers continue to see

neutral impact. One non-insurer and two insurers now see a positive impact. The last insurer notes a positive short-term impact but a negative long-term impact, repeating concerns about unbundling. They also question the extent of achievable personalisation and comment on the entry of new, smaller, specialised players into the insurance process through unbundling.

	Consultant	Pension fund	VC	Insurer 1	Insurer 2	Insurer 3		Pension fund	Consultant	VC	Insurer 1	Insurer 2	Insurer 3
Business model components	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties							Scenario C: Consumer expects new, personalised insurance policies Outcome 2: Successful connections with third parties					
Component 1: Key partners	Business as usual	ORANGE: Distribution partners, distributors only want to distribute feature-rich products that require third-party connectivity WHITE: Not decisive for technology partners	If the insurer is not able to get external data through open APIs this won't benefit partners to provide the best service possible	Opposite. You are likely to be excluded by distribution partners		Proactive partners should have helped with need.		GREEN: Distribution partners, distributors only want to distribute feature-rich products that require third-party connectivity WHITE: Not decisive for technology partners	OI promotes new business models and easier engagement with key partners	Partners benefit from insurance integration capabilities	In order to do business with distribution partners, you need to connect with third parties. Are often smaller specific products. Offer personalised product to right distribution partner (fit)		Partners are future-proof and unlock Open APIs
Component 2: Key activities	Business as usual		If the insurer is not able to get external data through open APIs this doesn't benefit some activities such as underwriting						OI enables more and easier data sharing to ingest into insurance processes and decisions.	Key activities in the insurance company benefit from succesful integration capabilities		Internal change is limited by third-party APIs and tooling	Use of Open data in core activities
Component 3: Value propositions	Business as usual		If the insurer is not able to get external data through open APIs the insurer will miss opportunities in terms of improving CX and journey	Same as other components	You can hardly personalise if you have not been able to obtain data	More data is more opportunity for personalisation. Insurance is based on solidarity principle, how to reconcile with personalisation?			OI promotes new business models, with better CX and convenience. Data driven model.	CX and personalisation should benefit from integration with third-parties		Enhanced by connecting to third-party solutions. Personalised offer does bite the solidarity principle	More data is more opportunity for personalisation. Insurance is based on solidarity principle, how to reconcile with personalisation?

Component 4: Customer relationships	Insurers fail to take advantage of client knowledge from embedded insurance partner.		Impact depends on the current state of customer relationship specifically in the case of indirect relationship	Additional data is needed to personalise, which is a very big challenge for established insurers. InsurTech can better address this.		Relationship strained by failure to provide personalised insurance			Embedded insurance partners hold client data and insights that make personalization easier.	Impact depends on the current state of customer relationship specifically in the case of indirect relationship	Offer personalised, especially well-priced products then you win the direct and indirect customer	Customers need to get used to possibly new ways of communicating. Marketing/product changes too, you are faster and more relevant but can also be intrusive. Staying low-tech also provides some degree of stability. Transition will be messy which could negatively impact customer relationship. Also threshold to share data to personalise properly	
Component 5: Customer segments	Insurers fail to take advantage of client knowledge from embedded insurance partner	Without third-party data, you can do less to meet end-user expectations	Impact depends on perception on the customer end. Generally this should be negative impact	Opposite (of "High risk of uninsurability. Potentially high premiums on higher-risk customers who can do little about it themselves.	Due to changing customer needs, you will have to look at focus groups other than dynamic families for proper serving			With third-party data, you can better achieve end-user expectations	Real time customer data enables more granular customer segmentation and better CX	Customer segments benefit from this point in the sense that they will have a more personalised offering	High risk of uninsurability. Potentially high premiums on higher-risk customers who can do little about it themselves.	Strengthened by connecting to third-party solutions	Personalised offers are more embeddable. Personalisation through specific offers based on customer data or on risk factors
Component 6: Key resources	Business as usual		In a relevant share of cases, infra remain as is. This can be negative in terms of risk models development	Insurance product development and risk models are not sufficient, mainly because of pricing vs competitor. Retail is mainly price product.					Insurer has an efficient and agile (IT and business) organization.	Infrastructure and risk model development / operations benefit from integrations with third parties	Potential on ecosystem player, right insurance prodcuts and risk models	Less agile as a large organisation but internal change can be limited by third-party APIs and tooling. External data allows you to properly assess a customer's risk, but bites with solidarity principle	Integration of open data in risk models and IT

Component 7: Channels	Business as usual	Similar to component 1, distribution partners. It is important to be present and use data from third-party platforms	If the insurer is not able to get external data through open APIs the relationship with digital third-party platforms won't be possible or will be difficult	You will not get into this because you cannot offer the right products / prices as an insurer.	Other audiences are in different places so your channels (e.g. media) need to change to appeal to other audiences			Similar to component 1, distribution partners. It is important to be present and use data from third-party platforms	Open Insurance (OI) promotes easier engagement with new partners.	Digital third-party platforms should benefit from this point	Potential on ecosystem player	GREEN/ORANGE: Unbundling can create many new distribution spots in the short term but erode brand and customer relationships in the long term	Personalised offers are better to embed
Component 8: Cost structure	Cost to adapt doesn't bring higher revenues (premium).		No integration can represent an additional cost for insurers as they will keep some processes manual			Higher costs compared to competitors			Expected higher cost of IT and commercial (commissions).	If the insurer is successful at leveraging the integrations, it should also be able to automate / streamline certain processes improving costs			Integrating open data requires investment
Component 9: Revenue streams	Business as usual			No longer profitable because churn is higher, people walk away.					Premium increase, new revenue streams, new products, new client segments.		All opportunities are increasing due to fulfilling consumer expectations, which in particular makes the perception of price and responding to new fast-changing customer needs decisive over personalisation.	GREEN/ORANGE: To what extent can you personalise? And smaller specialised players are entering the insurance process through 'unbundling'. Unbundling can create many new distribution spots in the short term but erode brand and customer relationships in the long term	New revenue?

D

Detailed subview analysis of the business model components of the integrated heat maps

In the horizontal description, each component has been examined across all scenarios. No figure where all outcomes of all scenarios have been integrated is attached, as this would not fit within a page. The reader could combine the three integrated heat maps as provided in Appendix C. While not exhaustive, the following observations can be made:

Component 1: Key partners
The impact (positive/negative) is greater on distribution partners than on technology partners. The relationship with distribution partners has a more significant influence. In the second outcomes, this relationship is positive, but in the first outcomes, distribution partners could exclude incumbents as other parties may offer better services, personalization, and scalable open APIs. The relationship with technology partners is generally stable or stronger, but there are questions about whether the partners are suitable in all outcomes.

Component 2: Key activities
Changes to key activities are generally necessary in all scenarios. These changes can have a strengthening impact, particularly in the second outcomes, but are negative or insufficient in the first outcomes.

Component 3: Value propositions
The impact on value propositions is predominantly positive in the second outcomes, especially in terms of personalization, richer functionalities, customer experience, and convenience. This is particularly evident in scenarios 2 and 3. However, insurers still raise the issue of the solidarity principle versus personalization.

Component 4: Customer relationships
Personalization has a positive impact on customer experience and journey. However, there are challenges regarding methods of communication and obtaining data.

Component 5: Customer segments
In the first outcomes, the impact is mixed, ranging from negative to limited. The impact is primarily positive in the second outcomes. It is notable that the theme of insurability is raised as an opposing view by one insurer.

Component 6: Key resources
In all scenarios, particularly in the second outcomes, significant adjustments are required for key resources, especially in IT and the development of risk models. Both cost and complexity are critical factors. Failing to make these adjustments negatively impacts the robustness of the business model.

Component 7: Channels
The impact on channels varies. A key factor is the relationship with digital third-party platforms (distributors), which can be strengthened in the second outcomes or lead to exclusion in the first outcomes.

Component 8: Cost structure
Costs generally increase in all scenarios, often more so in the second outcomes due to adjustments and additional investments. There is a strong relationship with *Component 9: Revenue Streams*, as the impact is either positively or negatively reinforced depending on the realization of higher revenues.

Component 9: Revenue streams
There is significant uncertainty about whether higher revenues will be achieved. Generally, in the second outcomes, expectations are positive. However, there are challenges regarding differentiation, customer relationships, and the successful implementation of changes to the other components.

E

Brainstorm outline

Outline brainstorm scenarios adoption open APIs in embedded insurance

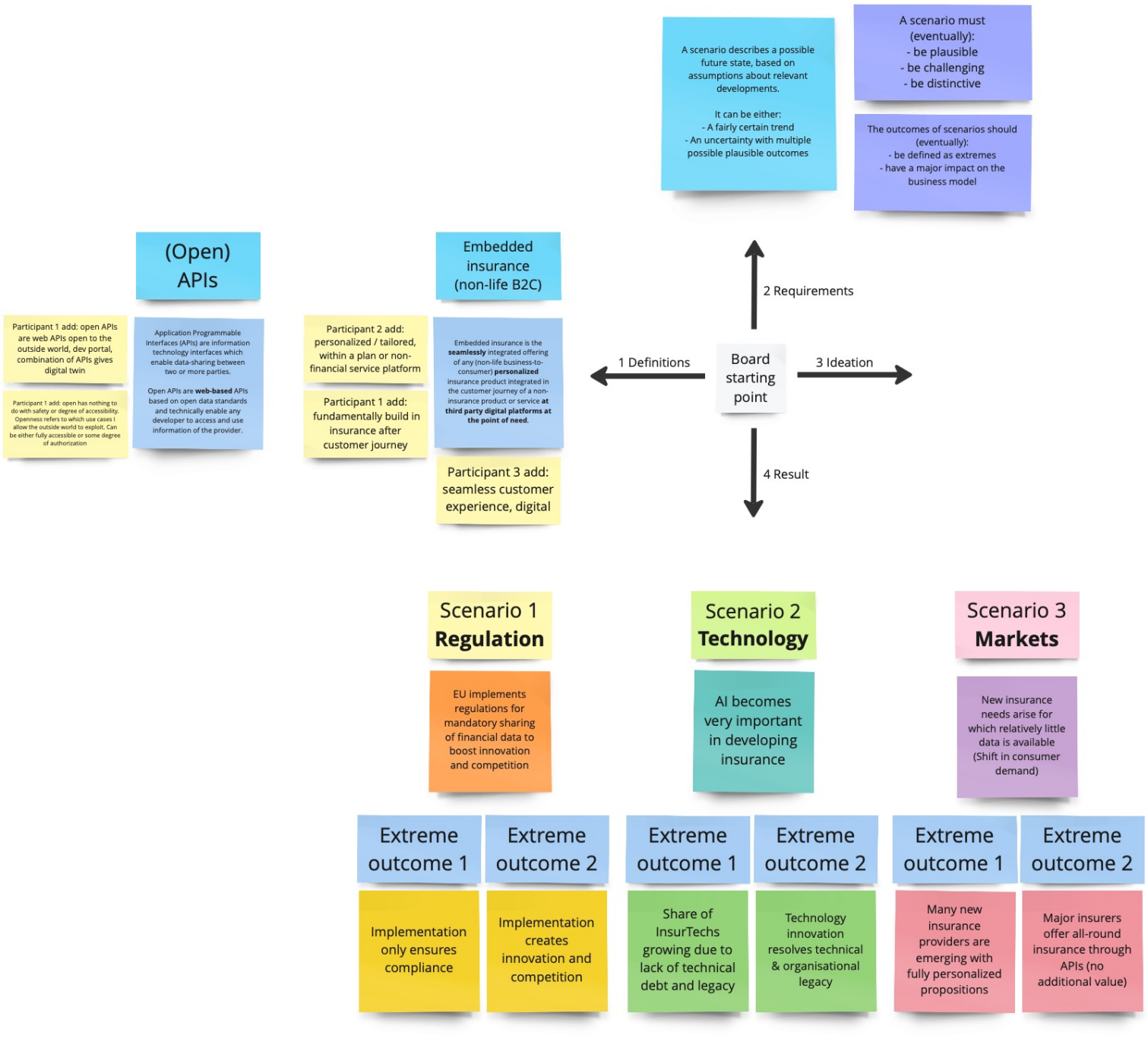
Time	Title	Type	Description of content	Goals of the segment/activity (why)
	0. Preparation			
Before b.s.	Informed Consent signed	Solitary	Participants sign Informed Consent beforehand	Participants consent with participating and usage of data
Before b.s.	Participant introduction	Solitary	Participants introduce themselves beforehand: name, job title, job description and areas of expertise	A clear image of the participants is created. This will be input for the Methodology and Limitations sections of the thesis
Before b.s.	Outline brainstorm shared	Solitary	Participants are prepared with an agenda, goals of the b.s. and overview of definitions to be used	Participants are prepared for the brainstorm
	BRAINSTORM			
	Walk in		Participants come in	Arrange the walk in earlier to start the brainstorm in time
5 min	**1. Welcome & Introduction**			
1 min	Organiser welcome	Plenary	Introduction Wesley	Rapport with participants is created
4 min	Agenda & Goals of the brainstorm	Plenary	Explain agenda & goals of the brainstorm Opportunity to ask any clarifying questions	Participants are familiarised with the goals and structure of the brainstorm
35 min	**2. Discussions definitions**			
5 min	Explanation Business Model Stress Testing method (BMST)	Plenary	Explanation of BMST	Participants know the context of the research
10 min	Definitions clarification and short discussion	Activity	Description of open APIs, the adoption of open APIs and embedded insurance for non-life business-to-consumer business model (canvas)	Participants are aligned on the definitions to be used in the research
5 min	Explanation scenario analysis method in this brainstorm	Plenary	Explanation of what kind of scenarios we are looking for	Participants know which results are expected
10 min	Discussion on most important aspects	Activity	Discussion on the provided important aspects (from literature) and whether they should be redefined	The aspects will be the point of focus during the brainstorm to have a clear scope and structure
35 min	**3. Scenario ideation**			
5 min	Explanation method of ideation	Plenary	Explanation open brainstorming per key driver	Participants are ready to start the ideation phase
10 min	Ideation: adoption open APIs in the context of embedded insurance driver 2	Activity	Identify possible scenarios through ideation for each aspect	Participants arrive at a longlist of scenarios covering multiple aspects related to the adoption of open APIs
10 min	Ideation: adoption open APIs in the context of embedded insurance driver 2	Activity	Identify possible scenarios through ideation for each aspect	Participants arrive at a longlist of scenarios covering multiple aspects related to the adoption of open APIs
10 min	Ideation: adoption open APIs in the context of embedded insurance driver 2	Activity	Identify possible scenarios through ideation for each aspect	Participants arrive at a longlist of scenarios covering multiple aspects related to the adoption of open APIs
15 min	**4. Rank best scenarios**			
3 min	Explanation ranking method	Plenary	Explanation of the ranking method: open discussion	Participants are ready to rank the longlist of generated scenarios

7 min	Selection best scenarios as input to BMST	Activity	Open discussion to select final scenarios	Participants arrive at 1 scenario with 2 extreme outcomes per key driver. The scenarios will be used as input for the BMST
5 min	Possibility to refine the selected scenarios and outcomes	Activity	Each scenario and extreme outcome will be discussed to improve	The selected scenarios and outcomes can be refined by the participants.
5 min	**5. Closing**			
4 min	Recap of the results	Plenary	Go through the results of the brainstorm	Make sure the participants agree with the obtained results & create room for final remarks of the participants
1 min	Ending the brainstorm	Plenary	Thank the participants for taking part	Make sure the participants are thanked for their valuable contribution to the research
	AFTER BRAINSTORM			
	6. Refinement			
	Refinement of the scenarios by the researcher	Solitary	The researcher will refine the selected scenarios and extreme outcomes	Make sure the final scenarios and extreme outcomes are clearly defined and suitable as input of BMST
	7. Validation			
	Validation of the final scenarios and extreme outcomes by the participants	Individually	The final scenarios and extreme outcomes will be communicated with the participants for validation.	The participants have the option to make any final remarks.

F

Brainstorm whiteboard

Brainstorm scenario development for the adoption open APIs in the context of embedded insurance
18 April 2024




(Scenario)
(Extreme outcome)
(Scenario)
(Extreme outcome)
(Scenario)
(Extreme outcome)
Scenario 1
Regulation
Scenario 2
Technology
Scenario 3
Markets
Participant 1: fida, data act, AI-act
each consumer has a 360degree personal financial scan
All financial data accessible by third parties (consented), fully personalised offering
FIDA fails, heavily fragmented market
Participant 1: EU regulation destroys any competitiveness for EU players
non-EU players innovate and outpace EU
Participant 1: EU regulation leads the way for the world
EU becomes a blueprint for non-EU markets
Participant 4: FIDA, other sector (e.g. Data act)
MB FIDA is adopted by whole FS market with innovation mindset, FIDA 2 is being developed by commission. Other sectors also open up leading to cross-sectoral use cases
MB FIDA is only adopted by letter of law with incumbents dragging their feet. No sparks of innovation. No enforcement of regulation
Participant 3: AI development
Machines take over the world
AI tanks / prohibited usage
Participant 3: Micro-Service Architecture Trends
All types of financial services can be combined & integrated seamlessly
Participant 1: increase of data + AI compute
Each consumer has a personal AI assistant that understands the appetite & desires for that consumer
Participant 1: web3 /crypto
insurance is no longer a company controlled product, but a societal collaborative effort to carry risk
fintechs run away with web3 solutions that destroy the market and operate out-of-sight
Participant 4: AI, cyber, legacy trends
MB: Legacy is not seen as bottleneck for open API implementations, AI helps accelerate the trend and underpins need to get access to data
MB: technical debt trap. No adoption of Open API technology
Participant 3: Emerging risk categories (climate change, cyber threats)
Plain P&C products become commodity, emerging risks key differentiator
Participant 3: Self driving cars
Motor insurance becomes manufacturer/ product liability
Participant 2: End-user expects insurance at point of relevance
In the long run all insurance services will be embedded --> Traditional Insurance will die
Participant 1: - rise of fintech from bigtech/startups
a few new world dominant players
No access to risk data (maximum disintermediation)
Participant 1: customers don't buy individual 'pockets' of insurance, but demand an exact proposition of all the e2e risk, that carries their exact risk appetite
insurance as a hyper personalised 'health-scan'
Participant 4: Incumbents don't have monopoly on trust relationship anymore
incumbents will die if they don't anticipate embedding trend

G

Interview preparation document

Preparation interview

Impact adoption open API's in embedded insurance

Wesley Kool

April-May 2024

Master's Thesis
Management of Technology, TPM, TU Delft

2 INSTRUCTIONS

Instructions

This is the preparation document for our interview.

The most important information is expressed in **bold** on each page.

This document contains the following pages:

- Information: Research explanation and definitions
- Example completed assignment for Uber
- **Assignment: please complete and return (PPT) template via email**
- Assignment support:
  - Description business model
  - Description scenarios
  - Explanation business model canvas

If you have any questions, do not hesitate to call me or send me an e-mail.

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3 RESEARCH QUESTION & DEFINITIONS

Interview

I research the adoption of open APIs in the context of embedded insurance. Specifically, we will look at how different scenarios for the adoption of open APIs affect the business model for embedded insurance.

Read the definitions which will be used during the interview.

Research question & scope

Research question

What is the impact of the adoption of open APIs on the embedded insurance business model for non-life insurance from insurance incumbents?

Scope

- The perspective is from the incumbent insurer.
- Apart from the initial sale, the insurer retains the entire insurance value chain, from policy management to claims handling.
- Life, health insurance and all business-to-business insurances are outside the scope of this study.

Definities

Embedded insurance

Embedded insurance is the at the point-of-need offering of a personalized insurance product that is seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

(Open) API's

Application Programmable Interfaces (APIs) are information technology interfaces that enable the sharing of data between two or more parties.

Open APIs are web-based APIs based on open data standards and make it technically possible for any developer to access and use information of the provider.

4 EXAMPLE UBER

Illustration assignment

An unrelated example is included for **illustrative purposes.**

We are going to confront potential future developments (top) with the components of the business model (left).

The goal is to describe the impact of a development on a component of the business model.

In this example you can see how the impact is described and how it is colored. For this we use the following scheme:

- Red: **This component is no longer viable.** The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: **This component is no longer profitable.** The outcome causes **the component to have to change.**
- Green: **The feasibility and profitability** of this part of the business model is **actually strengthened.**
- White: There is little or no impact.

business model stresstest

name Uber

		development 1 Self driving cars are accepted and can be used for passenger transport	development 2 Car sharing is widely accepted and the most common way for transport	development 3 Legislation decides that Uber should be treated as a traditional taxi company
who customers	Passengers		Uber makes car sharing possible, more passengers	Less drivers leads to less passengers
	Amateur drivers	Are not or less necessary	Fewer people offer themselves as drivers	Amateur drivers may no longer provide rides
	Professional drivers	Are not or less necessary	More rides are made by professional drivers	More rides are made by professional drivers
what proposition and value	Connecting drivers with passengers	Replaced by connecting passengers with self-driving cars	Less passengers are connected	
	Passengers: with a tap a ride from every place at any time, from affordable to luxurious			Less choice in drivers
	Drivers: easy access to passengers under their own conditions	This service expires	Connecting with even more passengers	
how activities and partners	Maintain and update platform			
	Collaboration with lease companies for special packages	Perhaps the lease company will also offer self-driving cars		
	Legal activities such as litigation and lobbying	No more lawsuits about amateur drivers needed		Uber will do everything to reverse legislation
why costs and revenues	Revenues: payment of passengers at the end of the journey	No intervention of driver, revenue will directly flow to Uber	More rides at the same time is more revenue	Less revenue due to fewer rides
	Flexible prices determined by crowds and transport availability			
	Costs: technological infrastructure, legal, employees and marketing	Perhaps the investment in self-driving cars is greater than the costs of drivers	More passengers per ride by drivers will reduce costs per trip	Uber will incur legal costs and have to retrain to a taxi company

date

Based on Business model stress testing: A practical approach to test the robustness of a business model from Timber Haaker, Harry Bouwman, Wil Janssen, Mark de Reuver from 2017

Source: https://businessmakeover.eu/de/tools/business-model-stress-test#:~:text=In%20the%20Business%20Model%20Stresstest,weaknesses%20through%20the%20following%20steps.

5 TEMPLATE (ASSIGNMENT)

Assignment

Prior to the interview, complete this template for ≥10 relationships between an outcome and a component that will have the most impact. You can use this document or the PPT-page provided.

Would you return the template back via mail at least 1 hour prior to the interview?

Purpose: Confront the components of the business model canvas **(page 6)** with the outcomes of the scenarios **(page 7).**

For each component, consider what the impact of each outcome will be. See if it will have a negative or positive impact.

Please use the following scheme:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

Need an example?
You can see an example on page 4.

Outcomes scenarios Business model components	Scenario A: New regulation data-sharing Outcome 1: Compliance	Scenario A: New regulation data-sharing Outcome 2: Beyond compliance	Scenario B: AI becomes the underlying technology behind insurance Outcome 1: Unsuccessful integration of AI	Scenario B: AI becomes the underlying technology behind insurance Uitkomst 2: Successful integration of AI	Scenario C: Consumer expects new, personalized insurance policies Outcome 1: Lack of connection with third parties	Scenario C: Consumer expects new, personalized insurance policies Outcome 2: Successful connections with third parties
Component 1: Key partners						
Component 2: Key activities						
Component 3: Value propositions						
Component 4: Customer relationships						
Component 5: Customer segments						
Component 6: Key resources						
Component 7: Channels						
Component 8: Cost structure						
Component 9: Revenue streams						

6 BUSINESS MODEL CANVAS

Remarks

Read the components of the business model for embedded consumer non-life insurance so that you are familiar with them.

Notes
Perspective: from the incumbent insurer's point of view
Value chain: all processes except sales.
Product: embedded non-life insurance for consumers

Need an explanation?
If this business model canvas is not sufficient, you will find on page 8 a detailed explanation of the structure of each component.

Definition embedded insurance (repeated)
Embedded insurance is the at the point-of-need offering of a personalized insurance product that is seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

1. Key partners	2. Key activities	3. Value propositions	4. Customer relationships	Customer segments
1. Distributor partners 2. Technology partners	1. Technology development 2. Product development 3. Policy administration & servicing 4. Underwriting 5. Claims handling 6. Balance sheet provision 7. Partnership management	1. Convenient customer experience through seamless integration and selling insurance at the point of need 2. Personalized insurance tailored to consumer and/or product	1. Direct (customer is linked through) 2. Indirect (possibly white label agreement)	1. All segments included
	6. Key resources		7. Channels	
	1. Technological infrastructure 2. Insurance product development 3. Risk models development 4. Operational capabilities		1. Digital third-party platforms	
8. Cost structure		9. Revenue streams		
1. Technology development and maintenance 2. Partnership management 3. Policy administration & servicing 4. Claims handling 5. Pay-out of successful claims 6. Commissions to distributors		1. Revenue from insurance premiums 2. Selling of value-added services 3. Cross-selling of insurance products		

7 OUTCOMES SCENARIOS

Remarks

The scenarios describe a number of possible future developments relevant to the adoption of open APIs in the insurance industry.

Please read the scenarios including the extreme outcomes so that you are familiar with them.

Scenario A: New regulation data-sharing

(FiDA) regulations are being introduced that require financial institutions to share customer data with third parties based on customer consent. This encourages digital transformation and innovations in data-driven business models.

Extreme outcome 1: Compliance
The insurer develops open APIs that fundamentally comply with (FiDA) regulations.

Extreme outcome 2: Beyond compliance
Powerful open APIs are being developed that comply with (FiDA) regulations and integrate seamlessly with a wide range of (financial) services.

Scenario B: AI becomes the underlying technology behind insurance

AI will become the fundamental technology in the insurance industry, with insurers integrating AI into all their processes.

Extreme outcome 1: Unsuccessful integration of AI
The insurer cannot seamlessly integrate AI into their IT. This limits the development of good open APIs and access to AI-driven insurance.

Extreme outcome 2: Successful integration of AI
The insurer seamlessly integrates AI into its IT.

Scenario C: Consumers expect new, personalised insurances

Consumers want new, personalized insurance for which little (risk) data is available. New insurance providers are capitalizing on this.

Extreme outcome 1: Lack of connection with third parties
The insurer cannot get external data through open APIs.

Extreme outcome 2: Successful connections with third parties
The insurer gains access to third-party data through open APIs. This allows new, personalized insurance to be offered quickly.

8 BUSINESS MODEL CANVAS EXPLAINED

Remarks

The business model canvas is a framework for describing a business model.

It consists of 9 different components that make up the business model.

Need an explanation?
If this business model canvas is not sufficient, you will find on page 8 a detailed explanation of the structure of each component.

Definition embedded insurance (repeated)
Embedded insurance is the at the point-of-need offering of a personalized insurance product that is seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

Business model components	Description	Explanation
Component 1: Key partners	1. Distributor partners 2. Technology partners	1. Third-party digital platforms that integrate insurance products at the point of need during the customer purchase process, providing access to a broad insurance customer base. 2. Partners who develop and maintain IT infrastructure, including a developer portal and (open) APIs, facilitating integration with distributor partners.
Component 2: Key activities	1. Technology development 2. Product development 3. Policy administration & servicing 4. Underwriting 5. Claims handling 6. Balance sheet provision 7. Partnership management	1. Designing insurance products that integrate seamlessly with third-party platforms and offer value to both partners and customers. 2. Developing the IT infrastructure to facilitate integration with distributors. 3. Managing the lifecycle of insurance policies. 4. Assessing risk and determining insurance premiums and terms. 5. Managing the claims process from initiation to settlement. 6. Managing financial reserves to cover future claims, maintaining solvency and compliance with capital requirements. 7. Establishing and maintaining relationships with sales and technology partners to enhance distribution channels and technological capabilities.
Component 3: Value propositions	1. Convenient customer experience through seamless integration at the point of need 2. Tailored personalized insurance	1. Insurance products are seamlessly integrated at the point of need during the purchase process of another non-insurance product or service. 2. Policies are tailored to the consumer and/or the specifics of the product or service, ensuring relevant and adequate coverage.
Component 4: Customer relationships	1. Direct (customer is linked through) 2. Indirect (possibly white label agreement)	Customer relationships are either: 1. The customer is linked through by the distributor. 2. The customer enters into a relationship with the distributor and the distributor with the insurer. This could be with a white label agreement: the name of the underlying insurer is then not known.
Component 5: Customer segments	1. All segments included	1. A purchaser can be any consumers adding and buying any insurance product during the purchase of a non-insurance product or service via the digital platform of a distributor from any industry.
Component 6: Key resources	1. Technological infrastructure 2. Insurance product development 3. Risk models development 4. Operational capabilities	1. Robust IT systems are needed to handle integrations, data analysis, policy management and customer interfaces. 2. Insurance offerings that can be integrated seamlessly should be well-developed. 3. Advanced risk modelling capabilities are essential for accurately assessing and pricing risks. 4. Robust operational capabilities are needed to manage and execute their insurance processes efficiently.
Component 7: Channels	1. Digital third-party platforms	1. Sales are integrated in the sales processes of third-party digital platforms of distributors.
Component 8: Cost structure	1. Technology development and maintenance 2. Partnership management 3. Policy administration & servicing 4. Claims handling 5. Pay-out of successful claims 6. Commissions to distributors	1. Costs of building and maintaining IT systems. 2. Costs of building and managing relationships with partners. 3. Costs of managing the life cycle of policies. 4. Costs of handling and reviewing claims. 5. Costs associated with paying out approved claims. 6. Costs associated with commissions or fees paid to distributors for each policy sold.
Component 9: Revenue streams	1. Revenue from insurance premiums 2. Selling of value-added services 3. Cross-selling of insurance products	1. Revenue from premiums paid by the purchasers of the integrated insurance products [RISK][INT] 2. Revenue from offering additional services, such as extended coverage or personal assistance options. 3. Indirect revenue from selling other insurance products to the purchaser of the embedded insurance product.

H

Interview questionnaire

Purpose

The interview aims to explore the impact of the envisioned scenarios for the adoption of open APIs in the context of embedded insurance on the nine components of the drafted business model canvas for embedded (non-life) insurance for consumers.

Introduction (5 minutes)

- Introduction of the researcher and interviewee.
- Remarks about:
  - The recording and transcription of the interview.
  - The opportunity to revise, clarify, or withdraw statements via the transcript to be received after the interview.
- **What is your role within your organisation? (Only if not clear)**

  This question is designed to get acquainted with the interviewee and assess the level of knowledge and authority associated with the role. Additionally, it helps to understand the context of the answers.
- **How long have you worked in the insurance industry? (Only if not clear)**

  This question assesses the interviewee's experience, which helps to contextualise and validate the authority of the answers.
- **What is your perception of embedded insurance?**
  - How do you see embedded insurance being applied now and in the future?
  - Is it positive or negative?

  This question is designed to gain insight into one's perception of embedded insurance, providing context for the responses.

Scoping Questions (10 minutes)

- **Is there anything missing in the given definition for embedded insurance?**

  Remark: "In this interview, we will use the given definition."

  This question verifies whether the interviewee agrees with the definition used during the interview, ensuring shared understanding and reliability across interviews.
- **Is there anything missing in the given definition for open APIs?**

  This question assesses the interviewee's agreement with the provided definition of open APIs and their preparedness for the interview.

- **When would you consider APIs to be ”open”?**

  Remark: ”In this interview, we consider …to be ’open.’”

  This question encourages discussion about the definition of ”open” APIs, aiming to refine and align perceptions within the industry.

Core Questions (40 minutes)

- **Illustration: Uber**

  Do you have questions about the example or the goal of this interview?

  This ensures the interviewee understands the research goals and provides clarification as needed.

- **Business Model Canvas**
  - Does the business model canvas accurately describe the business model for embedded non-life insurance for consumers?
  - Would you modify any component, and why?

  This question assesses the accuracy and completeness of the business model canvas.

- **Scenarios**
  - If you had to summarise the scenarios, what do you think are the most important aspects?

  This question captures the interviewee’s perceptions and expectations regarding proposed scenarios in the insurance industry.

- **Impact on BMC**
  - Which scenario would you like to start with?
  - On which component will the outcome of this scenario have the most impact?
  - How would this change the component?
  - What positive or negative impacts would this have?
  - Repeat for other components within this outcome.

  These questions systematically evaluate the impact of each scenario on components of the business model canvas.

Follow-up Questions

- Can you provide examples of the use of embedded insurance/open APIs/impact within your organisation?
- What is the most impactful component, and what is this impact?
- Can you give an example of this within your organisation or at a competitor?
- How do you see this happening?
- What would need to change?
- What is your underlying reasoning?

Closing Questions (5 minutes)

- Are there high-impact relationships that have not yet been discussed? Can you briefly explain these?

  Remark: ”If you have any other additions after the interview, you can provide them via email.”

- Are there any final comments you would like to make before the end of the interview?
- Do you know anyone in your organisation or network who could also make a valuable contribution to this study?

Interview document

Interview

Impact adoption open API's in embedded insurance

Wesley Kool

May 2024

Master's Thesis
Management of Technology, TPM, TU Delft

2 RESEARCH QUESTION & DEFINITIONS

Interview

I research the adoption of open APIs in the context of embedded insurance. Specifically, we will look at how different scenarios for the adoption of open APIs affect the business model for embedded insurance.

Research question & scope

Research question

What is the impact of the adoption of open APIs on the embedded insurance business model for non-life insurance from insurance incumbents?

Scope

- The perspective is from the incumbent insurer.
- Apart from the initial sale, the insurer retains the entire insurance value chain, from policy management to claims handling.
- Life, health insurance and all business-to-business insurances are outside the scope of this study.

Definitions in this research

Embedded insurance

Embedded insurance is the offering of a personalized insurance product at the point of need, seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

(Open) APIs

Application Programmable Interfaces (APIs) are information technology interfaces that enable the sharing of data between two or more parties.

Open APIs are web-based APIs based on open data standards and **make it technically possible for any developer to access and use information of the provider.**

3 EXAMPLE UBER

Illustration assignment

An unrelated example is included for **illustrative purposes.**

We are going to confront potential future developments (top) with the components of the business model (left).

The goal is to describe the impact of a development on a component of the business model.

In this example you can see how the impact is described and how it is colored. For this we use the following scheme:

- Red: **This component is no longer viable.** The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: **This component is no longer profitable.** The outcome causes **the component to have to change.**
- Green: **The feasibility and profitability** of this part of the business model is **actually strengthened.**
- White: There is little or no impact.

business model stresstest

name Uber

		development 1 Self driving cars are accepted and can be used for passenger transport	development 2 Car sharing is widely accepted and the most common way for transport	development 3 Legislation decides that Uber should be treated as a traditional taxi company
who customers	Passengers		Uber makes car sharing possible, more passengers	Less drivers leads to less passengers
	Amateur drivers	Are not or less necessary	Fewer people offer themselves as drivers	Amateur drivers may no longer provide rides
	Professional drivers	Are not or less necessary	More rides are made by professional drivers	More rides are made by professional drivers
what proposition and value	Connecting drivers with passengers	Replaced by connecting passengers with self-driving cars	Less passengers are connected	
	Passengers: with a tap a ride from every place at any time, from affordable to luxurious			Less choice in drivers
	Drivers: easy access to passengers under their own conditions	This service expires	Connecting with even more passengers	
how activities and partners	Maintain and update platform			
	Collaboration with lease companies for special packages	Perhaps the lease company will also offer self-driving cars		
	Legal activities such as litigation and lobbying	No more lawsuits about amateur drivers needed		Uber will do everything to reverse legislation
why costs and revenues	Revenues: payment of passengers at the end of the journey	No intervention of driver, revenue will directly flow to Uber	More rides at the same time is more revenue	Less revenue due to fewer rides
	Flexible prices determined by crowds and transport availability			
	Costs: technological infrastructure, legal, employees and marketing	Perhaps the 'investment in self-driving cars is greater than the costs of drivers	More passengers per ride by drivers will reduce costs per trip	Uber will incur legal costs and have to retrain to a taxi company

date

Based on Business model stress testing: A practical approach to test the robustness of a business model from Timber Haaker, Harry Bouwman, Wil Janssen, Mark de Reuver from 2017

Source: https://businessmakeover.eu/de/tools/business-model-stress-test#:~:text=In%20the%20Business%20Model%20Stresstest,weaknesses%20through%20the%20following%20steps.

4 BUSINESS MODEL CANVAS

Remarks

Notes
Perspective: from the incumbent insurer's point of view
Value chain: all processes except sales
Product: embedded non-life insurance for consumers

Need an explanation?
If this business model canvas is not sufficient, you will find on page 9 a detailed explanation of the structure of each component.

Definition embedded insurance (in this research)
Embedded insurance is the offering of a personalized insurance product at the point of need, seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

1. Key partners	2. Key activities	3. Value propositions	4. Customer relationships	Customer segments
1. Distributor partners 2. Technology partners	1. Technology development 2. Product development 3. Policy administration & servicing 4. Underwriting 5. Claims handling 6. Balance sheet provision 7. Partnership management	1. Convenient customer experience through seamless integration and selling insurance at the point of need 2. Personalized insurance tailored to consumer and/or product	1. Direct (customer is linked through) 2. Indirect (possibly white label agreement)	1. All segments included
	6. Key resources		7. Channels	
	1. Technological infrastructure 2. Insurance product development 3. Risk models development 4. Operational capabilities		1. Digital third-party platforms	

8. Cost structure	9. Revenue streams
1. Technology development and maintenance 2. Partnership management 3. Policy administration & servicing 4. Claims handling 5. Pay-out of successful claims 6. Commissions to distributors	1. Revenue from insurance premiums 2. Selling of value-added services 3. Cross-selling of insurance products

5 OUTCOMES SCENARIOS

Remarks

The scenarios describe a number of possible future developments relevant to the adoption of open APIs in the insurance industry.

Scenario A: New regulation data-sharing

(FIDA) regulations are being introduced that require financial institutions to share customer data with third parties based on customer consent. This encourages digital transformation and innovations in data-driven business models.

- **Extreme outcome 1: Compliance**
  The insurer develops open APIs that fundamentally comply with (FIDA) regulations.
- **Extreme outcome 2: Beyond compliance**
  Powerful open APIs are being developed that comply with (FIDA) regulations and integrate seamlessly with a wide range of (financial) services.

Scenario B: AI becomes the underlying technology behind insurance

AI will become the fundamental technology in the insurance industry, with insurers integrating AI into all their processes.

- **Extreme outcome 1: Unsuccessful integration of AI**
  The insurer cannot seamlessly integrate AI into their IT. This limits the development of good open APIs and access to AI-driven insurance.
- **Extreme outcome 2: Successful integration of AI**
  The insurer seamlessly integrates AI into its IT.

Scenario C: Consumers expect new, personalised insurances

Consumers want new, personalized insurance for which little (risk) data is available. New insurance providers are capitalizing on this.

- **Extreme outcome 1: Lack of connection with third parties**
  The insurer cannot get external data through open APIs.
- **Extreme outcome 2: Successful connections with third parties**
  The insurer gains access to third-party data through open APIs. This allows new, personalized insurance to be offered quickly.

6 TEMPLATE INTERVIEW SCENARIO A

Assignment

Purpose: Confront the components of the business model canvas with the outcomes of the scenarios. For each component, consider what the impact of each outcome will be. See if it will have a negative or positive impact.

We will use the following scheme:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

Scenario A: New regulation data-sharing

(FIDA) regulations are being introduced that require financial institutions to share customer data with third parties based on customer consent. This encourages digital transformation and innovations in data-driven business models.

- **Extreme outcome 1: Compliance**
  The insurer develops open APIs that fundamentally comply with (FIDA) regulations.
- **Extreme outcome 2: Beyond compliance**
  Powerful open APIs are being developed that comply with (FIDA) regulations and integrate seamlessly with a wide range of (financial) services.

Business model components	Description	Outcome 1: Compliance	Outcome 2: Beyond compliance
Component 1: Key partners	1. Distributor partners 2. Technology partners		
Component 2: Key activities	1. Technology development 2. Product development 3. Policy administration & servicing 4. Underwriting 5. Claims handling 6. Balance sheet provision 7. Partnership management		
Component 3: Value propositions	1. Convenient customer experience through seamless integration and selling insurance at the point of need 2. Personalized insurance tailored to consumer and/or product		
Component 4: Customer relationships	1. Direct (customer is linked through) 2. Indirect (possibly white label agreement)		
Component 5: Customer segments	1. All segments included		
Component 6: Key resources	1. Technological infrastructure 2. Insurance product development 3. Risk models development 4. Operational capabilities		
Component 7: Channels	1. Digital third-party platforms		
Component 8: Cost structure	1. Technology development and maintenance 2. Partnership management 3. Policy administration & servicing 4. Claims handling 5. Pay-out of successful claims 6. Commissions to distributors		
Component 9: Revenue streams	1. Revenue from insurance premiums 2. Selling of value-added services 3. Cross-selling of insurance products		

7 TEMPLATE INTERVIEW SCENARIO B

Assignment

Purpose: Confront the components of the business model canvas with the outcomes of the scenarios. For each component, consider what the impact of each outcome will be. See if it will have a negative or positive impact.

We will use the following scheme:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

Scenario B: AI becomes the underlying technology behind insurance

AI will become the fundamental technology in the insurance industry, with insurers integrating AI into all their processes.

- **Extreme outcome 1: Unsuccessful integration of AI**
  The insurer cannot seamlessly integrate AI into their IT. This limits the development of good open APIs and access to AI-driven insurance.
- **Extreme outcome 2: Succesful integration of AI**
  The insurer seamlessly integrates AI into its IT.

Business model components	Description	Outcome 1: Unsuccessful integration of AI	Outcome 2: Successful integration of AI
Component 1: Key partners	1. Distributor partners 2. Technology partners		
Component 2: Key activities	1. Technology development 2. Product development 3. Policy administration & servicing 4. Underwriting 5. Claims handling 6. Balance sheet provision 7. Partnership management		
Component 3: Value propositions	1. Convenient customer experience through seamless integration and selling insurance at the point of need 2. Personalized insurance tailored to consumer and/or product		
Component 4: Customer relationships	1. Direct (customer is linked through) 2. Indirect (possibly white label agreement)		
Component 5: Customer segments	1. All segments included		
Component 6: Key resources	1. Technological infrastructure 2. Insurance product development 3. Risk models development 4. Operational capabilities		
Component 7: Channels	1. Digital third-party platforms		
Component 8: Cost structure	1. Technology development and maintenance 2. Partnership management 3. Policy administration & servicing 4. Claims handling 5. Pay-out of successful claims 6. Commissions to distributors		
Component 9: Revenue streams	1. Revenue from insurance premiums 2. Selling of value-added services 3. Cross-selling of insurance products		

8 TEMPLATE INTERVIEW SCENARIO C

Assignment

Purpose: Confront the components of the business model canvas with the outcomes of the scenarios. For each component, consider what the impact of each outcome will be. See if it will have a negative or positive impact.

We will use the following scheme:

- Red: This component is no longer viable. The outcome is a danger to the component of the company or business. This component will no longer be able to continue to exist.
- Orange: This component is no longer profitable. The outcome causes the component to have to change.
- Green: The feasibility and profitability of this part of the business model is actually strengthened.
- White: There is little or no impact.

Scenario C: Consumers expect new, personalised insurances

Consumers want new, personalized insurance for which little (risk) data is available. New insurance providers are capitalizing on this.

- **Extreme outcome 1: Lack of connection with third parties**
  The insurer cannot get external data through open APIs.
- **Extreme outcome 2: Successful connections with third parties**
  The insurer gains access to third-party data through open APIs. This allows new, personalized insurance to be offered quickly.

Business model components	Description	Outcome 1: Lack of connection with third parties	Outcome 2: Successful connections with third parties
Component 1: Key partners	1. Distributor partners 2. Technology partners		
Component 2: Key activities	1. Technology development 2. Product development 3. Policy administration & servicing 4. Underwriting 5. Claims handling 6. Balance sheet provision 7. Partnership management		
Component 3: Value propositions	1. Convenient customer experience through seamless integration and selling insurance at the point of need 2. Personalized insurance tailored to consumer and/or product		
Component 4: Customer relationships	1. Direct (customer is linked through) 2. Indirect (possibly white label agreement)		
Component 5: Customer segments	1. All segments included		
Component 6: Key resources	1. Technological infrastructure 2. Insurance product development 3. Risk models development 4. Operational capabilities		
Component 7: Channels	1. Digital third-party platforms		
Component 8: Cost structure	1. Technology development and maintenance 2. Partnership management 3. Policy administration & servicing 4. Claims handling 5. Pay-out of successful claims 6. Commissions to distributors		
Component 9: Revenue streams	1. Revenue from insurance premiums 2. Selling of value-added services 3. Cross-selling of insurance products		

9 BUSINESS MODEL CANVAS EXPLAINED

Remarks

The business model canvas is a framework for describing a business model.

It consists of 9 different components that make up the business model.

Notes
Perspective: from the incumbent insurer's point of view
Value chain: all processes except sales
Product: embedded non-life insurance for consumers

Definition embedded insurance (in this research)
Embedded insurance is the offering of a personalized insurance product at the point of need, seamlessly integrated into the sales process of a non-insurance product or service on third-party digital platforms.

Business model components	Description	Explanation
Component 1: Key partners	1. **Distributor partners** 2. **Technology partners**	1. Third-party digital platforms that integrate insurance products at the point of need during the customer purchase process, providing access to a broad insurance customer base. 2. Partners who develop and maintain IT infrastructure, including a developer portal and (open) APIs, facilitating integration with distributor partners.
Component 2: Key activities	1. **Technology development** 2. **Product development** 3. **Policy administration & servicing** 4. **Underwriting** 5. **Claims handling** 6. **Balance sheet provision** 7. **Partnership management**	1. Designing insurance products that integrate seamlessly with third-party platforms and offer value to both partners and customers. 2. Developing the IT infrastructure to facilitate integration with distributors. 3. Managing the lifecycle of insurance policies. 4. Assessing risk and determining insurance premiums and terms. 5. Managing the claims process from initiation to settlement. 6. Managing financial reserves to cover future claims, maintaining solvency and compliance with capital requirements. 7. Establishing and maintaining relationships with sales and technology partners to enhance distribution channels and technological capabilities.
Component 3: Value propositions	1. **Convenient customer experience through seamless integration at the point of need** 2. **Tailored personalised insurance**	1. Insurance products are seamlessly integrated at the point of need during the purchase process of another non-insurance product or service. 2. Policies are tailored to the consumer and/or the specifics of the product or service, ensuring relevant and adequate coverage.
Component 4: Customer relationships	1. **Direct (customer is linked through)** 2. **Indirect (possibly white label agreement)**	Customer relationships are either: 1. The customer is linked through by the distributor. 2. The customer enters into a relationship with the distributor and the distributor with the insurer. This could be with a white label agreement: the name of the underlying insurer is then not known.
Component 5: Customer segments	1. **All segments included**	1. A purchaser can be any consumers adding and buying any insurance product during the purchase of a non-insurance product or service via the digital platform of a distributor from any industry.
Component 6: Key resources	1. **Technological infrastructure** 2. **Insurance product development** 3. **Risk models development** 4. **Operational capabilities**	1. Robust IT systems are needed to handle integrations, data analysis, policy management and customer interfaces. 2. Insurance offerings that can be integrated seamlessly should be well-developed. 3. Advanced risk modelling capabilities are essential for accurately assessing and pricing risks. 4. Robust operational capabilities are needed to manage and execute their insurance processes efficiently.
Component 7: Channels	1. **Digital third-party platforms**	1. Sales are integrated in the sales processes of third-party digital platforms of distributors.
Component 8: Cost structure	1. **Technology development and maintenance** 2. **Partnership management** 3. **Policy administration & servicing** 4. **Claims handling** 5. **Pay-out of successful claims** 6. **Commissions to distributors**	1. Costs of building and maintaining IT systems. 2. Costs of building and managing relationships with partners. 3. Costs of managing the life cycle of policies. 4. Costs of handling and reviewing claims. 5. Costs associated with paying out approved claims. 6. Costs associated with commissions or fees paid to distributors for each policy sold.
Component 9: Revenue streams	1. **Revenue from insurance premiums** 2. **Selling of value-added services** 3. **Cross-selling of insurance products**	1. Revenue from premiums paid by the purchasers of the integrated insurance products.[HSK][NI] 2. Revenue from offering additional services, such as extended coverage or personal assistance options. 3. Indirect revenue from selling other insurance products to the purchaser of the embedded insurance product.

J

HREC documents

Delft University of Technology
HUMAN RESEARCH ETHICS
INFORMED CONSENT TEMPLATES AND GUIDE
(English Version: January 2022)

The following templates have been developed by the Human Research Ethics Committee (HREC) to assist you in the design of your Informed Consent materials for non-medical research involving human Research Subjects. **It is important to adapt this template to the outline and requirements of your particular study, using the notes and suggestions provided.**

For additional information or specific expertise on preparing your Informed Consent materials you can consult the following:

- The TU Delft Research Ethics webpages,
- Your faculty Data Steward, the TU Delft Privacy Team
- Our brief guide on Completing the HREC checklist
- Our Risk-Planning tool, Managing Risk in Human Research

If you have any questions about applying for HREC approval which are not dealt with on the Research Ethics webpages, please contact HREC@tudelft.nl

You can find **Dutch versions** of the Informed Consent templates in the Informed Consent section of the Research Ethics webpages.

Informed Consent as a legal and ethical agreement

The key function of the Informed Consent (IC) process is that this is where you (the Responsible Researcher) come to an agreement with your participants about what they will do for your research and what you will do, both legally and ethically, to ensure their physical, emotional and reputational security. It is key that they know exactly what – and particularly what potential risks – they are agreeing to, and that this is clear in your agreement, and executed in practice.

Two types of Informed Consent

"Informed Consent" covers two distinct, if overlapping, elements of a participant's agreement to participate in scientific research. These are essentially: consent to participate in the research and consent to the way in which any personal data will be processed and managed.

- **Research Participation** – obtaining a participant's consent to participate is essential for any research involving human "subjects". It requires researchers to flag the potential physical, emotional or other risks they might be exposed do by virtue of the research process or its findings.

- **Data Processing and Privacy** – at the same time, under the European General Data Protection Regulation (2016) Informed Consent is the most common (but not only) legal basis for collecting Personal Data (including both Personally Identifiable Information and/or Personally Identifiable Research Data) from "human subjects". Within the context of scientific research specifically it is important that research participants ("human subjects") understand what potential risks they might face as a consequence of the collection of any Personal Data, as well as what steps will be taken to mitigate those risks. The development and execution of a robust **Data Management Plan** constitutes one of those mitigating steps.

Structure and content of your Informed Consent materials

Your Informed Consent materials can be considered as a legal and ethical contract between you and the people who will be providing you with your research data. In most cases this agreement will comprise of Participant Information and Explicit Consent points. The Participant Information is normally a short, clear summary that informs your participant of anything that might affect their willingness to participate in your research. The specific Explicit Consent points list specific points with which your participants can choose to agree or disagree. Bear in mind, when you are giving participants particular choices, that you will need to execute these agreements with precision.

Standard structure of Informed Consent materials

Participant Information	• Your **Participant Information** should clearly summarise what your research aims to do, what participants are asked to do, what risks might arise – including identification – and what steps you will take to mitigate them. Remember to include not just the personally identifiable research data (PIRD) you collect, but also how you will store the Informed Consent forms and any personally identifiable information (PII) therein. • See TEMPLATE 1
Explicit Consent points	• In addition to the Participant Information it is best practice (and sometimes a legal requirement) to include a list of specific **Consent Points** with which your participants can agree or disagree. • Bear in mind that where your participants disagree, you will need to have **practical plans** in place to comply with these specific points. • See TEMPLATE 2

Alternative approaches to Informed Consent

Depending on your research methods and goals, the standard approach outlined above may not appropriate or possible. For example, if you are gathering your research data using an anonymous online survey, the option of removing specific datasets may not be possible – and so this is not something you can offer in your Informed Consent process. In such cases, the Participant Information and Explicit Consent points are replaced by an **Opening Statement** with which participants demonstrate their agreement by clicking the link to the survey (see TEMPLATE 1).

Alternative Informed Consent materials

Opening Statement	• Where your participants are asked to, for example, complete an anonymous online survey, a signed Informed Consent form is not an option. Instead, the Participant Information and Explicit Consent points might be replaced by an **Opening Statement**. In this case a participant's agreement with the terms and conditions of your research can be signified by clicking through to the survey. • Your Opening Statement should ensure that your participants are aware of what your research is about, and what is expected of them before they click through to the survey. • Make sure that your participants can leave the survey or skip questions in line with your Opening Statement – and that your Opening Statement is clear on this. • Make it clear that by clicking through to the survey participants are agreeing to conditions.
Verbal Consent	• In some circumstances it might be necessary to use other Informed Consent approaches – such as verbal consent and/or consent of a Gatekeeper.
Debriefing Information	• Where deception is required for your research, Informed Consent has technically not been given. In such cases you are advised to debrief your participants, explaining why they were deceived and how, and seek Informed Consent again after the debrief.

Where it is not possible to seek Informed Consent at all – e.g.: because your method involves covert observation, relies on existing datasets, or is collected from the public domain – steps to ensure the safety of your participants are nevertheless required. For example, you can make sure that the party or parties providing your data are permitted to do so, collect information on the original informed consent process, or demonstrate that you understand how combining multiple datasets might lead to unintended consequences and the steps you will take to avoid this.

Please contact your Faculty Data Steward or the TU Delft Privacy Team, or consult our Guidance Notes on completing the HREC checklist for more information.

Executing Informed Consent agreements

Like any contract between parties, your Informed Consent agreement needs to be managed and executed in perpetuity, so make sure that you have plans in place to honour the agreements you have made – including what happens if you or another member of the research team moves

elsewhere. Bear in mind also what is and is not executable in practical terms. For example, if you are seeking approval to use personal names with quotes in any publications, then it is unlikely that you can assure anonymity of stored data. Equally, if you agree with participants to use actual names in any kind of publication, it is best practice to obtain additional, specific approval from named participants prior to publication.

It is critical here that the risks and mitigating steps you identify in your HREC checklist and Data Management Plan are consistent with the agreement you make with your participants. It is your job as the (Responsible) Researcher to ensure that your participants are made aware of any potential risks which they may not themselves foresee. In relation to any Personal Data you may be gathering for administrative purposes and/or as research data, it's equally important that this agreement is in line with how you will manage your data in practice.

To this end, you must make sure that the information across your HREC application documents is consistent and aligned.

TEMPLATE 1: Participant Information/Opening Statement

Key points to include	Opening Statement
1. Level (eg: Masters, PhD, research) purpose, potential outcomes and implications of the study 2. The role of TU Delft and any third parties including funding body 3. Who participants are (eg: children, experts, students in a dependent role to the researcher) 4. What exactly what they are being asked to do 5. What if any Personal Data (Personally Identifiable Information and/or Personally Identifiable Research Data) will be collected, and how it will be used, published and managed. This should include clarity on: o how the data you collect will be used during the research o safeguarding personal information, maintaining confidentiality o de-identifying (pseudo/anonymising) data o controlling access to data, data archiving and reuse o (possible) data publication and dissemination, and o data archiving and the retention period for research data or criteria used to determine that 6. What physical, emotional or reputational risks might arise from participation either during or after the study, and what steps will be used to mitigate these risks 7. Participants' right to refuse to answer/withdraw from the study at any time 8. The right (or otherwise) of participants to request access to and rectify or erase personal data 9. Any remuneration for time/compensation for travel 10. Contact details of the Responsible Researcher and procedure for making complaints. **Note: the TUD Human Research Ethics Committee should not be included as a contact and does not deal with participant complaints.**	Dear participant, You are being invited to participate in a research study titled "The adoption of open APIs in the embedded insurance business model: An impact assessment". This study is being done by Wesley Kool from the TU Delft, in collaboration with INNOPAY, the internship provider. The purpose of this research study is to explore the impact of various scenarios regarding the adoption of open APIs (Application Programmable Interfaces) in the context of embedded insurance. This brainstorm specifically aims to explore the various scenarios possible regarding the adoption of open APIs in the context of embedded insurance, and to select the 3-4 most applicable scenarios. and will take you approximately *90* minutes to complete. The data will be used for conducting a Master's Thesis for the study Management of Technology, TPM, TU Delft, and the findings will be published online in the TU Delft Repository. Only anonymized direct quotes will be openly accessible in the thesis document. I will be asking you to participate in a brainstorm. During the brainstorm, together with your participants you will be asked whether you agree with the provided selection of important aspects regarding the adoption of open APIs in the context of embedded insurance. After that, you will be asked to ideate various scenarios on how the adoption of open APIs may change the embedded insurance context. Finally, you will be asked to select the best applicable scenarios which will be used as input for the next phase of this research, which is about an business model impact assessment (not part of this brainstorm). As with any (online) activity the risk of a breach is always possible. To the best of my ability your answers in this study will remain confidential. I will minimize any risks by anomyzing the transcript of the brainstorm by removing any information that may lead to identification of you as a person. In addition, the transcript will be send to you to provide for the option to clarify, restate or retract statements made. The personal data to be collected includes your name, email address, name of the company, job title and job description. The data will be stored locally on the personal cloud of the researcher. After the publishment of the thesis, the data will be stored locally on the personal cloud of the researcher and of the responsible teacher for 5 years.

	Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions. As mentioned, the option will be given to remove any transcribed data within 5 days after being notified. This does not include the final results of the brainstorm, which will be immediately used during the next phase of this research. Kind regards, Wesley Kool, Master student Management of Technology, TPM, TU Delft Corresponding researcher Master's Thesis Tel: +31 6 311 811 42 Email: w.l.a.kool@student.tudelft.nl Contact details responsible researcher: Mark de Reuver, Full Professor, TPM, TU Delft Email: G.A.deReuver@tudelft.nl

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TEMPLATE 2: Explicit Consent points

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated 09/04/2024 or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study involves: Information will be captured via a hybrid brainstorm. The brainstorm will be recorded with video and audio via Microsoft Teams. The audio will be transcribed as text and anomyzed. After the research, the video recording will be destroyed. Direct quotes will be used in the findings of the research. The anomyzed transcripts will not be published online, but stored locally for 5 years.	☐	☐
4. I understand that I will not be compensated for my participation.	☐	☐
5. I understand that the study will end 18 April 2024.	☐	☐
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study involves the following risks: the possibility of sharing confidential information of the company. I understand that these will be mitigated by having the option to review, restate or retract quotes within 5 days after being notified of the anomyzed transcript.	☐	☐
7. I understand that taking part in the study also involves collecting specific personally identifiable information (PII), which are your name, email address and employer, and associated personally identifiable research data (PIRD), which are your job title, job description, and personal and professional views, with the potential risk of my identity being revealed.	☐	☐
8. N.a.		
9. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach: - data transcripts will be anomyzed; - data will be stored on the cloud of the corresponding researcher only during the thesis, and for a maximum of 5 years stored securely and locally and/or personal cloud of and only accessible to the corresponding and responsible researchers; - after successful transcription the video will be destroyed.	☐	☐
10. I understand that personal information collected about me that can identify me, such as my name and email address, will not be shared beyond the study team.	☐	☐
11. I understand that the (identifiable) personal data I provide will be destroyed immediately after publication of the thesis on the TU Delft Repository, or if necessary, after stored locally and/or on a personal cloud and destroyed 5 years after publication.	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
12. I understand that after the research study the de-identified information I provide will be used for the final thesis graduation document of the Master's Thesis of the corresponding researcher. The publication of the thesis document includes the usage of direct anomyzed quotes collected during this research.	☐	☐
13. I agree that my responses, views or other input can be quoted anonymously in research outputs.	☐	☐
14. **Optional, not necessary:** I agree that my real name can be used for quotes in research outputs.	☐	☐
15. N.a.		
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
16. I agree that my output will be stored as anonymized transcripts locally and/or personal cloud of the researchers up to 5 years, which will not be published.	☐	☐
17. N.a.		

Signatures

_____ _____ _____

Name of participant [printed] Signature Date

[Add legal representative, and/or amend text for assent where participants cannot give consent as applicable]

I, as legal representative, have witnessed the accurate reading of the consent form with the potential participant and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

_____ _____ _____

Name of witness [printed] Signature Date

I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____ _____ _____

Researcher name [printed] Signature Date

Study contact details for further information:
Wesley Kool
w.l.a.kool@student.tudelft.nl

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- Our brief guide on Completing the HREC checklist
- Our Risk-Planning tool, Managing Risk in Human Research

If you have any questions about applying for HREC approval which are not dealt with on the Research Ethics webpages, please contact HREC@tudelft.nl

You can find **Dutch versions** of the Informed Consent templates in the Informed Consent section of the Research Ethics webpages.

Informed Consent as a legal and ethical agreement

The key function of the Informed Consent (IC) process is that this is where you (the Responsible Researcher) come to an agreement with your participants about what they will do for your research and what you will do, both legally and ethically, to ensure their physical, emotional and reputational security. It is key that they know exactly what – and particularly what potential risks – they are agreeing to, and that this is clear in your agreement, and executed in practice.

Two types of Informed Consent

"Informed Consent" covers two distinct, if overlapping, elements of a participant's agreement to participate in scientific research. These are essentially: consent to participate in the research and consent to the way in which any personal data will be processed and managed.

- **Research Participation** – obtaining a participant's consent to participate is essential for any research involving human "subjects". It requires researchers to flag the potential physical, emotional or other risks they might be exposed do by virtue of the research process or its findings.

- **Data Processing and Privacy** – at the same time, under the European General Data Protection Regulation (2016) Informed Consent is the most common (but not only) legal basis for collecting Personal Data (including both Personally Identifiable Information and/or Personally Identifiable Research Data) from "human subjects". Within the context of scientific research specifically it is important that research participants ("human subjects") understand what potential risks they might face as a consequence of the collection of any Personal Data, as well as what steps will be taken to mitigate those risks. The development and execution of a robust **Data Management Plan** constitutes one of those mitigating steps.

Structure and content of your Informed Consent materials

Your Informed Consent materials can be considered as a legal and ethical contract between you and the people who will be providing you with your research data. In most cases this agreement will comprise of Participant Information and Explicit Consent points. The Participant Information is normally a short, clear summary that informs your participant of anything that might affect their willingness to participate in your research. The specific Explicit Consent points list specific points with which your participants can choose to agree or disagree. Bear in mind, when you are giving participants particular choices, that you will need to execute these agreements with precision.

Standard structure of Informed Consent materials

Participant Information	• Your **Participant Information** should clearly summarise what your research aims to do, what participants are asked to do, what risks might arise – including identification – and what steps you will take to mitigate them. Remember to include not just the personally identifiable research data (PIRD) you collect, but also how you will store the Informed Consent forms and any personally identifiable information (PII) therein. • See TEMPLATE 1
Explicit Consent points	• In addition to the Participant Information it is best practice (and sometimes a legal requirement) to include a list of specific **Consent Points** with which your participants can agree or disagree. • Bear in mind that where your participants disagree, you will need to have **practical plans** in place to comply with these specific points. • See TEMPLATE 2

Alternative approaches to Informed Consent

Depending on your research methods and goals, the standard approach outlined above may not appropriate or possible. For example, if you are gathering your research data using an anonymous online survey, the option of removing specific datasets may not be possible – and so this is not something you can offer in your Informed Consent process. In such cases, the Participant Information and Explicit Consent points are replaced by an **Opening Statement** with which participants demonstrate their agreement by clicking the link to the survey (see TEMPLATE 1).

Alternative Informed Consent materials

Opening Statement	• Where your participants are asked to, for example, complete an anonymous online survey, a signed Informed Consent form is not an option. Instead, the Participant Information and Explicit Consent points might be replaced by an **Opening Statement**. In this case a participant's agreement with the terms and conditions of your research can be signified by clicking through to the survey. • Your Opening Statement should ensure that your participants are aware of what your research is about, and what is expected of them before they click through to the survey. • Make sure that your participants can leave the survey or skip questions in line with your Opening Statement – and that your Opening Statement is clear on this. • Make it clear that by clicking through to the survey participants are agreeing to conditions.
Verbal Consent	• In some circumstances it might be necessary to use other Informed Consent approaches – such as verbal consent and/or consent of a Gatekeeper.
Debriefing Information	• Where deception is required for your research, Informed Consent has technically not been given. In such cases you are advised to debrief your participants, explaining why they were deceived and how, and seek Informed Consent again after the debrief.

Where it is not possible to seek Informed Consent at all – e.g.: because your method involves covert observation, relies on existing datasets, or is collected from the public domain – steps to ensure the safety of your participants are nevertheless required. For example, you can make sure that the party or parties providing your data are permitted to do so, collect information on the original informed consent process, or demonstrate that you understand how combining multiple datasets might lead to unintended consequences and the steps you will take to avoid this.

Please contact your Faculty Data Steward or the TU Delft Privacy Team, or consult our Guidance Notes on completing the HREC checklist for more information.

Executing Informed Consent agreements

Like any contract between parties, your Informed Consent agreement needs to be managed and executed in perpetuity, so make sure that you have plans in place to honour the agreements you have made – including what happens if you or another member of the research team moves

elsewhere. Bear in mind also what is and is not executable in practical terms. For example, if you are seeking approval to use personal names with quotes in any publications, then it is unlikely that you can assure anonymity of stored data. Equally, if you agree with participants to use actual names in any kind of publication, it is best practice to obtain additional, specific approval from named participants prior to publication.

It is critical here that the risks and mitigating steps you identify in your HREC checklist and Data Management Plan are consistent with the agreement you make with your participants. It is your job as the (Responsible) Researcher to ensure that your participants are made aware of any potential risks which they may not themselves foresee. In relation to any Personal Data you may be gathering for administrative purposes and/or as research data, it's equally important that this agreement is in line with how you will manage your data in practice.

To this end, you must make sure that the information across your HREC application documents is consistent and aligned.

TEMPLATE 1: Participant Information/Opening Statement

Key points to include	Opening Statement
1. Level (eg: Masters, PhD, research) purpose, potential outcomes and implications of the study 2. The role of TU Delft and any third parties including funding body 3. Who participants are (eg: children, experts, students in a dependent role to the researcher) 4. What exactly what they are being asked to do 5. What if any Personal Data (Personally Identifiable Information and/or Personally Identifiable Research Data) will be collected, and how it will be used, published and managed. This should include clarity on: o how the data you collect will be used during the research o safeguarding personal information, maintaining confidentiality o de-identifying (pseudo/anonymising) data o controlling access to data, data archiving and reuse o (possible) data publication and dissemination, and o data archiving and the retention period for research data or criteria used to determine that 6. What physical, emotional or reputational risks might arise from participation either during or after the study, and what steps will be used to mitigate these risks 7. Participants' right to refuse to answer/withdraw from the study at any time 8. The right (or otherwise) of participants to request access to and rectify or erase personal data 9. Any remuneration for time/compensation for travel 10. Contact details of the Responsible Researcher and procedure for making complaints. **Note: the TUD Human Research Ethics Committee should not be included as a contact and does not deal with participant complaints.**	Dear participant, You are being invited to participate in a research study titled "The adoption of open APIs in the embedded insurance business model: An impact assessment". This study is being done by Wesley Kool from the TU Delft, in collaboration with INNOPAY, the internship provider. The purpose of this research study is to explore the impact of various scenarios regarding the adoption of open APIs (Application Programmable Interfaces) in the context of embedded insurance. This interview specifically aims to explore the possible impact on nine components of the embedded insurance business model for non-life business-to-consumer insurance offerings regarding various scenarios for the adoption of open APIs in the context of embedded insurance, and will take you approximately 60 minutes to complete. The data will be used for conducting a Master's Thesis for the study Management of Technology, TPM, TU Delft, and the findings will be published online in the TU Delft Repository. Only anonymized direct quotes will be openly accessible in the thesis document, the transcript will not be published. I will be asking you to participate in an interview. During the interview you will be asked whether you agree with the provided scenarios and business model canvas of the embedded insurance non-life business-to-consumer the adoption of open APIs in the context of embedded insurance. After that, you will be asked how each scenario would impact the various components of the business model canvas. As with any (online) activity the risk of a breach is always possible. To the best of my ability your answers in this study will remain confidential. I will minimize any risks by anomyzing the transcript of the interview by removing any information that may lead to identification of you as a person. In addition, the transcript will be sent to you to provide for the option to clarify, restate or retract statements made. The personal data to be collected includes your name, email address, name of the company, job title and job description. The data will be stored locally on the personal cloud of the researcher. After the publishment of the thesis, the data will be stored locally on the personal cloud of the researcher and of the responsible teacher for 5 years. The transcripts will not be published, only anonymous quotes directly used in the research findings will be accessible.

	Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions. As mentioned, the option will be given to remove any transcribed data within 5 days after being notified. Kind regards, Wesley Kool, Master student Management of Technology, TPM, TU Delft Corresponding researcher Master's Thesis Tel: +31 6 311 811 42 Email: w.l.a.kool@student.tudelft.nl Contact details responsible researcher: Mark de Reuver, Full Professor, TPM, TU Delft Email: G.A.deReuver@tudelft.nl

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TEMPLATE 2: Explicit Consent points

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated 09/04/2024 or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study involves: Information will be captured via an (online) interview. The interview will be recorded with video and audio via Microsoft Teams. The audio will be transcribed as text and anomyzed. After the research, the video recording will be destroyed. Direct quotes will be used in the findings of the research, which will be published. The anomyzed transcripts will not be published online, and stored locally for 5 years.	☐	☐
4. I understand that I will not be compensated for my participation.	☐	☐
5. I understand that the study will end 11 July 2024.	☐	☐
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study involves the following risk: the possibility of sharing confidential information. I understand that this risk will be mitigated by having the option to review, restate or retract quotes within 5 days after being notified of the anomyzed transcript.	☐	☐
7. I understand that taking part in the study also involves collecting specific personally identifiable information (PII), which are your name, email address and employer, and associated personally identifiable research data (PIRD), which are your job title, job description, and personal and professional views, with the potential risk of my identity being revealed.	☐	☐
8. N.a.		
9. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach: - data transcripts will be anomyzed; - data will be stored on the cloud of the corresponding researcher only during the thesis, and for a maximum of 5 years stored securely and locally and/or personal cloud of, and only accessible to, the corresponding and responsible researchers; - after successful transcription the video will be destroyed.	☐	☐
10. I understand that personal information collected about me that can identify me, such as my name and email address, will not be shared beyond the study team.	☐	☐
11. I understand that the (identifiable) personal data I provide will be destroyed immediately after publication of the thesis on the TU Delft Repository, or if necessary, stored locally and/or on a personal cloud and destroyed 5 years after publication.	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
12. I understand that after the research study the de-identified information I provide will be used for the final thesis graduation document of the Master's Thesis of the corresponding researcher. The publication of the thesis document includes the usage of direct anomyzed quotes collected during this research.	☐	☐
13. I agree that my responses, views or other input can be quoted anonymously in research outputs.	☐	☐
14. **Optionally, not necessary:** I agree that my real name can be used for quotes in research outputs.	☐	☐
15. *N.a.*		
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
16. I agree that my output will be stored as anonymized transcripts locally and/or personal cloud of the researchers up to 5 years, which will not be published.	☐	☐
17. N.a.		

Signatures

_____ _____ _____

Name of participant [printed] Signature Date

[Add legal representative, and/or amend text for assent where participants cannot give consent as applicable]

I, as legal representative, have witnessed the accurate reading of the consent form with the potential participant and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

_____ _____ _____

Name of witness [printed] Signature Date

I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Researcher name [printed]	Signature	Date

Study contact details for further information:

Wesley Kool

w.l.a.kool@student.tudelft.nl

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Delft University of Technology
HUMAN RESEARCH ETHICS
CHECKLIST FOR HUMAN RESEARCH
(Version January 2022)

IMPORTANT NOTES ON PREPARING THIS CHECKLIST

1. An HREC application should be submitted for every research study that involves human participants (as Research Subjects) carried out by TU Delft researchers
2. Your HREC application should be submitted and approved **before** potential participants are approached to take part in your study
3. All submissions from Master's Students for their research thesis need approval from the relevant Responsible Researcher
4. The Responsible Researcher must indicate their approval of the completeness and quality of the submission by signing and dating this form OR by providing approval to the corresponding researcher via email (included as a PDF with the full HREC submission)
5. There are various aspects of human research compliance which fall outside of the remit of the HREC, but which must be in place to obtain HREC approval. These often require input from internal or external experts such as Faculty Data Stewards, Faculty HSE advisors, the TU Delft Privacy Team or external Medical research partners.
6. You can find detailed guidance on completing your HREC application here
7. Please note that incomplete submissions (whether in terms of documentation or the information provided therein) will be returned for completion **prior to any assessment**
8. If you have any feedback on any aspect of the HREC approval tools and/or process you can leave your comments here

I. Applicant Information

PROJECT TITLE:	The adoption of open APIs in the embedded insurance business model: An impact assessment
Research period: *Over what period of time will this specific part of the research take place*	**22/4/2024 – 11/7/2024**
Faculty:	**TPM**
Department:	**Engineering, Systems & Services**
Type of the research project: *(Bachelor's, Master's, DreamTeam, PhD, PostDoc, Senior Researcher, Organisational etc.)*	**Master's Thesis**
Funder of research: *(EU, NWO, TUD, other – in which case please elaborate)*	**N.a.**
Name of Corresponding Researcher: *(If different from the Responsible Researcher)*	**Wesley Kool**
E-mail Corresponding Researcher: *(If different from the Responsible Researcher)*	**w.l.a.kool@student.tudelft.nl**
Position of Corresponding Researcher: *(Masters, DreamTeam, PhD, PostDoc, Assistant/ Associate/ Full Professor)*	**Master's Management of Technology, TPM**
Name of Responsible Researcher: ***Note:*** *all student work must have a named Responsible Researcher to approve, sign and submit this application*	**Mark de Reuver**
E-mail of Responsible Researcher: *Please ensure that an institutional email address (**no Gmail, Yahoo, etc.**) is used for all project documentation/ communications including Informed Consent materials*	**G.A.deReuver@tudelft.nl**
Position of Responsible Researcher : *(PhD, PostDoc, Associate/ Assistant/ Full Professor)*	**Full Professor**

II. Research Overview

NOTE: *You can find more guidance on completing this checklist here*

a) Please summarise your research very briefly (100-200 words)

What are you looking into, who is involved, how many participants there will be, how they will be recruited and what are they expected to do?

Add your text here – (please avoid jargon and abbrevations)
What: I am exploring the impact of various scenarios related to the adoption of open APIs in the embedded insurance business model for non-life business-to-consumer insurance offerings from the perspective of insurance incumbents. Who/how many/expectations: I am involved as the moderator of the brainstorm. 3-4 industry experts from INNOPAY take part in the brainstorm to generate ideas for possible scenarios regarding the adoption of open APIs. I am also involved as the interviewer of 10-15 interviewees from various insurance incumbent companies and industry experts working from a variety of organisations. The interviewees will be asked their view on how the generated scenarios could impact the different components of the embedded insurance business model. How recruited: The brainstorm participants will be recruited within the company INNOPAY via internal communication. The interviewees will be recruited via email using the network of INNOPAY and via personal invites through email or LinkedIn personal messages.

b) **If your application is an additional project** related to an existing approved HREC submission, please provide a brief explanation including the existing relevant HREC submission number/s.

Add your text here – (please avoid jargon and abbrevations)
N.a.

c) **If your application is a simple extension of, or amendment to,** an existing approved HREC submission, you can simply submit an HREC Amendment Form as a submission through LabServant.

N.a.

III. Risk Assessment and Mitigation Plan

NOTE: *You can find more guidance on completing this checklist here*

Please complete the following table in full for all points to which your answer is "yes". Bear in mind that the vast majority of projects involving human participants as Research Subjects also involve the collection of **Personally Identifiable Information (PII)** and/or **Personally Identifiable Research Data (PIRD)** which may pose potential risks to participants as detailed in Section G: Data Processing and Privacy below.

To ensure alighment between your risk assessment, data management and what you agree with your Research Subjects you can use the last two columns in the table below to refer to specific points in your Data Management Plan (DMP) and Informed Consent Form (ICF) – **but this is not compulsory**.

It's worth noting that **you're much more likely to need to resubmit your application if you neglect to identify potential risks**, than if you identify a potential risk and demonstrate how you will mitigate it. If necessary, the HREC will always work with you and colleagues in the Privacy Team and Data Management Services to see how, if at all possible, your research can be conducted.

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
A: Partners and collaboration						
1. Will the research be carried out in collaboration with additional organisational partners such as: • One or more collaborating research and/or commercial organisations • Either a research, or a work experience internship provider[1] *[1] If yes, please include the graduation agreement in this application*	**Yes**		**Internship provider is INNOPAY.** **Sharing sensitive information might lead to data breaches.** **The researcher uses a laptop provided by the company, which may get lost or stolen.**	An agreement is in place where it is stated which access the researcher has, which data may or may not be used for this research. Also, obligations regarding data protection have been set in place. Furthermore, secure channels for data transfer are in place. The data and thesis documents will be secured in a personal cloud, which is by default not accessible by either the company or anyone else, even in the case the laptop gets lost or stolen.		
2. Is this research dependent on a Data Transfer or Processing Agreement with a collaborating partner or third party supplier? *If yes please provide a copy of the signed DTA/DPA*		**No**				
3. Has this research been approved by another (external) research ethics committee (e.g.: HREC and/or MREC/METC)?		**No**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
If yes, please provide a copy of the approval (if possible) and summarise any key points in your Risk Management section below						
B: Location						
4. Will the research take place in a country or countries, other than the Netherlands, within the EU?		**No**				
5. Will the research take place in a country or countries outside the EU?		**No**				
6. Will the research take place in a place/region or of higher risk – including known dangerous locations (in any country) or locations with non-democratic regimes?		**No**				
C: Participants						
7. Will the study involve participants who **may** be vulnerable and possibly (legally) unable to give informed consent? (e.g., children below the legal age for giving consent, people with learning difficulties, people living in care or nursing homes,).		**No**				
8. Will the study involve participants who **may** be vulnerable under specific circumstances and in specific contexts, such as victims and witnesses of violence, including domestic violence; sex workers; members of minority groups, refugees, irregular migrants or dissidents?		**No**				
9. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children, own students or employees of either TU Delft and/or a collaborating partner organisation)? *It is essential that you safeguard against possible adverse consequences of this situation (such as allowing a student's failure to participate to your satisfaction to affect your evaluation of their coursework).*		**No**				
10. Is there a high possibility of re-identification for your participants? (e.g., do they have a very specialist job of which there are only a small number in a given country, are they members of a small community, or employees from a partner company collaborating in the research? Or are they one of only a handful of (expert) participants in the study?	**Yes**		**Potential harm to participants' professional reputation or job security if sensitive opinions are inadvertently disclosed.** **Re-identification of participants from anonymized data. There are only a few big insurance companies which have only a limited number of specific job titles of the participants.**	Informed consent clearly outlining how the data wll be used, stored and published will be required. Data will be anomyzed to the extent possible and collecting unnecessary personally identifiable information will be avoided. The participant will be given the opportunity to review the anomyzed transcript to restate or retract information shared.		

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
				Only direct quotes from the transcripts will be openly accessible if they are used in the thesis document. Transcripts will not be published.		
D: Recruiting Participants						
11. Will your participants be recruited through your own, professional, channels such as conference attendance lists, or through specific network/s such as self-help groups	**Yes**		**Participants will be recruited using INNOPAY's network and by using personal direct messages via the LinkedIn platform and via company websites. Risk of perceived coercion**	It will be ensured participation is voluntary and there are no negative consequences if one chooses either chooses to participate or not to participate.		
12. Will the participants be recruited or accessed in the longer term by a (legal or customary) gatekeeper? (e.g., an adult professional working with children; a community leader or family member who has this customary role – within or outside the EU; the data producer of a long-term cohort study)		**No**				
13. Will you be recruiting your participants through a crowd-sourcing service and/or involve a third party data-gathering service, such as a survey platform?		**No**				
14. Will you be offering any financial, or other, remuneration to participants, and might this induce or bias participation?		**No**				
E: Subject Matter *Research related to medical questions/health may require special attention. See also the website of the CCMO before contacting the HREC.*						
15. Will your research involve any of the following: • Medical research and/or clinical trials • Invasive sampling and/or medical imaging • Medical and *In Vitro Diagnostic Medical* Devices Research		**No**				
16. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants? *If yes see here to determine whether medical ethical approval is required*		**No**				
17. Will blood or tissue samples be obtained from participants? *If yes see here to determine whether medical ethical approval is required*		**No**				
18. Does the study risk causing psychological stress or anxiety beyond that normally encountered by the participants in their life outside research?		**No**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
19. Will the study involve discussion of personal sensitive data which could put participants at increased legal, financial, reputational, security or other risk? (e.g., financial data, location data, data relating to children or other vulnerable groups) *Definitions of sensitive personal data, and special cases are provided on the TUD Privacy Team website.*		**No**				
20. Will the study involve disclosing commercially or professionally sensitive, or confidential information? (e.g., relating to decision-making processes or business strategies which might, for example, be of interest to competitors)	**Yes**		**Risk: The interview participant could share commercially sensitive or confidentialinsights regarding the strategy of its business which might be of interest to competitors. This could be for example on how the business (plans to) use open APIs in the context, how its partnerships look like and insights into commercial plans not known to the public (yet).** **Data could be misinterpreted leading to inaccurate or even harmful conclusions.**	The transcript of the interview will be anonymized and will be send to the participant for approval, where it will be given the opportunity to restate or remove insights that are commercially sensitive or confidential, or are not correctly transcribed. Only direct quotes from the transcripts will be openly accessible if they are used in the thesis document. Transcripts will not be published. Raw research data will be stored safely and strictly accessible to the researcher only.		
21. Has your study been identified by the TU Delft Privacy Team as requiring a Data Processing Impact Assessment (DPIA)? *If yes please attach the advice/ approval from the Privacy Team to this application*		**No**				
22. Does your research investigate causes or areas of conflict? *If yes please confirm that your fieldwork has been discussed with the appropriate safety/security advisors and approved by your Department/Faculty.*		**No**				
23. Does your research involve observing illegal activities or data processed or provided by authorities responsible for preventing, investigating, detecting or prosecuting criminal offences *If so please confirm that your work has been discussed with the appropriate legal advisors and approved by your Department/Faculty.*		**No**				
F: Research Methods						
24. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		**No**				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
25. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		**No**				
26. Is pain or more than mild discomfort likely to result from the study? And/or could your research activity cause an accident involving (non-) participants?		**No**				
27. Will the experiment involve the use of devices that are not 'CE' certified? *Only, if 'yes': continue with the following questions:*		**No**				
• Was the device built in-house?						
• Was it inspected by a safety expert at TU Delft? *If yes, please provide a signed device report*						
• If it was not built in-house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? *If yes, please provide records of the inspection*						
28. Will your research involve face-to-face encounters with your participants and if so how will you assess and address Covid considerations?	**Yes**		**The researcher has symptomps of COVID-19 during the brainstorm or face-to-face interviews**	The participant(s) will be notified and given the possibility to cancel or reschedule the interview.		
29. Will your research involve **either:** a) "big data", combined datasets, new data-gathering or new data-merging techniques which might lead to re-identification of your participants **and/or** b) artificial intelligence or algorithm training where, for example biased datasets could lead to biased outcomes?		**No**				
G: Data Processing and Privacy						
30. Will the research involve collecting, processing and/or storing any directly identifiable PII (Personally Identifiable Information) including name or email address that will be used for administrative purposes only? (eg: obtaining Informed Consent or disbursing remuneration)	**Yes**		**More PII could be obtained than necessary. Possibility of PII data breach.**	All data processing activities will be GDPR compliant and PII will only be collected when strictly necessary. PII will be stored in a safe cloud environment, accessible to the researcher only (except for participants recruited via the network of INNOPAY, this information is accessible for INNOPAY as well). A clear Data Management Plan will be in place.		
31. Will the research involve collecting, processing and/or storing any directly or indirectly identifiable PIRD (Personally Identifiable Research Data) including videos, pictures, IP address, gender, age etc and **what other Personal Research Data** (including personal or professional views) will you be collecting?	**Yes**		**Collecting job profile roles and personal views. Could be more obtained than necessary and possibility of data breach.**	All data processing activities will be GDPR compliant and PIRD will only be collected when strictly necessary. PII will be stored in a safe cloud environment, accessible to the researcher only during the research. A clear Data Management Plan will be in place.		

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		*Please provide the relevant reference #*	
ISSUE	**Yes**	**No**	**RISK ASSESSMENT – what risks could arise?** *Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!*	**MITIGATION PLAN – what mitigating steps will you take?** *Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.*	**DMP**	**ICF**
32. Will this research involve collecting data from the internet, social media and/or publicly available datasets which have been originally contributed by human participants	**Yes**		**There will be made use of widely online accessible industry reports and personal or company views from industry experts.**	No mitigation plan required as only openly accessible articles, blog post, industry reports or similar will be used.		
33. Will your research findings be published in one or more forms in the public domain, as e.g., Masters thesis, journal publication, conference presentation or wider public dissemination?	**Yes**		**Master thesis (TU Delft Repository)**	In the informed consent forms it will be clearly staed that the research findings will be disseminated through the thesis, which will be made publicly available. Only direct quotes from the transcripts will be openly accessible if they are used in the thesis document. Transcripts will not be published.		
34. Will your research data be archived for re-use and/or teaching in an open, private or semi-open archive?		**No**				

H: More on Informed Consent and Data Management

NOTE: *You can find guidance and templates for preparing your Informed Consent materials) here*

Your research involves human participants as Research Subjects if you are recruiting them or actively involving or influencing, manipulating or directing them in any way in your research activities. This means you must seek informed consent and agree/ implement appropriate safeguards regardless of whether you are collecting any PIRD.

Where you are also collecting PIRD, and using Informed Consent as the legal basis for your research, you need to also make sure that your IC materials are clear on any related risks and the mitigating measures you will take – including through responsible data management.

Got a comment on this checklist or the HREC process? You can leave your comments here

IV. Signature/s

Please note that by signing this checklist list as the sole, or Responsible, researcher you are providing approval of the completeness and quality of the submission, as well as confirming alignment between GDPR, Data Management and Informed Consent requirements.

Name of Corresponding Researcher (if different from the Responsible Researcher) (print)

Wesley Kool

Signature of Corresponding Researcher: WLA Kool

Date: 11/04/2024

Name of Responsible Researcher (print)

Mark de Reuver

Signature (or upload consent by mail) Responsible Researcher:

Date: 11/04/2024 Signed by email (see upload)

V. Completing your HREC application

Please use the following list to check that you have provided all relevant documentation

Required:

- **Always:** This completed HREC checklist
- **Always:** A data management plan (reviewed, where necessary, by a data-steward)
- **Usually:** A complete Informed Consent form (including Participant Information) and/or Opening Statement (for online consent)

Please also attach any of the following, if relevant to your research:

Document or approval	Contact/s
Full Research Ethics Application	After the assessment of your initial application **HREC will let you know if and when you need to submit additional information**
Signed, valid Device Report	Your Faculty HSE advisor
Ethics approval from an external Medical Committee	TU Delft Policy Advisor, Medical (Devices) Research
Ethics approval from an external Research Ethics Committee	Please append, if possible, with your submission
Approved Data Transfer or Data Processing Agreement	Your Faculty Data Steward and/or TU Delft Privacy Team
Approved Graduation Agreement	Your Master's thesis supervisor
Data Processing Impact Assessment (DPIA)	TU Delft Privacy Team
Other specific requirement	Please reference/explain in your checklist and append with your submission