A Balancing Act

Defining a control-oriented approach to public sector agility

Thesis Report

Ferre Westermann
Delft University of Technology
Faculty of Technology, Policy & Management
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Defining a control-oriented approach to public sector agility

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Ferre Westermann

Student number: 4169697

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Graduation committee

Chairperson	: Prof. dr. J.A. De Bruijn, Organisation & Governance
First Supervisor	: Dr. H.G. Van der Voort, Organisation & Governance
Second Supervisor	: Dr. S. Cunningham, Policy Analysis
External Supervisor	: Ir. M.L. Bakker, Government Institution

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Preface

This report and relevant academic article and appendices together form the final documents of my thesis research for the Master of Science in 'Complex Systems Engineering & Management' at Delft University of Technology. Within the research I focus on the topic of agility in public sector bureaucracies and its paradoxical required control. I am convinced agility will play an increasingly important role in public institutions over the coming years and can create momentum to bring substantial change to the sector to be more efficient and people-oriented. It has this potential given its logicality and simplicity but due to its adaptive nature it also brings the risk of destabilization which indicates control over the agile process should be tailored to public sector bureaucracies' characteristics. I enjoyed exploring this topic through this research while especially the case study and related interviews enlarged my curiosity and motivation to create meaningful recommendations.

I am very grateful for all the help I received from those I interviewed and those who participated in the validation sessions. Furthermore, I would like to thank my graduation committee, Dr. Haiko van der Voort, Dr. Scott Cunningham, and Prof. Hans de Bruijn for their guidance during my research. I would also like to thank Ir. Marco Bakker for his help as my external supervisor. Lastly, I would like to thank my parents, George and Suus, my brother and sister, Jard and Jonne, my friends, and my love, Diellza, for their support.

Yours sincerely,

Ferre Westermann
4 March 2019

Abstract

Agility is increasingly being used in the public sector as its adaptive approach through short-cycled development could allow public services to keep up with developments in technology and the complex problems contemporary societies face. There are, however, some dilemmas at play when it comes to agility and the public sector's transparency and stability for accountability. Furthermore, agile projects appear to be less predictable and more likely to go off track. The main paradox of agility is that even though it appears to be at odds with control, it is required for agility to be effective. Besides, public sector bureaucracies come with their own control mechanisms which theoretically conflict with agility. The research explores these phenomena by considering how control over agile processes in the public sector can be enhanced through the use of control mechanisms. By using an explorative and single case study approach with validation sessions the research combines qualitative data from theoretical and practical findings which are analyzed through a Revised Levers of Control framework to provide recommendations for controlling public sector agility. It indicates that the agile process itself is the main means of control for which an extensive list of mechanisms is provided of both strategic and operational nature. Besides, the vast presence of interfaces in the public sector increases complexity while external deadlines and tight budgets provide a clear desire for planning as control. A main recommendation therefore consists of mechanisms to be used to perform planning within agility. The research also showcases that types of bureaucratic control can facilitate or are even required for the agile process to function when it comes to centralized strategic visions on priorities and an organizational vision on implementation of agility. Overall, this implies control over agility in the public sector to be a balancing act between mechanisms associated with 'pure agility' and with public sector bureaucracies. Further empirical research into the use and implications of proposed control mechanisms and presence of interfaces in practice would help in enriching the findings and provide more insight into the requirements of different types of public sector organizations to control their agile processes.

Key words: agility, public sector, bureaucracy, control

Executive summary

Agility, public sector and control

After providing success stories with some of the corporate powerhouses of the world, agility is increasingly being used in the public sector to transform public services to be capable of keeping up with dynamic developments in technology and complex problems societies face. Its adaptive and short-cycled development which embraces uncertainty is seen as clearly contrasting original linear waterfall methods and design-up-front. Only on a theoretical basis, however, there are already three dilemmas when it comes to applying agility in the public sector. Firstly, agility's adaptiveness, little documentation, and human interaction do not bide well with public values of transparency and accountability. Secondly, public sector's stability for accountability brings potential conflict with adaptive approaches (such as agility) given dynamic learning and continuous change. Finally, bureaucratic command and control interventions might not find resonance or even disrupt agile characteristics and thus its potential. Also practice illustrates that agile projects in the public sector are challenging especially in relation to big ICT developments and replacement of legacy systems. It appears that agility requires more time and commitment, bring greater demand to developers and clients, and increases the ease at which projects can go off track. The main paradox of agility is thus that even though agility appears at odds with control at first sight, control is required for agility to be effective. Besides, agility's internal approach to control the approach seems to conflict with bureaucratic control typical to public sector organizations. This research focuses on agility's internal approach and the implications of bureaucratic control and their interplay to provide recommendations on control over agile processes in the public sector.

Identifying control mechanisms through desk research and case study

The concept of controlling agility in the public sector is explored through a theoretical study and explorative single case study approach while using a revised version of Simon's Levers of Control. By reflecting on the characteristics of agility in the public sector and identifying suitable control mechanisms, the research contributes to the understanding of how the characteristics of bureaucratic public organizations shape the implementation and the desired control over agile processes. Potential control mechanisms are identified in a theoretical study by analyzing thirteen different management methods and frameworks. Together, these provide insight into the control mechanisms inherent in the agile approach while also providing potential complementing mechanisms from other approaches. The case study oriented at Agile Release Trains (ARTs) within a department of one of the main Dutch Ministry's executive

institution. It served as an explorative single case study in which qualitative data was received through 17 representative interviews. The findings from the theoretical study and case study combined provide qualitative information to reflect on the implications of the characteristics of bureaucratic public services on the use of agility and to provide concise recommendations for the use of control mechanisms. The results were validated through two focus groups at the Sociale Verzekeringsbank ('Social Insurance Bank') which is an executive institution for the Ministry of Social Affairs and Employment and one other main executive public institution active at a national level.

Agility and control in the public sector

Analysis of the control mechanisms through the Revised Levers of Control framework indicated that control requires clear strategic decisions and dedication next to its operational focus. It was furthermore illustrated that control in agility has both to do with clear procedures and roles and with values and norms given the need for an agile mindset and environment of trust and transparency. Overall, the analysis showed that the agile process itself functions as the main control given its short-cycled development with continuous adaptation with most mechanisms oriented at enhancing the performance of the process.

The case illustrated that the control mechanisms identified in the theoretical study, for instance related to agile roles and events, are already used in practice or provide valuable additions. The case study also showed that the public sector demands deviation from the core characteristics of agility which is represented in the following five points:

1. The interaction with interfaces given a broken value stream increases the complexity of the agile process
2. The need for planning given external deadlines
3. The difficulty of the specification of requirements which is rather different than used to in waterfall projects
4. The need for clear centralized visions to outline the implementation of agility and to guide prioritization
5. The interaction between agility and top-down waterfall structures

When reflecting on the three initial theoretical dilemmas it becomes clear that characteristics related to public sector bureaucracy control can actually assist the agile process or might even be necessary. This mainly relates to hierarchical centralized visions on prioritization for

allocation of resources and planning of interface interactions. The research furthermore illustrated that the risk aversive culture of bureaucracies strongly persists due to external deadlines, required continuous functionality and tight budgets which places constraints on how agility's dynamic learning should be performed and the level of innovation which is tolerated. This should therefore also be specified centrally. Control over agility in the public sector is thus a balancing act between control mechanisms related to agility and public sector bureaucracies.

Main control mechanisms and challenges

While the research provides an extensive list of potential control mechanisms it stresses the importance of five mechanisms key to controlling the agile process.

Define and update strategic visions on organizational priorities and to be developed products

Given the many interfaces in public sector organizations and their organizational complexity these visions on organizational and program level are required to prevent prioritization without strategic guidance which would entail loss of control over the process.

Define and update a vision on how agility is implemented

There should be an indication which parts of the organization, layers and teams are expected to make a shift to agility. Some aspects of its portfolio might have important deadlines on the short term or currently lack the capacity to make such a shift. This is required to start the required training and education on time and provide clear links between old and agile roles.

Set up the right mechanisms for agile planning

Planning plays an important role when it comes to control in the public sector and therefore mechanisms which support this should be in place. This firstly relates to defining and updating a MVP which includes business value and technical debt. Planning furthermore requires stable teams and reliable metrics and should include interface interactions.

Changing the portfolio

The research illustrated that two important components, team stability and creation of visions, are gravely hampered by traditional portfolio management as the current set-up is a one-year approach and works by assignments. The portfolio should be changed to a multi-year approach while allocation of resources is oriented at ensuring team stability.

Client and stakeholder interaction

The mechanisms identified from process management can provide worthwhile recommendations to increase a ‘sense of us’ and set up a fair process based on parties’ core interests and agility’s events, rules and roles. The reason why this interaction is so crucial besides providing input is that the client’s wishes regarding MVP and deadlines form the primary external factor which determines whether deadlines are met with which in turn increases the desire for control.

Further challenges for public sector agility

Furthermore, four main challenges were identified which should be recognized and cared for. Firstly, agility requires time, dedication and preparation. Since agility generally starts organically in the IT departments it is important to ensure training and education is provided before scaling. Secondly, public sector workspace does not facilitate agility given the new flex work policy. Furthermore, agility requires a new approach for accountability compared to traditional project management. Finally, agility’s staff demands provide a mismatch with current management layers in public sector organizations.

Further required research

To further validate or challenge the research findings more empirical research in the public sector is required to assess the use and effect of the control mechanisms on a more detailed level since this research primarily used an explorative approach. A quantitative study could for instance provide insight into the frequency and scale at which such mechanisms are used throughout public sector organizations working with agility.

1. Controlling Public Sector Agility

1.1 Agility in the public sector

The introduction of agility, which finds its roots in private sector software development and has 'learning' and 'value creating product development' at its core, appears to be a promising concept to enhance the efficiency of projects in the public sector. Agility made its rise as an adaptive form of governance given the dynamic changes in society, climate change and the global economy (Luna-Reyes & Gil-Garcia, 2015; Nelson, Howden, & Smith, 2008; Nograšek & Vintar, 2014; Weerakkody, Janssen, & Dwivedi, 2011). Especially given its learning character and incorporation of stakeholder requirements it provides a useful concept to solve complex problems which embody a lot of uncertainty and unfold in a multi-actor arena (Nelson et al., 2008). It acknowledges that one cannot know the product or service requirements at the start of the project, while an incremental development process provides more insight in the to be developed product and stakeholder requirements (Balter, 2011). An alarm bell might start ringing at this point and one might wonder if agility is not too loose a method for the public sector as it is such an open approach which evolves around uncertainty. The first dilemma which therefore arises is that agility's adaptiveness, little documentation and emphasis on human interaction in theory do not bide well with the public values of transparency and accountability (Armstrong, 2005). This immediately stands in relation to the second dilemma as governmental transparency and accountability are, in part, traditionally reached through stability. This stands in contrast, however, with the dynamic learning and continuous change of adaptive approaches, such as agility (Janssen & Van Der Voort, 2016). Yet, this adaptiveness and embracing of uncertainty is potentially the biggest strength of agility. It is important to realize that agility does not necessarily create uncertainty, it acknowledges it, and then starts exploring it to the extent necessary to create a Minimum Viable Product. Therefore, it provides a stark contrast to traditional waterfall methods where the requirements are stated up front as illustrated in figure 1. It is therefore a beneficial method for many problems in the public sector which are generally complex and uncertain (Geuijen, 2018).

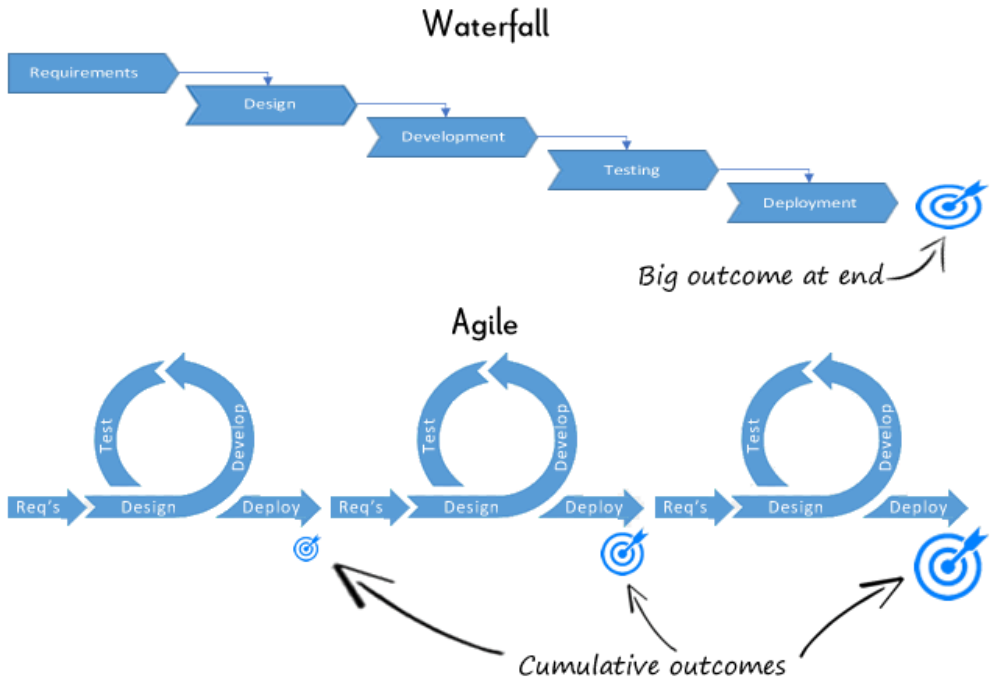

Figure 1: Distinction waterfall and agile development http://www.crmsearch.com/agile-versus-waterfall-crm.php

It should thus not come of too much as a surprise that agility is increasingly being implemented in the public sector worldwide (Mergel, Gong, & Bertot, 2018). To name a few examples: in the USA the FBI used agility to implement a new case management system (Shahzad, 2016), and the Danish Business Authority managed its digital transformation through agility (Lundqvist & Olesen, 2016), while the agility of UK's Government Digital Service (GDS) is even renown worldwide (Agile Business Consortium, n.d.). The trend is also visible in the Netherlands, where in 2010, for instance, ICTU, an independent governmental advisory and project organization which focuses on ICT services, was one of the only actors in the Dutch public sector which was using 'pure' agility, the concept is starting to take a firm foothold to stay and perhaps even create a new policy paradigm. Some recent example projects of agility are the IT reorganization of the Netherlands Food and Consumer Product Safety Authority (NVWA), replacement of legacy systems in the Customs and Tax Administration and the national registration of personal data (Basisregistratie Persoonsgegevens), and the digitalization of the judicial procedures (Kwaliteit en Innovatie). This is where the second alarm bell should start ringing. KEI, the aforementioned project which went from 7 million to over expenditure of more than 200 million, used an agile approach. Is agility then maybe a too loose approach for the public sector? How did such a project span out of control regarding costs, value and time? Which control mechanisms are suitable for agile projects to prevent such failures from

happening? The third dilemma for agility in the public sector is that traditional control mechanisms typical for bureaucracies, such as command-and-control, might not find resonance or even be counter-productive for agile projects (Lappi & Aaltonen, 2017).

1.2 Focus of the research

From the previous paragraph one can identify a total of three core dilemmas at play when applying agility in the public sector:

1. Agility's **adaptiveness**, **little documentation**, **human interaction** theoretically do not bide well with public values of **transparency and accountability**.
2. The public sector's **stability** for accountability brings potential conflict with adaptive approaches (such as agility) given **dynamic learning** and **continuous change.**
3. **Bureaucratic control** interventions might not find resonance or even **disrupt agile characteristics** and thus its potential.

These dilemmas specifically identified in relation to agility resonate with general questions on legitimacy of authority and the distribution of power that come with upcoming trend of Public Value Management (I. Williams & Shearer, 2011). While this research does not provide an in-depth analysis on the development of general policy paradigms, it is worth noting that the dilemmas on agility, and thus this research, are situated in the wider academic debate of the evolution of public policy (more on this is discussed in chapter 2). Next to these dilemmas, there are also characteristics of agility which in itself provide problematic implications which might hamper its functioning, as defined by Fridman (2016):

1. There is **less predictability**: Quantification in agility is difficult, especially in the beginning of projects, while fears of the unknown can provide negative effects on the performance of the development cycle.
2. It requires **more time and commitment**: The frequent face-to-face communication and close cooperation for cross-cutting collaboration and meeting of user requirements demands more time and energy.
3. There is **greater demand on both developers and clients**: Linked to the previous point, the frequent collaboration and feedback asks for a bigger commitment from different parties

throughout the whole project cycle. Not only is active participation required, training is needed to ensure this fits the agile approach.

4. There is a **lack of necessary documentation**: When new members join the team, not everything can be known from the documentation as communication is mainly performed face-to-face. This can bring misunderstandings and hamper the learning process.

5. Projects can more easily **go off track**: Since there is no strict planning or guidance, the process is dependent on customer feedback, which in case it is not sufficient or even misleading can lead development to wrong areas or into an everlasting process.

Overall, it becomes clear that agility brings complications which need dedicated control to be overcome. Sheer implementation of the agile principles without adequate measures to limit negative side effects can easily lead to project failure. Furthermore, as seen from the previously mentioned dilemmas a lack of control over agility provides friction with values of public sector services.

The main paradox of agility is that even though agility appears at odds with control, it is required for agility to be effective.

To provide demarcation and specification to what is meant by control in this research, while taking both the technical and social aspects of agility into account, the following definition is used:

Control is the capability to influence a specific component of the agile process or its execution, through management or governance, in a desired manner through control mechanisms.

Agile process within this context refers to both development and operational related processes which aim at providing or developing a product or service related to a pre-defined problem or customer demand.

The focal point of the research is to identify control mechanisms which can be used to reach desired control. For the definition of control mechanisms, there are multiple definitions available which are captured in one overall vision by Tessier and Otley (2012). This approach combines both the operational and strategic domain and also fits the technical and social instruments of control in agility. Technical instruments, as can be expected, relate to technical

aspects such as procedures and rules, whereas social instruments have to do with the social dimension such as values and norms. Whereas Tessier and Otley provide an implicit overall definition, this can be explicitly framed as the following:

Control mechanisms are technical or social instruments or actions which are used with the aim to enhance the control over a specific component or execution of the process, either related to operations and/or strategy.

While the primary focus of the research is on control the desire for control is also included in the research to identify the type of control required in public sector agility. The following definition is used for this:

Desire for control is the underlying motivation which provides the incentive to reach a certain type of control.

Taking the aforementioned aspects into account, the overall research question is defined as

How can the control over agile processes in the public sector be enhanced through the use of control mechanisms?

To retrieve an answer to this research question six sub-questions stand at the core of the research:

1. *What does agility entail?*
2. *Which control mechanisms does the theory prescribe?*
3. *Which control mechanisms are used or desired in practice?*
4. *What is the desire for control in public sector organizations?*
5. *What are the key implications of the public sector on the use of agility?*
6. *Which control mechanisms should be used to control public sector agility?*

The research thus provides a multidisciplinary approach to control to provide a framework which assists in creating a complementary control-oriented strategy. The contents of the report are twofold: on the one hand there is the academic literature on ‘control’ from different

theoretical backgrounds, and on the other hand there is the empirical evidence retrieved from an agile case in the public sector.

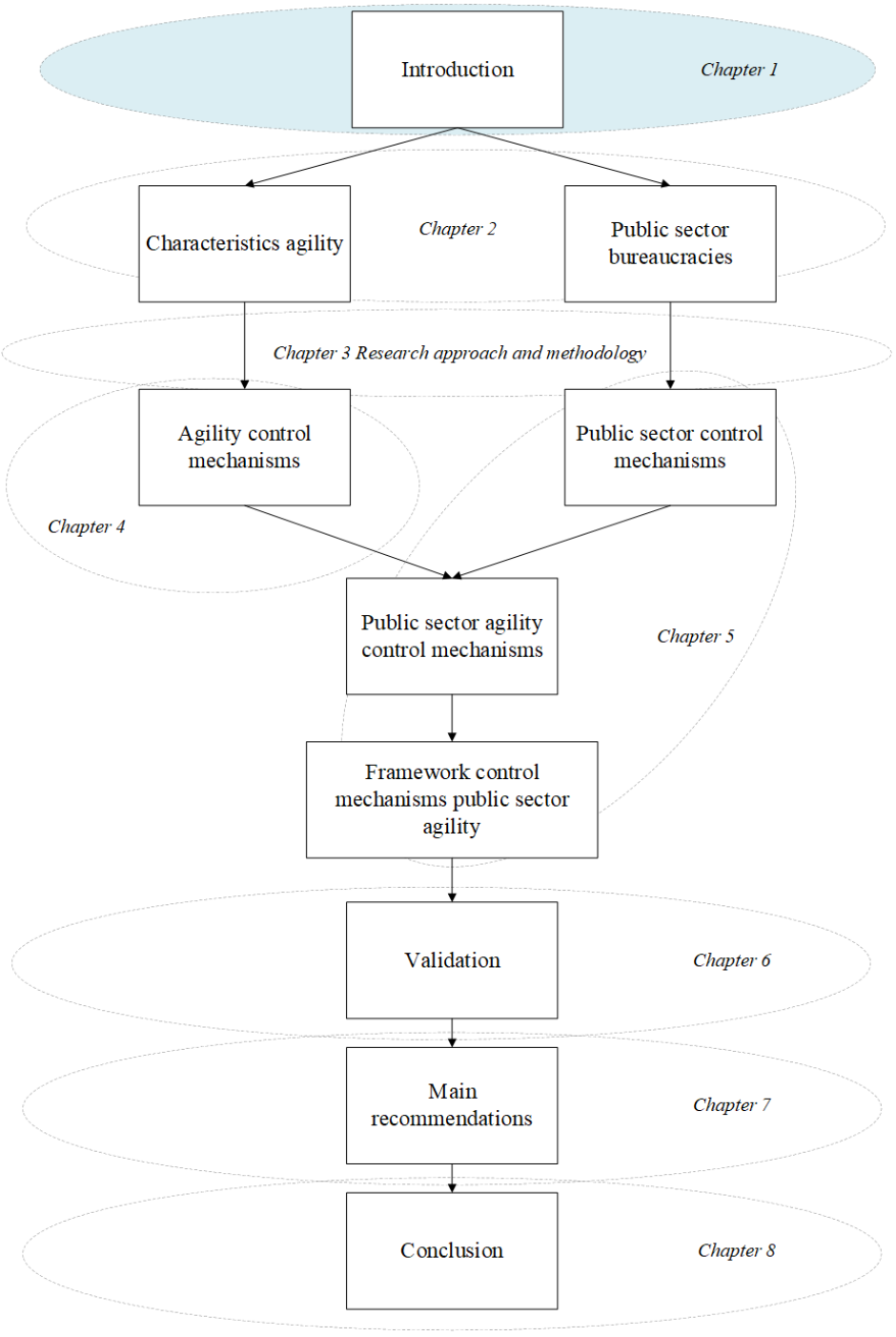

Figure 2: Report structure

1.3 What comes next

Chapter 2 will further explore the reason why looking into agility can be worthwhile given public sector bureaucracy characteristics and the elements associated with agility. It also illustrates the theoretical tension between agility and public sector control. Chapter 3 will specify the research approach and methodology while chapter 4 provides the general framework of control mechanisms conceived through a theoretical study. It uses the general clusters which characterize agility but elaborates into detail what specific mechanisms are prescribed by using existing management theories and concepts. In chapter 5 the report engages in case study research where both an explorative approach is used to identify control mechanisms not mentioned in the academic literature and the applicability of the mechanisms of chapter 4 are relevant. Results of three validation sessions are provided in chapter 6. Chapter 7 discusses the overall results and concrete characteristics of public sector agility along with the main control mechanisms while the conclusion is presented in chapter 8.

Chapter 2 Public sector bureaucracy, agility and control

This chapter provides further insight into public sector characteristics and the implications it has on control and innovation. Then the potential agility can hypothetically bring for innovation and a new type of control in the public sector is discussed before the specific elements of agility are explored along with the control inherent in the approach. This is used to illustrate the tension between public sector bureaucratic control and agility. The chapter ends with the Revised Levers of Control framework which is used in the research the characterize the identified control mechanisms.

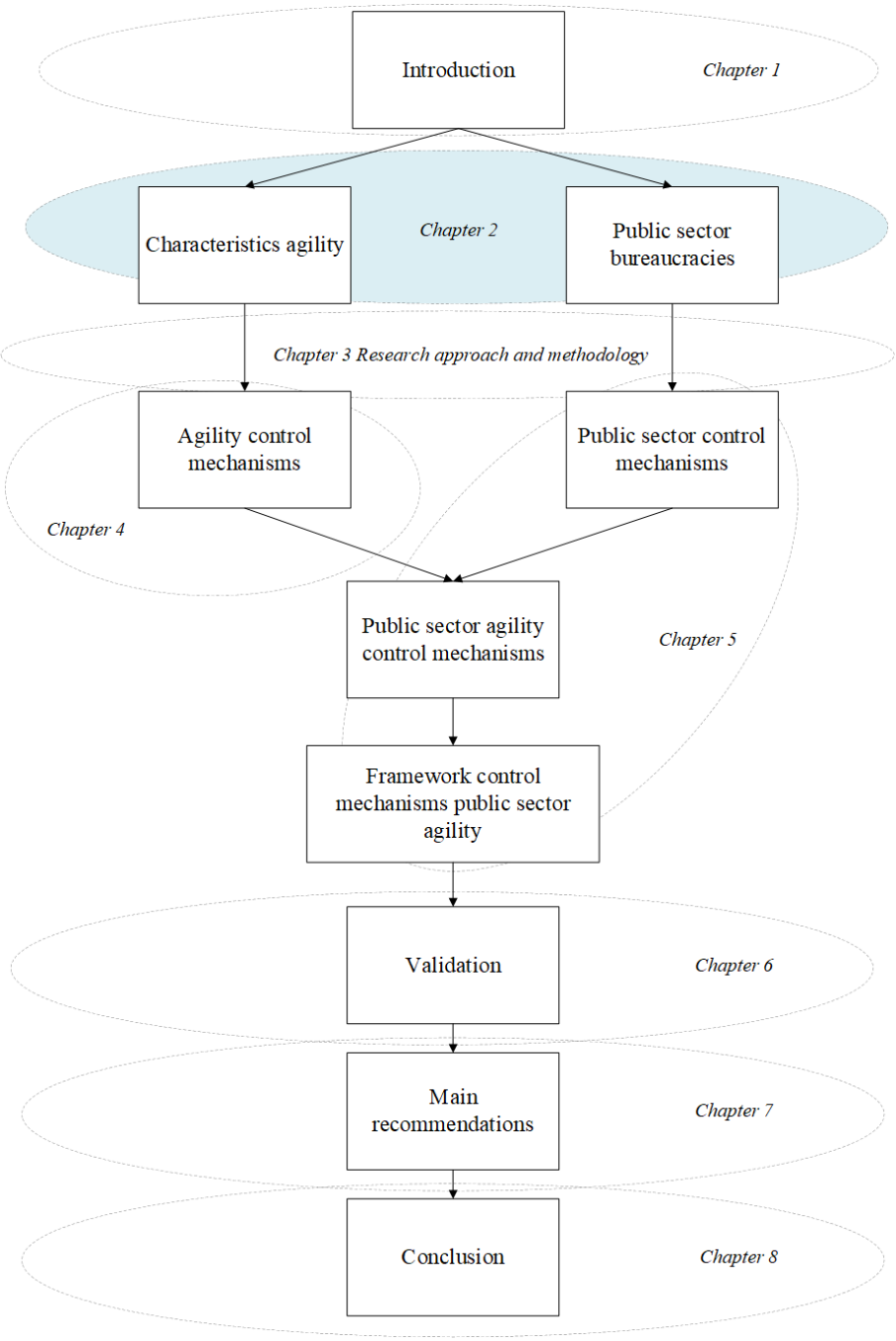

Figure 3: Report structure

2.1 Public sector bureaucracies, control and innovation

2.1.1 The awaited turn to post-bureaucracy

According to Weber (1958) bureaucracies have three main characteristics to perform with speed and unambiguity: hierarchy, rules and strict procedures (red tape), and specialized technical competence. They are furthermore considered to be related to a political decision-making body, while they embody concentration of administration or material resources (Max Weber, 1978). At the end of the 20th century scholars noted the need for a transition to 'post-bureaucracy' which would put flexibility and the human element at the center due to increasing public dissatisfaction (Ventriss, 2000) and scholar's criticism (Basu, 1994) regarding inefficiency and red tape that typified public sector bureaucracy. A shift was envisioned towards autonomy and teamwork through increased collaboration, trust and decentralization and reduction of formal structures and centralized control (Clegg, 1990; Cooke, 1990; Heydebrand, 1989). Parker and Bradley (2004), however, already indicated that control and hierarchy of the bureaucracy in the public sector did not make way for post-bureaucracy around the turn to the new millennium due to new forms of control on monitoring performance, such as benchmarking and financial controls (Farrell & Morris, 1999). Parker and Bradley then already stated that "instead of a shift from bureaucracy to post-bureaucracy there is rather a shift from one form of bureaucracy to another, not associated with less control but with different mechanisms of control" (p.212).

An important aspect of the performance-based mechanisms is the presence of strategic planning within public sector bureaucracies (Vigado-Gadot, 2003). Johnson (2015) lays out how the debate on centralization and central planning versus decentralization and incrementalism has been ongoing since the end of the Second World War and showcases through case studies that out of the different schools of thought stated by Mintzberg, Ahlstrand and Lampel (2009), such as power, positioning and learning, the planning school is most present as a means of control. While the emphasis on planning is related to external deadlines regarding legislation Johnsen states it is a "paradox that the public sector extensively uses strategic planning where the organisations often are professional bureaucracies and the environments are unstable." (p.262) while he also remarks that planning is needed since there is "policy ambiguity, demands for openness, attentive publics, time problem, and shaky coalitions" (p.264). This indicates that both planning and flexibility are desired in the public sector.

Next to the presence of planning the bureaucratic hierarchical nature of public sector organizations persisted throughout the years (Bontis, 2007; Hazlett, McAdam, & Beggs, 2008;

Marilena & Elena-Mihaela, 2008) which more specifically can be characterized given the following characteristics. Public sector organizations have rather complex inter-organizational structures (Rashman, Withers, & Hartley, 2009) while staff members are considered as important repositories of knowledge (McAdam & Reid, 2000) which means that transferring across departments, which occurs often, leads to a loss of tacit knowledge (Marilena & Elena-Mihaela, 2008). Public sector bureaucracies furthermore still have relative lack of autonomy (LaPalombara, 2001; McNabb, 2007), high presence of political accountability (Kothari, Hovanec, Hastie, & Sibbald, 2011) and risk-aversive cultures (Bontis, 2007; Ferguson, Burford, & Kennedy, 2013; LaPalombara, 2001). These together indicate that a turn to more autonomous and human-oriented type of bureaucracy did not yet take root and large-scale innovation was off the table.

2.1.2 Public sector bureaucracies and innovation

There is, however, a desire for innovation due to stakeholder expectations (Rashman et al., 2009) such as the general public or politics, aim for cost-reduction and increase of efficiency (Larsen, 2015; McAdam & Reid, 2000) and recognition to make use of technological developments (Moussa, McMurray, & Muenjohn, 2018). As the previous paragraph already indicated there are certain characteristics of public sector bureaucracies which provide barriers to innovation such as the risk-aversive culture. Further impediments are the blockades to information flow by command-and-control structures and red tape (Chiem, 2001), vertical hierarchies (Marilena & Elena-Mihaela, 2008), bureaucratic sectarianism and performance measures (Sørensen & Torfing, 2011), poor reward mechanisms, lack of time, constraining culture and failure to halt failing projects (Mulgan & Albury, 2003; Vigado-Gadot, 2003). That some of these, such as inadequate communication, centralized hierarchical control, lack of resources, risk- and change-aversiveness and sectarianism, were already noted by Kanter (1984) indicates how these aspects are firmly rooted into public sector bureaucracies and are challenging to overcome.

2.1.3 Types of innovation in the public sector

While Van de Ven et al (2008) define innovation as a dynamic journey Stewart (2010) distinguishes between three types of innovation: incremental, radical and systemic. Incremental innovation entails that minor improvements are made “to existing products or services and in so doing meet standards for regulation compliance” (Wagner & Fain, 2018, p. 1207), radical innovation entails rather disruptive change by replacing old with new systems and therefore

bares a higher likelihood of risks and costs, while systemic innovation is primarily driven by developments within the used technology. While radical innovation can be very beneficial public sector organizations generally tend to avoid it given its inherent risks and potential costs of failure (Luke, Verreynne, & Kearins, 2010). Walker (2007) and Stewart (2010) on the other hand states that for public sector organisations the use of incremental innovation is the most desired as it better aligns with regulatory responsibilities and mandates while Sørensen and Torfing (2011) also applaud use of an incremental manner in the public sector given its potential for long-term foresight.

2.1.4 Innovation as and through agility

This is where agility comes in as a potentially successful form of innovation as incremental adaptation basically captures the essence of the approach. Further characteristics of agility also provide a hypothetical strong case for succeeding in bringing innovation to the public sector. Multiple scholars indicated that innovation depends on an organization's ability to manage internal and external cooperation to exchange ideas through free flow of information to create value and reduce the previously stated barriers and allocate resources in such a manner which facilitates these actions (Agolla & Van Lill, 2013; Ingraham, Joyce, & Donohue, 2003; Walker, 2007). The concept of agility serves to promote cooperation within an organization and with its stakeholders while eliminating barriers by focusing on simplicity, efficiency, and speed. It has furthermore been indicated that decentralization and self-organization foster innovation (McMillan & Carlisle, 2007; Rashman et al., 2009; Wynne & Otway, 1983) which are also core elements of agility. Besides, agility finds its root in software development and has clear linkage to IT. Since Kim et al (2014) indicated that IT innovation can help overcome red tape procedures and sectarianism in bureaucracies the potential of agility to improve public sector organizational effectiveness through new means of control becomes an even stronger case.

Together these factors indicate the potential agility has to foster innovation in the public sector while simultaneously providing a new form of control which bridges the performance-based control with the post-bureaucratic need of flexibility. The next paragraph explores the concept of agility to provide a specific definition used for this research.

2.2 What does agility entail?

This paragraph provides insight into the main literature on agility to provide a clear definition of an otherwise rather vague concept. Furthermore, the inherent control of agility is presented.

2.2.1 The Agile Manifesto

Agility is a concept that is widely used and has been given different definitions within different contexts (Luna, Kruchten, & de Moura, 2015). While sometimes considered a methodology, it is in its basis just a set of values and principles. The essence of agility comes from the 'Manifesto for Agile Software Development'. Written by a group of representatives of software companies in the beginning of the 2000s, it embodies four values and twelve principles which were meant to bring requirements of the product itself along with the client's wishes to the forefront of software development, rather than being overshadowed by excessive documentation and rigid procedures (Beck et al., 2001). As can be seen from the values and principles, agility is very responsive and interactive and not planned into detail. To a certain extent, agility is designed to be uncontrolled to a certain level to allow for dynamic learning processes. Table 1 captures the four main values and table 2 the twelve principles.

Agile values
1. *"**Individuals and interactions** over processes and tools;*
2. ***Working** software over comprehensive documentation;*
3. ***Customer collaboration** over contract negotiation;*
4. ***Responding to change** over following a plan."*

Table 1: The four values of the Agile Manifesto (emphasis added)

Agile values
1. *"Our highest priority is to satisfy the customer through **early and continuous delivery** of valuable software.*
2. *"**Welcome changing requirements,** even late in development. Agile processes harness change for the customer's competitive advantage.*
3. ***Deliver** working software **frequently**, from a couple of weeks to a couple of months, with a preference to the shorter timescale.*
4. *Business people and developers must **work together daily** throughout the project;*
5. *Build projects around **motivated individuals**. Give them the environment and support they need and trust them to get the job done.*
6. *The most efficient and effective method of conveying information to and within a development team is **face-to-face conversation**.*

7. ***Working*** *software is the primary measure of progress.*
8. *Agile processes promote* ***sustainable development****. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.*
9. *Continuous attention to* ***technical excellence and good design*** *enhances agility.*
10. ***Simplicity****--the art of maximizing the amount of work not done--is essential.*
11. *The best architectures, requirements, and designs emerge from* ***self-organizing teams****.*
12. *At* ***regular*** *intervals, the team* ***reflects*** *on how to become more effective, then tunes and adjusts its behavior accordingly."*

Table 2: The twelve principles of the Agile Manifesto (emphasis added).

2.2.2 Defining agility

While finding its roots in private sector software development, agility is now increasingly applied in the public sector. This fits a wider trend in the evolution of design ideas and strategic management regarding the recognition that not all information required for solving complex problems is available beforehand, specifically at the top layers of decision making (Nerur & Balijepally, 2007). This led to a broader definition of agility which suits its applicability for projects and activities not only related to low-level activities regarding IT and software development (De Luna et al, 2015).

> *"Agile governance is the ability of human societies to sense, adapt and respond rapidly and sustainably to changes in its environment, by means of the coordinated combination of agile and lean capabilities with governance capabilities, in order to deliver value faster, better, and cheaper to their core business." (Luna et al., 2015, p. 8)*

Luna et al. came with this definition to combine existing literature on agility and create a common vision and definition, but the lack of specificity makes it difficult to be used and a more complete definition of agility is thus required. This definition furthermore includes a 'lean' approach which originates from Toyota's famous lean manufacturing concept (Bendell, 2006), next to an agile one. As both concepts are quite similar since they embody continuous learning and letting a team do their work, they are mixed up or often even taken as one (Fichtner, n.d.; Post Agilist, 2012; Schapendonk, 2011). Yet, they differ since lean focuses on eliminating 'waste', redundancy and repetitiveness, whereas agility mainly revolves around short times frames with frequent customer interaction and rapid change. While elements of lean might

occur during the cases at hand, this research primarily focuses on agility which, even after Luna et al.'s definition requires a more specified definition of the concept.

The introduction of agility fits the trend that project development should be more aproned to change, include more intense stakeholder interaction and embody continuous creation of value to increase the business by overcoming the sub-optimization of traditional methods when dealing with complex problems in a multi-stakeholder arena with a lot of uncertainty; especially where innovation is required (Cohen, Lindvall, & Costa, 2004; Fowler & Highsmith, 2001; Highsmith & Highsmith, 2002; Howell, Windahl, & Seidel, 2010; Nelson et al., 2008). A key aspect of agility is that the continuous focus on value-creation through incremental short cycles allows for a learning process which over time sheds more and more light on the uncertainty surrounding the development process, be it technical complexity, changing customer requirements or a dynamic environment (Balter, 2011; Nerur & Balijepally, 2007). Agility also takes a very interactive approach on a social dimension by placing human interaction in the spotlight, both within the enacting team/organization by using self-organization but also by focusing on continuous and active stakeholder collaboration (Howell et al., 2010).

Taking the existing academic literature, which provides the academic foundation that would have been lacking by only referring to the 'Agile Manifesto', agile processes can be defined as having the following definition with three core aspects.

Agile processes:
1. Focus on the deliverance of **value** and acknowledge the requirements are not known up-front but will be **learned** during the **incremental** process through **short cycles** and continuous **evaluation and adaptation.**

2. Focus on keeping things **simple** and only include what is **necessary** and **efficient** to meet the retrieved **requirements** which can **change during the process**.

3. Bring **human interaction and collaboration** to the forefront, both through **team facilitation, self-organization** and **daily interaction** in the development process and **stakeholder collaboration**.

2.2.3 Control inherent in agility

From the given description it becomes clear that agility embraces uncertainty and promotes learning rather than having rigid planning and water-fall like development constructions and therefore requires a different approach to leadership (Lappi & Aaltonen, 2017). In general, it has its own approach to control over the development process by continuously letting the process be influenced by social and technical external and internal dynamics. Social internal, for instance, by the dynamics of self-organization and impact of team composition, while social external comes in the form of changing relations with stakeholders. From an internal technical point of view the process is changed by developed increments by the team members which do not follow a pre-fixed plan and technical external by considering the changes in the market. It is not said that non-agile projects do not per se have (a part of) these characteristics but agility's openness to continuous change is the main distinction. Control over agility is therefore perhaps less a paradox but more a change of perception on how to go about control. Taken the previously stated definition of control mechanisms and the mentioned characteristics of the agile approach, one can already state that agility embodies several clusters of mechanisms through which agility aims to control the agile process.

Cluster	**Description**
Agile leadership	Given the difference from traditional project management and it not automatically being implemented as desired agility requires a different kind of leadership
Agile mindset and skills	Agility's way of working requires different mindset and skills
Continuous change	Agility requires continuous learning and change which allows for aligning product development with the learning process and external dynamics
Collaboration and feedback	The interactive and frequent feedback allows for more direct control embedded within the process
Events and procedures	There are strict procedures for the events that take place to be efficient and work simple
Organizational set-up	The organizational characteristics of business or organizations aiming to implement agility should facilitate this process

Portfolio and budget	Given its differences with traditional approaches when it comes to uncertainty and openness to change a different approach to the portfolio and budgeting is required
Teams and roles	Agility places emphasis on team functioning in which self-organization and roles are important
Technology and tools	The rapid and dynamic agile process uses specific tools to facilitate agility
User and stakeholder interaction	Through user and stakeholder interaction, agility aims to provide a good fit to the demands which are and will be placed on the product

Table 3: The different clusters of control mechanisms

After having specified the need to consider agility in the public sector, and having set out what agility entails, the following paragraphs will illustrate the interplay between control in public sector bureaucracies and agility which stands at the core of this research.

2.3 Controlling agility in the public sector

2.3.1 Controlling agility

As has been mentioned in the previous chapter, agility brings a higher risk to go off-track when not executed well and therefore has its own control mechanisms. Mechanisms related to events, procedures, roles and stakeholder interaction are meant to create structures with support self-organizing teams, dynamic learning processes (including failure) and continuous adaptation. The research therefore includes a focus on which mechanisms are part of controlling the agile process regardless of private or public sector context.

2.3.2 Control in the public sector

The previous chapter furthermore illustrated that contemporary bureaucracies generally are still based on hierarchy and centralized control with a firm emphasis on performance management and planning. This comes with a risk averse culture and presence of red tape which themselves serve to provide control but also provide barriers for innovation. While agility indicates it has clear potential to merit the public sector through stimulating internal and external collaboration, autonomy and teamwork, and emphasis on value through incremental innovation there appears to be a conflict with these bureaucratic control measures. The research therefore also explores

the use of control mechanisms which operate within this tension and have potential to bridge both worlds.

2.3.3 Contingency approach to agility

The previous sub-paragraphs illustrate that the use of agility in the public sector likely diverts from the ideal agile implementation. The research therefore embodies a contingency approach which entails that the implementation of agility and its required control incorporates mechanisms from other approaches as there is no one theory which can exactly prescribe how to govern an organization or make decisions given diversity in situational variables related to relations, tasks and power (Fiedler & Chemers, 1974). Johnsen (2015) already illustrated that public sector organizations generally combine schools of thought of which strategic planning is generally the most common one. He characterized it as a paradox that planning is used in unstable environments but that it is necessary given among others political scrutiny and required openness. Furthermore, taking the presence of deadlines for implementation of deadlines into account it is therefore expected that performing control over agility in the public sector has a clear connotation to strategic planning.

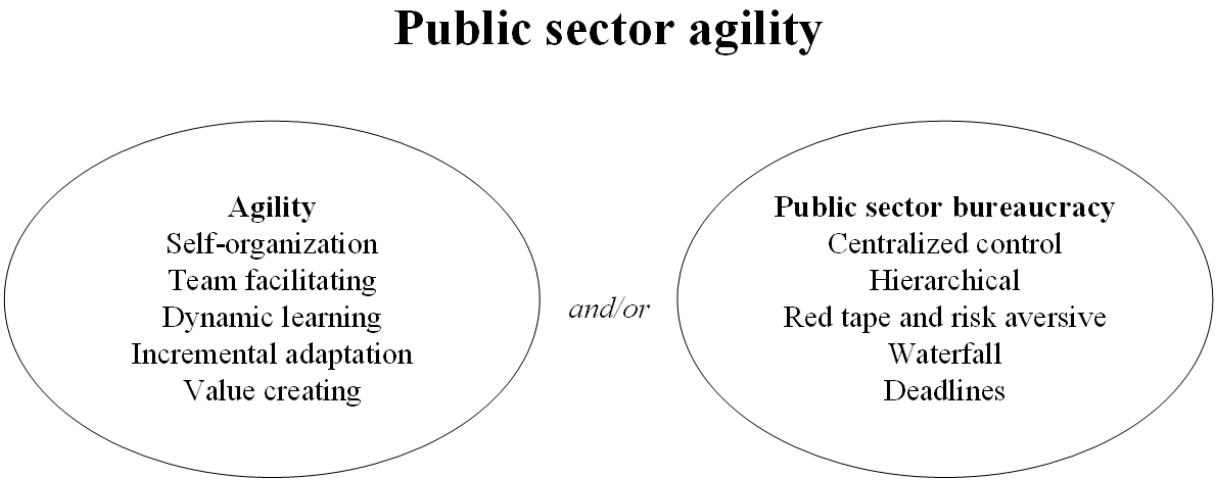

Figure 4: Conceptualization public sector agility

2.3.4 Control of what and for who?

Control is considered as a relatively broad concept within the research as reflected in the definition: ‘the capability to influence a specific component of a project or its execution in a desired manner through control mechanisms’. The definition is not narrowed down into specific schools of thought (Mintzberg et al., 2009) or specific components of the agile process, such as agile events, or bureaucratic control, such as red tape, but is rather broad to ensure that

potentially important elements of control not present in the mainstream literature are identified and elaborated upon. As will be illustrated in the research, control relates to different technical and social aspects which both target team facilitating measures which enhance performance and managerial planning and performance measurements. As agility is a concept which can be applied from team level to the whole organization the research considers implications of team, program, portfolio and organizational levels. The agent of control is not regarded as one person or role but is primarily considered to be the managerial and general organizational level. While this might appear to contradict the team-focused mindset of agility these levels are considered given the current decision-making authority to implement such changes.

2.4 Control mechanisms

There is a vast body of academic literature on the definition of control and its relevant mechanisms. Given the multidisciplinary nature of this research a holistic approach to types of control and mechanisms is required. Tessier and Otley (2012) provide a conceptual framework which further develops Simons' classic Levers of Control framework (1994) by utilizing academic literature of almost two decades and its critique on the framework given further theoretical and empiric academic research. This conceptual development therefore serves as a suitable framework to categorize the control mechanisms to indicate what type of control is required as it is an overarching approach.

2.4.1 The old Levers of Control framework

The initial framework by Simons (1994) can be used to identify different types of control, their mechanisms, and categorize them regarding their characteristics and desired results. The original framework consists of four levers (belief systems, interactive control systems, boundary systems, and diagnostic control systems), whereas belief systems and interactive control systems are considered as 'positive', since they promote creativity and flexibility, boundary systems and diagnostic control systems are named 'negative' since they primarily function for compliance.

Lever	**Definition**	**Status**
Belief systems	These types of controls focus on the values and purpose of the organization.	Positive
Interactive control systems	These are formal information systems to be used by managers to "involve themselves regularly and	Positive

	personally in the decision activities of subordinates" (1994, p.34).	
Boundary systems	These types of control relate to delineation of what is and what is not desired (such as codes of conduct). They therefore serve as strategic boundaries.	Negative
Diagnostic control system	These mechanisms can be used to assess and communicate critical performance indicators which can be used for monitoring.	Negative

Table 4: The original four levers (Simons, 1994).

While Simons' original approach provides a mainstream conceptual framework used throughout the past decades there are certain shortcomings which do not aid the goal of this research. The original concept of boundary systems for instance states that delineation and compliance is focused on a strategic level only and not on operational as well while the latter appears to be the main focus of agility. Furthermore, the definition of interactive control systems is oriented at managers' involvement within the process rather than mechanisms incorporated in the process itself. Since agility incorporates an approach in which the process theoretically becomes more important than manager interaction given the checks within incremental adaptation the original Four Levers of Control fall short. Therefore, the research uses a Revised Levers of Control framework by Tessier and Otley (2012) since it incorporates years of academic criticism and reflection on the original framework and utilizes it for expanding it. The following sub-paragraph presents the main criticism Tessier and Otley gathered and the newly revised framework.

2.4.2 The Revised Levers of Control framework

Tessier and Otley provide extensive argumentation for their alterations to the framework. The main criticism from the literature is that Simons' original concepts as stated in table 4 are rather vague and even ambiguous, which led to a call for a more in-depth investigation on the Levers of Control. Tessier and Otley dissect Simon's Levers of Control framework and clearly distinguish characteristics and define them, generally in contrast to its opposite, to make the distinctions clear. These are their main adjustments and additions:

1. The use of the terms 'positive' and 'negative' is replaced by 'enabling' and 'constraining' to take away normative implications in interpretation of the objective of the mechanisms.

2. A distinction is made between the managerial intentions of control and the perception by employees.
3. The revised framework considers the presentation of the controls to bridge the intention and perception.
4. The labels ‘positive’ and ‘negative’ are used to describe the attitude of employees towards the control and are thus deliberately carry, in this use, normative weight.
5. The two main objectives of controls are distinguished as performance or compliance related.
6. For both performance and compliance, managers can use the reward and/or punishment mechanisms.
7. Controls are either technical or social and can be categorized according to the control systems.
8. Diagnostic and interactive controls are used to describe control system, rather than being control systems themselves.
9. The initial four levers are replaced by four other control systems which distinguish between operational and strategic activities and performance and compliance (boundaries): operational boundary, strategic boundary, operational performance and strategic performance.
10. A control mechanism can have multiple objectives and can be used at different levels (operational and strategic).

This is represented in the following figure, while the table summarizes the definitions of the concepts.

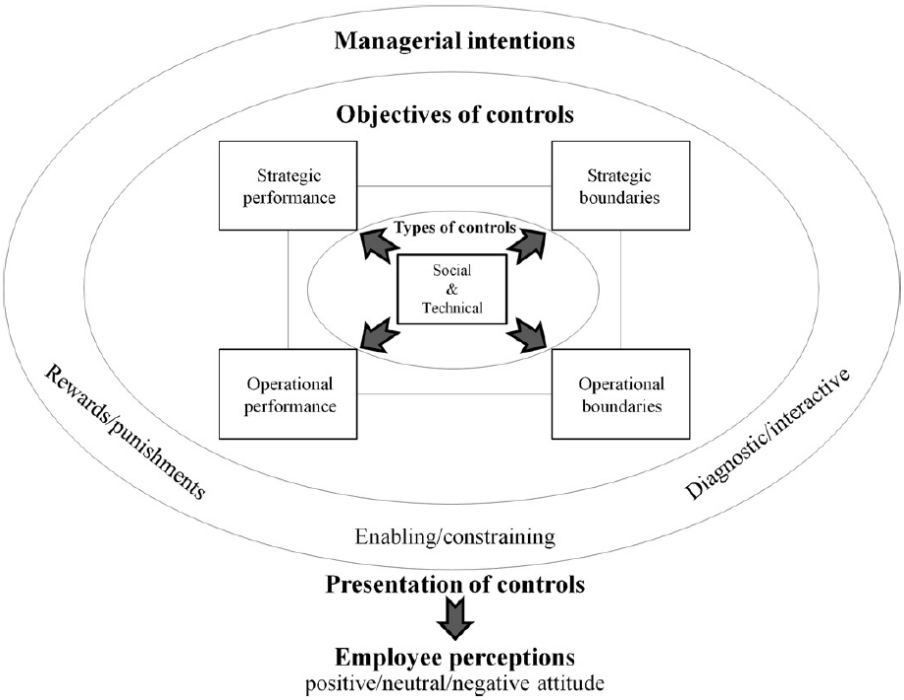

Figure 5: The revised Levers of Control framework (Tessier & Otley, 2012).

Concept	Definition
Strategic/operational	Does it relate to the operational or strategic aspects?
Performance/boundary	Is the objective of the mechanism to create and enhance performance or is the end goal to comply with regulation or standards?
Social/technical	Is the mechanism based on social aspects (i.e. values and norms) or technical (i.e. rules and procedures)?
Diagnostic/interactive	Is the mechanism used rather continuously or only when there is a specific need to?
Enabling/constraining	Does the mechanism enable creativity and flexibility, or does it increase predictability and reduce options?
Reward/punishment	Does the mechanism provide a reward or punishment?

Table 5: Overview of the concepts of the revised Levers of Control framework

2.4.3 Reflecting on the revised framework

While the revised framework provides an improvement regarding Simons' original framework, there are still certain implications to consider. Tessier and Otley themselves state seven points for refinement.

1. The framework should be tested through empirical studies.

2. Quantitative analysis is required to verify the validity of the conceptualization.
3. In line with point 3, there are currently no measurement instruments to be used for the concepts.
4. Whereas the framework focuses mainly on managers, it could prove valuable to place more emphasis on the contribution of employees.
5. The organizational structure and issues related to decentralization are not considered in the framework.

The research embodies explorative research through using the framework and can therefore assist in the empirical validation, but it does not provide quantitative analysis, nor is the provision of relevant measurements to such a cause a primary aim of this research. As the framework will be applied on agile projects and control mechanisms there will, however, be attention for the employees' contribution, organizational structure, and decentralization as these are already incorporated within the identified control mechanisms. So, while the framework itself is perhaps not tailored to decentralized organizations the author also believes it does not provide barriers to assess the implications of such characteristics through the use of this framework. While the revised framework includes the perception of employees towards control mechanisms as positive or negative, this research does not explicitly assess this variable since the explorative qualitative research approach does not facilitate such enquiries for each mechanism. The appropriateness of a mechanism is mainly considered given the desire for control and characteristics of agility in the public sector.

2.5 Overview of the conceptualization

This chapter presented the potential agility has to improve public sector performance and control while also indicating the tensions at hand between bureaucratic characteristics and agile functioning. This presented the main conceptualization of the research where control in public sector agility is considered as incorporating mechanisms related to agility and to those specifically oriented at public sector bureaucracies. A meta-analysis is performed through the Revised Levers of Control framework to analyze the approach which should be taken towards controlling public sector agility to provide insights into main strategic and operational mechanisms and the social and technical dimensions at play. Figure 6 presents the overall conceptualization discussed in this chapter.

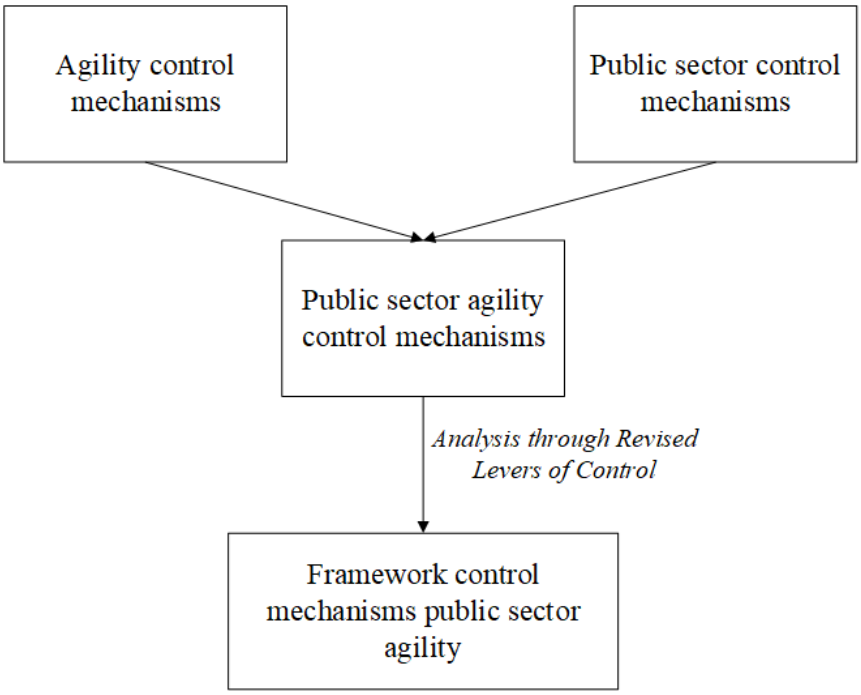

Figure 6: Conceptualization of the research

2.6 What comes next

The next chapter discusses the research approach and methodology used to retrieve information and perform the analysis and recommendations of the research.

Chapter 3 Research Approach and Methodology

This chapter presents the research approach and methodology. The research explores the concept of controlling agility in the public sector through a theoretical study and explorative single case study approach. By reflecting on the characteristics of agility in the public sector and identifying suitable control mechanisms, the research contributes to the understanding of how the characteristics of bureaucratic public organizations shape the implementation, and thus the required control, of agile projects.

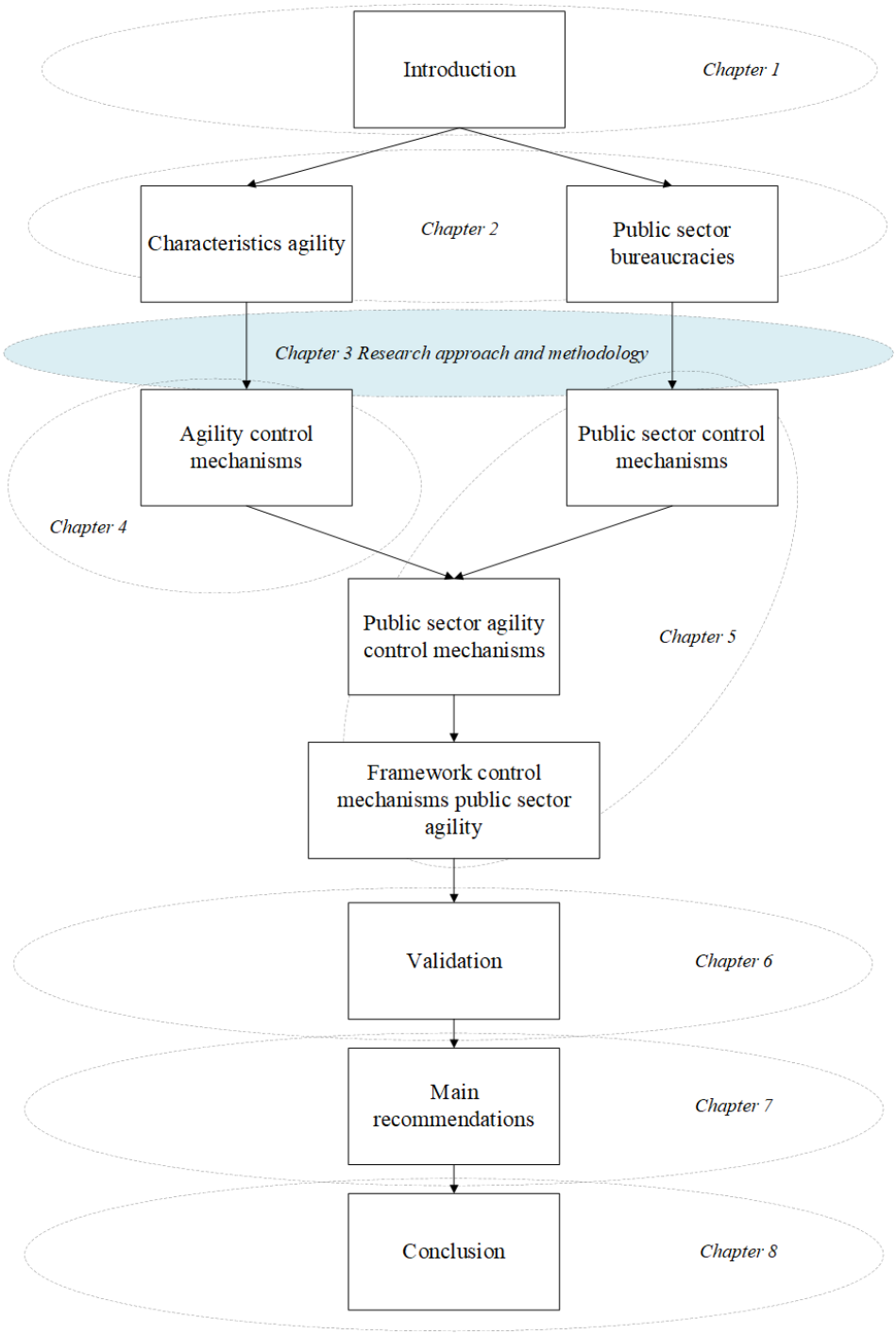

Figure 7: Structure of the report

3.1 Exploratory research with case study

The research uses a case study approach as it revolves around enhancing already existing systems, being agile projects in the public sector. While the research focuses on enhancing the controllability of these projects, there are certain variables which cannot be influenced, such as the environment in which the projects unfold. Together these characteristics resemble research which calls for case study research, which can be defined as "a methodology, a type of design in qualitative research, an object of study and a product of the inquiry" (Yin, 1994, p. 245). The research can be categorized as an inquiry into the use of agility in public sector projects through qualitative research which aims to contribute to the functioning of such projects and enhancing their controllability. The research also functions exploratory as there is no strict conclusive but rather a wide and information-seeking approach (Sandhusen, 2000) to discover important factors that influence the control of agility in the public sector. That the research provides a combination of both approaches is resembled in the use of methodology. The Revised Levers of Control framework is used to characterize the control mechanisms while existing management concepts and frameworks served to identify control mechanisms from existing literature. The single case study again has a more explorative approach as the enquiry into the desire for control and appropriate mechanisms is not shaped by a predefined framework or categorization.

3.2 Identifying control mechanisms from theory

For the theoretical study control mechanisms were identified by analyzing thirteen different management methods and frameworks categorized into four application areas: agile oriented methodology, agile project and portfolio management, adaptive and agile governance, and stakeholder interaction. Together, these provide insight into the control mechanisms inherent in the agile approach while also providing potential complementing mechanisms from other approaches. The following table provides an overview of the methods and frameworks.

Agile oriented methodology	
DevOps	A framework originating from software development which links development and operations change with a focus on automation and monitoring (G. Kim, Debois, Willis, & Humble, 2016).
Holacracy	A management model in which team members self-organize within determined rules, roles and customer demand (Robertson, 2007).

Kanban	A method often used in Scrum to help manage product development processes which entail continuous delivery in a visual manner while aiming to enhance flow and limit the amount of work in progress (Sutherland & Schwaber, 2013).
SAFe	A framework which can be used to apply scaled agility on not only a project, but also program, portfolio, or larger solutions level (Scaled Agile, 2017).
Scrum	An iterative and incremental agile framework with clear roles, short communication lines and development sprints (Sutherland & Schwaber).
Agile project and portfolio management	
Agile portfolio management	A management approach which links an agile project with the overall strategy and tactical execution of other related individual projects (Chin, 2004).
Agile project management	A management approach which focuses on agile team dynamics, tools and measurements for success (Crowder & Friess, 2015).
Conditions agile project management	An approach to agile project management to consider whether agility is suitable for an organization and the relevant project (Chin).
Adaptivity & agile governance	
Adaptive governance	A governance approach in which balancing between adaptability and stability is required while building ambidextrous organizations which embody, accept and address conflicting interests and values (Janssen & Van Der Voort, 2016).
Agile (project) governance	Two conceptual frameworks which focus on the dimensions of agile project governance, such as steering, controlling, system states and laws of interaction (Lappi & Aaltonen, 2017; Luna et al., 2015).
Stakeholder interaction	
Process management & Management in Networks	Approaches which focus on managing the process of decision-making in a versatile multi-actor network with competing, while focusing on the dilemmas at play and factors that support or block change (De Bruijn & Ten Heuvelhof, 2008; De Bruijn, Ten Heuvelhof, & In 't Veld, 2010).

Table 6: Overview of analyzed management theories and frameworks

3.3 Embedded single case study

The research uses a single case study which provides the possibility to go in-depth in one case to explore potentially relevant aspects. The single case serves neither as a critical case, which is used to test specific propositions of a stated theory under the right conditions, nor as an extreme or unique case, which would be applicable for rare events or situations. Rather, it serves as a revelatory case: to provide insights into a case in a manner which has not been done before even though it entails a rather common phenomenon (Yin). Furthermore, the case serves as an embedded case study design, in contrast to a holistic one, since it does not examine "only the global nature of a program or of an organization" but explores further subunits such as the different levels ranging from organizational to individual level and a wide variety of other units "such as meetings, roles and locations" (Ibid, p.41-42). A disadvantage of the embedded case study design is that the analysis can become vague when there are no specific sub-units to be identified, or when the link between the units are not clarified in the research. Since the case and research at hand do have these clear sub-units, related for instance to management, teams, roles and events, and the analysis links the findings on different levels this disadvantage does not provide issues for this research.

The case used in the research unfolds in an executive public sector organization which provides a crucial role in performing public services in the Netherlands. The organization has clear bureaucratic characteristics of the public sector: complex organizational structures with general centralized hierarchical control, presence of deadlines given the implementation of legislation, red tape, and clear ties to a political organ. The organizational portfolio consists of rather big IT projects while its project failures are often placed under political scrutiny. The organization generally does not outsource its activities to third parties but embodies the necessary departments and technology to perform all activities in-house. The department involved in the research, similar to others in the organization, uses the SAFe framework which is also included in the theoretical study of this research. This entails that agility is scaled up from a team level to the program with a tendency to adapt the portfolio level too. The department has two different Agile Release Trains (ARTs) which are organizational structures that include multiple agile development teams and roles under one program. More information of SAFe and ARTs can be found in Appendix A1.2.5. One of the ARTs has been performing for a longer period of time and is currently in its sixth PI event (approximately 1.5 years) while the other is currently in its first PI, finding itself rather long in the preparatory phase P0 at an earlier stage. While the ARTs are placed in the same department they handle different value chains and have little to no

interaction at the time of the research although this might be changed in the future. The department proved valuable for the research given multiple reasons. Firstly, the use of two ARTs in one department allowed for two examples which increased the richness of qualitative data and allowed for comparison and reflection since they still embodied different type of developments and had to cooperate with different stakeholders and users. Secondly, the management of the department itself illustrated keen interest in research that would provide insight into increasing control over the two ARTs as it was clear that the process and development previously had not gone as desired and had to a certain degree been changed for the better through multiple mechanisms implemented the receding months. The case therefore provided insight into problems the ARTs were facing at the time of the interviews and the times before, while simultaneously bringing information on the use of control mechanisms in practice. That an internal analysis on the ARTs' performance was conducted parallel to this research further illustrates the topicality of the case.

3.4 Interviews

The research used interviews to retrieve the required qualitative information from the single case study as it provides a valuable research instrument to retrieve specific information to enhance the understanding of an "investigated phenomena" (Alshenqeeti, 2014, p. 39). While it is clear the sought for information focuses on desire for control and control mechanisms there is already a certain guidance for structured questions. Since, however, the enquiry is from an exploratory standpoint in which the questions are not boxed into certain categories, such as the ones identified from the theoretical study, structured interviews would prevent retrieving potentially unexplored information. Therefore, semi-structured interviews were conducted. This provided the interviewer the possibility "to probe and expand the interviewee's responses" (Rubin & Rubin, 2011, p. 88)**,** while using a basic checklist to ensure the required information regarding control is retrieved (Berg, Lune, & Lune, 2004).

In total the author held 17 interviews with the main questions focusing on the desire for control, aspects of the agile process that were not under control and the mechanisms used to enhance control. Appendix 2 presents further information about the questions asked and the interview protocol. Appendix 4 includes the interview transcripts for the 17 interviews. For two of them, the interviewees did not provide consent to be recorded. Therefore, overall statements made during the interviews are included for these two. The interviewees were chosen to provide a representative image of the different roles within the two ARTs. This entails that roles

belonging to both team, program and portfolio level were interviewed, and roles distinguishing the business and technical side were included.

Role	*ART 1*	*ART 2*
Manager	X	
Controller	X	
Epic Owner	X	
Business Owner	X	X
User	X	
Product Manager	X	X
Release Train Engineer	X	X
Lead Architect	X	X
Specification team member	X	
Product Owner	X	X
Scrum Master + Team member	X	X

Table 7: Roles interviewees of ART1 and ART2

3.5 Thematic coding

To ensure that the interviews are used to their utmost potential, the interviews are fully transcribed and analyzed through extensive coding. For the analysis, the thematic network approach was used. This serves as a valuable method to conduct analysis of textual data by coding and creating themes and their interrelations on a multi-level basis (Attride-Stirling, 2001). It therefore assists to "explore the understanding of an issue or the signification of an idea" (p.387). The identified and newly discovered presence or absence of control mechanisms can be considered as basic themes. These are grouped in organizing themes to illustrate how these factors together lead to a certain phenomenon. The global theme in the research relates to control over the agile process while organizing themes relate to identified control clusters and the desire for control. In general, the codes are listed as either contributing to increasing of control or to losing control. This dichotomy helps distinguish between identifying both enhancing mechanisms and problem areas which require further mechanisms.

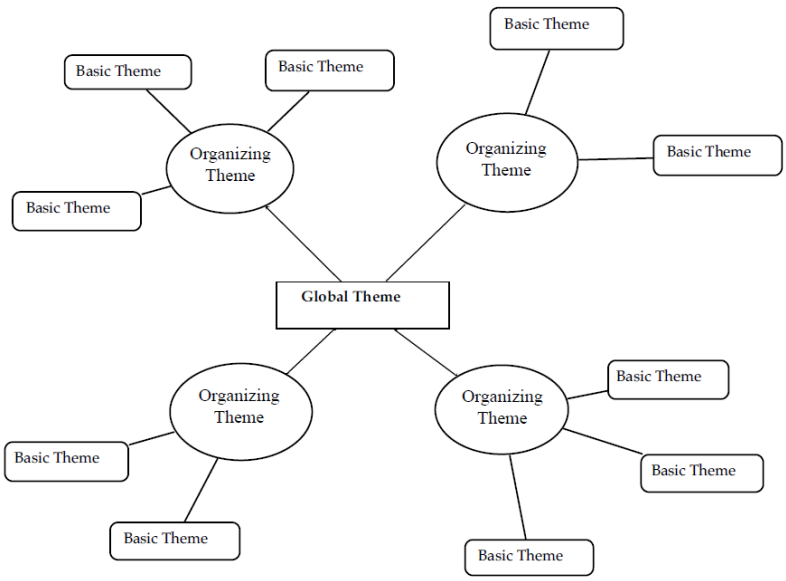

Figure 8: Overview of a thematic network from Attride-Stirling (p.388)

3.6 Validation

A theoretical disadvantage of using a single case in contrast to multiple cases is that validation of the results would be greater given the comparison between cases within the initial case study. Yet, multiple cases would have limited the author's availability to go in-depth which is why the single case method was chosen. To ensure, however, that validation of the result was still performed, the author conducted three focus group meetings with staff members of two executive organizations in the Dutch public sector, one of which being the Social Insurance Bank, on their use of agility to discuss the findings. The validation served mainly for two purposes:

1. Considering the implications of public sector characteristics on control over the agile process
2. Analyzing the applicability of the recommended control mechanisms

To ensure the focus groups provided a representative image of the different roles and departments involved in an agile process, the focus groups included people from both IT and business.

Sociale Verzekeringsbank ('Social Insurance Bank') Executive Institution for the Ministry of Social Affairs and Employment)

After having tested agility with one agile team about five years ago and terminating the experiment when it appeared the non-agile environment did not allow for agility this organization started about a couple years ago with a reintroduction of agility throughout most of the teams in the organization after targeted training and education on agility and has for about a year been working with an own SAFe-based methodology to scale their agile practices. By focusing on one of the value chains the organization provides an interesting validation point as an organization which has similar characteristics to the case study regarding the current implementation of agility yet through a different trajectory and thus control mechanisms.

At this organization two validation sessions were organized in which the research findings were discussed. In advance of the sessions a document with the main observations was shared with the participants which stood at the center of the discussions. In total eleven staff members participated including the Director of a service, Program manager, Portfolio manager, Scrum Masters and Product Owners.

Organization 2

This executive institution is one of the main national executive institutions in the Netherlands. It started its implementation of agile on a lower scale by initially only focusing on functionalizing the specification of requirements in an agile manner. It is about to scale up its agile processes to the program level and to have development teams run according Scrum as well in 2019. Therefore, the organization provides a suitable validation given the experience it already has with implementing agility in the specification phase, while simultaneously serving as an example of testing the applicability of the prescribed control framework for an organization in the beginning of its agile expansion.

At this organization one session was held with a manager, representative of a cluster of programs, a delegated process owner and a senior adviser.

3.7 Place of methods and analysis in the report

The following figure indicates how the theoretical study, case study, validation and Revised Levers of Control framework are used within the research and report.

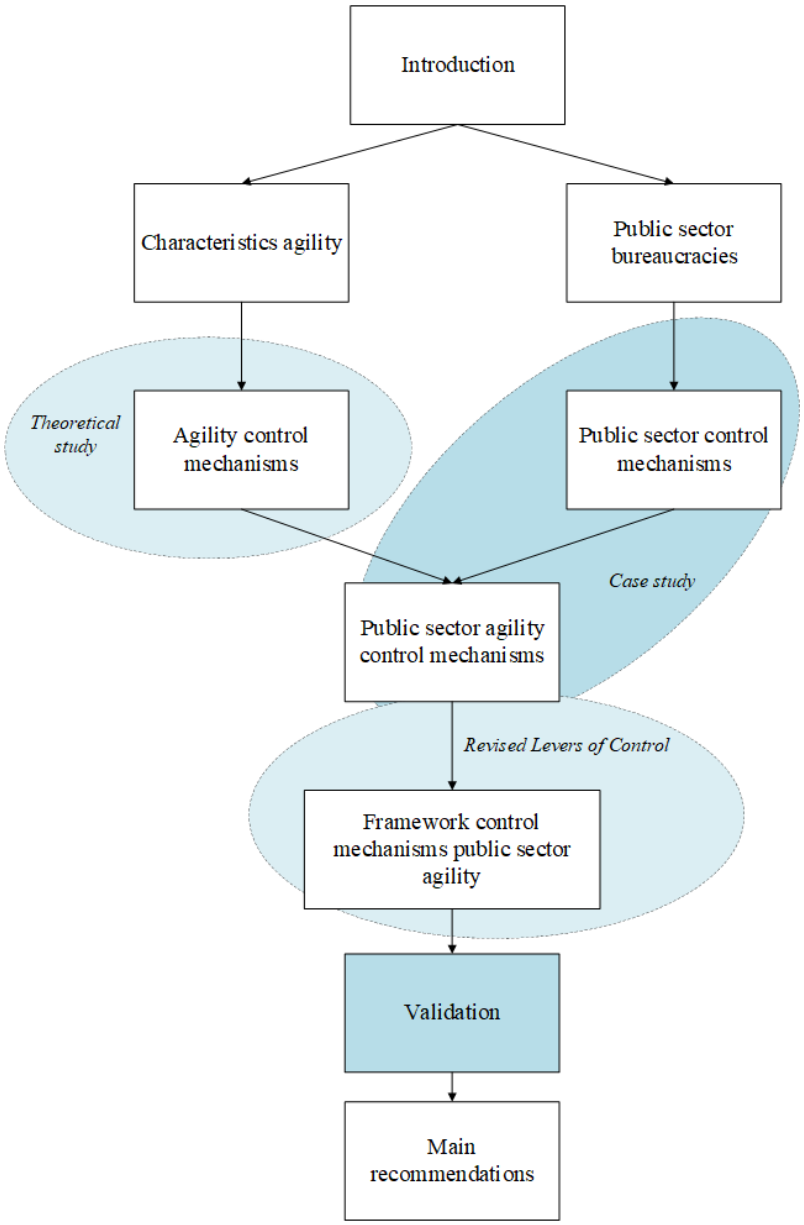

Figure 9: Place of theoretical study, case study, analysis of control mechanisms and validation

3.8 What comes next

The next chapter presents the control mechanisms inherent to the agile process which were retrieved through the theoretical study.

Chapter 4 Potential control mechanisms from theory

This chapter provides an overview of the findings from the theoretical study regarding the control mechanisms which can be identified in the various methods and frameworks stated in paragraph 2.4. The following paragraphs summarize the main findings categorized into the ten clusters of control mechanisms. The complete analysis can be read in Appendix 1.

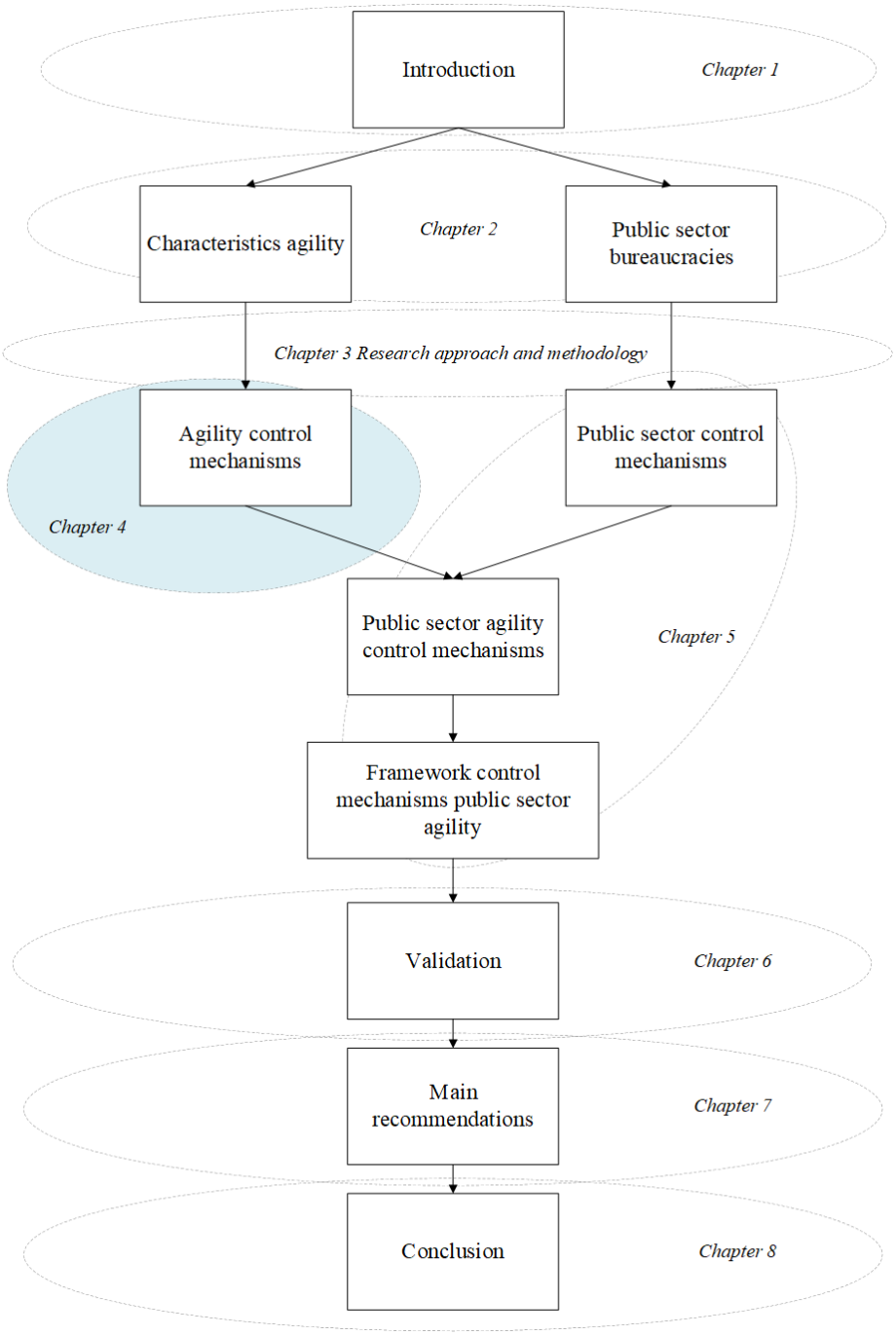

Figure 10: Structure of the report

4.1 Overview of the identified control mechanisms

The identified control mechanisms can be categorized into different clusters which fit. The following segments give an overview of each of the clusters with its relevant mechanisms, while simultaneously indicating from which method or framework they have been retrieved.

Agile leadership

Agility requires a certain kind of leadership to accommodate agility's specific characteristics. Especially agile project management comes with specific points. An agile manager should have specific **agile skills**: be diplomatic, communicate effectively, be a good listener, and an analytical thinker. Furthermore, the manager should create an **environment of trust** which also stimulates diversity, inclusiveness, learning, mentoring, critical reflection, and creativity. With special regards to self-organization, the manager should also **prevent and eliminate dysfunctional elements** such as absence of trust, fear of conflict, lack of commitment and absence of focus. Lastly, the manager should **motivate** people in all levels in the organization (SAFe), for instance by celebrating quick wins (agile governance) and should set a good example and **promote accountability**. While these are perhaps not leadership skills that are now in the world of project management and can also be desired in traditional waterfall structured projects, the need for them increases when applying agility.

Agile mindset

There are a couple other factors that are important to keep in mind to be effective and act 'simple', as agile requires. Holacracy prescribes that one should **only focus on tensions that arise** and go for **workable solutions**, not the best, given the changing environment and required speed. Adaptive governance warns mature and bigger organizations to **balance between adaptiveness and stability** to not create instability, while agile governance calls for the need to **combine the drive for agile with business incentives** to ensure one does not block the other. Also agile project governance states this **tension between technology and business** should not be taken for granted but should be cared for.

Collaboration and feedback

Collaboration is crucial for agility since it relies on interaction and feedback. A mechanism which resonated through multiple frameworks is that of a **shared language** (Scrum, Holacracy, agile project governance, agile project management). Specific concepts which should be defined are, for instance: a definition of done (Scrum), independence, interdependence, and

self-organization (agile project management). SAFe even states the **common solution vision and mission** should be stressed to facilitate alignment in collaboration. To further ensure overall organizational alignment, DevOps calls for **collaborative development** between the development and operational departments, while SAFe, Scrum and agile project management also require **formal events for feedback**, including daily stand-ups. Further mechanisms for alignment and cooperation can be found in the feedback provided by **linkage** in Holacracy where the feedback process is formalized into rules and roles (lead link and rep link), while adaptive governance generally calls for the need to **facilitate bottom-up information provision**. Holacracy furthermore presents **integrative decision-making** as a tool to be used to ensure collaboration and transparency. DevOps and agile project management furthermore call for creating an **environment of trust** to facilitate the transference of individual knowledge to the team and organizational level and enhance collaboration. Collaboration also needs a **team room,** although agile project management also calls for the need to have space for team members' **privacy**. It also prescribes that when agile teams are distributed over a geographical area, they should still be **assembled** at the start (2-6 weeks), and later on in the project and have their communication facilitated by **communication tools,** such as Skype, videoconference, or even phone calls. Furthermore, agile project governance and agile governance specifically state the need to **educate and train employees** throughout the organization, also the higher management and board, on the principles of agility and this new way of working.

Continuous change

Change is an important aspect of agility as it relates to being adaptive. The process of change, however, does not just occur as desired out of the blue. Scrum, Kanban, Holacracy, SAFe and agile project governance all call for **continuous estimation on empirical data and adaptation**. This relates to both the product and sprint backlogs, but also general progress and resource availability and needs. Furthermore, agility requires the use of **agile EVMS** to incorporate the influence of uncertainty, for instance on team membership and software defect volatility. Kanban furthermore provides specific instructions to **measure flow and keeping it stable** by measuring the WIP, SLE (in % and days), cycle time, throughput and item age. To add transparency in the process and stimulate creativity, it also prescribes to **visualize** the flow. There is a slight distinction in the aforementioned approaches and agile portfolio management which considers detailed measurements rather cumbersome in time and therefore prescribes **top-down and bottom-up abstract estimations**. Only when these differ, more detailed estimations should be made to find out what the exact progress is and what resources are used

and required for this. Agile portfolio management demands this, since it considers the **portfolio**, of which there should only be one, to be **continuously adapted** to the business and environment of the organization.

Events and procedures

Agility itself does not provide specific formal events, but agile affiliated methods each come with a set structure of formal events with clear procedures. Most emphasis is placed on sprints, as this is where the development mainly happens. Scrum calls for **structured formal events** in its sprints for planning, execution, review and retrospective while SAFe states this should be performed on **all levels** which should be coordinated. Sprints preferably have a **stable time** and are not **too long** (30-45 days) according to SAFe and agile project management. Else the reviews will not be effective anymore and there is an oversupply of information to stakeholders which hampers the feedback process. There should also be **daily-standups** according to Holacracy and Scrum to facilitate the day-to-day interaction. Sprints can be **changed** to accomplish their goal, and even **cancelled** when the goal cannot be achieved anymore; the latter is to be avoided as it can be traumatizing for teams. Holacracy and Scrum call for **strict procedures** for separate events for efficient use of time. The former also states the need for a distinction between **tactical and strategic meetings** and includes **special-topic meetings** on issues which did not fit the formal events content or time wise.

Organizational set-up

While agility prescribes self-organization for teams, it does not in itself provide recommendations for how the organization as a whole should be shaped. DevOps calls for **distinctive paths for development and operation** even though there is frequent collaboration, while SAFe states the agile processes on **each level should be considered as different structures**. Holacracy and agile governance state that control mechanisms and changes made should **relate to the organizational context** and **requisite organization.**

Portfolio and budget

Agility should not be performed outright without assessing whether a project is suitable or not for an agile method. Agile project management shows that agility **requires a presence of uncertainty**. This can relate to internal uncertainty regarding team creativity and external related to scientific, market and business uncertainties. Furthermore, the **organizational set-up** preferably allows for agility. A short-term multi-organizational project without a strong prime

contractor does not allow for common objectives and creation of an agile culture. In these cases a more traditional approach is likely favored. After this is assessed, the business case should be adopted to agility's needs. Given the adaptive nature of agility there is a different approach to how the budget should be performed. Furthermore, just that agility embraces learning and accepts uncertainty, does not mean that it should not use the information available at the outset. According to agile project governance, the **business case should be complete** which entails that it considers the stakeholders, goals, budgets, and specifications of the to be developed product or service. With regards to the budget, **pre-project fixed budgeting should be avoided,** especially when the specifications are not yet stated, while the budget should focus on **objectives and values** which stand at the core of the project rather than time and motion from a traditional EVMS approach. SAFe states that **financial constraints should be set on the highest level** possible which should then trickle down to the specific functioning of the project level.

Teams and roles

Self-organization, an important aspect of agility, does not mean a free-for-all approach. Clearly defined **rules and roles** are recurring concepts in the analysis. For Scrum this relates to a distinction between Product Owner, Scrum Master, and the development team. SAFe even defines these roles for the three different levels and also includes the distinction of the operating or developing team and two further separate roles: one for setting up the architecture of the development and one for being responsible for 'content' of the developed product and its increments. With regards to the development/operation team, it is noted by agile project management and agile portfolio management that even though agile teams should be responsive to change **team membership should be kept stable**. For Holacracy the distinction between the roles provide clear accountability and authority for control. It also names a separate facilitator (similar to Scrum Master) and **secretary** for each team meeting. When it comes to stakeholder involvement the literature also brings interesting notions. SAFe calls for **one team** involved in **customer interaction**, while agile project governance even proclaims this should be **one person** (product manager) to avoid unnecessary complexity. Process and network management even say there should be a distinction between the **architect** of the stakeholder interaction process and its **manager**. Holacracy goes further by mentioning that the **board** of the organization should represent the different stakeholder interests.

Technology and tools

Even though each agile project has its own characteristics, there are still common characteristics which pave way for general recommendations on mechanisms to be used. Agile project management for instance calls for the need to have a **systems and software architecture in place early on** while adaptive governance simultaneously warns to **prevent path dependency** and **use flexible infrastructure**. To manage the development of increments DevOps recommends **Build Tools**, while **Continuous-Integration Tools** serve to continuously integrate increments into the existing product while testing it. In general, there should be **continuous and automated testing and deployment** which can be applied anywhere in the system (DevOps and agile project governance). When it comes to measuring the specific impact, **logging and monitoring tools** should both be used in combination with **survey data** to enhance the learning process and gain a complementary holistic picture (DevOps). Orchestration technologies can then be used to ensure that the deployed increments ensure complementary functioning (DevOps). Finally, a **Collaboration Framework** which integrates all the tools can be used to provide a complete image of the data at hand (agile project management). With regards to the functioning of teams, **productivity tools** which foster innovation, collaboration and creativity should be used, while **communication technology** is useful to facilitate interactions in teams that do not work in one single place.

User and stakeholder involvement

As stakeholder, and especially customer, interaction, is very important in agility it should come as no surprise that multiple frameworks call for the need to receive information from stakeholders. In general, the idea is to receive continuous feedback on **data-sharing** (DevOps) or a **system/solution demo** (SAFe). To ensure that stakeholder feedback is used to its full potential, SAFe envisions stakeholder feedback in **every level**, while stakeholders can even **be part of the organizational structure**. Holacracy, as its team functioning is rather closed off, however, mainly envisions the stakeholder interaction through **board membership** which should reflect the actual stakeholders involved. Agile project governance, next to stressing the need to identify the **right customer**, calls for a systematic approach to identifying and engaging with stakeholders to which network and process management bring interesting insights. Firstly, the **selection of partners** should not only focus on the *power* of such actors but also their potential contribution to *substance*. It should furthermore be remembered that these actors have strategic interests and objectives which should be aimed to be understood through **continuous actor analysis**. To facilitate the participation of stakeholders and increase their **trust**, the

process of interaction should be **fair** by obeying to agreed *rules of the game* and respecting parties, *core interests,* and there should be a **sense of urgency**. Furthermore, there should be **progress**, or at least the perspective thereof, by creating *quick wins* and using *windows of opportunity*. By considering the development process as a **multi-issue game**, the agenda can be altered to achieve these goals and **framing** should also be considered as a tool to be used. Finally, to ensure cooperation towards a common goal, there should be **negotiated knowledge**: a shared understanding and interpretation of the problem at hand.

4.2 What comes next

This chapter presented the main findings regarding control mechanisms relevant to agility which were identified in an extensive theoretical study. Appendix 1 includes more information on the analysis and further mechanisms. The following chapter will discuss the case findings in which the correspondence and discrepancy between what theory prescribes and practical public sector agility requires according to the case is included as well.

Chapter 5 Potential control mechanisms from the case study

This chapter discusses the case findings and presents the implications for control over agile in the public sector. First the similarity between the findings from the theoretical study and case study are discussed to illustrate the applicability of the former for practice. Secondly the chapter discusses the discrepancy between theory and practice to illustrate where the former falls short and what can thus be learned from the case study when it comes to the influence of public sector bureaucracy characteristics on the agile process and how this affects the required control. Then an analysis of the characteristics of the control mechanisms given the Revised Levers of Control framework is presented.

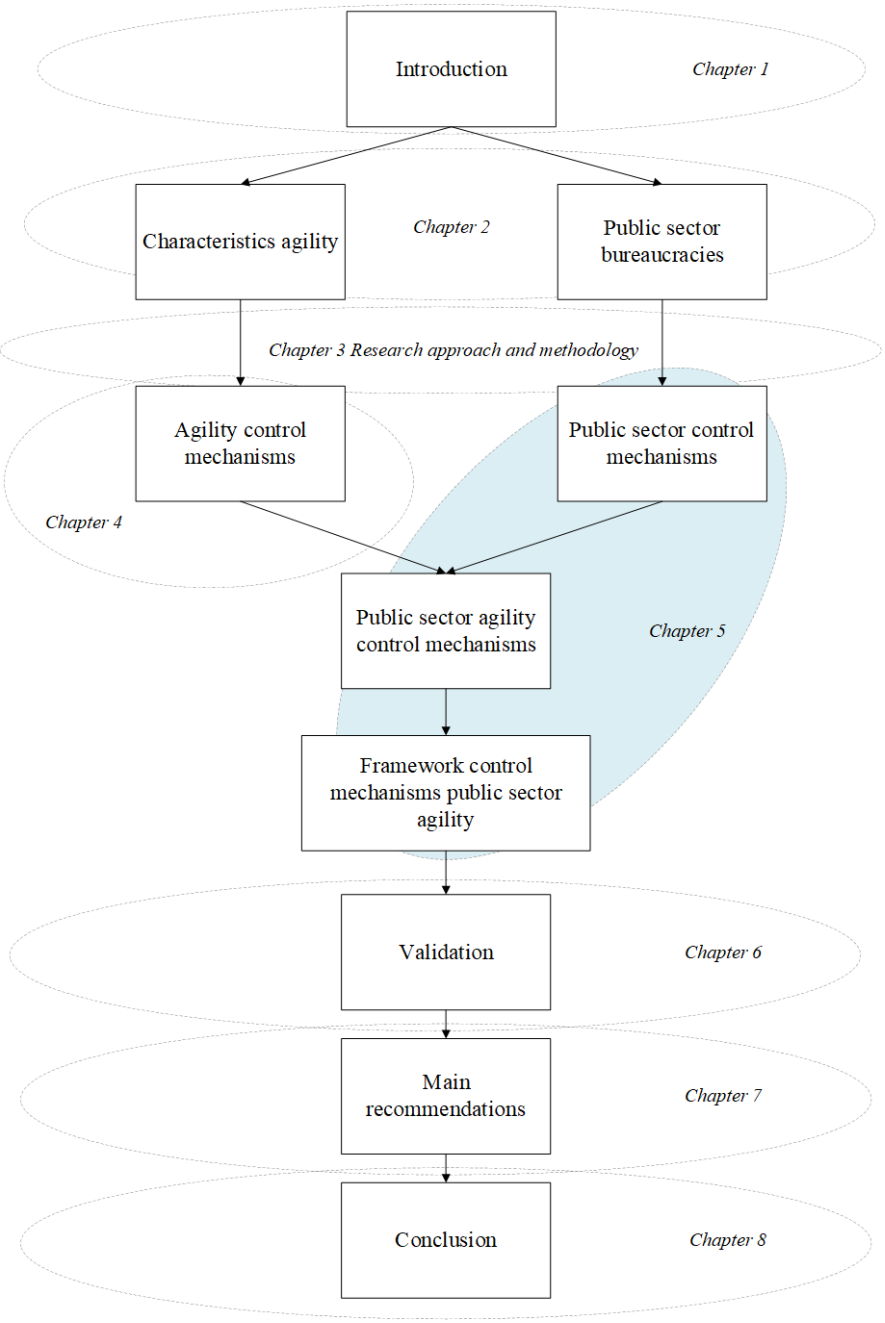

Figure 11: Structure of the report

5.1 Bridging theory and practice

The case study provided clear links to the findings of the theoretical study when it comes to control mechanisms to be used. All identified clusters from chapter 4 were present. From the similarity between the theoretical findings and practice one can already state that agility in the public sector has a clear connection to what theory prescribes which is promising for its use within the public sector. The complete analysis can be found in Appendix 3 while this paragraph provides some important insights related to events and procedures and teams and roles. These two categories were chosen given their importance within the agile process and they furthermore indicate how the theoretical findings correspond with practice. For events and procedures this chapter also indicates the identified codes which stand at the core of the analysis to illustrate how the analysis was performed. The complete analyses with codes can be found in Appendix 3.

5.1.1 Events and procedures

Increasing control	*Losing control*
Agile elements in place	Business influencing timing and structure events
Agile events	Business not invited
Agile events prevent mistakes	Different cadence leads to uncertainty
Agile events prioritizing	Different cadence teams
Agile planning on non-SAFe teams	Difficult planning PI due to agendas
Inclusive PI events	Diverging from sprint planning
Insight into agile events helps when to visit	In the beginning time is rather short to finish all tasks
	Lack of content discussion in events
	Lack of participation events team members
	Sprint planning difficult with vague specifications
	Too much according to the book counterproductive

Table 8: Codes related to the cluster events and procedures

From the interviews it becomes clear that **agile events** clearly add to control over the agile process. Inclusive agile events enhance cooperation and communication while preventing

potential mistakes or miscommunication and can even be used for the prioritization. It also appeared that the **agile events** can work on non-agile teams, which was the case with one waterfall team which was part of one of the ARTs. Yet, some issues were identified which hamper the control over the process. Firstly, certain representation of the business and users were not invited to the events in the beginning and only joined at a later moment, while their input in the beginning could have been valuable. Events thus have to be **inclusive** which does not only mean the relevant persons, such as business owner, can be present but that they are also invited. The business is now increasingly participating and it is now even coming to a point where it starts to influence the planning and agenda of the agile events. While it is in general difficult to plan the events given peoples' busy agendas, this new influence does not fit the facilitation of teams. Even though management and business should be part of the events their set-up should always look at whether it is **team facilitating**. Linking events between ARTs to make it easier for management while this provides unnecessary events for the agile teams is therefore not desired. Teams should also keep themselves to the sprint planning and there is a challenge in having **all team members participate** in the events. It still occurs that members do not join events or when they do spend their time coding rather than listening and discussing. Furthermore, there is sometimes a lack of **discussion on content** in the events but are rather update sessions. Both phenomena indicate that the frequency of events is likely too high which decreases efficiency and delays the process. Teams in the case, for instance, ran on two-week sprints while theory prescribes **sprints of 3-4 weeks**. In the case, it became difficult for teams to reach their sprint goals given small delays of a couple days due to interfaces. Short sprints furthermore lead to less progress as the chunks of work are too small which in the end requires more time. When teams also do not run on similar **cadence**, the planning and ease of interaction with interfaces becomes even more problematic. Lastly, to be able to perform planning in the short-cycled context of agility teams need to be predictable. This includes the mechanisms already present in agility such as **stable membership of teams** and **agile metrics.**

> *"To go to [office location] and visit the PI's we reached a lot of insight into the process which gave a clearer overview. Clearer to see when to jump in and influence more by describing what the business wants" (Program level employee)*

> *"You also have ICT staff that is not always open to cooperation and would rather code than be in a meeting while these meetings can give them a lot of background information*

for their work, but to involve them in that and show it that they see the added value, there is a lot of work in that" (Team level employee)

"You notice it becomes more of a progress meeting where we tell the RTE about the progress we made. Then I think to myself it is not supposed to be a progress meeting but rather coordination [between teams] on is there something changing, something we need to take into account, does our progress impact you." (Team level employee)

"Also with the Product Management meeting with 15 Product Managers, but this is more an update session than a joint discussion and prioritization." (Program level employee)

5.1.2 Teams and roles

The teams in the ARTs are rather small with around 5-6 team members while tasks are rather specialized. Teams membership was rather instable as changes were made which hampered the progress since every time the team needed to re-find its balance. **Stable team membership** is therefore a clear control mechanism which aids the agile process as it makes performance more predictable which is required for planning. It is a general issue in the organization that team staff is decreasing while its demographic is rather old, which can become an issue the coming years. The water head structure, with more people in management than in development teams is also a worrying aspect to take into account when agility is supposed to "bring power to the teams". Given the troubles in the employment of team members and difficulty on the job market it is furthermore worrying that team members can be unhappy and worry about their task security. It is important that the organization changes its approach towards teams and **invest in capacity and skills**. Especially because the hiring of external staff is not particularly desired for short term given the time needed to train them, their lack of knowledge about the organization, and lack of future knowledge capturing. When possible, **internal staff** should therefore be used and in case only external is possible that **knowledge transferring** is facilitated.

The agile roles are mostly filled in, although the performance would benefit from **full-time** Product Owners, Product Managers and Scrum Masters. Furthermore, there is currently a lack of business affiliation and product ownership in the Product Owners and Product Managers roles since the required knowledge already was not present at the time of implementation of agility. In one of the ARTs, however, the Product Management strongly deviates from what

theory prescribes as it consists of about thirteen persons with one relatively inexperienced Product Manager in the lead while it is preferred to have **one or two Product Managers** with vast experience and knowledge of the organization, to be developed product, and knowledge of the technology and business side of the program. This ensures that there is a single point of communication with the stakeholders and users which leads to the bundling of knowledge and that, furthermore, authority over the Program Backlog is concentrated. A recurring statement on roles which was also repeated was that certain roles, such as Product Owners and RTEs, are performed by previous project managers which have a tendency to fall back to their old roles which can hamper the team facilitating mindset and decentralization of agility while creating uncertainty. **Clear description of roles, tasks, accountability and responsibilities** are needed while the Scrum Master and RTE are supposed to ensure people act within their roles.

> *"Stable teams are very important and I see within the train, with [interface X] that they like to change that and very easily say we will completely reassemble all teams. Then you lose everything, you lose a part of your knowledge, your velocity, teams need to get used to each other again and you lost another three months" (Team level staff)*

> *"We sat together with ten people to discuss what the role is of an Epic Owner and a couple hours later we decided we have to look at what his good for supporting the Business Owner and let's say that is his role and that is it. It is not really tangible. Am I only the driver of the car or do I need to replace tires, put gas in it, wash it, what should I do? There is a lot of unclarity and everyone even thinks they know everything." (Program level employee)*

> *"So it has to be better under control who has which responsibilities within the train between [two departments], there is a lot of fuzz on the line." (Program level employee)*

5.2 The discrepancy between theory and practice

After the coding and analysis of the interview transcripts two conclusions could already be made. Firstly, the prescribed control clusters as mentioned in chapter 4 were all present regardless of the intensity with which they were used or desired. Secondly, the case highlighted new organizational themes as control clusters which were not identified in the theoretical study. These themes are related to the following points:

1. The **interaction with interfaces** which increases the complexity of agile process.

2. The need for **planning** and the implications this has on performing control.
3. The difficulty of the **specification** of requirements which is rather different than what the business is used to in waterfall projects.
4. The need for clear **visions** that provide insight into:
    a. The current and future desired functioning of *agility* in the organization and departments
    b. The *specification of requirements* and their *prioritization* by setting direction on to be developed products
5. The **interaction between agility and top-down waterfall structures**

The following paragraphs present the findings for each of the five newly found concepts. The original control clusters of chapter 4 were also identified in the case study and can be used as recommendations. As the clusters sometimes interact mechanisms of these clusters are also discussed. The detailed analyses and recommendations can be found in Appendix 3.

5.2.1 Interaction with interfaces

One thing that was very present in the case study, in contrast to the theoretical findings, was the presence and importance of interfaces with other system applications, departments, or development teams. The dependencies with interfaces are so present since the value stream in public sector bureaucracies is in general cut up over different departments and systems. These interfaces can play an important role in the agile process as they allow for more flexibility and can increase speed but from the findings of the interviewees it became clear this process is currently not under control. Development teams can suffer delays due to interfaces, either because they are dependent on them or they have to change their planning to facilitate other projects or updates. This process thus becomes problematic given the lack of agreements and transparency and can lead to delays and technical or functional debt. This can, however, largely be avoided through making **agreements with the interfaces** and **plan interactions** beforehand to smoothen cooperation, by anticipating upcoming changes in development of interfaces, discussing prioritization with interfaces and also understanding why delays occur in the first place. This will not only help the planning, but also adds to the trust between departments, managers or teams involved in interfaces.

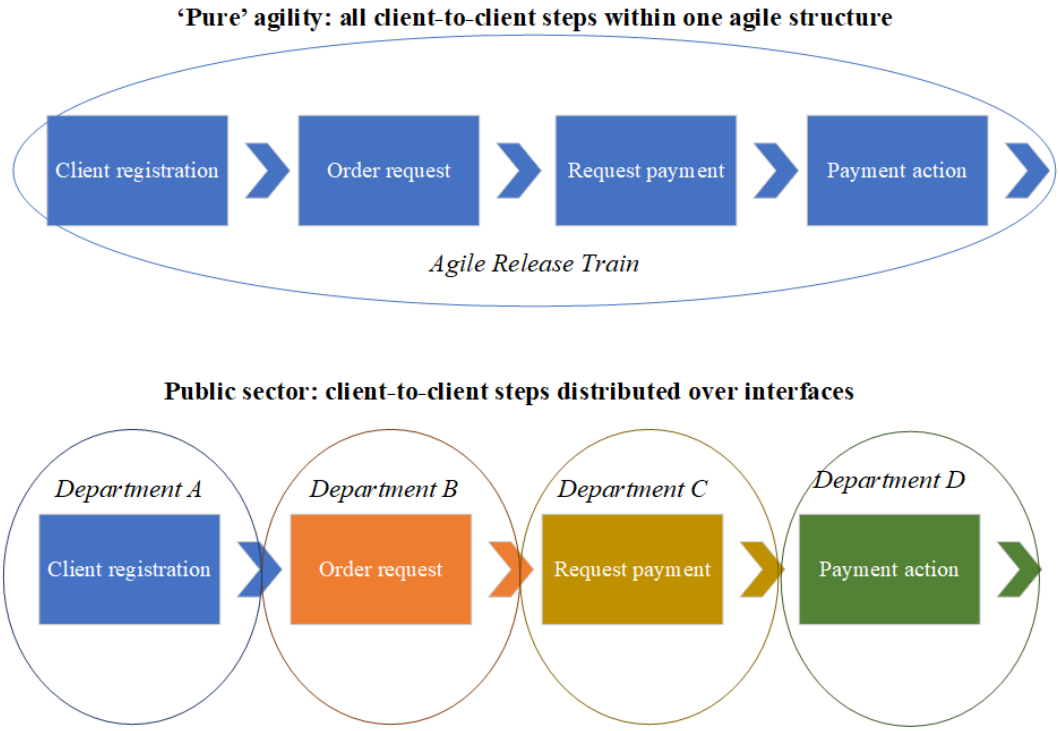

Figure 12: Simplified example of interfaces dividing the client-to-client process

"[Department B] knows where it is heading and also wants to make a big transition like we are doing with the renewal. There we have the agreement of 'okay fine, that is good plan, but then after January 2021'. These kinds of agreements you make to prevent that in case they do it earlier that it goes wrong and then you have a risk on your project" (Program level employee)

"These parties like to cooperate on that [making agreements and planning] they encounter their own issues too. So meeting together once in a while to see how to make the process go smoother and easier, but it just goes slow, you would like it to go faster" (Team level employee)

5.2.2 Planning and delivering on deadlines

From the interviews it became clear that planning is difficult, especially in the long term, given the short-cycled development in agility which only gives clarity over the next 2 PIs (about six months). However, given the portfolio of the organization to implement legislation at a certain date there is a strong focus on deadlines and time pressure to deliver business value even though this becomes more challenging given the big size of projects. Planning furthermore becomes more difficult when there are changes in staff capacity, when staff members are inexperienced

or sick, or when there are dependencies in interfaces. The presence of **technical debt** also influences the planning so this should be **measured and included in the planning**. Furthermore, because the development is so short-cycled, small delays can have a lot of impact. To increase control over the planning capability, risks should be brought to the forefront of the project where **interfaces should be identified and planned** when possible, even though the exact content of the task is not yet known. Taking this in mind, one interviewee mentioned how waterfall used to be better with risk management and planning regardless whether it delivered better content. Furthermore, planning becomes easier when tasks are narrowed down and have clear WSJF values as agility prescribes but the sprint length should also fit to ensure specification is not too burdening and small events do not bring substantial delays. Agility also indicates that one can and likely should divert from the initial planning. Therefore, a **spring length** of 30-45 days. When dealing with deadlines regarding legislation the general mechanisms agility offers should be used: an overview of features which create the **MVP** should be included in the program backlog along with the required function points. In large projects creation of a **road map** can help to indicate which parts should be ready when. When placed against the performance of development teams an estimation can be made on how many sprints are required to reach the MVP. Agility also asks for **planning of volatility** given unexpected changes. The many dependencies with interfaces in public sector bureaucracies only increase the need to not make planning too tight. Furthermore, a finding from the theory should be used when it comes to **survey data** since there is always a chance that data does not represent all the information available to judge whether a project meets a deadline or not while in the beginning of a project or in the event of team changes metrics are not always that trustworthy. Taking these aspects into account one can make an estimation on whether a deadline is met with. When it becomes clear that this will not happen more **team (members) can be added** to the project even though it will take a couple months to get them up to speed.

> *"Now you have sprints of two weeks and you want to have things finished at the end of the sprint so the things you deliver are smaller, but they still need to go through the whole process including user acceptation tests so there are many phases it has to go through. You didn't use to have that with waterfall where you had 9 months' time to get the whole chunk through the chain and if you then have to wait a day or two then who cares, you have 9 months." (Team level employee)*

"You also have development trajectories and surroundings, there a lot of changes are put through, so also from the infrastructural group we frequently get invites that something has to happen. The past year that has not been managed well which made a lot unexpected and pushed forward which lead to a pile of it which makes it seem like there is a lot of technical debt to be solved and functionality is pushed back" (Program level employee)

5.2.3 Specification of requirements

Agility places rather different expectations at the business when it comes to specifying requirements for the to be developed products. Rather than through a big design up front, the specification is provided in smaller chunks, especially when working with Scrum principles. Epics, features and user stories need **clear hierarchical definitions** to guide the specification process and provide workable input for teams. The case illustrated that this specification is so complex that typical SAFe roles such as Product Managers and Product Owners could not do this specification by themselves given the complexity. Therefore, **special specification teams** were created to translate the epics to features and user stories. There is, however, still disagreement on when an epic, feature or user story is specific enough while this debate still continues. To illustrate the importance of clear epics, features and user stories, the introduction of agility in one application shows a suitable example: at the start of the project, specifications were lacking which lead to functional and technical debt the teams are still coping with. The introduction of a specification team assisted in smoothening the specification process, along with downsizing and structuring the requirements. Furthermore, the **sprint length** is again of crucial importance since this determines how the epics, features and user stories should be specified.

"[On complexity of specification] We want to do it well really fast, but it is a totally different way of working" (Program level employee)

"You see that the complexity in the functional side is heavier which means you have to have a lot of preparation before you let your scrum teams work" (Program level employee)

"I think there is something going on. For example, there are Epics but if you really look at it, many of those Epics we would now say those were actually features, so what was

the real Epic? Well that is quite a searching process to get the levels right from Epics to Features" (Program level employee)

5.2.4 Visions: strategy, prioritization and implementation of agility

From the beginning there was a lack of vision on the products that were going to be developed exactly, which was also hampered by the complexity of specification, uncertainty and a tendency not to commit and take decisions high up in management. The current portfolio set-up also does not promote the forming of visions since there is a focus on separate short projects. Together with the presence of deadlines, it is therefore also not always possible to create or implement a vision since projects have to deviate from the desired overall architecture to achieve the desired functionality on time. The lack of vision increased the complexity of the specification process since there was a lack of strategic guidance. This also led to a situation where teams come up with their own architectural template. It appeared that the process of creating a vision was kept rather separated from the team members, while these have extensive knowledge of the systems. The new developments with program plan, business case, charcoal sketch and road map contribute in creating a vision and sharing this with relevant parties. These relate **to process and architectural visions.** This also relates to the organization at large to define a vision on which **legacy systems** should be transformed or even replaced over time. These visions are required for two reasons: firstly, it can enhance public service provision efficiency and fast adaptiveness over a longer period of time and secondly it is required for guidance on **prioritization**. Agility means adaptiveness but especially in the face of deadlines there should be prioritization when it comes to which services or application need to be ready on time. Given the complexity of **interfaces** it is also likely that a certain update or renewal is dependent on developments in another segment of the organization. If the vision and thus prioritization does not keep such interactions into account the prioritization will fall behind technical demands. The vision should therefore include both **business and technology** developments.

From the interviews it also became clear there are different perceptions on how agility is or should be implemented within the organization. Also taking a statement into account that **roles and responsibilities** are not always clear, which lead to delays and miscommunication, and that sometimes deviation "from the book" is required and sometimes not, it can prove helpful to also create a vision document **to specify how agility** and the used methodologies or frameworks, such as SAFe, are exactly implemented within the two ARTs. Also when implementation of agility throughout the organization might be desired full on implementation

of agility might not be. Especially in the public sector certain services need to keep running and performing for the public good. A potential **transition** to agility should therefore also be clarified. While this might not be expected for the whole organization, departments that start with agility can create such a vision to illustrate what the implications of agility are for the interaction with their interfaces.

"With that [creating vision] I also say that I will not do a certain thing and you notice we are very careful with that. Often also with making it more specific, SMART, you have to keep to that then. You can see that we find that very difficult. Especially when you do not know what you want." (Program level employee)

"In the past you could not create vision, then there was money for monitoring, then for financial accountability, well what you saw a lot in projects, and still can, is that then all of a sudden building teams work on financial accountability, but is that then really the most important within the vision? No, but because you do not have a vision it goes from one thing to the other." (Team level employee)

5.2.5 Waterfall and agility

The organization and specifically this department do not fully function according to agility and SAFe. There are traditional structures present in the organization such as other project teams, management layers, the chain tables and even a Prince2 Project Board in one of the ARTs. One interviewee mentioned these are still in place given a lack of trust of the ARTs functioning well enough without further management interventions, which also portrays itself through the **traditional escalation mechanism** in case agreements are not met with. In general, there is still a waterfall mindset at the top and one respondent involved in these traditional structures mentioned most of the participants often do not even know the basics of SAFe and agility. While certain interviewees framed the influence of these traditional structures as negative, one respondent stated that these can also help with clearing up responsibility issues. Next to these traditional decision-making structures, the traditional portfolio management does not support agility and hampers the creation of a vision. As mentioned in the paragraph on planning, waterfall was better at bringing risks to the forefront along with generic **linear planning** which can be used to plan interface interactions more on time. Certain aspects of agility can also be used by waterfall teams as stated by the RTE of the local train, such as the **agile planning events**, although this should not be forced upon such teams. In general, a recurrent element

was that interaction with waterfall structures is very present and will likely persist given the rooted bureaucracy within the organization. Besides, a complete immediate turn to agility is even undesired since agility requires time and care to be implemented next to the presence of deadlines and legacy systems. In the meantime control over the agile process and the performance of the department and organization at large requires a **balancing act** between agility and waterfall. This includes: combining the interfaces between agile and non-agile teams into one planning, indicating which teams and departments work agile or will start to given the required functionality the applications are supposed to provide, and the extent to which innovation and dynamic learning by failure is tolerated to ensure harmony between interfaces. Furthermore, the interviews indicated that **separate management** of agile and waterfall teams is required since the shift to agility is quite a demanding one regarding time and mindset.

"Because both Prince2 and the traditional structure have difficulties with SAFe agile not giving answers to how to deliver the realization of legislation. Legislation is linear… We cannot tell our director or the minister they should go to the Second Chamber to tell them my agile train took longer… Legislation is also that you have to implement it as a whole, you do not have a choice." (Program level employee).

"Waterfall was not all that bad, but then I mean the fact that you made a rough planning and had to give a place to your risks" (Team level staff)

"It is a lot and within [the department] we noticed that it [management of both agile and waterfall teams] is too much, if you want to be fast you need the focus and the concentration and time." (Program level employee)

5.3 Analyzing the identified control mechanisms

This segment discusses the findings of the case study regarding the characterization of control mechanisms by using the Revised Levers of Control framework from paragraph 2.2. The complete analysis of the characteristics of the mechanisms is to be found in Appendix 3.

Concept	Definition
Strategic/operational	Does it relate to the operational or strategic aspects?

Performance/boundary	Is the objective of the mechanism to create and enhance performance or is the end goal to comply with regulation or standards?
Social/technical	Is the mechanism based on social aspects (i.e. values and norms) or technical (i.e. rules and procedures)?
Diagnostic/interactive	Is the mechanism used rather continuously or only when there is a specific need to?
Enabling/constraining	Does the mechanism enable creativity and flexibility, or does it increase predictability and reduce options?
Reward/punishment	Does the mechanism provide a reward or punishment?

Table 9: Characteristics of the Revised levers of Control

5.3.1 Characteristics according to the Revised Levers of Control

Controlling agility requires strategic vision next to operational control

Many of the mechanisms relate to the operational agile performance which is not a big surprise given the importance of operational adaptiveness in agility. Interestingly, however, there are many mechanisms with a strategic nature. This indicates that even agility, regardless of its strength of dynamic operational learning requires clear strategic decisions and dedication. This is perhaps strongest showcased in the need for a vision on the product to be developed which might sound counterintuitive for agility but is required to deliver certain guidance to development.

Strategic	Operational
• Create a vision on the to be developed product (business case, road map) • Ensure the required knowledge and skills for agile roles are present in the relevant departments • Adapt the portfolio to facilitate agility (multi-year budgets and team stability)	• Have sprint lengths of 30-45 days • Ensure teams have similar cadence • Roles, responsibilities and tasks should be clear and kept up to date • Use WSJF for prioritization

Table 10: Examples of strategic and operational mechanisms

Controlling agility entails that complying to regulation is mainly embedded within the agile process

While most of the control mechanisms relate to the performance of the agile process only a couple relate to complying to regulation or standards. Adherence to regulation should be embodied in the process through the roles and responsibilities and specifications of requirements. The only clear compliance mechanisms are associated with guidelines which new development should follow, reporting standards and portfolio set-up.

Performance	Boundary
• Measure flow and keep it steady • All relevant parties should be invited to the events • Define a shared language (business and technology, team and management layer) • Ensure teams have similar cadence	• Create and use automisation tools for guidelines • Provide regularity in reporting standards for different departments • Adapt the portfolio set-up to facilitate agility (finance on program level, multi-year, ensure team stability)

Table 11: Examples of performance and boundary mechanisms

Control in agility about both changing mindset and promoting values and following procedures and rules

Both social and technical mechanisms are identified in the research. This illustrates that the implementation of agility is not just a mindset but comes with its own inherent rules or procedural control mechanisms dependent on the methodology or framework that is used. This also indicates that control can be lost when the rules and procedures are not clear or abided by. The following table presents some examples of important social and technical mechanisms.

Social	**Technical**
• Stimulate the agile mindset (workable solutions, decrease fear of failure, just begin) • Use framing to increase the 'sense of us'	• Use agile events with clear rules and procedures • Roles, responsibilities and tasks should be clear and kept up to date • Traditional structures and escalation mechanisms can coexist with agile

• Balance between adaptiveness and stability (define in vision)	ones as long as division of responsibilities and tasks is clear

Table 12: Examples of social and technical mechanisms

A functioning agile process itself is the main control mechanism

Most of the control mechanisms can be classified as interactive mechanisms which should continuously be performed. This is again not that surprising given the flexible character and continuous adaptation that comes with agility. This adds to the belief that a functioning agile process itself is the main control mechanism given its inherent mechanisms such as the agile events and continuous adaptation embedded in the process given new developments. Given the short-cycled development of agility this furthermore is not surprising. More diagnostic mechanisms which are used relate to ensure a basic architecture (vision) is in place early on in the process and that traditional escalation mechanisms can still be used if necessary although frequent used should be avoided since it hampers the planning process.

Interactive	Diagnostic
• Continuous adaptation of tasks and prioritization • Create smaller tasks with clear WSJF values for planning and predictability • Identify risks and interactions with interfaces and plan them with foresight • Roles, tasks and responsibilities should be made clear and updated continuously	• Have a basic architecture (vision) in place early on • Traditional escalation mechanisms can coexist with agility as long as division of responsibilities is clear

Table 13: Examples of interactive and diagnostic mechanisms

Agility provides an environment in which creativity can flourish while using constraining control mechanisms to boundaries and rules which should be adhered to

While agility is sometimes considered as a ‘free-for-all’ and ‘power to the teams’ approach, it actually requires control mechanisms which shape the boundaries in which team work and stakeholder interaction can flourish. To provide the transparency needed for open communication and trust, control over the agile process therefore provides clear constraining factors which should be strictly followed to avoid confusion. Few mechanisms were therefore

found which completely fit to the purely enabling characteristics of the Revised Levers of Control.

Constraining	**Enabling**
• Ensure teams have similar cadence in their planning • Create a vision on the to be developed product to guide prioritization and tolerated innovation • Keep the management of agile and waterfall teams separate • Staff should act within their roles' responsibilities and tasks	• Enhance the agile workspace • Promote and train the agile mindset and skills • Enhance capacity with mainly internal staff • Promote trust and the 'sense of us' to limit sectarianism

Table 14: Examples of constraining and enabling mechanisms

Good cooperation and positive atmosphere in agility are the 'rewards'

Most of the mechanisms discussed are not clearly of a rewarding or punishing character. While no punishment mechanisms were identified, there were some that can be considered as rewarding such as training and education opportunities along with enhancing the agile workspace. The absence of clear individual reward mechanisms also does not provide any real surprises since the concept of agility is focused on improving the process of development and therefore a smoother cooperation in environment of trust and positive atmosphere is the supposed reward. Since these values are so important, mechanisms that could be characterized as punishing are therefore particularly not a part of the desired approach, with the possibility for traditional escalation and firing of staff as last resorts. Furthermore, the absence of financial individual rewarding mechanisms is expected given the general absence of such rewards in the public sector (Bontis, 2007; Chiem, 2001; McNabb, 2007). Reward mechanisms in the form of investing in education, training and human capital are important not only for rewarding staff for desired behavior but also to facilitate the innovation process (Wagner & Fain, 2018).

Rewarding	Punishing
• Ensure a fair process of interaction between departments in which core interests are protected • Train agile skills to staff • Agile leadership (team facilitating, providing environment of trust, motivation) • Enhance the agile workspace	• Firing of staff members

Table 15: Examples of rewarding and punishing mechanisms

5.3.2 Where analysis through the Revised Levers of Control fall short

Before further elaborating on the specifics of the control mechanisms to construct a control-oriented framework for public sector agility, a reflection on the suitability of the Revised Levers of Control characterization is required. From the previous points it can be seen that the characterization certainly provides valuable insights into the functioning of control in agility. It was illustrated that controlling agility can be seen as yin and yang with both social dimensional mechanisms related to mindset and trust, and technical procedures and roles. Furthermore, agility requires strategic vision while a functioning process itself provides control given the continuous adaptation and simultaneously forms the reward.

While these insights are valuable in itself to recognize the characteristics of a control-oriented strategy, they do not directly assist in prioritizing certain mechanisms or differentiating between need-to-have and nice-to-have. As can be seen from the vast list in Appendix 3, it is difficult to construct a clear strategy without further categorization.

- On the basis of what to prioritize, a distinction is first made between conditional mechanisms non-conditional mechanisms.
- Another distinction is made between which complicating factors are likely to be expected along with their required mechanisms and mechanisms which can be implemented to.

5.3.3 Visual overview of identified control mechanisms

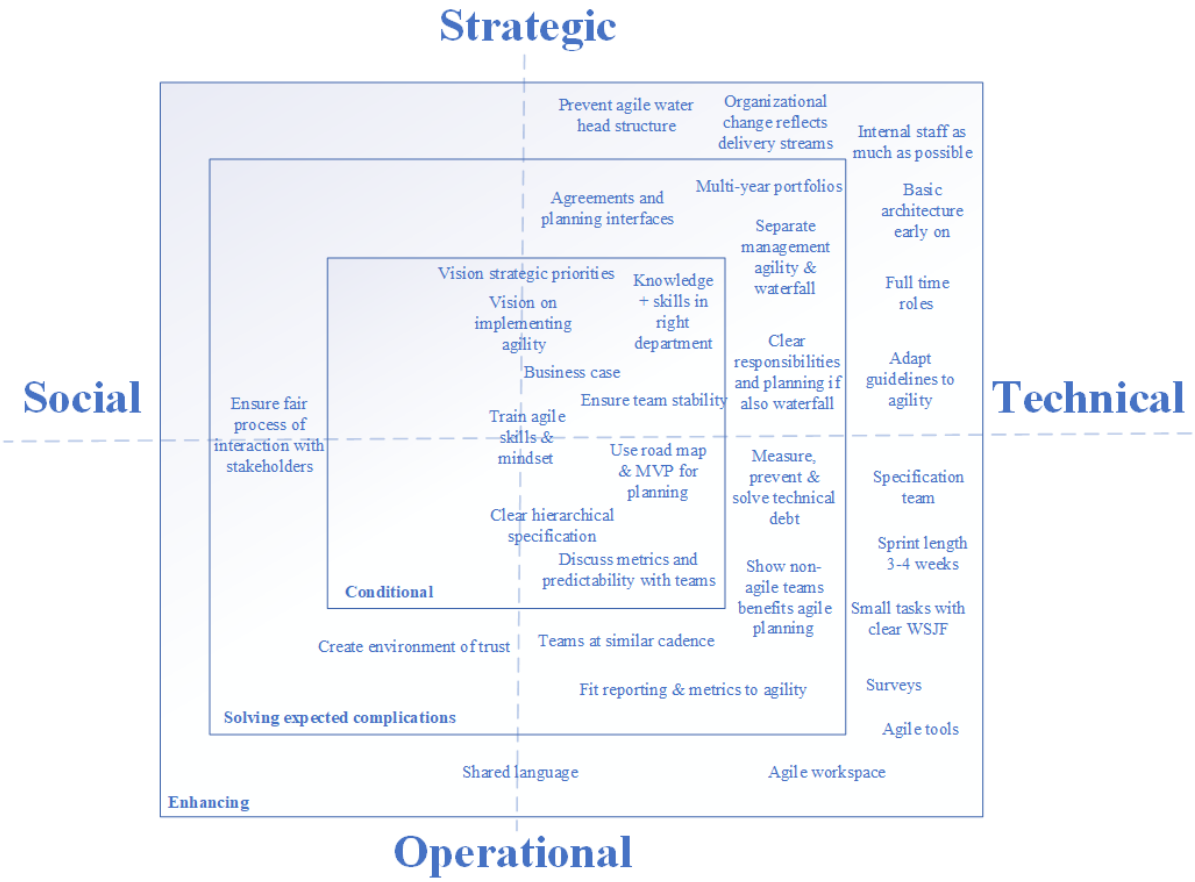

Figure 13: Overview of control mechanisms

Figure 13 provides an overview of some important mechanisms which add to enhance control over the agile process. It provides a wide range of mechanisms and from the examples it can be seen the mechanisms mainly serve to facilitate the agile process. The mechanisms oriented at stakeholder interaction for instance serve to smoothen cooperation between departments and receive input for adaptation in a timely manner, while teams running at similar cadence and team stability serve predictability which is used for planning.

5.3 Reflection on conceptualization

5.3.1 External deadlines, planning and desire for control

When reflecting the findings on the conceptualization presented in paragraph 2.2 the clear presence of control by planning due to deadlines is as expected. While agility brings clear merits to increase cooperation within the organization and with stakeholders and users and increases transparency agility in the public sector deviates from the ideal agile. The need to deliver on deadlines and presence of accountability at the management layer steers the desired control. This is illustrated in the contrast the interviewees gave to where their desire for control stems from. While team members stated their desire for control is related to facilitating team performance and enhancing flow and predictability, higher management mentioned rather different aspects. Accountability, achieving results and the presence of a deadline were mentioned to increase management's desire for control which increases when there is shorter time left. But also the current system of HR planning provides incentives for control as the budgeting for HR is performed years in advance in the Directorate. Two interviewees stated that the desire for control enfolds rather as a fake appearance of control than real control where higher management wants to have the feeling to be in control, even though the methods through which this is enacted might not be the most suitable. An example of this is the focus on metrics as a team level employee indicated that control is aimed for by persistently using unreliable measurements. This desire for control has been strengthened over the years by multiple big projects going over budget and suffering heavy delays. Something typical for large IT projects in public sector bureaucracies.

> *"My desire for control? Because I have to be finished on time with the development of the service" (Program level employee)*

> *"The desire for control… that is purely oriented from my responsibility, and that increases when the pressure increases and time gets shorter; the desire than increases". (Program level employee)*

> *"My desire for control comes from the fact that I want to deliver results faster than I currently can. My desire for control thus comes from wanting the preparation to be done correctly so my team can easily identify what the next step will be and that they do not have to invent a lot of things again." (Team level employee)*

"Because they want 'appearance of control'. Because I believe that when you have your process well taken care of, that you do not need many other control mechanisms. The better your process is in order, the less mechanisms you need… Because I see control mechanisms as an inherent part of the process." (Program level employee)

Taking the interplay between the two main types of control, for enhancing performance and to deliver on deadlines, and the further case study findings into account the following section reflects on the interplay between agility and public sector bureaucracies to characterize the contingency of agility in the public sector.

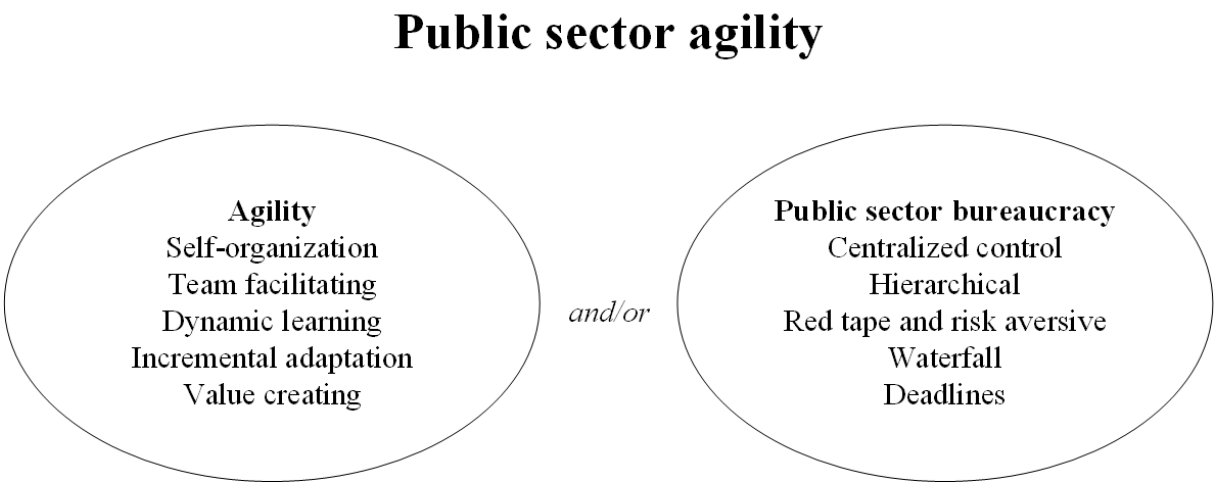

Figure 14: Interplay agility and public sector bureaucracy

When interpreting the figure from paragraph 2.3.3 after the theoretical and case study findings the following observations can be made:

Centralized control to guide self-organization

It was shown how team members and other agile roles can self-organize and function when their tasks, roles and responsibilities are clear. It holds true that in this regard there is no centralized control. What the research does indicate, however, is that centralized control is required when applying agility in the public sector for clear strategic visions on prioritization, desired products and value, implementation of agility and timing of renewal programs. Centralized strategic control is required to perform self-organization within public sector bureaucracies.

There should be more emphasis on team facilitation

On the short term it does not seem plausible that public sector bureaucracies will lose their hierarchical nature. This does not mean that the organization cannot be more team facilitating. Team facilitation is tied to decentralization which stands at the core of agility and is as well what makes it such a strong concept. The core of public sector performance lies with team level development and operations and the agile process should be constructed in their favor and not that of (higher) management.

Amount of tolerated innovation and risk aversiveness creates bounded learning

While agility proposes dynamic learning with room for failure the research indicated this is not always desirable within public sector context where budgets and planning are tight and main services have to remain functional at all times. Pure dynamic learning is therefor likely off the table while the traditional red tape and risk aversiveness can also hamper the agile process. It should therefore be indicated what level of innovation is tolerated.

Coexistence incremental agility and waterfall

The research indicated that agile and waterfall structures can coexist and at times might even be necessary, for instance when there are important deadlines on a short notice. Besides, implementing agility requires preparation, training and education which also illustrates the need for coexistence on the short term. Interfaces between agile and waterfall teams require agreements, for instance on availability, and should be incorporated in the planning.

Value delivering through an MVP in the face of external deadlines

Agility's strength in learning during the process to seek the value which should be delivered is its strength. Yet, as indicated in the research, control in public sector bureaucracies is mainly focused on planning given the presence of deadlines. Identifying a MVP and specifying its epics, features and user stories and updating these during the process provides clear guidance for value delivery while allowing for planning measures to ensure deadlines are met with.

5.4 What comes next

After having discussed the case findings which led to an overview of control mechanisms and reflection on the interplay between agility and bureaucratic control in the public sector the next chapter presents the validation findings. Afterwards the final chapter before the conclusion puts all findings together to provide the main recommendations for controlling public sector agility.

Chapter 6 Validation

Chapter 6 in itself does not constitute a sub-question of the research but serves to validate the case findings and therefore challenge or strengthen the answers provided to the sub-questions in the previous chapter.

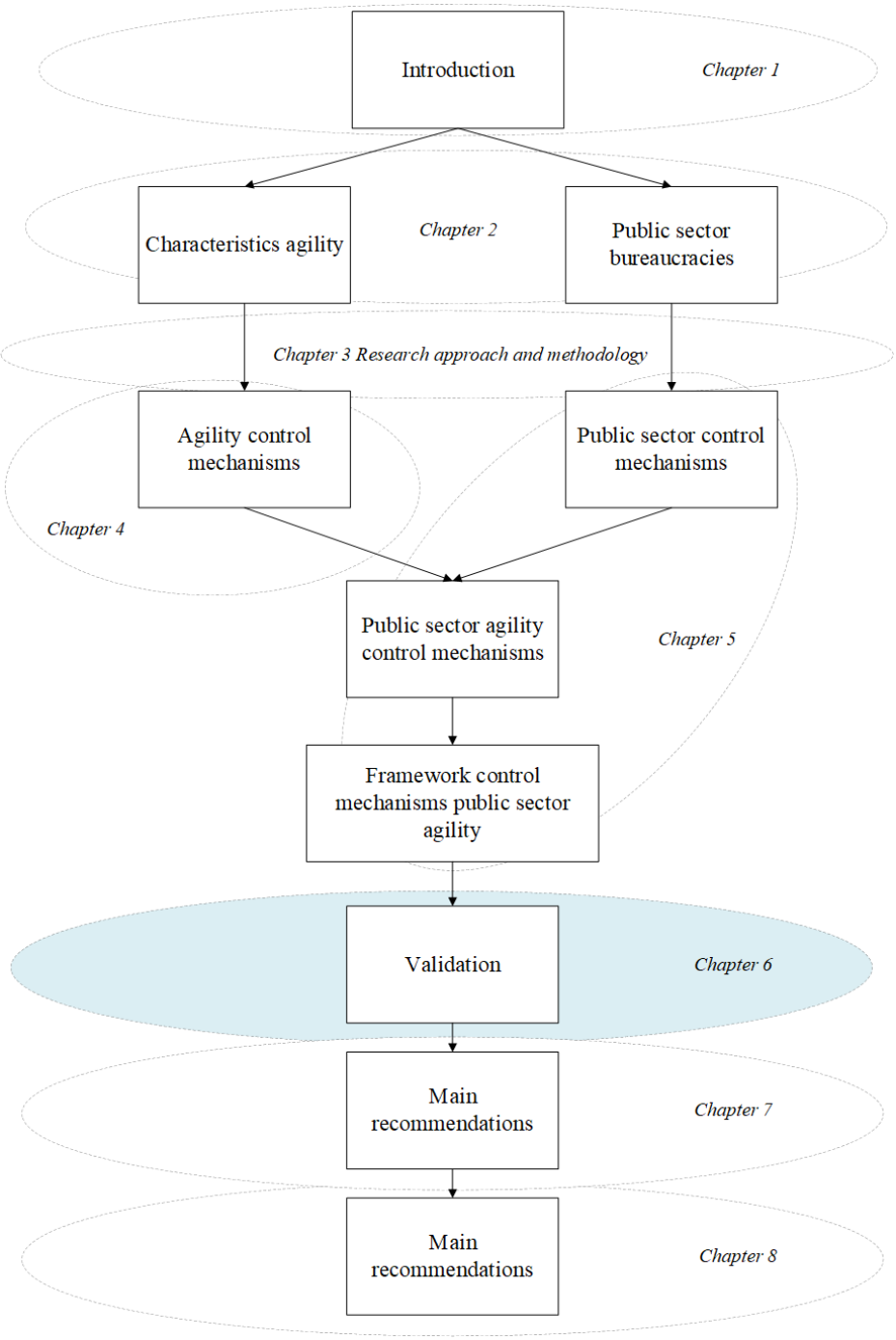

Figure 15: Structure of the report

6.1 Validation set-up

A single case study's benefit is that extensive insight can be gained on the topic when applying explorative research, while a downside is that validation of the results is not already captured to a certain extent within the approach itself. Therefore, extra validation was orchestrated to test the result findings. The validation served mainly for two purposes:

1. Considering the implications of public sector characteristics on control over the agile process
2. Analyzing the applicability of the recommended control mechanisms

6.2 Implication public sector characteristics on agility

The main results of the validation are presented in discussed themes which reflect the main observations of the research.

Complexity of agility for delivering deadlines increases with presence legacy systems and interfaces

A clear distinction between two types of systems portrayed itself in the validation sessions: a front-end application which barely has dependencies with the rest of the organization and the renewal programs of or within legacy systems. The participants agreed that performing agility in the latter is a lot more challenging given, firstly, the technical complexity that comes with legacy systems and interfaces and, secondly, the coordination required between multiple parties along with the potential delays this brings. This coordination requires interaction with multiple parties since, as was also stated in the research findings, the client-to-client process is broken up according to functions. Besides, it was stated that the rather large scaled projects required by legislation demand interaction between these interfaces placed in different divisions.

Clear prioritization stands at the core of the challenge

According to the participants there was one crucial aspect which made agility challenging which was the lack of clear prioritization. While a portfolio manager indicated that priorities are structured and clear, certain Scrum Masters and Product Owners stated this was not the case as it seemed like prioritization was performed on an ad-hoc basis without clear guiding vision. These ad-hoc changes sometimes led to unexpected reshuffling of teams and made it more challenging to cope with unexpected technical debt. This made control difficult since predictability and planning suffer from such developments. In the other organization it was

mentioned as well that the prioritization set at the organizational portfolio level was not always abided by in lower levels. Along with the phenomenon that prioritization is performed rather top-down with little bottom-up feedback given a “no bad news” culture, this creates a situation where the agile process is hampered instead of facilitated and control over the performance is lost. This again shows the importance of strategic decisions and dedication to a vision which incorporates bottom-up recommendations to support the agile process.

Challenging to ensure team stability

It was already mentioned that team stability is sometimes hampered by the transferring of specialized staff for other prioritized applications. Furthermore, it was stated that the organizations have to use external staff because there is no capacity to have all staff internally. There is clear awareness that this brings the risk of losing knowledge but its transferring can be captured to a certain extent within the process by specifically reserving time for such activities. Control over knowledge capturing is then performed which can assist in preventing further delays. Furthermore, participants agreed that delays due to changes in team staff was not pe se problematic but surely was when this provided conflict with the priority areas and deadlines. This is again where an organizational vision on priorities is required so potential changes to staff and their implications on development do not create conflict with deadlines.

Public sector workspace does not facilitate agility

Another research finding which was also present in the validation session was that the current workspace does not facilitate agility given a lack of meeting rooms and team office space. This even came to the point that there is an escalation to the Board of Directors in one of the organizations. It was acknowledged that this in itself does not directly lead to a loss of control but it does create potential delays in the performance which makes the process less predictable.

6.3 Required control mechanisms

While the previous paragraphs indicated that the implications of public sector bureaucracies on agility found in the case study were also present in the organizations participating in the validation sessions, this paragraph discusses the main control mechanisms. These mechanisms were considered to be of relatively big importance for controlling public sector agility.

Balancing of agility and waterfall indeed requires strategic vision

The participants of the workshops indicated they would like to work fully agile throughout the organization but in both organizations this is currently not possible as there is resistance to implement agility in other departments within the organization or even from the Works Council. This resistance comes from the belief that such a transition is not possible given the presence of legacy systems or is not more beneficial compared to current waterfall methods. Furthermore, the participants agreed that immediate introduction of full agility brings the potential to disrupts existing systems which need to keep performing given political pressure and societal relevance. Extensive training and time to get used to this new way of working was also recognized as important mechanisms. In other words: to ensure control in the transition to agility the coexistence between agility and waterfall is not only possible but perhaps even required. The co-existence between agility and waterfall is therefore expected to continue in the near future which can work according under certain circumstances. As one participant indicated:

> "*Hybrid (waterfall and agility) is not a problem when, first of all, there are clear agreements made and, secondly, these are met with. But in the current culture there is no accountability on unfulfilled agreements".*

The participants agreed that a vision is needed on in which departments agility would be implemented and how this interacts with legacy systems and waterfall teams. The separation should be explicitly made clear or else could prevent disturbance of the agile process, an example of which was mentioned as following:

> "*There is a wrong focus of accountability which leads to disturbance. There is a line manager who intervenes in the agile process since he feels accountable. This needs to change with placing accountability with the teams, but this is a difficult mindset to switch at the top.*"

Strategic vision is also required for prioritization

As aforementioned the validation sessions indicated the complexity of prioritization and the importance for control over the agile process. Prioritization of the wrong elements can, for instance, lead to not meeting deadlines. Clear vision is required on both an organizational level and on a program or product level. The former is needed to allocate resources required for

priority areas to ensure team stability while the latter serves to provide clear steps for creating the MVP. The validation sessions illustrated that vision is required on these higher levels to facilitate teams in their development. These visions should, however, be created and adapted through bottom-up signals. These visions should also include information on expected renewal programs in legacy systems and other running applications. If this is not included the prioritization in the visions might be neglected when technical debt needs to be solved unexpectedly. Furthermore, this overall vision can assist in providing generalizability of applications within the organization.

Coordination between interfaces should be kept as simple as possible

The increased complexity due to interfaces requires agreements and planning. Coordination is thus important but also should not be performed more than deemed necessary. Agility requires simplicity to facilitate teams and management should not try to enhance control by adding more components than necessary in the coordination efforts to make it seemingly better manageable. The agile team facilitating mindset should be followed. As one participant indicated:

> "*If there are no dependencies, then do not manage them as such. It then makes things even more complicated."*

Furthermore, the participants indicated that the organizations should eventually shape its organizational structures to the delivery stream which would already decrease the complexity and required coordination. This transition would follow the concept of requisite organization present in holacracy as one participant stated:

> *"Logically the organization would follow the process."*

Vision on what agility means for that organization

What stood at the center of the both organization's implementation of agility was that there was clear preparation with a try-out and participants agreed the introduction of agility should be a conscious one even though it often starts organically in IT departments. Two statements indicated it entails clear decisions and vision to implement agility as the concept itself is not in itself clear enough to be understood within the organizational and technical context. The first quote relates to what an organization entails with agility:

"*We have to become agile to be adaptive, but what does that actually mean?"*

Secondly, the implementation of agile throughout an organization can include introducing agility in the management layer for which there were opposing views present. While certain participants indicated that full agility should be applied throughout the organization rather fast someone stated:

"Only scale when you have to, do it where it hurts. Else you make it more complicated."

This also indicates that, just as the case study indicated, there can be opposing views on how agility should be implemented in the organization and that it cannot just be expected that there is a common orientation on how to go about the agile process. To guide the development of agility, a vision on what agility entails and how this should be implemented in the organization can assist this process.

A different approach is required for client and stakeholder interaction

One finding from the validation which was more present than in the case study research had to do with the interaction of the organizations to its clients and partners. It was agreed that the organizations should stand more for their own ground and enter into dialog with their counterpart Ministry and other partners to provide space for maneuver in the scope required for agility. This would also be in the clients' interests since this interaction can bring out the real priorities at that moment rather than dependencies on former planning. This entails that the organization itself takes more control over the client interaction rather than being subjected to the clients' conceived wishes which might not always fit the adaptiveness of agility. Another interesting finding from the validation session was that there is a distinction between public sector organization when it comes to internal processes or outsourcing of, for instance, database maintenance. Agility then requires a different way of interaction which is more related to agile contracting and also changes the accountability which does not fit traditional contracting measures. As one participant indicated:

"'Demand-and-supply' was a very good control mechanism. Now we have to do it more with trust, but accountability in agile contracting is still quite something."

This indicates that a new approach to client and stakeholder interaction is required to explore the full potential of agility. This could also provide substantial implications to the desire for control and delivery of deadlines.

6.4 Conclusion of the validation

The validation findings correspond with those of the theoretical and case study. While it did further illustrate the importance of a new approach to client and stakeholder interaction it did not provide contrasting findings regarding the implications of the public sector characteristics and required control mechanisms.

6.5 What comes next

After having discussed the findings from the theoretical study, case study and validation session, the following chapters provides overall conclusions and main recommendations related to controlling public sector agility.

Chapter 7 Controlling public sector agility

After having reflected on the findings from the theoretical and case study, and even validating the results in two other organizations, this chapter summarizes the implications of control and agility in the public sector. It does so by presenting key implications, reflecting on the initially stated dilemmas, and expanding upon five of the main control mechanisms.

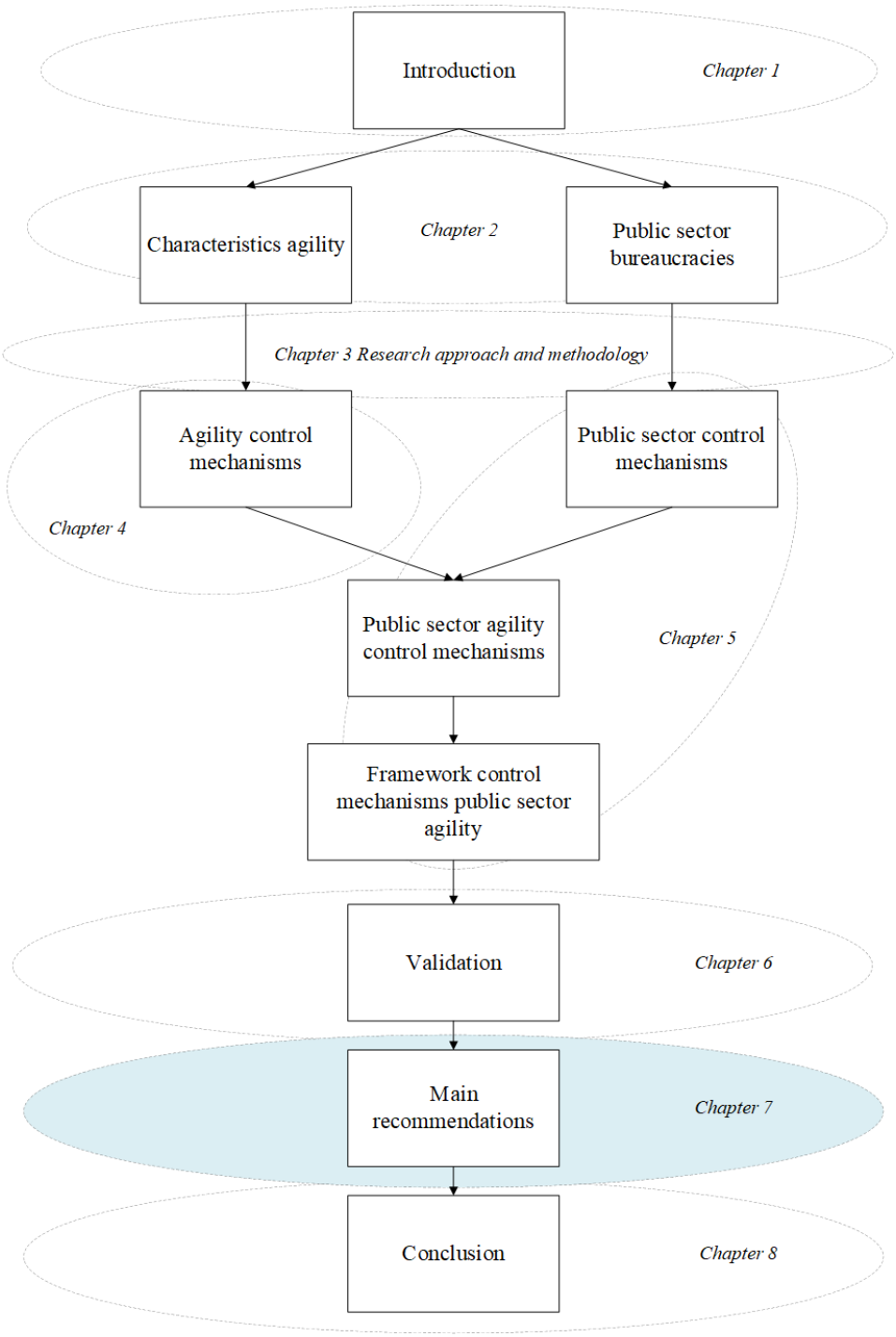

Figure 16: Structure of the report

7.1 Key points

Overall, there are three main findings of the research when it comes to control in public sector agility. These relate to considering the agile process as the main control mechanism, realizing the complexity created by legacy systems, interfaces and lack of capacity, and lastly recognizing the importance of planning as control in public sector bureaucracies.

7.1.1 Replacing centralized control with an agile process

The key aspect of control in public sector agility is the use of the agile process itself. The increased cooperation between departments, teams, organizational layers and users and stakeholders, together with adaptiveness through incremental and short-cycled development provides a system of continuous control. To ensure that the agile process functions as such many control mechanisms have been identified in both theory and practice. In agility control is thus first and foremost related to setting up and adapting the agile process which, for instance, relates to events and procedures, roles and the agile mindset. This provides a contrasting approach to the traditional means of control of public sector bureaucracies such as centralized control, hierarchy and red tape. One might wonder whether this is indeed a better approach to increase control in public sector organizations than the use of such traditional measures but the research indicated three aspects in which agility in the long-term provides clear benefits. Firstly, the use of agility through its adaptive and short-cycled character provides a promising way of working to change the IT system and overcome the current dependency and complexity on legacy systems. Secondly, the emphasis on cooperation and transparency can help overcome sectarianism present in public sector bureaucracies and increase trust.

7.1.2 Increased complexity through interfaces, legacy systems and lack of capacity

Public sector bureaucracies are generally known for the vast presence of legacy systems which substantially influence IT development as the new applications need to fit ‘the old world’. Furthermore, the organizational structures are generally orchestrated in functions, such as client registration, payments, portals. This created a web of interdependencies between new and old application and processes and thus other teams and departments which new development needs to take into account. This is rather different than the client-to-client delivery stream of agility and leads to complexity with interfaces. While this might not necessarily be an issue for development itself it can create substantial delays given lack of capacity in these interfaces.

Furthermore, updates in these interfaces might require adaptation in other ones. This again does not have to be problematic but given the importance of planning this might be.

7.1.3 Clear emphasis on planning in the public sector

Given the presence of external deadlines due to implementation of legislation public sector organizations place clear emphasis on planning as a means of control. In combination with rather non-flexible required functionality this influences the agile process. The following paragraph will illustrate this is not in itself problematic but does require further specific control mechanisms. The presence of deadlines increases the need of managers to perform centralized control which can disrupt the agile process by sudden changes, non-team facilitating mindset and negative influence on trust. This in turn hampers the functionality of the agile process to perform as the main control mechanism itself. Planning is thus not only important to ensure implementation of legislation but also to prevent a tendency to fall back to traditional centralized control.

7.2 Reflecting on the dilemmas

This paragraph reflects on the dilemmas stated in the beginning of the report to challenge the validity of these theoretical statements after having considered the research results.

7.2.1 Dilemma 1

Original: Agility's **adaptiveness**, **little documentation**, **human interaction** theoretically do not bide well with public values of **transparency and accountability**

The research did not provide reasons to believe the new approach to documentation and emphasis on human interaction hampers the transparency and accountability. There might be a new way of performing metrics or reports but this does not hamper it. If anything, transparency stands at the core of agility and it was indicated by interviewees that agility enhances its applicability in practice through increased cooperation. Accountability in agility, however, does present a challenge since traditional accountability measures can disrupt the agile process by falling back to traditional control mechanisms while the presence of many interfaces further complicates the accountability question. Rather than stating it as a dilemma the research indicates it is more a warning signal.

Recommendation: Public sector agility demands different **accountability** structures since traditional accountability does not fit the complexity of interfaces and can lead to traditional control which hampers the agile process.

7.2.2 Dilemma 2

Original: The public sector's **stability** for accountability brings potential conflict with adaptive approaches (such as agility) given **dynamic learning** and **continuous change.**

The research indicated that the toleration for dynamic learning was hampered by presence of deadlines, required continuous functioning of applications and tight budgets but not per se stability in itself. The concept of continuous change was not deemed problematic as such in the research but rather the lack of prioritization to guide development which led to continuous change without any strategic direction.

Recommendation: The presence of deadlines, tight budgets and required continuous functionality in the public sector indicates there should be **clear boundaries on innovation** and **dynamic learning,** while **continuous change** is beneficial as long as this is guided by **vision**.

7.2.3 Dilemma 3

Original: **Bureaucratic control** interventions might not find resonance or even **disrupt agile characteristics** and thus its potential.

The research indicated that the agile process requires a different approach to control in which the way the process is set up, including events, procedures, rules and roles, is the main control mechanism. This includes a team facilitating culture in which teams are empowered, internal and external collaboration is improved and adaptiveness is included. However, the research also illustrated that certain control mechanisms require hierarchical and central functioning and that this can even facilitate the agile process. Public sector agility unfolds in relatively large bureaucratic organizations with multiple internal departments and portfolios which requires strategic vision on the organizational and program level. While this should incorporate bottom-up information provision, the visions themselves are still centralized and hierarchical. Furthermore, given the many interfaces present in public sector agile processes and their dependencies planning is an important mechanism. This is also not expected to change in the short term given the importance of planning as control in the public sector.

Recommendation: Public sector agility can benefit from or might even need mechanisms associated with **bureaucratic control** such as **hierarchical strategic visions** and **planning** as long as these support control mechanisms inherent to the agile process such as prioritization and predictability.

7.2.4 A balancing act between agile and bureaucratic control

Overall, reflection on the previously stated dilemmas and general findings indicate that control over the agile process in the public sector requires control mechanisms belonging to 'pure agility' and to centralized strategic visions and planning as associated with bureaucratic means of control. To ensure the use of both mechanisms supports the agile process in public sector bureaucracies, control should be seen as a balancing act between the two. This reflects the key statement of adaptive governance, the umbrella under which one can place agility in the public sector, where public institutions should function as 'ambidextrous organizations' balancing between stability and adaptability (Janssen & Van Der Voort, 2016). Figure 17 illustrate this interaction and incorporates elements from figure 4 and 14. The team facilitating mindset of agility should be generally be incorporated and is thus not part of the balancing act. The creation of value and the synergy between incremental adaptation and waterfall are incorporated in the visions and planning. It should be emphasized that control over public sector agility is more than the balancing act and also includes the mechanisms as included in appendix 3 and paragraph 5.3.3, yet the balancing act is crucial to consider as this stands at the core of ensuring control over the agile process by on the one hand preventing flexibility without direction and on the other preventing restricting centralized control which hampers the agile process.

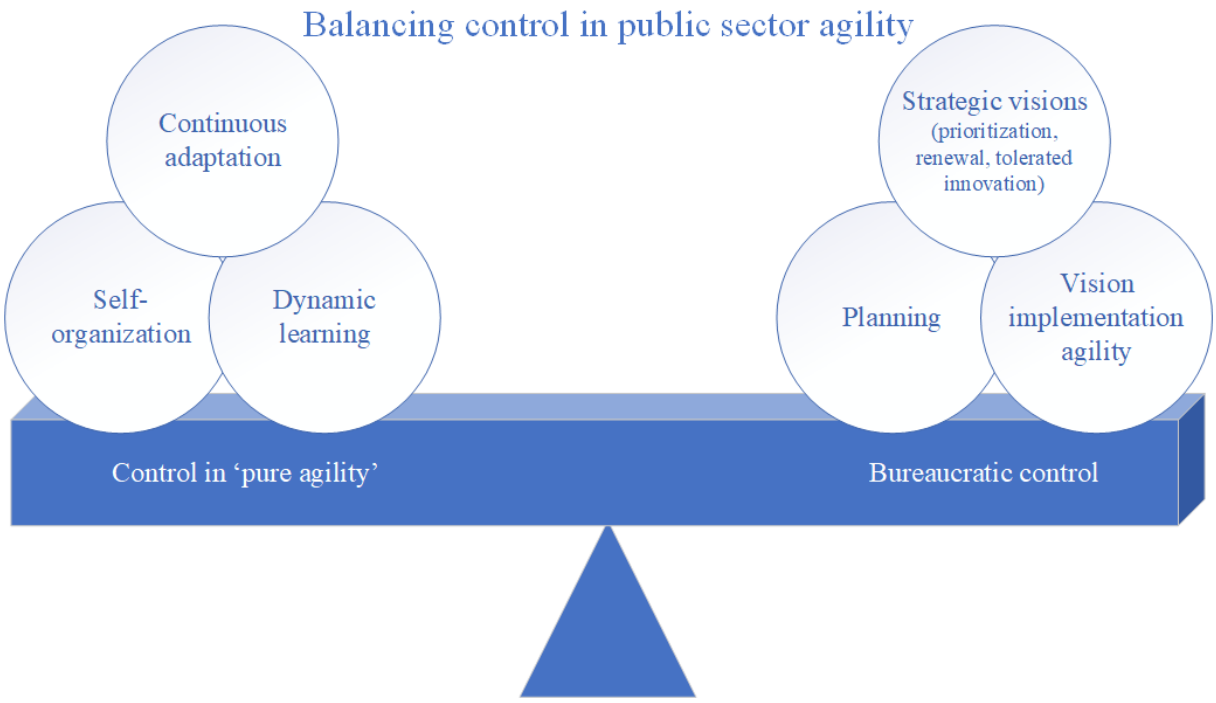

Figure 17: The balancing act of control in public sector agility

7.3 Key control mechanisms

Now the key points of the research have been discussed and the initial dilemmas have been revised, this paragraph presents five main mechanisms for controlling public sector agility.

7.3.1 Define and update strategic visions on organizational priorities and to be developed products

The report illustrated that there is a need for clear strategic visions for two reasons: to provide a framework for prioritization of programs and tasks, and to provide guidance for specification of epics, features and user stories.

On an organizational level this entails that the following should be included: priorities on programs related to implementation of legislation and a vision of which renewal programs will take place within the organization the following years. On the organizational level an overview should thus be made of the departments and programs within the organization, their upcoming portfolio tasks and their interdependencies. This should include both creation of business value and solving of technical debt to, firstly, enhance efficiency, decrease reinventing of the wheel and sustained dependence on legacy systems and, secondly, to provide guidance on prioritization of tasks.

On a program level business cases and road maps should be constructed which follow the prioritization and planning as set out in the organizational strategic vision. They provide

more in-depth insights into the epics and expected technical debt with clear WSJF values and explicitly mention the required interfaces. Furthermore, it should be coordinated with stakeholder what level of innovation is aimed for to increase cooperation and guide creation of new ideas by having "a common understanding of exactly what this innovation is, who plays what role, when and how" (Wagner & Fain, 2018, p. 1222) which should be included in the business case. Other elements to be included in the business case are the goals, budget, specified epics, and interfaces. The road map provides insight into the main steps required to reach the MVP including both business value and technical debt and should incorporate the known uncertainties such as upcoming legislation. Furthermore, an architectural vision is required to guide the development process.

While these are two hierarchical visions with the organizational one at a higher level they should feed into one another to ensure that bottom-up information is used to set the organizational vision.

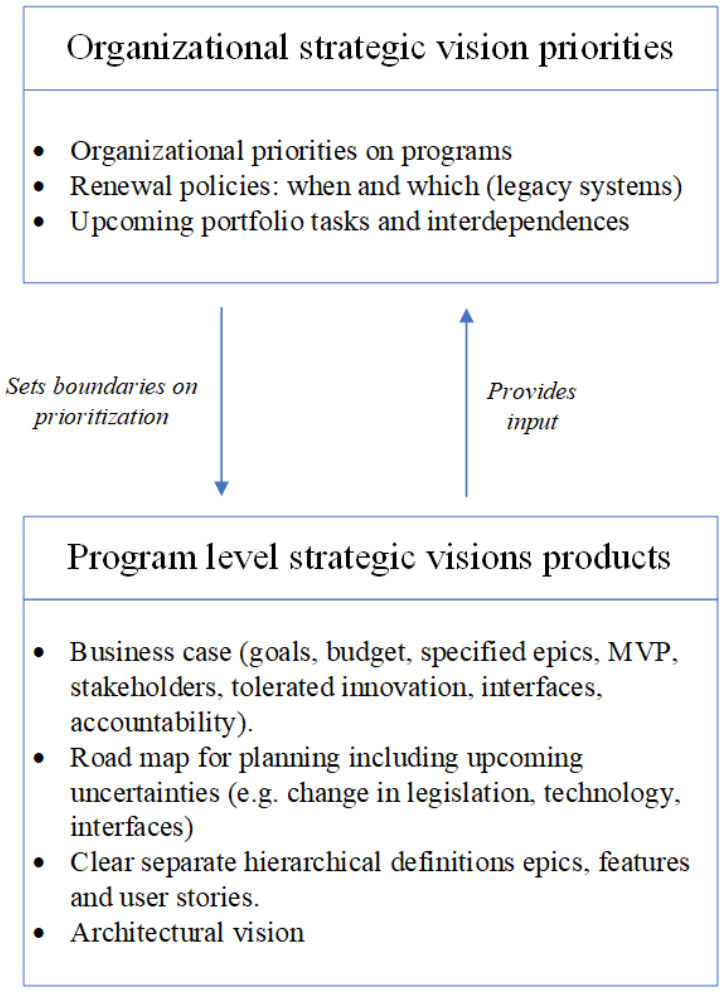

Figure 18: Strategic visions

7.3.2 Define and update a vision on how agility is implemented and balances with waterfall

The report indicated that agility in itself is a rather vague concept of which staff members can have different perceptions of how it currently works or should work in the future. A vision should be constructed on how agility is performed on the organizational, program and team level.

On an organizational level there should be an indication which parts of the organization are expected to make a shift to agility. Some aspects of its portfolio might have important deadlines on the short term or currently lack the capacity to make such a shift. An absence of such a vision is, however, rather likely given the current hesitance and/or resistance to turning completely agile.

This is not per se problematic when it is clear on a program level which teams work in an agile manner and which function according to traditional waterfall structures. When these interfaces are made clear these can be incorporated in the planning. When it is made clear how traditional structures such as project boards and chain tables interact with the agile process and roles redundancies can be identified which should then be solved to avoid confusion and unnecessary coordination. It should also be indicated which teams are expected to make the turn to agile in the near future so training and education can start well beforehand. This also relates to management as the use of agility places rather different demands on both the business and technology side of the organization and traditional project management is replaced by agile structures, roles and mindset. Responsibilities and tasks should also be made clear along with accountability in which not only the agile methodology should be considered but also its linkage to existing roles and traditional structures.

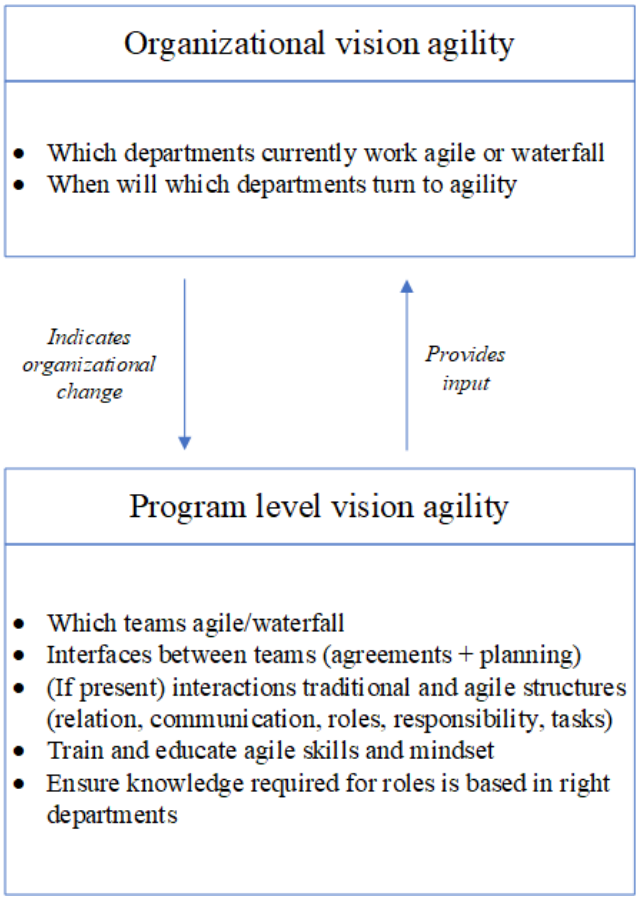

Figure 19: Visions on implementing agility

7.3.3 Set up the right mechanisms to use agile planning

Given the importance of planning in the public sector the right control mechanisms should be set in place which can be categorized into two groups: to provide clear guidance on the required tasks to complete a MVP and to ensure predictability of team and train performance.

The first category relates to the strategic visions mentioned earlier. For a to be developed product or application a MVP should be defined consisting of clear epics and features with related WSJF values. This requires guidance on the to be developed product which should be stated in the vision documents. It also requires insight into present and expected technical debt required to create the MVP. Given the rather large scale of projects it can be that special specification teams are orchestrated, as was seen in the case, but it is always important that there is a clear distinction between epics, features and user stories. When using the SAFe framework the role of Product Manager/Management is crucial for the program backlog, MVP and WSJF values. A highly experienced staff member required for this position with knowledge of both the business and technology side. This can also be performed by two persons together, one more technology affiliated and the other more business. When there are more than two

Product Managers there is no clear accountability for the program backlog nor concentration of knowledge. That the case at hand provided thirteen Product Managers is therefore highly problematic as not one of the Product Managers is really in the lead when it comes to making decisions or being accountable. So even though there can be many interfaces with departments in public sector projects it is important to keep the Product Management to one or two staff members.

The second aspect important for agile planning relates to predictability. The number one component that allows for predictability in agility is team stability since changes in membership lead to delays and loss of knowledge. Control over the planning is thus lost when teams are suddenly changed. The vision documents and portfolio should therefore support team stability or indicate when teams might change when other programs are prioritized. Change of staff can still occur unexpectedly in which case a couple months are needed to rebalance the teams and get new insight into their performance (function points per hour). In the case of SAFe the RTE is responsible to provide a clear image on the performance of teams by using metrics. Using the right metrics is crucial since this can else lead to wrong team performance (to score well on metrics rather than providing desired results) or lead to decrease of trust and sense of appreciation (when teams feel like they are not understood by higher management). Measuring technical debt and incorporating this in the planning is therefore also important since a focus on only business value paints a false image of actual performance. The sprint length is also a crucial aspect since too short sprints suffer substantially from short delays which are highly present given the many interfaces and presence of legacy systems, and lead to too small specified tasks which places heavy burdens on the specification phase. The ARTs of the case study could thus potentially benefit substantially from changing their sprints from two to four weeks and ensuring similar cadence with interfaces so planning is performed synchronously.

While these mechanisms appear rather straight forward it should be recognized that in practice teams and ARTs need time to get going. They need to get used to the agile work methods and in case of team changes need to rebalance its internal relations and perhaps even train staff members. Since the specification of epics, features, and user stories also might change this increases the uncertainty of using early performance to predict. Teams should therefore be kept running for a while to provide valuable metrics and in the meantime surveys can be performed to use tacit knowledge to provide predictions on the planning and delivering of deadlines.

When there is a MVP with clear epics and features which incorporates technical debt and business value and there is a planning with interface dependencies and updates and

predictability in team performance, an assessment can be made on whether the MVP will be delivered on the deadline. This planning should incorporate a certain volatility since adaptation is almost guaranteed since the requirements might change during the process, delays might occur due to internal aspects or interfaces, or actual team performance differs from what was expected. When it turns out the deadline is probably not met with there are four possibilities: it can be chosen to add team members or complete teams to the ART to add performance, interaction with the client might lead to extension of the deadline, or interaction with the client might lead to a smaller version of the MVP. Therefore, the client and stakeholder interaction in agility is important. A fourth option would be to fall back to a traditional waterfall manner of development although it should be noted that this again takes time to implement and also creates further complexity given the interactions with interfaces and disrupts the agile process. A turn back again to agility becomes rather challenging. The last option should therefore be avoided when possible.

Overall, this also illustrates the importance of organizational vision on prioritization and relevant allocation of resources as this prevents from not meeting deadlines from occurring.

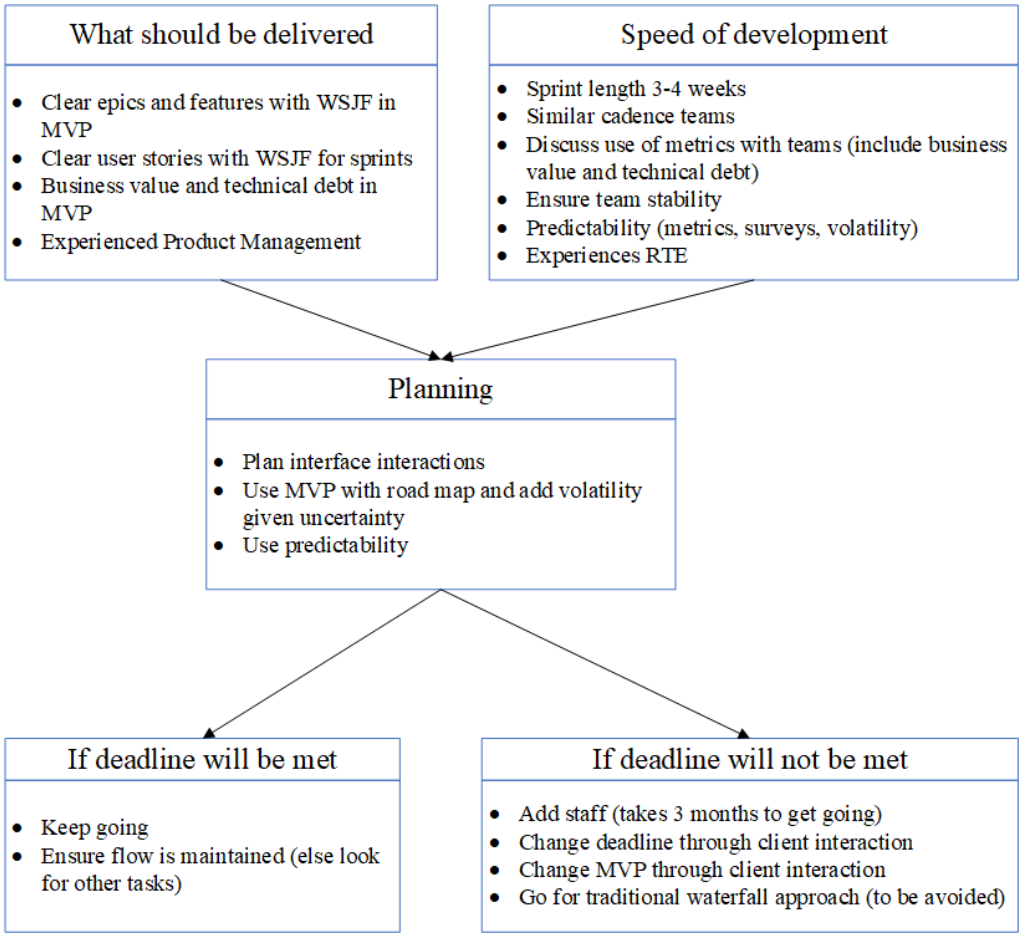

Figure 20: Mechanisms related to planning in agility

7.3.4 Changing the portfolio

The research illustrated that two important components, team stability and creation of visions, are gravely hampered by traditional portfolio management as the current set-up is a one-year approach and works by assignments. This provides uncertainty for teams' set-up for over a year which is problematic given the importance of team stability for predictability which in turn is desired for planning. Furthermore, because the financing is assignment-based there is barely agency and flexibility at the program and team level to decide on which functionality to work and it is not clear what budget is available the year after to use. This impedes the creation and implementation of visions. The portfolio should thus be changed to a multi-year approach while allocation of resources is oriented at the program level which can then ensure team stability according to its priorities.

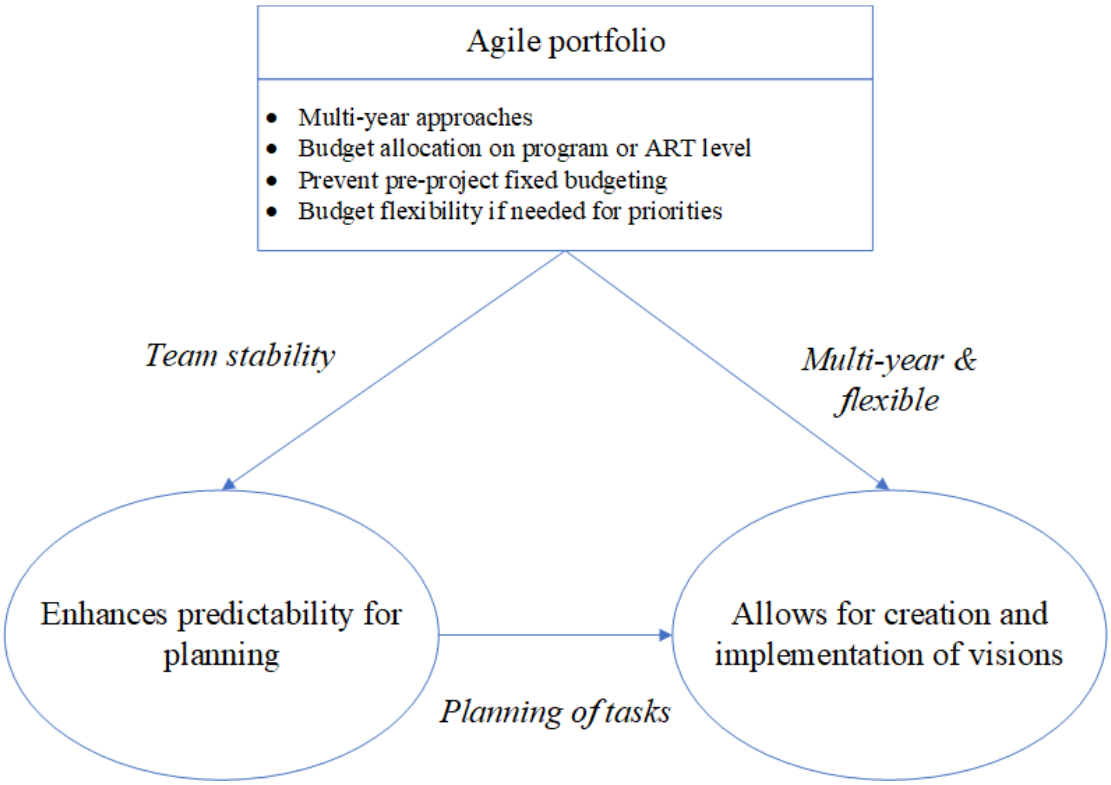

Figure 21: The agile portfolio

7.3.5 Client and stakeholder interaction

Trust and transparency are two main aspects of the agile process. In absence of these the process has a tendency to be drawn back to traditional forms of centralized control by higher management rather than letting the agile process function as the main control mechanism in itself. The case study illustrated that as expected there is sectarianism within the bureaucratic complexity of public sector organizations. Stakeholder analysis and interaction is already

crucial in public sector given this high stakeholder complexity (W. Williams & Lewis, 2008) but comes even more to the forefront in the agile process given the continuous cooperation with external partners, between departments and teams and frequent interactions with interfaces. Agility mentions it is important to look at client and stakeholder interaction but does not provide specific mechanisms on how to go about it besides promoting the agile mindset and having inclusive agile events. A 'sense of us' should be enhanced while the process of interaction should also be managed. The mechanisms identified from process management and management in networks can provide worthwhile recommendations. Each department can be seen as having its own core values and interests and agility provides a first step to clear rules of the game when it comes to the procedures, events and roles. In the case of SAFe the Product Manager can be regarded as the Process Manager which should ensure the relevant parties feel their interested are captured within the agile process.

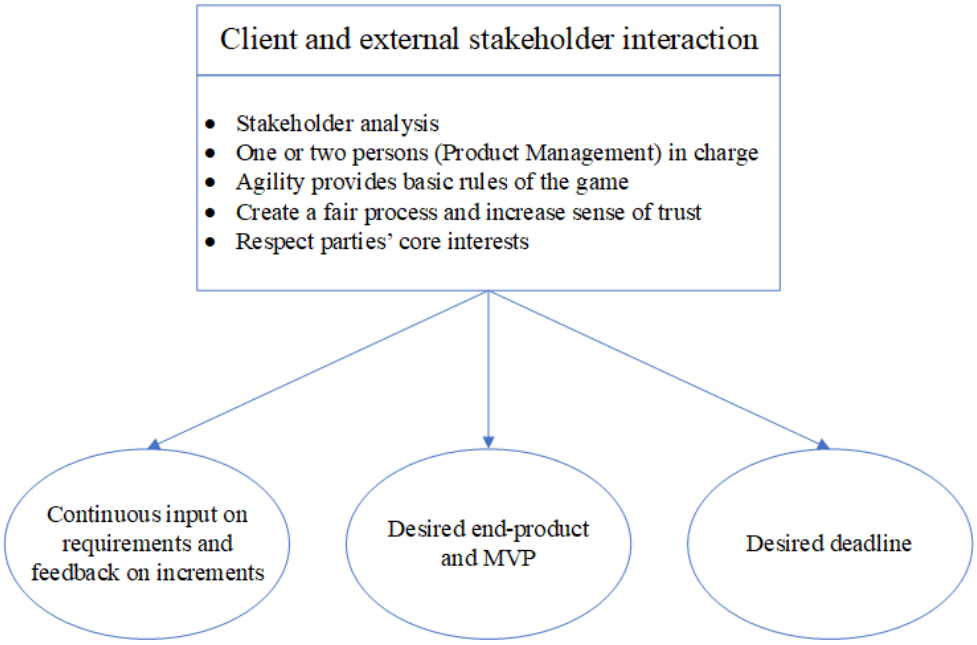

Figure 22: Client and stakeholder interaction

7.4 Further challenges

7.4.1 Agility requires time, dedication and preparation

Introducing agility entails introducing a new way of working with different roles, procedures, events, mindset and skills. This does not happen overnight and requires dedicated training and thought-through strategic visions. Fast implementation without these leads to situations in which development can create substantial technical debt which needs to be solved at a later stage as was shown in the case study. Implementing agility should thus be performed consciously. The case study and two organizations of validation sessions all illustrated that

agility started rather organically in the IT departments which indicates the presence of a trend. Public sector organizations that are currently not yet active with considering their agile implementation would be well recommended to do so since else this development might spread and scale without clear policy. In the case study this led to the situation where the business was not ready for its new tasks which made it lose control over the performance of teams and the process itself.

7.4.2 Public sector workspace does not facilitate agility

As repeated throughout the report the current trend of public sector flex work does not facilitate agility. Limited office space where teams can sit together in combination with a few available meeting rooms and absence of private spaces do not facilitate or stimulate the frequent and spontaneous face-to-face interaction and meetings so important in agility. While it cannot be expected that this policy is immediately reversed it is worth considering to attempt limiting the negative effects of this trend. This does not directly hamper the control but the workspace characteristics do hamper potential speed of development and team performance which can create delays and damage the positive atmosphere.

7.4.3 A new approach to accountability

Agility places the accountability of development on teams while public sector bureaucracies are used to centralized hierarchical control with management accountability. Especially when one considers agile structures, such as ARTs in SAFe, teams can be distributed over different departments while the business of one of the departments is in the lead. With organizations that outsource part of their portfolio to outside organizations agile contracting also raises questions on who can be held accountable for what when there are so many interdependencies. So while agility increases cooperation which can be beneficial for the process it stirs up traditional accountability structures which need to be revised. Changing accountability to agile roles in which the Business Owner in combination with Product Manager and RTE are at the end of the chain held accountable for the process might be worthwhile but more research into reshaping the accountability question is desired.

7.4.4 What about management and the teams?

A turn to agility brings another aspect into consideration which has to do with the management layer. The traditional bureaucratic characteristics which focused on conformity and performance created a substantial layer of management in public sector organizations over the

past decades (Wynne & Otway, 1983). Agility on the other hand favors team facilitating organizations which are rather flat compared to these old set-ups while it also does not have a role which suits that of a Project Manager. There is a risk that new or double roles are created to find new positions for managers. While the case study indicated that the complexity of the program at hand given the relatively big size of the project and many interfaces required more roles on the program level than agility might usually indicate the focus on team facilitation should not be neglected. One interviewee called the phenomenon “agile water head” where there are more managers in place in the middle layer rather than that there are team members which only led to more delays and less time available for smaller teams do to the job. The current market conditions already make it difficult to attract new staff which makes this an even more worrying trend. Human resources should therefore take the different demands on staff agility requires into account while the organization in general needs to review the new roles for managers and assess organizational structures to start fitting the delivery streams which decreases the need for coordination as the structures are already placed within the same department or agile organizational structure.

Chapter 8 Conclusion and reflection

8.1 Agility and public sector bureaucracies

Through an extensive theoretical analysis, in-depth explorative embedded single case study and further validation the research provides insight into how control over public sector agility can be performed. It was illustrated that agility with its short-cycled development, self-organization and team facilitating mindset seemingly provides a stark contrast to the hierarchical centralized control and red tape typical for public sector bureaucracies. The debate on adaptiveness and decentralization of the public sector was already present at the end of the 20th century but did not find resonance in practice given the new turn to performance-based mechanisms with an emphasis on strategic planning as a form of control. The research showcases that the use of agility provides substantial benefits which have the potential to provide a new approach to control in public sector projects. Its focus on cooperation can assist to overcome sectarianism in public sector bureaucracies while its short-cycled development can assist to replace legacy systems with new generalizable modular blocks over time. Furthermore, planning is also a possibility in agility which is important for public sector performance.

8.2 Controlling public sector agility

A theoretical study indicated control mechanisms inherent to or related to agility which are oriented at controlling a certain aspect of the process. These control mechanisms can be clustered in the following themes:

Agile leadership	Organizational set-up
Agile mindset and skills	Portfolio and budget
Continuous adaptation	Teams and roles
Collaboration and feedback	Technology and tools
Events and procedures	User and stakeholder interaction

Table 16: Control clusters

Control mechanisms identified in theory were all present in the case study which focused on an important executive organization of the Dutch public sector. The case study did, however, illustrate five implications of using public sector bureaucracies which influence the required control. The validation sessions supported these findings:

1. The interaction with interfaces given a broken value stream increases the complexity of the agile process

2. The need for planning given external deadlines
3. The difficulty of the specification of requirements which is rather different than used to in waterfall projects
4. The need for clear centralized visions to outline the implementation of agility and to guide prioritization
5. The interaction between agility and top-down waterfall structures

Analysis of the control mechanisms through the Revised Levers of Control framework indicated that control requires clear strategic decisions and dedication next to its operational focus. It was furthermore illustrated that control in agility has both to do with clear procedures and roles and with values and norms given the need for an agile mindset and environment of trust and transparency. Overall, the analysis furthermore showed that the agile process itself functions as the main control given its short-cycled development with continuous adaptation with most mechanisms oriented at enhancing the performance of the process.

When reflecting on three theoretical dilemmas stated in the beginning of the report it became clear that characteristics related to public sector bureaucracy control can actually assist the agile process or might even be necessary. This mainly relates to hierarchical centralized visions on prioritization for allocation of resources and planning of interface interactions. The research furthermore illustrated that the risk aversive culture of bureaucracies strongly persists due to external deadlines, required continuous functionality and tight budgets which places constraints on how agility's dynamic learning should be performed and the level of innovation which is tolerated. This should therefore also be specified centrally. Overall, this implies that control over public sector agility includes a balancing act through the use of control mechanisms related to agility and to public sector bureaucracies.

8.3 Main control mechanisms

While the report presents a list of control mechanisms a selection was made into five crucial control mechanisms which are crucial for control over the agile process in the public sector.

Define and update strategic visions on organizational priorities and to be developed products

The report illustrated that there is a need for clear strategic visions for two reasons: to provide a framework for prioritization of programs and tasks, and to provide guidance for specification of epics, features and user stories. This relates to visions on the organizational level and

program level which incorporate business value and technical debt through business cases and road maps. Given the many interfaces in public sector organizations and their organizational complexity such a vision on organizational level is required to prevent prioritization without strategic guidance which would entail loss of control over the process.

Define and update a vision on how agility is implemented

On an organizational level there should be an indication which parts of the organization are expected to make a shift to agility. Some aspects of its portfolio might have important deadlines on the short term or currently lack the capacity to make such a shift. On the program and team level it should be clear which teams and layers will use agility in the near future to start the required training and education on time and provide clear links between old and agile roles.

Set up the right mechanisms for agile planning

Planning plays an important role when it comes to control in the public sector and therefore mechanisms which support this should be in place. This firstly relates to defining and updating a MVP which includes business value and technical debt with clear WSJF values while one or two experienced Product Managers have authority over the program backlog and stakeholder interaction. Planning furthermore requires stable teams to receive reliable metrics which in combination with survey data and incorporated volatility can be used to make rough planning on delivering deadlines. Interfaces with other agile teams and especially non-agile teams should be planned beforehand or staff can be placed within a team or ART for that period of time.

Changing the portfolio

The research illustrated that two important components, team stability and creation of visions, are gravely hampered by traditional portfolio management as the current set-up is a one-year approach and works by assignments. The portfolio should be changed to a multi-year approach while allocation of resources is oriented at the program level which can then ensure team stability according to its priorities

Client and stakeholder interaction

Agility places more emphasis on client and stakeholder interaction than waterfall given the continuous adaptation and cooperation but does not provide specific mechanisms on how to go about it. A ‘sense of us’ should be enhanced while the process of interaction should also be managed for which mechanisms from process management can prove fruitful. The mechanisms

identified from process management and management in networks can provide worthwhile recommendations to set up a fair process based on parties' core interests and agility's events, rules and roles. The reason why this interaction is so crucial is since the client's wishes regarding MVP and deadlines is the primary external factor which determines whether deadlines are met with which in turn increases the desire for control.

8.4 Further challenges of public sector agility

Furthermore, four main challenges were identified which should be recognized and cared for. Firstly, agility requires time, dedication and preparation. Since agility generally starts organically in the IT departments it is important for public sector organizations to keep an eye on internal developments and provide guidance on this process to ensure training and education is provided before scaling. Secondly, public sector workspace does not facilitate agility given the new flex work policy which limits the potential of spontaneous face-to-face interaction. It therefore hampers speed of development which decreases predictability and furthermore can lead to frustration with team level staff. Furthermore, agility requires a new approach for accountability compared to traditional project management. Especially in the case of agile contracting with external parties accountability issues can arise which can trigger traditional control responses. Finally, agility considers a rather flat organization with many team level staff members and relatively few managers as its requisite organization. This provides a stark contrast to the current size of the management layers in public sector organizations. While part of management can be retrained for new agile roles after extensive training it appears that there will be quite some redundancy which is unwanted in agility as it aims for simplicity. The wider introduction of agility can thus bring significant changes to the management demography of organizations which brings job security implications for a rather large staff base.

8.5 Reflection

The use of a single embedded case study allowed for in depth research where interview findings could be crosschecked for verification while the workshop sessions with two other executive institutions served for validation. The findings did not indicate reasons to challenge the research results although it should still be noted that more empirical research is required to challenge and build on the recommendations for control in public sector agility as the use of a single embedded case study in combination with two validation organizations together still forms a rather limited source of data. Furthermore, the research uses a qualitative approach which does not include quantitative assessment on how often certain mechanisms are used compared to

others which especially in relation with the Revised Levers of Control framework gives insight into the types of control used and their effect on the process. The framework itself also requires further reflection. It was valuable for analyzing control mechanisms' characteristics, but it proved less guiding for constructing clear recommendations regarding 'need to have' and 'nice to have'. A more extensive study on how the framework can be elaborated for this objective can substantially improve the usability of the framework for practice.

The general research approach also needs to be reflected upon. While the explorative nature allowed for a broad scope which increased the likelihood of identifying a wide range of necessary control clusters and related mechanisms it is not ensured that all possibilities are actually included. The research only includes those related to the theoretical and case studies. Empirical study of other cases might illustrate the need for other control mechanisms, for instance, as the validation sessions indicating the need for more research into agile contracting due to outsourcing. The general approach also prevents very detailed analysis of the identified mechanisms functioning in different settings. While it is true that the implementation of agility and required control should be tailored to the organization's characteristics a more detailed template of the newly identified mechanisms specific to the public sector can provide valuable information. This especially relates to the creation of strategic visions on priorities, products and implementation of agility along with the new approach to client and stakeholder interaction.

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