The Governance of Collaborative Ecosystems

Towards Trusted and Secure Online Business

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THE GOVERNANCE OF COLLABORATIVE ECOSYSTEMS

Towards Trusted and Secure Online Business

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EXECUTIVE SUMMARY

The digital society increasingly demands for integrated ICT transformations. Societal, technical, and institutional developments enable interorganisational and cross-sectoral integration of digital services. However, a lack of trust and legal certainty impedes electronic transactions and the development and adoption of innovative digital services. Digital trust services counter this by providing solutions for secure and trustworthy electronic transactions, which benefits the electronic society. Therefore, the European Union introduced Regulation No 910/2014 including legal requirements and obligations for safe and secure delivery of qualified trust services by private parties. Nonetheless, the lack of responsibility divisions, collaborative structures, and processes for parties to realise an effective adoption of trust services, currently hamper society.

Collaborative ecosystems are dynamic and co-evolving communities of interdependent stakeholders. These ecosystems could support valorisation of digital trust services. These services facilitate secure, easy-to-use, and trusted electronic transactions between various types of organisations and citizens, based on qualified trust services. However, to allow a wide adoption, public and private stakeholders need to concur on the building blocks which make up the technical and organisational architecture of the ecosystem. Governance contributes to efficient and effective ecosystem orchestration by providing rules on decision-making processes. Nonetheless, stakeholders pursue different interests while envisioning different ecosystem operations. In addition, the governance needs to fit with the technical architecture of an ecosystem, meanwhile, it assesses external factors and the development through time. The challenges of designing a governance model for collaborative ecosystems are relatively unexplored, as literature is sparse. The Governance Network perspective is taken as theoretical perspective, and suits to analyse collaborative ecosystems by characterising four key concepts of governance networks.

Current frameworks do not suffice to design a governance model for collaborative ecosystems. To bridge other gaps found in literature, the main research question is aspired to be answered by following Hevner's Design Science Research approach: "How to design a governance model for a collaborative ecosystem which facilitates electronic transactions?". Therefore, the research objective is to design a framework which analyses and mitigates the challenges in a current collaborative ecosystem by prescribing a fitting governance model which adapts to its context through time. Firstly, a conceptual framework is constructed based on scientific literature. The framework proposes an analysis of the governance in three phases, namely: the development, transitional, and, operative phase. This allows setting the scope and context, describing governance challenges, and prescribing governance mechanisms to mitigate challenges. Here, metagovernance is chosen as mean to organise a proper coordinated governance through designing and managing sound combinations of values, norms, and, principles. Secondly, to test this framework, a single unit case study is performed which concentrates on the Trusted Information Partners (TIP) initiative in the Netherlands, a collaborative ecosystem under development. The data input for the framework consists of 13 semi-structured interviews, document analyses, and meeting attendances. Results show how TIP is currently organised to tackle governance challenges, and which challenges remain to be addressed. Governance challenges comprise uncertainties and tensions, which both evolve through time. TIP participants mention the governance model must mitigate external factors which impact the ecosystem (e.g., EU law, new innovations, and, trust of citizens). Applying the phased framework stresses the importance of mitigating the following four internal tensions first: I) centralised versus decentralised growth, II) self-interest versus collective interest, III) public versus private value creation, and, IV) inclusivity versus efficiency. Before the ecosystem can scale, TIP must mitigate these four tensions by means of a layered governance model. The layered governance model consists of chain, domain, and, general governance. The framework prescribes six governance mechanisms for the latter level to mitigate the internal tensions. Therefore, the governance mechanisms relate to the governance tension it mitigates. An evaluation in the form of a workshop highlighted that TIP stakeholders prioritise effectiveness, transparency, and, participation as the most impor-

tant values to focus on. Therefore, when forming the governance model, it is valuable to also include the values for proper governance which are neglected. To organise proper governance functioning, TIP should also implement the 22 prescribed principles which allow this.

In conclusion, this thesis presents a three-phased framework which enables to design a governance model for a collaborative ecosystem. The study affirms that a framework should cogitate three components when designing a governance model for a collaborative ecosystem facilitating electronic transactions:

- Identifying the governance tensions enables context setting of factors affecting the ecosystem. By mapping these, the factors affecting the governance of a collaborative ecosystem can be comprehended.
- Prescribing governance mechanisms boosts the mitigation of power dynamics. Governance mechanisms are designed to mitigate a specific power dynamic. The governance mechanisms span a layered governance model consisting of chain, domain, and, a general governance level.
- Pursuing governance consistency checks whether proper governance takes place in decision-making. The codes for proper governance ensures the evaluation and conformity of the governance model. These consist of 7 value pairs and 14 norms. The principles for proper governance serve as implementation and conformity strategy of proper governance in governance mechanisms.

The framework contributes to the knowledge base of governance networks, because the research provides building blocks for establishing a governance model for collaborative ecosystems. To boost the service delivery of collaborative ecosystems, the framework could be validated by applying it to an operative collaborative ecosystem. As where the framework currently focusses on a developing ecosystem, the insights of an operative ecosystem can increase the generalisability of the framework. Future research on this can provide further alignment between the functioning of ecosystems and the governance model. Applying improved framework versions to other digital ecosystems, could also stimulate the valorisation of trusted services in society as a whole.

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ACRONYMS

CoSEM Complex Systems Engineering & Management. 2, 9

DSR Design Science Research. 7, 23, 77

eIDAS Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC. 2, 4, 7, 8
ERDS Electronic Registered Delivery Services. 3
eSociety Electronic society. 3, 4, 8, 11
EU European Union. 2, 5, 78

GDPR General Data Protection Regulation. 19
GNT Governance Network Theory. 12, 13, 19, 22, 79

IS Information systems. 3–5, 13, 20, 23

KYC Know Your Customer. 19

LoA Level of Assurance. 4, 7, 19
LR Literature Review. 10–13, 21

MSP Multi-sided platform. 14–16, 18, 21, 24

NPM New Public Management. 10, 12

PPC Public-private collaboration. 15, 18
PPP Public-private partnerschip. 15, 21

QTSP Qualified Trust Service Provider. 2, 3

S2S System-to-System. 19
SSI Self-souvereign identity. 4

TIP Trusted Information Partners. 6–9, 40, 68, 74, 75

GLOSSARY

Collaboration Cooperation between stakeholders by ideally interacting through decision-making rules. 43, 44, 47, 50

Collaborative ecosystem Dynamic, co-evolving communities of interdependent and cross-sectoral stakeholders with a shared interest and goal to create new public, private, and, community value by aiming to solve a societal problems and/or create societal opportunity through collaboration and competition. 3–5, 8, 10, 11, 13, 14, 19, 21–27, 31, 33, 34, 38, 40, 47, 55, 62, 66, 69, 70, 79

Ecosystem governance The totality of interactions in a collaborative ecosystem, which enable ecosystem participants to orchestrate, co-create, and, curate to solve societal problems and/or creating opportunities, with the design and use of governance mechanisms, and to account for its activities over time. 16

Governance The totality of interactions, in which public organisations, private parties, other stakeholders, and, civil society participate, aiming at solving societal problems or creating societal opportunities. 12–14

Governance mechanism A conscious or unconscious steering process or strategy of stakeholders, for the facilitation, guidance, and alteration of interactions in a governance network. 3, 6, 7, 9, 12–14, 18–22, 24–27, 29–31, 33, 44, 55, 79

Governance model The supported set of all governance mechanisms within a governance network, where all ecosystem participants formally or informally agree to. 20–22, 55, 69, 79

Governance network "More or less stable patterns of social relations between interdependent actors, which cluster around a complex problem, and/or a set of resources and which emerge, are sustained, and are changed through a series of interactions" [Klijn and Koppenjan, 2015, p.11]. 13, 14, 18, 22, 79

Metagovernance A means by which to produce some degree of coordinated governance, by designing and managing sound combinations of values, norms, and, principles, to achieve the best possible outcomes from the viewpoint of those responsible for the performance of a certain form of collaborations. 13, 14, 21, 22, 62, 79

Multi-sided platform An information architecture developed and designed by one or more organisations to generate value by connecting two or more different parties (i.e., service user) who want to exchange products, services or information. x, 15

Network governance Emergence of a set of governance mechanisms used by stakeholders within a governance network which aims to influence their complex interaction processes and/or the characteristics of these networks [Klijn and Koppenjan, 2015, p.11]. 11–13, 15, 21, 22

Network management The collection of strategies, structures, and resources responsible for the day-to-day facilitation, guidance, and alteration of interactions in a network to maintain collaboration processes in a network. 13, 79

Proper governance A governance including the fundamental governance values, norms, and, principles, which allow ecosystem evaluation and governance model conformity. 25

Qualified trust service A trust service which is in accordance with the applicable requirements from Article 24 of eIDAS. 3, 5, 7

Qualified Trust Service Provider As defined by eIDAS, a trust service provider who provides one or more qualified trust services, and is granted the qualified status by the supervisory body. x, 2

Trust service As defined by eIDAS, an electronic service normally provided for remuneration which consists of: (a) the creation, verification, and validation of electronic signatures, electronic seals or electronic time stamps, electronic registered delivery services and certificates related to those services, or (b) the creation, verification and validation of certificates for website authentication; or (c) the preservation of electronic signatures, seals or certificates related to those services;. 2–5, 10, 11, 13, 14, 22, 79

1 INTRODUCTION

This first chapter of this thesis serves as an introduction to the research problem (Section 1.1) and an explanation of its problem relevance (Section 1.2). By analysing the regulatory European developments of trust services in the first place, the institutional, societal, and technical challenges for secure and trusted data exchange between civilians and organisations are put in perspective. Thereafter, the fundament of the problem relevance is put forward by arguing which societal (Section 1.2.1) and scientific needs (Section 1.2.4) will be pursued to provide research value. By presenting the research questions in Section 1.3, and the research approach in Section 1.4, the research demonstrates how this thesis will be designed to contribute to the current body of knowledge. Finally, Section 1.5 explains the fit with the field of study for a Complex Systems Engineering & Management (CoSEM) thesis, and Section 1.6 illustrate the reading guide of this thesis.

1.1 PROBLEM IDENTIFICATION

This section explains why the European Union (EU) regards an intervention for secure and trusted data exchange as important, and how this links to challenges which public and private parties face when developing trust services. This leads to the problem which is posed when organising collaborative processes and structures with governance.

1.1.1 European Regulatory Impulse

With the implementation of the European Regulation on electronic identification, authentication and trust services (Regulation (EU) No 910/2014, better known as eIDAS), the EU paved the way for European standards as a common foundation for doing business digitally. Currently, transactions demanding a high legal certainty, like mortgage loan requests, often need physical presence or (wet) paper autographs. Processes demanding a high legal certainty occasionally depend on information chains using postal services and e-mail, which are prone to error and insecure [Kruger et al., 2007]. Here, the current lack of legal certainty and trustworthiness of digital services forms the main barrier for the adoption of new, trusted electronic services. The eIDAS provides an outline on the building blocks for an ecosystem, which can facilitate secure, trusted and efficient digital transactions between parties. This will stimulate civilians, public and private parties to conduct business in a reliable and straightforward manner.

To trigger a wide adoption, eIDAS sets "requirements on conditions and standards for secure, trustworthy and easy-to-use electronic transactions" [1]. This cross-border regulatory framework addresses the current lack of legal certainty and trustworthiness of online services, which stimulates secure digitisation of electronic interaction between civilians, public and private organisations. To safely ensure the position of the private sector as a trusted third party, additional requirements are set for Qualified Trust Service Provider. QTSPs are private companies which can increase the self-reliance of civilians, by delivering trust services in a user-friendly and user-centric environment. This online environment, with a wide range of functionalities, guarantees the highest level of legal certainty for all users. This requires QTSPs to undergo audits and deploy strict EU norms on quality of security and trust. Cross-border interoperability of trust services could spur innovation, increase market efficiency and security, and boost the European

1 Regulation (EU) No 910/2014 on electronic identification and trust services for electronic transactions in the internal market

(digital) single market. While advantages of a transition towards secure and trusted electronic services are evident, risks appear when trust services fail to develop in a scalable, trustworthy and viable manner. Furthermore, public values like security and privacy could be jeopardised, and need to be safeguarded.

1.1.2 Challenges in Public-Private Collaboration

Collaborative ecosystems are dynamic and co-evolving communities of interdependent and cross-sectoral stakeholders which could support the societal need of developing and adopting digital trust services. To allow a wide adoption, organisations need to agree on the building blocks which make up the shared information systems (IS) infrastructure of the ecosystem. This shared infrastructure consists of a collective technical and organisational architecture. However, how trust services will evolve in electronic society (eSociety) involves a lot of uncertainty. Following comparative literature in governance studies, it is likely that the emergence of trust services is characterised by the role of contextual factors (i.e., social norms, regulation, market, and, technology) on interdependencies between participants of the governance mechanism [Medaglia et al., 2017b,a]. Governance contributes to efficient and effective arrangements between ecosystem participants, by providing guidelines and measures on decision-making processes, collaboration structures, and collaborative processes [Provan and Kenis, 2007]. Therefore, governance plays a fundamental role in structuring collaborative ecosystem [Kitsing and Vallistu, 2021]. This requires participants to concur on the formal governance agreements embedding decision rights, control mechanisms and incentive structures [Tiwana, 2013]. However, participants often have different interests to join the ecosystem, which could lead to conflicting requirements on governance. Thus, harmonisation between participant requirements by designing a governance model is crucial for a sustainable ecosystem development. Tensions between stakeholders, markets, regulation, and technology, can lead to a failing adoption and scaling of the ecosystem [van Engelenburg et al., 2020]. Insights on these tensions will support a well-aligned governance design. A balancing act needs to be performed between safeguarding public values while keeping an economically sustainable and operable ecosystem. The following section will discuss the relevance of these challenges in light of prevailing societal and scientific needs.

1.2 PROBLEM RELEVANCE

Where the previous section gave a small introduction on the European developments of trust services and the role of governance, this section will be concerned with linking the societal and scientific needs with their relevance by assessing the practical and theoretical gaps in the current body of knowledge.

1.2.1 Societal Need

Societal, technical and institutional developments led to a need for secure and digital environments where citizens, public, and private organisations do business online. From a market perspective, trust service solutions (like electronic seals, timestamps, Electronic Registered Delivery Services (ERDS)) offer market value with new business cases. Moreover, from a government perspective, trust services allow immediate legal binding action, burden of proof, increased liability, higher transparency, and, consumer confidence [2]. In the end, this contributes to public values covering legitimacy and trust in society. Nevertheless, the eSociety currently develops in a flawed provider-centric manner, where privacy policies do not reflect the interests of individuals. Dijkhuis et al. [2018] argue, that the lack of easy and low-cost qualified trusted services hinder a human-centric design where individuals do online business with legal certainty and can exercise their rights. QTSPs can provide efficient and effective personal data management

2 ENISA presentation on market adoption of qualified trust services

for individuals by offering the highest Level of Assurance (LoA) in accordance with eIDAS. However, eIDAS does not provide clear guidelines for an interoperable development of trusted services, leading to sectors agreeing to different standards with the risk of isolated development of new trust services. This negatively affects the adoption of these services, and thus digitisation in general. To avoid this differentiated development of trust services, public and private parties need to collaborate to ensure universal agreement on standards and allow (inter)national interoperability of trust services.

Furthermore, the greater the operability of trust services, the more public and private value these services can offer. Thus, network effects can be identified where the values of trust services are higher, when more users (i.e., various organisations) conform to the same set of agreements. Aligning the interests of these parties will create all sorts of tensions, as parties are highly interdependent while pursuing different interests. Examples of tensions which need settlement are knowledge differences (disclosing intellectual property), business models (competing public and private solutions), market dependencies (maintaining a level playing field), and, technological developments (public positioning towards self-souvereign identity (SSI) and digital wallets). Establishing conformity is double-edged as public parties require trust in private party solutions, and private parties require trust in public authority. This will require a supported governance model with agreements on decision-making processes and standardisation. The stakeholder incentives to participate in a collaborative ecosystem are yet to be explored due to the recent emergence of the trust service market, and the way in which competitive industries, public, and, private sectors are interwoven. Therefore, there is a societal need to analyse these incentives, and discover where potential bottlenecks for the collaboration could impede the inter-organisational and cross-sectoral deployment of trust services.

1.2.2 Societal Relevance

Development and adoption of innovative trust services in the eSociety will reduce the lack of online trust and security of data exchange which currently interferes with digitisation. A governance model is essential to organise decision-making processes, and overcome tensions between collaborative ecosystem participants. As the technological and organisational architecture of a shared IS infrastructure are connected [Bharosa et al., 2015], organisational agreements and procedures must align the technical standards of data exchange and taxonomies. This makes a governance crucial for orchestrating the behaviour and authorities of participants, due to the influence of decision-making processes on design choices of the technical architecture. Additionally, in a digitally connected world, individual organisations often lack capacity and resources to address the complex problems eSociety is facing [Klijn and Koppenjan, 2015]. This creates a vast and interdependent network, where stakeholders collaborate through many intensive interactions. The business perspective of Deloitte on ecosystems also identifies that value creation is developing beyond vertically integrated and industry bounded corporations [3]. Apart from the opportunity and competitive advantages seen by private parties, public parties will need to find opportunity as well. Extending the well-researched business perspective with a public stance, will therefore support addressing the societal challenges trust services offer solutions to. A well-structured governance includes the procedures to organise parties to join and operate in the ecosystem efficiently and effectively, while pursuing the values the ecosystem strives for. Ensuring the operative ecosystem offers scalable trust services, increases network effects, while it balances the public and private values at hand.

Therefore, this research will design a framework which assesses the relevant tensions, and prescribe governance requirements which can mitigate them. This helps organising interoperable trust services as described by eIDAS. The framework could also be used for future public-private collaborative ecosystems which facilitate cross-sectoral trust services solutions.

3 Introduction: Business ecosystems come of age, E. Kelly, Deloitte, 2015

1.2.3 Scientific Need

While the EU provides a regulatory foundation, private parties will need to collaborate with public parties and provide qualified trust services for commercial and public purposes. This characterises recent developments where public private parties collaborate voluntary for service delivery systems [Bertot et al., 2016]. Governments increasingly collaborate with private parties to tackle the development of complex ICT projects, due to their decreasing set of ICT skills and capacity [Cordella and Willcocks, 2010]. An example of such a collaboration occurring in the Netherlands is Standard Business Reporting (SBR). The leverage of innovation by others, is also known as the 'outside-in approach' [Klievink et al., 2016]. SBR facilitates business-to-government information exchange [SBR, 2021], while enabling leaner compliance monitoring with fewer capacity and higher data quality [Bharosa et al., 2012]. Though the inter-organisational collaboration in the SBR case resembles with the development of trust services in Europe, disparity is found in the more dominant role of the government during the development and operation of SBR. This is opposed by the more balanced public-private need to collaborate for enhancing the trust and security in online business conduct.

Due to these new organisational arrangements and external dynamics (e.g., technological and market changes), current mechanisms of governance cannot adapt quickly to the new changing environments [Medaglia et al., 2017a]. New governance practices are required to accommodate evolving and dynamic collaborative processes in order to improve adoption of qualified trusted services. Governance plays a fundamental role in structuring platform ecosystems [Kitsing and Vallistu, 2021]. Therefore, this thesis will analyse potential mechanisms of governance for coordinating interdependent actors. Literature often refers to this as a socio-technical design effort [Bharosa et al., 2013], where the socio-technical arrangements and models provide a two-folded technical and social perspective to reduce system failure [Medaglia et al., 2017b; Esteves and Joseph, 2008; Bostrom and Heinen, 1977]. The broad stakeholder interests structuring requirements call for flexibility in shaping the future architecture of ecosystems [Glukhikh et al., 2021]. However, their different requirements and often contradicting wishes makes designing the governance of an ecosystem a delicate and challenging task. A balancing act needs to be performed between safeguarding public values while keeping an economically viable ecosystem using fair governance with decision-making processes. Stakeholder requirements will echo on tensions like innovation versus interoperability or control versus generativity. The interests will thus affect the ecosystem, making harmonisation between technical and social arrangements crucial for interoperable trust services.

1.2.4 Scientific Relevance

Research on the coordination of the ecosystem participants often focusses on the private business values [Lopes and Farias, 2020; Alghatam, 2019; Song et al., 2018], leaving out important public tensions which emerge in the trust services market. While studies have been conducted for assessing new steering instruments for public-private collaboration [Bharosa et al., 2018], not all studies reflect on a method or framework. A framework presented by Valdez-De-Leon [2019], describes key enablers which serve as guiding tool to strategise on growing towards a market leader. But, this framework lacks the notion of tensions a publicly-privately shared IS infrastructure might bring, and the governance requirements needed to mitigate them. In addition, when frameworks offer the inter-organisational perspective, governance is often disregarded or only partly discussed [Glukhikh et al., 2021; Wnuk et al., 2014]. Therefore, the governance instruments do not suite a public-private collaboration for developing an ecosystem. In addition, the approaches were often case study dependent, therefore lacking generalisable knowledge for a framework. This thesis will contribute scientifically through posing a framework for the governance of collaborative ecosystems. By applying this framework in the domain of trusted services, the research will integrate the sophistications of shared IS infrastructures, the tensions between actors, to prescribe a governance for a collaborative ecosystem facilitating trust services.

1.3 RESEARCH QUESTIONS

The research will focus on 4 sub-questions, which are linked with the research objective. The main research question is formulated to address the knowledge gaps primarily stated in Section 1.2.4.

Main research question
How to design a governance model for a collaborative ecosystem which facilitates electronic transactions?

In the end, by answering the following sub-questions, a conclusion on the main research question is found:

1. *Which insights does the current literature provide into the governance of collaborative ecosystems?*
2. *How can the development of governance in a current collaborative ecosystem be captured in a framework?*
3. *What governance model can be used for a collaborative ecosystem in the Netherlands which facilitates electronic transactions?*
4. *How can the framework be improved to ensure a proper functioning governance model for a collaborative ecosystem?*

1.4 RESEARCH APPROACH

The research will be following a qualitative research method, as the answering of research questions will solely focus on qualitative data gathering, processing, and validating for designing a prescriptive artefact [Creswell and Creswell, 2018]. This section will explain why a qualitative approach was chosen, alongside the advantages and disadvantages. Next to that, argumentation will be given why this is the leading approach for this research, and which methodology will be applied to structure the research process.

1.4.1 Research Objective & Scope

The central research objective of this thesis is to design a framework which enables to analyse and mitigate the tensions of a governance mechanism by prescribing a fitting governance model which adapts to its context through time. Although technical challenges will emerge when designing the ecosystem, the fundamental challenge here, is a permanent governance model which adapts to institutional, technical and organisational challenges. The ecosystem under study is a governance mechanism which facilitates electronic transactions through valorisation of qualified trust services. The definition of ecosystem governance is: "The totality of interactions in a governance mechanism, which enable ecosystem participants to orchestrate, co-create, and, curate to solve societal problems and/or creating opportunities, with the design and use of governance mechanisms, and to account for its activities over time". To improve the valorisation of the qualified digital services, this thesis aims to design a framework which enables to analyse and mitigate the tensions of a governance mechanism by prescribing a fitting governance model which adapts to its context through time.

The research will work towards the following deliverables to contribute to the objective: I) characterise the characteristics of a public-private governance mechanism, II) identify stakeholder tensions and other power dynamics, and III) design a governance model which structures the governance mechanisms for governance mechanisms. By firstly analysing the intentions and requirements of the public and private stakeholders at the Trusted Information Partners (TIP) case, tensions can be extracted. These tensions can be mitigated with a governance model. A general framework can be developed, by delineating the TIP operations with the general modus operandi of a governance mechanism. This framework could also support the coordination of

public-private collaboration efforts in the Netherlands in general, acknowledging that initiatives like TIP face similar governance challenges which can be mitigated with a governance model.

The framework will be applied to a governance mechanism in the Netherlands. Putting the framework to practice in an actual problem allows data gathering from stakeholders who deal with pressing current issues. This focus will support data gathering of a problem in the field of qualified trust services, while also providing generalisable scientific knowledge on governance mechanisms. This is an important notion, as the research will not study the digital interactions itself (e.g., identification and authorisations) between natural persons (i.e., citizens or businesses) and governmental organisations via eID's for performing public tasks. In addition, the framework is applicable to cross-domain qualified trust service implementations in various information chains. This has been defined by the eIDAS Regulation as an implementation of LoA 'high', emphasising the importance of security and trust. The framework will assist designing a governance model for a governance mechanism which is structured interorganisational and cross-sectoral. Therefore, the framework is limited to markets taking this public-private approach to realise an ecosystem with trust services according to the eIDAS. This also applies to the ecosystem approach under study, which lies at the heart of the Dutch cross-domain implementation of trusted services.

1.4.2 Research Methodology: Design Science Research in Information System Research Framework by Hever et al. (2004)

The implementation of the framework will be evaluated by analysing the generalisability of the framework for other governance mechanisms. This will allow broader, and more complete insights of governance mechanisms mitigating tensions in public-private collaborations [Creswell and Creswell, 2018]. This research intends to expand the understanding of governance for ecosystems by employing by using the Information Systems Research Framework by Hevner et al. [2004]. This framework is used to structure the qualitative methods, to work toward a generalisable framework (see Figure 1.1). After this general framework is constructed, it can be applied to the TIP case study to find out whether the needs of the practical environment fit with the body of scientific knowledge. The relevant flow of research steps where the framework by Hevner et al. [2004] is applied, and thus a Design Science Research (DSR) approach.

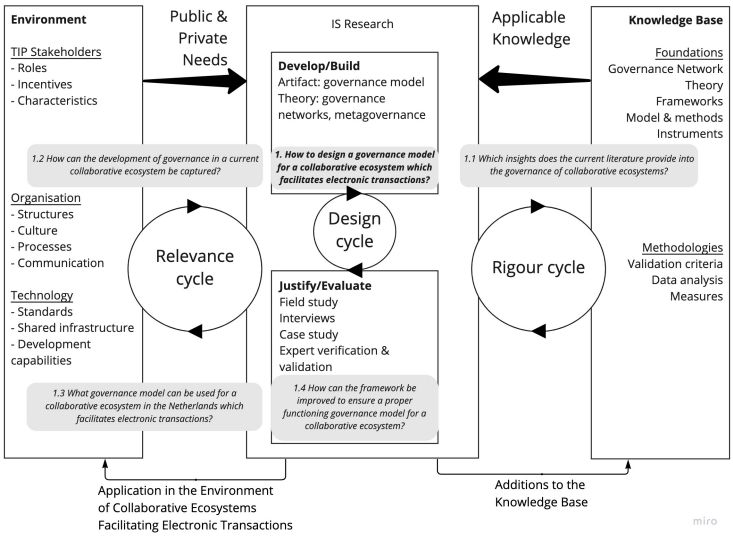

Figure 1.1: Information Systems Research Framework [Hevner et al., 2004] applied to the mixed method approach

With experts validation, evaluation of the framework can be achieved of the governance challenges and mechanisms. This allows more informed decision-making for public policy-makers

and private stakeholders on ecosystem governance. While the methods of data collection vary, they substantiate the research focus and overcome bias problems [Oppermann, 2000].

1.4.3 Qualitative Research Method

The research will start with an exploratory method which collects qualitative data with the intention to create a more detailed understanding of ecosystem governance through exploratory literature. This literature review will firstly assess which theories and concepts fit the scope of this thesis. By providing a landscape overview of relatable literature, governance of ecosystem will be put in scientific perspective. This enables an overview of the explored areas of research, and the unexplored areas of research. Knowledge gaps will be analysed, aiming to address parts where scientific research is scarce. This thesis will evaluate the design of new governance mechanisms for structuring public-private ecosystems. This is why the research is developing theory in this domain of governance.

It starts off with a qualitative research phase covering the governance development by analysing power dynamics and possible governance models for structuring and evaluating the TIP ecosystem governance. This qualitative exploratory phase is advantageous for unravelling all different concepts of governance to eventually concretise the framework. This first part will materialise the framework, where governance requirements need to be extracted from literature. By studying the fit between the stakeholder tensions and the transition towards the intended ecosystem, governance requirements can be found. This is a single unit case study type I as described by Yin [2014], due to the fact multiple organisations are analysed with a holistic case. This improves the confidence of the findings [Yin, 2012], where the practical environment underpins the development of an artefact (i.e., a framework). The case had to revolve around a public-private collaboration, where a governance model needs to be put in place to achieve a digital transformation. Other selection criteria were the notion of interdependence of resources, where technical and organisational components need to be integrated. The case study will distil governance requirements on the development of governance in a collaborative ecosystem. These requirements will be extracted by questioning stakeholders on their perspective of implementing values like transparency, integrity, and, openness. This allows the data gathering of general governance requirements, where analysis on possible conflicts between requirements give an overview on tensions.

The Example of Trusted Information Partners

TIP is an initiative in public-private setting, started by the private sector to valorise innovation of digital information exchange in the Netherlands. This innovation is needed, because in many situations, a lack of online trust and secure data exchange is hindering further digitisation of information chains. In this initiative, public and private parties collaborate to strive for an eSociety where civilians and organisations (public and private) can do online business in a manner that is easy-to-use, trusted, and secure. TIP makes agreements on standards and guarantees the minimal necessary functionalities which enable parties to do digital business safely, simply and reliably. This mission is realised by developing a domain-transcending ecosystem, where parties can develop eIDAS-compliant (trust) services. The ecosystem should be open for new participants, while the use of open standards also allows interoperability and expandability of functionalities.

Currently, several public and private parties are working on TIP by investing varying resources (working capital, financial capital) into the currently undefined entity form of TIP. During the first stages, TIP will concentrate on the housing domain by improving efficiency of trusted data exchange in processes with high legal and financial consequences (e.g., buying a house). It started in the housing domain due to (among others) its high societal value, high costs and amount of current transactions, and familiarity among stakeholders. The ecosystem will be generalisable to other domains in order to accomplish easy-to-use and secure digital business between civilians and organisations. Therefore, the current partners in the TIP initiative, consist of actors engaged in this domain. Nevertheless, a part of these partners are also

interested in scaling ecosystem functionalities, because it is fundamental for a viable ecosystem to operate cross-domain. This means that the ecosystem must evolve to also enable secure data transactions in other domains (e.g., insurance practices, notarial services, etcetera). This could create business values for private parties, while public parties safeguard the public values it could offer to citizens.

An ecosystem which aligns stakeholder interests, adapts to changing power dynamics, and organises public-private collaboration processes and structures needs a governance model to develop in a controlled, effective, and, healthy manner. The governance model will consist of agreed upon rules on collaboration structures and processes organising the operative TIP ecosystem.

1.5 LINKAGE WITH COSEM MASTER PROGRAM

This thesis is written for the fulfilment of requirements for the degree of a Master of Science in CoSEM. It is argued that the research objectives relates with the MSc program, due to the complex, socio-technical system, which is under study. Here, alignment of stakeholders is needed for the functioning of the cross-sectoral and technical system which is structured by institutional arrangements. Therefore, the complexities of designing a governance model for a governance mechanisms, is in line with the challenges emerging when designing an artefact in socio-technical. Also, the to-be-designed system (in this case a framework for designing a governance model) is not yet defined. This requires analysis on who will join, what their requirements are, and what is needed to evaluate the behaviour of the system. Also, the prescribed knowledge gap pertains technical and organisational aspects which need to be addressed by doing research. The problem has a political, social, economical, jurisdictional, and technical aspect which are continues and cross-sector; this makes the problem inherently complex, and requiring a multidisciplinary perspective for analysis.

1.6 READING GUIDE

The research objective of this thesis is tackled with the following structure. The first part contains the introduction to the research problem, and the approach taken to solve it. By answering the first sub-question in Chapter 2, a literature review is conducted on the frameworks for governance development, and their requirements. Chapter 3 will continue on the knowledge gaps of the chapter before, and answers sub-question two by providing a conceptual framework. Where Chapter 4 will discuss the environment the framework will be tested in, Chapter 5 will answer sub-question three by applying the framework and focusing on the output of it. This output will be validated in Chapter 6, and taken along to improve the framework. Finally, Chapter 7 will interpret the results and give recommendations for the case study, wherein the Chapter 8 the main research question is answered.

2 LITERATURE REVIEW

To identify the knowledge gaps, a literature review analyses state-of-the-art literature in the governance domain. To form an overview of the established literature, Section 2.1.1 will clarify the contested theories and concepts like governance, network governance, and, the Governance Network Theory. After the scope is set by choosing a theory, examination of the literature on network governance of information systems can be done in Section 2.3. In order to provide a uniform use of definitions, several terms will be dissected in this literature review. Accordingly, to concretise the theoretical foundation, the Glossary presents all concept with definitions.

2.1 THEORETICAL BACKGROUND

Before establishing an overview of relevant scientific research, a theoretical background on important and contested concepts which are fundamental in this research are analysed. This revolves around the perspectives of dominant governance theories and their interrelations with collaborative ecosystem are clarified. This supports the analysis of the research problem through a theoretical lens, which avoids misconceptions of contested theories and allows interpretation of the literature review (LR), and the research problem later on. Analysing the different theories on governance makes the relevance of key concepts clear to this research clear. This enables explanation of the research problem, and provides a perspective to interpret the research results.

2.1.1 The Application and Theories of Governance

Governance is often mentioned in literature as an 'coffee table' or intuitive concept, where some researchers deem a definition unnecessary, and leaving it open [Lee, 2003]. However, to enable setting a scope to the research problem, this research will first define governance, and chose a theoretical perspective which fits analysing collaborative ecosystem (which could spur development and adoption of trust services). Thus, this section will firstly take a step back and illustrate the applications of governance. Secondly, defining the term and the interpreting different theories allows finding a theory which fits to this research.

Applications of the Term Governance

This thesis identifies four different applications of the term governance. These four dominating uses of governance are summarised in Table 2.1. The first identified use of governance focuses on how a government is functioning properly, instead of the way organisation is done. Corporate governance, as described by [Considine, 2008], is about the means of control (e.g., corporate methods like management and targets) on public values, like transparency, integrity, and, legitimacy. This is in line with good governance, which refers to the principles of proper functioning of public administration Meuleman [2008]. It analyses the fair operation of government based on the rule of law which secures unprejudiced treatment of civilians.

New Public Management (NPM) is the second identified term in which often relates to governance. NPM relates to market governance, where public bodies deliver public services by setting goals and design policies to achieve them [Hood, 1991]. To do this, the government steers, instead of its traditional role to row. In NPM, (public) organisations accountability is controlled with the use of key performance indicators, contracts, market competition and other mechanisms adopted from markets and quasi-markets.

Thirdly, multi-level, and inter-governmental governance, describes the difficulties of achieving results in a multi-actor setting. This literature stresses that networks are needed to address these problems, because they tend to cross the boundaries of public organizations and their hierarchical levels [Bache and Flinders, 2004; Agranoff and McGuire, 2004]. Although literature on multi-level and inter-governmental governance regard different network concepts, their common denominator is to pursue goals in multi-actor systems. Issues focus on redeveloping economic deprived areas or environmental issues.

The final identified prevailing term is network governance. Here, the primal aim of attention is the complex interaction process between all involved stakeholders [Kooiman, 2003; Sørensen and Torfing, 2007b]. Networks consist of public and non-public parties, and develop policies to shape their environments [Meuleman, 2008].

Table 2.1: Dominating applications of the term governance

Governance as ...		**Adopted from**
... good or, corporate governance	Value- and norm-based principles (e.g., transparency, integrity, and accountability) which organise the proper functioning of public administration.	[Rhodes, 1997; Klijn and Koppenjan, 2015]
... New Public Management	Adopting market mechanisms and private management methods (e.g., contracts, market competition) to the public sector.	[Rhodes, 1997; Meuleman, 2008; Klijn and Koppenjan, 2015]
... multi-level or inter-governmental	Specifying the required places public organisations (from different governmental levels) take in different types of networks to reach goals in a multi-stakeholder environment.	[Meuleman, 2008]
... network governance	Emergence of a set of mechanisms used by stakeholders within a governance network which aims to influence their complex interaction processes and/or the characteristics of these networks.	[Klijn and Koppenjan, 2015, p.11] & [Kooiman, 2003; Rhodes, 1997; Sørensen and Torfing, 2007b; Meuleman, 2008; Klijn and Koppenjan, 2015]

The four dominant applications of the term governance all adopt the relation between public bodies and societal actors in their efforts to address public issues. This relational aspect is often interchangeably used with network governance by scientists. The list however also includes hierarchical relations and market-style relations. As addressed in Societal Relevance, the governance should not only focus on the role public organisations have in societal problems and tweaking governmental operations. Also, the role of other non-public organisations, markets, and individuals in the issues eSociety, are crucial to include. Apart from a public perspective in which government strives for public value delivery, the perspective on a wide development of trust services through collaborative ecosystems is broader because it also involves complex public-private interactions to tackle public issues. For this research, the presented list should therefore unite the three ideal types of governance, namely: hierarchical relations, market-style relations, and network relations. This broader viewpoint is relevant for this research, as this research focuses on the identification of factors which influence and mitigate the collaboration challenges in the multi-actor environment of collaborative ecosystem. Trust services develop in an inter-organisational (combination of public-private organisations), cross-sectoral (spanning multiple markets) manner to ensure trust and security for online business in the eSociety. Therefore, the following broad definition of governance is adopted from [Meuleman, 2008, p.11]:

"Governance is the totality of interactions, in which public organisations, private parties, stakeholders, and, civil society participate, aiming at solving societal problems or creating societal opportunities"

The definition thus includes all interactions between public, private, non-public, non-private organisations, and, society. While governance literature often regards public managers as principal governance actor by emphasising on the institutional aspects at play, this research regards all involved stakeholders as the principal governance actors. Therefore, the LR takes a broad perspective on the collective of relations between all stakeholders and the influence of institutions

(containing their values, norms, procedures) on them. A meta-level overview of governance as defined by [Markus and Bui, 2012, p. 164] states a 'high-level of strategic coordination'. Where the authors mention a focus on both financing and decision-making structures, the LR will only focus on the decision-making aspects of governance. The objective of governance is to establish the rules that control decision-making. In addition, the research will be regarding the meso level of governance, which concentrates on providing guidance for middle-management (e.g., public and private project owners) and the complex societal problems they are involved with. This differs from the much-more studied perspective of macro level governance, which analyses the relation between public organisations and civil society [Kooiman and Jentoft, 2009; Meuleman, 2008].

Perspectives on Governance in Public Administration Literature

In the literature on public administration three prevailing perspectives on governance prevail. The Traditional Public Administration perspective focuses on effective policy implementation by traditionally organised public bodies. NPM complements the improvement of public organisations by including market mechanisms, like market competition, and contracts. Finally, the Governance Network perspective improves service delivery by addressing the complex problems interdependent actors face in their interactions and processes. Therefore, the Governance Network perspective has an inter-organisational focus. Table 2.2 highlights the focus, core characteristics, and, objectives per governance perspective.

Table 2.2: Perspectives on governance in public administration, adapted from Klijn and Koppenjan [2015]

	Traditional Public Administration	**New Public Management**	**Governance Network perspective**
Focus	Hierarchical and bureaucratic coordination	Internal control and central steering of public organisations	Horizontal relations between public and non-public organisations (inter-organisational focus)
Core characteristics	I) Dependence between public and private actors, II) neutral policy execution by public administrators, III) public administration influences complex behaviour, IV) management with command and control	I) Dependence between public and private actors, II) independent agencies set goals for policy implementation, III) market mechanisms structure service delivery, IV) private management methods used to row,	I) Interdependence of actors, II) complexity of interactions and processes, III) institutions emerge and influence behaviour, and IV) guidance of interactions with network management
Objective	Effective and rigid policy implementation based on the principles of equality, legitimacy, and legality	Effective and efficient public service delivery	Boost service delivery quality through harmonised inter-organisational relations

The LR will continue on Governance Network perspective, where governance is seen as the governance within a governance network. A governance networks is understood as the "more or less stable patterns of social relations between interdependent actors, which cluster around a complex problem, and/or a set of resources and which emerge, are sustained, and are changed through a series of interactions" (adapted from [Klijn and Koppenjan, 2015, p.11]). This perspective enables to examine horizontal relations between both the public bodies, and other organisations involved to pursue the objective of service delivery effectuation. Next to this objective, the perspective characterises actors as interdependent, which leads to complex interactions between these actors. This perspective fits the scientific need to analyse the role new governance mechanism play in their interdependent, multi-actor settings. Moreover, analysis of institutional relations (e.g., power relations) is valuable, for the reason that rules and patterns emerge from them. Analysing the rules which facilitate stakeholder interaction can reveal their influence on the network performance [Klijn and Koppenjan, 2012]. Hence, the Governance Network perspective is chosen as perspective, while it addresses all relevant aspects of the research problem. Renowned governance authors argue the ideas and new practices from this perspective resulted in the full-fledged Governance Network Theory (GNT) [Klijn and Koppenjan, 2012]. In the latest years, theories of NPM became less appealing and shifted towards network governance [Medaglia et al., 2017a]. Although NPM characterised market governance insight into the way business-like operations can complement organising and managing the public sector. According to scientists, GNT could complement the knowledge gaps which NPM fails to address [Klijn

and Koppenjan, 2012]. GNT contributes to the New Public Governance paradigm by addressing the problems with complexity, interdependence, and dynamic environments.

2.2 LITERATURE REVIEW APPROACH

A LR is a methodology where a finite amount of literature is analysed to evaluate on a topic of interest and interpret it. In this LR gives an overview of IT governance for public-private ecosystem are assessed by examining network governance, governance of IS, and the link with collaborative ecosystems. A case will be made why the governance mechanism from literature on IS, and multi-sided platforms, are also deemed fit for governing the ecosystem. Initial research direction is set by reviewing tensions in the governance of the ecosystem caused in a public-private setting. This literature was found using two online sources: Web of Science and Scopus. According to Moher et al. [2009], a PRISMA flow diagram is set up to give an overview of the systematic review. This resulted in finding 13 articles, as depicted in Appendix A Figure A.1. This figure also describes the terms and constraints used for the searches, as well as other techniques used in the literature review. By giving an overview of 13 state-of-the-art scientific articles, lessons and gaps can be distilled for the governance of collaborative ecosystems facilitating trust services.

2.3 DEFINING KEY CONCEPTS: NETWORK GOVERNANCE AND COLLABORATIVE ECOSYSTEMS

Where Section 2.1.1 introduced the GNT, Section 2.3.1 will clarify the concept of network governance and the role of metagovernance to improve network governance. Section 2.3.2 provides an overview of the literature on IS, platforms, and, digital ecosystems. Finally, discusses the governance of collaborative ecosystem by comparing it with the governance literature of IS, and highlighting the challenges.

2.3.1 Network Governance

Governance is the totality of interactions in a governance network. As Table 2.1.1 highlights, Klijn and Koppenjan [2012] characterise four common aspects in governance networks: I) interdependence of actors, II) complexity of interactions and processes, III) institutions emerge and influence behaviour, and IV) guidance of interactions with network management.

Networks have a high interdependency between stakeholders, as the public issues they address require collective action, and resource sharing [Agranoff and McGuire, 2004; Klijn and Koppenjan, 2015]. While stakeholders cannot act individually, interdependence creates complexity and unpredictability of interactions [Sørensen and Torfing, 2007b]. Furthermore, the actions of one stakeholder, also influence the interests of other stakeholder. Therefore, parties have individual perceptions on the problem, leading to differences in strategies to allow (public) service delivery [Sørensen and Torfing, 2007b]. In order to tackle value conflict (which could lead to network failure), network management provides guidance and facilitation of stakeholder interactions [Klijn and Koppenjan, 2015]. The distinction between management and governance is important to make, because their different meaning can be mixed up and disturb the research objective. Network management is the collection of strategies, structures, and resources responsible for the day-to-day facilitation, guidance, and alteration of interactions in a network to maintain collaboration processes in a network. This differs from the definition of network governance, which is the emergence of a set of mechanisms used by stakeholders within a governance mechanism which aims to influence their complex interaction processes and/or the characteristics of these networks. The governance mechanism support the public service delivery and solutions. However, on a meta-perspective, strategies and steering attempts are unconscious and self-governing [Kooiman, 2003]. Finally, a governance network is understood as the "more

or less stable patterns of social relations between interdependent actors, which cluster around a complex problem, and/or a set of resources and which emerge, are sustained, and are changed through a series of interactions" (adapted from [Klijn and Koppenjan, 2015, p.11]).

To concretise the scope of governance networks, Kooiman [2003] provides the following three different orders of governance uses: first order governance (day-to-day activities for problem-solving and opportunity creation), second order governance (institutional design, maintenance, and care), and metagovernance (the norms and principles for governing as a whole). In metagovernance, the norms and principles are the object of governance. These also apply to governing the problem-solving (first order) and institutional design (second order). Metagovernance is the governance of governance [Sørensen and Torfing, 2007a]. The relation between metagovernance and the second order of governance is understudied [Kooiman and Jentoft, 2009]. This research will take a meta perspective, by analysing how to organise governance in inter-organisational collaborations, and evaluate it with norms and criteria. The term metagovernance is adopted from Meuleman [2008], and defined as:

"Metagovernance is a means by which to produce some degree of coordinated governance, by designing and managing sound combinations of values, norms, and principles, to achieve the best possible outcomes from the viewpoint of those responsible for the performance of public private collaborations"

In the public-private environment trust services will need to valorise, metagovernance takes a society-centric approach. Thence, it recognises that rules controlling decision-making in the governance mechanism will influence the outcome of the network [Daugbjerg and Fawcett, 2017]. Sørensen and Torfing [2007a] argue metagovernance combines both hand-off and hand-on tools, which provide to respectively distant and internal implementation of interventions. Hands-off tools revolve around the institutional design and network framing, while hands-on tools are management strategies within a governance mechanism. This partly suits the focus of this thesis, as the factors influencing the governance mechanism are analysed from a more descriptive perspective. This does not coincide with possibility to implement hands-off tools. However, the prescriptive perspective taken to design principles and norms to mitigate interorganisational collaboration challenges, do suit the internal implementation of management strategies for governance mechanisms. To summarise, governance is the totality of interactions in a governance network. The following section will compare the application of governance network to collaborative ecosystem. This is fundamental to whether, and how governance mechanisms can be steered with rules which control the decision-making.

2.3.2 Collaborative Ecosystems

A supportive infrastructure influences the collaboration process between ecosystem participants, also known as the playing field, in order to achieve a specific ecosystem goal. The cluster of ecosystem participants all strive for this objective, and allocate resources to achieve this goal. Furthermore, the participants are often a mixture of public and private organisations which interact by exchanging information and data. The need to innovate the information chain in which information is shared, can lead to a shared understanding of a problem which requires action. This group is likely to have variating interests and values. Their ecosystem requirements therefore differ, making the ecosystem design a complex design problem. Modularity is an important aspect highlighting this [Jacobides et al., 2018]. Modularisation means the ecosystem incorporates shared software assets with different functions. Ecosystem participants deliver these assets, which make up the modules of the ecosystem. Governance of the ecosystem is necessary to provide a fair, balanced, and, effective decision-making process which fits within the network of actors. de Bruijn and ten Heuvelhof [2018] list three evaluative criteria of a good decision-making process. Firstly, the outcome of the process should satisfy all participants. Secondly, it should continue the willingness of participants to address other problems. And lastly, the level of which participants feel treated fairly, regardless the outcome of the process.

Before moving towards the definition of a collaborative ecosystem by comparing literature on MSPs and digital ecosystems, it is important to mention this research will both use the terms

public-private collaboration (PPC) and public-private partnership (PPP). However, distinction must be made, because PPP are seen as a hybrid form of governance (market and network governance), establishing contractual and relational practices between multiple actors [Benítez-Ávila et al., 2019]. This research will only use literature on PPPs when it also recognises broader insights on PPC apart from contracting. In addition, as stated in Chapter 1, the initiative is currently taken by private parties, moving towards a cross-sector collaboration. Nevertheless, this research will adopt a framework pertaining to an inter-organisational and cross-sectoral collaboration which is led by a coalition of the willing, which is a collection of both public and private parties.

Multi-Sided Platforms

This research draws on the definition of a multi-sided platform by Bharosa et al. [2013], as an information architecture developed and designed by several organisations with direct interactions between multiple customer (i.e., service user) types. An MSP provides advantages for aggregating information demand (from e.g., banks or government organisations), and standardise information exchange for providers (e.g., companies and intermediaries), while its centralised coordination benefits from economy of scale and cost reduction. Evans [2003] described that MSPs create value for two or more distinct groups of actors by facilitating interaction between them. Thus, MSPs can be seen as intermediaries [Hagiu and Yoffie, 2009], aiming to create network effects, where a positive feedback loop is sought between the amount of users of a group and the value of the good for the other user group.

Research by Constantinides et al. [2018] outlines the challenges on openness and competitiveness causing difficulties on collective decision-making for the governance objects of platforms. A modular multi-layered architecture (decentralised governance) can increase the innovation potential [Ciborra et al., 2000; Boudreau and Hagiu, 2008; Rochet and Tirole, 2006], by distributing incentives and liability across stakeholders. Opposed to this, is a centralised governance, stimulating control. When the platform owner keeps a balance between (competitive) interest and the interest of platform users, conflict-of-interest risks may arise [Constantinides et al., 2018]. The complications of governance also relate to the ecosystem; however, literature mainly reflects on the private platform governance, like controlling the monetisation strategies to influence strategic behaviour. Literature is scarce on digital ecosystems with a public-private collaborative component, where its risks and tensions dwell on other conflicts-of-interest than appearing with private platform owners which current literature addresses. Literature often mentions governance objects steering interactions of stakeholders based on pricing models and economic interests [Parker and Van Alstyne, 2018; Tiwana, 2013]. However, discovering governance steering objects based on balancing public and private interests to mitigate conflicting tensions, is still an understudied perspective.

Bharosa et al. [2013] take this different perspective by analysing how PPC shape an MSP by detecting obstacles and decisions effecting collaboration and engagement between all parties. Klievink et al. [2016] explain that the governance structure is chosen based on the public or private driven approach in which stakeholders relate to each other. E.g., for the more public-driven SBR case, a dual governance structure was chosen. Public-private governance was employed on (decision-making) standards and agreements, which supported adoption by private parties. While a public governance was chosen for the information architecture, as the private sector could not own the infrastructure. In another model, a collective business design model was chosen where no dominant regulator leads decisions on governance and information infrastructure. A balance needs to be made between maintaining control to safeguard public values, and facilitating autonomy for boosting innovation in a collaborative manner. Dijkhuis et al. [2018] argue for a public-private governance steering the ecosystem architecture, however, the implementation remains unclear. In addition, the public-private governance requirements through the iterative development of an ecosystem are an ill-researched topic. Linking the characteristics of MSPs with digital ecosystems can therefore broaden the knowledge on ecosystem and its characteristics.

The way in which ecosystem participants strive for the same objective, is similar to the way in which MSPs organise interaction between users to couple supply to demand. As the support-

ive infrastructure is a collaborative effort, the participants can benefit from cost reduction and economy of scale. However, where MSPs mostly rely on a single platform owner, ecosystems consist of multiple parties which cooperate and compete to valorise innovation.

Digital Collaborative Ecosystems

The term and application of 'ecosystems' spans various scientific domains. Therefore, this thesis defines a digital ecosystem as a complex collaborative network facilitating innovative electronic services through ICT platforms. Ecosystems have differentiating characteristics, which are important to define in order to delineate effective management of the ecosystem. This is done by drawing parallels with MSPs, as many of the MSP components define the ecosystem organisation and characters in the big picture. Though MSPs are familiar to ecosystems, an ecosystem defines the components of an MSP. Note that MSP components define a part of the components an ecosystem consists of, thus offer insights for the meta concepts of an ecosystem.

Digital MSPs revolutionised many sectors by improving efficiency and boosting innovation. Platform owners act as conductors of the digital platform, supporting the coherence between developers whom create value by delivering digital resources (e.g., services and content) [Tiwana, 2013; Constantinides et al., 2018]. MSPs differentiate themselves, as digital resources are not tangible and revenue is not generating through product sales. Instead, the platform owner organises interaction between platform customers and the developers. This resembles the orchestration practices of conductors, where the musicians (in this case the developers) have autonomy in their functioning in the symphony (the digital platform). Traditional organisations with hierarchical authority structures in command-and-control style do not cultivate efficiency and innovation. Digital platforms institute authority with architectural and governance rules which strive for balancing platform control supporting the engagement of participants [Parker and Van Alstyne, 2018; De Reuver et al., 2017]. This in turn will generate values for all platform users. Ecosystems must define the architectural and governance rules for efficient and effective operation. The supportive infrastructure of each ecosystem adopts the 'rules-of-the-architecture' and the 'rules of the game'.

The design of digital architectural rules contribute to the technical organisation of mechanisms on the platform. These 'rules of the architecture' are the technical blueprint, describing how the design of the technical architecture of the ecosystem. It defines how platforms safely contribute to a modular ecosystem, while innovative change is incentivised with clearly defined design rules [Tiwana, 2014b; Baldwin et al., 2008]. Some of these rules of the architecture are: data definitions (e.g., technical standards), data ownership, server architecture, and, the data exchange protocols. Because this thesis focusses on a framework for organising the collaboration, the rules of the architecture will not be reflected in a model for the ecosystem governance.

Another component of the supportive ecosystem infrastructure is the 'rules of the game'. The 'rules of the game' capture the way in which ecosystem participants behave and act in the ecosystem. According to de Bruijn and ten Heuvelhof [2018], the rules of the game contains two components: I) the decision-making processes, and II) the position of actors in decision-making. Ecosystem participants behave and act in a certain way. Their individual strategies and behaviour reflects their relation to the decision-making process, and their positioning towards this decision-making. Acting and behaving in the rules of the game, does not mean that participants live up to them. Participants can behave strategically to pursue their own interests, even if this harms the interests of others, or the ecosystem in general. Strategic behaviour in networks complicates the decision-making process. The overview of all components is visualised in Figure 2.1.

Therefore, collaborative ecosystems are understood as dynamic, co-evolving communities of interdependent and cross-sectoral stakeholders with a shared interest and goal to create new public, private, and, community value by aiming to solve a societal solution and/or create societal opportunity through collaboration and competition.

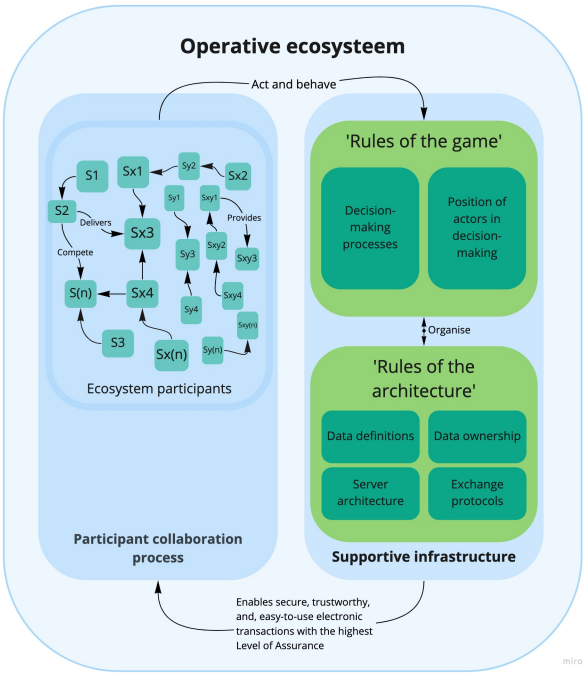

Figure 2.1: The components of a digital ecosystem facilitating secure and trusted electronic transactions

2.3.3 Governance in Collaborative Ecosystems

As previous sections highlight, governance can be applied to technical or organisational components. While governance is not a new concept, many applications can be found in the form of contemporary scientific literature, guidelines, best practices, and, standardisation norms. The DMBOK and EA framework definitions of governance set different applicable definitions and boundaries for ecosystem governance concepts. This will conduce to the definition of ecosystem governance adopted further in this section.

The continuous interaction of the public-private collaboration is an important feature for its development of an ICT infrastructure. Frameworks, like the Enterprise Architecture (EA) framework and the DAMA-DMBOK framework, help organisations to identify and organise changes towards a desired ICT infrastructure vision and implementation. By establishing conventions and principles, ICT related strategies and implementations can be integrated. The EA framework develops enterprise architecture by taking a quite practical approach to support decision-makers. Its main components consist of: I) the architecture description from different perspectives, II) architecture design, and III) architect organisation (in terms of structures and guidance by governance). The EA framework has wide application in the private sector for its technically practical way to develop an enterprise architecture. However, to enable interoperability for cross-border e-government services, it should also include institutional, political, social, and legal factors Mondorf and Wimmer [2016].

DMBOK takes another approach for supporting decision-makers, and adopts the following definition for data governance: "the exercise of authority, control, and shared decision-making (planning, monitoring and enforcement) over the management of data assets" [1]. The DMBOK framework is therefore also more practical, by providing decision-makers guidelines to follow for data and information management [Brous et al., 2016]. Therefore, the DMBOK framework provides perspective on managing data for ecosystems. The perspective of this thesis is in fact also providing guidelines for the collaborative ecosystem as a whole. The perspective could be useful for data ecosystems, which allows alignment on common goals for facilitating data sharing [2].

1 The DAMA Guide to the Data Management Body of Knowledge (DAMA-DMBOK), 1st Edition 2009, p.19
2 Simple Governance for Data Ecosystems by the Boston Consulting Group

Mondorf and Wimmer [2016] conclude that the EA framework lacks the governance of stakeholder relations, because practical techniques on specification and governing stakeholder relations and their information exchange are missing. Because collaboration between parties can be identified from the very start of the ecosystem development, the governance network under study requires governance mechanism which organise inter-organisational relations, while bringing in the perspective of a continuous and life cycle development of the ecosystem as well [Medaglia et al., 2017a]. Therefore, also the definition of data governance from the DMBOK framework needs to be modified for collaborative ecosystems. Governance therefore provides guidance for distributed innovation, which emerges through participants collaborating [Tiwana, 2014a].

Governance of Collaborative Ecosystems

Constantinides et al. [2018] indicate the autonomy of stakeholders interaction versus the control on innovation of the platform. While the public parties want to increase participation and adopt public values, private parties might be focused on making profit [Janssen and Estevez, 2013, p.4]. Although it is challenging to attract businesses to use public platforms, opportunities emerge from developing an ecosystem where both parties collaborate and commit to [Medaglia et al., 2017a], and ecosystems are often mentioned as technological vehicle to tackle big societal challenges [Pittz and Adler, 2016; Tiwana, 2014b]. While PPC is not easy to organise [Bryson et al., 2015], research in the domain of governance instruments for MSPs seem rewarding, because there is a demand for research on the mechanisms on adoption and operation of MSPs [Kitsing and Vallistu, 2021]. Difficulties for designing governance mechanism rise as development can be delayed by "the need to agree on standards in an environment with heterogeneous interests, changing laws and unclear revenue models" [Bharosa et al., 2012, p. 34]. Ecosystems in various domains are still in development, while European regulation is being revised, technology always progresses and norms are still under development. This makes the selection of governance instruments to employ uncertain too, because the governance and technical architecture need to fit [Bharosa et al., 2015]. Which governance mechanism will suit the ecosystem therefore needs to be evaluated based on the tensions stakeholders bring. One of the mechanism focus points is standardisation. The role of neutral and open standards is important for MSPs with a public function [Klievink et al., 2016]. Electronic data interchange (EDI) is a set of standards which allows sending data and information in common formats between stakeholders whom have agreed to such format [Khanam et al., 2015, p.199]. EDI is the IT resource provided by an ecosystem facilitating trust services. To propel in standardisation processes, a balance between compulsory measures and adaptive measures might be needed [Bharosa et al., 2011]. Research of Pittz and Adler [2016] stress the importance of participatory decision-making, where stakeholders can steer the decision-making process itself. Nonetheless, the paper is written from the lens of an open strategy, where all stakeholders can collaborate to solve complex social problems. Whether this perspective also fits solving complex governance challenges with a digital component, remains unanswered.

Other components which contribute to tensions are the information infrastructure (data ownership and standardisation), the system of agreements (decision-making structure, entry audit and enforcement) and the platform business model (revenue model, platform ownership model and funding structure). This research will especially focus on finding the stakeholder tensions affecting the governance model. Furthermore, the evaluation of the governance model through governance principles requires operationalisation of quality measures to design governance mechanism for a healthy ecosystem. Rather than designing governance for command-and-control, which is seen in more traditional organisations, the goal must be to shape and influence an ecosystem which provides private and public values [Tiwana, 2014a]. Whether this is done in a durable and 'healthy' way, will require evaluation of the robustness, productivity, and, niche creation of the ecosystem. In literature this is often done for the evaluation of a private platform leader [Jansen et al., 2013; Wnuk et al., 2014; Parker and Van Alstyne, 2018]. Nevertheless, evaluation models like these can also be useful to analyse the activities a certain platform leader should perform to improve the position of the ecosystem.

The assumptions of the GNT mostly fit the description of ecosystems and their governance in general. The participants collaborate in so called, 'participant collaboration processes', which are steered and influenced through structures and processes for decision-making processes [Bryson et al., 2006]. Therefore, the governance of ecosystems is seen as the steering and influencing of collaborations between ecosystem participants. In conclusion, the definition of governance of collaborations by [Vangen et al., 2015, p.8] is adopted and adjusted to suit the definition of governance in collaborative ecosystems: "The totality of interactions in a collaborative ecosystem which enable ecosystem participants to orchestrate, co-create, and, curate to solve societal problems and/or creating opportunities, with the design and use of governance mechanisms, and to account for its activities over time".

The governance model is the set of all governance mechanism, where all ecosystem participants formally or informally agree to. This also enables influencing the ecosystem in such a way, to minimise strategic behaviour. Influencing the ecosystem means the orchestration, co-creation, and, curation of the operative ecosystem [de Man, 2021], which includes keeping oversight on the ecosystem, defining the strategy to pursue a vision, and analysing which potential participants need to join for added value. The next section discusses the challenges of governing collaborative ecosystem.

Governance Challenges for a Collaborative Ecosystem

Lack of legal certainty currently impedes the transformation towards digital information chains. Critical transactions require knowing the judiciary actors (Know Your Customer (KYC)) with the highest LoA (LoA-high), while protecting sensitive data needs (General Data Protection Regulation (GDPR)). To avoid the development of decentralised, domain focused ICT infrastructures, a cross-domain public-private approach is needed. This is where a System-to-System (S2S) ecosystem initiative provides a solution to society. S2S refers to a (fully-automatised) data exchange process between organisations, where essentially no human assistance is needed for data exchange between internal information systems [Bharosa et al., 2015]. For this, information exchange functionalities allow: I) request of online users addresses and notifying actors on information exchange, II) users to query requirement specifics on exchange processes. This puts the citizen in control of their data, as aspired by many governments.

When defining an ecosystem both a technical and organisational perspective are important, as an interplay between technology, users and policy-makers takes place. For achieving an ecosystem which evolves over time, their changing needs should be adapted [Janssen and Estevez, 2013]. From a technical standpoint, an ecosystem is "a collection of complements (apps) to the core technical platform, mostly supplied by third-party" [De Reuver et al., 2017, p. 127]. From an organisational view, an ecosystem comprises a "selection of enterprises interacting to achieve the goal" [Glukhikh et al., 2021, p. 5]. Although the second definition only hints at private party interaction by mentioning enterprises, this research will take a broader stance by studying the cooperation between public and private organisations. Continuing on the characterisation of platforms as socio-technical systems [Baldwin et al., 2008], the technical infrastructure (e.g., interfaces and data standards) and the (chain) governance interact with each other [Klievink et al., 2016]. Governance can be seen as the glue between processes and structures. Processes encompass commitment delivery towards an interdependent goal, while organising trust and intent. Structures cover norms and rules that appear when making agreements on these processes [Bryson et al., 2015]. Changes in the technical infrastructure can affect the governance mutually, which might require flexibility and continuous evaluation of the chain governance to preserve the right fit [Bharosa et al., 2015].

Challenges that transformations towards digital ecosystems face are:

1. **Onboarding of (new) partners**:
   Aligning stakeholders in the collaboration is challenging, because they bring new interests and requirements. Also, the governance, and specifically the decision-making structures, must be able to adopt new potential partners. The onboarding itself will be manageble when governance mechanism tackle this challenge, and makes participation of new partners and their efforts towards a digital transformation easier.

2. **Accountability structures**:
   The previous point also relates to the transparent accountability and ownership structures of processes. Partners have various incentives to join the system, because the ecosystem needs to align with their interests and required output of the ecosystem. Therefore, how accountability is distributed in the ecosystem is vital to communicate (e.g., in the terms & conditions with a role description participating agree to).

3. **Alignment of business processes and public services**:
   The ecosystem covers digitisation of public and private IS, where public and private parties both strive for own goals. Before an operative ecosystem can be achieved, interests, commitment, and, synergies between business processes and public services call for alignment. Only when the participants (and citizens) can profit from an initial use cases, the ecosystem will prove its value to other potential adopters.

4. **Reach of the governance model**:
   Due to the state-of-the-art form of collaboration, what the governance model needs to include might differ from stakeholders to stakeholder. As not much scientific literature can back the exact governance design, finding out what processes, structures, and measures need to be included is challenging.

5. **Interpretation of an operative ecosystem functioning**:
   Improving information chains when multiple parties are involved becomes more challenging. Governance needs to ensure that the functioning of the ecosystem is evaluated upon, allowing interpretation of the ecosystem development with all participating parties. However, it can be questioned whether all parties should be involved in this evaluation. Another challenging aspect is how power of parties is allocated, and authority is represented.

Above-mentioned challenges will need to be mitigated by the governance model. Typical challenges like these are common in the field of transforming digital processes. By setting up a governance model, an operative ecosystem can be steered and challenges can be mitigated. The governance principles are partly in place to evaluate on this. The next section describes the general cycle for development of the governance for ecosystems.

Literature on Governance of Ecosystem

Current literature on describing and designing the governance model for digital ecosystems is available yet scattered. While the importance of governance is undisputed, designing a framework for a normative governance model remains challenging due to scattered scientific literature. Whether literature can prescribe the governance for a collaborative ecosystem, the following requirements should be met:

1. Have the ability to capture (life-cycle) development through time
2. Integrate external factors which influence the ecosystem
3. Recognise the context of both a public and private collaboration, and how to govern their relations
4. Provide governance mechanism adaptable to the context (not a 1-fits-all solution)
5. Prescribe governance model for a digital ecosystem
6. Assesses link between the ecosystem function (what the system does), and the governance implementation (how the system should behave)

The previous sections provide an overview of the state-of-art literature on the governance of information systems and digital platforms. Articles describe and prescribe different governance mechanism for steering digital transformations. Table 2.3 highlights all investigated papers which prescribe a governance model for digital (eco)systems.

Table 2.3: Normative governance model requirement compliance of reviewed articles

Requirements on a normative governance model	[Klievink et al., 2016]	[Kitsing and Valistu, 2021]	[Medaglia et al., 2017a]	[Medaglia et al., 2017b]	[Otto and Jarke, 2019]	[Bryson et al., 2006]	[van Engelenburg et al., 2020]	[Reggi and Dawes, 2016]	[Wouters et al., 2020]	[Mondorf and Wimmer, 2016]	[Glukhikh et al., 2021]	[Lopes and Farias, 2020]
Have the ability to capture development through time	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Integrate external factors which influence the system	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Recognise the context of both a public and private collaboration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Provide governance mechanisms adaptable to the context	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relate governance model to a digital ecosystem	No	Yes	No	No	Yes	No	No	Yes	No	No	No	No
Assesses link between function and implementation	No	No	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No

The literature provides an extensive body of knowledge on governance requirements. Nevertheless, none of the articles meet the requirements which are needed to adopt a normative model for ecosystem governance. The literature will therefore be used as a basis for forming the normative governance model, which is explored in Chapter 3.

2.4 KNOWLEDGE GAPS

To summarise, Section A.2 provides an overview of the articles, describing the result summary, and the knowledge gaps which surface. Although PPP is a much discussed topic for physical infrastructures in the academic field of public administration, economics, and management, the topic remains understudied for the digital transformations through a collaborative ecosystem. More specific, the involved governance challenges and governance model of digital ecosystems are crucial for managing societal digital transformations. Governance will support minimising the risks that emerge in collaboration and operation in digital ecosystems. Therefore, it needs to be embedded from the beginning, making alignment by all participating parties important for developing the transformation in a sustainable and viable manner. Furthermore, papers focusing on platforms developed by governments tend to analyse government to government or government to citizen interactions [Esteves and Joseph, 2008], thus neglecting other possible information exchanges between parties. Also, less attention is paid to granular levels of governance. Governance mechanism (e.g., decision-making structures, control mechanisms and incentive structures) are often applied to organisations on the same level of scale [Weill and Ross, 2005; Lopes and Farias, 2020]. However, the ecosystems develop through time, requiring different governance mechanism to adapt to different phases in time and scale as well. Next to this, stakeholder requirements, tensions, and, other power dynamics which influence the network governance (and the ecosystem in general) require renewed insights. Especially the steering over time towards an undefined governance model, requires evaluation of the governance model by looking at the consistency and performance of the ecosystem governance. Literature prescribes many values, norms, and principles for good governance [Klijn and Koppenjan, 2015]. However, little analysis was discovered of the applicability of these values, norms, and principles for the metagovernance of collaborative ecosystems. Furthermore, operationalisation for performance measuring of the ecosystem governance are yet to be studied.

The literature review also analysed tensions of governance which need to be explored for the governance of public-private MSPs. As detected in the LR, the focus of governance mechanism is mostly on private MSPs, while research efforts on the concepts of public-private MSPs are limited [Klievink et al., 2016; Bharosa et al., 2013]. A known challenge of MSPs found by Bharosa et al. [2018], is the division of shared cost of the infrastructure where the benefits of such a system are shared unequally among all stakeholders. Although solving this question will lead

to a viable ecosystem, this research will only focus on providing a broader perspective. With metagovernance the effect of values, norms, and, principles, on the governance mechanisms is evaluated, allowing the conformity of the governance model. In other words, this research will focus on designing a framework for the governance model of a collaborative ecosystem.

As the ecosystem under study is a digital ecosystem one, the focus of this study will be on a collaborative digital ecosystem. Other literature by Constantinides et al. [2018]; Kitsing and Vallistu [2021] mainly focused on the governance of private platforms, which maintain full autonomy over their decision-making processes. Besides, the focus of literature on private ecosystem is often the governance of data, which corresponds to the issues of decision-making on data sharing [Reggi and Dawes, 2016]. Whether inter-organisational design of decision-making structures, alignment processes and formal communications remain understudied, especially between public-private parties. Above all, these three governance mechanism identified by Weill and Ross [2005], apply to the design of enterprises and not public-private initiatives like a collaborative ecosystem. However, in the case of the collaborative ecosystems many public-private stakeholders need to be able to govern where a clear and efficient structure of collaboration is needed. Previous experiments with network governance by Klijn and Koppenjan [2000] concluded that public organisations remain hesitant to give up power. How governance network can be organised to effectuate service delivery is therefore valuable to research. By analysing the stakeholder interests and incentives to join such an ecosystem, the challenges to valorise trust services become clear. By taking the perspective of the GNT, the collaborative ecosystem is seen as a governance network. This allows to analyse the interactions and especially the tensions between the stakeholders in order to form a supported governance model[3]. To examine how and which governance model applies for a collaborative ecosystem, this thesis will design a framework which investigates a current collaborative ecosystems which facilitates electronic transactions through valorisation of trust servicess.

3 Other perspectives (e.g., the ecosystem perspective on software [Baars and Jansen, 2012], or openness [Jansen et al., 2012], economic perspectives on network effects and platform governance [Song et al., 2018], or, meta-organisations [Kretschmer et al., 2022]) could also apply, but were not chosen

3 A CONCEPTUAL FRAMEWORK FOR DESIGNING ECOSYSTEM GOVERNANCE

3.1 TOWARDS CAPTURING THE GOVERNANCE OF A COLLABORATIVE ECOSYSTEM

For the enhancing and establishing an ecosystem governance, the identified gaps in previous chapter are bridged. How an ecosystem develops, and which components are relevant for a governance model is at the centre of this section. This requires to link the current scientifical governance models and frameworks with the requirements for an improved framework for public-private ecosystem governance. As this research follows a DSR approach, the framework is refined by applying it to the case study in Chapter 5.

3.2 COMPONENTS OF THE DEVELOPMENT OF GOVERNANCE IN COLLABORATIVE ECOSYSTEMS

The components influencing the governance of an ecosystem are visualised in Figure 3.1, highlighting its cyclical development. As [Thomson and Perry, 2006, p.22] describe, a cyclical development of collaboration is inherent to the collaboration process. While their framework applies mostly for public administrators, the cyclical process of collaboration should also be adopted for the framework towards an ecosystem governance. The cycle consists of four components, which are related to each other. The focus of this thesis is based on four components which are distilled from five papers: I) a governance model [Tiwana, 2013; Medaglia et al., 2017a], II) power dynamics [Bryson et al., 2015; Medaglia et al., 2017b], III) ecosystem characteristics, and, IV) governance consistency [Jansen et al., 2013] (see Figure 3.1).

An important notion earlier made, reflected upon the development towards a collaborative ecosystem where ecosystem participants can do electronic transactions through digital trust services. To ensure this, (in)formal agreements will be needed to structure a system of agreements. The **governance model** deals with structuring the decision-making on these agreements, how they are made, and revised. Examples of governance model aspects are decision-making processes and formal communication between parties [Weill and Ross, 2005]. This contributes to arrangements between public and private parties in an efficient and effective way [Provan and Kenis, 2007]. To steer the (unknown) changes within ISs, a governance ideally also defines how the governance itself can be changed [Bharosa et al., 2015]. The **governance consistency** evaluates the governance model through various quality measures. Klievink et al. [2016] recognise governance reduces the behavioural complexity by organising arrangements between actors to allocate decision-making, manage shared resources, and enact mechanisms for coordination and resolution of differences. Bharosa et al. [2013] also acknowledge the interdependencies between stakeholders within the information chain which need to be shaped by design choices. These **power dynamics** make designing a governance model challenging, as they affect the ecosystem, and the governance model itself. This uncertainty of the both the 'rules of the game' and the 'rules of the architecture' makes the governance model itself also subject to change [Bharosa et al., 2015; Medaglia et al., 2017b; Glukhikh et al., 2021]. Figure 3.1 provides a visualisation of the governance development in ecosystems, where Section 3.2.1 will zoom in on the phases of the governance for ecosystems.

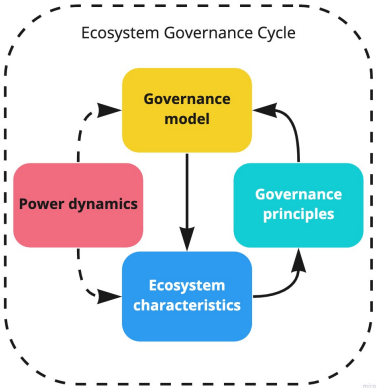

Figure 3.1: The development cycle of governance in collaborative ecosystems

Governance Model

The governance model is the collection of governance mechanisms which is designed to influence the ecosystem. The mechanisms are designed based on both the literature on the governance for ecosystems of MSPs, and the and the requirements for the ecosystem at hand. The latter form of requirements is dependent on the characteristics of the ecosystem. These characteristics are in their turn dependent on the context the ecosystem operates in. How these different characteristics can be assessed to construct a coherent governance model, is discussed in Section 3.4.

The governance model contains several levels (general, chain, and domain governance). This research takes a general stance, by concentrating on the relation between the requirements of proper governance and governance mechanisms.

Power Dynamics

Power dynamics relate to multiple factors which cannot be steered directly, while they have an impact on the governance model and the operational ecosystem. The private led coalition requires cooperation of public parties to achieve a collaborative ecosystem. Their interests, resources, and governance translate to tensions in the coalition [Medaglia et al., 2017b], which impact collaborative processes and structures [Bryson et al., 2015]. To reduce tensions, outlining these requirements and recognising goal interdependence are fundamental to design the ecosystem governance. The work of Bryson et al. [2015] describe multiple aspects that recapitulate on the endemic tensions which are likely to influence public-private collaboration. The theoretically validated tensions in scientific literature form a base to allow the classification tensions which are found empirically. Ideally, conflict must be prevented beforehand, by avoiding tensions. Conflicts can come from differences in stakeholder goals and incentives, or strategic and tactical ecosystem operation.

Ecosystem Characteristics

The operative ecosystem is an ICT platform which facilitates electronic services through a public-private collaborative network. To operationalise this broad definition, this thesis uses a set of characteristics which classify the type of ecosystem dependent on several characteristics. By narrowing down the solution space of all the ecosystems the framework can be applied to, a customised governance mechanisms can be designed which match a comprehensive governance model. Section 3.4 will distil the characteristics of the ecosystems to which the framework can be applied to.

Governance Consistency

The governance consistency of a collaborative ecosystem serves three purposes to acquire a well-functioning governance. Governance consistency generates governance requirements for a mature governance model, while also controlling whether the operative ecosystem lives up to its objectives. So, firstly, consistency concretise how a governance model must implement values like transparency, inclusiveness, and, participation. Governance consistency generates requirements on how proper governance can be organised. Secondly, these principles can also be used as iterative evaluation of the ecosystem's functioning. How the ecosystem 'scores' on openness and accountability, for instance, can reveal to decision-makers what can be improved.

Generating requirements for a governance model will call for a definition on what proper governance of an ecosystem means. Proper governance are fundamental governance values, norms, and, principles, which allow ecosystem evaluation and governance model conformity. The codes for proper governance are seen as a generic list, and serve as guidelines, which can be implemented through specifying them to various governance mechanisms. Governance mechanisms can relate to multiple values of proper governance, which can be described as a one-to-many relationship. Therefore, the values of proper governance does not generate a list of governance mechanisms, but rather a list of governance requirements. To implement the codes for proper governance, governance mechanisms should conform to these governance requirements. While ecosystems have different characteristics, the governance requirements serve as a template for designing governance mechanisms for a specific ecosystem. By taking the codes for proper governance into account, generic governance requirements are formed for the design of a mature ecosystem governance model. The principles determine the values of proper governance, where the requirement can be seen as a prerequisite needed to implement the principle in a certain governance model. This is useful for the designing the governance mechanisms which will eventually form the governance model for an ecosystem at hand.

When the functioning of a operative collaborative ecosystem must be controlled, the principles of proper governance can evaluate the performance of all ecosystem participants. Whether the users and providers on the ecosystem are behaving as prescribed, can be monitored with the values and norms which the ecosystem strives for. The governance can be structured as such that participants are stimulated or penalised, depending on whether participants behave accordingly. This makes room for interactive learning, where stakeholders can learn from each other (more on this in Section 3.2.1).

Thirdly, principles are often related to each other. Therefore, trade-offs in decision-making can reflect on the different considerations in a specific phase. According to Kooiman and Jentoft [2009], reflection on the governance principles makes choices in the governance design easier. It is expected that these principles change overtime, as their priority can change during different phases of the development and operation of the ecosystem. Therefore, a mature governance model must be able to adapt and evolve, as changes of stakeholders, technology, and processes will occur [Kofman et al., 2009]. Next to an adaptable governance, auditing should be organised to provide feedback and control on certain ecosystem decisions for the governance model. Auditing here is seen as an internal or external examination of the ecosystem. But, changing the governance model based on this examination should be balanced. Because not all decisions will not reflect on all values of proper governance, inconsistencies in the ecosystem decision-making could result in failure of the system [Giardino et al., 2014]. Various studies have been conducted to evaluate the governance of software development [Bannerman, 2009; Chulani et al., 2008]. However, this research will focus on the evaluation of the governance consistency of an ecosystem, focusing on following 3 aspects: 1) values, 2) norms, and 3) principles. While this operationalisation is still understudied, the case study will make the values explicit by putting the norms into practice. In addition, the development of the governance principles is an incremental transformation through time. As was stated, the governance principles follow from prescriptive values and norms. Also the other three components of the governance are transforming overtime.

3.2.1 Notion of Phasing

Before moving on towards a framework, the transformation of the ecosystem governance components must implement the notion of phasing. Phasing is seen as the development of the functional (technical) architecture, and the application and design of the governance model through time. A report by NSOB partly describes how public organisations can take a stance in their position to achieve a societal change [1]. Broadly speaking, two phases are identified in governmental process management: I) experimenting, and II) scaling. These phases never happen 'on their own', as it depends on the way public and private stakeholders position themselves in the process. A government body can have different approaches towards their positioning in the experimental and scaling phases, depending on the public role they want to fulfil. This public role is dependent on the goal of the experiments, and the goal of scaling. The report supports public organisations to plan their strategic positioning and make choices in the way to experiment and scale. But the choices on experimenting and scaling for ecosystems facilitating trusted services are done in public-private setting.

Thus, this development is twofold: it encompasses I) a descriptive aspect of how the system operates according to the designed architecture, and, II) a normative aspect of how the system should operate according to the prescribed governance model. There is a distinction between the implementation of a governance design of the ecosystem, and the actual functioning of the ecosystem. The designed governance of the ecosystem is the implementation of steering processes, which influence all interactions and thus ecosystem functioning. Thus, governance mechanisms are implemented to influence the actual functioning of the two aspects of the ecosystem: the collaboration process of participants on the ecosystem, and, the decision-making processes of the ecosystem. The rules of engagement, and the rules of the game are part of the governance model.

When looking at the value of trustworthiness, the distinction between implementation and functioning becomes clear. The trustworthiness of the former form, has to do with the trust between the parties on the ecosystem. This is characterised by the relationships between parties. The structures and processes can be designed to increase the trust between parties. The latter form of trustworthiness has to do with the trust implemented in the (technical) architecture of the ecosystem itself. For the alignment of the goals of the ecosystem and the goals of the governance, it is essential to reflect on this difference.

The notion of phases towards an operative collaborative ecosystem is visualised in Figure 3.2. The framework is the fundament, where this model also reflects on the two phases of experimentation and scaling, and the development of values towards governance principles. Finally, a mature governance model steers an operative collaborative ecosystem. Power dynamics have an effect on the ecosystem and the governance model. The governance consistency principles are seen as the previously mentioned mechanism of feedback which can be adopted by the mature governance model. The final phase of an 'operative governance phase' is a goal which is strived for. It resembles an ideal situation, also known as the 'to-be' situation. The phases develop organically. An experimental ecosystem might grow towards a scaleable ecosystem with multiple users, prove to require modification, and therefore going back to an experimental ecosystem.

The following sections will discuss the three phases of the ecosystem governance cycle: I) governance development phase (Section 3.3.1), II) unknown transitional phases (Section 3.3.2), and III) operative governance phase (Section 3.3.3).

3.3 A FRAMEWORK FOR CAPTURING THE DEVELOPMENT OF GOVERNANCE IN COLLABORATIVE ECOSYSTEMS

The framework is applied in three phases to enhance and establish a mature governance model for an operative collaborative ecosystem. It is put into practice by; 0) setting the scope and context, I) create a descriptive design, and II), prescribe a normative design. By capturing the

1 'Experimenting and upscaling' by the NSOB

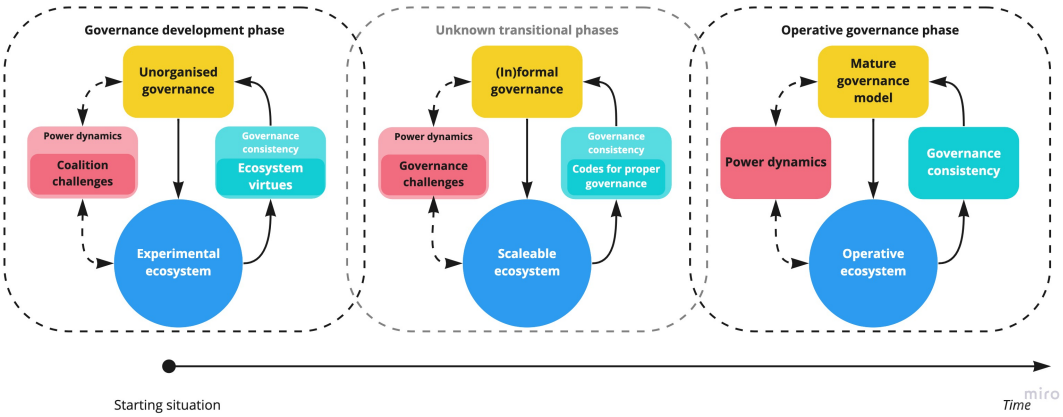

Figure 3.2: Phases of the development of governance in collaborative ecosystems

life-cycle development of an advancing ecosystem case, identification, and categorisation of components influencing the case is feasible.

A governance is not limited by the boundaries of an ecosystem. Everything having an impact on the ecosystem, no matter which phase it is in, will relate to the governance of that ecosystem. Therefore, setting a boundary on the governance model is important for scoping the research. The first phase sets this ecosystem scope, and discover the starting situation of the ecosystem. The second phase will describe the current ecosystem, together with its (in)formal governance model. The third and final phase prescribes the 'to-be' situation of the ecosystem, by designing governance requirements to mitigate challenges identified in the previous phase. Also, these normative requirements will support the evaluation of the governance model, validating its performance on the ecosystem.

The framework coordinates the development of interaction between various user groups and specifies decision-making processes regarding usage and selection of trust services stimulated through the supportive infrastructure. A governance model is the collection of instruments (i.e., governance mechanisms) which stakeholders implement to steer the direction of ecosystem development. In this research, the framework is also including endemic tensions, described as power dynamics, on which stakeholders do not have control. Before moving on to the components of the conceptual framework, the challenges that digital transformations towards a digital ecosystem are identified.

3.3.1 Governance Development Phase

This phase can be seen as the beginning towards an operative collaborative ecosystem. Due to the availability of technology, stakeholder knowledge, and the potential of a future ecosystem, a will to collaborate between parties can be identified. At this point, the ecosystem is still in experimental phase while it is not customised for all party needs. The coalition of the willing is still in development, as interested parties can still participate and no commitment is given on clear collaboration processes and structures. The collaboration is prone to coalition uncertainties and tensions, requiring alignment of the needs, incentives, and goals of all participants. The distinction made in Section 3.2.1 is also implemented in the components of the phased governance cycle. The governance component is seen as the steering of the ecosystem (also known as the governance implementation), and the operative ecosystem is the actual functioning of the ecosystem (also known as ecosystem functioning). The following description on the phase components will clarify this.

Unorganised Governance

In the initial phase of the governance cycle, the coalition is collaborating as they believe in an ecosystem idea built on available technologies and services which supports their needs

[Glukhikh et al., 2021]. At this phase, no governance model is structured, because participants want to check individually whether the idea fulfils their own needs. This will decide on whether they want to contribute to this ecosystem or not. Therefore, the collaboration structures are still undefined, and coalition parties do not formally show commitment in this phase. This makes interaction between the involved participants erratic and unstructured [de Bruijn and ten Heuvelhof, 2018], where the objectives of the ecosystem are still in development. The involved participants form a 'coalition of the willing'. This is a group of stakeholders envisions a certain functioning system, i.e., an ecosystem for qualified trusted services. This supported infrastructure containing the governance and technical architecture of the ecosystem is still under construction. As there is no agreed structure of collaboration and collaborative processes forming a governance, participants can influence both the design of the governance and the functioning of the ecosystem itself. Alignment of their differing interests is required to form this supported infrastructure, leading to coalition uncertainties and tensions.

Coalition Challenges

Before stakeholders collaborate and commit to a governance model, different interests, resources, and individual governance structures influence their relations. These relations can be positive due to trust, resulting in the trade of goods and services between two parties. Relations can naturally also be negative, resulting in mistrust between parties. This affects the collaboration between parties, making it difficult to start developing a balanced governance model for an ecosystem. Therefore, 'coalition challenges' will shape the collaboration structures and collaborative processes. The challenges can be split up in two: I) coalition uncertainties, and II) coalition tensions. When the tensions are not managed correctly, they can erupt into conflicts [Bryson et al., 2015]. Conflicts often arise due to opposing interests and needs which cause tensions. When no consensus can be found, it is unlikely parties will come to an agreement. Therefore, conflicts need to be confronted or avoided. By confronting the uncertainties with discussion an agreement can be forced. When avoiding these uncertainties, participants do not make a decision, with the chance of disrupting the ecosystem in future phases. This complicates the collaboration towards a mature governance model. So, before a formal governance of a public-private ecosystem can be formed, coalition tensions should be mitigated. This means that parties must find a balance between their (competing) relationships, interests, and resources. If this balance cannot be found, it is likely that parties will abandon the coalition.

Experimental Ecosystem

The ecosystem is yet to be constructed, which means that the coalition of the willing is in the designing process of the governance model and the technical architecture. The experimental ecosystem is the descriptive aspect of how the system operates, with a focus on: I) the collaboration process between ecosystem participants, II) the decision-making process, and III) the technical functioning of the ecosystem. While there is no formal governance model, the experimental ecosystem is fundamental for the actual design of the operative ecosystem. Participants have influence in the ecosystem design by proposing decision-making processes for the governance model, and solutions for the technical architecture. In this phase, also new participants can be invited to join the coalition. The participant might require evidence of the ecosystem functioning, in order to be convinced of joining. However, the coalition is still reluctant for potential participants, because they can largely structure the design of the ecosystem.

Ecosystem Virtues

The ecosystem functioning is steered through the governance model, whereas the technical architecture of the ecosystem is developing based on the perceptions of the participants. The governance model develops towards a(n) (in)formal governance in the next phase, after which a mature governance model is constructed. Although the technical architecture will not be designed in this thesis, it will be taken into account for the design of the governance. As Chapter 2 put forward, the technical architecture and the governance design need to fit. The fit between

the experimental ecosystem and the governance must be evaluated in terms of the consistency of the governance. The governance consistency evaluated the ecosystem performance in terms of the ecosystem virtues, and the codes for proper governance. The ecosystem virtues characterise the values, norms, and principles which a functional ecosystem must strive for. These relate to the performance of the technical design choices. The codes for proper governance relate to the values, norms, and principles of the decision-making process, reflecting on the performance of the governance itself. All in all, striving for good governance necessitates the 'institutional underpinning of efficient economic and political management' [Grindle, 2010].

The ecosystem pursues certain objectives, which are essential to its functioning. Values are general qualities the desired system should have. These are the starting point on which prescriptive norms follow. Prescriptive norms are "a principle of right action binding upon the members of a group and serving to guide, control, or regulate proper and acceptable behaviour" [Merton, 1973, p.269]. By forming prescriptive norms, a norm-based governance strategy can be organised, which can serve as instrument to overcome governance challenges [Raymond et al., 2021]. Norms are often unwritten codes of conduct by which a group is expected to live by. In this case, the norms will be written down. Firstly, by stating which values the ecosystem pursues, the prescriptive norms are defined and coupled to the values. Secondly, the prescriptive norms form a basis for the governance consistency. In the end, a principle can be defined, which is a normative and functional requirement of the governance which comprises the value it originated from. As the principles will vary between ecosystems, it is important for the scope setting to do this in the first phase of the framework. In the end, these values form the basis of the governance consistency, which will be concretised depending on the specific ecosystem characteristics.

3.3.2 Unknown Transitional Phases

The second phase of the framework is rather ambiguous, while the structuring of chaotic governance processes from the previous phase towards a formal governance develops organically. The governance develops by means of recurring collaboration processes, decision-making on the span of governance, and aligning the interests of stakeholders. Participants of the ecosystem are collaborating in a structured way, enabling commitment of current and potential parties, and shaping the 'rules of the game'. Therefore, the experimental ecosystem of previous phase can develop further towards a functionally operative ecosystem which can provide public or business value for the involved participants. To do this, the ecosystem might experiment with different ecosystem functions to a scaleable system. Although the system might already provide value, the lack of a mature governance model limits the ecosystem from scaling towards new domains with potential participants. The uncertainties and tensions of the coalition are either overcome, or participants abandoned the collaboration. Nevertheless, the current coalition is still subdued to uncertainties and tensions, but challenges are much more endemic of character. This means collaboration challenges are relatable to the efficient and effective functioning of the ecosystem, which requires the continuous process balance between two opposites related to governance (e.g., inclusiveness versus efficiency). This phase also makes other values explicit which derive from the codes for proper governance. When not managed correctly, tensions between these values could lead to the failure of the ecosystem.

(In)formal Governance

The governance of the ecosystem can be both identified as formal and informal. Some parts of the collaboration processes become regular, which shapes the structures towards an informal, and eventually formal, governance model. For the classification of governance mechanisms, this research adapts the three dimensions of governance from Tiwana [2013]. The three dimensions revolve around: I) decision rights, II) formal and informal control mechanisms, and III) incentive structures. Decision rights assign authority and responsibility of certain decision-making processes to participants of the ecosystem. Formal control mechanisms are seen as the tools to align the ecosystem participants with the values where the ecosystem and its governance strive

for. Formal control is exerted through three mechanisms: I) gatekeeping, II) process control, III) metric control. Relation control is the fourth informal control mechanism. Relation control is governing the ecosystem by organising alignment between parties through the creation of a shared culture with supported values and norms [Tiwana, 2013].

Signing a contract or agreement is a formal way of showing commitment to mechanisms forming a governance model. Other formal, but less stringent, commitment can also given by signing a Letter of Intent (LoI) or a Memorandum of Understanding (MoU). These mechanisms will develop trust between parties, stimulating legitimacy and a shared understanding of the problem. Collaborative processes increasing the trust between parties will stimulate the development of collaboration structures, which is fundamental for organising a mature governance model.

The initial interests of an ecosystem participant largely determines their primal level of commitment. But moving towards the realisation of a scalable and operative ecosystem only occurs when the experimentation proves to suffice participant needs and demands. Participants will commit, because the public or private value (e.g., data security of citizens, or monetary business value) of the ecosystem can be scaled and gained. This makes it possible for participants to prove internally why it is worthwhile to join the ecosystem. Also evidence can now prove the value of joining for new external participants. With that, informal governance mechanisms can become formal governance mechanisms. When participants agree on this, the governance mechanisms need to prove their value to the ecosystem. Therefore, not all informal mechanisms which organise the collaboration process lead towards a supported governance model. Nevertheless, integration of informal governance mechanisms in the governance model is still important for these ecosystems [Klievink et al., 2016]. Because these mechanisms reflect on collaborative processes based on values and norms, the weaknesses of traditional governance models with a command-and-control strategy can be undermined.

Governance Challenges

The challenges in this phase are more characterised by the way in which parties collaborate together in this phase. While the coalition tensions and uncertainties of the previous phase have already been identified, the tensions and uncertainties of this phase relate to the governance and scaleable ecosystem component of the framework. Although these can result from the coalition challenges of the previous phase, they can also emerge from the way the ecosystem will scale. The uncertainties and tensions are endemic, meaning that the opposing needs and incentives of the stakeholders are ongoing, and apparent during the scaling of the ecosystem.

Scaleable Ecosystem

After the starting situation provided evidence of successful ecosystem experiments, the ecosystem can scale towards wider domain functioning with the support of participants. This means that more ecosystem users start adoption within the same information domain, which is also known as vertical scaling (e.g., new information providers in the housing domain adopt qualified signing). Horizontal scaling is the other form, where the ecosystem expands towards multiple users in other domains (e.g., new information providers in the financial domain, next to the housing domain, adopt qualified signing). The design of the governance model and the technical ecosystem architecture must enable such expansion. When the ecosystem provides value for multiple ecosystem users, it does not automatically mean the system is a scalable one. Therefore, the ecosystem must be redundant and resilient. Redundancy means the ecosystem functions in the same way for multiple users, standards can prove to be suitable here. Also, redundancy enables the ecosystem to have a fallback mechanism, when for example an important participant decides to terminate the collaboration. Resilience has to do with the capability of the ecosystem to resist sudden changes. The ecosystem can scale better when it can withstand and adjust to shocks by rapidly providing the same functioning without being deformed. The move towards a proven scalable ecosystem is not a sudden one, but adopts slowly as it provides more value towards various domains. When the ecosystem does not function according to participant needs, the system might go back to the experimental phase.

Codes for Proper Governance

The codes for proper governance should consist of reports and examples from both public and private organisations which describe how an ecosystem should be governed. The source of these codes should vary from scientifical literature, to programs by ministries or corporates with practical examples on governance requirements. These requirements assist setting governance requirements and priorities in what the ecosystem should be striving for on strategic level.

This thesis will apply a concise list of different 'codes for proper governance'. The 'codes for proper governance' is a collection of reports and literature, often describing the public and private principles and requirements for proper governance as prescribed by Section 3.3.1. This is done to implement an inclusive yet focused set of governance principles for a digital ecosystem. Here, reflection of both the private and public sector is integrated, while both parties must be represented in the governance. The values for proper governance are constructed based on 4 reports on good governance. After structuring the values, the prescriptive norms can be determined which should prevail in the governance of public-private ecosystems. The norms describe what behaviour the ecosystem governance is striving for. Operationalisation of the norms is done with the construction of principles for proper governance of an ecosystem.

The list of values for proper governance of this research is an aggregation of the following codes of good governance:

1. 8 Characteristics of Good Governance by the United Nations [2]
2. Code of Conduct containing 7 rules of public governance by the Dutch Ministry of Internal Affairs [3]
3. 12 Principles of Good Democratic Governance for improvement of service delivery to citizens [4]
4. 12 Principles of Good Governance for cross-domain organisations by the governance forum [5]

3.3.3 Operative Governance Phase

The final phase of the framework is the operative governance phase. As can be seen in Figure 3.2, the components of the operative governance phase transform towards: a mature governance model, power dynamics, an operative collaborative ecosystem and governance consistency principles. The final phase of the governance cycle is forming a descriptive and normative analysis of respectively the forces and behaviour on a collaborative ecosystem, and the governance mechanisms which can influence the steering of the ecosystem. This phase refers to a mature governance model as a certain level of governance maturity is reached. This means that the ecosystem has implemented and adopted a governance model which structures, for instance, the rules-of-the-game, decision-making processes, and other ecosystem functions. The model presents a method to measure the principles of the governance consistency as part of a metric. Therefore, the mature governance model is also capable of providing insights on the performance of the operative ecosystem. In this phase, participants commit to a collaborative ecosystem where a supported and mature governance model is in place.

Mature Governance Model

As explained by Kooiman and Jentoft [2009], the governance should integrate the process of learning with 'interactive learning'. This is achieved when participants are able to learn from each other's learning. Here, it is important to be able to shape the development of the governance and the 'change process' itself. In the first place, the framework integrates this by taking the phases of the governance development into account. The transformation towards a mature

2 United Nations Economic and Social Commission on Good Governance
3 Code of good public governance by the Dutch Ministry of Internal Affairs and Kingdom Relations
4 Strategy for Innovation and Good Governance at Local Level, by the Council of Europe
5 Principles of good governance by the governance forum

governance model is a process of change and a learning process itself. Secondly, the governance consistency principles pose as a metric which evaluates the governance model through constructed guidelines to follow. This instrument supports participants by measuring the ecosystem performance, which feeds back towards the formal instruments of governance. Participants can actively take part in the learning process, and steering can be applied. Therefore, the mature governance model conforms to the principles of good governance, which are described in the governance consistency. This makes the final governance model of the operational ecosystem more mature.

Power Dynamics

Power dynamics are the factors which cannot be steered, while they have an impact on the governance model and the ecosystem. As the ecosystem is now scaled and functional in (multiple) information chains, it relates with the societal system boundaries which are wider than the governance challenges of previous phase. The power dynamics not only reflect on challenges related to the cooperation and steering of the ecosystem, but also on the societal changes which affect the ecosystem. The power dynamics consist of an external and internal dimension. The external dimension consists of the following factors: social norms, regulation, market, and, technology. The internal dimension encloses: governance tensions and governance uncertainties. These factors remain, as the governance challenges are endemic. The contents of these governance challenges will also evolve, while challenges transform through time.

Operative Ecosystem

The operative ecosystem in the operative governance phase is the desired situation. In this desired situation, the ecosystem is up and running, where the participants collaborate with each other with a decision-making process and a technically functional ecosystem architecture. Contribution from the participants through the ecosystem creates value for public organisations, private parties, and citizens. Parties contributing and committing to the system ensure proper functioning, which is controlled by the governance model which partly describe the rules-of-the-game. It is the goal of ecosystem to develop further in new (business) domains, making this phase infinite. It is sought that the playing field the ecosystem operates in, is always expanding by attracting new potential participants. The governance model provides steering mechanisms for this, and should inherit this adaptivity trough time. This is where the governance consistency principles support the evolution of the ecosystem too.

Governance Consistency

A healthy ecosystem which can grow and operate in a controlled manner, needs rules of engagement where participants act in line with. Also, the operation of an ecosystem infrastructure, consisting of decision-making processes and a technical architecture, is better organised when implementing supported principles in a governance model. These principles can be advantageous, especially for complex, qualitative, and incalculable problems [Brous et al., 2016]. By modifying the definition of a principle from Bharosa and Janssen [2015], the definition of a governance consistency principle converts to a "normative, reusable and directive guidelines, formulated to inform, and, support the way in which an ecosystem sets about fulfilling its objective(s)". The formulation of these governance consistency principles also follow the criteria for a good enterprise principle by TOGAF, created to standardise Enterprise Architectures for more efficient and effective digital operations [6]. The principles must be: understandable, robust, complete, consistent, and, stable. In addition, the principles fit with checking how mature the ecosystem governance is. Therefore, the principle must also be measurable and enabling the participants to act upon the principle. In the end, this will support the tracking and steering of an ecosystem governance and the performance of the ecosystem itself.

6 TOGAF® Standard, Version 9.2

3.4 FRAMEWORK APPLICATION

This section will describe how the framework will be put into practice, by analysing the required data input, finding the appropriate 'tools' for data extraction and analysing what the required data output is. Firstly, by zooming in on the specific phases of the framework, the relevant components are categorised. This creates an overview of the required data input which comes from a case study. The assessment of analysing the required data input and output will provide an overview of methods of data analysis which must be done to create the required data output. Finally, this data output will contribute to the structuring of a mature governance model which can be evaluated. The governance consistency evaluates the functioning of the operative ecosystem, making it a qualified mechanism to measure and validate the performance of the ecosystem governance. This will feed back to the mature governance model. In a mature governance model, parties commit to governance mechanisms which manage, structure, and, design (innovative) collaboration processes. In the end, Table 3.1 describes the three phases in terms of all objectives, study foci, and, deliverables over the course of the three phases.

Table 3.1: Application of the framework in three phases

	Phase 0		**Phase I**		**Phase II**	
Step	1. Scope setting	2. Map contextual overview	3. Describe supported components	4. Describe challenging components	5. Prescribe mature governance	6. Assess governance evaluation
Objective	Find out whether the framework can be applied to the case study	Understand the factors affecting the governance to comprehend the ecosystem context	Distil how the governance steers ecosystem scaling	Relate governance challenges and principles affecting ecosystem scaling	Design governance mechanisms which pursue relevant governance and ecosystem values	Evaluate whether and how ecosystem governance performs
Study focus	How does the ecosystem relate to the framework and in what state is it?	How can the ecosystem context be defined?	Which components contribute towards a scaleable ecosystem governance?	Which components affect a scaleable ecosystem governance?	What governance mechanisms fit the ecosystem and governance values?	How is the ecosystem governance expected to perform?
Deliverable	Scoped governance setting	External power dynamics and ecosystem values, norms, and, principles	Description of scaleable ecosystem requirements, ecosystem characteristics, and, governance requirements	Description of power dynamics, governance challenges, and, codes for proper governance	Collection of governance mechanism requirements, operative ecosystem characteristics	Evaluated governance model and governance consistency

The first phase will structure scope of the case study data to create a scoped setting which requires a governance model. Hence, if and how the framework relates to the case will be determined. Step 2 in phase 0 enables the dissection of case study data in terms of the framework components. The framework already hints to the interrelation between these components, the causal relations between components is not of interest here. The qualitative output of this is used in step three (phase I) of the cycle. Here, the context of the case allows describing the supported governance and ecosystem characteristics which structure the fundaments of the ecosystem governance. This allows to review the (in)formal governance model which is currently in place for the case study. In step four, interviews allow classification of the challenges, (in)formal governance mechanisms, and the values of proper governance. A gap analysis in phase II will compare which governance challenges are addressed in the governance model, and which are not. From this, a normative design will follow. This phase apprises of the requirements and mechanisms for a mature governance model. This also includes the governance consistency for the measuring the ecosystem governance performance. This evaluation mechanism consists of principles based on the generic values and norms for proper governance. In addition, the adoption of ecosystem virtues form a significant measure of the specific values the ecosystem pursues. These are case study specific, and require alignment with the values a proper ecosystem governance is striving for. This way, the governance consistency evaluates the mitigation of all power dynamics which affect a collaborative ecosystem. The rest of this section will zoom in on the components of three phases, allowing refinement of the data in- and output requirements.

4 CASE STUDY

The following sections will focus on a comprehensive explanation of the case study approach and how the Trusted Information Partners case suits as a testing ground for applying the framework. The Section 4.1 explains the methodology of the thesis. Apart from the case study selection, the data collection strategy will also be explained. In Section 4.2, the case study will be introduced by giving a description of its intentions, the current status, and how TIP can alleviate the earlier identified knowledge gaps by contributing knowledge on collaborative ecosystem. Secondly, the case study approach will be substantiated by arguing for why it fits within the research goals of this thesis, and what case study type the selected case belongs to.

4.1 CASE STUDY APPROACH

The Trusted Information Partners (TIP) initiative is the chosen case study of this research. TIP is a Dutch public-private collaboration initiated by the private housing market sector with the aim to digitise information exchange between public and private organisations. Organising this technically is already possible, because existing technical solutions can enable the digitisation. The challenge here is the organisation of a fair and well-functioning governance model, where all stakeholders formally agree to. While this collaboration is in the need for a mature governance model, it fits as a case for the main unit of analysis. The definition by [Yin, 2012, 6] describes a case as a bounded entity (i.e., behavioural phenomenon by various organisations) with a blurred boundary between the case and its contextual conditions. The constructed theoretical framework guides the unknown timeframe of the case to improve clarity between TIP and its ambiguous temporal dimensions. The objective of the case study approach is to make an "empirical inquiry that investigates a contemporary phenomenon (the 'case') in depth and within its real-world context" [Yin, 2014, 16]. By investigating the TIP initiative as a contemporary phenomenon, an in depth descriptive analysis of the case is possible. Furthermore, data analysis of this descriptive analysis effectively contributes to the characterisation and evaluation of the contextual factors which influence the TIP case study [Hollweck, 2016].

The case entails analysis of both public and private parties which form a coalition to improve the trust and security of information chains in the housing domain. Data gathering rested on several collection methods. First, a document analysis was performed based on public and private documents, meetings, and informal talks on policy, architecture, and governance. This allowed analysis on the *as-is state* (the current state of collaboration and architecture), and the *to-be state* (the prospected end state of collaboration and architecture) of the ecosystem. Secondly, 14 one-hour interviews with ecosystem partners and consultants supported this document analysis. Stakeholders are questioned on: success perspectives, incentives to join, and governance requirements from a strategic, organisational, and technical perspective. By using a semi-structured format, requirements were extracted by their interpretation how values of the ecosystem should be implemented with concrete governance mechanisms. By applying the framework, the considerations between mechanisms and the influence of external factors will be assessed. Qualitative coding is used for the processing and gathering of data. This allows a qualitative analysis of the case study. Through interviews, the gathered data can be categorised, labelled, and grouped in order to find patterns. The iterative process of comparing scientifically validated governance requirements with empirical requirements, allowed cross-checking of the case with the literature. Finally, a validation will be performed to evaluate whether the frame-

work fits the expectations of case study stakeholders. This also supports answering the final research question by reviewing whether the framework could be improved.

4.1.1 Case Selection

The application of the framework to the TIP case study enables a real-world application of the framework within the current developments of the case. This improves the confidence of the findings [Yin, 2012], where the practical environment underpins the development of an artefact (i.e., a framework). The qualitative case study is a single case study type I as described by Yin [2014], due to the fact multiple organisations are analysed in a single context. The case represents a holistic analysis, as the framework is applied to a single unit of analysis within the case. Although multiple organisations are interviewed for different perspectives, the intervention of integrating a governance model is the same.

The criteria of the case study selection are in line with the objective of this thesis. While the functionalities of this ecosystem are clear, the governance requirements ensuring proper decision-making and collaboration processes for an operative TIP ecosystem, provide less definite guidance. Yet, for a well-functioning ecosystem which mitigates affecting challenges and safeguards public and private values, a fitting governance model is crucial. Hence, the case revolves around a collaborative digital ecosystem, which requires a governance model to stimulate and raise the level of legal certainty and level of assurance of digital data exchange. Table 2.3 highlighted that literature does not often relate to digital ecosystems, let alone digital ecosystems for facilitating trusted services, while perceptions on its definition vary. Secondly, another selection criterium was the notion of interdependence of resources, where a technical and organisational components need to be integrated by parties representing both public and private interests. Finally, the selected case must require the need for a mature governance model, as a governance is missing or lacks the three evaluative criteria for a good decision-making process [de Bruijn and ten Heuvelhof, 2018].

4.1.2 Data Collection

Data collection for the case study is done through interviews, document analysis, desk research by using grey literature, and, a validation workshop. Literature is mostly found at scientific sources and internally at the graduation firm of the researcher in the form of documents and informal discussions. Therefore, three pitfalls for the use of data should be taken into account: I) use of classified sources, II) adopting conceptual ecosystem drafts as scientific facts, and III) be subjugated to bias. The first pitfall can be mitigated by checking whether sources are allowed to be published with the external supervisor. Because the company makes clear distinctions on confidentiality, not many difficulties are expected. The second and third pitfalls are harder to overcome. Currently, decisions on ecosystem governance are still under development, thus subdue to possible changes. Therefore, this research should pay attention to finding stakeholder tensions and requirements which can be validated with literature. Otherwise, findings could be biased due to a single-sided stakeholder perspective. This can also reduce the last caveat mentioned. When a proper description of an ecosystem governance can be given, the knowledge gap of PPC governance mechanisms will be addressed. The outline of all input data of the case study can be found in Table 4.1.

Selection of Interviewees

Data is partly gathered through 14 expert interviews, consisting of the participants of TIP. Per organisation one expert is interviewed in a one to one-and-a-half hour sessions. The interviews were held online in the months of November and December. Invites were sent to all stakeholders of the TIP collaboration which also participated in the monthly held strategic meetings. These participants were chosen, on the assumption that their knowledge of the collaborative and individual objectives were already formed making their insights valuable for the case study. Here, the participants of the general governance is reflected by questioning all involved parties.

Table 4.1: Outline of data used in the case study

Collection method	Data type	Data substance
Document analysis	Papers, description, presentations	Materials containing the description of the current and future functioning of TIP since February 2020 (N=19)
Interviews	Transcript	Transcripts of interviews with TIP participants and strategic implementors November and December 2021 (N=14)
Validation workshop	Workshop proceedings, recordings, and, survey	Interactive workshops with TIP participants validating the governance workshop March 2022
Meeting attendance	Meeting notes, official records	Meeting notes from meetings held by TIP participants in various discussion arenas (N=9)

In addition, parties will be structured on their role within the TIP ecosystem, to classify the data to the right level of governance. This was also the logic behind the invitations of two private parties, namely, a private public affairs consultant, and the chairman of the TIP collaborative meetings. Both the interviewees contributed to the designing of the current governance, and to the active execution of the governance. Their experience and role in TIP offers therefore another perspective than the participants whom actively pursue their interests. This allows the validation of causal relations within the theory development of the governance for ecosystems [Gerring, 2004]. The semi-structured interview questionary used can be found in Section B.3. After the interview, the recordings were transcribed and deleted. After which the interview notes were anonymised and summarised.

Parties will be structured on their role within the TIP ecosystem, to classify their interests, needs, and, foreseen challenges in the collaboration. This allows the data analysis of participant positioning towards ecosystem objectives, governance challenges, and, governance requirements contributing to the generalisable theory development of ecosystem governance. This is where a single-unit case study offers added value for the theoretical development for the governance perspective under study [Gerring, 2004]. The case study will also distil stakeholder requirements on the development of a successful governance adoption. Aligning these requirements with the governance consistency principles ensures how the framework can implement adaption over time.

Table 4.2: Overview of interviewees

Interviewee	Type of party	Organisational unit
Tax Authority	Public party	Department of central administrative processes (executive organisation of the Ministry of Finance)
Ministry of Interior and Kingdom Relations	Public party	Department of Digital Society (Directorate-General Government organisations)
Cleverbase	Private party	Qualified Trust Service Provider
Smart Data Company	Private party	strategic data consultant
Digicampus	Public private network organisation	Collaborative innovation
Hypotheken Data Netwerk (HDN)	Private party	Non-profit cooperative association for digital financial services related to housing
ING	Private party	Bank, Real Estate Finance
Nederlandse Vereniging van Makelaars (NVM)	Private party	Association for real estate agents
Visma	Private party	Software provider
Public Affairs consultant	Private party	Strategic consultant
TIP Chairman	Private party	Private foundation for parties wanting to participate on the ecosystem

The following section will continue on explaining the linkage between TIP and the digital ecosystem, the role of all ecosystem participant, and, current situation of the collaboration.

4.2 CASE STUDY: TRUSTED INFORMATION PARTNERS

How the framework applies to the case study can be illustrated by exploring the Dutch Trusted Information Partners (TIP) initiated in the housing market. The collaboration focusses on building a digital ecosystem which supports the advances of trusted and secure data exchange with

high legal certainty. The need to digitise is currently restricted by two constraints, due to: I) legal and technical reasons some processes cannot be performed digitally, and, II) unnecessary risks for involved parties. The housing market is an environment which is bounded by many regulations. In addition, stakes are high due to large transaction amounts. This is where trusted, and secure online services can provide benefit to the housing market. Digital signing of rental or sales agreements, for example, with tokens, timestamps, and signatures which are commonly acknowledged by all participating stakeholders.

In order to reduce the two boundaries that hinder building a digital society for doing business, the private sector initiated a collaboration with public parties. As highlighted in the literature review, this 'private-led intension' to cooperate is happening world-wide. Both parties have an interest to collaborate, because public parties are in the possession of high quality data of civilians. Furthermore, public parties also want to facilitate secure and safe information exchange between civilians and private organisation. Currently, these data transactions are still exposing civilians to unnecessary risks while they require a high degree of certainty. Their provider-centric design cause risks for, e.g., social engineering, data breaches, and identity theft.

On the 10th of November, the start was marked by the signing of a Letter of Intention. Here, two governmental organisations and five service and software providers agreed to the ecosystem development, which facilitates online business in an easy and trusted manner. A description of their roles are stated in Table 4.3.

Table 4.3: Description of the Trusted Information Partners who signed the Letter of Intent

Stakeholder	Type of party	Description
Tax Authority	Public party	Government body concerned with the administration and execution of taxes.
Ministry of Interior and Kingdom Relations	Public party	Government body focussing on a well-organised and effective public administration where civilians can trust in.
Cleverbase	Private party	Qualified Trust Service Provider (QTSP) providing digital services for secure signing, authentication, trusted electronic data exchange and archiving.
Digicampus	Private party	Facilitator of initiatives between governments, knowledge institutes, private parties and civil groups.
Hypotheken Data Netwerk (HDN)	Private party	Non-profit association stimulating innovation and efficiency processes for mortgage issuers and other mortgage related services.
ING	Private party	Private and corporate bank offering products and services which fulfil their customer demand.
Nederlandse Vereniging van Makelaars (NVM)	Private party	Association for real estate agencies and valuers stimulating development of products and services which offer an added value for the housing domain.

To achieve the cross-domain functioning of the ecosystem, stakeholders operative in other domains must be able to join the current coalition. To also achieve a secure and open ecosystem, this current coalition must agree on design choices of the governance enabling these three pillars of the ecosystem. Bryson et al. [2015] state that challenges in stakeholder requirements can be bridged by inclusive processes, supporting a unified vision with developing inclusive structures while managing power imbalances. This will facilitate a collaborative governance structure containing governance mechanisms that organise an operative TIP ecosystem.

4.2.1 The Need for a TIP Ecosystem Governance

Private parties benefit from maintaining and developing the public service infrastructure, while public parties benefit from societal and governmental digitisation through the privately developed Electronic Acting Spaces (EAS) for citizens. The TIP ecosystem provides benefit for the information chains of housing domains. Citizens, public and private organisations can share information via their own systems with other companies or government organisations. Thus, apart from the housing market, an ecosystem can provide advantages for many cross-sector use cases (e.g., insurance, mortgage, or notary services). An overview of the coalition of the willing,

which consists of the initial public and private parties from the housing sector, can be found in Table 5.1.

TIP defined the goal of governance as two-folded. Firstly, it must develop and implement a system of agreements for trusted data exchange which comply with the eIDAS. Secondly, it allows making decisions on the system of agreements itself. Where committed parties honour the agreements, decision-making is transparent and well-balanced. Transparency means every party knows what is decided on, while well-balanced means power is evenly distributed where parties know their responsibilities. Because the ecosystem is still in its development phase, the coalition is in the process of deciding what to adopt in this primal governance. The coalition can be seen as a 'coalition of the willing', as stakeholders want to contribute towards a secure and trusted way of doing business, by collaborating towards an operative Trusted Information Partners (TIP) ecosystem. In this phase, participation is voluntary, and participants are free to leave the collaboration. The signing of the Letter of Intent (LoI) also characterises this unrestrained coalition of the willing, because it does not require commitment on stakeholder contribution efforts. Contribution takes place by showing commitment by investing through mostly working (FTE's), and financial capital (monetary investments).

From an experimental towards a scaleable ecosystem through a public-private collaboration, resembles a movement that does not happen sequentially. Involved parties recognise an opportunity, and internally move towards implementation. Experimentation is a way of proving involved stakeholders the system works, and creates traction towards other potential stakeholders to join. Through the force of disruption, a swarm of stakeholders is brought in motion. This 'swarming' behaviour, as described by the NSOB report in Section 3.2.1. In Estonia, a country with a developed digital society, this swarming behaviour is already visible in the way trust and responsibility between public and private parties is organised [1]. The development towards an implementation requires governance objectives which are defined by values and norms. Furthermore, it requires mitigation of governance challenges.

The shared vision embracing the values and norms of the TIP ecosystem is: "All parties share the goal of formulating a system of agreements that enables them to exchange information across domains. This system of agreements must include conditions on (personal and governmental) data access" [2]. While stakeholders can agree on this vision, they have different interests in joining the system. These governance challenges were made explicit during the interviews. These stakeholders also have a varying views in terms of success perspectives, although the ecosystem defined a general mission build on 3 pillars.

4.2.2 Purpose of a TIP Ecosystem

A System-to-System ecosystem (S2S ecosystem) provides a platform for civilians, public and private bodies to share information with each other (automatically) via their own Electronic Acting Spaces (EAS). Straightforward operation of natural and legal persons is possible in a legal-binding and reliable way, while functioning cross-domain by using open standards. Dijkhuis et al. [2018] designed the primal steppingstones for a human-centric approach of the technical architecture for the collaborative ecosystem. According to the authors, Qualified Information Exchange (QIE) can be enabled through affordable and user-friendly digital identities from qualified trust services. QIE is the "qualification of all involved identities and the action taken upon data in the exchange of two or more persons" [van Wijk et al., 2016, p. 54]. With a common technical infrastructure, processes supporting legal certainty can be less prone to failure, as it is being less reliant on physical locations and logistics [Dijkhuis et al., 2018]. The technical architecture of the supportive infrastructure takes shape as an online ecosystem, where functionalities are provided by the ecosystem partners with variating roles. While these ecosystem participants have different roles, interrelations, and responsibilities, a governance of the ecosystem is needed.

As stated earlier, the supportive infrastructure of the ecosystem consists of the rules of the game, and the rules of the architecture. The current governance of TIP is based on a three-

1 iBestuur article on developing a digital identity for citizens
2 TIP Governance description (8th of June 2021)

layered decision-making structure, consisting of an operational level, tactical level, and, strategic level. This is largely resembling the decision-making process within TIP, where the board meeting of the strategic level makes decisions based on the input of the tactical and operational level.

The technical architecture can be seen as operational blueprint of the ecosystem, which contains the linkage between commitment and technical operation of the ecosystem. The rules of the architecture can for example describe agreements on interpretation and implementation of standards, support of implementation via open source code sharing, or evaluative experiments and implementations. This is established for three levels in which the ecosystem operates: I) the information chain, II) the domain, and, III) the general ecosystem. This part of the supportive infrastructure will not be assessed when applying the framework to the case study.

5 RESULTS

Where the previous chapter presented background on the TIP ecosystem, this chapter will adapt the framework from Chapter 3 to do an in-depth analysis of the TIP ecosystem. By applying the conceptual model to the TIP case study, the development of governance in a current collaborative ecosystem is captured. This allows to refine the framework with the public and private needs of the TIP collaborative ecosystem. The application of the framework will structure the analysis of the case study in three phases. In the end, the identification of the framework components will enable the prescription of a normative governance model. Firstly, Section 5.2 will set the scope and context of the collaborative ecosystem under study. Secondly, the second phase will describe the governance model, power dynamics and governance consistency (Section 5.3). Lastly, a normative design is presented (Section 5.4). By using the framework step-by-step as an approach to achieve this, the results will provide a conclusion and recommendations for the TIP case study. This is visualised in Figure 5.1. How the data analysis takes place to extract the required framework component in each phase, will be explained in the next section.

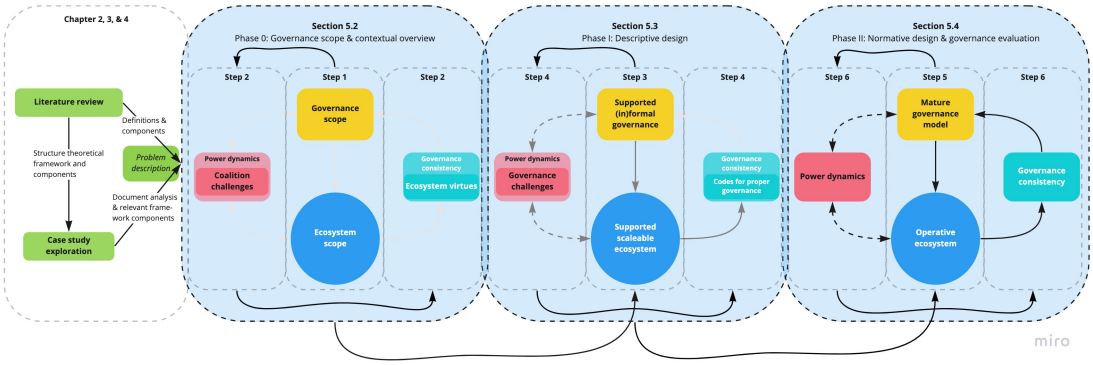

Figure 5.1: Application of framework

5.1 DATA ANALYSIS

This section focusses on the research concerns, before applying the framework to the TIP case study. By questioning what the research should analyse, and why this is important, the requirements are formed on the data gathered from documents, interviews, and, workshops. This enables to study the same phenomenon while analysing it with different interviews [Auerbach and Silverstein, 2003]. As can be seen from Figure 5.1, before the framework application of phase 0, definitions on the relevant framework components were chosen for the description of the first phase. These components also centre the outline of the semi-structured interviews. While their main focus related to the four components of the framework, some freedom was built in for unforeseen topic exploration. After structuring and preparing the data from interviews, the data is analysed and coded to find overlapping themes (following the qualitative coding strategy of Creswell and Creswell [2018]). The coding objective of this research is: "Finding the governance challenges, norms, and, values which contribute to the formal and informal governance mechanisms of the current ecosystem, to assess the design of a mature governance". By coding all the interviews, categorisation of all themes is feasible. Also, the documents on the

TIP governance and the meeting proceedings were used in combination with coding to extract the coalition challenges of phase 0.

5.2 PHASE 0: SCOPE SETTING & CONTEXT

The application of the framework within the TIP case study moves through various steps. The first part of the framework analyses the governance which is organised by coalition of the willing through the analysis of documents and scientific literature. This encompasses analysing several components. Namely, it elaborates on the incentives, ecosystem characteristics, and coalition tensions of the involved stakeholders. This allows categorisation of stakeholders based on their role in the ecosystem, instead of their predefined role as public or private organisation. Stakeholders will have requirements on the governance model which is depending on their perspectives. From there, the second part will pursue describing the unorganised governance model. For this, power dynamics which have an impact on the governance and the ecosystem itself are investigated. The internal dimension of the power dynamics will be reflected upon, namely the coalition challenges. By relating this power dynamic to the governance model, the ecosystem is characterised, while exploring the values, norms, and, principles which the ecosystem pursues. Finally, insights can be given on the coalition challenges and how a governance model is structured to mitigate these with (in)formal mechanisms in the next phase.

5.2.1 Step 1: Scope Setting

Coalition of the Willing: General Goals & Incentives

Before analysing what the goals and incentives are of the subject of the case study, an important notion must be made. This notion has to do with the fact that the TIP ecosystem itself does not have a goal, that is, the stakeholders participating in the ecosystem all have individual goals. However, the individual goals stakeholders strive for, are interdependent. All stakeholders have their own reason to participate in the ecosystem. Nevertheless, the overarching intension to initiate the ecosystem shows resemblance in stakeholder reasons to participate. It requires agreements to align the goals of stakeholders with the interdependent goal of TIP. Therefore, public and private organisations need to cooperate to develop processes and structures which make up the agreements of a governance model [Bryson et al., 2015]. The interdependent goal of TIP which stakeholders endeavour can be categorised in two parts: a governance goal, and an individual stakeholder goal.

Characterising the Experimental Ecosystem

The current ecosystem is described in Figure D.1. The participant collaboration process contains the information chain in which the TIP initiative is operable. Users in an information chain cooperate by sharing information between parties. The shared information domain dependent, and could for example contain: civilian financial information, business revenues, statistics related to policy, income, medical files, etc. Information sharing has a certain objective, and often involves public organisations (e.g., executive authorities maintaining Key Register of Persons, Tax Authority, ministries), private parties (e.g., banks, associations, corporates), and civilians. Digital reporting is the way in which information exchange takes place. The coalition of the willing cooperates and exchanges digital data in the information chain. The potential participants, highlighted in red, also interacts in the information chain, without being able to send digital data according to the standards of the coalition. While the potential participants are not an actual part of the ecosystem, they can be invited or attracted by the coalition of the willing. The participants making up the coalition of the willing decides not only ecosystem functioning, but also the general governance model in use for later participants. Therefore, the current participants and the potential participants are important to illustrate in the figure. Furthermore, the coalition of the willing is acting and behaving to design a decision-making process. Legally, the

current coalition of the willing is instituted as a foundation. This is a legal person where a group of stakeholders is pursuing a public goal, without making profit. The choice for this legal person also touches upon the values of governance, as it partly structures the responsibility of the stakeholders, and obligates certain legal acting. For instance, board representatives of TIP are not responsible for misconduct, whereas the collective of stakeholders is. In addition, financial capital can be generated, e.g., through gifts, subsidies, or value creation, but pay out to board members is not allowed. This design of the decision-making process is interdependent with the technical architecture design. All in all, this experimental supportive infrastructure should be designed in such a way, trusted and secure digital business is enabled for the ecosystem participants.

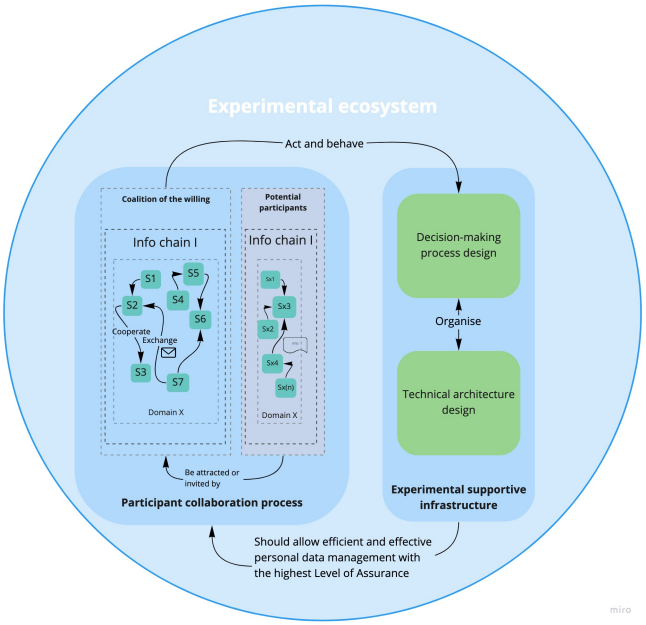

Figure 5.2: Experimental ecosystem

Stakeholder Incentives

The first step, is to discover the different stakeholder incentive to join the TIP initiative. The current participants of TIP (see Table 5.1 for an overview) were asked what their incentive was to join. This list also includes parties which are not represented in the 'Board of Representatives', because the ecosystem needs them for operating in good order. This applies to one party, namely, Visma. Although this party is (currently) not in the 'Board of Representatives' to steer in the decision-making of TIP, their view on the ecosystem is important to take along because of two reasons. First off, due to their unique perspective as software provider. This is interesting, as it the only party with this perspective, while wanting to contribute to the system. Secondly, Visma will be part of the interactions that will happen on the ecosystem. Therefore, the party will have a power position in the value chain, making their incentive to join an indispensable optic to take in. Appendix B highlights the varying stakeholder incentives to join TIP.

When analysing all the different incentives to join, the following general observations are refined. Foremost, all parties strive for a more secure, trusted, and, cross-domain ecosystem, in which public values are a crucial part for its success. This holds for all parties, including the more private value oriented party Visma. Although these private parties pursue public values, it is often not the central pillar in their incentive to join the TIP ecosystem. Parties explain to value the privacy of their customers by improving data minimisation, and complying with other national and international regulation. Private parties mostly want to integrate the TIP initiative within a business case by making business operations more efficient, effective, safer, scalable, and reliable by using data with higher quality. Here, the housing market, consists of

interdependent public and private stakeholders conforming to inter-organisational taxonomies. Digitisation is therefore only accomplished in cooperation between all parties.

Private stakeholders often reason to contribute to the safeguarding of public value by improving the customer's experience. This helps parties to attain business value, which is an important incentive for all private parties to join TIP. This is contrasted by the incentives of public parties to join the TIP ecosystem, which are more characterised by safeguarding public values. Both public parties mention the importance of increasing the level of efficiency, safety, and knowledge of qualified information exchange between public and private parties with collaboration. TIP focusses on the digitisation of transactions where legal certainty is needed, due to high financial or judicial consequences. Channelling new innovations in the domain of qualified trusted services is possible, and eIDAS implementations will surface. Here, it is essential to integrate the TIP initiative with current projects and programs in the domain of the digital society. As the Ministry of Interior stated, it is likely the initiative will fit within a running program. However, when it cannot extend the 'SBR renewal' program, another suitable program must be found where different public servants will join the project table. Also, public parties explain expanding their knowledge on eIDAS is key for their incentive to join. This also applies for private parties, like the NVM, which allows them to learn, join, and steer innovative eIDAS implementations.

Table 5.1: TIP stakeholder overview

Stakeholder	Type of party	Description of added value
National Tax Authority	Public party	Department of central administrative processes (Ministry of Finance). As a partner, the Tax Authority will be functioning as an information service provider on citizen tax data and a responsible entity for information exchange processes between citizens and private parties.
Ministry of Interior and Kingdom Relations	Public party	Department of Digital Society (Directorate-General Governmentorganisations). As a partner, the Ministry will provide data as information service provider, and be a responsible entity for information exchange processes.
Cleverbase	Private party	QTSP
Digicampus	Public private network organisation	'Project manager' and relation with scientifical organisations
Hypotheken Data Netwerk (HDN)	Private party	Cooperative association of mortgage issuers and related services
ING	Private party	Bank
Nederlandse Vereniging van Makelaars (NVM)	Private party	Association for real estate agents
Visma	Private party	Digital information exchange infrastructure provider
Intermax	Private party	Cloudsourcing company

5.2.2 Step 2: Contextual Overview

This step will be concerned with the extraction of the coalition challenges that emerge in the primal phases of the intension for cooperation. Data input spans from the TIP documents and, meeting proceedings. By applying the following diagram, the categorisation of the coalition and governance challenges is possible. The governance challenges are used in phase I of the framework, while these do not reflect the challenges of the coalition of the willing. In this phase, the remaining codes for the coalition challenges were identified.

Coalition Uncertainties

The coalition uncertainties are categorised on three main groups which are explained below. The uncertainties cause the coalition of the willing to postpone decisions, due to the possibility of conflict between participant.

Chicken-egg problem

The chicken-egg problem incites uncertainty due to two ecosystem complexities. Firstly, the design choices on the technical architecture are dependent on the governance model, whereas the governance model is dependent on the technical architecture. Secondly, implementation of the

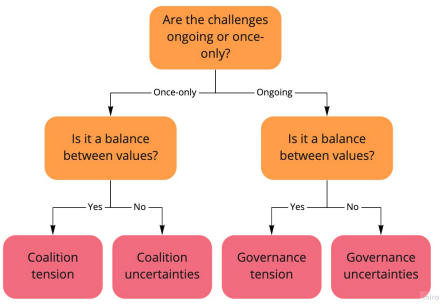

Figure 5.3: Categorisation of the coalition and governance challenges

ecosystem requires substantial investments, which could benefit many sectors. Due to legacy of systems and inflexibility of internal system changes, high sunk costs are involved, which leave stakeholders tentative to join the ecosystem. When this investment is not substantial, the effectivity of the ecosystem can be cumbersome.

Knowledge asymmetry between parties

The differences in knowledge appears as the knowledge on the whole ecosystem of participants is distributed asymmetrically. Some have more knowledge than others on various aspects of the ecosystem, like technical functionality, operations, organisation, etc. This can be either intentional, or unintentional. Intentional knowledge asymmetry is deliberate the disparity of business or public value between parties. While intellectual property rights are in place to ensure rightful ownership, this is not necessarily bad. Intentional knowledge asymmetry could serve as strategic behaviour and could problematises further developments. Unintentional knowledge asymmetry is less damaging, and can be avoided through specific governance mechanisms.

Distrust between organisations

Coalition Tensions

The coalition tensions are conflicts which balance between two values. The tension mentioned here are appearing during the first phase of the framework, as they are caused by the freshly initiated collaboration between parties. To avoid the occurrence of conflict, governance mechanisms should offer a balance between the two value extremes.

Individual versus interdependence

The first tension has to do with participants which have differing priorities in ecosystem functioning. Variating success perspectives between the participants is causing this. Some participants see possibilities for international growth, while others see it as a nationally bounded ecosystem.

This can be evaluated by the way stakeholders express their success perspectives and how they contribute to the system. When this is not in line with the values of the ecosystem, stakeholders will be likely to pursue an individual way of problem-solving. Internal tension of participants can also emerge, where parties pursue a slow or fast adoption of the ecosystem. Bryson et al. [2006] describes this phenomenon as the partner autonomy versus the interdependence of a collective interest. This is an internal tension, as the differing perspectives come from within the ecosystem (participants conceive uncertainties from both integrating their organisation to the ecosystem, and integrating the digital ecosystem as a whole).

Visioning Ecosystem Virtues

First, there are the goals of the individual stakeholders. These public and private organisations have an incentive to join the system, in order to realise their internal goal. This internal goal will be evaluated by asking for their success perspective of the ecosystem. This consists of questioning about their perspective on TIP, their interests to join, willingness to cooperate, and, success

criteria. Secondly, there is the goal of TIP. This two-folded goal aligns all individual goals of the parties to formulate agreements to enable cross-domain information exchange. This allows to define how the ecosystem behaves (application and design of the governance), opposed to how it operates technically (technical architecture of the ecosystem). Although the technical design of the ecosystem will partly define the system's behaviour, the governance goal is mainly to align parties to strive for a unified operative ecosystem. This sequence in time is important to mention, as the governance goal will change through time. For TIP, the current coalition is to design a general decision-making structure and a technical architecture for the implementation of an ecosystem in the housing domain. This decision-making structure can be seen as the primal governance of the ecosystem, because it supports the first stages of the ecosystem development. This primal governance model will be further analysed in Section 5.3. This initial 'system of agreements' helps to decide upon design choices for the technical architecture, while aiming for the ecosystem values. The ecosystem strives for the following values: trustworthiness, openness, and cross-domain applicability. When the TIP ecosystem is more mature, the governance goal will not only need to align parties to develop an open, trustworthy, and applicable ecosystem. It will also need to maintain the control on participating parties, to preserve the values the TIP ecosystem strives for. The following norms foresee how TIP must strive for the ecosystem values:

1. *Norm of trustworthiness*: every actor must have at least one online process requiring a high level of online identification and authentication, which makes the use of non-qualified trust services obsolete. Also promoting further standardisation in formal information exchange chains in the domain of housing, but also other domains (e.g., financial services, insurance). This requires alignment of standards between the domain chains (e.g., finance, pension, and, housing) and the government. Government parties will act as an institutional rule setter of standards and norms for the digital society.

2. *Norm of openness*: the ecosystem is open for: I) the end-users, II) the providers of ecosystem building blocks, and III) new trust services from information services. Providers of ecosystem building blocks can easily conform to supported standards. While new potential information service providers can join if they comply with the ecosystem entry criteria. Therefore, aligning coordination with governments and private parties as chain partner (information provider) becomes necessary.

3. *Norm of cross-domain applicability*: parties from various domains make use of the same data exchange, making data applicable for cross-domain functionalities. As new stakeholders must join the system to assure its cross-domain functionality, the governance must be resilient to changes overtime. Next to adapting to changes of the public-private coalition, the governance model is also subject to power dynamics in terms of technology, markets, regulation and social norms. Guaranteeing scope of chosen standards, concepts and agreed arrangements through formal systems management or adoption of systems.

As the TIP ecosystem already constructed three values (trustworthiness, openness, and, cross-domain functioning), no additional values are selected. The reasons for these stakeholders to join the TIP ecosystem are explained in Section B.2. This highlights their various incentives, while striving for the same ecosystem values. While parties have differing incentives to join the ecosystem, the ecosystem becomes viable if all participants contribute in a way which is in line with the ecosystem objectives. The coalition challenges and the current ecosystem virtues inspire and justify the governance mechanisms which are currently in place for the ecosystem. This is also true for the coalition tension of individual versus interdependence. The ecosystem virtues guide the vision of implementing the experimental ecosystem in various domains. The norms and principles relate to these three values, and substantiate the design choices of the technical architecture. The three values, are not immediately related to governance. Therefore, they serve as inspiration for the governance model to achieve the vision.

5.2.3 Phase 0: Interim Conclusion

The first phase of the framework attains qualitative knowledge on the four components as explained in Section 3.3.1. The case study is evaluated on the following components: I) collaboration structures, II) coalition challenges, III) experimental ecosystem characteristics, and, IV) the ecosystem virtues. The in-depth overview of the first phase is visualised in Figure 5.4.

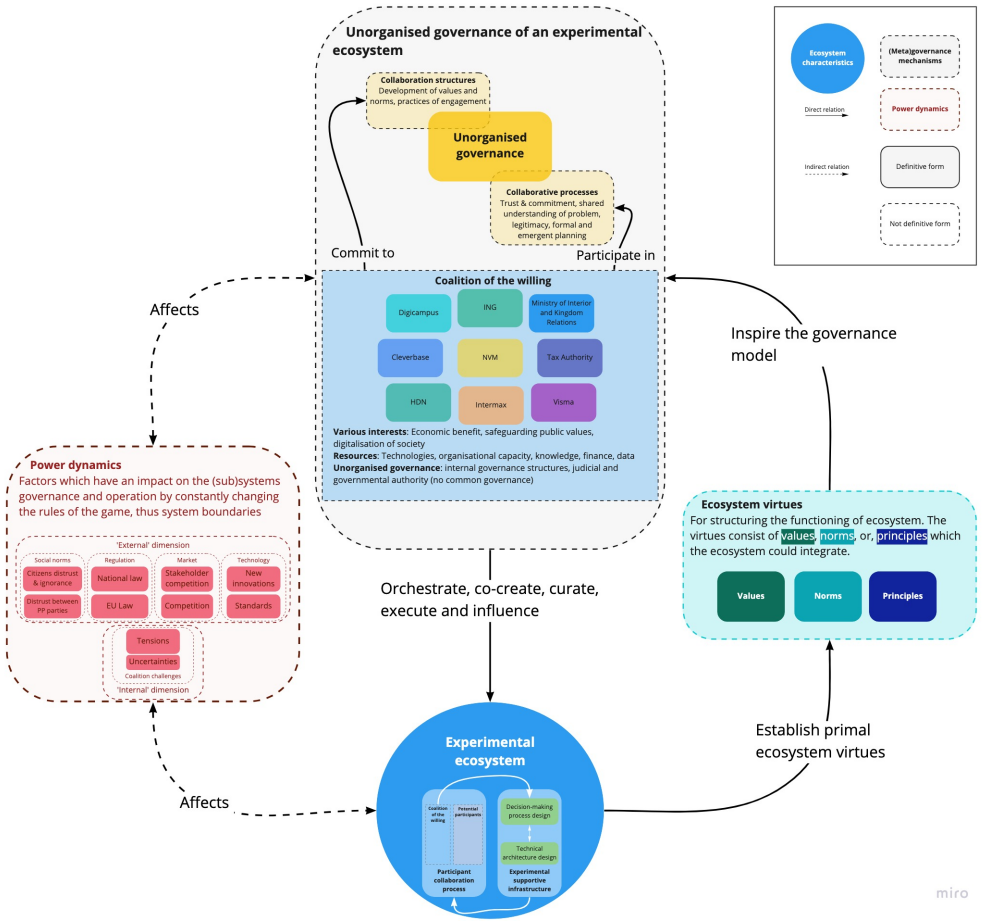

Figure 5.4: Unorganised governance model in phase 0

The coalition of the willing develops due to the intension and need of parties to cooperate. The start of an intension and need to cooperate can have various reasons. In the case of TIP, the interests are digitalisation of society, safeguarding public values, and economic benefit. In the figure, the coalition of the willing is visualised in the governance component, while its actual position is in the experimental ecosystem. This is done to illustrate how the coalition is committing to collaboration structures and participating in collaborative processes. Whether a parallel can be drawn between the four characteristics (see Table 2.2) of the perspective and the ecosystem, is possible by analysing the unorganised governance of the experimental ecosystem. Here, it is found that the coalition of the willing consists of interorganisational (both public, private, and, other organisations) and interdependent stakeholders which participate in complex interactions. Stakeholders in the information chain exchange data, and are mutual dependent due to information taxonomies and standards. In addition, the interactions can be classified as complex, because ecosystems are socio-technical systems with nested structures and processes. Also, the interviews showed that there is trust between parties, and a shared understanding of the problem. This lead to the third characteristic of the Governance Network perspective, namely, the emergence of planning and collaboration structures. This is seen as the formation of institutions (second order governance by Kooiman [2003]). As these collaboration structures maintain the day-to-day interactions, the four characteristics of the Governance Network perspective thus

also fit the experimental ecosystem. This means the Governance Network perspective suits further analysis of collaborative ecosystems, and can be used as theoretical frame.

As explained before, the current coalition interacts in an information chain where more efficient and effective data exchange with the highest level of assurance can be reached. The information chain contains a finite number of participants, as the coalition of the willing is organising an experimental ecosystem. The design of the decision-making process is structuring the collaboration between participants. This deals with the organisation of trust in the decision-making process design. This is the relational level of trust between the participants (e.g., commitment through finance). The technical architecture design deals with the organisation of trust in the technical components of the ecosystem. This is the implementation of trust through technical architecture components (e.g., safe data exchange through encryption).

The power dynamics consist of an external dimension, and an internal dimension. The external dimension relate to the contextual factors which continuously have an effect on the experimental ecosystem. The coalition challenges are only illustrated in this phase, as their exact relation with the governance model and scaleable ecosystem will be determined in phase II (Section 5.4). The internal dimension relate to the two coalition tensions and the three coalition uncertainties which were dissected. In the experimental TIP ecosystem, the ecosystem virtues lack addressing the chicken-egg problem, and the individual versus interdependence tension. When the investments in the ecosystem are not substantial, the effectivity of the ecosystem can be cumbersome. Next to financial capital, investments also include working capital of full-time employees spend on other contribution types. This must be addressed in the (in)formal governance model.

The context of the TIP ecosystem can be described with the four components which suit as boundaries of the governance scope. Although the interests of the current coalition of the willing are aligned, if coalition challenges cannot be mitigated, they can affect the scaleable ecosystem of the next phase. How the coalition challenges and ecosystem virtues exactly relate to the governance model and the ecosystem functioning, is explored in Section 5.3.

5.3 PHASE I: DESCRIPTIVE DESIGN

By using the interviews as data input the four components of the unknown transitional phase are structured. Firstly, analysis is done on the governance model at hand based on the coalition tensions and ecosystem virtues of the previous phase. Secondly, the governance challenges are formed in code groups, after which the ecosystem characteristics structure the TIP case. What the ecosystem is striving for, is summarised in the descriptive norms and values.

5.3.1 Step 3: Determine Supported Components

Describing Governance Dimensions

The governance model of the second phase takes shape as collaboration structures and collaborative processes slowly start forming and dictating the rules of the game. Three governance dimensions adopted from Tiwana [2013] are organising towards formal and informal governance mechanisms: I) decision rights, II) formal and informal control mechanisms, and III) incentive structures. This step will analyse how collaboration structures and collaborative processes are organised in the TIP case, in order to discover the how the governance dimensions relate to TIP.

Decision rights

Decision rights are the way in which authority and responsibility is organised in the ecosystem. The TIP decision-making structure is a layered model, where the decisions rights are partitioned in layered manner. The decision-making process of the TIP ecosystem resembles a layered system of consultation where each layer is organised with different functionality, representation, and authority. The working groups are organised in four sections: knowledge, technique, market approach & communication, and governance. Advices and recommendations are based on the expertise of the group participants, and contribute to operational design choices. Parties

contribute to the design of the system, by taking part and proposing solutions in the four working groups. The platform consultation is situated between the working groups and the board meetings. Not every party which signed the LoI is represented in board meetings, while no commitment is given in terms of a formal agreement. The platform meetings make sure that growth of TIP is stimulated by prioritising opportunities, and detecting and resolving potential disputes as early as possible. Eventually, decision-making is done by the board, which is the highest level of authority in TIP. The design propositions and progress by the working groups are monitored and controlled in the platform meetings. Organisations representing the platform meetings, are also represented in the board meeting while their representative is likely to be more senior. The TIP community creates societal support by involving interested parties (public, private, and civilians) during meetings. These meetings inspire potential participants by sharing knowledge on the status of the ecosystem, its vision, and the operative use cases. This layer has no decision-making authority. The current coalition already agreed informally to the primal governance structure, on the terms presented in Section B.4. Figure 5.5 depicts the decision-making structure. This is an informal governance model, as collaboration structures and collaborative processes are organised, but none of the participants agreed formally to this decision-making design.

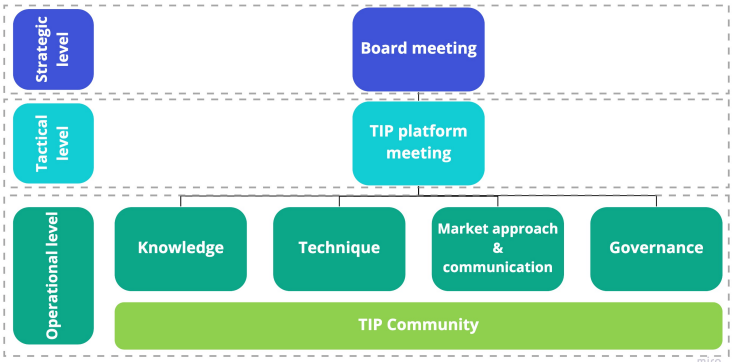

Figure 5.5: TIP decision-making process

It can be concluded that there are three levels in the ecosystem in which decision rights are partitioned. Firstly, the operational level which resembles the most decentralised form of decision-making, because all participants who want to join can join. Secondly, at tactical level in the platform meetings. This layer consists of the parties which are present in the board meetings. Therefore, this is a more centralised form of decision-making. Thirdly, the most centralised form of decision-making is done on the strategic level, at the board meetings. This body also possesses the most authority, as decisions are made on the general ecosystem by all parties who regard the decision as important.

Formal and informal control mechanisms

The formal and informal control mechanisms are currently developing for the TIP ecosystem. The first formal control mechanism is gatekeeping. During the first board meeting, it became apparent that criteria need to be described what and who is allowed on the platform. The working group governance was made responsible for further refinement of this governance mechanism. By asking on the requirements for gatekeeping were extracted. This allows the overview of mechanism possibilities in the next phase, discovering the governance tensions these could bring. While the current governance does not yet define the control mechanisms for the process and the metrics, interviewees are questioned on the design of these mechanisms. By asking how the ecosystem values are operationalised, different perspectives on the governance requirements are identified.

Gatekeeping is a formal control mechanism which defines the degree on which predefined criteria are used to determine the acceptance of new potential participants on the ecosystem. Three requirements must be met: I) the ecosystem must be able to review new participants. II) This must be done in unprejudiced and responsive manner. III) Potential participants should accept this judging.

Process control determine the level to which ecosystem participants are rewarded or penalised on their adherence to the rules on processes and structures which contribute to the ecosystem values.

Metric control determine the level to which ecosystem participants are rewarded or penalised based on their contribution towards the 'predefined target performance' metrics of the ecosystem.

Relational control

Relational control is an informal form of control, which relates to the degree to which the ecosystem uses norms and values to align the behaviour of participants with that of the ecosystem objectives.

Incentive structures

The incentive structures consist of governance mechanisms which incentivise a certain participant behaviour, in order to achieve an ecosystem value. These structures create a certain incentive for the participants to, e.g., stimulate commitment, boost innovation, or, achieve transparency.

Characterise a Scaleable Ecosystem

The scaleable ecosystem enables efficient and effective personal data management with the highest Level of Assurance in a domain. The system is able to attract new domains, as the supportive infrastructure can also provide value for potential participants. Here, the ecosystem participants can have act and behave according to variating roles in the decision-making process. The public role is also dependent on the goal of scaling, which is either yielding possible improvement paths, or disruption of the path itself.

The ecosystem participants can exchange data with each other, through shared service centres. These shared service centres provide digital data exchange in a pre-processed and standardised manner through standardisation. When parties adopt same standards, system-to-system exchange of data packages is possible allowing more automised processes [Strikwerda, 2014]. Note that the figure does not represent this service oriented data exchange, as only the interaction between entities is visualised. The envelope icon in the figure represents this standardised form of data exchange. Here, the user is in control of the data this person wants to share through a personal acting space (PAS). The QTSP provides this personal acting space. Apart from sharing data, participants cooperate through their regular operations. Figure 5.6 only represents the information sharing between parties.

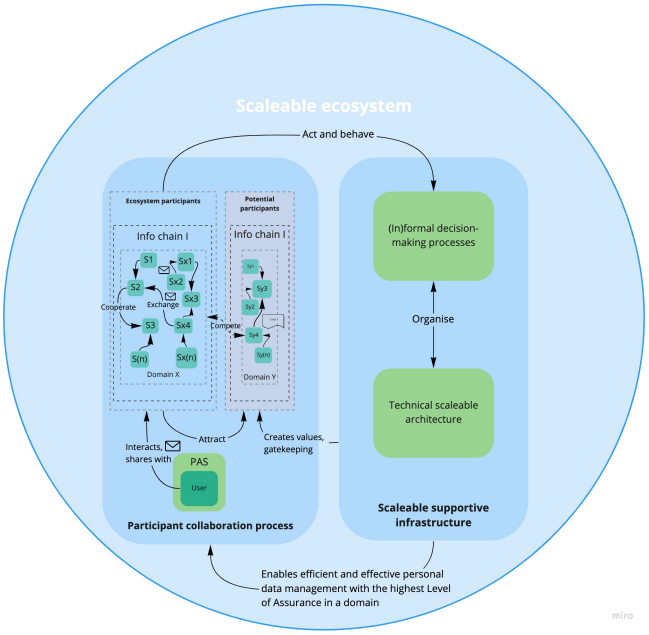

Figure 5.6: Scaleable ecosystem

5.3.2 Step 4: Determine Challenging Components

The challenges identified by the stakeholders are listed in Section C.3. The data analysis described in Section 5.1 was then put to practice by identifying codes, and mapping them in code groups. Continuing on the categorisation efforts of the previous section, the group codes are determined for the governance challenges in this phase. In addition, the data analysis support the identification of norms and values, as the interviewees were asked about the governance requirements of the ecosystem. In Table 5.2 the code groups of the governance tensions are presented. The overview of qualitative codes linked with their code group is displayed in Section C.4.2. Qualitative coding dissects the norms and values, of which an overview is presented in Section C.4.3. The following aspects will be taken along and reflected upon in the TIP case study: competing institutional logics, individual versus interdependence, stability versus flexibility, and inclusivity versus efficiency. How these tensions relate to the transitional phase will be discussed in this section.

Table 5.2: Code groups of the governance challenges

Framework component	Code group
Governance challenges	
Governance uncertainties	Competing institutional logics Power imbalances
Governance tensions	Self-interest versus Collective Interest Central versus Decentral Ecosystem Growth Control Public versus private value creation Inclusivity versus efficiency

Governance Uncertainties

Competing Institutional Logics

The first uncertainty revolves around the institutional characteristics of the coalition of the willing. Institutions are rules that help organising transactions between different actors. Stakeholders act according to their institutional logic, which is defined by the way they shape the 'rules of the game' with formal and informal rules. An institutional logic is the aggregation of structures, processes, and, norms that form legitimate interaction between stakeholders. An example is the way civilians need to identify themselves in requesting a mortgage. *"Logics can also compete, because actions, processes, norms, and structures that are seen as legitimate given one institutional logic may be seen as less legitimate or even illegitimate when one uses other logics* [Pache and Santos, 2013]". This make room for opportunities of change, where stakeholders enact by positioning themselves towards clashing logics. Literature proclaims that competing institutional logics are embedded in society on macro level Røhnebæk [2021]. Nevertheless, collaboration in this phase faces institutional complexity, while it has to be decided how participants can address the competing institutional logics. Stakeholders will try to define and influence this process, in order to include their own incentives [Bryson et al., 2006]. Accordingly, competing institutional logics arise due to the relationships between parties.

Competing institutional logics can prove to be beneficial, as it moves stakeholders to bring innovation and change to a problem. This will require management of the public-private collaboration, as a balancing act appears: diversity in parties can foster innovation, while disparity between parties causes undermining collaboration[Røhnebæk, 2021]. The coalition of the willing builds in legitimacy by involving many stakeholders. Internal trust can be organised and promoted, by ensuring joint-learning spaces for the exchange of knowledge. Information sharing, and learning through these joint-learning spaces, is seen as a collective effort to support a shared understanding of the problem which parties want to address [Thomson and Perry, 2006]

In terms of the nature of coalition parties, a straightforward distinction can be made between public and private parties. Nevertheless, this distinction is an incomplete one. Also, within these two parties, institutional logics compete due to actions, processes, norms, and structures which parties adapt to. Therefore, uncertainties coming from competing institutional logics are continuous, and need to be addressed by the ecosystem participants.

Power Imbalances
The coalition of the willing contains participants with variating backgrounds. Distinction in power can again be made between all these public and private parties. For instance, a governmental party has the authority of the public, by implementing and enforcing policy. Private parties can disrupt information chains with their knowledge on technology and offering (business) solutions. During the operation of the ecosystem, power of parties can also change. Sometimes this is intensional, allowing participating parties to actively contribute to the system. The question for both public and private parties is, how to balance power between all parties through time? For example, the adoption of an ecosystem by new parties is crucial for its evolutionary course, making the distribution of power a crucial aspect to take into account. Partners with less power might lose interest if they feel they will be exploited. Other uncertainties in power discrepancies can be omitted by adopting inclusive processes and structures of collaboration. For example, a mechanism to implement equality can be the distribution of formal decision-making power.

Power imbalances do not only emerge during this phase of the ecosystem governance cycle. Literature indicates that stakeholder beliefs and power become more and more influential during later stages of collaboration. Therefore, power imbalances are also present in the next phase (on which further explanation will follow in Section 3.3.3.

Governance Tensions

The identified governance tensions can be characterised as: self-interest versus collective interest, and, central versus decentral ecosystem growth control. The tensions are always a balance between two values, in which a balanced must be found to overcome possible conflict.

Self-interest versus Collective Interest
Intentions of the coalition of the willing are important to align. The question is whether parties strive for their own individual interest, or the collective interest of the ecosystem. Aligning all participant interest with the interdependent ecosystem goal is decisive on whether the ecosystem objectives will be met.

Central versus Decentral Ecosystem Growth
This tension deals with the growth of the ecosystem through time. A central ecosystem is focussing on a decision-making in which a central authority takes the lead. This central power has the authority to do make decisions of a large group. In a decentralised ecosystem the power of authority is spread out over different domains, where the decision-making is structured in groups with equal authority.

Public versus Private Value Creation
Creating value for the current partners means different values have to be met. An evaluation with a roadmap could prove difficult, as an ecosystem grows organically. Therefore, control of the healthy growth of the ecosystem is needed. The public balancing act means that a technically sound ecosystem (safe, effective, efficient) is strived for, while making it easy for users to adopt and 'seeing through' interests of ecosystem providers. For private actors this also means the ecosystem should be technically sound, but it should also create private value. Adoption by public and private parties of the ecosystem is political as well, while there currently is an opportunity window (where solution, political, and problem streams come together). When a partner 'hijacks' the system, other parties can stop to contribute actively.

Inclusivity versus Efficiency
The final tension is all about the focus on what the ecosystem should be to do now, and when the ecosystem should open up for other domains. The tension emerging here, is the balance between an effective ecosystem delivering functionality for a small group, and an ecosystem which is inclusive for potential participants in new domains. This could however challenge the steering of the ecosystem, due to the larger size. These future developments can be anticipated by organising a governance model with strategic planning, inclusive yet efficient steering instruments and flexible governance arrangements in [Bryson et al., 2015]. The question is how to remain inclusive by involving new information providers, QTSPs, and other domains, while the decision-making process is still efficient. This means the ecosystem must scale controlled, while building in flexibility.

Codes for Proper Governance

The codes for proper governance served as the basis for the prescriptive values and norms described in this section.

Values

The selection of material on good governance is based on an iterative process with the literature review of previous chapter. The findings were used as starting point to categorise the general values for values which are listed below. Values are chosen based on their relation with the scientific body of knowledge with logical thinking. This is the list of values for:

1. Transparent & Integrity
2. Accountable & Representative
3. Participation & Inclusive
4. Open to Change & Innovation
5. Efficient & Effective
6. Adaptive & Self-corrective
7. Responsive & Legitimate

Norms & Principles

The values of lead to the prescriptive norms encompassing what the governance model of TIP should strive for. A single value entails a single norm.

1. Transparent & Integrity

Transparency entails a coherent form of decisions-making, by following clear, understandable and, accessible rules and regulations. Those affected by decisions (ecosystem users) and those deciding (authority), should avoid information asymmetry between parties. Making information on these rules and regulations publicly available can stimulate the transparency (and innovation).

Transparency norm: "Decision-making processes should be coherent, clear, understandable, and accessible."

Transparency principle: "Install an independent body responsible for supervising on the transparency of decision-making processes and the decision-makers."

Information asymmetry also impedes on the integrity of governance. Acting with integrity means that information is shared internally (with participating ecosystem parties) and externally (with all non-participating ecosystem parties, this includes regulators and governmental law enforcement) on procedures and decisions. Integrity also means that stakeholders act in accordance with the rules-of-law set by the ecosystem, and set by regulators. For instance, financial management is done fairly in relation to the participating ecosystem stakeholders, and follows governmental jurisdiction.

Integrity norm: "Decision-making complies with internal rules-of-the-game and external rules-of-law."

Integrity principle: "Define a code of conduct for all ecosystem participants."

2. Accountable & Representative

A well-functioning governance, must ensure that accountability is taken for action in which the

ecosystem operates in. This is both important for internal actions or decisions and for external actions and decisions. For the participants operating in an ecosystem, it is important to clarify the responsibility of decision-making with the impact of those decisions. Providing insights into who is allowed for which decision, will provide accountability through transparency. Furthermore, compliance with rule-of-law will make the ecosystem more equal.

Accountability norm: "Participants take responsibility of decisions and actions in order to organise accountability."

Accountability principle: "Institute checks and balances in every process where decision-making takes place."

Also, parties with a minor contributing role in the ecosystem should be able to contribute or be represented in the decision-making. In addition, the governance should take feedback of users of the ecosystem into account which is not limited in freedom of expression.

Representation norm: "A supported group of governing authority is designated and represents participants equally."

Representation principle: "Organise democratic representation with checks and balances for the highest decision-making authority."

3. Participation & Inclusive
For a participatory governance, all stakeholders who want to make a contribution to the decision-making, are either recognised to make contributions, or represented in the decision-making. There is a balanced decision-making based on the will of the many, while respecting the legitimate rights, needs, and interests of minorities. All parties wanting to participate, should be enabled to do so.

Participation norm: "All eligible potential participants can join the ecosystem."

Participation principle: "Describe general terms and conditions of participation including the entree barriers who is allowed to enter and who is not."

A participatory ecosystem also stresses the importance of an inclusive governance. Parties should have the feeling that they are represented. As explained earlier, 'vulnerable' have options to steer and improve their position in the ecosystem. It should not matter whether a participant is public or private, or small or large. The governance should be inclusive, and representative for all.

Inclusiveness norm: "All participants can contribute regardless their background."

Inclusiveness principle: "Evaluate every (potential) ecosystem participant anonymously according to the same criteria."

4. Open to Change & Innovation
To support incremental but also fast learning, the governance must ensure a climate which supports this. While ensuring an environment which allows learning, it should be resilient, meaning disruption cannot cause loss of any values. Continuous innovation is supporting a 'healthy' development of the ecosystem, also causing participants to develop further.

Openness to Change norm: "Learning awareness is created on opportunities, risks, and mistakes to increase performance."

Openness to Change principle: "Structure incentives for cross-domain implementation which does not affect the control of participants on the ecosystem."

This aligns with the stimulation of solutions that strive for a more efficient and effective ecosystem. Making room for innovation could focus on experimenting with pilots, programs, and new technologies. Important is the creation of a learning space where ideas are shared and valorisation of potential solution is enabled. Typically, a central authority does not control or steer the innovation, but the symbiosis of decentralised initiatives stimulates innovation.

Innovation norm: "Innovation is internally encouraged, and stimulated through valorisation."

Innovation principle: "Organise internal incentives to adopt new technical innovations like emerging standards."

5. Efficient & Effective

Efficiency and effectiveness both centre around the sustainable deployment of the ecosystem governance. This means that goals are set to reach certain principles the ecosystem strives for. The effectiveness tells something about whether the results meet the objectives stakeholders agreed to. Depending on the principles of the ecosystem, the results will need to meet the user needs while making efficient use of the resources the ecosystem uses. The board of an ecosystem will need to publish the goals it endeavours.

Efficiency norm: "Efficient functioning of resources is pursued."

Efficiency principle: "Define what makes the ecosystem worth it, in order to prioritise the ecosystem objectives."

Effectiveness norm: "Ecosystem performance and results meet a supported set of objectives."

Effectiveness principle: "Set transparent and measurable goals to achieve the objectives the ecosystem strives for."

6. Adaptive & Self-corrective

The ecosystem will need to create awareness on mistakes to improve efforts and performance. This requires recognising of mistakes, and independent and open evaluation. By reflecting on the mistakes, action can be taken to avoid further escalation, or to let it happen again. Adaptiveness also makes sure that identification of potential risks is guaranteed by allowing quick and supported diversion from conflict. This holds not only for potential risks, but also for opportunities. The implementation of checks and balances is therefore crucial for just and proper decision-making. Adaptive mechanisms should never cause turmoil due to conflicting decisions.

Adaptiveness norm: "Organise for the absorption of change"

Adaptiveness principle: "Organise the measuring of possible effects of opportunities and risks and evaluate these outcomes."

Next to adaptiveness, the ecosystem must encompass the maintenance and strengthening of the capacity and competence of governing. This means that processes and practices are designed which convert know-how into capacity. Allocation of incompetence is required to continuously improve the governance and its impact.

Self-corrective norm: "Checks and balances are in place to allocate or eradicate competence and capacity."

Self-corrective principle: "Set conditions and procedures when exceptional decision-taking may take place."

7. Responsive & Legitimate
To make sure the structures and processes serve all participants, responsiveness is central for the governance. Responsiveness not only looks after the fact that participants are served within a timely limit, it also allows consensus-oriented decision-making. As the ecosystem objectives need to adapt to the needs of the users, consensus on the processes and structures of the ecosystem is needed to get there. This will require feedback of the ecosystem users, and a strategy broad consensus on how the ecosystem can achieve this.

Responsiveness norm:"Coordination structures and processes serve all participants and should facilitate prompt consensus of decision-making"

Resonsiveness principle: "Maximise prompt decision-making and the sharing of knowledge through interactive learning processes (where participants learn from each other)."

This also makes the justification of decisions an important value to take into account. Decision-making must be justified with the authority and responsibility of such a governing body. This aligns with integrity of decisions, with compliance of laws and regulations.

Legitimacy norm:"Decision-making affecting any participant should always be justified"

Legitimacy principle: "Ensure all decision-making can be justified."

5.3.3 Phase I: Interim Conclusion

The objective of phase I is to describe the governance model, scaleable ecosystem, governance challenges, and, the values and norms for proper governance. Firstly, the ecosystem virtues from phase 0 were addressed by evaluating how they relate to the scaleable ecosystem and the governance mechanisms currently in place. This resulted in finding the ecosystem characteristics and governance dimensions of the scaleable ecosystem. Secondly, how the coalition challenges related to this phase, allowed analysis of the governance challenges which affect the scaleable ecosystem.

The collection of formal and informal governance mechanisms provided a description of the primal governance model, and how certain coalition challenges are mitigated. Through the interviews, the characteristics of the scaleable ecosystem were structured, and the relation with stakeholder interests, success perspectives and foreseen challenges described. In addition, the governance model is layered, requiring different governance mechanism on different levels. Where the highest level needs general governance agreements, lower levels of governance call for a suitable domain or chain level fit.

The codes for proper governance resulted in finding 7 values and norms which an ecosystem governance should strive for. The governance requirements from the interviews served as input for the governance mechanisms. By aligning the mechanisms with the challenges, input is gathered for prescribing a mature governance model in the next phase. The mature governance model must mitigate the governance challenges of this phase.

5.4 PHASE II: NORMATIVE DESIGN

5.4.1 Step 5: Prescribe Mature Governance

The governance model for the operative collaborative ecosystem is constructed based on the governance tensions from the previous phase. These tensions provide insights in the considerations

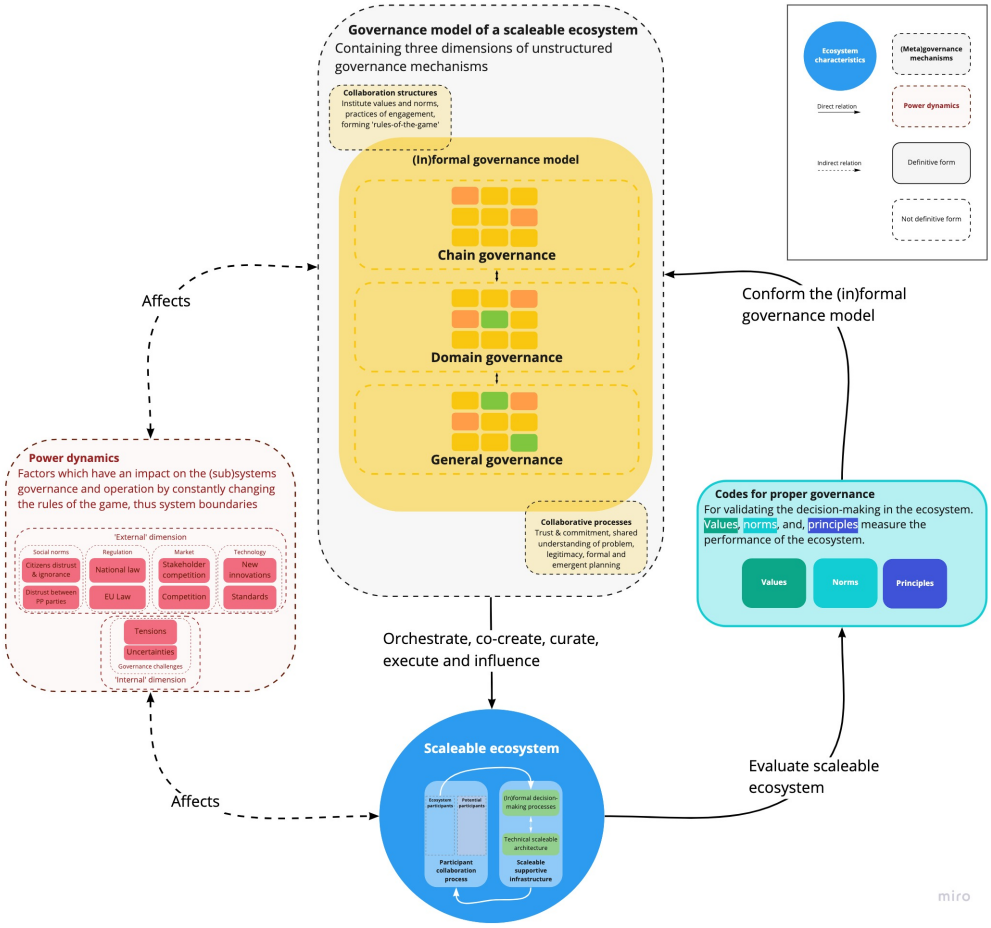

Figure 5.7: (In)formal governance model in phase I

of the governance mechanisms. To do this, the governance dimensions of the previous phase are related to one of the governance tensions, and further specified with governance mechanisms. These governance mechanisms span the governance dimension. In the end, the collection of the governance mechanisms form the governance model.

Construction of a Mature Governance Model

Literature indicated that ecosystems are continuously in development, as participating organisations relate differently when moving from an experimental ecosystem, towards an ecosystem which provides value and is operative [Medaglia et al., 2017b]. This final phase will relate the governance tensions with the governance dimensions to establish the considerations for governance mechanisms. Therefore, the governance tensions are coupled to the governance dimensions. The governance dimensions define a span of solutions in which governance mechanisms are prescribed. The governance mechanisms can be seen as the collection of governance considerations.

Central versus Decentralised Growth

Decision rights

The decision rights will organise the authority and responsibility of ecosystem participants. The decision-making processes of TIP is currently organised through a layered approach. In this layered approach the operational level provides solutions to the tactical level. When the tactical level decides to agree to the solution, the strategic level has the final say in decision-making. The strategic level therefore has the highest authority, with the responsibility of steering the ecosystem accordingly with its objectives. Hence, the authority and responsibility of the ecosystem is organised in a centralised manner. This should also be the case for the statutory system, which describes the mandates on decisions like additional security, user experience, interoperability

of standards, etc. While law leaves gaps on the interpretation and use of standards, mandates should be given to force participants on standard use. The governance will then allow generalisation of certain sector standards towards general standards. Commitment of certain standard use can be forced. Mandates on the use of standards is important, while it allows the cross-domain applicability of the ecosystem. While many board members will lack the knowledge on standard use, knowledge will be required from the lower operational level. By using this bottom-up approach, knowledge of the lowest level can be used in the decision-making in the highest level.

The ecosystem is never finished and grows in an 'organic' manner. Roadmapping which stakeholder must join in a particular phase will therefore not work, making flexibility in the governance is required. To allow this flexibility, parties should be able to enter or leave the ecosystem as smooth as possible. Organising a distributed, decentralised knowledge base in the ecosystem will increase the resilience of the ecosystem. When stakeholders leave, the operations should continue like before. This makes the ecosystem recover quickly when this happens. In order to increase the robustness of the ecosystem, accountability structures should also be organised in a decentralised manner. Accountability structures describe the role of participants in the decision-making processes, and what their contribution is to the ecosystem in terms of financial, organisational, technical, and knowledge commitment. In case participants leave, their position becomes replaceable by a participant with a similar accountability structure.

To decrease the complexity of public-private decision-making, decision rights are needed to be organised transparently, where all participants understand all decision rights. This also helps to organising a fair board where parties feel included in the decision-making. If the transparency is not accounted for, participants can feel left-out in the decision-making and lose their trust in the decision-making itself.

Self-Interest versus Collective Interest

Relational control

The relational control shapes the behaviour of participants by relying on shared norms and values. This means the ecosystem participants should share the same values and norms of the ecosystem. Current and potential participants should be familiar with these values and norms. Categorisation of participants their type of interests and implementation vision is used for analysing their positioning towards TIP. This is illustrated below in Figure 5.8.

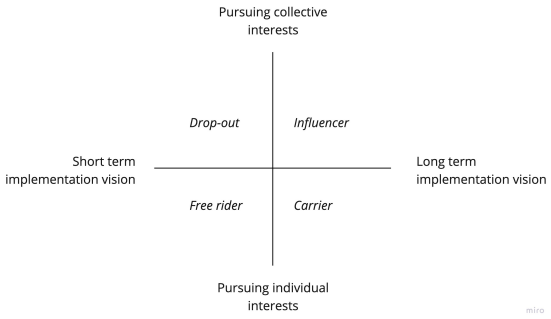

Figure 5.8: Positioning model of (potential) participants towards TIP implementation

Stakeholder management can serve as governance mechanism to move all participants to the 'influencer' side of the model. For this, the self-interest of parties should be aligned with the collective interest of the ecosystem. In addition, the collective interest should also adapt to the interests of participants. To do this, knowledge sharing on the ecosystem values and norms is crucial.

Incentive structures

Next to stakeholder management, parties can be influenced through incentive structures. For commitment of economic and working capital, transparency of the system is key. Some participants might invest and earn more value from the ecosystem than others. Putting parties together, and let them learn from each other business cases, is a way to be transparent. This

also allows parties to see synergy effects; where can interdependence of parties be located, and why is collaboration needed? Transparent knowledge sharing thus creates trust and commitment. Here, successes should be shared, as participants all have to faith the ecosystem will function technically. For this, agreements must be made which maintenance of the right level of assurance. This allows users to operate secure and trusted. Another positive effect of sharing successes, is the stimulation of cross-domain applicability. As potential partners can be attracted by the successes, constantly inviting potential partners does not have to be initiated by current TIP participants themselves. This also increases the efficiency of the ecosystem.

Next to incentive structures for commitment, decisions on phases of innovation need to be transparent for current and potential partners. This could prevent unforeseen and radical system changes, where participants are unaware of innovative changes making them leave the ecosystem. A mechanism to organise this are forums of discussions which have a practical character. When wider supported in lower decision-making levels, innovation implementation can be suggested to higher levels, allowing transparency and adaptivity. Innovation is also stimulated by organising competing software providers, qualified trusted services, and other infrastructure providers on the ecosystem. This avoids a lock-in situation, where the ecosystem is dependent on one party. Where interviewees often mention the ecosystem to integrate many QTPSs, the ecosystem should be open for all parties, which requires reflection on responsibilities. This can be organised through gatekeeping, which will be reflected upon in the discussion of the final tension.

Due to the vast magnitude the TIP ecosystem pursues to be operative for, the positioning of the ecosystem towards societal norms and regulation, is important. This requires keeping track of national, and international (EU) regulation, standards in other markets (e.g., SSI), and also on other domain standards to check whether TIP complies and vice versa. This can create an oil-slick-effect, enabling cross-domain applicability. This also holds for positioning towards technological dynamics, like how the digital wallet is shaped in Europe, where international decisions need to be made to implement such an infrastructure. The vast scope of TIP also necessitates the positioning towards civilians where trust of civilians needs to be organised to eliminate doubt, and serve all knowledge demands.

Public versus Private Value Creation

Process control

The experimental ecosystem encompasses fewer participants, information chains and domains than the operative ecosystem. Therefore, the governance model of the operative ecosystem steers a larger ecosystem, comprising more participants in different interactions. This makes the ecosystem context-dependent, requiring the governance to be flexible to this context as well. In other words, depending on the context, the governance model must be able to adapt itself. For example, independent representation of multiple parties is needed, when decision-making becomes to slow with all participants. Change management is needed to adapt to unforeseen changes in the system. Agreements on commitment are needed, along with the consequences when parties can or do not adhere to the agreements. To know when the ecosystem should adapt, the governance requires reflection of the governance performance. This is where the governance consistency continuously reflects on both the performance of the governance, and the performance of the ecosystem. Governance consistency allows adaptivity through the 'feedback loop', visible on the right side of the mature governance model in Figure 5.10.

The process control is the degree to which participants follow a prescribed set of methods and procedures. Whether participants live up to this prescribed set, a monitoring system must be in place to monitor the behaviour of ecosystem participants. Firstly, the prescribed set of methods and procedures must be written down in a document describing a code of conduct. This code of conduct describes the way of working on the ecosystem, by stating what is expected, and what is not expected. Monitoring of the code of conduct is enabled through a backdoor-control consisting of two independent monitor parties. Public agencies and authorities check whether the ecosystem lives up to pursuing public values. Private auditors are the second independent monitoring party, which contributes to the quality assurance. Whether it is possible to lean on certificates and current decision-making structures will need further discussion. Based on the

monitored participants, their behaviour must be rewarded or punished. This allows adaptivity of the system, by acting on desirable behaviour.

Control via metrics

Secondly, the ecosystem must be controlled by evaluation of the outcome of ecosystem and governance performance. Distinction in performance is needed between the functioning of the ecosystem (performance of ecosystem virtues), and the behaviour in decision-making (evaluation of codes for proper governance). Evaluation of the ecosystem virtues must measure the functioning of the ecosystem itself. For this, the performance of the openness, trustworthiness, and applicability of the ecosystem participants must be measurable. When the participants do not contribute functionally to the ecosystem, they must be punished. When participants create value in terms of the ecosystem virtues, they must be rewarded. This also touches upon an anti free-rider mechanism, where free-riders are punished or expelled from the ecosystem.

Next to the evaluation of the ecosystem performance, evaluation of the governance is needed. Here, the codes for proper governance can evaluate the behaviour of participants in decision-making processes. The seven values of proper governance serve as measure to evaluate the governance performance. Where the decision-making does not align with the values of proper governance, change of the governance must be discussed.

Inclusivity versus Efficiency

Gatekeeping

To enable an inclusive ecosystem, all participants wanting to join, should be able to join. However, front-control is required to assure a certain level of quality. The stricter the criteria of entree, the less inclusive the ecosystem becomes. This will make the ecosystem more efficient, as decision-making can be faster. However, innovation is limited due to the adoption of participants offering new technologies is prevented. Gatekeeping define the entree and exit barriers of the ecosystem by setting criteria on which participants may join, or leave. The ecosystem must pursue transparency of gatekeeping, where all parties should be able to judge what makes the system worth joining. If this is unknown to potential participants, the ecosystem will not be likely to grow by attracting new participants. Also, gatekeeping must avoid strict rules of entry to prevent lack of adoption. Flexibility of the governance model is needed in the operative phase to enable adoption of new providers and innovative technology. This requires a basic set of entree rules, where additional agreements with potential participants can be made. Transparency of the gatekeeping is therefore needed, where monitoring can be done on the fairness and independence of additional agreements can be evaluated.

When participants are authorised to join the ecosystem, representation in decision-making structure is needed where all parties are represented. Although all parties should be able to join and discuss all decision-making, this must depend on the contribution parties make. How this representation must be organised, and which factors this is based upon (e.g., performance, value contribution, etc.) will require further discussion with participants. Revision on the entity form of TIP is also required when the TIP grows. The entity form might need to adapt to another entity form to allow equal representation by all parties. An association is an example of such entity form where all private and public members can be represented equally. Wide representation in this entity form is needed for the architecture of standards to enable wide use of TIP in The Netherlands.

Characterisation of the Operative Ecosystem

The operative ecosystem functions cross-domain, in multiple information domains. In addition, potential participants of other domains can join the ecosystem, where cooperation with potential domains can initiate new digitised use cases, as well as stimulate innovation in other information chains. This is known as horizontal integration, where innovation enables participants to take over roles that were performed by other smaller parties [Bharosa et al., 2015]. The integration of new participants in the information chain is known as vertical integration. The collaboration process of participants in the ecosystem is visualised in Figure 5.9.

The practices of system engineering note a difference between the function of a system, and the implementation of the system. The former describes what the system exactly should do. The latter prescribes how the system should behave. This distinction is relevant for the framework

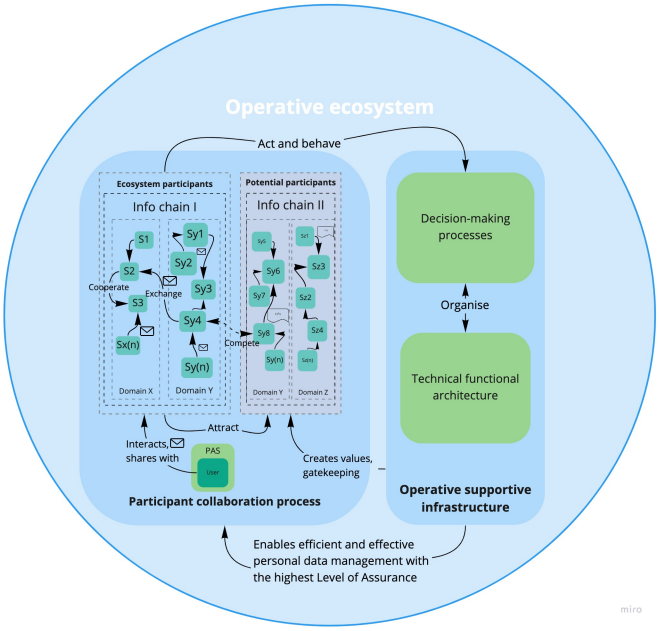

Figure 5.9: Operative ecosystem

to make, because the requirements for a functional ecosystem differ from the requirements of how the ecosystem behaves. The requirements on the implementation of the ecosystem are seen as the governance requirements, while they prescribe how the ecosystem should behave. These need to align with the functional requirements of the ecosystem. For TIP this difference is illustrated in the participant collaboration process and the supportive infrastructure. The collaboration process is the way in which the ecosystem functions, while the decision-making processes prescribe how the participants should behave. The case study found that reflecting on both is necessary for the ecosystem governance. Proper governance is therefore reflecting on the process of decision-making, while the ecosystem virtues reflect on the performance metrics of the ecosystem.

5.4.2 Step 6: Evaluate Governance

The final step will evaluate the governance model along the power dynamics which affect the ecosystem, and the governance consistency which evaluates the ecosystem and governance functioning. In the end, the maturity of the governance model is analysed by assessing the governance values with the governance dimensions.

Assess Power Dynamics

In the collaboration between public and private parties various factors influence the collaboration and therefore the ecosystem. By mapping the power dynamics which influence the ecosystem, the vulnerabilities of the ecosystem become apparent. Firstly, the external power dynamics are made explicit by applying its four factors. This categorisation sets the context in which the ecosystem develops, and creates an understanding of why certain governance mechanisms need to be in place and whether they affect the power dynamic. In addition, the context factors of the ecosystem are an important measure of performance which will be discussed in the second part of this step. The external power dynamics relate to four external factors, however, also internal challenges are substantiated. This will give grip on the decision-making process by explaining to stakeholders which governance challenges are at hand, and how governance mechanisms can mitigate these.

Social norms

Citizens Distrust & Ignorance

Sentiment in society is an important external power dynamic which influences the system, especially in knowledge intensive area where expertise is scarce, causing a low level of public understanding. This creates a gap in understanding, which complicates building a governance with space to adopt all technical possibilities. The governance positions itself towards societal norms, as incentive structures are organised to eliminate the doubt of citizens. Participants must actively contribute towards the knowledge sharing which is needed to feed the knowledge demands of citizens.

Distrust between public & private parties
Furthermore, the social norms of the trust between public and private parties affect the ecosystem. The ecosystem itself can be seen as problem where a shared understanding of the problem must be created to indicate the interdependence of participants. This shared understanding of the problem will increase the trust and commitment of participants.

Evaluate Governance Maturity with Consistency

Applying the framework also includes the evaluation whether the current TIP collaboration adopts their own values. This will qualify whether evaluation can be done with the current values in the first place. By evaluating how the 7 values of proper governance relate to the governance model, the governance performance can be evaluated. As the power dynamics partly form the challenges which the ecosystem hinges upon, the governance values serve as basis to address specific challenges.

The prescriptive values which will evaluate the governance model are:

1. Transparency & Integrity
2. Accountability & Representativeness
3. Participatory & Inclusiveness
4. Openness to Learning & Innovativeness
5. Efficiency & Effectiveness
6. Adaptivity & Self-corrective
7. Legitimacy & Responsiveness

Each governance dimension is evaluated by investigating whether it lives up to the prescribed governance value. The governance maturity level refers to the level of which the ecosystem optimises the values for proper governance. The governance maturity depends on the amount of governance values which are represented by the governance model. The highest maturity level is seven. Each governance dimension has its own maturity level, where a fully mature governance model therefore adopts all governance values. Evaluating the governance model for TIP resulted in the following evaluation.

Table 5.3: Governance maturity check

Governance value	**Governance dimension**					
	1. Decision rights	2. Relational control	3. Incentive structures	4. Process control	5. Control via metrics	6. Gatekeeping
1. Transparency & Integrity	x	x	x	x	x	x
2. Accountability & Representativeness	x			x	x	
3. Participatory & Inclusiveness	x					x
4. Openness to Learning & Innovativeness			x		x	x
5. Efficiency & Effectiveness			x	x	x	
6. Adaptivity & Self-corrective	x		x	x	x	
7. Legitimacy & Responsiveness						
Total	4/7	1/7	4/7	4/7	5/7	3/7

The most mature governance dimension is the control via metrics with a score of five out of seven. The least performing governance dimension is relational control, with a score of one

out of seven. The other governance dimensions score either a three or a four out of seven. Therefore, no governance dimension is fully optimised, leaving room for improvement. In addition, the current governance model does not relate to the governance value of legitimacy & responsiveness.

5.4.3 Phase II: Interim Conclusion

The framework contributes to the life-cycle development by mapping out all relevant components in between the starting point of the coalition, and the pursued functional ecosystem. Firstly, this assesses what the current coalition exactly is striving for and which tensions complicate the realisation of this. Secondly, it allows insights in why certain design choices are made (or not made), and which governance considerations need to be taken into mind. Putting the development in the timeframe of the operative ecosystem, allows describing the four components which are at play when orchestrating a collaborative ecosystem in the to-be situation. The framework takes a three-phased approach, describing the coalition setting, the current state, and the to-be situation. Assessing each component of the framework broadened the understanding why certain governance aspects create tensions, and which governance mechanisms are needed to avoid further conflict. The final governance model is structured along the three governance dimensions. This model was evaluated by checking how power dynamics affect the ecosystem, and evaluating the maturity of the governance. Here, some governance dimensions scored higher on certain governance values than others. Before moving to the validation of the framework, a conclusion on the TIP as case study is given where recommendations are given in the form of principles for the governance. To conform the governance model to these codes of good governance can be interpreted as applying metagovernance to the governance model of the ecosystem. This is because sound combinations of values, norms, and, principles are combined to form an organised governance in the collaborative ecosystem.

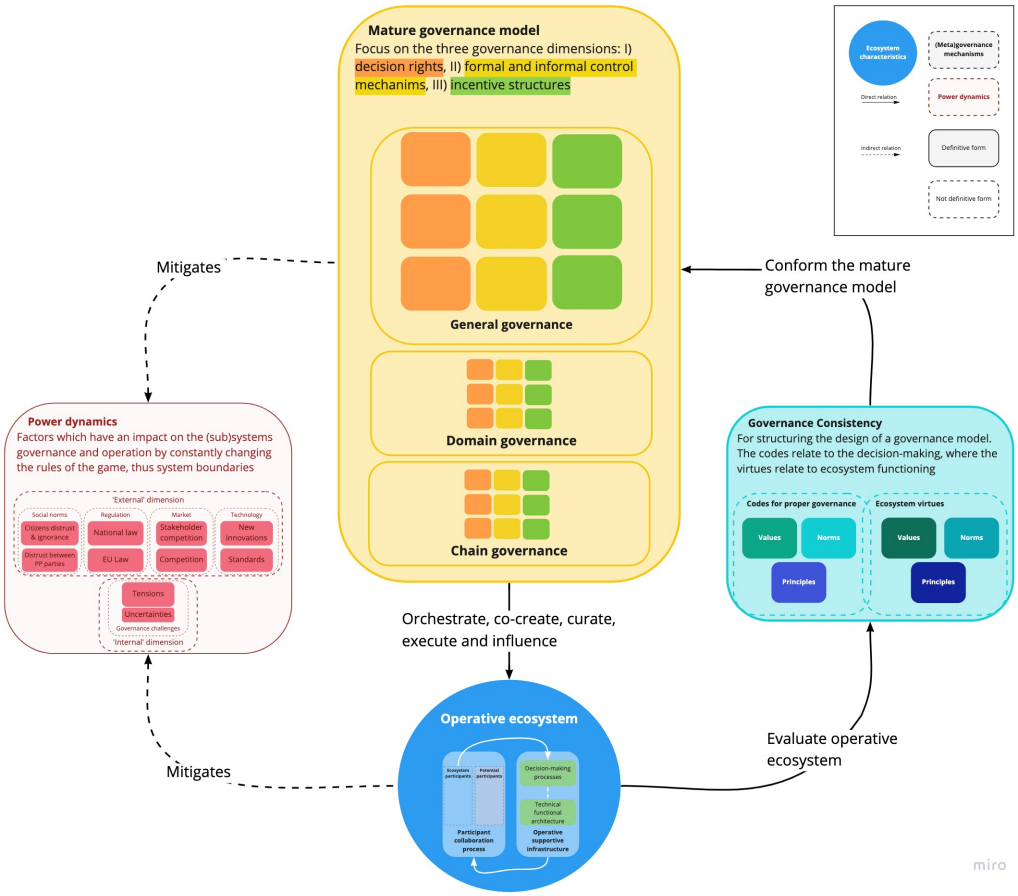

Figure 5.10: Mature governance model in phase II

6 ADAPTING THE FRAMEWORK

6.1 VALIDATION OF THE RESEARCH

Validation of research can be checked with four main types of validity: construct, content, face, and criterion validity. This validity can be checked on various aspects of the research, i.e., the research method, research results, research approach, and research conclusion. As this thesis is interested in the governance model which can found by applying the framework, the validation will be paying attention to the results from the case study. The main types of validity are described in Table 6.1.

Table 6.1: Forms of validity

Form of validation	**Description (example)**
Construct validity	Whether the method measures what initially was intended to be measured (do the interviews really extract the data on stakeholder requirements, success perspectives and governance challenges?)
Content validity	Whether the method represents what it aims to measure (whether the method contains all relevant subject or parts it aims to measure, e.g., in the case of interviews whether all governance aspects are covered)
Face validity	Whether the content of the method appears to suite the aim of the research (more informal and subjective assessment on how suitable the content of the method seems to be on the surface. E.g., whether in the beginning of the interview all the right aspects are about to be questioned)
Criterion validity	Whether the results are accurately measuring the concrete outcome they were designed to measure (how well can a method predict the outcome, e.g., how well can the framework extract all tensions and provide support for the successful adoption towards an ecosystem governance

6.2 VALIDATION OF THE FRAMEWORK

The outcomes of the framework are validated by checking whether the results are accurately measuring the concrete outcome it was designed to measure. To do this criterion validity, the validation deals with the prioritisation of the governance values and checking the completeness of the governance principles. Validating the values and principles which the ecosystem pursues is important, as they form the focus of governance mechanisms and evaluation of a formal governance model. Therefore, the first validation should extract the focus of the current ecosystem by asking participants which value they deem important now, in the near future, and in the distant future. By enabling respondents to prioritise the values and react on the corresponding principle, feedback is generated on the priority of the governance values and completeness of the governance principles.

6.2.1 Prioritising Governance Values

The TIP participants of the working group governance form the group of validators. The participants who contribute to the governance working group are chosen, as they contribute actively to structuring the TIP governance and eventually are the users of the ecosystem. Therefore, the group possesses the right knowledge level to provide the needed insights. The validation session was organised online, where the whole group participated in an interactive session.

After a short explanation on the research, participants learnt what part of the research framework is under study for the validation. When all participants understood the objective and validation, the validators moved towards the session part where their feedback gathering is key. Through interaction on a collaborative online whiteboard, each participant received three memos. With these memos participants were asked to provide feedback on the following. Firstly, participants rated the priority of governance values. Participants place the first memo at the value which they deem most important for the governance right now. The second memo indicates the value which is important in the near future. The third and last memo links to the value which is important for the distant future. Next up, respondents reflect on the principles which corresponds to the value. Answers were sought for the following two questions: I) Why does this principle contribute to the realisation of a governance for an open, trustworthy, and cross domain functional TIP ecosystem? II) What could be changed to the principle to ensure a better connection with the TIP ecosystem? When all participants prioritised three governance values, and reacted on the corresponding principle, the participants reflected on the validation session in general. Here, participants chose from three options (satisfied, neutral, dissatisfied) to communicate their perspective on whether they think constructing governance principles contribute to the design of a governance model for TIP.

All values were presented, followed by the principle it is coupled to in Section 5.4.2. From all values, participants chose the following three the most:

1. Effectiveness (7/8 votes)
2. Transparency (5/8 votes)
3. Participation (4/8 votes)

Further consensus was found in the answers of the participants, as also the rating of priority resembled between their answers. Out of the seven votes, five found this value most important for the ecosystem governance now. This was similar for the value of transparency, where three out of five participants rated this value as important in the near future. The value of participation was more mixed, and varied in priority perception. Figure 6.1 displays the prioritisation of all participants

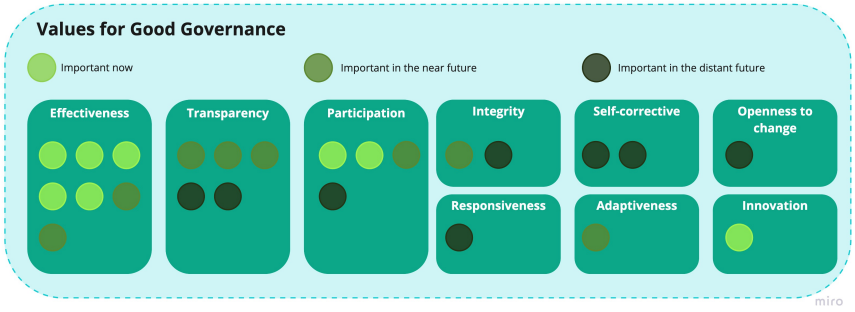

Figure 6.1: Prioritisation of values by participants

Finally, seven out of eight participants were satisfied and thought that setting governance values and principles is contributing towards the design of a governance model. Answers of the satisfied participants showed overlap as they highlighted that making these values explicit is important to evaluate the core values of the TIP governance and to which principles the governance requirements must adhere to. In addition, most validators also remarked that the values and principles are a good starting point to further concretise a governance model. Also, validators also would like to explore the grounds where opinions were more divided. This could be fruitful for gathering the values which lead to more conflicting governance requirements.

The following points were noticed which influence the validity of the validation itself in a negative way:

1. When participants do not choose a specific value it does not mean they regard it as unimportant. There is a chance that participants did not understand the value itself, are not aware of the link with the governance, or find other values more important.
2. Some participant reactions concern the governance value, instead of a reaction on the principle.
3. The difference between the values for a functional ecosystem versus the values for a functional governance (e.g., ecosystem values like trustworthy of information exchange versus governance values like trustworthy decision-making).
4. One participant placed more than one memo, and therefore not all answers could be included.

6.2.2 Interpretation of Validator Suggestions

1. Principles should be decoupled from values. Principles are therefore broader, and pursuing multiple values.
2. One participant noted that for their organisation the Return on Investment (RoI) should always be included. While this is more a focus of the functional ecosystem, this suggestion was not adopted. Another participants mentioned that also trust in the governance itself is a necessary value to adopt for the code of good governance for TIP.
3. One participant asked who should fill the seat of the independent supervisory body.
4. One participant had difficulties with interpreting and prioritising governance values, because according to this person overlap between the meaning of the value could be detected. This complicates unilateral interpretation of the value.
5. Participants see the added value of prescribing values, norms, and, principles, but would like to concretise the principles for proper governance.

6.3 IMPROVING THE FRAMEWORK

The suggestions of the validators led to redesigning the value pairs, norms, and, principles. These changes are listed below. Before the principles for proper governance are modified, the results of the case study are interpreted. Therefore, the improved principles for the TIP governance model can be found in Section 7.4.1. The first phase of the framework is also improved to allow the application of it for other collaborative ecosystems. This can be found in Appendix D.

Prescriptive Values

1. Transparency & Integrity
2. Accountability & Representativeness
3. Participatory & Inclusiveness
4. Openness to Learning & Innovativeness
5. Efficiency & Effectiveness
6. Adaptivity & Self-corrective
7. Legitimacy & Responsiveness

Prescriptive Norms

1. Transparency & Integrity

Transparency norm: "Decision-making processes should be coherent, clear, understandable, and accessible."

Integrity norm: "Decision-making complies with internal rules-of-the-game and external rules-of-law."

2. Accountability & Representativeness

Accountability norm: "Participants take responsibility of decisions and actions in order to organise accountability."

Representation norm: "A supported group of governing authority is designated and represents participants equally."

3. Participatory & Inclusiveness

Participation norm: "All eligible potential participants can join the ecosystem."

Inclusive norm: "All participants can contribute regardless their background."

4. Openness to Learning & Innovativeness

Openness to Learning norm: "Learning awareness is created on opportunities, risks, and mistakes to increase performance."

Innovation norm: "Innovation is internally encouraged, and stimulated through valorisation."

5. Efficiency & Effectiveness

Efficiency norm: "Efficient functioning of resources is pursued."

Effectiveness norm: "Ecosystem performance and results meet a supported set of objectives."

6. Adaptivity & Self-corrective

Adaptiveness norm: "Organise for the absorption of change"

Self-corrective norm: "Checks and balances are in place to allocate or eradicate competence and capacity."

7. Legitimacy & Responsiveness

Responsiveness norm:"Coordination structures and processes serve all participants and should facilitate prompt consensus of decision-making"

Legitimacy norm:"Decision-making affecting any participant should always be justified"

7 DISCUSSION

This chapter will discuss the results from Chapter 5 of this thesis by focusing on two aspects. By firstly interpreting the key findings of the framework application, the governance model which was found for the TIP ecosystem is evaluated. The second aspect reflects the implications of the framework itself, by elaborating on the significance of the governance model for the TIP case, and the implications of these findings for the governance of collaborative ecosystems. After this, this chapter will discuss the limitations of the research. This is done by discussing the research method, data collection, and, research validation. In the end, recommendations are made for the practical implementation, and further research for the generalisation of the framework.

7.1 INTERPRETATION OF THE FRAMEWORK RESULTS FOR A COLLABORATIVE ECOSYSTEM

The results indicate that the governance model of a collaborative ecosystem can be designed with a three-phased framework. Following a DSR approach, this research applies the framework to the case study of Trusted Information Partners TIP, and finds four relevant internal governance tensions. Before scaling the ecosystem, the tensions must be mitigated with six governance mechanisms spanning a layered governance model. The layered governance model consists of chain, domain, and, general governance. The framework prescribes six governance mechanisms for the latter level. An evaluation in the form of a workshop highlighted that TIP stakeholders prioritise effectiveness, transparency, and, participation as the most important values to focus on. Therefore, when forming the governance model, it is likely that TIP will also prioritise implementation of relating governance mechanisms. However, to organise proper governance functioning, TIP should also implement the other values for proper governance. Therefore, this research prescribes 22 principles to enable this.

Power Dynamics

The coalition tensions are hard to mitigate, as there is no organised governance which enables doing this. Therefore, the identified coalition uncertainties and tensions, will likely to continue in phase I. This holds for both the uncertainties as for the tensions. The phase 0 uncertainty of the 'chicken-egg problem' relates to the uncertainty of 'power imbalances', the power imbalance of finance to be precisely. While private organisations are interested in the financial model of the ecosystem, public organisations want safe tax spending. Therefore, the 'chicken-egg problem' is embedded in the governance uncertainty 'power imbalances'. 'Knowledge asymmetry' of phase 0 also relates to the power imbalance of 'difference in knowledge'. And the coalition uncertainty of 'distrust between organisations' relates to the power imbalance of 'trust'. The coalition tension of 'individual versus interdependence problem-solving' directly relates to the governance tension of 'self-interest versus collective interest'. This illustrates that the lack of a governance causes coalition challenges of phase 0, to continue in the governance challenges of phase 1. This is in line with literature [Medaglia et al., 2017a; Bryson et al., 2006]. To ensure mitigation of power dynamics relating to the external dimension (e.g., citizens distrust & ignorance, EU law, and, stakeholder competition), the ecosystem must position itself towards these by mitigating them through the governance model. Therefore, a shift of focus is necessary for TIP to also include the external dimension of the power dynamics.

Governance Model

The four governance tensions are all internal governance challenges, as they come from the participants of the ecosystem. Therefore, when the governance challenges are not mitigated, this could lead to immediate or later drop out of participants, and possibly failure of the collaborative ecosystem. The way in which decision rights are organised through a layered structure for the governance model seems essential for the success of collaborative ecosystems in general. The governance model should orchestrate decision-making in which all participants are represented, while decision-making is responsive and efficient. Currently, the ecosystem uses a bottom-up approach where knowledge from the lower authorities is needed for the decision-making of higher authorities. When the ecosystem grows, this dependency must still be in place. When the information asymmetry between the participants increase, strategic behaviour can occur which can damage the trust between parties [de Bruijn and Janssen, 2017]. By defining clear rules of the game, decision-making processes and positions of decision-makers will become transparent. With accountability structures organised in a decentralised manner, insights in the position of participant is available, increasing the robustness of the ecosystem. Centralised decision-making should therefore focus on transparency, while remaining legitimate and responsive. Checks and balances must be in place to ensure decision-making is justified and monitored. Because an ecosystem involves cross-domain stakeholders, the interaction within a domain are dependent on the granularity of interactions. Therefore, the information chain itself must be responsible for the governance. Decision-making on the level of domain and general governance, should therefore be left to respectively, the middle-management and board level authority of a decision-making structure.

The second tension on which the ecosystem should get grip on, is the tension between self-interest and collective interest. The focus of the two governance dimensions, relational control and incentive structures, is much more on aligning the participants interests with the ecosystem values and norms. When applying the positioning model to the TIP participants, not all parties seem to pursue the collective interest of the system with a long term implementation. While participants are aware of the ecosystem virtues and the benefit they create individually, the awareness of long term interdependence by many participants is much lower. Relational control must make sure the individual interests and short term implementation visions of participants move to collective interests with a long term implementation vision. When this is not realised, participants can slow down in adoption speed which could cause drop-outs. During this phase where only a coalition-of-the-willing participates in decision-making this is problematic, as parties are less replaceable compared with an operative ecosystem.

The third tension is related to the public private context in which the ecosystem is operative. While parties will need to adhere to the collective interests the ecosystem pursues, their incentive to join the ecosystem is based on their individual interests. These individual interests differ between all sorts of parties from public to private values. To prevent the system to be hijacked by participants which either pursue public or private values, the value creation should be balanced. In order to safeguard this balance, two governance dimensions must be in place which strive for independent monitoring of behaviour and ecosystem functioning; I) process control, and II) control via metrics. While this allows adaptivity of the ecosystem by acting upon desirable or deviant behaviour, the described mechanisms are less reflective on how this adaptivity can exactly be organised. The governance model is therefore adaptive to the governance measures which are set by the participants themselves. This is where metric control proves its value. To be truly adaptive, the governance should organise for absorption of change.

The last tension relates to the governance dimension of gatekeeping, which is concerned with entree and exit of participants on the ecosystem. The question is whether the ecosystem must structure strict entree and exit barriers to ensure its quality, while flexible rules increases inclusivity and innovation. Especially for the phase the current ecosystem is in, applicability of the cross-domain function is crucial. Therefore, strict entree and exit criteria must only be instituted in case the performance of the decision-making, or the ecosystem functioning declines. As new participants are likely to join the ecosystem, the monitoring of the ecosystem performance. Although the governance values are generic for every collaborative governance, the ecosystem values can change through time. The framework allows these changes, while the

ecosystem values and norms can be adjusted. Nevertheless, the instituted governance model will need adjustment as well, because previous evaluation was based on other ecosystem virtues. It is questionable whether these changes in the governance model are feasible, as the adjustment of the governance model requires time, resources, and capacity.

Governance Consistency

The governance consistency for every collaborative ecosystem must include prescriptive values, norms, and principles striving to mitigate all power dynamics. The framework distinguishes two aspects to evaluate the ecosystem on: I) codes for proper governance, and, II) ecosystem virtues. The former analyses the decision-making on the values and norms of proper governance, while the latter analyses the performance of functional ecosystem. Validation on the values and principles for TIP were evaluated with an interactive workshop with (a part of) the interviewees, in order to improve the codes for proper governance. This resulted in changing the value pairs as overlap between values was indicated. In addition, principles can pursue multiple values. This led to decoupling the principles from the values, to form a set of principles for proper governance.

Also, the participants prioritised the prescriptive values, and reflected on the prescriptive principles to enable a primal evaluation of the TIP decision-making. The combined focus of participants on effectiveness, transparency, and, participation illustrates the relevance to also implement the values which are less well reflected in the decision-making processes. These final prescriptive principles are found in Section 7.4.1, and serve as recommendations for conforming the TIP governance model to the codes of proper governance.

7.2 IMPLICATIONS OF THE FRAMEWORK FOR COLLABORATIVE ECOSYSTEMS

Previous section discussed the implications of the framework application to the case study. This section will reflect on the implications of the framework to collaborative ecosystems. The literature review highlighted six requirements a governance model should fulfil for prescribing a normative governance model (Table 2.3). These requirements formed the starting point of constructing the framework, and will now be used to position the results in existing literature.

1. ***Capture life-cycle development through time***

   When an operative ecosystem is described further in the future, the more ambiguous the ecosystem functionalities will become. The likeliness of the participants to support the system will depend on their knowledge of the future possible ecosystems. As an operational ecosystem is undefined, it is unclear when this phase terminates. Is it functional for all future operative ecosystems, and if not, how does this change the components? This complexity was addressed by the framework, by taking in the notion of time. This allows to define a 'to-be' situation of the ecosystem, where power dynamics can still be determined. This context dependence therefore does not influence the proper design of a governance model.

2. ***External Factors***

   As power dynamics evolve through time, the question rises how accountability of these factors can be organised in the ecosystem. By reflecting on all power dynamics and governance consistency the gaps in the governance model started to form. The governance tensions are viewed as the known-unknowns, where the model knowns what the unknown decision between two governance mechanisms are (which derives back from a tension). Therefore, when the framework is applied cyclically, as the form suggests, the framework

is constantly identifying the external factors affecting the ecosystem. Through the layered governance model, the ecosystem participants position themselves in relation to various power dynamics. This allows accountability of power dynamics by the ecosystem as a whole.

3. ***Public-Private Context***

   Collaboration where public and private parties are involved, creates a context which requires new governance mechanisms. Due to the magnitude of the collaborative ecosystem, different levels of scale emerge which complicates the steering of the ecosystem. The layered governance model reflects on this, by adopting the three governance dimensions into the layered decision-making structure the case study proposes. Therefore, the framework can address the complexities of collaborative ecosystems. There is no differentiation between public or private parties in terms of the decision-making. The framework adopts both values of the public as the private sector, making the governance equal to all participants.

4. ***Adaptive governance***

   Application of the framework in the case study illustrates how the governance adapts to the challenges through the different phases. As the ecosystem is context-dependent, and time-dependent, reflection on the ecosystem and governance performance allows adaption to the context. In other words, depending on the context, the governance model is able to adapt itself. Hence, the framework adapts its governance design to different ecosystems, where no 1-fits-all solution is sought.

5. ***Governance for a Digital Ecosystem***

   Reflect on what a decision-making should contain (to be less erratic): I) agreements about entry and exit, II) agreements related to the decision-making, III) agreements related to conflict management, IV) agreements related to the organisation of the process, V) agreements related to the planning and budget. In the end, the agreements only work if they are not biased towards the outcome of certain solutions. Reflect what the governance model should describe in terms of the 'rules of the game': decision-making processes, and position of actors in decision-making

6. ***Function versus Implementation***

   The behaviour of participants on the ecosystem leads to a certain ecosystem performance. Therefore, the implementation (i.e., the governance model), influences the ecosystem functioning (i.e., operative ecosystem). The framework assesses the link between function and implementation through the governance consistency. This is vital for the governance model, while the governance design of it is implementing lessons of the ecosystem functioning. Conflicts emerging when the governance design is not in line with the functioning of the ecosystem, need further decision-making. The severity of these possible conflicts is currently not evaluated at the governance consistency. Also, which authority has the responsibility of addressing these conflicts are questions remaining for further framework improvements.

7.3 LIMITATIONS

The application of the framework in the TIP case study allows capturing the governance development in a collaborative ecosystem. The maturity of the resulting governance mechanisms is

reflected with the codes of proper governance. Although this is an aggregation of prescriptive values, norms, and, principles from both public and private organisations, the method of evaluation is not a proven-method. Therefore, validation and verification of the governance model is brief. Besides, the framework was applied, and evaluated based upon one case. Therefore, the framework is not applied to a digital ecosystem in a different domain, decreasing the validity towards other domains. Although the single case study analysis allows studying a unique phenomenon under unusual circumstances, a multiple-case study analysis better suits research in which theory building is the main purpose [Yin, 2014]. Due to time constraints, a multiple-case study was not possible. The research limited the bias of interviews by asking for perspectives instead of direct challenges, and present these extensively in appendices, validity of the research remains applicable to the case. Therefore, this research has analytical power to enable a robust framework [Eisenhardt, 1989], but partly lacks creating a generalisable framework due to the single unit case study. As the framework was applied to a case of which the governance is still informal, the

For the data collection, 14 interviews were held with the participants of the ecosystem. Although this is above the minimum of creating a clear overview of the case, the representation by interviewees is one-sided. Each interviewee represented their entire organisation which might not portray the entire organisation perspective. Therefore, some TIP participants represented ministries, banks, and software providers which employ over ten thousand employees. The internal challenges which emerge when implementing TIP in these organisations were only broadly reflected upon. Next to allowing interviews with multiple participant per organisation, interviews could have been held with parties which do not participate in the ecosystem. By also performing interviews with potential participants, the perspective of less optimistic stakeholders could have been taken along. This could have improved the research by allowing a more critical perspective on the challenges of the ecosystem. Furthermore, this sheds light on the must-have governance requirements for organisations which provide value to the ecosystem, but currently do not partake in the decision-making.

While representation of the TIP participants contained a wide variety of organisation types, the input of that organisation was bounded by the knowledge of often one person. This resulted in data input which was dependent on the knowledge this particular participant possesses of the TIP initiative. It was noticed that some interviewees had a better perception of the envisioned ecosystem than others.

Also, the interviews took place in the months of November, December and January. During these months, participants of TIP also actively participated in working groups which focused on designing the technical and governance aspects of the ecosystem. Therefore, some interviewees were bounded in their response by only thinking of requirements which were related to topics discussed in these working groups. An example of this was the discussion on the design of entree and exit barriers the ecosystem should install for the gatekeeping of potential participants. When asking for governance requirements of an open ecosystem, interviewees often mentioned the importance of setting entree criteria, where also other governance requirements can be instituted for an open ecosystem. Therefore, most input related to the current challenges of the ecosystem, and therefore lacking reflection on challenges for the future operative ecosystem. This notion of the moment of analysis also holds for when applying the framework itself. The final phase of the framework namely reflects on the maturity of the operative ecosystem. This phase was performed already for the current TIP ecosystem, while in reality the TIP ecosystem is still in its experimental phase.

A validation was conducted on the governance consistency component, by using a collaborative online whiteboard. The interviewees from the case study were asked to reflect upon the prescriptive values and principles. This group is therefore no expert in governance, limiting the scientific quality of the validation. By using three memos, validators prioritised the values by putting the memos in sequence of importance. Although participants were given only three memos, some felt the need to reflect on multiple principles. While this did gather useful thoughts on the principles, these memos were left out when prioritising the most important values of the coalition. Furthermore, not all participants from the working group governance could participate in the validation session, leaving the reflection of some participants underex-

posed. Continuing on the contributing participants, one participant validating the governance consistency is not part of working group governance. Therefore, this reflection was more from the perspective of organising, instead of the content itself. Another limitation of the validation was the simultaneous interaction of the participants. More tentative participants waited on other participants to post the memos and responded to their choices. This resulted in group think, where the outcomes could present itself as more uniform than they truly are. In addition, participants could also think and reason from the 'forced' perspective which is in line with their organisation, instead of thinking from their own personal beliefs. Therefore, some results were less revealing and provided nothing new.

7.4 RECOMMENDATIONS

The recommendations will reflect on two aspects. First, the recommendations for implementing the governance model for the case study, by using the principles from the codes for proper governance as implementation strategy (Section 7.4.1). Secondly, recommendations are given on the framework, and how to ensure the generalisability to be more specific (Section 7.4.2).

7.4.1 Implementing a Governance Model for TIP

The following principles for proper governance should be taken into account when implementing and conforming the governance mechanisms of TIP with. The principles were constructed after the validation of the framework, by using the recommendations of validators, and the interpretation of the framework results.

1. Organise the ecosystem governance in a phased manner, by phasing the expansion of participants, relevant use cases, and supportive ecosystem infrastructure.

   While this stimulates an organised, and manageable, growth of the ecosystems, it should be made clear that moving in phases could decrease efficiency and effectiveness as parties could hamper development of a phase.

2. Establish the governance mechanisms of the ecosystem with a layered governance model.

   When dividing governance mechanisms, a layered governance model provides grip on the complexity of the ecosystem. When addressing governance tensions on other levels, overview through an accountability structure must be minded.

3. Execute and maintain a layered governance model, which also spans the governance of domains and chains.

   The layered governance model is executed by the authority from the general governance.

4. Install an independent entity (e.g., a foundation or association) which strives for open standards, knowledge sharing, and a level playing field.

   The entity form will be the main pillar in the organisation of the day-to-day management of the ecosystem. How this will fit in with roles such as a Board of Directors, Board of Commissioners, and the roles of officers (such as president, secretary, treasurer) will need further discussion, alongside their compensation.

5. Maintain a layered governance model consisting of a strategic, tactical, and operational level.

This refers to the decision-making authority of the ecosystem. Mind that who will be positioned where is defining the rules-of-the-game, and therefore the decision-making of the ecosystem.

6. Organise transparency for decision-making processes and the decision-makers.

   Next to organising the transparency, it must be ensured this transparency is maintained. Also, not every decision-making process needs to be transparent. Discussing what is transparent and what is not should be the target.

7. Define a code of conduct for all ecosystem participants.

   A code of conduct seems not very important, it does capture how things are done. It is important to think about, and taking in the values which are important for the ecosystem participants. Be aware of no enforcement of the code of conduct.

8. Organise accountability and responsibility structures for every decision-making authority.

   Be aware that not all ecosystem behaviour can be structured, the most important accountability and responsibility should be the focus.

9. Organise democratic representation of the participants for every decision-making authority.

   Allowing a democratic representation defines the ecosystem operation. Mind efficiency and effectiveness might be under pressure.

10. Set conditions and procedures for exceptional decision-making under certain extreme circumstances.

    A 'red-button' policy must be in place to allow decision-making in extreme circumstances. How strategic behaviour plays a role is important to be aware of.

11. Describe flexible entry and exit criteria on gatekeeping of potential participants.

    This also relates to the governance mechanism described earlier. A trade-off between innovation and inclusiveness must be taken.

12. Evaluate every potential ecosystem participant on the same criteria.

    This has consequences for the integrity of the ecosystem, where transparency should be safeguarded.

13. Create incentive structures for a cross-sectoral ecosystem implementation, with efficient, effective, and inclusive decision-making.

    The public and private values are dependent on the cross-sectoral characteristics of the ecosystem. This might therefore be different in other ecosystems.

14. Create incentive structures for an open ecosystem which stimulates innovation.

    An open ecosystem is something TIP is striving for. Incentives structures should thus also be in place to organise this.

15. Create incentive structures for a trustworthy ecosystem which organises monitoring and enforcement of participants.

    An open ecosystem is something TIP is striving for. Incentives structures should thus also be in place to organise this. Integrity is important to mind here.

16. Organise internal incentives to evaluate new technical innovations like emerging standards.

    An open ecosystem is something TIP is striving for. Incentives structures should thus also be in place to organise this.

17. Define what makes the ecosystem worth by prioritising which values the ecosystem strives for.

    How this message is conveyed to other potential participants will decide whether new participants will be attracted.

18. Set transparent SMART goals to achieve the objectives the ecosystem strives for.

    By making SMART goals, ensures the ecosystem virtues.

19. Organise for change absorption.

    Change absorption will determine the adaptivity and self-correctiveness of the ecosystem. Resilience and robustness is key for a viable ecosystem, however, chaos can emerge when not managed properly.

20. Incentivise to maximise knowledge sharing through interactive learning processes between ecosystem participants.

    Knowledge sharing is of great importance to diminish tensions, and increase openness to learning.

21. Ensure all decision-making can be justified.

    Decision-making must follow a logic or rationale with support of ecosystem participants. Trust is important, and decides on whether decisions prevail.

22. Maintain the execution and compliance of the governance by all ecosystem participants and decision-making authorities with process control.

    The ecosystem will need to reward and punish ecosystem participants with process control. However, this needs to be fair as misuse of process controls is probable. The codes of proper governance needs to be in place for this.

7.4.2 Generalisation of the Framework

While this thesis used a single-unit case study to build and test the theoretical framework, the framework was not applied to other real-world cases. Based on applying the framework to the TIP case, this section evaluates the validity of the framework for other cases. As concluded in previous section, the framework can prove to be useful in situations where the participants of a digital ecosystem are apparent, and a vision of the scaleable ecosystem is in place. When this vision is not unified, the framework builds upon the perspectives of the interviewees. This makes the framework prone to bias in the case these perspectives do not overlap. This is partly

filtered by the description of the governance challenges, as many uncertainties and tensions will emerge when stakeholder answers show discrepancies. Nevertheless, prescribing the operative ecosystem characteristics will be questionable, as stakeholders will have different perspectives on it. Despite the fact the framework provides more insights to ecosystems which are more concrete, the framework will capture challenges which need to be mitigated. These challenges can be placed in the life-cycle, enabling prioritisation which challenge needs to be addressed first. Also, the good governance values can be reflected upon by evaluating whether they apply to the ecosystem. When these do not relate to the ecosystem at all, they can inspire structuring a primal governance model for the ecosystem.

The three-phased approach presented in Section 3.4 allows the framework to be executed according to the steps which are described. Each step provides an objective, study focus, and deliverable, allowing to analyse the governance of digital ecosystems. Firstly, the ecosystem under study is scoped where the components of the first phase characterise the ecosystem, and coalition challenges are dissected. In order to gather this information, research should be able to do a document analysis on this ecosystem, or gather this information through interviews. Therefore, the framework provides insights for ecosystem of which the participants and ecosystem virtues can be identified. In the second phase, the framework provides a working method to cluster the supported components from interviews. The data should gather interests, success perspectives, and foreseen challenges. Comparing these individual perspectives allows structuring possible governance challenges. In addition, governance requirements are gathered by asking interviewees how to realise the ecosystem values. The final phase structures the governance model through three dimensions. By linking the governance requirement with the governance mechanisms, a choice between two possible governance mechanisms becomes apparent. These also relate to the governance tensions on which a balance is sought. The final step allows evaluation of the governance mechanisms, by measuring its performance through the governance consistency and evaluating if it mitigates all power dynamics. Therefore, the components of the three-phased approach are generic terms, and following the steps is therefore possible for other cases. How the validity of the framework can be increased for applicability to other cases, will be discussed in Section 8.2.2.

Finally, while not all participants reflected on the governance principles, a large stake of the framework validation revolved around the prioritisation of values. This actually does not validate the values itself, as participants only reflect on the priority of values on which the governance model should focus. Therefore, validating the mature governance model itself remains to be carried out. Whether participants feel like the governance model mitigates relevant governance challenges, if and how they would adopt it, are questions which will still persist. This could also improve the governance maturity check of the framework.

8 CONCLUSION & RECOMMENDATIONS

To conclude the research, this chapter aims to answer the main research question in Section 8.1. This will be done by summarising the most important insights, and stating why these insights are valuable. How the conclusion can be applied in practice is part of Section 8.2. This is elaborated on the recommendations for further research. Finally, the contributions to science and society are discussed in Section 8.3.

8.1 CONCLUSION

This thesis aspires to answer the following main research question: *"How to design a governance model for a collaborative ecosystem which facilitates electronic transactions?"*. The research aims to identify the governance tensions, and prescribe governance mechanisms which steer interactions in a collaborative ecosystem in such a way, mitigation of tensions is possible. The governance model is the supported set of all governance mechanisms within the collaborative ecosystem. Designing a governance model for a collaborative ecosystem is a challenging problem, with many complexities. To get grip on these complexities, a three-phased framework was developed through the DSR approach.

A conceptual framework proceeding from state-of-art-literature is constructed and applied to the current collaborative ecosystem of TIP. Needs and requirements for building a governance model for TIP are extracted by performing a case study with qualitative methods, such as semi-structured interviews, document analyses, and meeting attendances. By inserting the needs and requirements, it can be concluded that a three-phased framework captures the development of governance in TIP collaborative ecosystem. Moreover, this framework prescribes a layered governance model, consisting of general, domain, and, chain levels of governance. To mitigate the four governance challenges, it is essential for the success of TIP to implement six governance mechanisms into this layered structure. For other collaborative ecosystems, the decision-making structure of the TIP case study, can be a leading example for this.

This study affirms that a framework should cogitate the following components when designing a governance model for a collaborative ecosystem facilitating electronic transactions:

- Identifying the governance tensions enables context setting of factors affecting the ecosystem. By mapping these, the factors affecting the governance of a collaborative ecosystem can be comprehended. In order to acquire a complete picture of the context, also other internal and external power dynamics are advised to confront.
- Prescribing governance mechanisms boosts the mitigation of power dynamics. Governance mechanisms are designed to mitigate a specific power dynamic. The governance mechanisms span a layered governance model consisting of chain, domain, and, a general governance level.
- Pursuing the codes for proper governance ensures the evaluation and conformity of the governance model. These consist of 7 value pairs and 14 norms. The principles for proper governance serve as implementation and conformity strategy of proper governance in governance mechanisms. Governance consistency checks whether the proper governance takes place in decision-making, and the performance of ecosystem functions.

While the single unit case study limits the generalisability of the framework, the research provides new insights into the complexities of designing governance models for collaborative

ecosystems. The framework is adaptable to time and context. In retrospect, the framework therefore provides building blocks for designing a governance model for any collaborative ecosystem with a digital component. The research illustrates, the governance model outcome of the framework does not depend on the distinction between public and private participants. With other words, the coalition of the willing could also consist of solely public, or private parties. Through validation of the framework with another use case, the framework could prove to be useful for designing the governance model for other collaborative ecosystems. This raises the question of the usefulness of the framework to collaborative ecosystems without a public-private context.

8.2 RECOMMENDATIONS

8.2.1 Implementation of a (Mature) Governance

The framework should be applied to other collaborative ecosystems which have a formal governance, and where the collaborative ecosystem is functionally operative. Next to comparing the current framework interpretation, this allows to validate and verify the framework on the second and third phase. This is useful for gathering knowledge on evaluating ecosystems on their decision-making and functional performance. In addition, this might provide new insights on governance models of other collaborative ecosystems.

Analyse a collaborative ecosystem by setting the scope and mapping the contextual overview. To align governance mechanisms, all power dynamics should be confronted. This allows to provide a complete overview of affecting factors, on which governance mechanisms can be constructed and evaluated through governance consistency. Analysing an ecosystem through time with the framework can create an overview of the design choices which were, and can be made for the design of the governance model. However, this requires good documentation.

Make ecosystem virtues and good governance measurable and actionable, by quantifying them. This also allows defining successes and share them with potential participants.

8.2.2 Future Research

Although governance for ecosystems is not new, governance for digital ecosystem is relatively unexplored. By applying the framework, the insights into governance tensions provide benefits by understanding their relation with the governance mechanisms. By relating the governance mechanisms to the case study, it was discovered what needs to be present for a mature governance model, and what the current state of the case study governance model is missing. For further research of the framework, the following suggestions should be taken into consideration:

1. **Generalise the framework** Validate challenges and their prescribed mechanisms by experts to assess whether framework applicable to other collaborative ecosystems. Make analysing the governance maturity measurable through quantitative measures also supports a more generalisable framework, with an actionable governance consistency. In addition, as Figure 1.1 illustrates, the rigour cycle is incomplete. To complete the cycle, the question of 'what new knowledge is available on governance models for collaborative ecosystems to be added to the knowledge base?' could be added.

   Also, generalisability of the framework could be analysed by studying the environment of digital trusted services in Europe. As the EU strives for an interoperable digital wallet, programs like Proposal for a Long-Term European IT Governance Model (e-SENS) could be taken into account. This could also include a political perspective, as the research problem is intertwined with political decision-making.

2. **Economic alignment of business models and stakeholder incentives** Incentive for participants to join the ecosystem has largely to do with the contribution of the ecosystem to them. Economic advantages are for most private parties the leading incentives to join. Therefore, aligning the ecosystem business model with the incentive structures, could im-

prove the applicability of the ecosystem. Private incentives for profitability relatively unexplored as the commercial and, or economic aspect were neglected due to scope and fit with the master program this thesis is written for. However, also the business model of the ecosystem needs alignment with the incentive structures, and therefore is an interesting domain for further research.

3. **Find causalities between individual perspectives and governance tensions** When positions of the (potential) participants can determine certain governance tensions, governance mechanisms can be designed to steer stakeholder positions towards the right ecosystem behaviour. This should also integrate the causality between stakeholder interests and the governance challenges from phase I. This allows to strategise around certain stakeholders positions, allowing to dissect the challenges that should be confronted. Concretising the operative collaborative ecosystem also enables to confront and discuss power dynamics. This will help to structure concrete governance mechanisms.

   Political power dynamics were not reflected upon, however, due to the magnitude of the ecosystem, the system is political as well. Power imbalances between public and private parties were partly reflected, by looking at power dynamic of 'trust between public and private parties'. As this description of ecosystem behaviour between participants only describes their anticipated role in the ecosystem, the dynamics between participants outside the ecosystem are interesting to include as well. Parties can also behave strategically in these decision-making processes to gain on their own interests, even while this hurts other parties [de Bruijn and ten Heuvelhof, 2018]. Strategic behaviour will emerge in working processes and decision-making structures. Their effects will need to be further analysed to assess the risks, by indicating where strategic behaviour can emerge to counter it. The power dynamics do not reflect on irregularities in the case of strategic behaviour, like the effect of private parties merging. While this behaviour is likely to occur, process control and control via metrics could be analysed on proactivity, for which change management can prove as a fruitful source for inspiration.

8.3 CONTRIBUTION OF THE RESEARCH

This section reflects on the contribution of this research for the current body of science Section 8.3.1, and for the society Section 8.3.2.

8.3.1 Scientific Contribution

The framework is analysed through the Governance Network perspective. This means the Governance Network perspective suits analysis of other collaborative ecosystems facilitating electronic transactions, and can be used as theoretical frame. As the Governance Network perspective fits with characterising a collaborative ecosystem, the results of this research should however be validated to also translate research finding towards the broader paradigm of the GNT.

However, to boost the service delivery of collaborative ecosystem, taking in a perspective will not suffice. To enable valorisation of trust servicess in collaborative ecosystem, the research analysed the use of metagovernance for all governance network where a variety of stakeholders is responsible for the operational ecosystem. The governance consistency in the framework allowed organising the governance model with values, norms, and, principles which lead to more hands-on metagovernance with concrete governance mechanism. When making these governance mechanism concrete, new challenges start forming. On most values the participants agree, however, when the application of those values concretise, also new tensions start to emerge. Some discussions were further developed than others, allowing better concretised tensions and therefore the governance mechanisms. The more concrete the tension, the better a design for a governance mechanism. In the end, while current literature mostly finds substantiation for network management, the governance mechanism found for collaborative ecosystems remained rather high level, serving as building blocks for the governance model. Also, this re-

search contributes in providing a link between ecosystem functioning and the implementation of a governance with a governance model, as literature provides little methods and models to assess this [Kitsing and Vallistu, 2021; van Engelenburg et al., 2020; Otto and Jarke, 2019].

8.3.2 Societal Contribution

Collaborative ecosystems are new forms of collaboration in which public and private organisations interact to valorise new qualified trusted electronic services. Facilitating reliable and trusted information exchange via an ecosystem can provide efficient and effective personal data management, where straightforward operation of natural and legal persons is possible in a legal-binding and reliable way. Therefore, the main challenge hampering the development of collaborative ecosystems is the lack of alignment between the ecosystem functioning and the implementation of a governance. The framework contributes by mitigating relevant governance challenges by prescribing a fitting governance model. Mitigation of governance tensions in collaborative ecosystems can therefore increase the valorisation of digital trust services. These services can contribute to a safe, trusted, and easy-to-use environment for online business. In addition, the framework can serve as a basis for governance of other public private collaborative ecosystems. It creates insights in creating trust in collaborations, analysing power dynamics, and evaluating the governance.

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A LITERATURE REVIEW

A.1 PRISMA FLOW DIAGRAM

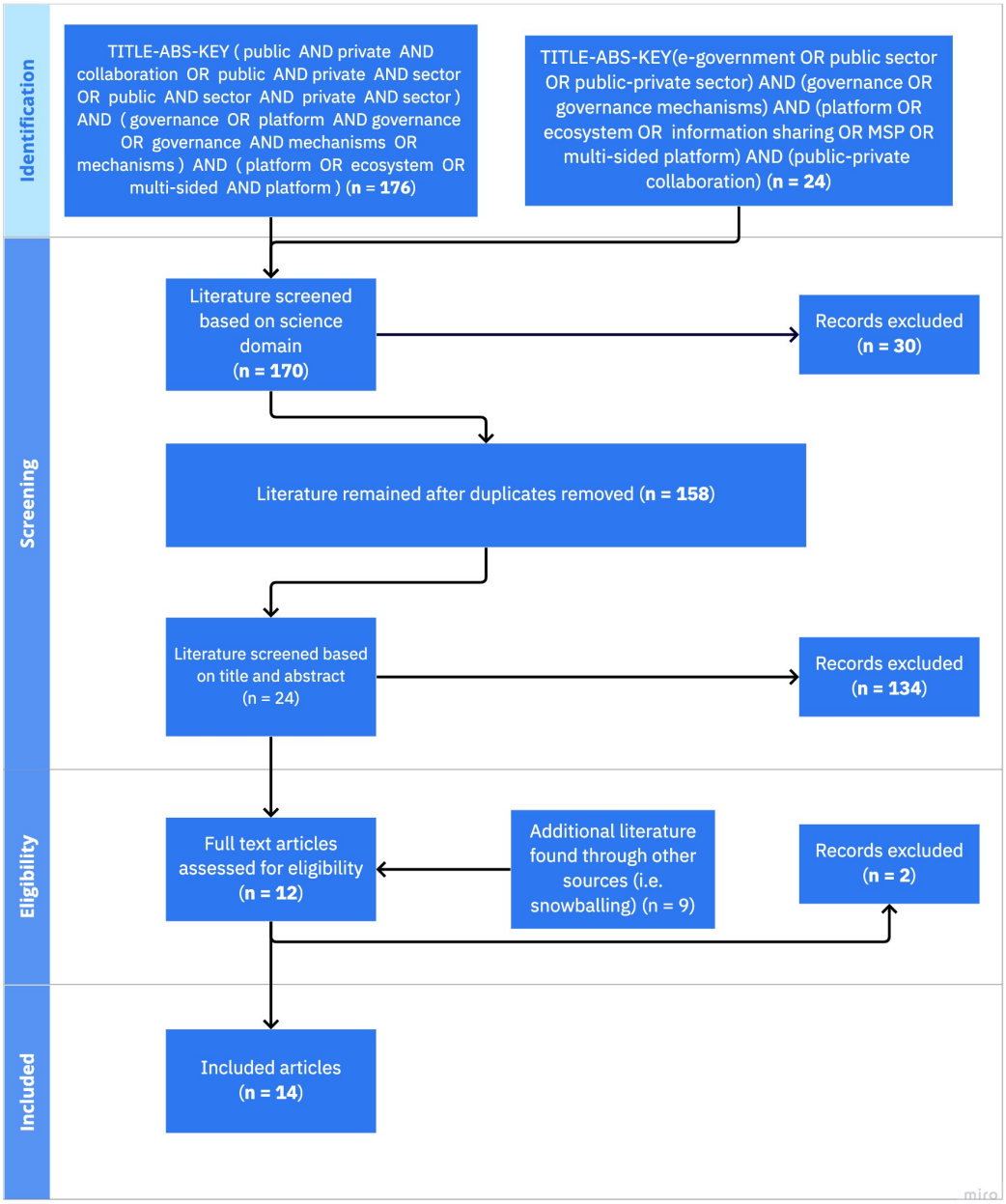

Figure A.1: PRISMA flow diagram

A.2 LITERATURE REVIEW OVERVIEW

Table A.1: Overview of literature review and their results

Author(s)	Result summary	Approach	Focus	Knowledge gap
Bharosa et al. [2018]	Revealing 5 steering instruments used by government agencies (external drivers for other parties, i.e. businesses, intermediaries and software providers) to influence adoption of SBR: policy on standardisation, governance, communication, knowledge exchange and technical configuration	Literature review and case studies	Identifying steering instruments public private collaboration of an digitisation implementation	SBR was more public driven, therefore, reflection on the more private driven initiatives is understudied
Bharosa et al. [2013]	When analysing the MSP development for business-to-government data exchange instruments were found on how design choices facilitate engagement, collaboration and participation (business incentive, legislation and standard development)	Case study	Investigate the barriers and decisions (with focus on platform governance and information infrastructure) in two public-private MSP initiatives	Providing platform governance structures for MSP developed in a public-private context, and which instruments can be implemented for cross-domain collaborations
Dijkhuis et al. [2018]	An ecosystem should be steered with public-private governance, with committed stakeholders and a system of agreements. Success of this is the ability of public and private organisations to move towards a public-private governance in which actors are committed	Design science research approach	Proposing building blocks to make eID solutions available to remove the barrier of a sound human centric and cross-domain QIE	The building blocks of a shared governance are plainly explained, but the realisation of the design of the governance mechanisms and their impact remain open
Klievink et al. [2016]	Platforms driven by the private sector can evolve in a way that enables extensive transformation of the operations of government. Balancing between autonomy and control, aligned business models with public values and collaborative process (of adopting standards) are fundamental ingredients	Case studies	Investigates the challenges and instruments for platform-enabled transformation by looking to advance knowledge on the understanding of how the public sector can transform the ways it interacts with businesses through public-private platforms	Research on stakeholder requirements and barriers can be deepened, which opens up research on data ownership, data re-use, openness, and balance between control and autonomy
Medaglia et al. [2017a]	Model on the power dynamics which were involved when public-private parties were heading towards a governance model of the Danish e-ID. Four context factors were identified: market, technology, regulation and social norms	Case study	The power dependence lens to investigate the interactions between private and public actors engaged in establishing a shared e-ID infrastructure	Link between the power dependence and possible governance mechanisms were not analysed, while the contextual model can also be applied to use, maintenance and development of a public-private MSP. Tensions between the power dynamics and outcome of governance mechanisms could broaden the knowledge on governance impacts
Medaglia et al. [2017b]	A process model to conceptualise paths towards the emergence of public-private collaboration for digital information infrastructure is proposed, where 3 factors (interests, resources and governance) characterise 3 phases of the path towards collaboration	Case study	The theoretical lens investigates how transformations over time in the developments between interests, the interdependence of resources, and the alignment of governance models between public and private parties shaped the emergence of the Danish national e-ID	3 factors (interest, resource and governance) describe the PPC transformation, but mechanisms to intervene on the tensions are lacking

Author(s)	Result summary	Approach	Focus	Knowledge gap
Constantinides et al. [2018]	By reviewing the literature on platform infrastructures and governance, themes and opportunities for new research areas were found	Literature review	Paper addresses to find new emerging themes on digital infrastructures and platforms and suggest new research areas	Tensions between control and innovations were discussed for physical infrastructures, where for digital infrastructures are still understudied. In addition, this mostly reflected on pricing issues for private sector platforms, where the focus of this research are designing mechanisms for a public-private platform which balance control and autonomy while generating (public) value for all parties
Glukhikh et al. [2021]	Formation of a framework for the development of a digital PPP platform taking into account the interests of the parties involved. Makes it possible to formulate stakeholder requirements on the design of a digital platform for PPP, which will determine the future set of tools when shaping its architecture	Systems engineering	The practice of interaction with stakeholders in the framework of systems engineering allows the determination of the basic needs and areas of activity of the participants	From the perspective of a PPP initiated and owned by the government, where private parties are seen as contractor, which differs with actor environment of the ecosystem. How flexibility implementations for the governance of the ecosystem could prove to be a fruitful research domain
Lopes and Farias [2020]	'The establishment of relationships of trust, supported by technology tools and promoted by leaders committed to well-established goals, is a characteristic of governance that has a positive influence on collaborative innovation processes'	Systematic literature review	Governance structures are needed to scatter the responsibilities for innovation processes to support innovation processes in the public sector	Mostly for the success of collaborative innovation processes. Can be useful, however, more related on organisation of relations, and not the forming of governance mechanisms for a ICT platform
?	Good data governance needs provision of organisational models and assignment on the roles and responsibility actors for sustainable and effective data re-use. Next to the stakeholder interdependencies, a trustworthy and secure data infrastructure are key for enabling data sharing	Research paper	Authors identify trust and transparency as key components for good data governance mechanisms for a successful realisation of inter-organisational data sharing of inter-agency data exchange	A reflection on governance mechanisms working towards an acceptable governance for stakeholders is not made. Although, provisions on organisational models and roles of actors for inter-organisational data sharing are mentioned, these do not reflect on decentralised sharing models of the ecosystem where citizens stay in control of their data. This leaves possibilities for further investigation
Wouters et al. [2020]	Seven groups of governance challenges were found that do not fit within the three common aspects of governance challenges (technical, organisational, and inter-organisational factors). Therefore, governance strategies must mitigate multiple factors simultaniously to effectuate service delivery	Case study	Presenting seven groups of governance challenges which were identified when analysing the inter-organisational service delivery of public invoicing services in Belgium.	The study reflects on the appearing governance challenges for an inter-organisational public service delivery case. However, which and how governance strategies can be organised to mitigate these, is left open. Also, the study views the public administrator as principal governance agent, whereas in collaborative ecosystems this is often not the case.
Mondorf and Wimmer [2016]	The study highlights four areas in which a framework for pan-European eGov services can be improved: critical success factors, building on standards, allow for alternative design principles and guidelines, and, determine stakeholder drivers and interests	Design science	The requirements for an architecture framework by analysing the application and usefulness of enterprise architecture components to this framework	The study remains unclear about the requirements which allow an architecture framework for an interopable design and implementation of electronic services. Also, how enterprise architecture can construct requirements which specify on the governance of public services, remains minimally discussed.
[Reggi and Dawes, 2016]	Two cycles are presented which have a positive influence on open government data. The first focusses on publicating innovation goals to citizens which are provided by intermediaries. Also in the second cycle the role of intermediaries is important to support linking views of policy makers with citizens. In addition, mechanisms allowing citizens to feed back into the publication of data is missing	Case study	Explore with an ecosystem perspective the research gap between the two research domains of open government data: re-use of data for innovation, and open data for participation and accountability of public organisations	The ecosystem perspective is interesting for this research. However, a focus on governance mechanisms which make up the design of a network governance is lacking.

B CASE STUDY

B.1 TRUSTED INFORMATION PARTNERS PREDEFINED ROLE OF ALL POSSIBLE PARTICIPANTS

1. Responsible entity for information exchange processes: Natural or legal person responsible for the information exchange via the ecosystem. Requirements are set on the specific data exchange, which are published via the message broker. Entity itself can also participate in the ecosystem
2. QTSPs: the Qualified Trust Service Providers need to prove regulatory compliance (e.g. fulfilling eIDAS requirements) towards auditors. Common industry standards, like ETSI, can prove to be useful for scalable, efficient and effective compliance with eIDAS requirements, as auditors can recognise the functioning of these standards more easily. It is not required to follow standardised norms, leaving space for QTSPs for own technological and procedural solutions to provide a high LoA. In this case, auditors still need to be convinced of technical and procedural functionalities of the ecosystem (e.g., data portability, key ceremony and protected environments).
3. Software providers: Provides services, regarding the quality of exchanged data, which users can request and pay for via ecosystem tokens.
4. Users (civilians and businesses): Natural person acting via the ecosystem on behalf of himself or someone else.
5. Legal entities (actors, e.g., real estate agents, valuer, financial advisors, etc.): Natural or legal person acting in society with a certain authority.

B.2 INCENTIVES OF TRUSTED INFORMATION PARTNERS

Tax Authority
Increased level of (data) efficiency, safety and trust by creating an ecosystem with multiple parties.
Connecting programs and projects to the Tax Authority to the ecosystem.

Ministry of Interior and Kingdom Relations
Application of eIDAS with a commencement of a public-private decision-making system, for wide application of qualified information exchange. Also channeling innovations like eWallets, while complying to EU and Dutch regulatory.
Agreements on standards and learn how to implement a technology aligned with regulation and the current situation.
Wide adoption possibilities are endless for public and private parties to exchange verified (government) data.

Cleverbase
Providing electronic IDs to citizens, which will support adopting wide use of services offered by Cleverbase. Efficient/effective/viable processes by provide a better way of doing online business and building an ecosystem which is scalable by bootstrapping the solution to gain advantage of network effects Higher trust on who individuals are, what mandate they have, which

organisations they participate in. Authenticity of KYC through data exchange with high Level of Assurance and with juridicial security and enforcement/audit through eIDAS.

Digicampus
Realisation of own missions making public services more human-centred by: 1) giving citizens control on their own data, 2) making transactions easy, 3) going from data silo's towards data partners.
Private demand on a neutral partner for guiding/leading the tactical TIP meetings in the development phase. This is realised by forming coalitions with parties that want to support these missions.

Hypotheken Data Netwerk (HDN)
Organise higher efficiency of financial services with standardisation to decrease costs in the housing and mortgage information chain. The ecosystem provides this innovation at a higher scale than currently is possible.
Missing data exchange is currently going on between public and private parties where customers will need to have control over their data, and can act with legal certainty in a digital society.

ING
Higher trust on who individuals are, what mandate they have, which organisations they participate in. Authenticity of KYC through data exchange with high LoA and with juridicial security and enforcement/audit through eIDAS.
Efficient/effective/viable processes with a scalable solution for time and money savings as credit process is not automised and costs a lot of money due to legacy problem.
Higher data quality when data is trusted and with high quality, it is internationally scalable. This is good for globalising trust for new ING partners and customers. This makes their business more viable for expansion.

Nederlandse Vereniging van Makelaars (NVM)
Higher reliability on data exchange (especially on KYC), while civilians have control on data with high privacy.
Easier 'housing experience' for the customer.
Business case by bringing value to financial advisors by making processes more efficient and effective (less GDPR struggles, easier data transactions).

B.3 QUESTIONARY FRAMEWORK USED IN INTERVIEWS

Topic	Opening questions within topic	Example follow-up questions	*Examples* and [intended insights]
Introduction & interviewee consent			
Personal welcome and greeting	Could you describe your role within your organisation?	Ask for consent on data gathering	
Introduction to research	[short introduction of research problem, knowledge gaps and research questions]	[define governance of the ecosystem]	[Explain the goal of the interview alongside the complete research]
Incentives and perspectives on joining TIP			
Perspectives on TIP	What do you believe TIP is?	What is your role within the TIP ecosystem?	[Perspective on TIP]
	Why is your organisation interested in joining the TIP ecosystem?	What intended goal of your organisation is to be achieved with a functional TIP?	[Insights into incentives, willingness to cooperate]
	When will TIP be a success for your organisation?	When will TIP be a success for you personally?	[Insights into success criteria]
Introduction to own perspective of TIP	[mention 3 aspects and reason to extract stakeholder requirements]		
Governance requirements			
General	What are the most important agreements that come to mind for building an open, trustworthy, and applicable TIP ecosystem?	Why do you consider [unique unforeseen aspect] as an important agreement aspect?	[Primal focus of stakeholder interests in certain governance aspects]
Trustworthiness	What does a trustworthy TIP ecosystem look like for your organisation?		
Functionally suitable	How can the right level of assurance be organised for all participating parties?	How can the highest level of legal certainty be implemented for TIP?	*'Chain is as strong as the weakest link'*
Trusted & reliable	What requirements are needed for a trusted and reliable ecosystem?	How should commitment and agreements be regulated, enforced, and monitored? How can disputes between parties be resolved?	*Requirement monitoring and enforcing, Potential adoption of regulation Commitment on FTE, funding, resolving disputes*
Applicability within:	How does a cross-domain TIP ecosystem look like for your organisation?		
A domain	How can applicability of the ecosystem be organised within domains?	Should the decision-making structure transform when	*Standardisation in domains*

Figure B.1: Interview questions

		adopting new domains in terms of representation? What is the role of standardisation on this level?	[How can standards of domains be distinguished from general (cross-domain) standards?]
Information chains of a domain	How can applicability of the ecosystem be organised within information chains?	What is the role of standardisation on this level?	*Standardisation in information chains*
Openness	What does an open TIP ecosystem look like for your organisation?		*Participation (providers/end-users), expandability in functionality*
Participation	How can participation for end-users be organised? How can participation for (new and basic) functionality providers be organised? How can participation for ecosystem partners be organised?	How should the ecosystem adopt new partners of other domains? Do requirements on participation differ for different joining parties (e.g. info. providers versus providers of basic functionalities)? What role does transparency and responsibility play for participation of these different actors?	*Access control on entry criteria, open participation, open standards for new functionalities* *Level playing field, fair competition, lock-in/monopoly situation.* *Fair responsibility*
	How can the ecosystem be accessible and available to all actors?	How can adoption of technology and standards be guarantee accessibility and availability?	*Allow adoption of technology and standards* *Funding independence decision-making*
Expandable in functionality	How can the development of new functionalities by partners be controlled, while stimulating innovation?	How can participation on building blocks be organised, while their development is agile?	[Innovation with building blocks by providers]
	How can the ecosystem organise most value to public and private parties?	How is expandability guaranteed in an independent manner?	*Organising network effects, automate data exchange* *Independent board, ease of onboarding, adoption requirements*

B.4 TIP GOVERNANCE AGREEMENTS

The board of TIP consists of at least 5, and not more than 8 parties with a mandate of decision-making in chains in the domain. Although this organisational structure is not determined yet, this research assumes a similar representation structure will be put in place. Other informal governance agreements on the primal governance structure are:

1. Has the objective of serving the public good
2. Consists of administrative players with the power to take action in specific chains in the aforementioned areas.
3. Bases its decision-making on the considerations of experts from chain initiatives or organisations from the various fields.
4. Is NOT concerned with substantive issues that are specific to the chain, but is focused on the exchange of information as such
5. Minimises its 'own' input. Preferably links up with existing standards and establishes links between existing consultative bodies and management organisations.

6. Bases its methodology for chain transitions on tried and tested scientific methods. It encourages the practical testing of concepts in order to make them widely available as best practices or standards.

C RESULTS

C.1 STAKEHOLDER INCENTIVES TO JOIN THE TIP ECOSYSTEM

Table C.1: Overview of stakeholder incentives to join the TIP ecosystem

Stakeholder	Type of party	Incentive to join
Tax Authority	Public party (executive organisation)	Increased level of (data) efficiency, safety and trust by creating an ecosystem with multiple parties. Connecting programs and projects to the Tax Authority to the ecosystem to avoid different interpretations of the eIDAS. To increase the level of trust in data exchange and between parties. Boost knowledge own on eIDAS by collaborating with other stakeholders.
Ministry of Interior and Kingdom Relations	Public party (Ministry)	Creating an ecosystem which addresses societal challenges like citizen's privacy, safe exchange of trusted data, low data efficiency, interoperability of public services in the EU, and trust between public and private parties. Connect the TIP ecosystem with the 'SBR renewal' or other programs of the Ministry. Commencement of a public-private decision-making system for wide application of the eIDAS for qualified information exchange. Also gaining knowledge on eIDAS and channeling innovations like eWallets, while complying to EU and Dutch regulatory. Adoptation possibilities are endless for public and private parties to exchange verified (government) data. Adopting new technology standards to move society towards a digital one.
Cleverbase	Private party (QTSP)	Making secure online business accessible to everyone on the highest level of trust, by enabling secure online transactions. Providing eIDs to citizens, which will support adoptation of other services offered by Cleverbase. Making online business the standard with more efficient, secure, and effective processes by building an ecosystem which is scalable, open, and trusted. Authenticity of data exchange with the highest Level of Assurance with juridicial eIDAS compliance and through enforcement with audit.
Digicampus	Public private network organisation	Realisation of own missions making public services more human-centred by: 1) giving citizens control on their own data, 2) making transactions easy, 3) going from data silo's towards data partners. Digicampus joined as stakeholder to stimulate trusted standards for data exchange due to the private demand on a neutral partner for guiding/leading the tactical TIP meetings in the development phase. This is realised by forming coalitions with parties that want to support these missions. However, they do not act in the value chain.
Hypotheken Data Netwerk (HDN)	Private party (no profit motive cooperative association)	Organise higher efficiency of financial services with standardisation to decrease costs in the housing and mortgage information chain. The ecosystem provides this innovation at a higher scale than currently is possible. Missing data exchange: is currently going on between public and private parties where customers will need to have control over their data, and can act with legal certainty in a digital society.
ING	Private party (bank)	Authenticity of customers (KYC) through data exchange with high LoA, juridicial security, high data quality. This enables higher trust on who individuals are, what mandate they have, which organisations they participate in. Coaltion at hand are trusted organisations, due to previous professional successes of collaborative and individual projects. Efficient, effective, and more scalable processes through a scalable solution where processes suffering legacy problems (e.g., expensive, time consuming creditting processes) can be automised. Higher data quality when data is trusted and with high quality, it is internationally scalable. This is good for globalising trust for new ING partners and customers. This makes their business more viable for expansion.
Nederlandse Vereniging van Makelaars (NVM)	Private party (association)	Higher reliability on data exchange (especially on KYC), while civilians have control on data with high privacy. Easier 'housing experience' for the customer. Business case by bringing value to financial advisors by making processes more efficient and effective (less GDPR struggles, easier data transactions).
Visma	Private party (software provider)	Organise innovative, reliable and digital data exchange between civilians, public and private parties in a way better than competition can. Mitigate paper information chains by offering a more efficient and secure way of digital data exchange.

C.2 STAKEHOLDER REQUIREMENTS

C.3 STAKEHOLDER FORESEEN CHALLENGES

C.4 QUALITATIVE CODING

C.4.1 Code Groups from Coalition Challenges

C.4.2 Code Groups from Governance Challenges

C.4.3 Code Groups from Prescribed Values & Norms

Table C.2: Success perspectives of interviewed stakeholders

Stakeholder	Inner beliefs	Success perspective
Tax Authority	The ecosystem can provide value for citizens, businesses, and government when adopted in the right manner. To design a technical architecture is the most important fundament in the to lay in order to create a functional adoption of the ecosystem which can evolve in the systems of the Tax Authority **Public values**: privacy, civilian safety and trust	- When it is adopted widely within a domains, and across multiple domain - The TIP ecosystem is eIDAS compliant, and also running Tax Authority programs (e.g. Digipoort, SBR Nexus) can be integrated within the ecosystem - TIP standards are implemented at the technical architecture of the Tax Authority - To gain more control on the identity of civilians with a higher quality of the data - The will to cooperate becomes less when the ecosystem develops further
Ministry of Interior and Kingdom Relations	A governance is needed for the secure development of the ecosystem. The security of citizens data are the pre-conditions for a safe and trusted ecosystem. Trust between TIP parties is important for safe data sharing, parties can leave when this trust is damaged. **Public values**: civilian privacy, data safety, inclusive, and transparant	- On the short term, it will be a success when the experiments can be implemented and operative - For the Ministry: when it can clarify how TIP can contribute to their 'SBR renewal' program - On the long term, when the TIP ecosystem proves to have a cross-domain function
Cleverbase	- **Societal profit**: of the ecosystem gains; it's not just a profitable move for selling Vidua. Then the ecosystem and CB would miss its success - **Responsibility**: towards employees that work hard on moving CB towards the ecosystem. Other marketable solutions would be possible, but this is not the intended strategy - **Competition drive**: At the center of designing the ecosystem, so CB must be part of the ecosystem solution	- When TIP ecosystem creates the necessary conditions enabling the integral function for a unique way of doing easy and secure online business by connecting different trust services. - When it proves to be the best market solution, where society as a whole profits from (instead of the party enjoying profit itself)
Digicampus	- **Personally** motivated to enable LoA high for citizens accessible on their phone - **Digital trust** has many similarities with physical trust, but more difficult to enable online (many security insecurities). Makes sense why current coalition is formed.	- When the **missions are realised in a broader sense**: the missions are a kickstart for goals pertaining; enabling a revenue model for Dutch start-ups, increasing 'duty of care', implementing a public-private collaboration for implementing eIDAS through qualified data exchange of trusted services - The ecosystem evolves towards a **viable system**, where no interference of the Digicampus is needed
Hypotheken Data Netwerk (HDN)	- Group collaborations are long term projects and need iteration to work towards a solution - **Collaborative goal** should be in place to align stakeholder interest, which will eventually overcome individual interests - When the **fundament** of the TIP governance is well-placed, system failure will be unlikely	- When customers have control on their data by deciding which data public and private parties may exchange
ING	- **Realisation of 'grand vision'**: realtime customer insights on, e.g. possibilities of housing mortgage, with civilian in control of data - **Build-up for/from trust**: creating more trust with a reliable business model together with organisations that do not see data of customers a the product (e.g., Google and MS). More trust means more loans, which is good for economy and the realisation of norms and values (human rights, woman rights, etc.) **Credibility of people**: moral compass of people building the ecosystem (coalition of the willing) fundamental to the (kick)start of TIP **Dependency on trust**: the QTSPs are responsible for regulatory compliance to create a trustworthy ecosystem. Governance are rules to resort to when collaboration causes friction.	- Trusted and qualified data exchange between partners for more reliable/viable investments - Business model not based on consumer data as product - Processes can be more efficient and effective - Fair, viable and widely adopted ecosystem for all participating actors (personally; enacted with CSR) - (Independent) board which makes decisions and commitment in the name of the organisation
Nederlandse Vereniging van Makelaars (NVM)	**Certain impulse of new innovation** (like DAO's) can support making the TIP ecosystem more efficient and viable. - **Public values**: privacy, civilian safety, trust - **Private values**: viable, profitable	- **Serving the customer** with an easy and privacy compliant system. Generic exchange functions are developed within the housing domain by building TIP architectures - System creates value for their real estate and valuer partners, and a business model is adopted where revenue is created (not via civilians) - When stakeholders can make decisions on the coupling of their systems to enable a general technical architecture

Stakeholder	Inner beliefs	Success perspective
Public consultant	- **Trustworthiness** and **applicability**: already (implicitly) adopted. Firstly, EU regulation on trust and control of quality by auditors assure trust. Applicability is implicitly covered by EU-wide regulation. Real challenge is in openness of the ecosystem. - **Public values**: privacy, civilian safety, trust in communication - **Private values**: trust between parties	- When parties are aware of the limitations of current data exchange in short term - When TIP is adopted market wide, cross domain, so the government 'cannot ignore TIP'. A self-fulfilling profency is realised when public organisations share their verified data with private parties (thus works in a multi-sided platform manner). - TIP creates the main standard for qualified information exchange by functioning successful in the housing domain. - TIP creates insights in the adoption of public-private qualified data exchange. So, where do initiatives and programs overlap? What knowledge can be gained to let these projects function correctly?
Public relations consultant	- Alignment with law and regulation is required for a successful operation of the ecosystem - Moving towards an operational ecosystem will reiterate on standardisation processes and the general modus operandi. This will help the reproducibility, and thus the applicability, of the system	- The **decision-making system** complies with law and regulation - A cooperative system is created, enabling proper collaborations between parties within and between information chains. - Demonstrating the ecosystem's applicability within different domains, and allowing new parties to join (might be more important than the technical functioning of the system)
Visma	- Coalition of the willing currently build on known business relations in which trust developed through shared successes in projects - Insight that government can not only lean on Visma for its solution (aware of lock-in effect) Innovation in a domain is based on the demand/requirement of applying new technology	- When **scalable services** can be built to organise cross-domain data exchange in information chains
Smart Data Company	- Keeping the ecosystem operational is a continues effort, where experience through time feeds back in the steering of the ecosystem. - QTSPs are the missing piece in qualified information exchange for public-private use cases. They provide value to society, but an agnostic (layered and bounded) governance is needed to implement them.	- Large absolute and relative number of the TIP ecosystem users in different domains. This means a high absolute number of joined partners, and relatively a high percentage of joined partners in a domain. - Wide relevance of the ecosystem in various domains by proving value to as much domains as possible. - Unambiguous way of facilitating information transactions by providing clear governance structures and agreements on functioning.
TIP Foundation chairman	- Formulation of a **collabotive goal** is needed, in order to realise a common goal with	- When the TIP ecosystem can make a **visible contribution** towards a Dutch implementation of eIDAS solutions in the form of a collaborative ecosystem for qualified trusted services - **Interests are balanced**: Tensions between public and private parties are dealt with, and interests are balanced - **Coalition of the willing**: needed for the start. After this, 1) public parties need to be interested in TIP, and 2) other domains must be able to join the initiative.

Table C.3: Stakeholder governance requirements or recommendations on the ecosystem

Interviewee	Requirement
Interviewee 1 and 2	- **Trustworthiness** - Monitoring with a public role: will need an independent monitoring system which is not solely left to the market. E.g., the (small) control by the government on PKIo and DigiD are examples how this can be organised juridically. Monitoring can be done on access control (entry and exit rules) - Tax Authority needs to comply with their open norm 'AWR'. The adoption of the ecosystem should fit with the AWR. Also other parties might have additional trust requirements (where eIDAS is open for interpretation). - Where the eIDAS only provides interpretation of resources, additional statutory systems (e.g., certificates or guarantees) are needed on the trustworthiness of standards, identity security, unambiguous user experience, etc. - Further requirements on authorisation are needed to enable a taxation system in the ecosystem within the operations of the Tax Authority. - **Openness** - All stakeholders should be able to join and discuss on the technical architecture (i.e., standards) which already have been made or will be made. The whole decision-making should not be slowed down by this. - A supported decision-making structure is needed where all parties are represented, which might not be an equal way but could depend on the contribution parties make. - The ecosystem should prevent putting one party in a monopoly position, and prevent a lock-in. Around 5 or 6 QTSPs should join. - All use cases for doing business online should eventually be covered, which might mean adoption of other European QTSPs. - Flexibility is required in the governance model to enable the adoption of new providers/technologies. - **Applicability** - Other initiatives and programs should be able to merge with a visible (in terms of PR) TIP ecosystem. 'Stakeholder management' is needed to steer these parties towards a TIP adoption. - Smaller parties with less (financial) capital should be able to join. - Coordination of standards is needed for parties (which work in multiple domains) to apply technology (architecture practices, certification standards, etc.) or legislation which could be done in the same manner. - Independent representation of parties who want to be represented in the decision-making (with the question who a right representative is), or parties are able to join the system of decision-making. - Wide representation in the governance of architecture concerned with the standards to enable wide use of TIP in the Netherlands. - Keeping track of (EU) regulation, standards in other markets (e.g., SSI), but also on other domain standards to check whether they fit TIP standards (this can create a oil-slick-effect).
Interviewee 3	**Trustworthiness** - Safety of citizens data should be the key priority when striving for an open, safe, and trusted online ecosystem. - When the trust in the ecosystem is damaged, parties should be able to leave immediately. - It is known where the ecosystem is striving for with the collaborating parties, a common goal must be defined. - Commitment should be given by all parties, and all parties are trusted to prevent data breaches (also damaging public image of the Ministry). - Every party should be able to decide upon the entry barriers of the system. These entry barriers are equal to all parties. - Whether the ecosystem lives up to regulation is something which the ecosystem should do instrinsically. **Openness** - An evaluation mechanism can be installed to do formal and informal evaluation of the trustworthiness, openness, and applicability of the ecosystem. - Formal evaluation can still be discussed, if and how evaluation of the ecosystem can be done (with a roadmap is one of the methods which was thought about). **Applicability** - Important aspect, as a wide adoption of citizens should be something that is strived for. - New domains should be adopted as soon as possible, to ensure wide adoption. - New agreements need to be made with the current coaltion to ensure difference between chain standards and general ecosystem standards.

Interviewee	Requirement
Interviewee 4	- **Trustworthiness** - Technical agreements: sole control on level 2 (qualified signature). Safe archiving in 'protected environment' which complies with HSNs so prove safety. This could also be done with cryptographic tech solutions. Choice needs to be made also on technical protocols for the communication between stakeholders. - Additional security measures: CB has own/extra technical security measures (as QTSP has own risk apatite in the level of risk customers may be exposed to), which need to be explained to auditor and need to be complied to. - Data portability: will ensure customers can change between QTSPs. This is where the market will differentiate itself; CB will be pragmatic, meaning it will balance between a functional system (decrease entry barriers) while being safe enough. - **Openness** - Access control: when parties are not yet a QTSP, but do have innovative services. Flexibility of all parties is needed to enable analysing new, safe technology. Anti free-rider mechanism: Likely to be based on financial incentives which can be based on tokens. - Incentive to invest in development: early adopters of the ecosystem are needed for development (which could be done with financial incentives by cutting expenses). - **Applicability** -
Interviewee 5	- **Trustworthiness** - Private stakeholder control: Government could 'hijack' ecosystem for wide adoption in NL (e.g., happend with Authorisatie Service Providers). - Lean on public regulation: Audit and laws of public organisation is fundamental for trusted data exchange. Private companies (e.g., QTSPs) can take responsibility to achieve a secure and trusted ecosystem with regulatory compliance. - Stakeholder commitment: Commitment on capital (financial, work) to invest in system: evaluation, innovation. For innovation of the ecosystem, new partners need to bring money to the table. Also to achieve technology goals like the wallet. - **Openness** - Set of criteria: what does it mean to work in an open ecosystem in terms of: financial, juridicial, stakeholder roles, organisational MVP, stakeholder goal alignment. - Stakeholder roles: role of the TIP foundation (chairman, supporting roles), role and mandates of public and private stakeholders - Transparency towards civilians: create trust of civilians by providing all knowledge demands to eliminate doubt. - Domain: providing a value proposition for who (starters in the housing market) - Representation: TIP foundation representation, by a board where generic stakeholders for decisions on the ecosystem. For working groups stakeholders should also have a say in their operations (e.g., how WG knowledge is operating more towards academic knowledge sharing). Branche representation (e.g., SBR) is needed for independent representation when information chains grow. Here, representation must be on the same level by a neutral party. - Supported system: all stakeholders are able to join decision-making on the fundamental basics of the ecosystem. Resolve disputes to avoid: free-riders, elite club, ... - Adaptable: for multiple domains, but also within the same information chain (e.g., mortgage, leasing, mandate). Solutions must be scalable in order to enable international adoption. Within the information chain can be achieved via competitors (where other banks also connect to ecosystem). Control on when to adopt new domains. Seems like hard adoption, needs commercial proposition (like the SBR case). - **Applicability** - Domain selection: decisions should be made on the amount of domains TIP is operating for in the beginning phases. - Standardisation: eventually all banks should be able to join, to adopt all (international) civilians and businesses. A business proposition (e.g., log-in with CB in SBR-nexus) could serve as incentive to let other banks join TIP as well, as a feeling is created they lack an essential functionality for digital identity. - Signature policy: workarounds, like signature policies, are needed for the (digital) registers that are not defined by the law. There needs to be an agreement in the classification of the actors within a chain. These signature policy standards vary per stakeholder. For ING this must also be scalable, as solutions can be adopted world wide (use the NAICS codes drilldown table to create uniform domain standards for classification). - Innovation stimulation: making use of multiple providers (e.g., QTSPs) to assure vendor rating (no lock-in situation, this will kill innovation)

Interviewee	Requirement
Interviewee 6	- **Trustworthiness** - Access control contain agreements on the terms and conditions for new parties to join and the requirements that must be in place - Monitoring can be evolving through time depending on the growth of the ecosystem. This can also be done by private auditors, as long as a quality assurance can be given. - **Openness** - Generic agreements on open standards are needed to provide an open ecosystem. - Entry commission to access the ecosystem is not supported by HDN, as a more open structure is preferred. However, a certain grip on the access control should be in place. - The governance should allow generalisation of certain sector standards towards general standards. This should be organised through the time - For new joining parties that abide to the missions of the TIP ecosystem, the governance should also focus on an equal representation of all parties - In order to make sure stakeholders will transcend their own interests, transparency on standards and agreements in the ecosystem is important. - **Applicability** - Agreements are made at different levels of the domains. - The platform created by HDN needs to fit into the functioning of the TIP ecosystem - To connect the HDN members to the TIP ecosystem, a proposition solving a certain problem, should be done. - Pilots and programs (e.g., 'Goed IDee') can serve as implementation boost for standards to implement qualified signatures and digital identities - To enable a wide adoption of TIP in multiple domains, parties in other sectors should be able to connect as soon as possible
Interviewee 7	- **Trustworthiness** - eIDAS framework does not cover all nessacary agreements: signature policy should be discussed in the information chains - Agreements are needed on the commitment of new parties. Must be balanced, as to strict rules of entry prevents adoption - **Openness** - Ecosystem needs other competitors: to stimulate competition, thus innovation - How to assure a supported system when parties are introduced by TIP partners? Transparent access control is needed - Organise a distributed knowledge base in the ecosystem. When stakeholders leave, the operations should continue like before which will require a robust system (prevent it from happening) and a resilient system (recovers quickly when it happens) - Data exchange between domains needs offer a business case which proves to be more useful than the current way of working. Otherwise parties will not join - **Applicability** - Requires a solid base for adopting new parties, however also a certain kind of flexibility is required for interests in a domain - Standards within a domain also need to be open, so software providers can offer the same services. So XBRL is a good open format, opposed to JSON which can be open but validation can be closed. Otherwise parties are excluded and the ecosystem will not be viable.

Interviewee	Requirement
Interviewee 8	- **Trustworthiness** - Government parties need to join the initiative due to their accurate data on civilians - A jurisdictional framework which can work out for making legitimate investments - Government needs to provide legal basis on data exchange within the housing market - Claim driven: civilians give consent, control on their own data - Trusted roles: provide trust towards the consumer, but also trust in the domain - **Openness** - Generic exchange functionalities with open standards - Keep control (with representation) over standardisation in the domain - Facilitate adoption of other taxonomies (i.e., 'Zorgeloos Vastgoed') - **Applicability** - Arranging standardisation: government initiatives and private projects need to align (e.g., when 'Zorgeloos Vastgoed' did not align a government project) - Government participation is important to provide a positive business case for NVM constituency, for a pull-effect - New private parties need to participate, as long they agree to the terms of the ecosystem. System of principles needs to be developed for this.

Interviewee	Recommendation
Interviewee 9	- **Trustworthiness** - Adopting new providers for new domains: front-control is needed (who may join, what data do they need, what data do they get)? This must be generically applicable to maintain transparency and fairness. - Back-door control is difficult, as this could affect the trustworthiness of the ecosystem. There might be a role here for existing agencies and authorities for this control (e.g., AP, Agency Telekom). - Regulatory compliance: can be organised by the parties themselves. - **Openness** - Scaling the ecosystem: When to involve other QTSPs/information providers/...? First, agreements need to be made, but after that, adoption must be enabled by the TIP ecosystem partners. Lock-in must be avoided, while keeping log-in methods and required certificates clear for citizens. - Openness for end-user: there must be a choice in QTSP - Openness for new providers: has to do with who pays the costs of onboarding and making transactions. So, financial commitment of stakeholders is needed. This also touches the entry and leaving criteria of stakeholders. - Transparency: independent group will make entry rules. Agreements need to be made on this. - **Applicability** - Wide adoption of standards: to let all stakeholders agree to same standards will enable network effects.
Interviewee 10	- **Trustworthiness** - Additional agreements for trust: eIDAS does not cover all aspects of a trustworthy ecosystem. Additional agreements on stakeholder roles are needed to assure a widely adopted LoA high. - Access control: not all stakeholders are on the same page (on data management, information security, legacy of systems), thus different requirements (for enterprise data spaces) need consideration. - System of agreements on control: where to put the balance between autonomous control, private audit, public authorities and standards? No monitoring is not an option, but leaning on other certificates or decision-making structures (e.g., GDPR DPIAS) might be possible? Further discussion is needed with parties to discuss which risks can be mitigated by leaning on other structures, as self-regulation could be too costly and complex for the financing model. - **Openness** - End user: onboarding in the right manner. How to address this to civilians? There is a way to address civilians for an eID in general, and a way to address civilians for the housing services. This needs to close in on each other. - New service providers: a part is done with open standards and the type of service providers. The question here is, what type of service provider is the new joining party (eIDAS focusses more on the categorisation of QTSPs)? There are trusted services (QTSP); maybe more is needed. - Level of transparency for participating parties: there are varying perspectives on how to operationalise these boundary rules (e.g., sharing BSI audits to check their quality) Questions of choosing standards (like authorisation with SAML or SACML) which enables innovation but also throws standards out. This also plays out at higher European level, which standards are chosen at other ecosystems. When connecting these European systems, connectors of standards are needed (uncertain which adapters are needed). - **Applicability** - Domain agnostic: to really be able to adopt a high LoA cross domain - Effect of spill-overs: when not-members of TIP see that TIP members use the ecosystem - Become the best practice on the right policy level of the eIDAS implementation - Pull: get other parties to join from their own will - Push: compete with other solutions in other domains by becoming a positive business case for them to adopt the ecosystem

Interviewee	Recommendation
Interviewee 11	**Trustworthiness** - From start, the ecosystem must provide the highest Level of Assurance, to ensure wide application (making the system more relevant) - The value of an accessible and easy-to-use system is higher than the effort of ensuring the highest LoA. - As there are some degree of freedom left in eIDAS, extra agreements on standards are needed for the technical architecture and the specifications on how to safely exchange data (ERDS) compliant on TIP. This will allow an interoperable system. - **Openness** - Implement degrees of freedom - The governance must include a scope definition on what is being agreed on and what is not. Whereas degrees of freedom must be implemented, where eIDAS can give direction on global requirements. - As potential partners have different roles on the ecosystem, entree and exit rules must be specified to these different roles. Also, a set of basic entree rules is required. - Transparency is needed for potential partners on the terms & conditions of on participation. These terms & conditions must avoid being discriminative on aspects apart from trustworthiness. - Also, the system must be transparent on phases of innovation for these potential partners. This could prevent unforeseen and radical system changes. - Innovation must be included in fora of discussions which have a practical character. When wider supported in lower decision-making levels, innovation implementation can be suggested to higher levels. - **Applicability** - In terms of an European interoperable system, in future an international focus might be required. However, at this stage, this is not required. Depending on an international information chain, or Member State who wants to join, there must room for alignment. - Change management is needed to adapt to unforeseen changes in the system. Agreements on commitment are needed, along with the consequences when parties can or do not adhere to the agreements. - Distinction in governance is needed between the function of the ecosystem (architecture, principles, etc.), and the implementation process (phasing the development, adoption differences, problem resolutions). This will create structures of collaboration with a shared understanding of the ecosystem aspects (e.g., working group architecture can make technical design decisions, where the implementation working group does not).

Table C.4: Stakeholder foreseen challenges

Interviewee	Foreseen challenges
Interviewee 1 and 2	- **Lack of knowledge**: on eIDAS - **Other operations or initiatives**: within the Tax Authority that can conflict with the TIP ecosystem (e.g., 'Ondernemersloket' which supports starting businesses with online business). - **Balancing act**: in technical and juridicial aspects. E.g. in the technical domain for public and domain responsible party, how to make it safe, while making it easy for citizens and software providers to adopt, and seeing through the interests of trust service providers? - **Different priorities**: at Tax Authority, software providers and the Ministry of Interior - **Other software providers**: are able to join, but think they created the right solution (eHerkenning) and stick to the notion that the ecosystem was 'the way Cleverbase did it'. Openness of the ecosystem is important to avoid this. - **Dependence on providers**: when to involve? The financial model should be aligned to their preferences as well, eventually the ecosystem needs them - **Public parties**: how can these parties join the ecosystem without the need to follow a public procurement procedure? - **Implementing TIP**: in the Tax Authority itself. Alignment within the own organisation and fitting it with law and regulation is needed (perspective on TIP, explaining technical integration, etc.) - **Chicken-egg problem at governance**: the choices on architecture are dependent on the design/implementation of a governance model - **Impossibility of complete governance system**: a complete system of agreements is impossible due to, 1) volatile politics, 2) risk trade-offs for citizens whom are less digitally skilled - **Will to cooperate**: decreases further in the ecosystem development due to stakeholder sunk costs and inflexibility of other stakeholders - **Arranging incentive of standard renewal**: in the governance of the architecture, where parties are obligated to adopt new standards (this is easier for the governance on implementation, where domain parties force software providers to use up-to-date standards) - **Governance and technical (future) adoptions**: stakeholder effort in working groups for technical and governance is to low, and how to implement a next personal data space (i.e., a wallet) on the basis of current agreements and architectures? - **Public or private hijacking**: might be avoided with knowledge exchange, and transparent goals in the cooperation.
Interviewee 3	- **Preferential treatment**: should be avoided, while this does not strive for the Ministry's values of an inclusive and open ecosystem. - **Vendor lock-in**: is not in line with the Ministry's interests, as all parties should be able to join an open ecosystem. - **Balancing efforts**: between developing the ecosystem in the current domain, and making sure other domains can join the ecosystem to assure a wide ecosystem use. - **Within own organisation**: needs to be checked whether TIP suits the expansion of the 'SBR renewel' program. Otherwise, Ministry's departments need to switch as TIP partner.
Interviewee 4	- **Commitment of stakeholders**: Difficulties in a commitment of (large) institutions due to insecurities in EU regulation/changing tech/moving panels (organisational strategies). - **Sentiment in society**: Knowledge intensive area where expertise is scarce, and level of understanding of 'a board' is low. This creates a gap in understanding, which complicates building a governance with space to adopt own technical possibilities. Many arguments on certain hypes (SSI, IRMA) complicate the essence of the principle based TIP ecosystem. - **Prioritise the essence**: Architects have busy role of creating the architecture and cannot keep track of many industry standards. They need to decide on the technical solutions that solve certain ecosystem problems. The essence of the trusted ecosystem is the right level of assurance. This is central for the collaboration. - **Governance**: shows that it works, technically it is possible (mentioned by Tax Authority), but we need to make agreements and maintain the right level of assurance. Civilian needs the security to operate. - **No internal adoption**: implementing TIP within ING will not work due to different operations, values, visions. Also, knowledge transfer towards internal management is difficult because of the abstract content of TIP.
Interviewee 5	**Content**: which standards, monitoring, organising control, adopting new domains. It is difficult to make stakeholders agree to 1 set of standards. - **Process**: different parties have different adoption speed (push from QTSPs/ING, is currently healthy). **Governance**: who decides what, who may take part in which level of a decision-making structure. How is participation organised over-time? **Finance**: who is liable for investments, ? There is a lack of information to agree on a business model providing value to all parties. Transparency is key here, because some parties might earn or invest more than another party. **Knowledge**: information asymmetry create power dynamics between parties. This tension is increasing, as some parties can make other decisions than others. Mechanism: Creating an open ecosystem **Power**: balance power of public and private parties to prevent a take-over of the ecosystem.
Interviewee 6	- **Long process of structuring**: the agreements in the ecosystem. Not a lot of challenges are expected, only that to come to a resolution will take time.

Interviewee	Foreseen challenges
Interviewee 7	- **Scaling the ecosystem**: when to involve new information providers, QTSPs, domains, etc.? How to let organisations between domains cooperate with each other (NVM versus KPN)? - **Transition phase**: Between the begin stage, and functioning phase a transition phase is appearing. As a business model will not automatically develop, tensions on finance/commitment/... will emerge. The government will have to play a role to bridge this gap (financially). Government can't join the foundation due to law. - **Connecting programs**: how to link internal programs, standards and initiatives. It is clear for public servants what the approach/focus (administrative attention) is. How to break the legacy of large organisations?
Interviewee 8	**Control of government**: in an unviable ecosystem where new parties cannot join due to the government taking full control (this happened at SBR). **Organising cross-domain adoption**: of the ecosystem where impulse of letting new parties join is not initiated by TIP partners themselves. **Organising a fair board**: when parties feel left-out in the decision-making and do not see the value in the ecosystem, parties will leave. **Responsibility structure**: where public parties can blame software providers due to a public procurement is undesirable.
Interviewee 9	**Governance**: governance needs to mitigate tensions of the coalition of the willing. This is two-sided, namely, 1) in terms of the implementation technical architecture, and, 2) the operation of the ecosystem through time. **Initial practical function**: of the ecosystem, which is also fit for the future operation of the ecosystem. Currently, the ecosystem is operative for a committed group of stakeholders wanting to contribute. When other partners join, a structure is needed where they can join, but do not complicate the decision-making and operation between incumbent partners. Balance in representation is needed for a efficient ecosystem functioning. **Additional complexity**: in the difference between internal public and private decision-making processes. Also, how these parties are able to do business in terms of judicial boundaries is adding complexity (e.g., maintaining a level playing field).
Interviewee 10	- Building in a **democratic decision-making structure**, including all the political governance challenges that come along in a decision-making system which is bound to change. E.g., how should the Tax Authority behave in a public-private collaboration, how is political accountability and control instituted (not for the ecosystem itself, but for the party that joins)? - A foundation is less **transparent** and controllable for the parlement, but easy for public parties to fund. So how will all these different accountability structures of separate stakeholders be represented? - **Building in flexibility**: applicability must be central here. In the primal development phase, parties should strive for a cross-domain implementation, even though this might not be in their best interest. When develops in a 'healthy' way and becomes bigger, a reflex of public parties is likely, to have more control on the ecosystem. How will parties within domains abide competition rules? - **Innovative projects**: act on the terms of the slowest parties. Ecosystem should consider new emerging standards or technical innovations (role of working groups and board). Evaluation of the ecosystem is key for this adoption. Also, a lock-in in a certain technology should be avoided by current providers (importance of technical working groups) and new providers (according to terms & conditions of the ecosystem).
Interviewee 11	- (As of now) chairman does not know the source for **internal tensions** between parties (e.g., slow/fast adopters, bureaucracy, entrepreneurial spirit). - Operation is more difficult than expected - Clashing interests (in complexity phase) - **Stategic games** emerge, where parties use different tactics to slow decision-making down, or speed decision-making up

Table C.5: Identified codes coupled to a code group

Code group	Identified code
Coalition challenges	
Coalition uncertainties	
Chicken-egg problem	Design choices on the technical architecture are dependent on the governance model, the governance model is dependent on the technical architecture Implementation of the ecosystem requires substantial investments, which could benefit many sectors. Due to legacy of systems, high sunk costs are involved leaving stakeholders inflexible and tentative for system changes. When this investment is not substantial, the effectivity of the ecosystem can be cumbersome.
Distrust between organisations	Preferential treatment of private parties due to good business relations or good cooperation history. No internal adoption: implementing TIP within a single organisation will not work due to different operations, values, visions. Also, convincing internal management is difficult because of the abstract content of TIP.
Knowledge gaps in decision-making	Long process of decision-making: to get to governance model for the ecosystem, to come to a resolution will take time. Participation by parties could cause possible friction with legislation. E.g., is a public procurement procedure obligated to follow, and what are current entree barriers for private organisations to join? Current commitment in working groups for technique and governance is low, this problematises further developments of a future supportive infrastructure for digital wallets Funding: who is liable for investments? There is a lack of information to agree on a business model providing value to all parties
Coalition tension	
Individual versus interdependence	The stakeholder perception whether they join the ecosystem for creating value for themselves or for the system. This can be evaluated by the way stakeholders express their success perspectives and how they contribute to the system. When this is not in line with the values of the ecosystem, stakeholders will be likely to pursue an individual way of problem solving. Internal tensions: between parties (e.g., slow/fast adopters, bureaucracy, entrepreneurial spirit). Difference in priority: all the parties have different priorities which the ecosystem should strive for. Success perspectives between parties differ, while the ecosystem must fulfil different functions for them. E.g., private parties might want to expand internationally, while public parties see it as a Dutch solution. Internal and external uncertainties between operations, programs or initiatives within the organisation (internally), or between organisations (externally). Connecting programs: how to link internal programs, standards and initiatives. It is clear for public servants what the approach/focus (administrative attention) is. How to break the legacy of large organisations?

Code group	Identified code
Governance challenges	
Goverannce uncertainties	
Multiple institutional logics	*An institutional logic is the aggregation of structures, processes, and, norms that form legitimate interaction between stakeholders. An example is the way civilians need to identify themselves in requesting a mortgage.*
Complex environment with many interactions	Process: different parties have different adoption speed. This can be healthy, but can also grow into a tension (e.g., push from QTSPs or ING, is currently healthy) Working groups in TIP do not work aligned and are positioned differently time-wise in the operative ecosystem. Strategic games emerge, where parties use different tactics to slow decision-making down, or speed decision-making up Rule of law: when parties do not comply with the law this can have implications for the system as a whole Uncertainty whether government can join the foundation due to law.
Power imbalances	*Conflicts in power discrepancies can be omitted by adopting inclusive processes and structures of collaboration [Bryson et al., 2015]*
Trust	Potential partners might say 'this is the way this group' tried to build this ecosystem, which leaves them using their own solutions Current partners want to keep control over the initiative, while for instance, private parties do not trust that public parties can steer towards an ecosystem they need. This also holds for public parties not trusting the private parties on steering towards an ecosystem they need. Complete governance model is impossible due to volatile politics, and risk trade-offs for citizens whom are less digitally skilled Organisational commitment: difficulties due to insecurities in EU regulation/changing tech/moving panels (organisational strategies)
Finance	Important to know how tax money is used, politically very sensitive Involvement of new participants should fit with the financial model of the ecosystem
Knowledge	Differences in knowledge on legislation, technology Difference in power; government has an authority to set laws and can force other parties Decision-making structures: who decides what, who may take part in which level of a decision-making structure. How is participation organised over-time?
Governance tension	
Central versus decentral ecosystem	Knowledge: information asymmetry create power dynamics between parties. This tension is increasing, as some parties have more power in decision-making than others. However, not every party can contribute on every decision, as this would make the decision-making process to slow. Power: Balance power of public and private parties to prevent a take-over of the ecosystem Building in a democratic decision-making structure, including all the political governance challenges that come along in a decision-making system which is bound to change. E.g., how should the Tax Authority behave in a public-private collaboration, how is political accountability and control instituted (not for the ecosystem itself, but for the specific party that joins)? A foundation is less transparent and controllable for the parliament, but easy for public parties to fund. So how will all these different accountability structures of separate stakeholders be represented?
Self-Interest versus collective interest	Self-interest can cause different adoption speeds, between parties (e.g., slow/fast adopters, bureaucracy, entrepreneurial spirit). This can create tension for slow adopters, they might drop-out. Collective interest should strive for contributing to all self-interests, while also striving for a interdependent need (otherwise parties go on their own) Building in flexibility: applicability must be central here. In the primal development phase, parties should strive for a cross-domain implementation, even though this might not be in their best interest. When develops in a 'healthy' way and becomes bigger, a reflex of public parties is likely, to have more control on the ecosystem. How will parties within domains abide competition rules? Innovative projects: act on the terms of the slowest parties. Ecosystem should consider new emerging standards or technical innovations (role of working groups and board). Evaluation of the ecosystem is key for this adoption. Also, a lock-in in a certain technology should be avoided by current providers (importance of technical working groups) and new providers (according to terms & conditions of the ecosystem)

Code group	Identified code
Governance challenges	
Governance tension	
Balancing public versus private value creation	Creating value for the current partners, and opening up for potential partners and other domains. Evaluation with a roadmap could prove difficult, as an ecosystem grows organically. Control on the healthy growth of the ecosystem is needed (with evaluation whether adoption of new partners is possible?). Adoption by public and private parties of the ecosystem. This is political as well, while there currently is an opportunity window (where solution, political, and problem streams come together). When a partner 'hijacks' the system, other parties will stop actively to contribute. Public balancing act: providing a technically sound ecosystem (safe, effective, efficient), while making it easy for users to adopt and 'seeing through' interests of ecosystem providers Initial practical function: of the ecosystem, which is also fit for the future operation of the ecosystem. Currently, the ecosystem is operative for a committed group of stakeholders wanting to contribute. The safety of the ecosystem, while making it easy for citizens and software providers to adopt? This also requires to grasp interests of all parties (e.g., Tax Authority wants to see through the interests of trust service providers)
Inclusivity versus efficiency	Timing of scaling the ecosystem: when to involve new information providers, QTSPs, domains, etc.? How to let organisations between domains cooperate with each other? Transition phase: Between the begin stage, and functioning phase a transition phase is appearing. As a business model will not automatically develop, tensions on e.g., finance and commitment will emerge. Transparency versus controllable of the entity (i.e., a foundation). Cause political complications where public funding is possible but less transparent. So how will all these different accountability structures of separate stakeholders be represented? Building in flexibility: applicability must be central here. In the primal development phase, parties should strive for a cross-domain implementation, even though this might not be in their best interest. When develops in a 'healthy' way and becomes bigger, a reflex of public parties is likely, to have more control on the ecosystem. How will parties within domains abide competition rules? Innovative projects: act on the terms of the slowest parties.

D CONCEPTUAL FRAMEWORK FOR COLLABORATIVE ECOSYSTEMS

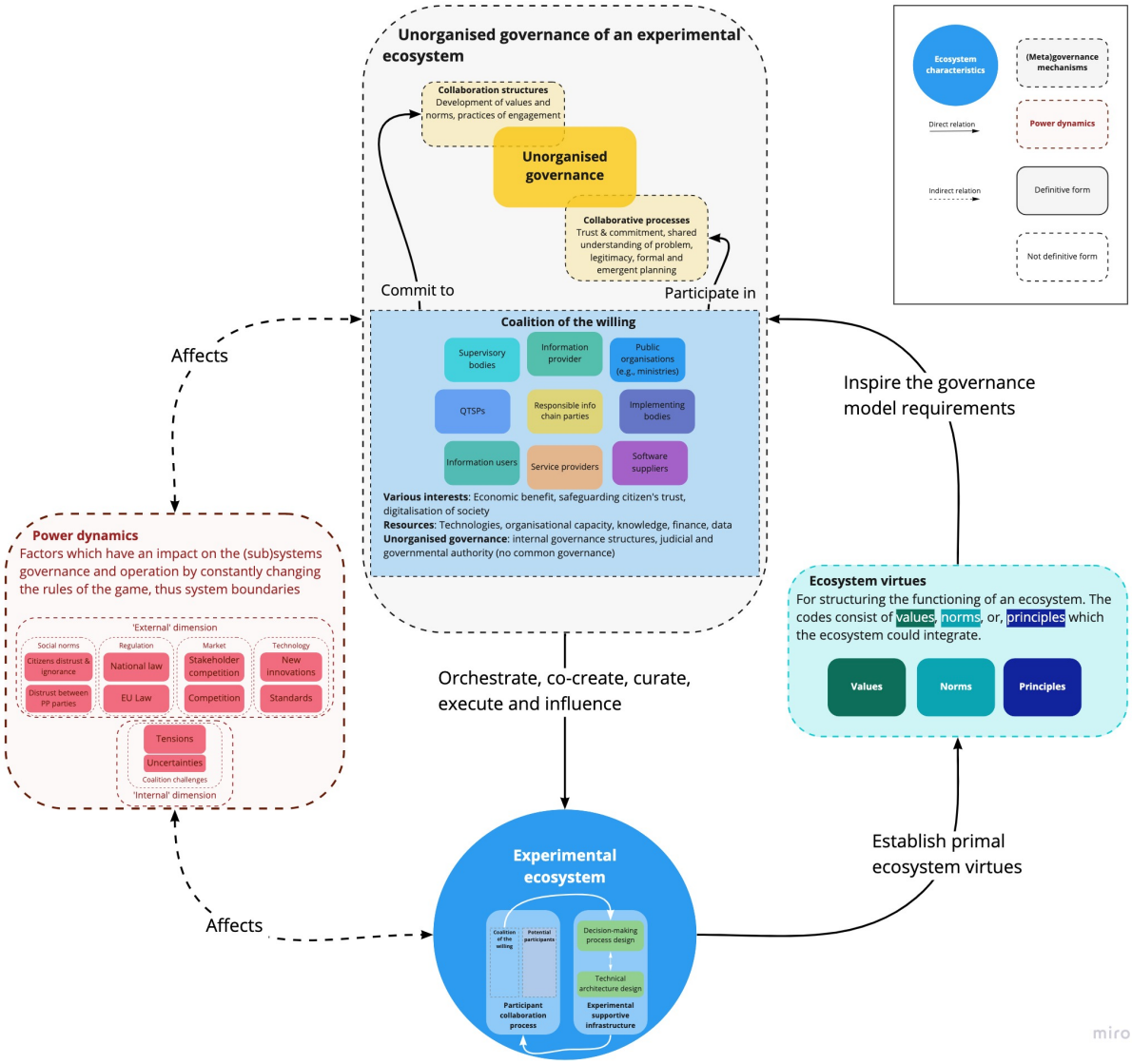

Figure D.1: Phase I of the framework applicable for other collaborative ecosystems