



Transforming government: The way towards digital era governance

Dissertation presented to
obtain the degree of Doctor
in Business Economics

by

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Daar de proefschriften in de reeks van de Faculteit Economie en Bedrijfswetenschappen het persoonlijk werk zijn van hun auteurs, zijn alleen deze laatsten daarvoor verantwoordelijk.

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Acknowledgment

In writing a problem down or airing it in conversation we let its essential parts emerge. And by knowing its character, we remove, if not the problem itself, then its secondary, aggravating characteristics: confusion, displacement, surprise.

– Alain de Botton

More than four years ago my parents motivated me to go talk to a certain Professor Viaene who had an interesting PhD vacancy. I was not immediately convinced. I liked my job at PwC, and did not want to change jobs after 2 years already. And isn't a PhD a long period of isolation resulting in a scientific booklet that nobody reads? It took my parents several family dinners to convince me to at least talk to the Professor.

The Professor needed less time to convince me. Stijn, after a long conversation with you, I knew that if I ever wanted to pursue a PhD, it would be this one. Was it the relevance of the topic which convinced me, the chance to follow the project at VDAB, or the mix of working at KU Leuven and Vlerick Business School? Probably it is the combination of these ingredients that won me over. After one week of weighing pro's and con's, I made the decision to go for a career switch, and looking back, I couldn't be happier with my choice. Stijn, thanks for convincing me with your enthusiasm to start this journey, and for keeping me motivated to finish it as well. You have been a wonderful mentor, constantly challenging me to grow further as a researcher, supporting me whenever I needed it, and inspiring me with many interesting talks. Thank you for giving me the opportunity to connect the academic world and the world of practice at Vlerick, and for helping me find that spot in between rigor and relevance. Thank you for standing behind your team, no matter what happened. I hope we can continue our collaboration for many years to come.

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Lieselot Danneels

Gent, 18 December 2018

Preface

All rules for study are summed up in this one: learn only in order to create.

– Friedrich Schelling

One of my main reasons to start this PhD research journey was the combination of working both at KU Leuven (a rigorous research institution) and at Vlerick Business School (which is tightly linked to practice). During my PhD, I have tried to position myself (and my research) in between the two. This has definitely not been the easiest path, but this interesting combination was the only one that made sense to me personally. When I came across the pragmatic research philosophy, it felt as a revelation that I was not the only one adopting this view.

Although a major part of the meta-scientific debate in information systems (IS) research has concerned interpretivism versus positivism (Goldkuhl, 2012), some authors have argued that a paradigm debate should also include pragmatism (Goldkuhl, 2004; Marshall, Kelder & Perry, 2005). Since then, pragmatism has been very present in IS research, but mostly implicitly, with very few articles or authors explicitly acknowledging for it. A foundational idea in the pragmatism philosophy is that the meaning of an idea or a concept is the practical consequences of the idea/concept. Pragmatism is therefore concerned with action and change and the interplay between knowledge and action. The role of knowledge is to be useful for action. The character of knowledge is not restricted to explanations and understanding, but also includes prescriptive, normative, and prospective knowledge. Local interventions are not believed to be limited to local improvements only, but are also instrumental in creating knowledge that may be useful for local as well as general practices. Pragmatism is appropriate as a basis for research approaches intervening into the world either by introducing organizational change, as is the case in action research, or by building artifacts, as is the case in design research.

The pragmatic research philosophy also corresponds with our research collaboration with VDAB. This doctoral dissertation was sponsored by VDAB (*Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding*), the public employment service for the Flemish region in Belgium, through a research chair at KU Leuven. At the same time, we were able to follow and actively contribute to VDAB's digital transformation throughout a period of four years. As VDAB is considered a forerunner in Belgium and in Europe when it comes to digital government, the local interventions at VDAB were instrumental in creating knowledge that may be useful for the more general problem of moving towards digital era governance (DEG) as well. The focus of this PhD was influenced by the combination of a general problem (moving towards DEG) and its instantiation in the case of VDAB's digital transformation. This enabled us to deepen our focus along the way by zooming in on particular issues linked to VDAB's digital transformation, such as the strategy development in VDAB's digital lab, and the capabilities which made VDAB's open services program work.

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Chapter 1: Introduction

“What if, instead of a vending machine, we thought of government as the manager of a marketplace?”

– Tim O’Reilly

The combination of new digital technologies such as social, mobile, analytics (big data), cloud and the Internet of Things has given rise to digital disrupters such as Uber, Airbnb, and PayPal. However, an unrealized potential to transform existing businesses and industries persists. McKinsey’s global survey (Gottlieb & Willmott, 2014) – covering all types of industries – identifies a significant gap between the recognition of the importance of the new digital technologies currently at our disposal and our understanding of the true value which digital can create. The same gap exists in government as well: a survey of government officials shows that, while nearly all respondents (96 percent) characterized the impact of digital technologies on their domain as significant, only 13 percent of government officials surveyed scored their organizations as digitally mature (Eggers & Bellman, 2015).

Gottlieb and Willmott therefore propose key recommendations from their survey. First, organizations need to learn to understand what creating digital value means. This includes familiarizing themselves with four new digital realities (see Appendix A: Welcome to the Ex-Co-nomy), and the required capabilities to cope with it:

- Experience is value
- Experimentation is necessary
- Collaboration reshapes strategy and business models
- Digital ecosystem platforms rule

Second, organizations should be set up in such a way that they can take full advantage of new digital opportunities. This will require a digital transformation: a form of end-to-end, integrated business transformation

where digital technologies play a dominant role. While the ExConomy framework describes a changing world and a need for mastering new capabilities, it does not address how to get from A to B.

The objective of this study is linked to these recommendations: understanding what creating digital value means, and how organizations can be set up to take full advantage of it, specifically in the public sector context. The following sections of this chapter first zoom in on digital transformation in the public sector context, before giving an overview of the research objective and the questions that will be answered in this dissertation. Finally, this chapter provides an outline of the dissertation and gives an overview of the publications originating from the research.

1.1 Digital transformation in government

How do you launch a digital transformation program in a not so obvious environment? Public administrations are often depicted as traditional, even conservative organizations and laggards in the adoption of innovative technologies. Yet public management theorists have advocated a governmental mind-set shift to create a highly digitized service environment that applies the most modern of digital technologies to achieve its goals.

The rise of new digital technologies resulted in a new vision of how public administration should organize itself. Fishenden and Thompson (2013) advocate a paradigm shift from New Public Management (NPM) to Digital Era Governance (DEG). As moving towards DEG requires a digital transformation from the old NPM-way of working, I explain both paradigms in more detail in the following subsections, and I give an indication of whether government currently shows NPM or DEG characteristics.

1.1.1 New Public Management

New Public Management (NPM) represented the belief that the public sector could be improved by the adoption of private-sector business concepts (Hood, 1991; Kernaghan, 2000). The hierarchical, bureaucratic, and multidivisional organization became unsuited to more volatile market conditions arising from globalization (Morris & Farrell, 2007).

Table 1. Doctrinal components of NPM according to Hood (1991)

Doctrine	Meaning	Justification
'Hands-on professional management' in the public sector	Active, visible, discretionary control of organizations from named persons at the top, 'free to manage'	Accountability requires clear assignment of responsibility for action, not diffusion of power
Explicit standards and measures of performance	Definition of goals, targets, indicators of success, preferably expressed in quantitative terms, especially for professional services	Accountability requires clear statement of goals; efficiency requires 'hard look' at objectives
Greater emphasis on output controls	Resource allocation and rewards limited to measured performance; breakup of centralized bureaucracy-wide personnel management	Need to stress results rather than procedures
Shift to disaggregation of units in the public sector	Break up of formerly 'monolithic' units, unbundling of U-form management systems into corporatized units around products, operating on decentralized 'one-line' budgets and dealing with one another on an 'arms-length' basis	Need to create 'manageable' units, separate provision and production interests, gain efficiency advantages of use of contract or franchise arrangements inside as well as outside the public sector
Shift to greater competition in public sector	Move to term contracts and public tendering procedures	Rivalry as the key to lower costs and better standards
Stress on private-sector styles of management practice	Move away from military-style 'public service ethic', greater flexibility in hiring and rewards, greater use of PR techniques	Need to use 'proven' private sector management tools in the public sector
Stress on greater discipline and parsimony in resource use	Cutting direct costs, raising labor discipline, resisting union demands, limiting compliance costs to business	Need to check resource demands of public sector to 'do more with less'

Several authors have expressed their view on NPM. Boston (1991) characterizes the central doctrines of NPM as “[an] emphasis on management rather than policy; [...] a reliance on quantifiable output measures and performance targets; [...] the development of new reporting, monitoring, and accountability mechanisms; the disaggregation of large bureaucratic structures; [...] a preference for private ownership, contracting out, [...]

private sector management practices such as [...] the development of corporate plans (and) performance agreements, the introduction of performance-linked remuneration systems; a general preference for monetary incentives rather than non-monetary incentives such as ethics, ethos, and status; a stress on cost-cutting, efficiency, and cutback management” (Boston, 1991).

Table 2. NPM themes and their components (adapted from Dunleavy, 1997; Dunleavy et al., 2006; Dunleavy & Margetts, 2013)

Theme	Explanation	Example components
Disaggregation	Splitting up large public sector hierarchies Achieving wider, flatter hierarchies internally Re-specifying information and managerial systems to facilitate this different pattern of control Strong flexibilization of previous government-wide practices in personnel, IT, procurement, and other functions Construction of management information systems needed to sustain different practices	<ul style="list-style-type: none"> • Purchaser-provider separation • Agencification • Corporatization and strong single organization management • Competition by comparison • Improved performance measurement • League tables of agency performance
Competition	Introducing purchaser/provider separation into public structures to develop multiple different forms of provision and to create more competition among potential providers Increasing internal use of competition processes to allocate resources	<ul style="list-style-type: none"> • Outsourcing • Compulsory market testing • Intragovernmental contracting • Product market liberalization • User control
Incentivization	Pecuniary-based, specific performance incentives	<ul style="list-style-type: none"> • Re-specifying property rights • Light touch regulation • Capital market involvement in projects • Privatizing asset ownership • Public-private partnerships

Pollitt (2009) summarizes NPM's characteristics as (1) a greater emphasis on performance, goals, and the measurement of outputs, (2) small, disaggregated organizations, (3) substitution of contracts for hierarchical relations, (4) widespread injection of market-type mechanisms, and (5) emphasis on treating service users as customers.

Hood (1991) provided an overview of NPM's 'doctrines', see Table 1. Hood summarizes the seven core components appearing in most discussions on NPM. The NPM components have been grouped into 3 core themes of disaggregation, competition, and incentivization (see Table 2, adapted from Dunleavy, 1997; Dunleavy et al., 2006; Dunleavy & Margetts, 2013).

Although NPM expressed high ambitions, the narrow focus on performance, competition, and incentivization created silos, and had a negative impact on service quality (Brown, Fishenden & Thompson, 2014). While NPM approaches first yielded diminishing results, they later led to acute crises and reversals of policy (Dunleavy & Margetts, 2010). Some side effects include the overconcentration on measurable indicators, reduced democratic control on disaggregated units, a strong fragmentation hindering coordination and integration, higher transaction costs, and weakened ethics (Pollitt & Dan, 2011).

Over time NPM evolved from being a newly promoted paradigm with some critiques, to being forced on the defensive because of empirical findings (Drechsler, 2005). Especially with business and society evolving towards a digital era, the NPM paradigm is not a viable concept anymore.

1.1.2 Digital Era Governance

Digital Era Governance (DEG), on the other hand, promotes the use of IT to define the way government and society interact. DEG can be defined as a paradigm on how public administration should organize itself, stressing three central themes (reintegration, needs-based holism and digitization changes, summarized in Table 3) which are centered around new objectives, and new ways of working. DEG can lead to a transformation into a more genuinely integrated, agile, transparent and holistic government (Dunleavy & Margetts, 2013).

Table 3. DEG themes and their innovative features (Brown, Fishenden & Thompson, 2014; Dunleavy & Margetts, 2013)

DEG theme	Innovative features
Reintegration	<ul style="list-style-type: none"> • Network simplification • Single tax and benefit systems using real-time data • Decentralized delivery • Radical disintermediation in public service chains • Delivery-level joined-up governance
Holism	<ul style="list-style-type: none"> • Interactive and ask-once information seeking and provision • Agile processes (e.g., exceptions handling, real-time forecasting and preparedness) • Joined-up delivery of local public services • Co-production of services • Online reputational evaluations in public services, including citizens' testimonials and open-book government • Development of social web processes and field services • Single benefits integration in welfare states • Single citizen account • Integrated service shops at central/federal level • New service delivery models linked to austerity and central disengagement
Digitization	<ul style="list-style-type: none"> • Active channel streaming, citizen segmentation • 100% online channel strategies and mandated channel reductions • Government cloud and apps • Free storage and data retention • Web-based utility computing • New forms of automated processes (e.g., zero touch) • Isocratic administration (e.g., co-production of services) • Rich technologies driven by social web • Freeing public information for re-use, mash-ups and so on

“First, reintegration of the silo government agencies created by NPM provides key opportunities for exploiting digital-era technology opportunities. Second, needs-based holism even goes far beyond this joined-up governance, as it argues for a move towards a genuinely citizen-based, services-based or needs-based foundation of the organization. This consists of the following components: client-based or needs-based reorganization, one-stop provision, interactive and ‘ask once’ information-seeking, data warehousing, end-to-end service reengineering, agile government processes. Third, digitization changes consist of completely embracing and embedding electronic delivery at the

heart of the government business model, whenever possible” (Dunleavy, Margetts, Bastow & Tinkler, 2006).

While the reintegration theme of DEG is a direct reaction to NPM’s disaggregation, the other central DEG components focus on entirely different priorities and orientations compared to NPM. Taken together, the two themes of reintegration and holism argue for a transformation from traditional forms of organization around channels and departmental structures to reaggregation around the citizen in the form of services. The digitization theme implies more than just adding a layer of technology, as digital technologies reimagine the relation between government agencies and society. Therefore, DEG relies on the emergence of new technologies and new business models.

In DEG, digital technologies and platforms are at the core of government (Dunleavy & Margetts, 2015). Very few of DEG’s features can be delivered in a top-down ‘command and control’ way, but rather rely on several stakeholders organizing around digital platforms and open standards. The role of government will be to provide a set of core processes across government and to provide the strategy, and especially governance, which enable the market to organize itself around this set of core processes (Fishenden & Thompson, 2013).

DEG provides an answer to calls, e.g., by the World Economic Forum (2015), for a new model of government based on digital platforms, which will eventually redefine the relationship between government and the people. Further research will still be necessary to further define DEG, as the vision is formulated in a high-level way. Rather than defining a clear end state, an important part of DEG research will center around new ways of working to move towards DEG.

1.1.3 Current landscape: How NPM or DEG is it?

In this section, we focus on where government is situated in the transition from NPM to DEG. Particularly, we zoom in on the Public Employment Services (PES) in Europe and their move towards digital transformation, given the centrality of VDAB (the PES for the Flemish region in Belgium) in this dissertation.

NPM has predominantly been translated into practice in Anglo-Saxon countries such as the UK, US, Australia and New Zealand (Pollitt, 2007) including contractualization, outsourcing, performance pay, and benchmarking (Pollitt, 2007). In continental Europe (Belgium, Finland, France, The Netherlands, Italy, Sweden, Germany) NPM has been implemented to a lesser extent (Pollitt & Bouckaert, 2004). In these countries, changes have been made to the financial system, staff regulations, government organization, and the quality of service.

The NPM principles have been introduced in the federal government in Belgium through the Copernicus reform (Hondeghem et al., 2013). According to the 'Bouillonnota', which provides the basis of this reform, the following principles have to be the core of change processes:

- An increased autonomy of public services
- An increased accountability of the administrations
- Managing by results
- Customer focus
- Transparency
- A simplification of regulations and processes
- Monitoring of quality delivered, ex ante and ex post
- Development of performance indicators to measure the effects of government actions

Due to the newness of the **DEG** paradigm – which is still undergoing further exploration – there are currently no measures or reporting of the translation of DEG into practice yet. In order to get a first indication of whether government is moving towards DEG, we used existing surveys or indexes on digital transformation in government and supplemented this with a digital transformation survey which we sent to the European Public Employment Services (PES).

First, a survey of more than 1200 government officials from over 70 countries on digital transformation states that “three-fourths of the respondents told us that digital technologies are disrupting the public sector; nearly all (96 percent) characterized the impact on their domain as significant” (Eggers & Bellman, 2015). For measuring digital maturity, the authors used 20 questions in three categories: people (digital know-how, ability of leadership, workforce

skills, avenues to upskill, enabling talent), processes (innovation and collaboration, citizen service, citizen involvement, open source usage, enabling procurement), and preparedness (strategy articulation, investment reaction and response to digital trends, capability benchmarking). A key finding of this survey is that governments are at very different stages regarding their digital transformation, with only a small percentage maturing, and a majority in early or developing stages, see Figure 1.

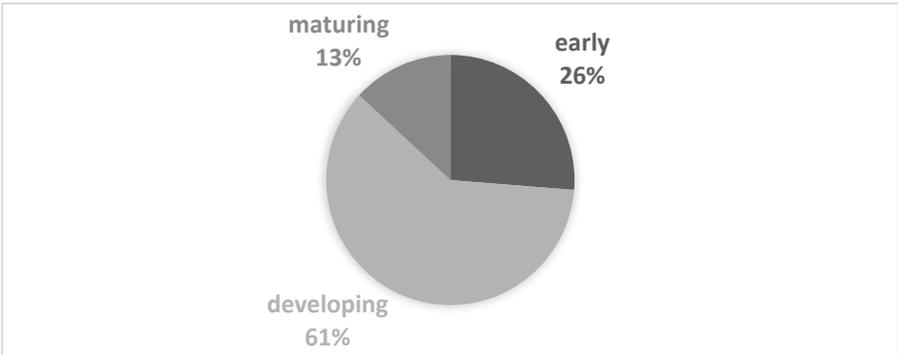


Figure 1. Digital maturity in government (Eggers & Bellman, 2015)

Second, the Digital Economy and Society Index (DESI), which is “a composite index that summarizes relevant indicators on Europe’s digital performance and tracks the evolution of EU member states in digital competitiveness” (DG CONNECT, 2017), gives an indication of the extent to which digital has been translated in the way of working throughout Europe. One of the five dimensions used for calculating the DESI index is focused on digital public services. However, this index mainly focuses on the use of digital to make existing processes more efficient (e.g., measuring the use of IT in the delivery of public services) rather than on how successfully governments have successfully implemented a digital transformation. This is reflected in the four eGovernment indicators for measuring digital public services: e-government users, pre-filled forms, online service completion and open data. Looking only at the 2017 DESI digital public services dimension, see Figure 2, some differences can be observed with the overall DESI index. The top eight still consists of Finland, the Netherlands, Denmark, Ireland and Sweden, but

welcomes three newcomers (Estonia, Austria, and Spain), and three other countries fall out (Luxemburg, Belgium, and the UK).

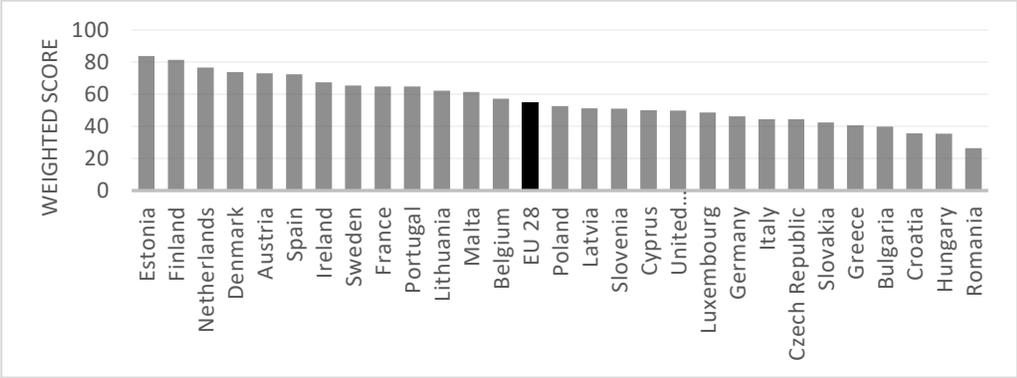


Figure 2. Digital Public Services (based on DG Connect, 2017)

Belgium’s score is only just above the EU-28 average. This score is mainly due to Belgium’s low score on the open data indicator, see Figure 3.

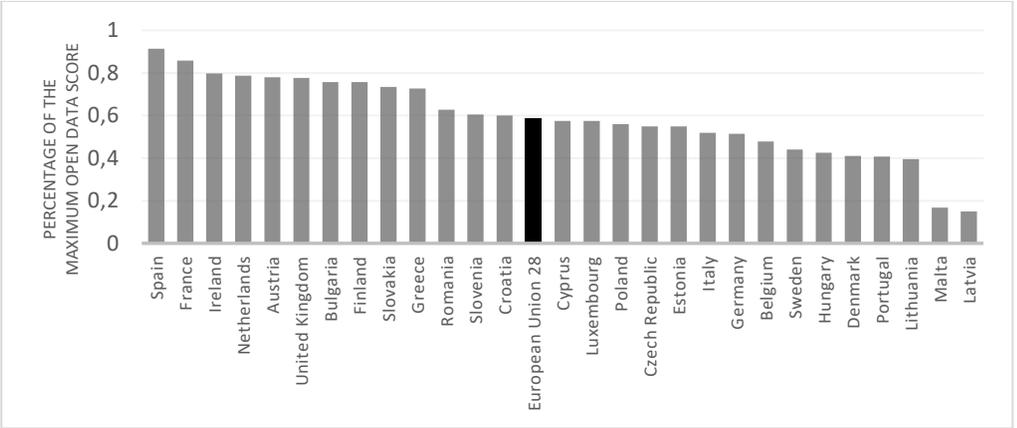


Figure 3. DESI - Open data indicator (based on DG Connect, 2017)

Third, we sent a survey to the European Public Employment Services (PES) to identify where they are situated on the transition from NPM to DEG (see Appendix B: Digital transformation survey). 18 out of 30 members of the EU PES network filled out the survey, and gave themselves a mean score of 4.57 on a scale of 7, see Figure 4. We identified VDAB as a forerunner, followed by Estonia and Austria.

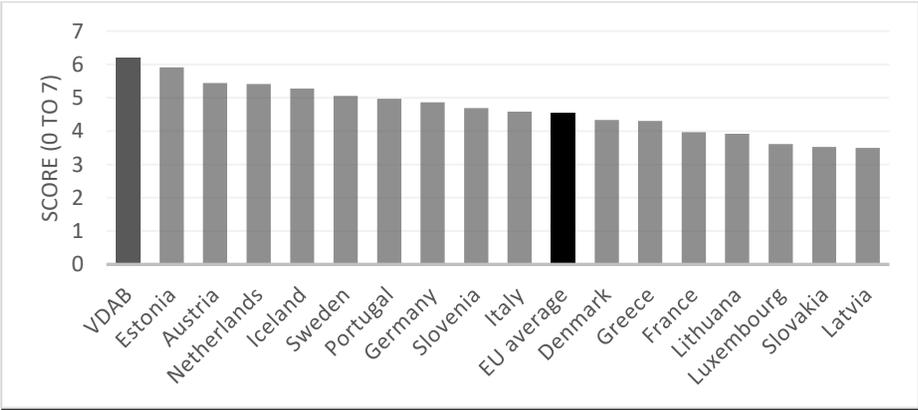


Figure 4. Digital transformation at EU PES – Mean score

The digital transformation survey focuses on six domains. VDAB was identified as a forerunner in three domains (strategy, talent, and culture). In the governance domain it scored third, and was preceded by Estonia and Sweden. In the business processes domain it scored fourth, and was preceded by The Netherlands, Estonia and Portugal. In the digital technology domain it scored second, and was preceded by Estonia.

While the DESI index might give the impression that – although Belgium as a country is rather digitized – the public sector in Belgium is not a digital top performer, this survey paints a different picture. It focuses on VDAB (the PES for the Flemish region) rather than on Belgium as a whole, but it shows that the case really is a forerunner from which others can learn. Moreover, it is a validation of the impact of our action design research approach with VDAB (see Chapter 3: Simple rules strategy to transform government. As moving towards DEG requires a digital transformation, we found the measurement

instrument useful and interesting enough to at least give us some first indications of where the PES are situated on the move from NPM to DEG.

1.2 Research objective and motivation

If public administration wants to evolve towards DEG, a paradigm shift moving away from NPM will have to be made. Therefore, the main research question of this dissertation is: *how can public administration move from NPM to DEG?* Moving from NPM to DEG comes with several sub-questions:

- What does DEG really mean?
- What are implications of moving from NPM to DEG?

In this dissertation I aim to explore these guiding questions, and gain a first understanding in a specific context rather than already providing complete answers. The goal is to support public administrations in making the transition towards DEG in order to make full use of digitally enabled innovations, while at the same time adding to literature on DEG.

It is important to also delineate what questions will not be answered in this research. This dissertation does not focus on whether everything has to be digitized, or what can or cannot be digitized. It does not focus on the individual perspective, neither on citizen participation nor on public sector employees, but is situated at the level of the public service or public sector organization (local, regional, or national).

1.3 Outline of this dissertation

Table 4 shows a schematic presentation of the outline of this dissertation and the content of its different chapters.

In **Chapter 2** we deepen the understanding of what DEG means by focusing on the widespread phenomenon of open data platforms, as platforms are seen as essential components of digital transformation in government. We use three knowledge epistemologies – cognitivist, connectionist, and autopoietic – as a lens for defining different types of open government data (OGD) platforms. To validate and further enrich the platform types, and to identify which types are most prevalent in research and which ones are

underrepresented, we performed a literature review of case studies on OGD platforms. Our search for elements of each OGD platform type in the case study literature resulted in a pressing question for more empirical research focusing on the network aspects of OGD platforms, and in a research agenda for the autopoietic platform type.

Table 4. Dissertation outline

	Contribution to overarching RQ	Specific RQ	Research Approach
Chapter 2	Better understanding what DEG means	How can we define open government data (OGD) platforms, and can we define different types of OGD platforms? Which elements of the different OGD platform types are found in the OGD case study literature?	Reinterpretation of knowledge epistemologies for OGD platforms Literature review of OGD case study literature
Chapter 3	Implications on strategy of moving from NPM to DEG	How do we formulate a good strategy of simple rules in the DEG context?	Action Design Research
Chapter 4	Implications on required capabilities to move from NPM to DEG	What does it take to co-create in an open partner network, based on digital technologies?: (1) how does a public service start with open IT-based co-creation? (2) which capabilities does a public service use to co-create value with its partners? (3) which capabilities do partner organizations use?	Embedded revelatory case study

In **Chapter 3** we have a look at the implications of moving from NPM to DEG. This chapter focuses on how to work towards disruptive DEG innovation in a turbulent strategic context by employing a strategy of simple rules. Together with VDAB, we apply an Action Design Research (ADR) approach to develop a simple rules strategy specific for VDAB’s context, which we call a set of ‘boundary breaking rules’. Coining these rules represents a first significant step in VDAB’s journey towards achieving a radical business innovation. In addition to the main artifact specific for the VDAB context, i.e., the ‘boundary

breaking rules’, we derive design principles concerning the nature of this artifact. This chapter aims to lay the foundations for a more broadly applicable design theory of simple rules, useful in contexts generalizable from the specific VDAB context.

In **Chapter 4** we focus on the implications on the capabilities required to move from NPM to DEG, by zooming in on open IT-based co-creation and the organizational capabilities required to get the most out of it. While co-creation has mostly been studied in the context of a single organization, or in one-on-one relationships, we focus on IT-based co-creation in an open partner network. We do this by investigating the revelatory case of VDAB’s 5-year experiment with open services, in which VDAB opened internal IT services through co-creation with external organizations. Based on an embedded case study, focusing on VDAB’s open services program as a whole and on three embedded cases of organizations using VDAB’s open services, we aim to explore the capabilities that help public services and their partners to be successful at open IT-based co-creation.

1.4 Publications

Articles in internationally reviewed academic journals

- Danneels, L., Viaene, S. (2015). Simple rules strategy to transform government: an ADR approach. *Government Information Quarterly*, 32(4), 516-525.
- Danneels, L., Viaene, S., Van den Bergh, J. (2017). Open data platforms: discussing alternative knowledge epistemologies. *Government Information Quarterly*, 34(3), 365-378.

Articles in other academic journals

- Leroy, F., Viaene, S., Danneels, L. (2016). Naar een digitale transformatie van overheidsinstellingen: de case van VDAB. *Vlaams Tijdschrift voor Overheidsmanagement*, 2016(3), 5-17.
- Viaene, S., Danneels, L. (2015). Driving digital: Welcome to the ExConomy! *The Journal of Financial Perspectives*, 3 (3), 182-187.

Articles in other professionally oriented journals

- Danneels, L., Viaene, S. (2015). Transforming government for the digital era: a simple rules strategy. *Cutter IT Journal*, 28 (11), 23-27.
- Viaene, S., Danneels, L. (2015). Digital transformation: unlocking the future. *Cutter IT Journal*, 28 (11), 3-5.

Article in an academic book, internationally recognized scientific publisher:

- Danneels, L., Viaene, S., Van den Bergh, J. (2017). Governance of open government data ecosystems. In: Hilb M. (eds.), *Governance of digitalization. The role of boards of directors and top management teams in digital value creation*, pp. 91-98, Haupt Verlag.

Papers at international scientific conferences, published in full in proceedings

- Danneels, L., Viaene, S. (2018). Open co-creation coming of age: The case of an open services program. In HICSS 2018: *Proceedings of the 51st Annual Hawaii International Conference on System Sciences*. Waikoloa, Hawaii, USA.
- Danneels, L. (2016). Digital business innovation of public services. In Scholl, H. (Ed.), *Electronic Government and Electronic Participation*. IFIP eGov ePart. Guimaraes (Portugal), 4-8 September 2016 (pp. 320-327) IOS Press.
- Danneels, L., Viaene, S. (2015). How to move towards digital era governance: the case of VDAB. *dg.o '15 Proceedings of the 16th Annual International Conference on Digital Government Research*. Phoenix, Arizona (USA), 27-30 May 2015 (pp. 29-36).
- Van den Bergh, J., Danneels, L., Viaene, S. (2017). Raising the bar for smart city ecosystems. *Proceedings of the International Conference for eDemocracy and Open Government (CeDeM)*, International Conference for eDemocracy and Open Government (CeDeM), Krems (Austria), 17-19 May 2017, pp. 22-27.

Meeting abstracts, presented at international scientific conferences and symposia:

- Danneels, L., Viaene, S. (2016). Open government data ecosystems. EIASM Workshop on corporate governance, in the governance of digitization track. Milan (Italy), 27-28 October 2016.

Teaching cases:

- Viaene, S., Danneels, L., (2016). Innovating with career analytics and big data. ECCH Case Study. Reference no. 316-099-1 (C) + 316-099-8 (TN).

White papers:

- Danneels, L., Viaene, S., (2015). Digital transformation of a governmental agency: A simple rules strategy. (4 p.)
- Danneels, L., Viaene, S., (2016). Naar een digitale transformatie van overheidsinstellingen. (15 p.)
- Viaene, S., Danneels, L. (2015). Driving digital: Welcome to the Exconomy. (9 p.)
- Danneels, L., Viaene, S. (2016). Knowledge-based interactions in open government data ecosystems. (31 p.)

Chapter 2: Open government data platforms: discussing alternative knowledge epistemologies

“I want to go back to the original vision of the role of government: a convener of things that we as individuals and companies can't do alone.”

– Tim O’Reilly

This chapter contributes to a better understanding of what DEG means. In order to realize DEG, several authors put a lot of stress on digital platforms (Dunleavy & Margetts, 2015; World Economic Forum, 2015). In this chapter, we zoom in on platforms as one of the possible components of DEG, by studying a very popular type of platform that is widely used in government: the open government data (OGD) platform. On OGD platforms, governments publish their data to be re-used by individuals and organizations. While understanding what government’s role is in the management and governance of OGD platforms will be indispensable for realizing this part of DEG, very little research has focused on this issue. We define what an OGD platform entails, and we reinterpret knowledge epistemologies as a lens to define different types of OGD platforms, each with a different role for government.

Related publications:

Danneels, L., Viaene, S. 2016. Knowledge-based interactions in open government data ecosystems. (31 p.)

Danneels L., Viaene S. (2016). Open government data ecosystems. Workshop on corporate governance, in the governance of digitization track. Milan (Italy), 27-28 October 2016.

Danneels, L., Viaene, S., Van den Bergh, J. (2017). Governance of open government data ecosystems. (p. 91-98) In: *Governance of digitalization. The*

role of boards of directors and top management teams in digital value creation. Hilb, Michael (editor), Haupt Verlag, 114p.

Danneels, L., Viaene, S., Van den Bergh, J. (2017). Open data platforms: discussing alternative knowledge epistemologies. *Government Information Quarterly*, 34(3), 365-378.

2.1 Abstract

Although vast amounts of data have been opened by several levels of government around the world and high hopes continue to be expressed with respect to open data's potential for innovation, whether open government data (OGD) will live up to expectations is still questioned. Up to now, the OGD literature has focused mostly on the technical side of open data, with little focus on network aspects. We argue that a definition of what an OGD platform is, and what is within its scope, is lacking. In this exploratory chapter, we use three knowledge epistemologies – cognitivist, connectionist, and autopoietic – as a lens to examine OGD platforms and to define three different platform types. To validate and further enrich the platform types and to identify which types are most prevalent in case study research and which are underrepresented, we performed a literature review of case studies on OGD platforms published in the main e-government outlets between 2009 and 2016. Looking for elements of each OGD platform type in the case study literature resulted in a pressing question for more empirical research focusing on the network aspects of OGD platforms. We also highlighted the underrepresentation of the autopoietic OGD platform type in case study research. We conclude this chapter by providing a research agenda for OGD platforms.

2.2 Introduction

The amount and the diversity of open government data (OGD) published by all levels of government worldwide continue to increase (Howard, Blanton, Holgate, Cannon & Tratz-Ryan, 2016). In Amsterdam, as just one example of the many smart city initiatives, open data is one of the eight project focus categories, in addition to smart mobility and smart living, among others (Fitzgerald, 2016). In the 'Apps for Amsterdam' contest, developers are

challenged to build apps that re-use OGD to improve the lives of residents and visitors. Examples at the national level include Singapore, aiming to become a smart nation (Chan, 2013), and Denmark, opening up basic data about the country and its citizens to be combined and re-used by others (Jetzek, 2016). It was predicted that open data could lead to \$3 to \$5 trillion of economic value, both directly through the development of new products and services and indirectly through innovative products leading to, for example, time savings for commuters avoiding traffic delays (Manyika et al., 2013).

OGD, or government-related data opened to the public (Kucera, Chlapek & Necasky, 2013), fits with a new vision of government as an enabler rather than a provider of public services. By opening its data on an OGD platform (an architecture of data services together with the governance of access and re-use), government allows third parties to create new value. Thus, OGD platforms are linked to Digital Era Governance (DEG), a paradigm on how public administration should organize itself which stresses three central themes (reintegration, needs-based holism and digitization changes). OGD platforms could be an important component of DEG, which is centered around new objectives, and new ways of working.

In the OGD literature, much has been written on the supply side, or the technological basis of open data, whereas there has been less focus on the use of open data (Maccani, Donnellan & Helfert, 2015) and the ways to foster re-use (van Veenstra & van den Broek, 2013). There are no clear definitions of what an OGD platform is, what is in scope, and whether there are different platform types. We are convinced that, even though the OGD literature is still in an early stage, there is a need for a research agenda that complements the focus on data supply with platform and network aspects.

Thus, this exploratory research aims to answer the following research questions: (1) How can we define OGD platforms, and can we define different types of OGD platforms? (2) Which elements of different OGD platform types are found in the OGD case study literature?

To do this, we use three knowledge epistemologies – cognitivist, connectionist, and autopoietic – as a lens. We apply this epistemology to the OGD context and use it as a basis for imagining different types of OGD platforms. We are convinced that this a useful and interesting lens to look at

OGD platforms, which can be considered a special form of knowledge system. By reinterpreting the knowledge epistemologies for OGD platforms, we define three platform types. To validate and further enrich the platform types, we perform a literature review that looks for elements of each type in OGD case studies published in the main e-government outlets (Scholl & Dwivedi, 2014) between 2009 and 2016. Although looking at the cases through the lens of the author brings some limitations, this review validates the applicability of the platform types to OGD case studies and indicates the focus of the OGD case studies. Based on the number of elements of the OGD platform types identified in the case studies, we are able to identify which platform types are most prevalent and which ones are underrepresented. Therefore, the literature review also gives rise to a research agenda that focuses on underrepresented elements and platform types.

Our first contribution is the introduction of three types of OGD platforms. A second contribution is that we explore, through empirical examples from the literature review, how the platform types lead to different foci for research on OGD platforms. We find that one of the types of OGD platforms, the autopoietic platform type, is underrepresented in the literature. Therefore, a third contribution is the development of a research agenda.

This chapter is structured as follows. Section 3 draws lessons for OGD platforms from the platform literature. Section 4 introduces the knowledge epistemologies that will be reinterpreted to define the different OGD platform types. Section 5 explains the methodology used for the literature review. Section 6 provides descriptive statistics on the results from the literature review. Section 7 presents the data analysis and discussion. Section 8 provides a synthesis and research agenda for OGD platforms. Section 9 closes the chapter with conclusions and issues for further research.

2.3 Towards a definition of OGD platform types

2.3.1 OGD

Ideally, open data is available online under an open license, in a structured, non-proprietary open format, using URIs, and linked to other data (Berners-Lee, 2010). If open data is government-related data opened to the public

(Kucera, Chlapek & Necasky, 2013), it is called open government data (OGD). There are three main approaches to OGD: transparency, accountability, and innovation (Attard, Orlandi, Scerri & Auer, 2015). We focus on the innovation approach, which is most closely linked to DEG, and which concentrates on fostering re-use of open data to develop new services.

The evolution of OGD initiatives and the corresponding OGD literature have been amply documented (Attard et al., 2015; Maccani et al., 2015; Thorsby, Stowers, Wolslegel & Tumbuan, 2017). In broad terms, the OGD literature started with defining basic concepts focused on the data but has evolved towards also taking external factors into account, opening up towards the entire OGD life cycle and including assessments and evaluations (Attard et al., 2015). However, up to now, the focus has mainly been on the supply of open data or how to make open data available (Attard et al., 2015; Maccani et al., 2015), rather than how to build something useful with it or how to foster re-use or build strategic partnerships. At the same time, van Veenstra and van den Broeck (2013) stress that, especially for later phases in the process of opening up data, the ways to foster re-use and build strategic partnerships become more important.

Several authors have expressed high hopes for OGD to transform government. O'Reilly (2011) was among the first to envision government as a digital platform, where government is "a convener and enabler rather than the first mover of civic action". O'Reilly identified the open data movement as one of the most promising forces driving this vision forward. His proposition was rooted in the belief that if the government realizes that it can be a digital platform provider, albeit a developing one, it might make radically different management choices (see, e.g., Danneels & Viaene, 2015). The enthusiasm around OGD by open data visionaries such as O'Reilly (2011) gave rise to many open data initiatives around the world, but it has been adjusted to a reality characterized by many barriers hindering the process of opening up (Huijboom & Van den Broek, 2011; Van Veenstra & Van den Broek, 2013; Zuiderwijk et al., 2012a, 2012b). As a result, more recent visions on how OGD can transform government take an ecosystem view, taking the complex interactions between many actors into account. According to the ecosystem approach, open data re-use does not automatically follow as a logical next step from open data publication, and the re-use of open data needs to be

consciously fostered. An example of the ecosystem approach can be found in Harrison et al. (2012), who want to see government evolve towards “information age networked and interdependent systems”. This view is also supported by Janssen and Estevez (2013), who refer to government as the orchestrator of a complex network of collaborative entities and see technological platforms as a key enabler. In the same vein, Brown et al. (2014) argue for a transition to “a new, diverse ecosystem of state, private and third sector activity, organized around the citizen in the form of services.”

2.3.2 OGD platforms

Contrary to most of the open data literature (Thorsby et al., 2017), our definition of an OGD platform is broader than only the data portal or datasets; it also includes the actors and the (results of the) use of the data. Gawer’s (2014) definition of a platform combines this focus on both technological elements and network aspects. She defined technological platforms as “evolving organizations or meta-organizations that: (1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery”. Similarly, OGD platforms consist of a core of OGD and a periphery of APIs, apps resulting from open data re-use, and even other (linked) data, tools, and services. OGD platforms create value by generating economies of scope in innovation and lower the cost of innovating by re-using OGD. An essential part of the OGD platform for generating value is the evolving network of actors surrounding it (e.g., the third-party developers, the platform’s partners and users). This network can be orchestrated by a central organization (government) or a combination of organizations. We define an OGD platform as “an architecture of data services together with the governance of access and (re-)use, created for the purpose of allowing third parties to create new value”. Government’s role consists of enabling and facilitating productive value creation by leading the architecture and governance design decisions. This does not automatically imply, however, that solely government makes these decisions; it depends on the degree of openness of the design.

2.3.3 Platform types

Several authors have proposed unifying frameworks of platforms, defining different platform types (Gawer, 2014; Henderson, Kulatilaka, Venkatraman & Freedman, 2014). Gawer (2014) bridged information systems and economic literature in her framework distinguishing between internal platforms, supply-chain platforms and industry-platforms. The platform types distinguished in the framework require different management and governance practices and thus different research focuses as well. The identification of different platform types is based on an exogenous variable, such as the organizational form (Gawer, 2014). Henderson et al. (2014) distinguish between three platform types (an intra-firm technology platform, inter-firm capability platform and ubiquitous business platform), based on the potential scope of impact enabled by technological innovation.

Much of the OGD literature has focused on the technical side of OGD platforms, or on open data supply (Attard, Orlandi, Scerri & Auer 2015; Maccani et al., 2015), but to our knowledge, no research has been performed on defining different types of OGD platforms. OGD platforms are still a rather new phenomenon, and compared to the technological platform literature, there are no separate literature streams studying it. Still, we can learn from the platform literature to make a distinction between different types of OGD platforms requiring a different management and governance approach and different research focus.

To define OGD platform types, it is necessary to determine which distinguishing exogenous variable defines the difference between the types. The openness of the platform and the accessible innovative capabilities from Gawer's (2014) framework provide no exogenous variables for OGD platforms, which are by default characterized by their openness. The evolving scope of potential impact of Henderson et al. (2014) does not qualify as a distinguishing feature either, because OGD platforms are open by default. A key barrier to bridging the different views on OGD platforms may lie in their definitions of knowledge and knowledge management. Different OGD platforms types should therefore not impose the same knowledge management view. Rather, a distinction of different platform types would present OGD platforms in the diverse ways in which they foster the generation of new value and highlight their essential characteristics.

2.4 Knowledge management epistemologies as a lens

This chapter takes knowledge epistemologies as a lens to propose different OGD platform types. Each platform type uses different definitions of knowledge and knowledge management. In this section, we first provide an overview of three knowledge epistemologies (cognitivist, connectionist, and autopoietic), which we then reinterpret for OGD platforms.

2.4.1 Knowledge epistemologies

Knowledge epistemologies are defined as basic assumptions about knowledge on which the addressed concepts and theories are based and vary in their perceptions of the notion of knowledge and the management and development of knowledge (Von Krogh & Roos, 1995). See Table 5.

Table 5. Knowledge epistemologies (based on Skok & Kalmanovitch, 2005; Venzin, von Krogh & Roos, 1998)

	Cognitivist	Connectionist	Autopoietic
Notion of knowledge	Knowledge is a fixed and representable entity that can be stored in computers, databases, archives and is easily shared	Knowledge can exist only through the connections of experts; it is problem-solution orientated and dependent upon those connections	Knowledge is part of a social system; it is observer/history dependent, context sensitive and not directly shared, only indirectly through discussions
Management and development of knowledge	Standardized management of information	Management of standardized information through communities	Management of data through individual people

Cognitivist approaches equate knowledge with information and data and thus believe that no further interpretation is necessary (von Krogh & Roos, 1995). Representationalism is a fundamental part of the cognitivist epistemology: the world is pre-defined and can be fully discovered and represented by the human mind or by an organization (Rorty, 1980). Learning is therefore the increasingly accurate definition of representation corresponding to the external world (Bruner & Anglin, 1973). People and organizations are

transparent to information from the outside and have the ability to process this information (Rorty, 1980). They behave like machines or computers and use logic and probability judgments to come up with internally consistent propositions (Varela, 1992). A knowledge management tool is used to acquire, store and disseminate information (Skok & Kalmanovitch, 2005).

The **connectionist** epistemology believes that many of the rules of how to process information are not universal but vary locally (von Krogh & Roos, 1995). Relationships and communication are the most important elements of the cognitivist epistemology (Varela, Thompson & Rosch, 1992). Knowledge emerges and resides not only in the brains of each organizational member but also in the connections among members through the rules of heedful interrelating: each member knows what needs to be done in relation to what the others are doing (Weick & Roberts, 1993). A knowledge management tool not only is used to acquire, store and disseminate information but also assists in making the right connections between different groups (Skok & Kalmanovitch, 2005).

In the **autopoietic** epistemology, knowledge cannot be directly conveyed from one individual to another, because data have to be interpreted (Venzin, von Krogh & Roos, 1998). Knowledge management systems are “created in an autonomous, simultaneously open and closed, self-referencing, and observing manner” (von Krogh & Roos, 1995). Autopoietic systems are often explained as biological cells, or autonomous entities that are able to constantly renew themselves: “components of the cell produce other components which produce the units that produced them” (Maturana & Varela, 1980). Knowledge management systems are seen as a living organism rather than a machine for processing information. Employees are free to use the knowledge management system or not, but the organization provides incentives for doing so and supports employees in pursuing new opportunities (Nonaka & Takeuchi, 1995). The environment and the knowledge management system are co-evolving. The process of interpreting incoming data in conversations is the cornerstone of knowledge development (Skok & Kalmanovitch, 2005). Positive feedback loops ensure that new additions to the knowledge management system enable the autopoietic system to make further observations, which in turn leads to new additions to the system (Venzin, et al., 1998).

2.4.2 Differing views on OGD platforms

We reinterpreted the knowledge epistemologies for OGD platforms, a specific form of knowledge systems. By starting from the knowledge epistemologies, we were able to develop an informed argumentation for three OGD platform types. Figure 5 compares the OGD platform, the actors, and their interrelationships according to each knowledge epistemology. It was a conscious choice to define different OGD platform types based on an existing lens, but this implies that the platform types are but one way to look at reality, rather than an exhaustive summary of existing platform types.

The **cognitivist** epistemology considers OGD platforms as neutral tools for disseminating information. In the cognitivist view, open data should be organized for ad hoc querying by, typically, individual actors. The focus is limited to the interactions between the actor re-using the data and the data themselves. The direction of this interaction is one-way. An example of a cognitivist OGD platform is an open data portal listing several types of datasets. The governance of the platform is rather limited in scope: the government ensures that the platform is open towards third parties (who could also be called customers of the OGD platform) and does not actively stimulate re-use.

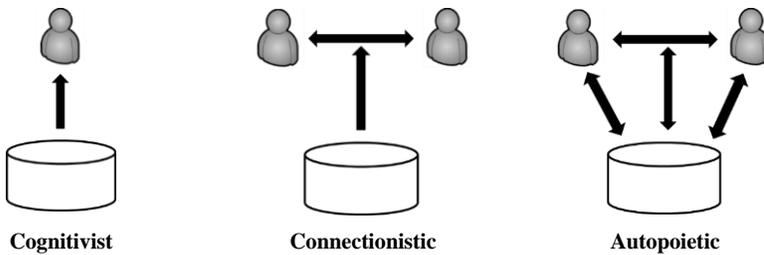


Figure 5. Open data platform and ecosystem parties according to the knowledge management epistemologies

In the **connectionist** epistemology, the government uses its data to foster connections between other platform actors and actively stimulates this. The aim is not simply combining datasets or making a connection between a platform actor and the data. Instead, the main focus is on connecting actors who otherwise would not necessarily collaborate to re-use open data. Although the OGD platform is an important enabler for this collaboration, the collaboration itself or results from OGD re-use are typically not visible on the platform. An example of a connectionist OGD platform is an open data portal listing several types of datasets, with certain parts of the platform focused on specific themes of interest, supported by offline hackathon events focused on bringing third parties together around these specific themes. In the governance of the platform, the government focuses on stimulating new value creation through the re-use of OGD by connecting third parties to each other.

Using the **autopoietic** knowledge epistemology implies looking at OGD platforms as living organisms rather than as machines for processing information. Feedback loops are the basis for a learning platform, which is reflected in the two-directional relationship arrows in Figure 5. An example of an autopoietic OGD platform is an open data portal listing several types of datasets from several sources (not only government) but also consisting of other tools and services that are useful in re-using the data and even results from the re-use (links to the apps, as well as new data resulting from the use of the apps). Hackathons are just one of the many ways to stimulate re-use, which all contribute to further enriching the open data portal. Governing the autopoietic platform requires important trade-offs to be made, balancing control over the platform and over the new value created with ways to stimulate more variety.

An important difference with the connectionist view is that actors remain on the platform and the re-use of OGD further enriches the platform. In the autopoietic view, OGD platforms are dynamic, self-renewing ecosystems, co-evolving with the environment. A central concept in the ecosystem literature is resilience: technology ecosystems need to be simultaneously stable, to assure ecosystem actors that their investments can yield long-term results, and evolvable, to adjust to changes (Wareham, Fox & Cano Giner, 2014). Therefore, the design of governance mechanisms for an autopoietic OGD platform is not an easy task: the main challenge is balancing this “paradox of

change” (Tilson, Lyytinen & Sorenson, 2010). An ecosystem keystone uses governance mechanisms that go beyond the mere publishing and distribution of OGD, instead forming a strategy that purposefully orchestrates an ecosystem of complementors (Tilson et al., 2010; Wareham et al., 2014). The orchestration role of the ecosystem keystone consists of two essential parts (Iansiti & Levien, 2004). The first is creating value by offering essential services, tools, or technologies that provide solutions to others in the ecosystem (in a more or less open way). For an OGD platform, this is the case by definition, and this part of the keystone role is covered in all three OGD platform types. Second, the keystone has to foster the health of the ecosystem by making sure that ecosystem parties want to join and remain around the table. Whereas in the connectionist OGD platform, the focus is making sure that third parties join, it is only in the autopoietic OGD platform type that all parts of the keystone role are fully covered. In an autopoietic platform or ecosystem, catering to ecosystem health implies a focus on ecosystem productivity, robustness and meaningful diversity. Productivity is increased by simplifying the complex task of connecting new participants to one another and by making the creation of new products by third parties more efficient. Robustness is guaranteed by consistently incorporating technological innovations and by providing a reliable point of reference that helps participants respond to new and uncertain conditions. The creation of meaningful diversity, contributing to the productivity and robustness of the system, is stimulated by offering innovative technologies to a variety of third parties. Different types of actors could potentially take up this keystone role, but because of the focus of this dissertation, we will focus on government as the keystone orchestrating the autopoietic OGD platform.

2.4.3 Repurposing knowledge management epistemologies for OGD platforms

We repurposed and reinterpreted the knowledge epistemologies as a lens, a perspective to propose different types of OGD platforms. This implies a broadening of the scope of the knowledge epistemologies towards a network of actors, compared to their original focus on a single organization (Von Krogh & Roos, 1995).

The three epistemologies, reciprocally, also present a difference in scope with respect to the role of government. In the cognitivist epistemology, the

government's role ends when the data are opened on a platform. In the connectionist epistemology, the government also aims to stimulate the re-use of OGD by fostering connections between different actors. In the autopoietic epistemology, the government becomes the orchestrator of the ecosystem platform.

The three epistemologies represent an evolution: each epistemology has characteristics that are similar to the preceding one but adds some important distinctive characteristics as well. The original knowledge epistemologies were already represented as a continuum, and technology keeps evolving towards more autopoietic forms. Still, our purpose is not to promote the autopoietic epistemology as the best option, regardless of the context. Although at best, the autopoietic epistemology might have the greatest potential to activate the entire innovation network, this will not always be possible or even preferable. The choice of any type of OGD platform depends on a government's objectives, resources, and context. It is key for the government to at least be aware of the different types of OGD platforms, as familiarity with the different types means having a better understanding of the limitations of each approach. The realization that others might strive for another type of OGD platform will decrease misunderstandings. The conscious choice of an OGD platform type is a critical success factor for research and for practitioners; therefore, moving from one platform type to another should be a mindful decision.

2.5 Methodology

We performed a literature review to validate and further enrich the OGD platform types that we proposed based on the differing knowledge management views. We were also looking for an indication of which types were most prevalent in the literature and which ones were underrepresented. Our aim was to look for signals or elements of the different OGD platform types, rather than to give an exhaustive summary of open data research.

To conduct the literature review, we followed the approach proposed by Information Systems (IS) researchers (Levy & Ellis, 2006; Webster & Watson, 2002). We selected articles published between 2009 and 2016. We focused on the main forums for electronic government scholars, both first tier and second

tier, as identified by Scholl and Dwivedi (2014). We reviewed both conference proceedings and journals, which have equal standing in the domain (Scholl & Dwivedi, 2014). We were looking for practical examples of open data platforms rather than theoretical or context-unaware suggestions for practice. A quick first scan of the literature on OGD confirmed that many practical examples occur at the local level. This is not unexpected given that smart cities are a popular and widely employed concept (see, e.g., Van den Bergh & Viaene, 2016) in which proximity to the citizens may ease practical applications of open data.

The literature review was an iterative process during which we reviewed references to search for other sources to be included. Based on this iterative review, we extended the list of relevant sources with two extra journals: Technological Forecasting and Social Change, and Journal of the Knowledge Economy. We included these journals as they are some of the only outlets for smart city literature.

Table 6. Selected journals and conferences

Journals	Conferences
Government Information Quarterly (GIQ)	Hawaii International Conference on System Sciences (HICSS)
Public Administration Review (PAR)	IFIP Electronic Government (IFIP EGOV)
Journal of Public Administration Research and Theory (JPART)	International Conference on Digital Government Research (dg.o)
Information Polity (IP)	European Conference on Information Systems (ECIS)
Journal of Information Technology and Politics (JITP)	IFIP Electronic Participation (IFIP EPART)
Transforming Government: People, Process and Policy (TGPPP)	European Conference on e-Government (ECEG)
International Journal of Electronic Government Research (IJEGR)	International Conference on Theory and Practice of Electronic Government (ICEGOV)
European Journal of Information Systems (EJIS)	Americas Conference on Information Systems (AMCIS)
Management Information Systems Quarterly (MISQ)	
Administrative Science Quarterly (ASQ)	
Journal of the AIS (JAIS)	
International Journal of Public Administration (IJPA)	
International Journal of Electronic Governance (IJEg)	
Information Systems Journal (ISJ)	
Technological Forecasting and Social Change (Technol Forecast Soc)	
Journal of the Knowledge Economy (J Knowl Econ)	

As a result, we reviewed 24 sources: 16 journals and 8 conferences. For a more detailed overview, we refer to Table 6.

Because of our empirical focus, we looked for combinations of “open data” AND “case study” or “open data” AND “smart city” in the title, abstract or text of the reviewed articles. We added the term “government” for the IS journals, which do not specifically focus on e-government. The keywords were kept broad on purpose as we expected to see a variety of cases, instead of focusing only on open data portals, hackathons, or smart cities.

The preliminary search resulted in 146 articles. The criteria for refining the preliminary set of articles were defined upfront by two of the authors, and they were further refined during three iterative review rounds. From the preliminary search result, we selected articles of more than four pages, limiting the preliminary result to a set of 127 articles. Six more articles were excluded by eliminating book reviews, editorials, introductions to special issues and descriptions of planned research. By reading the full articles, we removed those articles of which open data was not the main focus. Some articles mentioned only open data once; others took a government-internal perspective and dealt only with inter-agency sharing of data or data reporting between one specific industry and government. This resulted in the elimination of 45 articles.

From the remaining 76 articles, we selected those presenting a case study of open data in government, although not necessarily presented from the government’s perspective. It was not enough to present a use case merely to illustrate a theoretical proposition or model or to purely discuss open data gathering, open data publishing, or how the decision was made about whether to open data. Rather, we were looking for rich, practical case reports on open data re-use relating to our research questions. Finally, we arrived at a selection of 35 articles.

After the selection of the articles, two of the authors independently looked for cognitivist, connectionist or autopoietic elements in the case studies, based on the description of the epistemologies in section 3. During two consecutive discussion moments, they reviewed the mapping of the elements for inconsistencies. These were discussed until an agreed-upon mapping was reached, which in turn resulted in a further refinement of the entire mapping

process. Where possible, we focused on the reality of the case study rather than aspirations for the future, because we wanted to bring the vision for OGD platforms back to a practical level.

2.6 Descriptive statistics

Table 7 provides an overview of the case study topic, the research question, the level of government studied, and whether the article used primary data (P), secondary data (S), or both (P/S). Most articles used primary data sources: 12 articles used primary data only, 16 more used a combination of primary and secondary data, and only 7 articles relied on secondary data only. The case studies show different government levels, but a vast majority of the 19 cases are situated at the local level. 8 articles present cases at the national level, 1 presents a case at the regional level, and 2 present cases at supra-national level. One study could not be classified because it focused on hackers using a broad range of open data platforms. The remaining 4 articles either present a case taking place at multiple levels or several cases at different levels.

Table 7. Overview of open data case studies

Authors	Outlet	Case study topic	Research question	Level	Data
AlAwadhi & Scholl, 2013	HICSS	Seattle	“How do city officials define a ‘smart city’? [...] What are actual smart city projects and initiatives about and how do they match up with these definitions of ‘smart city’?”	Local	P
Bakici et al., 2013	J Knowl Econ	Barcelona	“(1) How does city hall manage transformation? (2) What are the underlying drivers and bottlenecks for transformation? (3) What are the main obstacles faced by the city hall? (4) What are the necessary conditions to be established for the transformation? (5) What are the assets/infrastructures required to become a Smart City?”	Local	P/S
Bertot et al., 2014	Dg.o	Medium-sized US city	“What are the local data needs of community organizations, libraries, and other community stakeholders? How do these stakeholders identify and select data of interest? How do these stakeholders currently manage the data that they use? Are there data that would be of use but are currently out of the reach of these stakeholders? How are these stakeholders using community data, and what are the gaps in skills regarding data use? What roles can libraries play in the collection, management, and use of data within local communities? What challenges do libraries face in assuming data infrastructure roles in their communities?”	Local	P/S
Chan, 2013	HICSS	Singapore	“What are open innovation strategies for creating an open innovation platform and enticing participation?”	National	S
Dawes et al., 2016	GIQ	New York and St. Petersburg	“How can a given government’s open data program stimulate and support an ecosystem of data producers, innovators, and users? In what ways and for whom do these ecosystems produce benefits?” “Can an ecosystem approach help governments design effective open government data programs in diverse cultures and settings?”	Local	P/S

Effing & Groot, 2016	IFIP EGOV	Berlin	“By using what digital strategies can cities effectively involve citizens and companies in the policy and development process of the city in order to become a smarter city?”	Local	S
Elbadawi, 2012	ECEG	Bahrain, Saudi Arabia and United Arab Emirates	“What are the key driving forces for opening up government in these countries? What approach did each country follow to initiate and manage its OGD initiative? What are the key challenges facing the OGD initiative in each country? What are the plans to overcome them? How does each of these countries perceive the OGP, in light of their local priorities and practices? How will these countries sustain and enrich their OGD practices in the future?”	National	P/S
Gonzalez-Zapata & Heeks, 2015	GIQ	OGD stakeholders in Chile	“What are the multiple meanings ascribed to open government data?” The authors further divide this into three sub-questions: “Who are the different stakeholders shaping the meaning of OGD in this context? What are the different meanings these stakeholders give to OGD in this context? Why are the different stakeholders ascribing these particular meanings?”	National	P/S
Hellberg & Hedström, 2015	TGPPP	Innovation competition in a Swedish municipality	“What are “the challenges of organizing an innovation competition for promoting citizen re-use of open public data?”	Local	P
Hielkema & Hongisto, 2013	J Knowl Econ	Helsinki	“How can Mobile Application Clusters be developed through competitions for innovative applications?”	Local and regional	S
Hjalmarsson et al., 2014	ECIS	Travelhack in Stockholm, Sweden	“What barriers inhibit the development of viable digital services from prototypes generated at digital innovation contests?”	Local	P
Hjalmarsson et al., 2015a	HICSS	Transport and accessibility project in North Sea	“How can different open data stakeholders benefit from performing systematic open data assessment?”	Supra-national	P

		European region			
Hjalmarsson et al., 2015b	ECIS	Travelhack in Stockholm, Sweden	“What innovation barriers constrain third party developers in different phases when performing open data service development after innovation contests?”	Local	P
Hu et al., 2016	Dg.o	Shenzen	“How to prepare an open data program?”	Local	P/S
Huntgeburth & Veit, 2013	ECIS	German University	Is there a “bias in favor of implementing Open Government”? What are “the consequences of implementing an Open Government initiative”?	Local	P/S
Janssen et al., 2015	IFIP EGOV	Smart energy (Amsterdam), Smart mobility (Rio de Janeiro)	What is “the complementariness of smart cities and big and Open Data research streams”?	Local	P/S
Jetzek, 2016	GIQ	Danish Basic Data Program	“How can the tensions in a multi-stakeholder open data infrastructure implementation be addressed through governance strategies?”	National	P/S
Juell-Skielse et al., 2014	IFIP EGOV	Travelhack in Stockholm, Sweden	What is “the motivation for the public to engage in innovation on open data”?	Local	P
Kassen, 2013	GIQ	Chicago	What is “the empowering potential of the open data phenomenon in the Chicago area as a platform useful for promotion of civic engagement projects at the local level”?	Local	S
Klievink et al., 2014	IFIP EGOV	European open government data	What are “common and differing elements in the IIs [Information Infrastructures] and their impact”?	Supra-national	P/S
Kuk & Davies, 2011	ICIS	Open data hackers in the UK	What are the “processes involved in the use of open data, and the enabling and limiting factors for the creation of sustainable service innovation based on open data”?	NA	P/S

			“How [does] the accumulation of artifacts, and the agency of developers, impact on sustainable open data re-use”?		
Lee et al., 2014	Technol Forecast Soc	Seoul and San Francisco	What are “the opportunities offered and challenges posed to different stakeholders in the smart city, including central government officials, city representatives, and private sector players”?	Local	P/S
Lindmann et al., 2014	HICSS	14 Finnish organizations	“What are the actors and their positions in the emerging value network?” “Which business and revenue models are utilized by the early open data entrepreneurs?”	National	P
Maccani et al., 2015	ECIS	Company turning open datasets into services	“What are the factors that influence the diffusion of open data for new service development?”	Local	P
Maruyama et al., 2013	HICSS	Collaboration between Code for America and city	What is the “usefulness of a diplomatic design approach” in the open data movement?	Local	P/S
Matheus & Janssen, 2016	Dg.o	Transparency and OGD portals in Brazil	What are “strategies for public organizations to become ambidextrous”?	National/ Regional/Local	S
Neuroni et al., 2013	HICSS	Zurich and Switzerland	“What are the main OGD goals in Switzerland from a leadership perspective, considering that transparency and participation are already at a satisfactory level?”	Local and national	P
Ojo et al., 2015	HICSS	Barcelona, Chicago, Manchester, Amsterdam and Helsinki	“How [are] open data initiatives [...] shaped by the different smart cities contexts and concomitantly what kinds of innovations are enabled by open data in these cities?”	Local	S
Reggi & Dawes, 2016	IFIP EGOV	OpenCoesione in Italy	Does the research stream focusing on OGD for purposes of innovation interact with the stream focusing on participation and accountability, and how?	National	P/S

Rudmark et al., 2012	ECIS	Stockholm public transport company	How are “co-creation activities motivated and driven”?	Local	P
Smith et al., 2016	HICSS	Trafiklab, Swedish open public transport data marketplace	“How do open data marketplaces generate value for open data users?”	Regional	P/S
Styrin et al., 2016	Dg.o	OGD in Mexico, Russia and the US	“How are variations in OG and OGD policies related to context-specific historical problems, policies and politics”? [...] “How do these information policies evolve from initial interest, expressed perhaps as a focus of the executive, towards sustained and institutionalized practice?”	National	S
Susha et al., 2015	TGPPP	4 case studies on statistical agencies and municipalities, in The Netherlands and Sweden	“Which organizational measures can facilitate the use of open data”?	Local and national	P/S
Valja & Ladhe, 2015	HICSS	Stockholm	“How is it possible to create new value chains and business ventures that take the goals of a city into account and at the same time be profitable for the participants, given the limited conditions?”	Local	P
van Veenstra & van den Broek, 2013	IFIP EGOV	RTO, The Netherlands	“Which drivers, enablers and barriers exist in organizations that open up their data to the public”? What are drivers, enablers, and barriers of open data? Do they remain the same in every phase of the process?	National	P

Table 8 gives an overview of the publication outlets of the 26 conference articles and 9 journal articles. Although IS outlets prevail at a conference level, we did not find any published article on this topic in the IS journals that were part of our selection.

Table 8. Publication outlets

Journal	Number of articles	Conference	Number of articles
GIQ	4	HICSS	9
J Knowl Econ	2	IFIP EGOV	6
TGPPP	2	ECIS	5
Technol Forecast	1	Dg.o	4
Soc		ECEG	1
		ICIS	1

Although we used 2009 as the starting year for the literature review, case studies on government opening data appear only a couple of years later. For an overview of the number of articles published per year, see Figure 6.

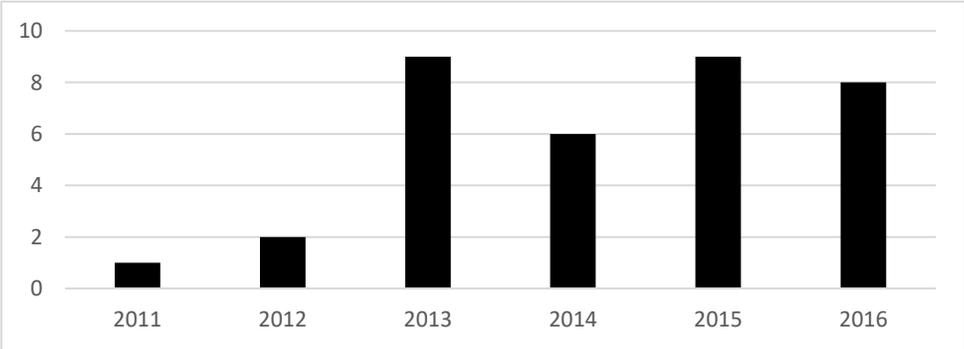


Figure 6. Number of publications per year

2.7 Data analysis and discussion

In platform research, considerable attention goes to the technological side, whereas the network aspects sometimes remain underexplored. Therefore, we use the network dimensions for OGD platforms (Dawes, Vidiiasova & Parkhimovich, 2016), which fit our definition of an OGD platform, to distinguish between the following aspects: dynamics over time, interactions and interdependencies, feedback and communication among stakeholders, sustainability, government intervention, environmental influences, and enabling actors. Looking for signals of the three OGD platform types in the case studies (not written with this purpose in mind) was not an easy task; it was easier to look for sub-characteristics. The network dimensions are therefore used as a lens which is subordinate to our main lens (the OGD platform types), and provide an overview of the sub-characteristics of each OGD platform type. In Table 9, we provide an overview of these dimensions, which have been grouped to better reflect the elements of OGD platforms identified in Figure 5.

Table 9. Network dimensions for OGD ecosystems (based on Dawes et al., 2016)

Dimension	Question
Dynamics over time and contextual responsiveness	How does the environment or context influence the way in which the OGD platform is organized, and how does the OGD platform evolve over time?
Enabling actors	Which actors are part of the OGD platform, and what are their interrelationships?
Interactions and communication	What do the dialogical processes look like in which discussions between platform actors occur?
Government intervention	What is the content and scope of the role the government plays with regards to the OGD platform?
Sustainability	What are the constraints to the long-term viability of the OGD platform?

We clustered the network dimensions because we encountered sparse data: each case study discussed only some of the network dimensions, and there were many missing values. Just like in statistics, we had to define our variables such that each network dimension was covered by a sufficient number of case studies for further analysis and discussion. We grouped two dimensions reflecting characteristics of the open data platform ('dynamics over time' and 'environmental influences') into one dimension, 'dynamics over time and contextual responsiveness', because in the case study examples, the dynamics over time were always influenced by the environment. Two dimensions focusing on the relationships between the open data platform and the enabling actors ('interactions and interdependencies' and 'feedback and communication among stakeholders') were always covered by the same examples from the case studies and were grouped into the dimension 'interactions and communication'. For each dimension, we propose a question to be answered in the OGD platform context.

In the following subsections, we further elaborate on the OGD platform types in a more detailed discussion for each network dimension. In addition, we systematically looked for elements in the case studies identified in the literature review. For each network dimension, we describe the most interesting examples.

2.7.1 Dynamics over time and contextual responsiveness

This dimension focuses on the dynamics over time of the open data artifact and the way in which the environment influences how the platform is organized.

In the **cognitivist** view, the open data platform is mostly regarded as a static artifact once it has been produced. The open data artifact consists of datasets that might be further detailed or corrected but stay in the same format. Additional datasets can be added, but the setup of the platform does not change radically over time. The only dynamics described are those of moving from a closed to an open system.

In addition, the open data platform is organized according to a one-size-fits-all approach. It is a neutral tool for storing and disseminating open data. Robinson, Yu, Zeller and Felten (2008) argue that the government's role in processing the data should be minimized or even eliminated and that it should

focus on “creating a simple, reliable and publicly accessible infrastructure that exposes the underlying data”.

According to the **connectionist** epistemology, ideally, the open data platform is adapted to the specific context in which it is used. Klievink, Zuiderwijk and Janssen (2014) argue that it is impossible to fully predict the users and types of re-use beforehand and that the open data platform may evolve to take emerging needs into account.

In the **autopoietic** view, the ecosystem and the open data platform are co-evolving systems: changes in the environment will, by default, elicit the ecosystem to adapt accordingly. All actors, as well as their relationships, contribute to the ecosystem. To become autopoietic, the applications developed with the APIs in Helsinki’s Living Lab open data competition (Hielkema & Hongisto, 2013) could, for example, enrich the open data platform by providing real-time use data of their own application.

Emerging and needs-driven parts of the open data platform are not one-off initiatives but rather result automatically from the platform use. The connectionist view already acknowledged that emerging parts of the open data platform are possible, but they are mostly initiated by the government. For example, a smart city can decide to focus on a specific topic in a Living Lab. In an autopoietic system, however, the open data platform can be enriched by different actors. Enabling many network actors to alter or add to the open data platform will require active governance of what the different actors are allowed to do (Tilson et al., 2010).

2.7.2 Enabling actors

In this dimension, we focus on the enabling actors who together form the network around the open data, and their interrelationships.

In the **cognitivist** epistemology, open data are re-used by a single party. Open data users consume open data on an individual basis, and there are no relationships needed with other actors to re-use the data. Janssen, Matheus and Zuiderwijk (2015) recognize that smart cities, for example, are highly dependent on smart citizens, “who are able to make advantage of the knowledge and in this way better utilize resources” to realize the benefits of open data.

In the **connectionist** epistemology, open data re-use occurs through the connection of several actors. The enabling actors cover different roles along the value chain from open data to re-use, and it is important that all roles are covered. Lindman, Kinnari and Rossi (2014) argue that "for the open data industry to emerge, there need to be more players occupying the roles of 'extract and transform' [data] and open data publisher because these are needed by the user experience providers to create new services".

Intermediate actors may foster connections between the actors re-using the open data. The government can take up this intermediating role, such as in Living Labs or libraries, but the mediator can also be an external party, such as Code for America (Maruyama, Douglas & Robertson, 2013).

In the **autopoietic** view, the actors form a network characterized by ecosystem interdependencies. Lindman et al. (2014) already gave the first hint towards this view by identifying the profiles that are necessary in an open data ecosystem. In the autopoietic view, the steps in the value chain are not one time only, and the artifacts developed along the steps are not restricted to the use of one specific actor. Most importantly, actions enrich the entire ecosystem rather than being limited to a one-way interaction.

Ideally, the ecosystem is organized or governed in such a way that crucial actors will take up their roles for the longer term or new actors will come up and compete with existing ones or fill in newly created spots (Wareham et al., 2014). It is not enough that all necessary roles are taken up at a static point in time. Rather, the autopoietic open data ecosystem is an autonomous system that recreates itself.

2.7.3 Interactions and communication

This dimension focuses on the interactions and communication between platform actors.

In the **cognitivist** epistemology, the focus is limited to the relationship between the re-user of the data and the data themselves. The goal is to organize the open data platform for querying by individual open data users. This means that interactions and interdependencies are limited to a one-sided data supplying relationship, corresponding to what Pollock (2011) labelled "open data as a one-way street". If necessary, a connection between the data

and potential users is actively fostered (Hjalmarsson, Johannesson, Juell-Skielse & Rudmark, 2015).

The **connectionist** epistemology focuses on two-way interactions between parties connecting offline to re-use the data. Often, the connections are facilitated by the government during hackathons (see, e.g., Hellberg & Hedström, 2015; Hielkema & Hongisto, 2013; Hjalmarsson et al., 2014; Hjalmarsson, Johansson & Rudmark, 2015; Juell-Skielse, Hjalmarsson, Johannesson & Rudmark, 2014).

Ultimately, interactions and communication between the government and society are transformed by open data. The one-way push from the government to its citizens is reimagined as a co-creative relationship in which society can build on the government's data (Bertot, Butler & Travis, 2014; Kassen, 2013).

In the **autopoietic** view, feedback from actors re-using the data and from their interactions forms the basis for a learning platform, where re-use of the OGD further enriches the platform. This contrasts with the cognitivist epistemology, in which there are no feedback loops from the re-use to the platform or to other actors and interactions are mostly data driven rather than needs driven (Janssen et al., 2015; Susha, Grönlund & Janssen, 2015). It also differs from the connectionist epistemology, in which feedback loops are limited to local connections between actors and feedback loops between the actors and the platform are lacking. This means that communication does not reach all complementors in the ecosystem but is limited to local connections. Kuk and Davies (2011) described how open data hackers started sharing tools with parties with whom they collaborated, but in an autopoietic system, such functionalities could become part of the open data platform.

2.7.4 Government interventions

This dimension focuses on the content and the scope of the role the government plays with regards to the open data platform.

In the **cognitivist** view, the government opens its data to be re-used but does not intervene much beyond setting up an open data platform. This can be a conscious choice, depending on the context, as government interventions are not always possible or even desirable.

Providing an open data platform might indeed be enough to foster re-use in some cases, where the demand for open data is externally driven from the beginning (see, e.g., Rudmark, Arnestrand & Avital, 2012). In other cases, some marketing may be necessary to connect open data users to the open data platform. Still, realizing that the government does not have to develop all services by itself is an important step in moving from a service provision strategy to a platform strategy.

In the **connectionist** view, the government acts as a central coordination mechanism and creates communities around open data. This includes attracting and connecting parties re-using open data. The need for a central coordinating mechanism is also recognized by Bertot et al. (2014), who find that none of the actors have the capacity to ‘do it all’.

In the autopoietic view, the government acts as the keystone orchestrating the ecosystem. Rather than actively coordinating the actors in the open data network, a keystone designs mechanisms that ensure that the ecosystem organizes itself. The role of the keystone consists of two parts: creating value and fostering the health of the ecosystem (Iansiti & Levien, 2004). With the open data platform, the government can offer essential services, tools, or technologies that provide solutions to others in the ecosystem. The government as a keystone also needs to foster the health of the ecosystem by making sure that ecosystem parties want to join and remain around the table.

In an **autopoietic** open data ecosystem, self-regulation is steered by governance rules balancing control and variety in open data re-use (Wareham et al., 2014). For example, if the open data ecosystem focuses more on certain areas, such as mobility, the government could apply governance rules to steer attention towards other important, but less popular, areas as well. In a keystone role, the government will have to balance the freedom of letting all parties do what they want with keeping some control over what is produced.

2.7.5 Sustainability

This dimension focuses on the constraints to the long-term viability of the open data platform.

In the **cognitivist** epistemology, the focus is on the data per se. Ideally, the range and reach of the data sources are increased regularly, and updates and

problem solving occur in response to comments or complaints. This resonates with the finding of Attard et al. (2015) that most challenges found in the literature are of a technical nature, i.e., related to the format, ambiguity, discoverability, and representation of the data.

In the **connectionist** view, sustainability implies that actors remain committed once they have joined the platform. Hence, the focus is broadened to also include sustainable actor engagement, and sustainable connections between the actors. In this respect, Kuk and Davies (2011) warn that efforts of connecting actors are concentrated too much on the early design phases; these early prototypes can be sustained only when the focus of stimulating collaboration is broadened to also include later design phases.

Ideally, sustained participation of platform actors leads to more products or services resulting from the open data re-use, i.e., higher productivity (Iansiti & Levien, 2004). However, Hjalmarsson et al. (2015b) argue that innovation contests, in their current set-up, have trouble reaching high productivity levels.

In the **autopoietic** view, the aim is to guarantee the sustainability of the entire ecosystem. If the government aims to become the keystone of a thriving open data ecosystem, it will have to cater to the ecosystem's health. This implies a focus on productivity, robustness, and niche creation (Iansiti & Levien, 2004). The connectionist view already focused on increasing the productivity of the ecosystem by simplifying the complex task of connecting ecosystem parties to one another and by making the creation of new products by these parties more efficient. In an autopoietic system, there is also a focus on guaranteeing robustness by consistently incorporating technological innovations and by providing a reliable point of reference that helps participants respond to new and uncertain conditions (Iansiti & Levien, 2004). In addition, OGD platforms have the aim of creating meaningful diversity, which is stimulated by offering innovative technologies to a variety of third parties.

Ecosystem sustainability also includes balancing certain paradoxes (Wareham et al., 2014) for which the keystone has to create appropriate governance mechanisms that balance the increase of desirable variance and the decrease of undesirable variance.

Table 10. Elements in the case studies

	Cognitivist elements	Connectionist elements	Autopoietic elements
Dynamics over time and contextual responsiveness	<ul style="list-style-type: none"> • Rudmark et al. (2012) describe how the Swedish public transport company has moved from closed to open, and more specifically how it was pushed to become more open. • Statistical agencies in Sweden and The Netherlands abstracted from the context in which their open data platform would be used because of the complexity of the environment consisting of different types of users (Susha et al., 2015). 	<ul style="list-style-type: none"> • Public transport authorities, together with a city-run Living Lab, initiated the HSL open data competition, focused on re-using transportation datasets from the Helsinki area (Hielkema & Hongisto, 2013) • Information infrastructures evolve with their context: “as the II [Information Infrastructure] and its services change, the type of users and usage also changes” (Klievink et al., 2014). • Trafiklab, an open data marketplace distributing open public transport data in Sweden, intends to act as “a community for open data users, as an initiative to catalyze the further provision of open data from the public transport sector as well as a support function for transport authorities that want to disclose data on their own terms.” (Smith et al., 2016) 	<ul style="list-style-type: none"> • On the Chicago open data portal, it is possible to hold online discussions, and fill out an interactive feedback form (Kassen, 2013) • “The II is open in the sense that any organization, business or person can use the II and contribute to it by adding datasets and applications that are not available in the II yet or by connecting extended (e.g., cleansed) datasets and the results of data use to the original dataset.” “Technical components and systems (e.g., forums, Wiki’s and data quality rating systems) enable social interaction between users.” (Klievink et al., 2014)

	Cognitivist elements	Connectionist elements	Autopoietic elements
Enabling actors	<ul style="list-style-type: none"> Maccani et al. (2015) give the example of a company that visualizes planning and building permit data from open datasets. 	<ul style="list-style-type: none"> Hielkema and Hongisto (2013) see Living Labs as intermediaries connecting the providers of open data with the developer community. They show “how Living Labs in their role of innovation intermediary can facilitate the collaboration between various actors in the mobile application cluster. By bringing challenges to the developer community [and supporting the resulting applications in the media], they drive the use of open data and further the smart city development.” Bertot et al. (2014) present the case of local libraries bringing stakeholder communities together and developing a range of skills, acting as central coordinating mechanisms or community platforms. As part of the Danish Basic Data Program (BDP), a data ambassador was hired relatively early in the program. “His responsibility was to serve as a communication channel between the BDP and potential private sector users, ensuring that relevant information was shared bi-directionally.” (Jetzek, 2016) 	No examples

	Cognitivist elements	Connectionist elements	Autopoietic elements
Interactions and inter-dependencies	<ul style="list-style-type: none"> An interviewee of the city of Seattle stated that open data are especially useful in informing the public about what the city is doing: "I don't think it's so much utilize information to help each other as it is to help our constituents out there, to let the public know better what we're doing and how we're doing it and how we might be impacting their street or their electricity." (Al Awadhi & Scholl, 2013) 	<ul style="list-style-type: none"> Hellberg and Hedström (2015) indicate that many hackathon participants join with the aim to connect to others: "approximately a fifth was contestants; the other participants were there for networking purposes. For instance, the organizers of the music festivals' aim was to get hold of someone who could work with their webpage, a task they succeeded with." Maruyama et al. (2013) discussed how Code for America fellows were instrumental in connecting different actors, both inside and outside government: "Sometimes the fellows acted as a hub for a network of existing change agents - rather than as initiators of change themselves. The fellows were connected with an alliance of supporters within the city, which included city employees, technologists, politicians and citizens. The fellows added value to the alliance by introducing enthusiastic supporters within the city to each other and connecting local change makers to their counterparts elsewhere in the U.S." (Maruyama et al., 2013) Trafiklab in Sweden regularly organizes meet-ups aimed at "stimulating interaction between stakeholders and to increase their involvement and insight in the development of the marketplace. At these meet-ups, data users interact face-to-face with other data users, exchange ideas on applications and share their motivation behind those applications. Furthermore, arranging meet-ups is also a means of gathering users' input and attracting new members to the community." (Smith et al., 2016) 	<ul style="list-style-type: none"> The Dutch CBS uses a specialized member-only LinkedIn group, which served a combination of functions: to post news and share materials, support discussions, answer questions, invite feedback on API performance, submit error reports, offer mentoring, etc. (Susha et al., 2015)

	Cognitivist elements	Connectionist elements	Autopoietic elements
Government interventions	<ul style="list-style-type: none"> Rudmark et al. (2012) describe how the insight that government should no longer provide all services by itself pushed the Swedish Public Transport Company to open up its data: “[The most popular iPhone application] is a prime example of that it is not necessarily we at SPTC who best can produce useful digital services for travelers. We hope that this initiative will lead to many more smart services to accommodate different types of travelers, says [Head of Internet Services, SPTC]” (Rudmark et al., 2012). 	<ul style="list-style-type: none"> In Helsinki “the role of government is visible in several of the actors and key incentives: in the provision of the open data and APIs, in the role as purchaser of services, as a supporting partner, and as owner of the Living Lab collaborative network and facilitation”. (Hielkema & Hongisto, 2013) The role of government also includes attracting and connecting actors re-using open data by “social media, workshops, websites, blogs, video, hackathons, education and tutorials, newsletters, networks of project partners, presentations and brochures” (Klievink et al., 2014). The eGovernment Master Plan in Singapore recognizes that “the role of the public sector becomes one of a facilitator that harnesses the strength of various parts of the society to meeting the needs of the individual citizens. The new eGovernment Master Plan is all about the government adopting an enabling and facilitating role enabled by technology to deliver public value. It’s about viewing data as a strategic infrastructure and using it effectively [...] [The portal provides] opportunities for the Government to collaborate with the people and private sector to co-create new e-services and approaches to service delivery.” (Chan, 2013) 	<ul style="list-style-type: none"> In Singapore, innovation competitions and call-for-collaborations are used for different purposes in a way to balance push and pull. Innovation competitions “appeared to be conducive for creating awareness and enticing broad participation but were weak in assuring the creation of specific high quality e-services”, while a Call-For-Collaboration invited “companies to submit proposals to develop and deploy specific e-services” (Chan, 2013).

	Cognitivist elements	Connectionist elements	Autopoietic elements
Sustainability	<ul style="list-style-type: none"> Hjalmarsson et al. (2015a) argue that systematic open data assessment may help open data providers understand where the gaps are and what can be improved. The assessment starts with an overall assessment of the open data resources available. Each of the data sources is then analyzed using six generic dimensions: access, support, license terms, costs, technical format, and quality. Identifying the differences between the data sources on each of these dimensions can identify opportunities for improvement. 	<ul style="list-style-type: none"> The data-use instances demonstrated the innovation possibilities, but rarely were they sustained or developed into sustainable services. [...] The active projects exhibited several unique characteristics [...]. They comprised: not a loner project; having immediate relevance and appeal to the hackers; devising a technical solution to a well-defined problem; aiming to form an open source community; seeking to improve the re-use value of data and other associated artifacts; and seeking to exploit the resulting technologies for service innovation and/or profit. Whereas other non-active projects were characterized by short-term goals, i.e., using open data to solve a problem of personal needs and use benefit (use value) (Kuk & Davies, 2014). At Monithon.it, an initiative performing civic monitoring activities on open data, “a major challenge for sustainability is creating enduring local groups with sufficient motivation and specific, interdisciplinary expertise to do this kind of work.” (Reggi & Dawes, 2016) 	No examples

2.7.6 Elements in the case studies

In Table 10, we describe some of the most interesting elements from the case studies identified in the literature review, for each combination of the knowledge epistemologies and the network dimensions.

2.7.7 Summary of the OGD platform typology

The characterization of the three knowledge epistemologies according to the network dimensions resulted in Table 11. The case study elements from the literature review serve as a validation of the table and an illustration thereof.

As we present the platform types as an evolution, with each type adding some elements compared to the scope of the previous type, not all individual elements or cells in Table 11 have to be distinctive when comparing platform types. Rather, all elements as a whole define each platform type as distinctive from the other types.

2.8 Synthesis and research agenda

Contrary to the popularity of OGD and high hopes expressed by O'Reilly (2011), a recently published article in *The Economist* (Out of the box, 2015) asks whether the open data movement will really effect a transformation and claims it is reasonable to ask why more has not been achieved. The research on barriers to OGD (Huijboom & Van den Broek, 2011; Van Veenstra & Van den Broek, 2013; Zuiderwijk et al., 2012a, 2012b) gave rise to a more realistic perspective on OGD, and several authors have argued for the need to take complex interactions with multiple actors into account (Brown et al., 2014; Harrison et al., 2012; Janssen & Estevez, 2013).

We argue that, given the importance of collaborating with multiple stakeholders, more research on network aspects of OGD platforms will be required.

Table 11. Knowledge epistemologies for OGD ecosystems (based on Dawes et al., 2016; Skok & Kalmanovitch, 2005; von Krogh & Roos, 1998)

Dimension	Cognitivist	Connectionist	Autopoietic
Dynamics over time and contextual responsiveness	The OGD platform is mostly regarded as a static artifact, as a neutral tool for storing and disseminating open data, organized according to a one-size-fits-all approach.	The OGD platform ideally evolves to take the context of open data re-use into account, and emerging and more needs-driven parts are possible.	Dynamic co-evolution with context occurs automatically: changes in the environment will by default elicit the OGD platform to adapt accordingly. Emerging and needs-driven parts of the platform are not one-off initiatives, but result automatically from platform use.
Enabling actors	Actors re-using open data have no need for relationships with other actors to re-use the data.	Open data re-use occurs through the connection of several actors, covering different roles along the value chain from open data to re-use. Intermediate actors can play an important role in connecting others.	OGD platform actors form a self-organizing network or ecosystem characterized by complex ecosystem interdependencies. Actors take up their roles for the longer term, or new actors come up and compete with existing ones.
Interactions and communications	Controlled by the government: one-way supply of OGD to open data users, and one-way communication push.	Two-way interactions between actors whose connection is enabled by OGD, often facilitated by government.	Feedback from actors re-using the data and from their interactions forms the basis for a learning platform.
Government intervention	Government realizes that it does not have to develop all services by itself and opens its data to be re-used and connects users to the open data.	Government acts as a central coordination mechanism for creating communities around open data.	Government acts as the keystone orchestrating the open data ecosystem by creating value and fostering the health of the ecosystem.
Sustainability	Focus on the data per se.	Focus on sustained commitment of the platform actors and their connections.	Focus on making the entire ecosystem thrive.

Through the literature review, we brought to light differences in focus in the case study research for the three OGD platform types. In the literature review, we looked for elements of three platform types in the case study research on OGD platforms. In general, we found only a limited number of studies adopting a network approach, focusing on the management and governance of a combination of the technical side and the actors in the innovation network. Moreover, we found a strong focus on cognitivist and especially connectionist platform elements, and a lack of research on autopoietic elements.

Each network dimension, regardless of the OGD platform type, was covered by only a limited number of case studies. This might be a consequence of the limited number of articles identified in the literature review, but the number of case studies covering certain specific network dimensions (especially the dimensions 'government intervention' and 'sustainability'), or the number of case studies covering several network dimensions is even lower. However, to make sense of the complexity and interdependency of a diverse set of actors and OGD platforms, the network perspective is ideally suited. This highlights a need for further research taking a network perspective to OGD platforms.

Despite this general lack of the network perspective, we covered several cognitivist and connectionist examples for each network dimension individually. Although we found a small amount of elements hinting towards the autopoietic platform type, we did not find any fully realized elements in the case study literature. It is not clear why this is the case. Are there no practical examples of autopoietic OGD platforms, or has the autopoietic view not been adopted by research? We are convinced that the autopoietic view deserves further attention. Moreover, if the open data community wants to understand why more has not been achieved and what could be done to achieve more, the autopoietic view on OGD platforms deserves a much more central position in the field.

We propose two types of questions for further research. First, further research could focus on why the autopoietic view remains absent in the case study literature. Is it a conscious choice that the autopoietic view is not applied? Are there barriers to applying the autopoietic view, and if so, are these of a practical, political or other nature? Second, despite the remarks that autopoietic OGD platforms will not always be possible or desirable, it is striking

that we did not find any clearly elaborated example in the literature. To encourage research on the autopoietic view, we developed a research agenda focusing specifically on important questions associated with the autopoietic OGD platform type.

Table 12. OGD platform research agenda (based on Hagi, 2014)

Strategic questions for MSPs	Research agenda for OGD ecosystems
How many parties?	<p>Empirical examples of how many parties to actively involve in the OGD platform and trade-offs between parties:</p> <ul style="list-style-type: none"> • Is there an optimal number of parties to involve? • Which parties are indispensable? • Which parties cannot co-exist in a sustainable OGD platform? • In which cases does a trade-off have to be made between which parties to involve? • Is government always the central party or platform orchestrator? <p>Empirical examples of government taking up the role of a missing side of the OGD platform:</p> <ul style="list-style-type: none"> • Does this help for growing the ecosystem? • Which roles can best be covered by government? • And how does government eventually transfer this role to another party?
Which features and functionalities?	<p>If OGD platforms aim to go beyond the data catalogues they tend to be now, which features and functionalities are crucial? Are there features that put the interest of different ecosystem parties at odds with each other? How should this conflict of interest be resolved?</p>
Pricing?	<p>Is losing income an important barrier to freeing up some of the most valuable data? What are viable business models for open data re-use?</p>
Governance decisions?	<p>Who is allowed to join the ecosystem, and which parts of the OGD platform can they access? What are the various parties allowed to do, and with whom are they allowed to interact on the platform? Do governance rules have to be created by a central party? How is the trade-off between quantity and quality of open data re-use handled? In which cases is one strategy preferred over the other? How does government ensure that low-quality suppliers do not drive out high-quality suppliers? How will it be ensured that parties take actions that not only are positive for themselves but also have positive spillover effects?</p>

An autopoietic view is associated with key questions regarding ecosystem platform management and governance. To develop a research agenda, we therefore look at the most important questions to be answered in the platform literature. Hagi (2014) argued that thinking of open data as the basis of a platform business model requires taking four important decisions into account. To fully support or foster knowledge-based interaction, the OGD literature should focus on these four decisions: How many different parties can be part of the ecosystem? Which features and functionalities should be part of the platform? What should pricing look like? Which governance decisions should we make?

In Table 12, we list a research agenda for autopoietic OGD platforms which we composed by asking several important sub-questions for OGD platforms for each of the four strategic questions defined by Hagi (2014). This research agenda serves as a first attempt for research on the network dimensions in an autopoietic view. We already cover a first step of this research agenda by researching autopoietic OGD platforms in smart cities, see Appendix C.

2.9 Conclusion

This chapter was developed out of alternative expectations of OGD, which might be caused by different definitions of what an OGD platform is. We proposed different types of OGD platforms by reinterpreting the lens of knowledge epistemologies. We performed a literature review and looked for elements of each type of OGD platform in open data case studies in the main e-government outlets (Scholl & Dwivedi, 2014) to validate and further enrich the OGD platform types.

The first contribution to the literature and to practice is the proposition of three types of OGD platforms: a cognitivist interaction between users and the data, connectionist interactions between different actors re-using open data collaboratively, and an autopoietic system in which each actor enriches the ecosystem through the platform's use. A second contribution is that we explore, through empirical examples from the literature review, how the platform types led to different foci for research on OGD platforms, for each of the different network dimensions. The platform types contribute to the OGD literature by offering a better framing for certain debates. Relating to the OGD

ecosystem literature, enthusiasm about the advantages of the autopoietic platform type has not yet been complemented with ample research on the implications of this approach, and more research taking ecosystem or network aspects into account is necessary. The distinction between the platform types could also contribute to the literature focusing on barriers to OGD, as future research could focus on distinguishing between barriers linked to the different platform types.

Looking for elements of the 3 OGD platform types in 35 articles resulted in pressing questions for future research. We found only a limited number of studies adopting a network approach. Therefore, this chapter calls for more focus on systematic data collection on the key governance decisions to be made for OGD platforms from a network perspective. We covered examples studying cognitivist and connectionist elements, but there was a lack of research focusing on autopoietic elements. As a first answer to the underrepresentation of the autopoietic view, further research could focus on barriers associated with applying the autopoietic view, both in practice and in research. In addition, we would like to encourage research aiming to overcome this barrier, by focusing on the most important decisions to be made in an autopoietic OGD platform. This will require rich and contextualized longitudinal case studies on how the interactions enrich not only the data but the entire ecosystem.

There are several limitations linked to this exploratory study. First, we re-used the case studies for interpretation according to the knowledge epistemologies lens, and this is beyond their initial purpose. As the case studies have not been written with the aim of being mapped on the OGD platform typology, certain elements relevant for the mapping exercise might have been omitted from the case description because of the original focus of the paper. Therefore, it is difficult to distinguish the reasons we did not find any fully realized examples of the autopoietic platform type: is this the case because the authors did not focus on autopoietic elements of the cases, or did the cases not show any autopoietic elements? To ensure the validity of the mapping, future research could validate with the authors whether the case study elements were classified correctly. Second, we looked at the cases through the lens of the author and thus mapped the articles rather than the cases themselves. This not only implies a time-sensitive snapshot of the case but also introduces a

time lag between what is currently occurring and what has been published about cases in the past. Third, choosing the network dimensions lens (Dawes et al., 2016) – which is closely linked to the autopoietic platform type – to analyze the elements from all three OGD platform types might have influenced the results of the analysis and the subsequent discussion section. Fourth, we presented the government as the central party orchestrating the OGD platform. Future research could focus on whether this always is (or has to be) the case, or whether the central party has to create all governance rules.

We hope, however, that our plea for a network approach to OGD platforms and for starting to apply an autopoietic view – as a complement to the cognitivist and connectionist view - will stimulate practitioners to revisit aspirations accordingly and will encourage researchers to focus on important questions associated with all three OGD platform types.

Chapter 3: Simple rules strategy to transform government

“The new economy’s most profound strategic implication is that companies must capture unanticipated, fleeting opportunities in order to succeed.”

– Kathleen Eisenhardt

DEG centers around new objectives for public administration, combined with new ways of working. This chapter contributes to a better understanding of the implications of DEG on strategy. It identifies a type of strategy (a simple rules strategy) that is ideally suited for dealing with a rapidly changing environment by which DEG is characterized (see e.g., World Economic Forum, 2015). Contrary to more traditional strategy types focusing on ‘where should we be?’ or ‘what should we be?’, a simple rules strategy answers the strategic question ‘how should we proceed?’. A simple rules strategy thus explicitly stresses the importance of new ways of working (more than new objectives). This chapter summarizes meta-requirements for simple rules. It also shares lessons on how to design a simple rules strategy in a DEG context, and thus proposes how the meta-requirements can be addressed in practice in the context of public services moving towards DEG. It focuses mostly on a different way of working,

Related publications:

Danneels, L., Viaene, S., 2015. Digital transformation of a governmental agency: A simple rules strategy. (4 p.)

Danneels L., Viaene S. (2015). How to move towards digital era governance: the case of VDAB. In Mossberger, K. (Ed.), Helbig, N. (Ed.), Zhang, J. (Ed.), Kim, Y. (Ed.), *dg.o '15 Proceedings of the 16th Annual International Conference on*

Digital Government Research. Phoenix, Arizona (USA), 27-30 May 2015 (pp. 29-36). New York, NY (USA): ACM.

Danneels L., Viaene S. (2015). Transforming government for the digital era: a simple rules strategy. *Cutter IT Journal*, 28 (11), 23-27.

Danneels L., Viaene S. (2015). Simple rules strategy to transform government: an ADR approach. *Government Information Quarterly*, 32 (4), 516-525.

Danneels, L., Viaene, S., 2016. Naar een digitale transformatie van overheidsinstellingen. (15 p.)

Leroy F., Viaene S., Danneels L. (2016). Naar een digitale transformatie van overheidsinstellingen: de case van VDAB. *Vlaams Tijdschrift voor Overheidsmanagement*, 2016 (3), 5-17.

3.1 Abstract

This chapter takes our research work with VDAB, the public employment service for the Flemish region in Belgium, as a starting point to study the transformation of government from New Public Management (NPM) to Digital Era Governance (DEG). This study focuses on how to work towards disruptive DEG innovation in a turbulent strategic context by employing a strategy of simple rules. Together with VDAB, we apply an Action Design Research (ADR) approach to develop a simple rules strategy specific for VDAB's context, which we call a set of 'boundary breaking rules'. Coining these rules represents a first significant step in VDAB's journey towards achieving a radical business innovation. In addition to the main artifact specific for the VDAB context, i.e., the 'boundary breaking rules', we derive design principles concerning the nature of this artifact. This chapter aims to lay the foundations for a more broadly applicable design theory of simple rules, useful in contexts generalizable from the specific VDAB context.

3.2 Introduction

VDAB, the public employment service for the Flemish region in Belgium, is in the midst of a transformation that will radically alter its business model, with IT as a key enabler. Environmental turbulence, high government expectations,

budget cuts and the involvement of a wide range of stakeholders exercise pressure on the transformation.

Our research work with VDAB serves as a stepping stone towards better understanding the shift from New Public Management (NPM) to Digital Era Governance (DEG). NPM represented the belief that the public sector could be improved by the adoption of private-sector style business concepts (Dunleavy, Margetts, Bastow & Tinkler, 2006; Fishenden & Thompson, 2013). However, NPM seems to have never really reached its promised benefits. Administrative complexity has gone up, government agencies have turned into different silos, and service quality has remained poor (Eisenhardt & Brown, 1998). Therefore, a new management stream promotes Digital Era Governance. DEG stresses the concepts of reintegration, holism and digitization. According to Dunleavy et al. (2006), DEG can lead to a “potential transformation to a more genuinely integrated, agile and holistic government, whose organizational operations are visible in detail both to the personnel operating in the fewer, broader public agencies and to citizens”. It is also expected that collaboration or co-creation between public and private partners and citizens will intensify. DEG puts much weight on IT to enable this innovation, especially in the way government is expected to interact with citizens and private organizations.

The move from NPM to DEG implies moving away from strategies neglecting a changing environment, siloed government agencies and purely incremental performance improvement. Thus, if an incumbent government agency such as VDAB sets out to make this move, it is important to understand the implications in terms of ‘how fundamentally different it must act’ vis-à-vis its past. To this end, we started an ADR project together with VDAB, guided by the following research question:

RQ: How do we formulate a good strategy of simple rules in the DEG context?

This chapter synthesizes from this exercise at VDAB by presenting the ‘boundary breaking principles’, a first significant strategic management artifact, and by documenting the way in which it was designed using Action Design Research (ADR). We derive design principles for a strategy of simple rules in a DEG context and hence contribute to a design theory specific for public services transformation in a DEG context. The purpose of this chapter

is also to demonstrate how we are utilizing ADR and what contributions we are after for stimulating the discussion concerning ADR, a relatively new research-for-practice method, with the aim of contributing to the advancement of the method.

This chapter is structured as follows. Section 3 clarifies the challenge to move from New Public Management to Digital-Era Governance. Section 4 links this type of move to the strategy field. Section 5 describes VDAB's strategic challenge. Section 6 elaborates on the methodology used. Section 7 presents the strategic management artifact of 'boundary breaking rules' and describes the way in which it was designed, presenting both meta-requirements and design principles. Section 8 presents the discussion. Section 9 closes the chapter with general considerations and plans for further research.

3.3 From NPM to DEG

There has been a dramatic shift in the understanding of the role of and the expectations towards IT and systems in public-sector agencies. Fishenden and Thompson (2013) argue that the future of public services is changing radically. They advocate a transition from NPM to DEG.

NPM represents the belief that the public sector can be improved by the adoption of business concepts, techniques and values from the private sector. It is characterized by a clear emphasis on performance. High performance is believed to be obtained by small, disaggregated organizations, competition by separating purchasers and providers of services, and incentivization by emphasizing specific performance measures (Dunleavy et al., 2006). Hood (1991) provides a summary of the doctrinal components of NPM: hands-on professional management, explicit standards and measures of performance, greater emphasis on output controls, disaggregation of units in the public sector, greater competition, private-sector styles of management practice, and greater discipline and parsimony in resource use. The ambition of NPM is to improve processes, efficiency and effectiveness.

However, NPM seems to have never really reached its promised benefits. Administrative complexity has increased, government agencies have become vertical silos, and IT has been largely outsourced to the private sector. Coordination and integration have been hampered because of the

disaggregation in small and specialized institutions and the resulting fragmentation of the public sector. The focus on performance targets and output measures has impeded meaningful improvement of public services and their outcomes (Brown, Fishenden and Thompson, 2014).

DEG emerged from the belief that IT systems can and ought to serve a higher purpose than only affecting back-office processes. IT must evolve to define the way that government and society interact. DEG stresses three central themes: reintegration, needs-based holism and digitization changes. “First, reintegration of the silo government agencies created by NPM provides key opportunities for exploiting digital-era technology opportunities. Second, needs-based holism even goes far beyond this joined-up governance, as it argues for a move towards a genuinely citizen-based, services-based or needs-based foundation of the organization. [...] Third, digitization changes consist of completely embracing and embedding electronic delivery at the heart of the government business model, whenever possible.” (Dunleavy et al., 2006) Some of the innovative features of DEG include radical disintermediation in public service chains, co-production of services, rich technology driven by social web and freeing public information for re-use (Dunleavy and Margetts, 2013). Most importantly, DEG relies on the emergency not only of new technologies, but also of new business models and supporting commercial incentives (Brown, Fishenden & Thompson, 2014).

Moving from NPM to DEG comes with several implications, most of which are yet to be uncovered and articulated. For example, the impact on the nature of strategizing and innovating with IT is bound to be significant and deserves empirical study. For established public service domains, such as public employment services, research will have to consider the current government setting as a starting point. This means that the transition to DEG, though implying IT-intensive change, cannot be fully understood by focusing on the IT artifacts only. A more profound understanding of the socio-technical change within context is not only necessary but is also pivotal to any successful reification of DEG.

3.4 Towards opportunity strategy

The strategy field has done a great deal of research studying effective strategy formulation for different types of environments. Bingham and Eisenhardt (2008) distinguish three different types of strategy: positioning, leveraging and opportunity strategies. The most important characteristic of each strategy type is summarized in Table 13, adapted from Bingham and Eisenhardt (2008). Each strategy positions itself in a different way: it answers a different strategic question, uses a specific type of competitive advantage, works in a certain type of environment, aims for a certain duration of competitive advantage and raises different challenges.

Table 13. Which strategy when?, adapted from Bingham and Eisenhardt (2008)

	Position strategy	Leverage strategy	Opportunity strategy
	<i>= build mutually reinforcing resource systems with many resources in an attractive strategic position and deepen their links</i>	<i>= build strategically important resources for current markets and leverage them into attractive new products and markets</i>	<i>= pick a few strategic processes with deep and swift flows of opportunities and learn simple rules to capture opportunities</i>
Strategic question	Where should we be?	What should we be?	How should we proceed?
Environment	Slowly changing, well-structured markets	Moderately changing, well-structured markets	Rapidly changing, ambiguous markets
Duration of advantage	Sustained	Sustained	Unpredictable
Impact on organizing	Tightly link all resources, consistent with the positioning strategy	Complicated, routine organizational processes	Simple or semi-structured organizational processes and simple rules that guide opportunity capture
Challenges	Change in the environment	Individual and organizational ability to build new core resources or abandon old ones may be low	Maintain an optimal level of structure

Moving towards DEG requires an opportunity strategy that leverages new digital technologies and that fits this turbulent environment and specific context. The nature of this strategizing exercise is summarized in Table 13. Indeed, it will be challenging for government to maintain an optimal level of structuring for its organizational processes. Moreover, the case of a public service moving from NPM to DEG brings with it the challenge of making sure that established behavioral reflexes or old frames are unlearned while new ways of acting are developed.

Per advice of Davis, Eisenhardt and Bingham (2009) and Eisenhardt and Sull (2001), strategy formulation in an opportunity context is best achieved using a strategic management artifact called simple rules. A simple rule is a concise statement of how an organization believes it should reach its strategic objectives. Simple rules are not broad, vague, mindless or stale, but represent those careful choices that will make the difference in terms of success and survival of the opportunity venture. Simple rules help to adapt quickly to changing circumstances while safeguarding the most profound strategic choices and balance efficiency and flexibility. They aim at directing and coordinating stakeholders in 'just enough' ways.

3.5 VDAB's challenge

Founded in 1989, VDAB (*Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding*) is the public employment service for the Flemish region in Belgium (Flanders). It offers employment services, training, and career guidance to society at large.

VDAB is an external autonomous agency. As a public sector organization, VDAB is publicly funded and its policy priorities are determined by government ministers. It is therefore still accountable to the Flemish government.

Every five years, a management agreement outlining mutual commitments for the next five years is concluded between the Flemish government and VDAB. This agreement translates the policy priorities into strategic goals for VDAB and determines what resources it will receive as well as the corresponding outputs.

In the new management agreement 2011-2015, VDAB was given the task of organizing the provision of new services that would support labor market and career policies. The agreement explicitly acknowledged the role of technology in service provision. It also emphasized service innovation that encouraged individuals’ self-reliance and self-management. We refer to Table 14 for a deeper understanding of VDAB’s old role and its new one. For a broader overview of VDAB’s context, we refer to Viaene and Broeckx (2013).

Table 14. New VDAB role

	Old VDAB role	New VDAB role
Target audience	Non-active citizens and job seekers (450K)	Non-active citizens and job seekers Working citizens (4,000K) Employers Labor market actors
Geography	Regional (Flanders)	Regional + Inter-regional (European)
Value proposition	Job security	Labor market services: job security career security employer services partnership, e.g., education, training providers, recruitment agencies, community organizations
Service delivery	Reactive Rigid Office (mainly) Office hours (9 to 5) Handholding (counselors and account managers)	Pro-active Flexible Multi-channel 24/7 Self-service, -reliance, -management

The main strategic question for an opportunity strategy is ‘how should we proceed?’, but the choice of which opportunities to capture is equally important to succeed. To reach its long-term objective, VDAB has decided to engage in a program of projects. A first project, named ‘Vick’, is ongoing. In particular, in its design of novel digital services, this project takes in scope young graduates with a time frame starting one year before they enter the labor market and ending two years after. This first project was strategically

chosen, as it focuses on serving a priority target segment which is underserved by the existing organization and it uses a new type of business model. In addition, focusing on this customer segment receptive of digital innovation would help to put VDAB in the picture early in a possibly life-long service journey, which shows high potential for future growth.

Project 'Vick' was set up in a particular way, inspired by Christensen's (1997) recommendations for disruptive innovation. Christensen advises to create an autonomous organization, or independent entity, and stresses the need for CEO or other senior manager support. This was considered at VDAB, as Project 'Vick' would be run very autonomously and would fall under direct supervision of the CIO and CEO. The project received full support from the complete management team and the agency governance council. Separate planning and budgeting processes were created, and team members could be freely chosen. The team was given the mandate to create their own way of working and experiment with what would work best.

The focus in the project management approach was to remain agile. Flexibility and speed were sought by reducing obstacles all along the way and by explicitly empowering the project manager and his team to make their own decisions without having to unnecessarily escalate. In other words, the project team received much discretion to discover what worked in terms of organizing and what did not. There would be a serious learning trajectory involved given that the initial maturity of the team for operating a project in an agile way was limited.

The project set-up consisted of a strategy loop and a product loop. In the strategy loop, a simple rules strategy was created for the steering committee management. In the product loop, a product was created for the end customers. By nature of the steering committee activities, the strategy and product loops are coupled. The focus of the chapter is on the strategy loop and the design process of the 'boundary breaking rules' artifact.

In the strategy loop, the 'boundary breaking rules' artifact was created for the steering committee management. Strategic steering committee meetings were organized once or twice a month. The steering committee consisted of VDAB's CIO and senior policy advisor, the project manager and the researchers. Among the responsibilities assigned to the project's steering

committee was to make sure that the project proceeded according to a strategic DEG rationale. The development and use of a set of ‘boundary breaking rules’ instantiated this requirement. The steering committee ended up overseeing multiple parallel service delivery tracks with the ambition to produce an integrated service offering. In general terms we talked about the IT artifact, but there were multiple parallel service component tracks.

In the product loop, a product was created for the end customers by the project team and the project manager. The project was executed by a core project team of 6 VDAB employees representing business and IT aspects. External parties were involved to bring in branding and agile software development expertise. The product development happened in an iterative agile loop, in which the end customers were heavily involved in testing and focus on the users’ experiences was key. After several of these loops, the product has been launched successfully.

3.6 Methodology

The underlying research project of this chapter applied the Design Science Research (DSR) paradigm, more specifically the DSR framework of Action Design Research (ADR) by Sein, Henfridsson, Purao, Rossi and Lindgren (2011). We aimed to develop an IS design theory, in line with Gregor and Jones (2007), that facilitates the design of a strategy of simple rules.

“Design science research is a research paradigm in which a designer answers questions relevant to human problems via the creation of innovative artifacts, thereby contributing new knowledge to the body of scientific evidence. The designed artifacts are both useful and fundamental in understanding that problem” (Hevner & Chatterjee, 2010). For conducting DSR, several frameworks have been proposed, which all divide the design process into several phases. Despite the plethora of different breakdowns of the DSR process, most studies promote an iterative approach comprising similar cycles. A seminal study in this area is the work of Hevner, March, Park and Ram (2004), who proposed seven guidelines to conduct design science research. These guidelines emphasize the need for design science to be motivated by a practical problem, which is addressed by rigorous

methodology, including an evaluation according to scientific standards and the communication of results to a community.

In this chapter, we adopt the ADR framework of Sein et al. (2011), who extended the DSR paradigm with action research elements and avoid the separation problem of building and evaluation of previous DSR frameworks, see Table 15.

Table 15. Comparing design research, action research, and ADR (based on Henfridsson, 2011)

Property	Design research	Action Research	ADR
Artifact	Central	Peripheral	Central
Organizational impact	Peripheral	Central	Central
Subject participation in research design	Possible	Mandatory	Mandatory
Subject feedback	Discrete	Continuous	Continuous
Transferability	Explicit	Implicit	Explicit
Success measure	Quantifiable measures of artifact behavior	Organizational impact	Organizational learning and artifact generalizability

ADR enables us to research IT artifacts as “ensembles shaped by the organizational context during development and use”. Sein et al. (2001) propose that the creation of an artifact is informed both by the researcher’s initial design and by continuous interaction with the organization. “ADR is a research method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts in an organizational setting” (Sein et al., 2011). According to Sein et al. (2011), it is crucial to include this organizational setting right from the start when designing an artifact, to ensure that the designed prototype really meets the organization’s needs. This underlines the importance of an exemplary case and rich case description for enabling theoretical development.

ADR research consists of four stages, summarized by Sein et al. (2011) in Figure 7. The first stage, Problem Formulation, recognizes a problem perceived in practice or anticipated by researchers. In the second stage, the problem

framing and theoretical premises from the first stage are employed to generate the initial design of the IT artifact, which is further shaped by organizational use and subsequent design cycles. This second stage is called Building, Intervention and Evaluation (BIE). In the third Reflection and Learning stage, which parallels the first two stages, we move conceptually from building a solution for a particular instance to applying that learning to a broader class of problems. In the last stage, all input from the previous three stages is combined into a Formalization of Learning. Situated learning indeed has to be further developed into general solution concepts for a class of field problems. The outcomes can be characterized as design principles and with further reflection as refinements to theories that contributed to the initial design of the artifact.

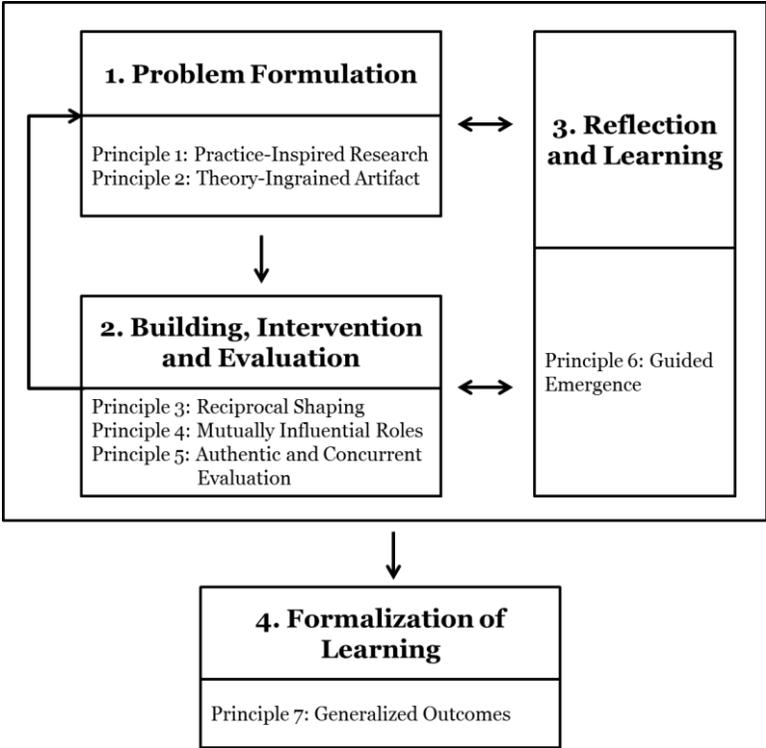


Figure 7. ADR method: stages and principles (Sein et al., 2011)

Our ADR approach covered all four stages of the process, as described in Figure 7, and has been accomplished in close collaboration with VDAB. The research was made possible by means of a strategic partnership between KU Leuven and a public-sector agency (VDAB), which funds a ‘Digital Business Innovation of Public Services’ multi-year research chair at KU Leuven. The aim of the research is to investigate possibilities for advanced digitization of public services.

We started the ADR process by defining general meta-requirements for a strategy of simple rules. This set of meta-requirements or goals specifies the type of artifact to which the theory applies and also defines the scope, or boundaries, of the theory. We then used ADR to develop the VDAB instance of a strategy of simple rules: the ‘boundary breaking rules’. From the design of this instantiation, we derived general design principles which provide an operationalization of the general meta-requirements.

Data was collected using participant-observation and analysis of both internal strategic documentation and previous case research. The researchers were present at the project kick-off, 19 project steering committees, which lasted for about two hours each, 4 workshops and 2 project reporting meetings with the CEO. One of the researchers consistently took notes, while the other intervened, in order to keep both activities separated. In addition, the researchers collected the notes of steering committee members, if any. They also observed the course of the project during several other project team meetings and attended informal meetings with the project manager.

To reach its long-term objective described in Table 14, VDAB decided to engage in a program of projects. One of the first projects, named ‘Vick’, is ongoing. The IT artifact in project ‘Vick’ is an app for young graduates entering the labor market that is designed in a fundamentally different way. The artifact under study in this chapter is not the IT artifact itself, but rather, a strategic management artifact called ‘boundary breaking rules’ that makes up a specific part of the IT ensemble. Thus, the locus of innovation with this artifact is, employing the method description introduced by Sein et al. (2011), organization-dominant. The artifact was created with the ambition to keep the project team – and later project teams – effectively and efficiently mindful of their aim to strategically disrupt (and not lapse into traditional working habits) while engaging in a project managed in an agile way. The artifact was

introduced in the initial phase of the project and was then was utilized and fine-tuned along the way.

The different ADR stages for developing the ‘boundary breaking rules’, and ADR principles linked to it, are summarized in Table 16. The table also includes a trace of how the different stages have influenced the artifact life cycle.

Walls, Widmeyer and El Sawy (1992) were the first to express the need for an IS design theory (ISDT). More recently, Gregor and Jones (2007) proposed eight components to document a design theory. We intend to develop a design theory for simple rules in a DEG context covering all components proposed by Gregor and Jones.

We see Design Science Research, and ADR in particular, as a promising approach because we not only want to solve VDAB’s challenge, but rather, we also aim to build an understanding of ‘how to formulate a good strategy of simple rules’ in a context where public service aims to transform from NPM to DEG. Moreover, formulating design principles to answer this strategic question and developing a design theory for simple rules has not yet been done and would thus increase the existing body of knowledge.

Table 16. ADR process at VDAB, in line with (Sein et al., 2011)

Stages and Principles		Artifact
Stage 1: Problem Formulation		
<i>Principle 1: Practice-Inspired Research</i>	Research was driven by VDAB's need for a better understanding on 'how differently it must act'.	<i>Recognition:</i> Recognition that a different way of proceeding is necessary to reach VDAB's DEG aspiration. The choice for working with an opportunity strategy utilizing simple rules is made.
<i>Principle 2: Theory-Ingained Artifact</i>	The management artifact created via ADR was informed by DEG, strategy and innovation literature, as well as previous case work and studying internal strategic documentation.	
Stage 2: BIE		
<i>Principle 3: Reciprocal Shaping</i>	Problems encountered in design and use of the simple rules, related to the specific VDAB context, were iteratively addressed by concurrent artifact revisions. The terminology of 'boundary breaking principles' was introduced early in the process.	<i>Iterative artifact revisions:</i> Wording and framing of the principles: use of comprehensible contrasting, 'from A to B', expressed in familiar wording while still representing a disruptive path. Referential strategy: use of colors and images to ease referral to A and B during design and use of the principles.
<i>Principle 4: Mutually Influential Roles</i>	The ADR team included researchers and practitioners. The role of the researchers ranged from addressing abstract problems to modeling, establishing and validating project management and governance structure and operationalizing theories pertaining to the principles to the specific context.	
<i>Principle 5: Authentic and Concurrent Evaluation</i>	The artifact was revised at regular moments, both in a planned and in an emergent way. During bi-weekly steering committees, the project's work was benchmarked against the 'boundary breaking rules', and at the same time, the 'boundary breaking rules' were challenged by putting up the mirror of the project work.	
Stage 3: Reflection and Learning		
<i>Principle 6: Guided Emergence</i>	The management artifact emerged from several iterations between its theory-informed design and use in context. New requirements emerged from the BIE stage and resulted in important artifact revisions.	<i>Emerging version and realization:</i> the 'boundary breaking principles' were revised based on new requirements occurring in the BIE stage.
Stage 4: Formalization of Learning		
<i>Principle 7: Generalized Outcomes</i>	A set of design principles was articulated for a strategy of simple rules in a DEG context, positioning VDAB's 'boundary breaking rules' as an instance.	<i>Ensemble version:</i> an ensemble artifact embodying the design goals and principles.

3.7 Designing simple rules for DEG

In this section, we first provide a summary of the ADR process, its stages and principles, and their influence on the artifact life cycle.

In the Problem Formulation stage, we define general meta-requirements for a strategy of simple rules. In the Building, Implementation and Evaluation stage we used ADR to develop the VDAB instance of a strategy of simple rules: the 'boundary breaking rules'. In the Reflection and Learning stage we applied the learning from designing the 'boundary breaking rules' to the broader class of simple rules strategies. In the Formalization of Learning stage, we present design principles as general solution concepts for the class of field problems.

We also present the current version of the 'boundary breaking (BB) rules' from VDAB.

3.7.1 Problem formulation and meta-requirements

In the first ADR stage, a problem perceived in practice or anticipated by researchers is formulated and related to a class of problems. Under the section 'VDAB's challenge', we formulated the problem of 'how differently must VDAB (learn to) act' and related it to a larger, more general class of problems. Employing ADR, we aim to generalize from our research in the context of project 'Vick' to the class of problems of moving from NPM to DEG by adopting a radical innovation approach.

To solve VDAB's challenge, we utilized a strategy of simple rules for developing VDAB's 'boundary breaking rules'. Before proceeding to the BIE cycle, it was necessary to formulate clear meta-requirements for developing such a strategy of simple rules. We summarized the existing literature on simple rules and complemented it with related literature streams on defining principles.

The key requirement and main obstacle for simple rules is to maintain optimal structure (Bingham & Eisenhardt, 2008). Given the specific DEG context, with public services aiming for transformation to cope with the turbulent environment, we articulated several meta-requirements, which mutually aim

to reach and maintain this balance. These meta-requirements and the specific literature by which they were informed are summarized in Table 17.

Table 17. Meta-requirements for simple rules

Meta-requirement	Literature
MR1: Specific	Davenport, Hammer & Metsisto, 1989; Eisenhardt & Sull, 2001; Sull & Eisenhardt, 2012
MR2: Transparent	Bingham & Eisenhardt, 2014
MR3: Actionable	Broadbent & Weill, 1997
MR4: Differentiating	Davenport et al., 1989; Bingham, Eisenhardt & Furr, 2007
MR5: Future-oriented	Broadbent & Weill, 1997; Sull & Eisenhardt, 2012

To clarify what simple rules should look like, Eisenhardt and Sull (2001) start by defining what they are not. Simple rules are not “broad, vague, mindless or stale”. To enable effective opportunity capture, the rules should be concrete and should identify a bottleneck that is both specific and strategic (Sull & Eisenhardt, 2012). When defining IT principles, Davenport, Hammer and Metsisto (1989) noted that there is no need for defining the ‘right’ principles. Rather, we need helpful principles appropriate for the particular environment. Therefore, the first meta-requirement addresses the challenge to make simple rules specific, not only in terms of preciseness but also with regard to clarity and uniqueness (**MR1**). Simple rules should be easy to perceive, as they also have to be easy to remember and communicate (Bingham & Eisenhardt, 2014). Thus, the second meta-requirement seeks simple rules that are transparent (**MR2**). Broadbent and Weill (1997) argued that business maxims should be articulated to express the firm’s competitive stance in a clear, actionable way. The same holds for simple rules: they should have practical value and thus be actionable (**MR3**). Bingham, Eisenhardt and Furr (2007) underline that strategy is about being different: not different positions in stable markets, but different heuristics in a dynamic market. Davenport et al.’s (1989) finding that principles should be appropriate for the particular environment definitely holds in the DEG context. Simple rules should capture the essential shifts to be made in the transformation from NPM to DEG. **MR4** therefore addresses the differentiating nature of simple rules. Several studies have reported the need for the rules to evolve (Eisenhardt & Brown, 1998; Sull

& Eisenhardt, 2012), but it remains unclear how often they should be revised. Sull and Eisenhardt (2012) advise to build in periodic checkpoints, or even to cap the total number of rules to a handful, to force ongoing discussion, as no rules should last forever. As soon as there is a change in environment, they should be reshaped (Broadbent & Weill, 1997). Therefore, we conclude that the rules should be future-oriented (**MR5**).

3.7.2 Building, Implementation and Evaluation

After the Problem Formulation stage, the ADR approach steps into a BIE cycle. In the VDAB case, an initial set of simple rules was coined by the project leader and the researchers, based on case research conducted in the context of writing a teaching case (see Viaene & Broeckx, 2013); a review of the internal strategic documentation available at the start of project 'Vick'; a review of the DEG, strategy and innovation literature; and guided by the meta-requirements for simple rules.

Every bi-weekly steering committee in the course of the project was utilized as a natural moment of validation of the effectiveness of the simple rules. To document their work, the researchers consistently took notes during meetings. In addition, they collected the notes of steering committee members. The simple rules were also evaluated in between steering committees in a less planned way.

At the beginning of the project, everyone involved was very enthusiastic about the possibility to start from scratch. One project team member claimed:

“We can design a completely new service delivery model, regardless of what exists today in VDAB, restart from scratch, build a new organization [...] so we will use as little ‘old VDAB language’ as possible and pretend that VDAB does not exist.”

However, as the project team consisted mainly of VDAB employees, it proved very hard to ‘unlearn’.

“What we learned is that we only book results when we think out of the box. But taking distance and unlearning is very difficult.” (Project manager, VDAB)

The terminology of ‘boundary breaking rules’ was introduced in the first steering committee because there was a need to emphasize that the simple

rules had to signal a fundamental departure from the past. It represented the first major revision of the simple rules. At the same steering committee, a second major revision was done to give the rules more buy-in: we introduced explicit wording and framing linked to the New Management Agreement. This wording helped in making the rules transparent (MR2), as they used familiar wording, as well as specific (MR1) and future-oriented (MR5), as they focused on reaching clearly defined future goals.

The next important artifact revision, still at a stage prior to the project kick off, was triggered because the researchers and steering committee members felt that the rules had lost some of their strength because they had been formulated to be politically correct rather than to really underline fundamental breakaways from the past. In preparing for the project kick off, we noticed that when presenting the principles outside the steering committee, we still sometimes failed to make people see how non-trivially different project 'Vick' was supposed to be, in terms of its outcome as well as its process. Thus, together with the project manager, we decided to change the format of a 'boundary breaking rule' from a sentence describing a new way of proceeding to a juxtaposition in the form 'from A to B'.

Taken together, the link to the management agreement, link to the current state of affairs and stress on the fundamental difference between the two represents a first design principle:

DP1: Make the simple rules specific, differentiating and future-oriented by linking them to both an agreed upon view on the future and the current state of affairs, and stress the fundamental trade-off between the two.

However, as an existing public service trying to reinvent itself, the project team was still confronted with comments such as "do not use or think in VDAB terminology" or "should we not use an alarm button every time we use VDAB terminology?" Instead of completely blocking off the use of old terminology or ways of thinking, we helped in naming the problem to better grasp it. We employed a referential strategy utilizing colors – green for the 'A' part and blue for the 'B' part – and visual metaphors to support the juxtaposition of 'old VDAB' versus 'new VDAB'. This did not miss its effect. The color codes and visual metaphors effectively created a common language for the team to

challenge the nature and results of their work. Team members started to make reference to the visual metaphors on a regular basis, and phrases such as *“This is green, not blue.”* or *“This is ‘A’, not ‘B’.”* were commonly used. The contrasting in the rules was very important to identify whether new ideas were really different: *“Are we not compromising too much? What about the rules?”* The referential strategy also worked well to communicate the initiative towards the management team, the agency governance council, external stakeholders and possible ecosystem partners. The new format helped to create enthusiasm for the transformation with these parties.

DP2: Make the simple rules transparent by employing familiar wording and by utilizing colors for easy referral.

During the project kick off, the group was asked to reflect on the rules and discuss how different project ‘Vick’ could and ought to be. This exercise allowed for further sharpening of the ‘boundary breaking rules’.

The discriminant nature of the rules was further strengthened once the core project team started its work. Not only would the project team’s work at the moment of the steering committees be benchmarked against the ‘boundary breaking rules’, but the rules would also be explicitly challenged by putting up the mirror of the project team’s work. An important challenge during this phase was to make sure that the ‘boundary breaking rules’ did not deteriorate into operational or tactical guidelines for the project but remained true to their purpose of describing strategic choices beyond the project.

We also organized two additional project workshops, each one lasting for half a day. Both workshops were used as moments of evaluation during the course of the project. The first workshop, involving the core project team and steering committee members, was used to evaluate the effectiveness of employing the ‘boundary breaking rules’. It was used as preparation for reflection with a larger group consisting of everyone who was involved in the project, including external parties. During the second workshop, we evaluated the complete project operation with all parties involved, adding up to 16 participants, including the start-up who performed the implementation of the app and the marketing company responsible for communication. Participants of both workshops were asked to individually prepare these workshops. Their preparation was collected for research.

For measuring the project progress, we kept track of how well the project scored on the rules. From the start, everyone participating in the project knew that it would be difficult to reach all future goals at once, but the ‘boundary breaking rules’ made everyone mindful of where we wanted to go. However, as the project went on, it became difficult to grasp how well we were doing. This is especially true in a disruptive DEG project, as old metrics do not apply anymore. When the participants of the first workshop scored project ‘Vick’ on the ‘boundary breaking rules’, a steering committee member recognized: *“Where we are right now is clearly a huge leap from how we worked in the past”*.

Scoring the project on the ‘boundary breaking rules’ also proved to be useful to verify whether all rules still represented fundamental trade-offs. If not, they could be removed as they had become redundant in terms of representing a future goal that is fundamentally different from the current state of affairs.

We also noted that this scoring moment presented itself as a natural evaluation of how clear and actionable the rules really were: did they mean the same thing to everyone? Only by scoring and saying why we did well or not, certain distinctions or different understandings became clear. In the individual preparations for the first workshop, there were some discrepancies in what was understood by the rules. For example, when scoring on the rule “from offering services to coordinating dynamic service journeys”, one core project team member gave a very high score:

“We defined services based on the different steps young people take in their last year at school and afterwards, on the labor market. Everything was checked with people from this target group, who ran us through their complete ‘journey’. We formulated services linked to touchpoints, so we definitely had attention for the customer journey.”

Others were far more criticizing, on points not even noted by the first team member:

“We are still lacking feedback loops in the app, and there is no urge to return to the app at a later time.”

During the workshop itself, however, all core project team and steering committee members reached the same conclusion, which represented a summary of all individual preparations:

“We acquired knowledge concerning the customer journey, but the process is still one-way and needs to become dynamic by integrating feedback loops and interaction.”

The workshop participants not only reached consensus as to the meaning of each separate ‘boundary breaking rule’, they also identified overlap in the meaning of different rules. For example, during the discussion on the rule “from ‘have to’ to ‘want to’ partner lock-in”, the team noted that user experience had already been discussed as a factor determining the score of two other ‘boundary breaking rules’.

To conclude, tracking of how well the project scored on the ‘boundary breaking rules’ had three important advantages. First, it provided a new metric to track progress in a disruptive project, the ‘boundary breaking rules’. Second, it was an instant verification of how ‘boundary breaking’ the rules still were. And third, it helped in refining the definition and the common understanding of the ‘boundary breaking rules’. Or, in other words, it helped in making abstract rules more comprehensible and actionable, which represents a third design principle.

DP3: Make the simple rules actionable by tracking project progress (“how different are we really?”) by how well you score on the simple rules to naturally improve the definition and common understanding of the rules.

In Table 18, we provide an overview of the most important moments in the artifact evolution, and link these moments to the resulting changes in the ‘boundary breaking rules’ artifact.

Table 18. Important moments in artifact evolution

Crucial Moment	Description	Resulting change
First steering committee	Need to emphasize fundamental departure from the past	Terminology of 'boundary breaking rules'
First steering committee	Need to give the rules more buy-in	Introduced explicit wording and framing linked to the new management agreement and other internal strategic documentation
Preparation of project kick-off	Rules had been formulated to be politically correct rather than to really underline fundamental breakaways from the past	Change the format of a 'boundary breaking rule' from a sentence describing a new way of proceeding to a juxtaposition in the form 'from A to B'
Project team work before general kick-off	Comments in the project team such as "do not use or think in VDAB terminology" or "should we not use an alarm button every time we use VDAB terminology?"	Referential strategy using colors – green for the 'A' part and blue for the 'B' part – and visual metaphors to support the juxtaposition of 'old VDAB' versus 'new VDAB'
Project kick-off	Reflection on rules, discussion of how different project 'Vick' could and ought to be	Further sharpening of the 'boundary breaking rules'
Workshops	Not all rules meant the same thing to everyone, as became clear through comparing individual preparation for the workshops	Consensus on the meaning of each separate 'boundary breaking rule' and identification of overlap in the meaning of different rules

3.7.3 Reflection and Learning

The third stage of the ADR process, Reflection and Learning, mostly occurred in parallel with the previous stages. During this stage, conscious reflection on the problem framing, the DEG and opportunity strategy literature and the emerging 'boundary breaking rules' ensemble are critical to ensure that the research process involves more than only building a solution for a particular instance. This was addressed by the guided emergence of the artifact, which resulted from several iterations between its theory-informed design and use in context, both in the project work and the steering committees.

We formulated general meta-requirements for a strategy of simple rules in a stage before the actual design of the artifact, and the design principles derived

from this process are an operationalization of the general meta-requirements. Therefore, our approach to ADR is by design mindful of generalizability.

3.7.4 Formalization of Learning

In the Formalization of Learning stage, situated learning is further developed into general solution concepts for a class of field problems. We generalized VDAB’s problem instance to the broader class of problems of moving from NPM to DEG. VDAB’s solution instance, the ‘boundary breaking rules’, can be generalized to other opportunity strategies, or simple rules strategies. The generalized outcomes of this formalization of learning stage are the design principles, which are shaped via the BIE cycle of the ADR project.

In Table 19, we summarize the three design principles derived during the ADR project, and we demonstrate how they address the meta-requirements.

Table 19. Design principles

	Design Principles	Meta-requirement
DP1	Make the simple rules specific, differentiating and future-oriented <i>by</i> linking to both an agreed upon view on the future and the current state of affairs, with the difference between the two representing a fundamental shift.	MR1: specific MR4: differentiating MR5: future-oriented
DP2	Make the simple rules transparent <i>by</i> employing familiar wording and by utilizing colors for easy referral.	MR2: transparent
DP3	Make the simple rules actionable <i>by</i> tracking project progress (“how different are we really?”) by how well you score on the fundamental shift inherent in the simple rules.	MR3: actionable

3.7.5 ‘Boundary breaking rules’ at VDAB

In addition to sharing the process on how we developed the ‘boundary breaking (BB) rules’, we also share the artifact itself, as we believe in its usefulness and applicability for similar public service transformations. The content of the ‘boundary breaking rules’ is grounded in customer journey, ecosystem and platform literature.

3.7.5.1 BB Rule 1: From digital support to digital first

This first principle already represents a major shift in a public sector agency dominated by rigid service delivery during office hours only. As indicated in Table 14, the service delivery in the new VDAB role will need to become e-enabled/intelligent, 24/7 and self-service. Furthermore, VDAB has to be able to deliver personalized services in a flexible and proactive manner. This means that digital needs to become a starting point for creating service concepts instead of an afterthought or supporting function. This will have profound implications on the way of working for VDAB.

Di Maio (2012) argues that ‘the nexus of forces’, defined as “the combined and synergistic impacts of social, mobile, big data and cloud technologies”, will bring disruption and opportunities to government organizations. Gradually, government organizations and non-government organizations alike will recognize this. Given the novelty of the challenge, however, it is not unexpected to see that McKinsey’s global survey (Gottlieb & Willmott, 2014) – covering all types of industries – identifies a significant gap between the recognition of the importance of the new digital technologies currently at our disposal and our understanding of the true value digital can create. Gottlieb and Willmott therefore propose key recommendations from their survey. First, companies need to learn to understand what creating digital value means. Offering a truly digital customer experience is profoundly different from digitizing an existing product or service. Second, organizations should be set up in such a way that they can take full advantage of new digital opportunities. Third, to increase their adaptive potential, organizations will have to attract and retain people with the right skills.

3.7.5.2 BB Rule 2: From service provision strategy to ecosystem strategy

Instead of continuing to provide services in a closed supplier-customer business model, VDAB aspires to become a labor market orchestrator or keystone in an open ecosystem (see Table 14). This represents a huge shift in strategic focus and value proposition. Most importantly, VDAB will have to learn how to delegate service provision to other ecosystem parties, instead of providing all services by itself, and will have to make sure that these ecosystem parties can thrive.

Ghazawneh and Henfridsson (2011) define an ecosystem as “a functional unit consisting of a set of actors (e.g., platform owner, third-party developers,

platform's partners and users) and a set of technology elements (e.g., software platform, boundary resources) that are mutually interdependent." The role of the ecosystem keystone consists of two essential parts (Iansiti & Levien, 2004): (1) create value by offering essential services, tools, or technologies that provide solutions to others in the ecosystem (in a more or less open way); and (2) foster the health of the ecosystem by making sure that ecosystem parties want to join and remain around the table. Catering to ecosystem health implies a focus on ecosystem productivity, robustness and meaningful diversity. Productivity is increased by simplifying the complex task of connecting new participants to one another and by making the creation of new products by third parties more efficient. Robustness is guaranteed by consistently incorporating technological innovations and by providing a reliable point of reference that helps participants respond to new and uncertain conditions. The creation of meaningful diversity, contributing to productivity and robustness of the system, is stimulated by offering innovative technologies to a variety of third parties.

3.7.5.3 BB Rule 3: From offering services to coordinating dynamic service journeys

VDAB's new role, as described in Table 14, implies a shift from providing job security to unemployed candidates to providing and enabling support for a wide variety of labor market services for both the demand and the supply side. Employer servicing and partnerships have to be included. From the customer's point of view, the focus on job security is extended to career security. The latter fits the argument of Rawson, Duncan and Jones (2013) that modern organizations should focus on end-to-end service journeys, rather than locally optimize satisfaction at singular touchpoints. In principle, this reasoning goes for demand-side as well as supply-side servicing.

A service journey, unlike a business process view, represents an outside-in view of servicing customers. This means that the individual services are not only conceived as part of a progression over time, they are also defined from the point of view of the customer and his perception of value. The opportunity of having direct, often real-time, information feedback in a digital servicing environment allows for conceiving dynamic service journeys, i.e., journeys that dynamically adapt based on the feedback received. To make this real, the digital platform that hosts the services needs to provide capabilities for

monitoring agent behavior and for analyzing it. In addition, it should allow for easy service redesign and redeployment based on this information. As VDAB moves towards becoming an ecosystem keystone and stimulates service provision to emerge from the ecosystem, service journeys will eventually consist of many possible ecosystem partner contributions. Making sure that this can happen in a coordinated way is an important keystone responsibility.

3.7.5.4 BB Rule 4: From 'have to' to 'want to' partner involvement

VDAB's broadening of target audience, i.e., from non-active citizens and job-seekers to including working citizens, employers and labor market actors who do not necessarily need to work with VDAB, comes with the need for developing a business model rooted in 'want to' rather than 'have to' engagement. This requires a fundamental change of mind set and way of working for all of the people at VDAB, as Fons Leroy, CEO of VDAB, explained:

"In the past, we could afford to stay put behind our desks. People depended on us, which put us in a dominant position. Things change dramatically if you aspire to facilitate people's careers. All of a sudden, the individual is in the driver's seat. So far, most of our efforts have been focused on the supply side of the labor market, providing training and job placement for job seekers. The role of conductor requires expertise and credibility in both the supply and demand side. It's only recently that we've started to actively involve employers in our processes and activities" (Viaene & Broeckx, 2013)

3.7.5.5 BB Rule 5: From plan-driven to agile projects

VDAB decided to enter a new space of serving and supporting the labor market defined by a serious heterogeneity of parties; unknown, diverse and evolving customer needs; and novel, continuously evolving digital technologies. Projects or programs operating in such a dynamic, complex environment would require adopting an agile way of managing project work.

The agile software development manifesto (Beck et al., 2001) is generally used to convey the key principles of agile project management when dealing with digital artifacts: agile methods prefer individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan. Indeed, a plan is but a plan in a dynamic and complex environment. In general, agile methods seek speed without giving up on

quality, flexibility without introducing chaos, and transparency without creating overhead. Project 'Vick' adhered to this logic (see above).

3.7.5.6 BB Rule 6: From 'ad hoc' initiatives to developing organizational capabilities

Peppard and Ward (2004) define an organizational capability as “the ability to use and deploy combinations of firm specific resources to accomplish given organizational goals”. Instead of focusing only on the delivery of separate digital innovation projects, VDAB wants to develop organizational capabilities in support of all previous boundary breaking principles, step by step, and project by project. Developing this set of organizational capabilities requires a commitment to double-loop learning across initiatives. Argyris (2002) argues that “double loop learning questions the values or assumptions that led to the actions.” The research chair activities provide support for this double-loop learning and organization formation.

Designing the right ecosystem governance will need special attention. It will be key to securing the health of the ecosystem. Governance specifies how ecosystem parties engage, interact and solve conflicts. Governance, especially in a dynamic environment such as the digital technology space, also involves designing an appropriate recipe for learning how to evolve the ecosystem over time, and how to involve the ecosystem partners in this exercise. Ecosystem development takes time. Figuring out what is the right way to govern its ecosystem will be of essence for VDAB. Based on an assessment of what works and what does not, the growth path can be effectively adapted.

For VDAB, the labor market ecosystem evolution and success will also go hand in hand with the evolution of its enabling digital (multi-sided) platform. The platform provides a foundation of core technology, information or business services that can be efficiently re-used and integrated by third parties to create and deliver different product, service or business model variations. Developing an architectural capability for maintaining, growing and innovating the platform will be essential to the ecosystem's viability.

3.8 Discussion

VDAB recently embarked on a journey from New Public Management (NPM) to Digital Era Governance (DEG). VDAB's strategic compass to move towards

DEG consists of three parts. First, VDAB clearly articulated the vision to transform digitally to become a labor market orchestrator. This is a radical departure from the past, when VDAB provided all services by itself. Second, we created an awareness of how different the 'new' VDAB is (by explicitly stating the difference with 'old' ways of working in the 'boundary breaking rules') and how difficult it will be to get there. Project 'Vick' tackles the same fundamental challenges in the labor market as VDAB did before, but focuses on delivering complementary services and experiments with different ways of organizing and working. The conscious choice of the first project, and especially the underserved target market segment of young graduates, was therefore an essential part of the opportunity strategy. We identified that there is a clear need for organizing and working differently and the use of simple rules. The strategic steering committees made sure that the project proceeded in line with the ambition outlined in the 'boundary breaking rules'. Third, a new strategic question will rise for future projects, when there are several opportunities to choose from: how do we select opportunities? Every opportunity strategy focuses on action rather than planning or detailed formulation, but this requires simple rules that guide the selection process.

Overall, the ADR cycles provide evidence for the utility of our strategic management artifact. We learned that the ways in which the 'boundary breaking rules' were utilized varied throughout different project stages, but they were important at all times. At critical evaluation moments, they were actively discussed, as they represent the relevant shifts to be made. Project team members recognized that it heavily determined the focus of the project:

"We have had huge discussion on all 'boundary breaking rules', constantly asking ourselves 'are we not compromising too much? What about the rules?' We did this in order not to slip away from where we want to go. And this is a good thing."

During most steering committee meetings, however, the rules were not actually discussed, but they served as an important mental background and provided guidance in the agenda of topics to be discussed: how to become a platform? Will the app we produce be a stepping stone towards the next one? How can we design the product in such a way that it triggers the customer to come back? What is the repeatability of what we are doing? Moreover, the

project sponsors recognize that the ‘boundary breaking rules’ have helped drive the sought-for transformation.

“Where we are right now is already a huge leap from how we worked in the past”

Table 20. Components of a design theory for simple rules

Component	Description
Purpose and scope	The aim is to develop a strategy of simple rules in a DEG context. Therefore, a set of Meta-Requirements for formulating simple rules in the DEG context has been identified and grounded by findings from existing simple rules literature.
Constructs	A strategy of simple rules was defined and conceptualized in the context of an opportunity strategy to move towards DEG.
Principle of form and function	Three Design Principles were derived iteratively and can be employed to inform the process of developing a good strategy of simple rules in a DEG context.
Artifact mutability	The artifact presented in this chapter, the ‘boundary breaking rules’, emerged from a continuous, iterative ADR process. We described different artifact mutations and recognize that the ‘boundary breaking rules’ will continue to change over time.
Testable propositions	We propose that public services employing some form of simple rules strategy in the effort to move from NPM towards DEG will be more successful in achieving this transformation than others.
Justificatory knowledge	The Meta-Requirements and the form of the ‘boundary breaking rules’ are derived from and grounded by simple rules and opportunity strategy literature. The ‘boundary breaking rules’ are positioned in the context of the NPM and DEG literature. The content of the “boundary breaking rules” is grounded in customer journey, ecosystem and platform literature.
Principles of implementation	The process of implementation of the ‘boundary breaking rules’ is richly described in the project “Vick” section.
Expository instantiation	The ‘boundary breaking rules’ artifact was presented in detail.

Therefore, we propose that public services employing some form of simple rules strategy in the effort to move from NPM towards DEG will be more successful in achieving this transformation than others. Although case study research in general, and single-case study using ADR in particular, poses certain challenges towards scientific generalizability, we believe that it can lay

the foundations for propositions that can be validated or extended in the future.

To summarize, we match the components of our design theory to the structural components of an ISDT described by Gregor and Jones (2007) in Table 20. In addition to other common structural components of theory, Gregor and Jones recognize the role of an instantiation of a design theory as an expository or representational tool. The components of artifact mutability, principles of implementation and expository instantiation are linked to this view.

3.9 Conclusion

With the creation of the ‘boundary breaking rules’ at VDAB, we aim at developing a design theory on ‘how to formulate a good strategy of simple rules in a DEG context’. In a first step to reach this aim, we provided a summary of the existing literature on simple rules and complemented it with related literature streams on defining IT principles to formulate clear meta-requirements.

Because the main artifact in this study is a strategic management artifact, we reviewed strategic management literature. As the transition from NPM to DEG puts public services in a turbulent environment, we focused on opportunity strategy and identified simple rules as the main construct our theory is based on.

We derived design principles in an iterative way, during the process of developing the ‘boundary breaking rules’. As these design principles address the meta-requirements, they can be employed in the broader context of incumbent government agencies moving towards DEG.

As VDAB’s transformation progresses over time, we intend to focus on the evolution of the ‘boundary breaking rules’ and other artifacts in future design science studies. Thus, we aim to grow towards an iterative and incrementally evolving insight of what it means to move toward DEG from within existing public services.

The findings from this study make contributions to practice as well as to the current literature. First, we presented the artifact itself, the ‘boundary

breaking rules'. This new design of a conceptual artifact, whose initial design was informed by both the literature and previous case study research, was iteratively revised by its use in practice. We are convinced that this combination of rigor and relevance adds to its value for other public services aiming for DEG transformation. Second, we provided a summary of existing literature into meta-requirements for simple rules. This not only contributes to existing simple rules knowledge by providing meta-requirements for formulating simple rules, but it also ensures that VDAB's artifact is useful for a larger class of problems, more specifically for formulating a good strategy of simple rules in a DEG context. Third, by deriving design principles from the design and use of the 'boundary breaking rules', we propose how the meta-requirements can be addressed in practice and thus in the broader context of public services moving towards DEG. Fourth, we propose a design theory for simple rules by providing all components for an ISDT according to Gregor and Jones (2007). This can serve as a base for further research for validating and extending this design theory. Fifth, we extended the application area of ADR, a relatively new design science research method, with the aim of contributing to the advancement of the method.

The current study has only studied VDAB's transformation, and we are aware that a single-case study employing ADR poses certain challenges towards scientific generalizability. Additionally, the IS design theory we developed for simple rules remains in a nascent stage. Hence, for a more rigorous design evaluation, we intend to compare our approach to reach DEG with different Public Employment Services (PES) throughout Europe.

Chapter 4: Exploring open IT-based co-creation in government

*“What distinguishes companies that have built advanced digital capabilities?
The ability to collaborate.”*

– David Kiron

This chapter explores the implications of DEG on capabilities by focusing on the capabilities required for co-creating with multiple partners in an open network, based on digital technologies. We investigate this phenomenon through the revelatory case of VDAB’s 5-year program with open services and we perform an embedded case study to form an answer to three research questions: (1) how does a public service start with open IT-based co-creation? (2) which capabilities does a public service use to co-create value with its partners? (3) which capabilities do partner organizations use? This chapter is the first to look at co-creation in an open partner network with multiple partners. It also adds to literature emphasizing the importance of IT in enabling this open type of co-creation, and giving insight into an organization that is starting with co-creation. To the public sector research it adds a focus on the combination of technology-related aspects and co-creation.

Related publications

Danneels, L., Viaene, S. (2018). Open co-creation coming of age: the case of an open services experiment. Hawaii International Conference on System Sciences, HICSS '18: Hawaii International Conference on System Sciences. Waikoloa, Big Island, Hawaii, 3-6 January 2018.

4.1 Abstract

Co-creation has mostly been studied in the context of a single firm and in dyadic, one-on-one, relationships, but much less in environments with

multiple parties. In this article, we focus on open IT-based co-creation – a phenomenon at the intersection of co-creation, open innovation, and platform literature – and the organizational capabilities required to get the most out of it. We do this by investigating the revelatory case of a public employment service that opened internal IT services through co-creation with external organizations. Based on an embedded case study, we aim to explore the capabilities that help public services and their partners to be successful at open IT-based co-creation.

4.2 Introduction

In 2013, VDAB (the public employment service of the Flemish region in Belgium) launched its open services program. VDAB opened internal IT services (including its job matching engine, and an online assistant for improving the quality of vacancies) such that they could be used by external organizations in their own IT systems. This fits with VDAB's aim to fulfill a conducting function in the labor market, and to stimulate public, private and non-profit labor market actors to cooperate and innovate. The open services were developed in collaboration with external organizations (private recruitment and selection agencies, interim agencies, employers, start-ups, and other European public employment services) who co-created these open IT artifacts. While the external organizations were part of the broader labor market ecosystem, they were usually no direct business partners, customers or suppliers of VDAB.

The case of VDAB's open services program and the more general phenomenon of open IT-based co-creation are linked to three important trends. First, in a more and more digitized and networked world, the private and public sector are faced with challenges and opportunities that cannot be addressed by single organizations, or sometimes even single industries (Furr et al., 2016). Therefore, organizations no longer limit their focus to what they are capable of on their own, but more and more look at what they can do together with others, including partner organizations, customers and start-ups (Viaene & Danneels, 2015). In other words, we increasingly see organizations co-creating value in a cooperative manner (Kohli & Grover, 2008). Second, while in the past co-creation took place in one-on-one alliances with customers or suppliers, we now see open partner networks (Furr et al., 2016) innovating

based on inflows and outflows of information in the network. Third, digital technologies create new possibilities for collaboration. Digital platforms enable new forms of co-creation (Kohli & Grover, 2008), such as organizations opening their assets for others to innovate upon. Examples include open government data platforms, such as the London DataStore, where the city of London aims to openly exploit its data by co-creating an open data platform together with NHS, power companies and utilities (Card, 2015).

Despite the increasing importance of co-creation, open innovation, and technological platforms, little is made explicit about the *capabilities* that make organizations successful at open IT-based co-creation.

A review of the IT-based co-creation literature revealed that very few studies focus on co-creation with multiple partners in an open partner network (Mandrella et al., 2016). While most research on co-creation takes a single-organization perspective, and only some research focuses on dyadic relationships, very little research is performed on more open forms of collaboration (Mandrella et al., 2016).

Another noticeable gap is that technology-related considerations often remain absent in studies on co-creation (Sarker et al., 2012; Kohli & Grover, 2008), while digital technologies can redefine co-creation.

In the public sector research community, a technology perspective is lacking in much of the research on co-creation and co-production (Voorberg et al., 2015; Osborne et al., 2016). On the other hand, the research on open (government) data focuses mostly on how to technically open up government information for external re-use by stakeholders, while the co-creation aspect is missing (Attard et al., 2015; Maccani et al., 2015).

Finally, while the co-creation case study research presents several cases showing mature forms of co-creation – e.g., ERP systems (Sarker et al., 2012) and cloud ecosystems (Huntgeburth et al., 2015) – we are not aware of any case studies on organizations that are starting with a co-creation program by opening assets in a co-creative way.

Our research objective is to empirically develop an understanding of the co-creation of an open IT artifact with multiple organizations in a government context. Therefore, this chapter aims at answering the research question:

“What does it take to co-create in an open partner network, based on digital technologies?”. This overarching research question is tackled by answering three underlying questions: (1) “How does a public service start with open IT-based co-creation?”; (2) “Which capabilities does a public service use to co-create value with its partners?”; and (3) “Which capabilities do partner organizations use?”. To answer the research questions, we investigate the revelatory case of VDAB, the public employment service of the Flemish region in Belgium, and its 5-year program with open services. We perform an embedded case study, looking at VDAB’s open services program in general and at three different sub-cases of organizations co-creating and using a set of open services.

The rest of this chapter is organized as follows. Section 3 discusses important aspects of open IT-based co-creation identified by three literature streams linked to this phenomenon: IT-based co-creation, open innovation, and technological platforms. Section 4 describes VDAB’s open services program, and discusses the methodology we use in this study. Section 5 presents the results based on the case study data with respect to open IT-based co-creation. Section 6 discusses the case study data in the light of the perspectives identified in the literature section. Section 7 concludes the chapter with a recapitulation of the key contributions, and a discussion of the limitations and future directions.

4.3 Key theoretical perspectives for studying open IT-based co-creation in government

In our revelatory case study, we can discern several aspects: VDAB creates an open IT artifact by opening internal IT services to be used by other organizations in their own systems, and this new artifact is created in collaboration with other organizations. In an effort to understand these aspects, we reviewed the IT-based co-creation literature, studies focusing on open innovation, the technological platform literature, and government literature. While the IT-based co-creation literature studies the ways to combine resources in alliances or collaboration between different actors, research primarily focuses on dyadic relationships and not on open partner networks (Mandrella et al., 2016). The open innovation literature and studies

focusing on technological platforms both discuss the impact of openness. The open innovation literature, which concentrates on internal and external sources for ideas and ways to market them, also points to the importance of moving from an organization to an ecosystem logic. The literature on technological platforms suggests the important role of governance when opening internal assets. Public sector literature provides insight in what co-creation, open innovation, and technological platforms look like in a specific context. We discuss these factors in further detail below and summarize them in Table 21.

Table 21. Key theoretical perspectives for studying open IT-based co-creation in government

Case elements	Literature stream	Perspectives
Co-creating business value with other actors	IT-based co-creation	<ul style="list-style-type: none"> Modes of co-creation (Kohli & Grover, 2008; Sarker et al., 2012; Rai et al., 2012; Ceccagnoli et al., 2012; Han et al., 2012; Grover & Kohli, 2012)
Opening assets for innovation by an open network	Open innovation	<ul style="list-style-type: none"> Openness in terms of knowledge flows (inside-out and outside-in) (Chesbrough, 2012; Chesbrough et al., 2006; Chesbrough & Bogers, 2014) From organization to ecosystem logic (Chesbrough et al., 2006; Chesbrough & Appleyard, 2007)
Designing an IT artifact that can be used by other parties	Technological platforms	<ul style="list-style-type: none"> Openness in terms of access and control of the platform (Tiwana et al., 2010; Wareham et al., 2014) Governance (Boudreau, 2010; Ghazawneh & Henfridsson, 2013; Tiwana, 2015)

4.3.1 IT-based co-creation

Co-creation has been defined by Sarker et al. (2012) as “a symbiotic relationship between a firm and its primary stakeholders” (Kohli & Grover, 2008), wherein “the stakeholders (i.e., the focal firm with its partners or clients) customize and co-produce products/services” (Payne et al., 2008). Co-

creation has been studied by marketing and service management literature as well as information systems literature. In marketing, co-creation is often framed using the service-dominant logic (Vargo & Lusch, 2004; Vargo & Lusch, 2008), with a focus on organizations co-creating services with customers. This article focuses on IT-based co-creation of value, where IT serves as a tool, an output, or is instrumental in generating the co-creation of business value (Kohli & Grover, 2008). IT-based co-creation of value represents the idea that “(a) IT value is increasingly being created and realized through actions of multiple parties, (b) value emanates from robust collaborative relationships among firms, and (c) structures and incentives for partners to partake in and equitably share emergent value are necessary to sustain co-creation” (Koch 2010).

Two main themes are important in the (IT-based) co-creation literature (Grover & Kohli, 2012): generation of value and the distribution or appropriation of the value (Ceccagnoli et al., 2012; Han et al., 2012).

IT-based generation of value focuses on bringing disparate collaborative resources together (Sarker et al., 2012; Rai et al., 2012). Sarker et al (2012) describe the mechanisms underlying value co-creation as three different modes of co-creation: exchange, addition, and synergistic integration. In the exchange mode of co-creation, “two participants in an alliance develop value by each providing resources/competencies the other partner needs”. In the addition mode, “one of the two parties builds on the contributions of the other in order to create value for both”. In the synergistic integration mode, both sides “(1) have to work together with each other, in a mutually reinforcing manner, (2) surrender some of their own autonomy, (3) have trust in the other to do what is in the interest of both sides of the relationship, and (4) invest in the relationship rather than just look for gains in it”.

IT-based distribution or appropriation of value focuses on whether organizations profit from engaging in co-creative activities, either through appropriation strategies such as intellectual property rights, or through improved business performance or spillovers (Ceccagnoli et al., 2012; Han et al., 2012).

The IT-based co-creation literature provides us insights into the ways to combine resources for co-creation of business value with different actors, but

a focus on open partner networks is missing (Mandrella et al., 2016). This is an important gap, since co-creation in open alliances differs from more closed forms of co-creation in its strategic scope and scale, governance mechanisms, member composition, and evolutionary dynamics (Han et al., 2012).

4.3.2 Open innovation

To add the element of openness to the co-creation literature, we reviewed the open innovation literature. Open innovation is defined as “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model” (Chesbrough & Bogers, 2014) and contrasts to a closed innovation model, where “internal innovation activities lead to internally developed products and services that are then distributed by the firm” (Chesbrough, 2012). It places external ideas and external paths to market on the same level of importance as the one reserved for internal ideas and paths to markets in the traditional closed innovation paradigm (Chesbrough et al., 2006; Gassmann, 2006). Chesbrough (2012) defines two types of open innovation: outside-in and inside-out. The outside-in type focuses on the opening of an organization’s innovation process to many kinds of external inputs and contributions. The inside-out type allows unused and underutilized ideas to go outside the organization for others to use in their business and business models.

Open innovation implies a shift from an organization to an ecosystem logic (Chesbrough & Appleyard, 2007). Not only can value be created through a community or network (opposed to in-house only), the value is also no longer captured by a single organization but by the complete ecosystem. This contrasts with the closed innovation model, where opening towards the external environment was only done for serving internal purposes of the organization (Chesbrough et al., 2006). Open innovation can thus be considered an organizational innovation (Christensen, 2006) and requires a business model fit (Chesbrough, 2006).

4.3.3 Technological platforms

The technological platform literature adds to research on co-creation and open innovation a focus on the platform artifact, which enables a network of

organizations to build on other organizations' assets. The technological platform literature also adds important considerations for the platform's design (openness and governance).

Gawer (2014) defines technological platforms as "evolving organizations or meta-organizations that (1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery".

Important debates in the platform literature center around two interesting themes: openness (Boudreau, 2010) and governance (Tiwana et al., 2010; Wareham et al., 2014). Although the themes are to some extent interdependent (e.g., the degree of openness impacts governance), we distinguish the two themes by explaining their components.

Regarding openness, there are two distinct approaches to opening a technology platform: granting access to the platform, and opening the control over the platform (Boudreau, 2010). The platform provider can "grant access to the platform and thereby open up markets for complementary components around the platform" (Boudreau, 2010). The openness of the platform is therefore partly determined by the openness of the platform architecture (Tiwana et al., 2010), a conceptual blueprint describing "a relatively stable platform and a complementary set of modules that are encouraged to vary, and the design rules binding on both". The platform provider can also give up control over the platform itself (Boudreau, 2010; Ghazawneh & Henfridsson, 2013; Tiwana, 2015). In other words, the platform can be proprietary to a single organization, or shared by multiple owners (Tiwana et al., 2010). Also the decision rights can vary in openness in dividing decision-making authority between the platform provider and complementors (Tiwana et al., 2010). Deciding on the openness of the platform is not a trivial task, and requires the consideration of significant trade-offs: more openness stimulates the adoption of the platform but lowers its appropriability, and stimulates diversity but reduces the platform provider's control (Boudreau, 2010).

Platform governance is crucial to manage such trade-offs and other tensions (Tiwana et al., 2010; Wareham et al., 2014). Wareham et al. (2014) distinguish three salient tensions linked to the stability-evolvability trade-off which

require appropriate governance: standard-variety, control-autonomy, and collective-individual. In the outputs, or complements built on the platform components, standardization has to be balanced relative to the creation of specialized complements and constant experimentation. Towards the actors linked to the platform, control on the quality of the process, product, and excess supply has to be balanced with mechanisms leveraging the autonomy for innovation. In the identifications of the platform actors, each individual actor should be able to work towards its own benefit, but this has to be balanced with a focus on the collective benefits for the entire network. Tiwana et al. (2010) summarize the control mechanisms to encourage desirable behavior by complementors (and vice versa) as formal (output and behavior) control, informal clan control, and input control.

4.3.4 Public sector context

In the public sector literature and in studies on digital government, we did not find any studies capturing all case aspects described in the IT-based co-creation, open innovation, and technological platform literature. We did find studies focusing on one or two of the literature streams. Although public sector literature does not provide us with theoretical frameworks to study the phenomenon at hand, it does provide us with a focus on the specific context that might have an impact on the case.

In a public sector context, co-creation is often used interchangeably with co-production (Voorberg et al., 2015), with both terms focusing mainly on the involvement of citizens as end-users in the design, management, delivery and/or creation of public services (Osborne et al., 2016) rather than on co-creation with (multiple) organizations. In the research on co-creation and co-production, a technology perspective is lacking (Voorberg et al., 2015; Osborne et al., 2016).

Open innovation studies in government often do not take the impact of digital technologies into account, such as Feller et al.'s (2011) research on a network of municipalities in Sweden collaborating with each other and with external parties to accelerate innovation. One exception is the case study of challenge.gov, which crowdsources solutions to tackle complex public management problems (Mergel & Desouza, 2013). In this study, Mergel and Desouza argue that open innovation approaches from the private sector

cannot be readily transferred to the public sector, because a political mandate is required for innovation and special rules and regulations, such as contracting rules, govern the interaction with the public sector.

One of the most eminent examples of technological platforms in government are open data platforms. The research on open data focuses mostly on how to technically open government information for re-use by external stakeholders, while the co-creation aspect is missing (Attard et al., 2015; Maccani et al., 2015; Danneels et al., 2017).

4.4 Case and methodology

4.4.1 Case context: VDAB's open services program

Founded in 1989, VDAB (*Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding*) is the public employment service (PES) for the Flemish region in Belgium (Flanders). It offers employment services, training, and career guidance to society at large.

In 2013, VDAB started with its open services program. IT services that were used internally were opened, in small pieces, such that other labor market actors could embed them in their own IT systems. The development of the open services took place in co-creation with external organizations, such as private recruitment and selection agencies, interim agencies, employers, start-ups, and other European public employment services. Also, for the further improvement of the open services, it was the ambition to do this in co-creation with all partners using the open services. While these external organizations were part of the larger labor market ecosystem, they were no direct customers or suppliers of VDAB.

To understand the open services, it is important to note that VDAB matches job candidates to vacancies based on competences rather than on job titles, to also include job seekers with a certain affinity to the job, and for better reorientation towards shortage occupations. VDAB is one of the forerunners in Europe in using and promoting competence-based matching (European Commission, 2016).

The first project that was part of the open services program consisted of the development of the Comeet service, which allows others to use VDAB's competences and competence templates in their own job-matching systems, together with three recruitment and selection agencies. In 2014, the Comeet service was also opened to other organizations. Today, VDAB offers 8 different open services, summarized in Table 22, which continue to be further co-developed with over 20 partner organizations.

Table 22. VDAB's open services

Service	Description
CV	Export CVs, if citizens agree to have their data transferred to partner databases
Vacancy	Export vacancies
Comeet	Competences and competence templates
Online Assistant	Automatic comments on contradictory or incomplete items in a vacancy
Study Tree	Lists all recognized types of education
Wordcloud	Suggests words that are commonly associated with a vacancy the user is introducing
Matching	Gives a list of matching candidates for a certain vacancy
Matching as a service	Same as above, implemented in the partner organization's own systems

The open services program fits with VDAB's strategy and the strategy of the network of European public employment services, which both acknowledge that public employment services will have to organize strong alliances and networks of public, private and non-profit organizations. For the EU 2020 strategy, it is a critical success factor that the public employment services acquire a mandate to fulfil conducting functions which include, amongst others, stimulating labor market actors to cooperate and innovate, collaborating closely with public or private partners and aligning labor market actors with labor market policy (European Public Employment Services, 2011). VDAB's strategy, VLAM 2020, puts forward three strategic decisions: networking with partners as an orchestrator, providing omni-channel services, and being a strong brand for work. The importance of networks and collaboration is also recognized by VDAB's CEO:

“Today VDAB is surrounded by a number of innovative organizations focused on the labor market, matching and (professional) education. From our

encounters with these new actors we see that networking and collaborating is the only value-adding strategy for them and for us. Therefore VDAB's orientation as network orchestrator requires further professionalization and expansion of the conducting functions, but also the realization of an 'open services' platform." (Viaene & Broeckx, 2013)

4.4.2 Methodology

We adopt a revelatory embedded case study approach (Yin, 2014). Since there is a lack of in-depth field studies on the rather new phenomenon of open IT-based co-creation, we chose to study a case that could potentially be a unique and exemplary source of insight on this phenomenon in depth. VDAB's open services program not only focuses on the phenomenon of interest, but has also been going on for a long time and could be investigated in depth. VDAB's case can be seen as exemplary since the public service is one of the forerunners in Europe when it comes to digital innovation of public services (Danneels & Viaene, 2015). Throughout VDAB's open services program, 8 different services have been co-created with more than 20 partners. We chose to balance a narrow, detailed focus on specific services with a broad, more general focus on the program as a whole through an embedded case study approach. Thus, we complement the focus on the VDAB's open services program in general with embedded cases, focusing on a specific service (or set of services) used by one (or more) partner organizations.

For selecting theoretically useful embedded cases (i.e., combinations of a service and one or more partners who co-created the service), two criteria were identified: the modes of co-creation in the open services, and the familiarity between VDAB and the partner organizations.

The first criterium resulted from the IT-based co-creation literature, where Sarker et al. (2012) make a distinction between three different modes of co-creation with different degrees of resource alignment, see section 4.3.1. We expected the degree of resource alignment to be related to the capabilities needed for open IT-based co-creation. Sarker et al. (2012) see the three modes of co-creation as a continuum and define the necessary criteria for advancing to a mode with a higher degree of resource alignment, see Table 23. Each co-creation mode is characterized by the criteria of lower level modes as well, but does not show higher level criteria yet. We used these criteria (defined by

Sarker et al., 2012) to identify the mode of co-creation for each open service before making the case selection, based on information obtained from VDAB. For the selected cases, we verified the criteria with the partner organizations as well. Seven of VDAB’s open services were classified as exchange and one open service as addition, see Table 23.

Table 23. Co-creation modes (based on Sarker et al., 2012)

Mode of co-creation	Criteria	Open services
Exchange	Each partner provides resources or competencies the other partner needs	CV, Vacancy, Comeet, Online Assistant, Study Tree, Wordcloud, Matching
Addition	Considerable alignment of resources is required	Matching as a service
Synergistic integration	Learning-based value is important Rent-earning capacity is sustainable over time and transferable outside the alliance transaction	None

The second criterium resulted from the case, our previous relationship with VDAB, and an analysis of the set of partners that were using VDAB’s open services. We expected that the degree to which VDAB had already collaborated in the past with the partner organizations might have an effect on the capabilities required for co-creation. Before selecting the cases, we identified together with VDAB’s open services program manager whether VDAB had a history of collaboration with the partner organizations during the normal course of business and whether VDAB had co-created with the partner organizations before the start of the open services program. We verified the outcomes with VDAB’s CIO and CEO, and for the selected cases we also verified the result with the partner organizations.

Juxtaposing the two selection variables resulted in the selection of three theoretically useful cases. In Table 24 we present our selection of embedded cases; each case consists of one open service and one or more partner organizations which co-created the open service. Only one open services was

identified in the addition mode (Matching as a service), and this service was co-created with one partner organization (Jobsplus).

Table 24. Case selection

		Mode of co-creation (Sarker et al., 2012)	
		Exchange	Addition
Familiarity with partner organization	Unknown partner	<i>Case 1:</i> Jobwalkr and the Vacancy service	
	Known partner	<i>Case 2:</i> Konvert, Randstad, Tempo-Team and the Comeet service	<i>Case 3:</i> Jobsplus and Matching as a service

Our prolonged relationship with VDAB allowed for an intensive data collection through semi-structured interviews and other documentary evidence. The authors continually followed VDAB’s digital innovation projects, of which the open services were a part, through monthly steering committee meetings and workshops from January 2014 until June 2017. For investigating the capabilities required for open IT-based co-creation, 7 interviews were conducted between February and June 2017, focusing on the capabilities that were important during the open services program from the point of view of VDAB and its partner organizations. The semi-structured interviews (see Appendix D for the interview guides) were carried out with the people responsible for the open services program, both at VDAB and its partner organizations; see Table 25.

During the interviews, we explained the study’s objectives and research questions, and we focused on the most important capabilities for the success of the open services program, as identified by the interviewee. Each interview lasted between 40 minutes and 2 hours, and notes were taken during the interviews. All interviews were recorded and transcribed. We also had access to internal VDAB documentation on the open services and on the partner organizations using the open services, and to the website providing information to the partner organizations. All of this documentation contributed to our broader understanding of VDAB’s open service environment.

Table 25. Organizations and profiles of the interviewees

Organization	Brief description	Interviewee position/role
VDAB	Public employment service of the Flemish region in Belgium, offering employment services, training, and career guidance to society at large.	CEO CIO Open Services Program Manager
Konvert	Family firm focusing on recruitment and selection	CIO/CTO
Randstad	HR service provider, focusing amongst others on temporary jobs, and recruitment and selection.	Business Performance Manager
Tempo-Team	HR service provider, part of Randstad Holding, focusing amongst others on temporary jobs, recruitment and selection	
Jobwalkr	Start-up that developed an app to inform users when relevant job opportunities are available in their neighborhood.	3 start-up owners
Jobsplus	Public employment service of Malta	IT Department Manager, and Labor Market Information Department Manager

For analysis of the interview data, the interview transcripts have been coded based on the criteria for case selection (i.e., modes of co-creation, and familiarity with the partner organization). In a next step, we identified the capabilities for VDAB and for the partner organizations that were mentioned in the interviews, and we organized these capabilities under the three major theoretical categories (i.e., IT-based co-creation, open innovation, and technological platforms).

4.5 Results and discussion

In this section we share the results from the interviews, describing the case of VDAB’s open service program as a whole and zooming in on the selected embedded cases. First, we identify the different steps VDAB took in order to become a co-creative organization. Second, we unveil the capabilities used by VDAB and its partner organizations in the light of the literature on IT-based co-creation, open innovation, and technological platforms.

4.5.1 Becoming co-creative

For VDAB, the process of becoming a co-creative organization started almost a decade ago. Two separate systems for introducing vacancies, one for internal consultants and one for external clients, were merged into one vacancy portal where VDAB employees and interim agencies as well as employers could introduce and follow up vacancies. In a next phase, as requested by several interim agencies, separate interfaces were developed for each external party to enable them to introduce vacancies to the VDAB portal directly from their own systems. However, it did not take long before VDAB decided together with Federgon, the federation of labor market companies, to use one standard HR-XML interface for all parties. The collaboration with Federgon proved to be very important in convincing the labor market companies to make the switch to adopt this standard interface, as VDAB's CIO explained:

“The most important question was whether the organizations were going to accept a standard forced on them by VDAB. From the point of view of VDAB, it was much easier to work with one standard interface. But would they be willing to adapt the hundreds of systems out there? [...] As soon as we were able to convince some of the biggest players, the whole sector understood that it could lead to productivity gains for everyone. And Federgon really helped us in convincing them.”

At the request of some of the partner organizations, the standard interface was complemented with multiple open services which allowed partner organizations to also export vacancies and CVs from VDAB's databases (the Vacancy and CV service in Table 22) or to improve the quality of their own vacancies (Online Assistant service in Table 22). Figure 8 gives an overview of the situation in June 2017, listing for each open service how many organizations showed interest in it, how many had a first discussion about it with the open services team, how many are implementing the open service to be used in their own systems, and how many are actually using the service. The motivation for VDAB to start with open services was clear from the start, and is also embedded in VDAB's strategy and the European PES strategy, as VDAB's CEO acknowledged:

“We are part of a network society, both in the labor market and in the broader economy. It's illusory to think that you can have an impact on the policy domain as a closed organization. On top of this, all

government organizations are facing budgetary constraints. It is necessary to look for new types of collaboration with the private sector.”

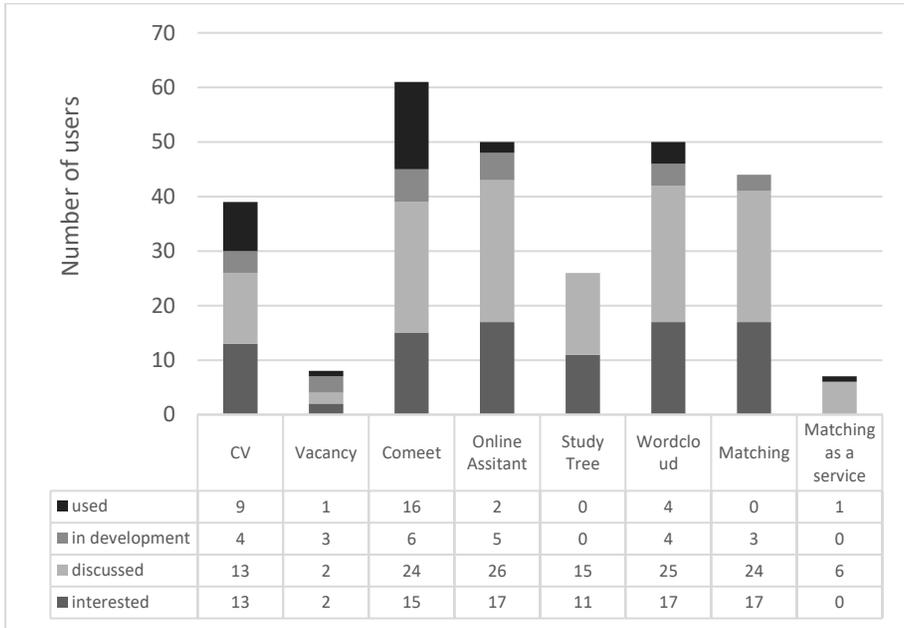


Figure 8. Use of the open services

For the partner organizations in the selected embedded cases, the motivation to start using and co-creating VDAB’s open services was quite diverse. Konvert, Randstad and Tempo-Team were part of the first open services pilot, in which they co-created the Comeet service. Randstad and Tempo-Team mainly used the Comeet service to experiment with the intake of external services and to learn how this could enrich their own data. Konvert was implementing a new CRM system, requiring new competence templates, and used three other open services as well: the Vacancy service, CV service, and Online Assistant. Implementation efforts for Randstad and Tempo-Team were limited: Randstad and Tempo-Team added a new step in the process to publish vacancies internally, and the recruitment and selection agency’s personnel was already familiar with using the service on VDAB’s website. For

Konvert, total development time took longer, but was part of the implementation of a new CRM system.

The start-up Jobwalkr used the Vacancy service for its app showing all job offers in your area on a map. Technically, the implementation of the Vacancy service was fairly easy, but the first version of the service lacked good documentation explaining how the open service worked. Therefore, it took one of the start-up owners responsible for coding about five weeks to implement the service. It is important to note that the start-up owners only had time to work on the start-up after office hours of their day job.

Jobsplus, the Public Employment Service (PES) of Malta, did not have an in-house competence-based matching system and wanted to rely on a system which had been used and tested by another PES rather than to reinvent the wheel. What convinced Malta to use VDAB's open services was the fact that VDAB could prove that it was already successfully providing open services to the private sector. In the case of Jobsplus using Matching as a service, considerable alignment of resources was necessary. The total implementation project took 18 months, but this also included building a new website, new services and applications.

4.5.2 Capabilities for open IT-based co-creation: the VDAB perspective

Through the semi-structured interviews and other documentary evidence, we were able to identify several capabilities that enabled VDAB to succeed with the open services program. In this section, we present the capabilities that emerged from the case linked to three perspectives identified in the literature section: openness, moving from an organization to an ecosystem perspective, and governance.

4.5.2.1 *Openness*

The degree of openness plays an important role in open innovation and in technological platforms. In our case study, we noticed the effect of several openness-related capabilities on the co-creation of the open services, see Table 26.

Table 26. Openness-related capabilities of VDAB emerging from the case

Perspectives from the literature	Capabilities VDAB
Outside-in and inside-out knowledge flows	Gather an outside-in view on internally developed services in order to develop a value-adding product that can be used by external organizations.
Access to the platform	Platform architecture capabilities: <ul style="list-style-type: none"> • Componentization of internal services • Providing a stable design of the open services for further re-use • Assuring technical performance of the open services and their impact on the organization • Identifying and providing crucial features for use of the open services, e.g., the importance of documentation
Control over the platform itself	Dynamically adapt the degree of openness of control and decision rights over the platform itself

One such capability emerging from the case was the interpretation of **outside-in flows of knowledge**. VDAB’s CIO emphasized the importance of gathering an outside-in view on its internally developed services:

“[We had to] discuss with the individual companies, convince them to use our services, try to capture their questions, and which services are relevant to them. This is something a government organization traditionally doesn’t do [...]: convincing companies to use their services.”

Similarly, Randstad attributed much of the success of the open services to VDAB’s ability to translate its internal services into a product that would be useful for external organizations as well:

“This is one of the most important things for me: they [VDAB] made the effort to listen to their customers and this has enriched the open services. I still have to sell it internally, but it is clearly a product that has an added value... I mean, look at the amount of customers they have.”

However, VDAB’s CIO recognized that further development of this outside-in capability was necessary:

“[You need to] think about which customers you want to reach with the open services and what they need. Don’t make the mistake of open data: opening everything you have and thinking it will be used. In designing open services, you need to think through what needs to be part of the service such that others will want to buy it.”

Another category of capabilities that emerged as important in all of the cases was related to the access to the open services, and more specifically the **architecture of the open services**. One of the capabilities that we identified under this category was VDAB’s ability to design the services through **componentization**. Randstad indicated that the division into very small open services that could be directly plugged into other organizations was crucial for the success of the open services:

“You can use pieces of it and join in when you are ready. The split into functional components, and that you can choose whether or not to deploy them, is very important.”

Another architecture-related capability which came out as crucial from the interviews was to **assure stability of the design for further re-use** (in this case, re-use of the open services by parties that did not assist in their initial co-creation). In other words, in the context of our study, an important capability for VDAB was to design the services to be used by different types of actors, rather than focusing on the individual needs of one partner organization only. As VDAB’s CEO stated:

“We want to offer the open services to a broad audience. Many organizations merge, or switch focus from interim services towards broader HR services. We cannot focus on one part of the labor market only, but have to make sure that we have a maximum impact on the entire labor market. This means trying to recognize commonalities among actors and developing services based on those commonalities.”

Randstad acknowledged that the focus on future re-use contributed to the success of the open services:

“Every party had the feeling that they were welcome and they [VDAB] gave equal attention to every question. Even smaller players with a question got an equal amount of attention. It [the open service] was not made for us. It is designed together with us, but not exclusively for us. [...] It was nice to start from smaller groups to eventually co-create a product that could be used in the whole sector.”

Another architecture-related capability that emerged as important in the interviews with VDAB's CIO and with Jobsplus was the ability to **assure technical performance** when the use of the open services would take off. As VDAB's CIO explained, the services could scale very quickly, so measures had to be taken upfront to guarantee performance of the services:

"Technically and operationally it's important for the open services to make sure that they are stable 24/7. You need to perform monitoring, performance tests, daily availability tests, have a fallback component... By working with an external system, you can also bring down your whole system, all applications. So you need to take measures to prevent that, such as throttling."

VDAB's CIO acknowledged that this was something new compared to previous projects:

"The [hardest part was] learning that it is more than just a technical project: we are not used to deliver products to customers. That's why things like 24/7, business continuity, and extra monitoring were not top of mind in the beginning. We had to think about a lot of these aspects for the very first time. But it can scale very quickly, so we needed a performance guarantee."

On a related note, both interviewees from Jobsplus highlighted the importance of assuring the technical performance for using VDAB's matching systems:

"It was a challenge when it came to network performance. We had several issues from a performance perspective. VDAB had to investigate their hardware and needed to upgrade."

A last capability that emerged from our interviews (e.g., with Jobwalkr and with Randstad) as a significant contributor to the open services' architecture was the **inclusion of central features** on the open services platform. Specifically, several partners acknowledged the importance of ample functional and technical documentation on the common Google site for all partner organizations, and of how this documentation was regularly updated together with the partner organizations. As the owners of Jobwalkr explained:

"I think it is a good thing they [VDAB] adapted the API documentation to its current version. The first version of the documentation was not that good... Everything was spread across different Google documents. Someone had created it, but it was clear that it had never been used in practice. That's why we had to find out everything at first."

Similarly, Randstad attributed much of the value co-created to VDAB's "thorough technical descriptions and good technical support environment".

The final category of openness-related capabilities that emerged in our study was related to **deciding upon the openness of the control** over the open services. VDAB's CIO indicated that having a strategic steering committee at the director level in VDAB was critical for the co-creation of the open services:

"Every time you do something, you have to agree with the strategic steering committee: can we do this? Can we make the services paying? For whom: only for the interim sector or for all companies? Which services do we still want to develop in the future? These are strategic questions on which you cannot find an answer with the users only, as would be done in a typical project. You need a steering committee at the director level."

Further, all interviewees from VDAB expressed the view that including external companies and federations in the oversight of the open services program was crucial as well. Specifically, VDAB's CIO elaborated:

"On top of that [internal strategic steering committee], you also have some sort of steering committee with the federation of labor market companies, and with companies participating in the pilots, to see what is possible or desirable and to adjust, to work out the initial services."

Likewise, VDAB's CEO highlighted the importance of finding a more open form of control a number of times during the interview, saying:

"We are now looking into how we can move towards a more cooperative structure, a different governance structure. Even if you would involve external parties in the steering committee, you are still more or less in a VDAB governance model. We need more involvement, and accountability [from the partner organizations] to further develop [the open services]."

4.5.2.2 From organization to ecosystem logic

Opening internal assets for external innovation implied a shift from an organization to an ecosystem logic. Value from the open services was no longer created in-house in VDAB's organization only, but through a network of labor market actors. As a consequence, value was no longer captured by VDAB only, but by the complete ecosystem. From the case, several capabilities

emerged relating to moving from an organization to an ecosystem logic, see Table 27.

Table 27. Organizational perspective capabilities for VDAB emerging from the case

Perspectives from the literature	Capabilities VDAB
<p>From organization to ecosystem logic</p>	<ul style="list-style-type: none"> • Adopting an ecosystem vision • Selling open co-creation internally as something strategically important • Ensuring an organizational set-up that allows the team responsible for open co-creation to be situated on the border of the organization and the ecosystem: linked to the rest of the organization but with other targets, and linked to external partner organizations, as an internal point of contact

One ecosystem capability that emerged as important was the **adoption of an ecosystem vision**. As VDAB’s CEO explained:

“You are only a good conductor when you start from the outside world, from customer expectations. You need to have ample relational skills. Of course, you also need to have knowledge of the labor market, the role of the different actors on the labor market, the strengths of the different actors... so a holistic vision on how the labor market functions and what the contributions of all actors are on the labor market. It is through this outside-in vision, combined with relational skills, that we are able to develop the open services.”

VDAB’s CEO further highlighted the importance of an ecosystem vision a number of times during the interview, declaring:

“If you look at it from a distance, I think you can only support every initiative to better match demand and supply [in the labor market]. And if you are somehow involved in that initiative, you can steer it as well.”

Another important ecosystem capability that emerged in our study is related to **selling the open services internally as something strategically important** in all levels of the VDAB organization. We found evidence of this in our interviews (e.g., with VDAB’s CEO and CIO) where it was suggested that the

impact on the internal organization could not be underestimated. VDAB's CEO explained:

“Internally in the VDAB organization, there will certainly have been some reservations towards the open services: there are always people asking whether you are not undermining your own services in favor of other labor market actors.”

On a related note, VDAB's CIO stated that while the open services are tightly linked to VDAB's strategy of becoming a labor market conductor, a key aspect was still to also convince VDAB's employees to look at the ecosystem perspective rather than at their internal organizational objectives:

“You are busy managing your internal personnel, and the open services don't have an impact on that. It's something that takes away workload outside of VDAB, but not many people in our organization are working on that. [...] Actually, it doesn't yield advantage for VDAB [internally], but it does help people to find a job. So, from our mission and goals it's important to do it, but it's thinking in terms of government 4.0 instead of in terms of government as it is today.”

When talking to the team responsible for the open services, what was emphasized was the importance of being more embedded in an ecosystem logic than in an organizational logic. In other words, in the context of our study, another ecosystem-related capability that emerged as important was to **ensure that the team** responsible for the open services **was fully submerged into ecosystem logics** rather than internal organizational objectives. The open services team consisted of a separate group with special management attention, and was separated from the rest of the organization. To also link the team to the rest of the organization, internal managers received updates on who was responsible and a process for launching questions was defined and shared internally. For the relations with the external partner organizations, the open services team served as an internal point of contact. As VDAB's CIO explained:

“What's important is that we have an internal contact point in case of any problems. Because the services are working on a continuous basis, we need to be there whenever something doesn't work as it should be... Even in the time of the HR-XML standard we already had a team of 2 people who could be contacted by external organizations with questions on how to use the HR-XML standard, how to interpret it.”

4.5.2.3 Governance

In our case study, we noticed the importance of several governance-related capabilities, see Table 28.

Table 28. Governance-related capabilities of VDAB emerging from the case

Perspectives from the literature	Capabilities VDAB
Control mechanisms	Balancing the use of informal mechanisms for control over the access to and use of the open services, such as trust, with formal control mechanisms, such as contracts and a payment model
Trade-offs in control-creativity	Balance a focus on control and standardization with mechanisms stimulating creativity, or the creation of specialized complements and constant experimentation

An **informal governance-related capability** that emerged as important was the **development of trust** in the relations with the individual partner organizations. VDAB’s CEO elaborated on this:

“The hardest part was gaining the confidence that we were in fact pursuing the common interest. This is different compared to collaborating with partners that are dependent on you (for tenders or financing): we didn’t have those levers here. We had to build trust that we wanted to go for it together.”

The CEO further explained that in 2002, VDAB split off its commercial services in temporary employment, recruitment and selection, competence management, and outplacement into a private company. He indicated that this helped in clearing out VDAB’s position as a labor market orchestrator, rather than a competitor for private employment services.

Another capability that emerged from the interviews was related to the **formal governance** of the open services program. One area where the formal governance of the open services program became explicit, was in the **development of contracts and of a payment model**. As VDAB’s CIO highlighted:

“What came afterwards, is thinking about a payment model. In a first phase everything is free of course. But as more and more services are developed, you start thinking: will we keep on doing this for free, or do you have to pay for certain services? Depending on the type of use, and the type of service, we have also been thinking: what can we ask for it?”

The open services Program Manager emphasized that it was not easy to convince partners to pay for the services, and attributed VDAB's success to its ability to explain the rationale for making the services paying:

“You could feel resistance to the payment of the services [...] To address this, we first set up our business model internally [within VDAB] and then we presented it to the partners (explaining which services would become paying, and for which reasons) and that was accepted by the partners.”

The open services Program Manager explained that open services which were beneficial to VDAB as well, such as the Online Assistant for improving vacancies, could be used for free whereas open services that were primarily beneficial to the partner organization using it, such as the CV service or Matching service, had to be paid for. She also indicated the differentiation that was made between the types of partner organizations, with for example third party suppliers of interim agencies paying a higher amount than individual interim agencies.

In our interviews with the open services Program Manager, we also found evidence that the contracts were further updated during the program:

“In the beginning, we had separate contracts for each service. After setting up the business model, we made one contract [per partner] with separate items that can be checked for each open service [used by the partner organization].”

Confirming the importance of the contracting capability, both interviewees from Jobsplus stated that the contract building was difficult and complex, as the project involved several contractors, and none of the public employment services were familiar with service delivery and contracting with another public employment service:

“It was very difficult as a whole, starting from the contract [...] From a procurement perspective, we definitely had to take into consideration legal aspects when doing the contract. Even in the planning part of it, we had to involve our legal advisors.”

The final governance-related capability that emerged in our study is related to **balancing standardization and control with creativity and experimentation**. On the one hand, VDAB's CEO and the program lead emphasized the importance of standardization and control mechanisms to prevent low quality or uncontrolled creative output. As the CEO noted:

“From the role of conductor [of the labor market], you try to use standards, to enforce transparency, and to ensure quality.”

In this regard, VDAB's CEO also referred to the importance of the relation with the federation of labor market companies (Federgon) for more standardization. Even before the open services were developed, the relation with Federgon helped VDAB to convince the interim agencies to use one standard HR-XML interface for uploading vacancies on the VDAB portal. VDAB's CEO acknowledged that, during the open services experiment, regular meetings and press conferences with Federgon assisted in informing and convincing the member organizations:

“The dialogue with Federgon was more important for the governance of the open services project than the relations with the individual actors.”

VDAB's Program Manager referred to a possible further standardization of the use of the open services by making some open services compulsory for partner organizations who want to post vacancies on VDAB's portal:

“We want to make the use of the Online Assistant service ‘compulsory’ for the partners who post vacancies on our portal. [...] We still give them the choice, for example with the Online Assistant, to use it in their own systems and only send it to VDAB after taking the feedback into account, or to upload it onto the VDAB portal and getting the feedback there.”

At the same time, VDAB's CIO saw possibilities for stimulating constant improvement of the services, including the development of new features:

“There is so much more that we can do, such as giving recommendations and other things that go further than just sharing vacancies. We are not skilled enough yet to go faster and to incorporate more information in the open services. The open services are still very close to their first concept [...] and their potential is still heavily underused. [...] A lot of our time still goes out to getting new organizations on board, and doing pilots with the partner

organizations, and seeing whether things work or not, setting up the environment... The operational things take a lot of time at the expense of developing new features.”

The CIO also indicated that improving the open services based on their use would become crucial:

“Once you have the services, you have to look at how they are used [...] You have to think about what next steps you can take: how can I further improve the services? How can I add new services?”

Further, VDAB’s CIO expressed some concerns regarding the heavy focus on one sector and not on other possible niches:

“Currently we are focusing heavily on the interim sector, but actually we need to think: how will we make sure that other organizations will use this? [...] You could communicate to all HR services of large organizations, this input would be useful to them as well, especially if you would provide open services with an even bigger added value for them.”

Lastly, VDAB’s CEO expected the partner organization to contribute more towards the development of new open services, for example by sharing data resulting from their use of the open services:

“Partner organizations should also give transparency back to us: [we need this to understand] how we can generate better services”

Taken together, all VDAB interviewees (CEO, CIO, Program Manager) indicated that it would be crucial to balance the trade-off between control and standardization on the one hand, and creativity and experimentation on the other hand.

4.5.3 Capabilities for open IT-based co-creation: the partner organization perspective

In this section we provide an overview of several capabilities that were used by the partner organizations for open IT-based co-creation. Although the spectrum of capabilities for the partner organizations was more limited (e.g., they were not involved in control or governance of the platform), several capabilities for making the open IT-based co-creation work emerged from the case as an answer to our third research question, see Table 29.

Table 29. Capabilities of the partner organizations for open IT-based co-creation in government

Perspectives from the literature	Capabilities partner organizations
Outside-in and inside-out knowledge flows	<ul style="list-style-type: none"> • Understanding how outside-in flow of knowledge fit with the organization’s business model • Actively contributing to the co-creation with inside-out knowledge flows
From organization to ecosystem logic	<ul style="list-style-type: none"> • Adopting an ecosystem vision

In our study, one capability that emerged as important in terms of openness was the **ability to link the outside-in flow of open services with the partner organization’s business model**. VDAB’s CIO emphasized the importance of this capability:

“They [the partner organizations] need insights into how they can use the open services in their business model. In order to do this, they need people who understand that their way of working will change as well. Again, this is more than just a technical project, and requires structures that fit with the new concept.”

Our interviews with all partner organizations revealed that, while open co-creation efforts are seen as a way to achieve more than would be possible for one organization on its own, this did require some degree of relinquishing control (which again needed to be in line with the business model). Randstad, for example, wanted to keep its independence as it considered its in-house competence templates as a core business. As Randstad’s Business Performance Manager stated:

“How far do we want to integrate with what jobseekers already fill out on the VDAB website? This depends on our roadmap for the future, how we want to anticipate, and our business model.”

On a related note, Konvert, which decided to switch completely to VDAB’s competence templates by using the Comeet service, also elaborated on its dependency on VDAB:

“How can we, together with VDAB, make sure that new professions [and their competence templates] will immediately be available in the system? What if a profession is deactivated in VDAB’s system, how will

this be translated in our systems? This was not a real concern, but definitely something we had to think about during the analysis phase.”

Further, the interviewee from Randstad (situated in the IT department) highlighted the importance of translating the possible added value of the open services to the business, saying:

“The hardest part about the open services is to sell them in our own organization, to show what we believe can be the added value. We are sometimes locked up in our own world, making it less evident to point to the added value for the organization.”

Jobsplus highlighted another factor in linking the open services to the business model, referring to the importance of making an estimation of the possible impact on internal business processes, but also on relations with partners:

“The employment service division had to go through a culture change: from very basic skills to another layer of training from our side. We even need to train employers to use these competences for proper matching as well, rather than just mentioning job names.”

Another capability related to openness that emerged from the interviews, was that the partner organizations needed to be capable of **providing inside-out knowledge flows** to VDAB as well. Currently, the inside-out knowledge flows remained limited to suggestions for improvement of the open service or the documentation. Several interviewees acknowledged that in the future, the contribution of the partner organizations could go further by also giving transparency back:

“Over time, we would like to make our own Jobwalkr API available as well [amongst others to VDAB], which could mean a win-win in both directions.”

The final capability for the partner organizations that emerged in our study is related to ecosystem thinking. As VDAB’s CEO highlighted, the partner organizations needed to **understand how they could contribute to the labor market ecosystem** and how this could lead to better results for everyone, rather than thinking from the perspective of one organization. In particular, VDAB’s CEO talked about how the organizations needed to look at VDAB as a partner organization instead of a competitor:

“They need to give up their vision on VDAB as a competitor and see us as an open partner organization, which is still difficult for some. We

are fishing in a bigger pond than they are. Especially in times when the economy is booming, competition increases.”

Referring to how the organizations needed to recognize each other as partners reciprocally, the start-up Jobwalkr emphasized that this was not a difficult task:

“We believe it is the most common thing in the world to use services developed by other parties. I actually find it weird that there are companies that are not doing this yet.”

Other partner organizations, such as Konvert, emphasized that this was more of a balancing exercise:

“We are fighting to increase our part of the commercial cake, but if everyone starts using homogeneous processes, and this is encouraged by government, I don’t have a problem with it.”

4.6 Closing comments and limitations of the study

The objective of this study was to explore what it takes to co-create in an open partner network, based on digital technologies. As an answer to our first research question, the case narrative in the results section showed how a public service starts with open co-creation. Through the case analysis we were able to explore the capabilities a public service uses to co-create value with its partners, and the capabilities used by the partner organizations, which answers our second and third research question.

We purposefully selected the embedded cases in order to identify theoretically different cases in view of maximal generalizability. In the embedded cases, we noted no differences in co-creation capabilities when the familiarity with the partner organizations differed. A limitation of this study, however, is that we could not make an in-depth comparison between the two modes of co-creation (exchange and addition) in an open setting yet, since there was only one organization using a service that was classified in the addition mode. Still, it already became clear that it will be more difficult to open this co-creation mode to an open partner network. The open service was heavily customized, and for future re-use the customizing will be different. Moreover, it is difficult to focus on the openness of the service towards future partners when they are not around the table.

Another limitation of this study is that its focus on the co-creation of public value (i.e., getting people to work) is not complemented with a focus on the distribution or appropriation of value between the different partner organizations. While we did not find any elements related to distribution or appropriation of value in the case, this might be an important element in networks for open IT-based co-creation.

This study focuses on the context of a public employment service co-creating with an open network of other labor market actors. While this case provides an excellent example of an open network, a third limitation of this study is that IT-based co-creation in an open network around other types of public sector actors may not resemble the public employment service or labor market context. Although we believe that the capabilities emerging through the analysis of the open services case are likely to be applicable in other public sector contexts as well, generalizability towards the private sector might be limited.

More research will be necessary to validate our provisional single-case study findings regarding the capabilities necessary for open IT-based co-creation. For further research, it will particularly be of interest to study the difference in required capabilities for different modes of co-creation (exchange, addition, synergistic integration), which our case has not been able to study in depth, and to add a focus on distribution and appropriation of (public) value.

4.7 Conclusion

In this article, we report the observations from an embedded case study at VDAB, the public employment service of the Flemish region in Belgium, and its 5-year program with open services. Through the literature on IT-based co-creation, technological platforms and open innovation, we identify key theoretical perspectives for studying open IT-based co-creation in government. The case narrative shows how a public service starts with open IT-based co-creation and what open IT-based co-creation looks like in a government context. We identify the capabilities used for open IT-based co-creation, both from VDAB's perspective and from the perspective of its partner organizations.

This article addresses several gaps identified in the literature. Specifically, our study has identified the capabilities for open IT-based co-creation between a public service and its partner organizations. We believe this to be an important contribution since most research on IT-based co-creation focuses on dyadic relationships. This study is arguably the first that attempts to look at the co-creation phenomenon in an open partner network with multiple partners. In addition, our study emphasizes the importance of IT in enabling this open type of co-creation. Furthermore, our study contributes not only to the literature on IT-based co-creation and technological platforms but also to public sector research. First, much of this literature on co-creation and co-production does not take technology-related aspects into account. Second, the open government data literature has failed to capture a co-creation aspect. Our study thus makes an important contribution to this literature by unearthing how a public service can co-create value with its partners by opening up internal IT assets to partner organizations. Further, our case study, by focusing on an organization that is only starting with IT-based co-creation, fills an important void in the co-creation literature, which has tended to focus primarily on mature forms of co-creation that are already in place.

We are hopeful that the capabilities for open co-creation discovered in this study will enable managers in public sector organizations to set up appropriate relationships with partners, realizing that more than technical capabilities alone will be necessary. We believe that the case narrative of the open services program itself can also be seen as an important contribution to practice, serving as a consultable record (Walsham, 1995). The case highlights the unique open services program of a forerunner in government. We are hopeful that other public sector organizations – that are also facing budget restrictions or that need to do more with less - would benefit from reflecting on VDAB's experiences with open IT-based co-creation.

Discussions and conclusions

“The digital technology revolution has pushed us to the edge of a fundamental reform of government service delivery. Interesting times lie ahead.”

– Alan Brown

5.1 Summary of findings

This thesis focuses on digital transformation – a form of end-to-end, integrated business transformation where digital technologies play a dominant role – in a government context. In particular, my goal is to start understanding how public administrations can implement a paradigm change and move from NPM to DEG. This question was boiled down into smaller sub-questions (“what does DEG really mean?”, “what are the implications of moving from NPM to DEG?”) which have guided the different chapters of this thesis. As the research questions were formulated in a broad and ambitious way, it was not my intention to provide a full answer to each question. Rather, the questions acted as a guide for zooming in on particular issues as a first step towards understanding digital transformation in public administration. In the epilogue of this dissertation, I reflect on the contributions of this dissertation to the DEG paradigm and give a definition of what DEG really means.

To reap the full benefits of digital in a DEG context, it is crucial to understand what DEG really means. This includes, amongst others, understanding technological platforms and collaboration with partner organizations in ecosystems, which are essential components of a digital transformation. In a first effort to better grasp what DEG really means, we therefore zoomed in on the popular and widespread phenomenon of open data, and more specifically open government data (OGD) platforms. In **Chapter 2** we provided an answer on two research questions: (1) how can we define OGD platforms, and can we define different types of OGD platforms? and (2) which elements of the

different OGD platform types are found in the OGD case study literature? Through reinterpretation of knowledge epistemologies for OGD platforms, we introduced a distinction between three OGD platform types: a cognitivist interaction between users and the data, connectionist interactions between different parties fueled by the open data platform, and an autopoietic system in which re-use by all types of ecosystem parties automatically enriches the learning platform (with the autopoietic OGD platform most closely linked to DEG). We explored elements of each platform type for different network dimensions, through empirical examples from the literature review (and thus identified important elements of the autopoietic DEG-like platform type). This distinction between different platform types will provide a common language for OGD research. The empirical examples in Chapter 2 provided both a validation and an illustration of the OGD platform types, and gave rise to pressing questions for further research. **Appendix C** builds on this research by imagining what an autopoietic open data ecosystem could look like in a smart city context, through a focus group and thought experiment with smart city managers.

While Chapter 2 focused on a deeper understanding of the DEG paradigm, Chapters 3 and 4 already investigate some of the implications of moving from NPM to DEG. In **Chapter 3** we focused on the implications on strategy of this paradigm shift. We answered the research question of how to formulate a good strategy of simple rules in the DEG context, by applying Action Design Research. We presented the development of a strategic management artifact at VDAB, the ‘boundary breaking’ simple rules strategy. This new design of a conceptual artifact, whose initial design was informed by both the literature and previous case study research, was iteratively revised by its use in practice. We are convinced that this combination of rigor and relevance adds to its value for other public services aiming for DEG transformation. Furthermore, our summary of the existing literature into meta-requirements for simple rules ensures that VDAB’s artifact is useful for a larger class of problems, more specifically for formulating a good strategy of simple rules in a DEG context. By deriving design principles from the design and use of the ‘boundary breaking rules’, we propose how the meta-requirements can be addressed in practice and thus in the broader context of public services moving towards DEG.

Chapter 4 complements the strategy focus of the previous chapter with a focus on the capabilities required for moving from NPM to DEG. In this chapter we focused on open IT-based co-creation – a phenomenon at the intersection of co-creation, open innovation, and platform literature – and the organizational capabilities required to get the most out of it. More specifically, we explored what it takes to co-create in an open partner network, based on digital technologies. We investigated this phenomenon through the revelatory case of VDAB’s 5-year program with open services. We performed an embedded case study to form an answer to three research questions: (1) how does a public service start with open IT-based co-creation? (2) which capabilities does a public service use to co-create value with its partners? (3) which capabilities do partner organizations use? This chapter is the first to look at co-creation in an open partner network with multiple partners. It also adds to literature emphasizing the importance of IT in enabling this open type of co-creation, and giving insight into an organization that is starting with co-creation. To the public sector research it adds a focus on the combination of technology-related aspects and co-creation.

Each chapter of this dissertation has contributed to DEG’s central themes (reintegration, needs-based holism, and digitization). Chapter 2 contributed to a better understanding of the digitization theme by zooming in on the popular new technology of open data platforms. It also contributed to a better understanding of the role of government in designing and governing platforms across organizational silos (reintegration), focused on needs clusters that make sense to citizens and business (needs-based holism). Chapter 3 incorporated DEG’s central themes in a digital strategy focusing on, amongst others, digital first (digitization), ‘want to’ partner involvement (needs-based holism), and ecosystems and service journeys (reintegration). Chapter 4 looked into the capabilities needed for needs-based holism and digitization by researching co-creation in an open partner network based on digital technologies.

5.2 Avenues for further research

Due to scoping and timing, compromises have to be made in every study and not everything can be researched. Especially in obtaining a deeper understanding of the rather new phenomenon of DEG, there are many avenues for further research to build on or extend the research performed in this dissertation. This section first introduces a set of directions for further research that are a direct result of the limitations of the research, before discussing a number of interesting issues for DEG research in general.

5.2.1 Validation of single case study findings

In Chapter 3 we studied VDAB's transformation, and we are aware that a single-case study employing ADR poses certain challenges towards scientific generalizability. Similarly, Chapter 4 focuses on the context of a public employment service co-creating with an open network of other labor market actors. While this case provides an excellent example of an open network, IT-based co-creation in an open network around other types of public sector actors may not resemble the public employment service or labor market context.

To validate these single case study findings, we propose to compare VDAB's approach to reach DEG through a strategy of simple rules, and the capabilities that enabled VDAB's open services program, with the approach taken by other public employment services throughout Europe, and possibly with other public sector actors.

5.2.2 Validation of the OGD platform mapping

To ensure the validity of the mapping of case study elements on the OGD platform types in Chapter 2, future research could validate with the authors of the respective case studies whether the case study elements were classified correctly. As we re-used the case studies for interpretation according to a lens beyond their initial purpose, certain elements relevant for the mapping exercise might have been omitted from the case description because of the original focus of the paper.

5.2.3 Extension of the design theory for simple rules

The IS design theory we developed for simple rules in Chapter 3 remains in a nascent stage. The components of our design theory for simple rules can serve as a base for further research focusing on validation or extensions of this design theory.

5.2.4 More empirical research taking a network perspective

In Chapter 2, we called for more empirical research taking a network perspective on OGD platforms, as this perspective is ideally suited for answering management and governance questions.

5.2.5 Research on why the autopoietic view on OGD platforms remains absent

Further research could focus on another question raised in Chapter 2: why does the autopoietic view remain absent in the case study literature? Is it a conscious choice that the autopoietic view is not applied? Are there no practical examples of autopoietic OGD platforms, or has the autopoietic view not been adopted by research?

First, research can verify whether an autopoietic platform is possible in practice. We already took a first step in Appendix C by verifying through a thought experiment with smart city managers whether the autopoietic OGD platform type would be possible in a city context. This could be complemented with thought experiments with other important actors in the open data ecosystem, and with actors at different levels (regional, national, transnational).

Second, if autopoietic OGD platforms are possible in practice, research can focus on barriers associated with implementing this platform type. Future research could also study whether these barriers are of a practical, political or other nature.

5.2.6 Research agenda on important questions associated with the autopoietic OGD platform type

To fully support or foster knowledge-based interaction, the OGD literature should focus on important questions associated with the autopoietic OGD

platform types. This will require rich and contextualized longitudinal case studies on how the interactions between platform actors enrich not only the OGD but the entire ecosystem. Table 12 in Chapter 2 presented a list of questions associated with four strategic platform decisions: How many different parties can be part of the ecosystem? Which features and functionalities should be part of the platform? What should pricing look like? Which governance decisions should we make? To answer these questions, further research should focus on the following:

- Empirical examples of how many parties to actively involve in the OGD platform and trade-offs between parties.
- Empirical examples of government taking up the role of a missing side of the OGD platform.
- If OGD platforms aim to go beyond the data catalogues they tend to be now, which features and functionalities are crucial?
- Are there features that put the interest of different ecosystem parties at odds with each other? How should this conflict of interest be resolved?
- Is losing income an important barrier to freeing up some of the most valuable data?
- What are viable business models for open data re-use?
- Who is allowed to join the ecosystem, and which parts of the OGD platform can they access?
- What are the various parties allowed to do, and with whom are they allowed to interact on the platform?
- Do governance rules have to be created by a central party?
- How is the trade-off between quantity and quality of open data re-use handled? In which cases is one strategy preferred over the other?
- How does government ensure that low-quality suppliers do not drive out high-quality suppliers?
- How will it be ensured that parties take actions that not only are positive for themselves but also have positive spillover effects?

5.2.7 Study differences in required capabilities for different modes of co-creation

Further research can study the difference in required capabilities for different modes of co-creation (exchange, addition, and synergistic integration), which our case in Chapter 4 has not been able to study in depth. However, it already became clear that opening the addition mode to an open partner network might be more difficult as compared to the exchange mode.

5.2.8 Focus on distribution and appropriation of co-created value

The case of VDAB's open services focused mainly on the creation of (public) value (i.e., getting people to work), but was less suited to focus on the distribution or appropriation of value. Further research could focus on whether distribution or appropriation of value is an issue in co-creation efforts where government is the main partner, and whether this changes over time (e.g., comparing initial co-creation efforts with more mature forms of co-creation).

5.2.9 Complementing our OGD platform types with another approach

For distinguishing between different OGD platform types in Chapter 2, we started from a theoretical lens which was not originally aimed at the OGD platform context and we reinterpreted the lens through informed argumentation. We verified in the case study literature whether we indeed found all elements specified by the theoretical lens. We consciously chose to apply this approach because we believed that OGD platforms are still in a nascent stage, and looking at examples in practice to derive platform types might lead to a narrow perspective.

Further research could, however, instead of starting from theory, start from practice by looking at more advanced types of platforms in other contexts such as business platforms, open map data etc. This might lead to interesting insights for OGD platforms as well: do our OGD platform types still hold, or does this approach lead to different results and why?

5.2.10 Non-government actors governing OGD platforms

Throughout this thesis, we presented government as the central party orchestrating the OGD platform. Future research could focus on whether this always is (or has to be) the case, and/or whether the central party has to create all governance rules. This fits in a shift to more openness, in which government does not only open access to its data, but also opens the control over the platform.

5.2.11 Attracting and retaining the right skills

Following Gottlieb & Willmott's (2014) recommendations, this thesis focused on learning to understand what digital value means in a public sector context, and took first steps towards understanding how public sector organizations can be set up to take full advantage of new digital opportunities (by focusing on the impact on strategy and capabilities). Further research could focus on Gottlieb and Willmott's third recommendation – on which this thesis did not focus – by investigating how public sector organizations can attract and retain people with the right skills to increase their adaptive potential.

5.2.12 New methods blending qualitative and quantitative approaches

Studying digital transformation in government more thoroughly will require new methods blending qualitative and quantitative methods. While qualitative approaches may help to reveal and understand a phenomenon, they fail to scale to broader effects. Quantitative approaches, on the other hand, sometimes require too simplistic assumptions about the nature of a complex phenomenon such as digital transformation. Innovative methods, blending qualitative and quantitative approaches (such as computational social sciences, configurational analysis, and complexity theory methods, see Nambisan et al., 2017), could help to overcome these problems.

5.3 Implications for practice

In this section, we provide a summary for managers and practitioners. We indicate how our results can contribute to public sector organizations aiming to pursue digital-era governance (DEG). First, our research findings can help practitioners to understand what digital transformation in the public sector

means. Second, some of our research findings can be translated into practical guidelines for starting with digital transformation in government.

5.3.1 Understanding what digital transformation means

In general, it is important to understand that digital transformation is not the same as using digital as a support for the current business. With the four realities in a digital world and VDAB's 'boundary-breaking rules', we provided two frameworks which will assist practitioners in realizing that it will take a transformation (mostly from an NPM perspective) to move towards DEG. The four realities in a digital world (see Appendix A) explain four new realities every organization has to cope with, and thus deserve consideration in executive committees:

- Customer experience is value
- Experimentation is necessary
- Collaboration reshapes strategy and business models
- Digital ecosystem platforms rule

VDAB's 'boundary-breaking rules' (see Chapter 3) provide an understanding of what DEG means:

- **From digital support to digital first:**
This represents a major shift in a public sector context dominated by rigid service delivery during office hours only. Service delivery will need to become e-enabled, intelligent, 24/7, personalized, flexible, and proactive. This requires digital to become a starting point for creating service concepts instead of an afterthought or supporting function.
- **From service provision strategy to ecosystem strategy:**
Instead of continuing to provide services in a closed supplier-customer business model, government should aspire to become an orchestrator or keystone in an open ecosystem. This represents a huge shift in strategic focus and value proposition. Most importantly, public sector organizations will have to learn how to delegate service provision to other ecosystem parties, instead of providing all services by itself, and will have to make sure that these ecosystem parties can thrive.

- **From offering services to coordinating dynamic service journeys:**
 Modern organizations should focus on end-to-end service journeys, rather than locally optimize satisfaction at singular touchpoints. A service journey, unlike a business process view, represents an outside-in view of servicing customers. This means that the individual services are not only conceived as part of progression over time, they are also defined from the point of view of the customer and his perception of value. The opportunity of having direct, often real-time, information feedback in a digital servicing environment allows for conceiving dynamic service journeys, i.e., journeys that dynamically adapt based on the feedback received.
- **From ‘have to’ to ‘want to’ partner involvement:**
 Developing a business model rooted in ‘want to’ rather than ‘have to’ engagement requires a fundamental change of mind set and way of working.
- **From plan-driven to agile projects:**
 Projects or programs operating in a dynamic, complex environment require adopting an agile way of managing project work. In general, agile methods seek speed without giving up on quality, flexibility without introducing chaos, and transparency without creating overhead.
- **From ‘ad hoc’ initiatives to developing organizational capabilities:**
 Instead of focusing only on the delivery of separate digital innovation projects, public sector organizations should develop organizational capabilities in support of all previous boundary breaking rules, step by step, and project by project.

We are also hopeful that reflecting on the case narratives of the development of VDAB’s ‘boundary breaking rules’ and of VDAB’s open services program will benefit other public sector organizations aiming to do more with less.

5.3.2 Starting with your own organization’s digital transformation

This dissertation proposes two possible assessments which can be used to identify how digitally ready an organization is: the Exconomy digital readiness assessment (see Appendix A), and Vlerick’s digital transformation survey (see Appendix B). We therefore advise practitioners, before they start with their

organization's digital transformation, to use these assessments as a discussion starter.

For public (employment) service managers wanting to pursue DEG, we advise to use VDAB's 'boundary breaking rules' (see Chapter 3) as a starting point for adopting a new way of working. First, the rules help to understand what digital really entails. Second, this strategy of simple rules helps to respond quickly to a changing environment.

For all responsables of digital transformation wanting to develop a similar strategy of simple rules, we advise to have a look at the design principles (our takeaway from designing VDAB's simple rules) in Chapter 3:

- Make the simple rules specific, differentiating and future-oriented by linking to both an agreed upon view on the future and the current state of affairs, with the difference between the two representing a fundamental shift.
- Make the simple rules transparent by employing familiar wording and by utilizing colors for easy referral.
- Make the simple rules actionable by tracking project progress ("How different are we really?") by how well you score on the fundamental shift inherent in the simple rules.

From our research on open data and open services, we can conclude that it takes more than just opening internal assets (technically). Rather, most new forms of digital government require collaboration with other (non-government) actors in an open setting, and a whole range of management capabilities and governance mechanisms will be necessary to make it work. Rather than adopting a 'build it and they will come' point of view, we advise open data program responsables to consciously choose the open data platform type they want to (and are able to) launch (see Chapter 2) depending on their ambitions and constraints:

- **One-way (cognitivist) open data platform:**
Government realizes that it does not have to develop all services by itself but opens its data to be re-used and connects other to the open data. The open data platform is a rather static, neutral tool for storing and disseminating open data. This open data platform type requires the least effort from government, but also has the most limited

possibilities. Mostly, it only serves transparency purposes, and re-use only works in an environment where an active community self-organizes around the data.

- **Social (connectionist) open data platform:**

Government acts as a central coordination mechanism for creating communities around open data. This requires more effort, such as organizing hackathons and living labs for connecting different actors and keeping them committed.

- **(Autopoietic) open data ecosystem:**

Government acts as the keystone orchestrating the open data ecosystem by creating value and fostering the health of the ecosystem.

Further, if they want to move an existing open data platform from one platform type to another, this should be a conscious choice and the program responsables should be aware of the implications on the government's role.

For public sector managers wanting to co-create with other organizations, for example through open services, Chapter 4 shows that this requires more than technical capabilities alone. If managers are aware of the many areas in which they might need capabilities (i.e., in the areas of IT-based co-creation, open innovation, and technological platforms), we are hopeful that this will help them to set up appropriate partner networks.

Epilogue

“Technology is neither good nor bad; nor is it neutral.”

– Melvin Kranzberg

After studying Digital Era Governance (DEG) for four years, both in theory and through practical examples, I believe I can say that I got to know the DEG paradigm inside out. In this epilogue, I want to end with some personal remarks on DEG: remarks on the content of DEG (what’s in it and, especially, what’s missing?), remarks on some of the critiques DEG faces, and a view on the future of DEG.

Comments on the content of DEG

The Digital Era Governance (DEG) paradigm was defined in an ambitious way, and answers the call for a new model of government that suits a digitally transformed society (see, e.g., Dunleavy & Margetts, 2013; Dunleavy et al., 2006). DEG presents a vision of government that fits with a digital world, stressing the importance of three main themes (reintegration, needs-based holism, and digitization changes) and many innovative features (such as, for example, radical disintermediation in public service chains, co-production of services, and freeing public information for re-use, mash-ups and so on).

At the same time, however, DEG remains rather vague and high-level, with little practical examples. Also, I do not believe that it stresses enough the fact that it is all innovative features taken together that really make DEG so different. Further, DEG is focused more on the *what* than on the *how*, with no real focus on the organizational transformation that will be required to get there.

In my doctoral dissertation I have aimed to resolve the vagueness linked to DEG by providing concrete, in-depth examples of what DEG could look like; an open government data platform with autopoietic characteristics, or open IT services that have been co-created with partner organizations. These

examples hint to many innovative DEG features (e.g., freeing public information for re-use, co-creation or co-production of services) and thus also add to the DEG paradigm by showing that the real impact comes from the combination of these features taken together.

In this dissertation, I added a focus on *how* to realize DEG (and on the organizational transformation that will be required) by sharing VDAB's 'boundary breaking rules' (contrasting old and new ways of working), and the capabilities for making open IT-based co-creation work. I believe this focus on how to realize DEG will be indispensable, as we cannot fully understand yet what DEG means (and where we need to go to) but we can focus on the way in which we are trying to get there. The 'how' is a central part of DEG, and should therefore be included in a definition of DEG. I would propose a new definition of DEG as "a paradigm on how public administration should organize itself, stressing three central themes (reintegration, needs-based holism and digitization) which are centered around new objectives, and new ways of working".

Most importantly, researching DEG for four years made me realize that a one-size-fits-all framework of what DEG is and how it can be realized will not be possible, and maybe should not even be our goal. Rather, it will be important to always take the importance of the context into account.

Critiques on DEG

A first critique on DEG relates to whether digital transformation is really so different from previous changes in public administration. I would like to remind critics that digital transformation is not just a change for public administration, but for all types of organizations who are part of a digital economy ruled by four realities (Viaene & Danneels, 2015):

- Customer experience is value
- Experimentation is necessary
- Collaboration reshapes strategy and business models
- Digital ecosystem platforms rule

Digitization is an essential component of DEG for coping with these new realities. Digital technologies are more than just an enabler of doing the same

things online, but rather they allow us to reimagine the way government and society interact.

DEG, like many other digital transformation efforts, also receives critiques linking to digital literacy and digital determinism. If more and more will be digitized, the gap between digital natives and people – or even organisations – with a lower digital literacy widens. The ones benefiting most from digitization would be the ones who already had the highest chances, the most money, or (in case of VDAB) the most promising jobs or careers, while the ones with less (digital) abilities are thus left behind even further. Moreover, DEG would promote some sort of digital determinism, where more digitization is always better. This would then lead to an incontestable digitization of all government services. In my view, both critiques originate from the somewhat misleading terminology of the Digital Era Government paradigm. I doubt whether the ‘digital’ adjective will remain an essential part of the DEG paradigm. I believe that the role for technology in DEG is that of a means rather than an end, an enabler rather than a purpose *an sich*. For example, by using digital technologies for doing easy tasks online (e.g., improving your CV, or even letting a chatbot building it for you from scratch), offline capacity can be freed up for doing harder tasks, for which there was probably not enough time before. The true test will be whether public administrations can use digital technologies as part of a digital transformation, a form of end-to-end, integrated business transformation where digital technologies play a dominant role.

The future of DEG

This dissertation gave a first peek into DEG, and more research will be necessary to fully understand what DEG means. In a first wave of DEG, it will indeed take some time to get used to the implications of digital by default. In my experience, the focus in this first wave is especially on citizen-centricity and more personalization, which are linked to DEG’s central theme of needs-based holism. This is the wave we are in right now. I hope that in the future, the ‘digital’ adjective will have become irrelevant as digital has really become the default. Instead, we might speak of ‘citizen needs-based government’, or ‘government as the manager of a marketplace’.

Towards the future, I am convinced that an ecosystem focus will become a more central component of DEG. We cannot ignore a changing environment in which government can no longer do everything on its own. Ecosystem platforms might even become a fourth central DEG theme. What I noticed throughout the studies in this PhD is that fully understanding the implications of collaboration with partners, or the orchestration of ecosystem actors is even harder than getting the first wave of DEG right. It will take more time to fully grasp this aspect of DEG, because of its inherent complexity with many parties involved. In most of the studies in this dissertation, I already took an ecosystem approach, but I always looked at government as the central actor or keystone orchestrating the ecosystem. This is not necessarily the case and future research on DEG could also focus on how government should act in this case.

Appendix

7.1 Appendix A: Welcome to the Ex-Co-nomy

Related publications:

Viaene, S., Danneels, L. 2015. Driving digital: Welcome to the Exconomy. (9 p.)

Viaene S., Danneels L. (2015). Digital transformation: unlocking the future. Cutter IT Journal, 28 (11), 3-5.

Viaene S., Danneels L. (2015). Driving digital: Welcome to the ExConomy! The Journal of Financial Perspectives, 3 (3), 182-187.

7.1.1 Abstract

A first step in better applying the new digital technologies currently at our disposal is understanding what creating digital value really means. To give digital a more precise focus, we have coined the 'ExConomy' framework, which breaks down what digital entails into four realities: customer experience is value, experimentation is necessary, collaboration reshapes strategy and business models, and digital ecosystem platforms rule. This appendix gives a presentation of these four realities and provides a tool for self-assessment of an organization's digital readiness.

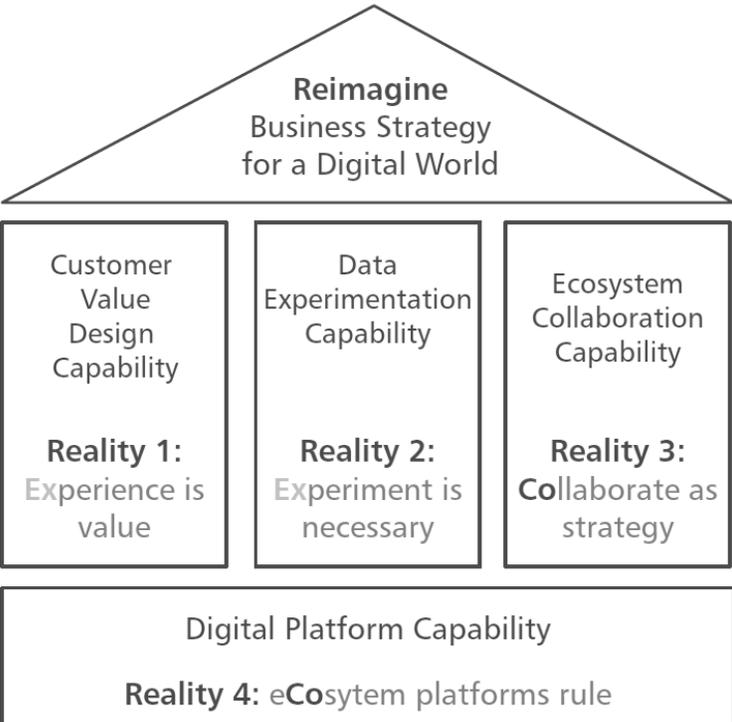
7.1.2 Introduction

There is a lot of confusion among practitioners about what 'digital' really means. Does it refer to a set of technologies (i.e., social, mobile, big data/analytics, the cloud, the Internet of Things), or is there more to it? To give digital a more precise focus, we have coined the term 'ExConomy'. It defines what digital entails from a business-value point of view and pinpoints why it deserves consideration in executive committees.

Here is the gist of things: companies embracing digital recognize the disruptive power of modern information technologies. As such, digital compels them to cultivate a profoundly new mindset and invest in winning capabilities for

competing and doing business. They understand that the digital economy is ruled by four realities, which we summarize as the ExConomy (see Figure 9):

- 1. Customer Experience is value.
- 2. Experimentation is necessary.
- 3. Collaboration reshapes strategy and business models.
- 4. Digital eCcosystem platforms rule.



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Figure 9. The ExConomy framework

This appendix examines the four realities in detail and offers a real-world example for each. We conclude with a set of survey questions organizations can use to assess their current state of digital.

7.1.3 Customer Experience is value

Products and services are not enough to win over or keep customers. The digital space is notorious for how fast it commoditizes products and services. Ultimately, value is attributed to the total experience of engaging with customers in ways that fit with their modern connected and mobile lives. Furthermore, today's companies must make their customer's transition from the digital into the physical world of experiences, and vice versa, seamless.

Digital leaders understand that it is crucial to take an outside-in perspective — putting themselves in the customer's shoes — when designing value propositions. They embrace digital technologies as a way to enhance relationships with customers, offering truly relevant and appealing customer benefits. They also recognize that, to be successful, every part of the organization must contribute to this vision. This stands in stark contrast to the traditional functional approaches for creating the customer experience and the business routines that push products onto the market instead of pulling customers in.

Example: P&G

P&G has invested in a global CRM system that focuses on managing data and processes to enable all of P&G's brands to engage with customers in meaningful digital ways and to provide a holistic customer journey experience. With this initiative, the company envisions facilitating a fundamental shift from mass to one-to-one, value-adding customer engagement. A significant strategic battle that P&G hopes to win is the "zero moment of truth" — the online point in time when the customer decides what to buy. To make this new customer engagement program work, P&G is seeking radical digital change in four complementary core areas: (1) from push to real-time supply network, (2) from what has happened in the past to real-time business intelligence, (3) from hierarchy to a flat, connected organization, and (4) from low-risk to speed-to-market innovation.

7.1.4 Experimentation is necessary

Customer attention is hyper-ephemeral in the digital space. New experiences are introduced constantly and switching between competing value propositions is best regarded as the rule rather than the exception. Now you

see your customer; now you don't. In the digital world, customers want control over their own customer journeys.

Digital leaders treat customers as moving targets and avoid working with untested assumptions. They understand that being relevant once is not enough; they must remain relevant. The way to do this is to keep up with the customer's digital self. Digital leaders deploy information technologies broadly to continuously monitor markets, sense customer needs and track behavior, systematically experiment with value propositions, and respond by swiftly scaling propositions that work. This implies a strong and wide-ranging cultural focus on using data and business analytics as competitive weapons. For such digitally attuned companies, adoption of big data technologies comes naturally, as they allow businesses to move from being product-oriented to offering a continuation of valuable experiences, and from mere transacting to building long-term relationships.

Example: Capital One

Capital One, one of the largest bank holdings in the US, has a reputation for performing leading-edge data analytics. Two decades ago, as a new entrant to the banking industry, Capital One succeeded in transforming the credit card business by radically betting on technology, data, and "test and learn." By treating each credit card offer as a data experiment, the bank successfully executed its information-based strategy to get the right offer to the right customer, at the right time, and at the right price. Today, the company continues to enhance and expand its information-based strategy beyond the credit card business. Capital One runs tens of thousands of data experiments every year to serve its customers better. Its significant strategic investment in cutting-edge big data platforms aims to consolidate its position as an analytics competitor.

7.1.5 Collaboration reshapes strategy and business models

When moving into unfamiliar territory, established organizations can rarely reinvent themselves from within. In addition, no single organization owns all the data, skills, and capabilities needed to compete for the customer in a digital world. The ability to partner strategically — going beyond transactional deals or outsourcing — is rapidly becoming a core capability to competing digitally.

Digital leaders are fundamentally open to collaboration. They bet their future not just on what their own companies are capable of, but on what others — including partner companies, customers, and start-ups — can do. They reconceive their business strategies and business models through the function of business ecosystems of digitally connected partners that are able to successfully co-create and share value. Moreover, they do not just select partners to get access to scarce, complementary skills or capabilities; rather, they do so to accelerate their learning cycle through co-creation initiatives enabled by digital connectivity, collaboration, and knowledge management opportunities. Such companies realize, however, that if internal collaboration is problematic, then co-creating with external partners is going to be extremely difficult.

Example: MasterCard

MasterCard has been working hard for recognition as a premier innovator in global payments. Its long-term vision: being the digital foundation of a cashless society in which every device is a commerce device. MasterCard Labs, a global network of digital innovation accelerator teams, is playing a pivotal role in facilitating this ambition by taking an outside-in view to accelerate time to market and by committing to win-win partnerships as its default innovation operating model. The MasterCard Labs for Financial Inclusion in Kenya, co-founded by the Gates Foundation, serves as a case in point: its purpose is to develop solutions for poor people living without access to mainstream financial services. MasterCard has committed to leveraging its proven innovation and product development methods as well as its existing infrastructure and solutions. Ultimately, however, success hinges on sincere co-creation efforts between profit-making companies, nonprofits, governments, and individuals.

7.1.6 Digital eEcosystem platforms rule

Digital innovation capability depends on the effectiveness of combining your unique digital assets with those of others. Today's most valuable digital partnerships are built around "digital ecosystem platforms" (i.e., carefully managed architectures of re-usable and integratable digital assets).

Digital leaders open up their existing digital asset base as services to a wide array of ecosystem partners. Accessibility and convenience are key to

leveraging the often sizable investments in creating digital platforms. Leaders also “virtualize” — or information-enable — physical assets to make the physical world digitally accessible. This allows them to use these assets at maximum capacity on demand and to develop sharing economy business models. They understand that digital ecosystem platforms are the key to long-term economies of scale as well as scope. To enjoy the positive network effects enabled by successful ecosystem platforms, such companies develop prowess in governance as well as architecture. Governance regulates access to, and interactions on, the platform to stimulate productivity and resilience.

Example: GE

GE’s competitive strategy for the Internet of Things revolves around Predix, a unique software platform that allows machinery and equipment to be information enabled as smart devices in order to connect seamlessly to each other via the platform. The ultimate goal is to make any device Predix-ready, regardless of vendor, and offer an API layer to customers and developers who want to develop new big data and analytics solutions for various industries, including mining, manufacturing, energy, and healthcare. GE positions Predix as the foundational platform for the Industrial Internet ecosystem. Predix’s unique selling proposition is to guarantee an architecture and governance built around open, elastic, secure, and resilient access to sensor data, processing, and communications. GE has partnered with Cisco and Intel to make this happen. The company has also forged global alliances with SoftBank Telecom, Verizon, and Vodafone to provide a range of wireless connectivity solutions.

7.1.7 Are you ready?

How can your organization understand where it stands today and how it should proceed into the ExConomy? One way to assess your readiness is by completing the survey presented in the Appendix. Via three questions for each of the four ExConomy realities presented in this chapter, you can evaluate your organization’s current situation relatively quickly.

Ideally, you should support the assessment with analysis of recent successes and failures, which helps ground discussions and make them real. Try to cover your own experiences, if any, but also expose interesting cases from beyond your normal benchmarking horizon. Since modern information technologies

have a tendency to lower industry barriers, it's good practice to examine what's happening in adjacent industries as well. The output of this exercise makes an excellent discussion starter, allowing management to articulate the organization's disposition and commitment to competing in a digital world. It's a great way to start reimagining your business strategy for the digital world.

Today, not only investors and analysts, but customers, suppliers, and employees, too, are challenging executive committees with regard to investments in modern information technologies. The realities of the ExConomy serve as their reference. In our experience, the need for transformation is likely high.

7.1.8 Assessing digital

In Figure 10, each ExConomy reality is followed by three questions. Using the following scale, to what extent does each question apply to your organization?

0 – Nonexistent

1 – Emerging

2 – Institutionalized

3 – Leader

The results will reveal your organization's current strengths and weaknesses – and its overall readiness – with regard to the ExConomy.

Customer experience is value.	
Everything we do contributes to a great digital customer experience.	
We create valuable experiences that fit perfectly with our customer's modern connected and mobile life.	
Our customer experience seamlessly blends the digital and the physical worlds.	
Experimentation is required.	
We continuously follow our customer's digital self and run many small data experiments to stay relevant.	
We excel at collecting, analysing and acting on data to cater to end-to-end customer journeys.	
Everyone in our organisation is capable of – and committed to – data-driven decision-making.	
Collaboration reshapes strategy & business models.	
We use digital means to foster strong employee empowerment and internal collaboration.	
We boost co-creation with partners and customers by using digital collaboration opportunities.	
By systematically sharing value and learning, we create win-win relations in an open partner network.	
Digital ecosystem platforms rule.	
We promote convenient re-use of digital assets with internal and external parties, who do the same for us.	
We virtualise all physical assets and leverage the data as part of our digital platform.	
We monitor platform usage in real time to improve the productivity and resilience of the platform.	

Figure 10. The ExConomy assessment

7.2 Appendix B: Digital transformation survey

In order to grasp how DEG the public employment services context is, we surveyed the European network of public employment services with an existing measurement instrument for digital transformation.

There is no measurement instrument for DEG yet, but there are measurement instruments for digital transformation which can already give a first indication of whether government is ready for the digital-era. We use the digital transformation survey developed by Vlerick Business School¹, inspired by the ExConomy model (see Appendix A: Welcome to the Ex-Co-nomy). This survey uses 36 questions for measuring six different digital capabilities on a 7-point Likert scale. For an overview of the survey questions, we refer to Section 6.2.1.

We sent the survey to the European network of public employment services (PES) (comprising all 28 EU countries, Norway, and Iceland) in May 2017. By September 2017, the survey had been filled out by 18 PES. For each question, respondents could indicate the way in which the subject matter applied to their organization on a seven-point Likert scale.

The survey was sent to end-responsibles for digital transformation. In Table 30 we summarize the roles of the respondents in the organization.

Table 30. Role of respondents

CEO	2
CIO	3
CDO	1
CMO	1
Other	Deputy CEO, Deputy director, Chief Communication Officer, Advisor of European PES affairs, Assistant DG, Head of unit, Digital strategist, Coordinating and Steering IT & process management, Advisor, Business Advisor

The mean digital transformation score for all PES, on a 7-point Likert scale, is grouped in six categories of digital capabilities in Table 31. In general, this

¹ Developed by Prof. Steve Muylle, Prof. Stijn Viaene, Dr. Willem Standaert, and Joachim van den Bergh

means that the public employment services neither agree nor disagree that they have the right capabilities for digital transformation. They are somewhat more comfortable when it comes to digital strategy and digital governance capabilities, and feel least comfortable when it comes to their digital talent capabilities.

Table 31. Mean scores

Total	4.55
Digital strategy capability	5.18
Digital governance capability	5.15
Digital process capability	4.81
Digital talent capability	3.40
Digital culture capability	4.20
Digital technology capability	4.56

Switching from a general perspective to a country perspective enables us to identify the best performers compared to the EU average and those lagging behind. Overall (focusing on the mean score of one PES for all six digital capabilities) the forerunner is VDAB (scoring more than 6 out of 7), followed by Estonia, Austria, The Netherlands, Iceland, and Sweden (which all score more than 5 out of 7), see Figure 11.

VDAB, which is identified as the overall forerunner, scores the highest for four capability types, relating to strategy, talent, culture and technology.

For digital strategy capabilities, see Figure 12, 5 PES score themselves 6 or higher on a scale of 7: VDAB, Austria, Portugal, Germany, and Italy. Lithuania scores itself lower than 4, and Malta even lower than 3.

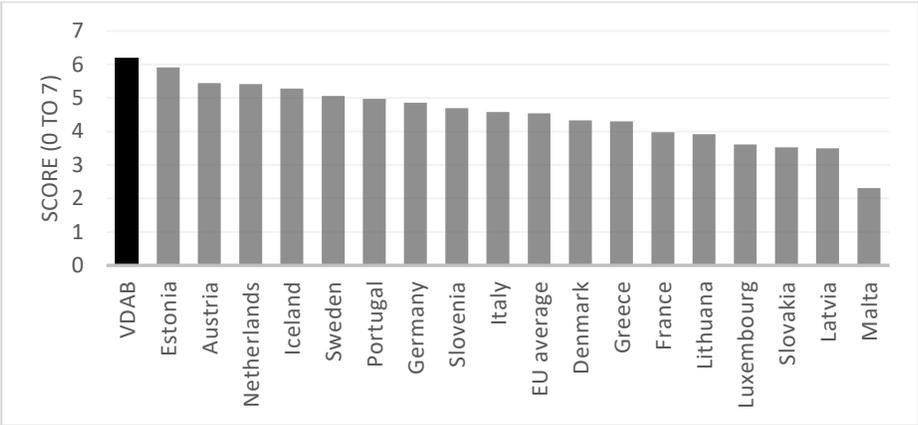


Figure 11. PES survey - mean overall scores

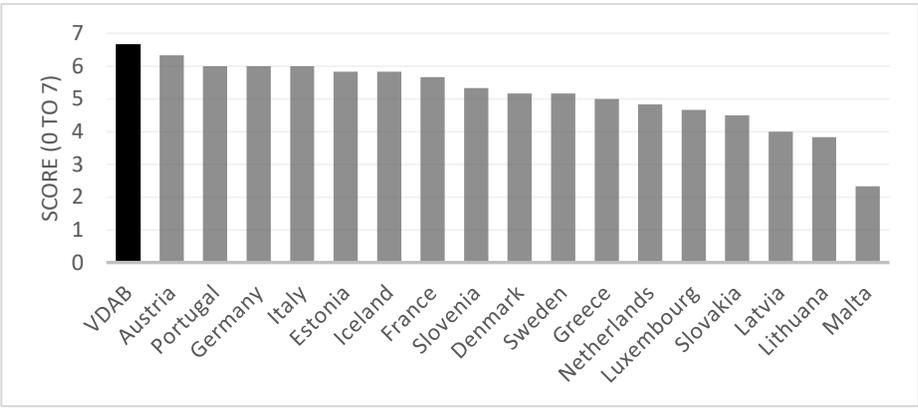


Figure 12. PES survey - Digital strategy capability

For digital governance, see Figure 13, Estonia is the forerunner with the maximum score of 7, closely followed by Sweden and VDAB. Three PES score lower than 4: Luxembourg, Latvia and Malta.

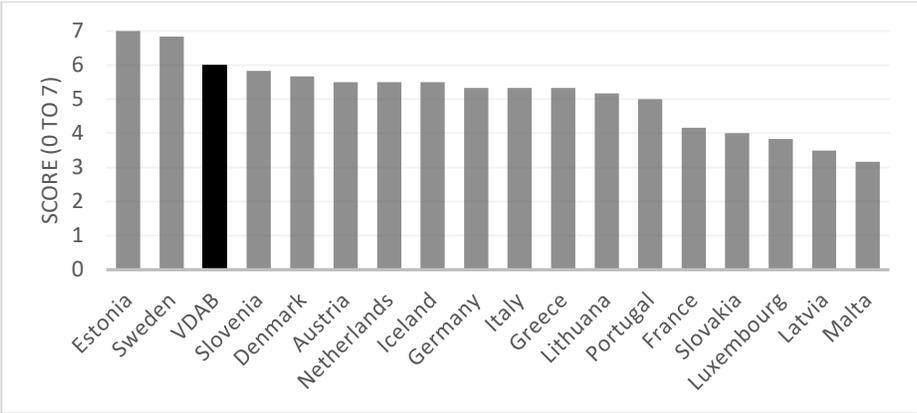


Figure 13. PES survey - Digital governance capability

For digital business processes, see Figure 14, The Netherlands score the highest, followed by Estonia, Portugal and VDAB.

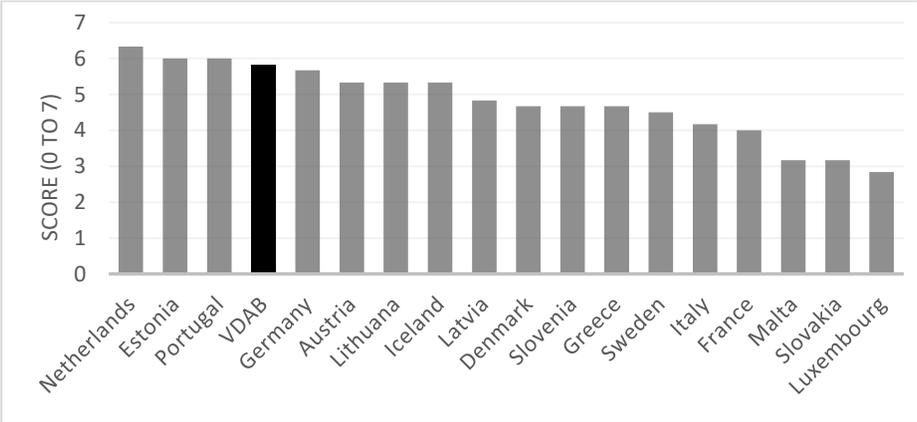


Figure 14. PES survey - Digital process capability

Digital talent capabilities on average have the lowest score of all six capability types, see Figure 15. VDAB scores the highest, followed by The Netherlands. 11 PES give themselves a score of lower than 4 on these capabilities.

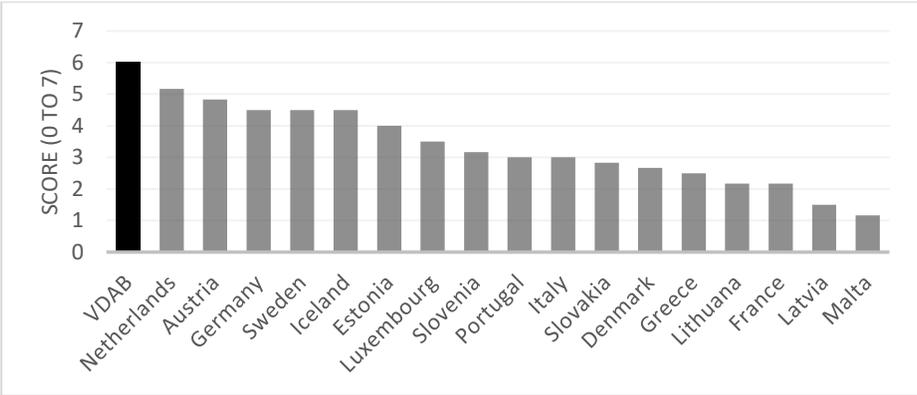


Figure 15. PES survey - Digital talent capability

When it comes to digital culture, VDAB has again the highest score, followed by Sweden and Estonia, see Figure 16.

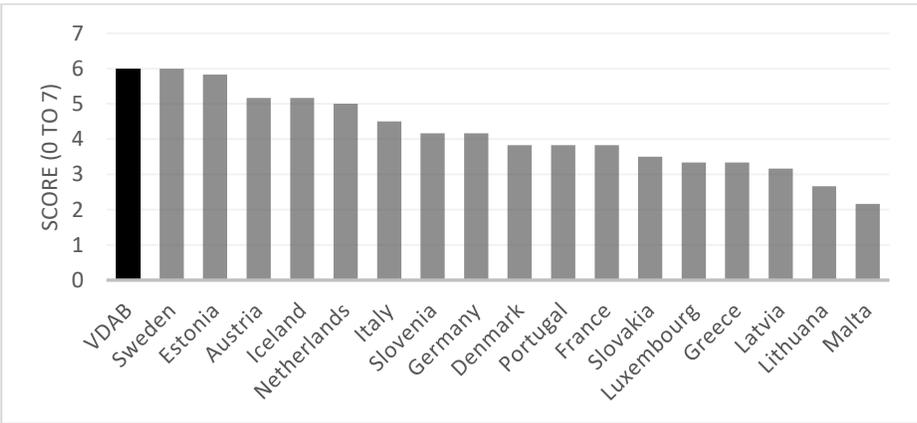


Figure 16. PES survey - Digital culture capability

We also asked respondents whether digitization had a positive impact on organizational outcomes. We provide an overview of the mean impact, on a 7-point Likert scale, on six organizational outcomes in Table 32. Respondents indicate that digitization especially had a positive impact on customer service

and internal processes, while the impact on procurement costs was rather limited.

Table 32. Impact on organizational outcomes

Customer service improved	5.23
Internal processes more efficient	5
Staff productivity increased	4.46
Asset utilization improved	4.62
Procurement costs decreased	2.92
Coordination with suppliers improved	4.38

This survey indicates that, on average, the European PES are already developing capabilities necessary for digital transformation, although some capability types are already further developed than others. In other words, we believe the PES are working towards DEG but are not there yet. Looking at individual PES, we can discern big differences. VDAB is a forerunner, but Estonia (especially regarding governance, processes, and culture), Austria (especially regarding strategy, talent, and culture) and the Netherlands (especially regarding processes and talent) also score high.

We recognize two important limitations in our approach. First, there is no perfect fit between the measurement instrument and the phenomenon we intend to measure. However, we are convinced that a general digital transformation measurement instrument can already give some first indications on digital transformation in government. Second, the survey was filled out by PES employees, according to their own estimations. This self-reported estimation will not always correspond to the real state of affairs. Therefore, it could be complemented with additional interviews asking why participants scored themselves in this way, and whether they can provide examples. These interviews could also identify interesting cases for future research.

7.2.1 Survey questions

Thank you for participating in **Vlerick Business School's digital transformation survey**.

The purpose of this survey is to identify digital transformation efforts at the European Public Employment Services. Digital transformation involves a fundamental, organization-wide change in doing business, based on the use of new digital technologies. The goal is to measure the digital readiness of the organizations, increase awareness of the digitization process and make the do's and don'ts of this digital transition transparent.

Your responses to this survey will be the basis for assessing the maturity and impact of digital transformation at different levels of your organization. The survey is based on scientific frameworks and measurement criteria. This survey needs to be completed by the highest ranking executive responsible for digital transformation. This could be the Chief Digital Officer, Chief Executive Officer, Chief Information Officer, or others. **We have selected you as a key respondent in our study**. If you are not the right key respondent, we kindly request you to send this survey to the executive responsible for digital transformation.

Your organization's digital transformation will be assessed relative to other public sector organizations.

This is an **independent study**. All data in this survey will be used for research purposes only.

This survey consists of six parts, and should take less than 10 minutes to complete. In case you have questions or comments, please do not hesitate to contact lieselot.danneels@vlerick.com.

Please check the lines below, indicating you are the appropriate respondent for this survey and will respond in an honest way.

- I hereby confirm that I am sufficiently aware of the subject of the questionnaire (digital transformation) in my organization.
- I hereby confirm that I will complete the questionnaire in an honest way.

Digital Strategy

Relative to other public sector organizations, please evaluate your organization’s **digital strategy** capability in the following areas on a 1 - 7 scale (1= strongly disagree; 7=strongly agree):

	1: Strongly disagree	2	3	4: Neither agree nor disagree	5	6	7: Strongly agree
Our digital strategy is integral to our overall strategy.							
Our digital strategy is inspired by the capabilities of powerful, readily accessible technologies (such as Social, Mobile, Analytics, Cloud, and Internet of Things).							
Our digital strategy is geared towards developing business capabilities that are responsive to a constantly changing competitive environment.							
Our digital strategy aims at fundamentally changing our business model and its business processes.							
Our digital strategy is translated into new value propositions and experiences for the customer.							
Our digital strategy reformulates our organization’s position from the point of view of ecosystem collaboration and competition.							

Digital Governance

Relative to other public sector organizations, please evaluate your organization’s **digital governance** capability in the following areas on a 1 - 7 scale (1= strongly disagree; 7=strongly agree):

	1: Strongly disagree	2	3	4: Neither agree nor disagree	5	6	7: Strongly agree
Our organization’s top management is fully committed to digital transformation.							
Our digital transformation is enterprise-wide and cuts across functional and hierarchical structures.							
Our organization sets up separate business units to accelerate its digital transformation.							
Our organization adopts agile structures and practices to enable its digital transformation.							
Our organization flexibly allocates adequate financial resources to support its digital transformation.							
Our organization efficiently shares ideas and practices on digital transformation.							

Digital Processes

Relative to other public sector organizations, please evaluate your organization’s **digital processes** capability in the following areas on a 1 - 7 scale (1= strongly disagree; 7=strongly agree):

	1: Strongly disagree	2	3	4: Neither agree nor disagree	5	6	7: Strongly agree
Our organization redesigns its business processes to fit the digital-age customer’s social and mobile behavior.							
Our organization seamlessly integrates the physical and digital customer experiences.							
Our organization systematically uses digital technologies to automate its core operational business processes.							
Our organization systematically uses digital technologies to automate its support processes (HR, Finance, etc.).							
Our organization systematically uses metrics and dashboards for real-time monitoring and management of business processes.							
Our organization leverages big data and advanced analytics to make its business processes smarter.							

Digital Talent

Relative to other public sector organizations, please evaluate your organization’s **digital talent** capability in the following areas on a 1 - 7 scale (1= strongly disagree; 7=strongly agree):

	1: Strongly disagree	2	3	4: Neither agree nor disagree	5	6	7: Strongly agree
Our organization provides its employees with the necessary resources and opportunities to develop skills to thrive in a digital environment.							
Our organization hires new digitally-skilled talents to drive its digital transformation.							
Our organization sources external digital technology specialists (blockchain, data science, machine learning, etc.) whenever necessary.							
Our organization is flexible in allocating adequate human resources for its digital transformation.							
Our organization exposes its employees to digital innovations through labs, incubators, accelerators, or employee swaps.							
Our organization has a strong HR reward and retention program for its digital talents.							

Digital Culture

Relative to other public sector organizations, please evaluate your organization’s **digital culture** capability in the following areas on a 1 - 7 scale (1= strongly disagree; 7=strongly agree):

	1: Strongly disagree	2	3	4: Neither agree nor disagree	5	6	7: Strongly agree
Our organization works to make customer-centricity the cornerstone of its digital transformation.							
Our organization stimulates its talents to experiment and ‘fail fast’ in order to seize digital opportunities.							
Our organization invests in making its culture more agile to seize digital opportunities.							
Our organization stimulates cross-functional teamwork to seize digital opportunities.							
Our organization invests in making its culture open to external collaboration to seize digital opportunities.							
Our organization embraces a culture of data-driven decision-making.							

Digital Technology

Relative to other public sector organizations, please evaluate your organization’s **digital technology** capability in the following areas on a 1 - 7 scale (1= strongly disagree; 7=strongly agree):

	1: Strongly disagree	2	3	4: Neither agree nor disagree	5	6	7: Strongly agree
Our organization combines an IT core that is reliable and resilient with agile IT development to deliver rapid results.							
Our organization’s digital service offering is supported by a technology platform (API, web services, etc.) that enables seamless integration of internal and external data and applications.							
Our organization creates appropriate digital risk management policies (digital governance, data privacy, cyber security, etc.).							
Our organization treats data as an enterprise asset in its own right, managed to be broadly and conveniently usable by a variety of internal and external stakeholders.							
Our organization stays current with new digital technology innovations (blockchain, cognitive computing, Internet of Things, etc.).							
Our organization flexibly allocates adequate IT infrastructure resources for its digital transformation.							

Performance

Relative to other public sector organizations, please indicate the extent to which, in the past 3 years, your organization’s digital transformation has contributed to the following performance outcomes:

	1: Not at all	2	3	4	5	6	7: To a large extent
Customer service improved							
Internal processes more efficient							
Staff productivity increased							
Asset utilization improved							
Procurement costs decreased							
Coordination with suppliers improved							

Which organization or organizations do you consider to be best-in-class in your industry in terms of digital transformation?

.....

Please also explain why you consider this organization to be best-in-class.

.....

Thank you for participating in this initiative. This final section provides us with information about you and your organization.

What is the name of your organization?

.....

What is your role in the organization?

- Chief Executive Officer
- Chief Information Officer
- Chief Digital Officer
- Chief Marketing Officer
- Other:

What is your name?

.....

7.3 Appendix C: Envisioning open data ecosystems in smart cities

“We are moving from organized stockpiles of knowledge to participating in active flows of knowledge. So understanding what those flows are and how you can tap into them is becoming increasingly important.”

– Colin Fairweather, CIO City of Melbourne

In Chapter 2, we used three knowledge epistemologies – cognitivist, connectionist and autopoietic – as a lens to examine Open Government Data (OGD) platforms and to define three different platform types. We reviewed the case study literature on open government data platforms in the main e-government outlets (listed by Scholl & Dwivedi, 2014), published between 2009 and 2016. In general, our research resulted in a pressing question for more research on network aspects of OGD platforms. For the autopoietic OGD platform type in particular, we did not find any fully realized elements in our selection of 35 case studies. It was unclear why the autopoietic OGD platform type was underrepresented: are there no practical examples of autopoietic OGD platforms, or has the autopoietic view not been adopted by research?

In this appendix, we aim to focus on whether an OGD platform would be possible in a smart city context. We chose this specific governmental context since open data becomes very tangible in the smart city. Typical smart city platforms deliver data in an open fashion to developers or citizens (Vilajosana et al., 2013). Despite the theoretical importance of open data in a smart city context, the current body of smart city case studies does not contain any examples of autopoietic open data systems.

Thus, in this appendix, we aim to answer the following research question: What could an autopoietic open data ecosystem look like in a smart city context? To answer this question, we organized a focus group with smart city and open data managers. During a thought experiment, the focus group gradually built an answer on the research question. By developing an image of what an autopoietic OGD ecosystem could look like in a tangible context such as the smart city, we hope to inspire practitioners and academics to start focusing on this type of open data ecosystem.

Related publications:

Danneels, L., Van den Bergh, J., Viaene, S. (2016). Open data ecosystems in smart cities. Pre-ICIS workshop on E-Government. Dublin (Ireland), 11 December 2016.

Danneels, L., Van den Bergh, J., Viaene, S. (2017). Open data ecosystems in smart cities... What if? 21st International Research Society on Public Management Conference (IRSPM), Smart cities track. Budapest (Hungary), 19-21 April 2017.

7.3.1 Literature review

7.3.1.1 *Open data*

Much of the available literature on OGD has focused on the supply of open data rather than on its use or how to foster re-use and build strategic partnerships (Attard et al., 2015). For open data platforms to become drivers in realizing the vision for the future of governance in which the government acts as the orchestrator of an open data ecosystem, the focus of open data research has to be broadened beyond open data supply (Maccani et al., 2015).

Several OGD authorities have expressed high hopes for OGD to transform government. O'Reilly (2011) was among the first to envision government as a digital platform on which it acts as "a convener and enabler rather than the first mover of civic action". O'Reilly identified the open data movement as one of the most promising forces driving this vision forward. His proposition was rooted in the belief that if government realizes that it can be a digital platform provider, albeit a developing one, it might make radically different management choices. More recent visions on how OGD can transform government (Brown, Fishenden & Thompson, 2013; Harrison, Pardo & Cook, 2012; Janssen & Estevez, 2013) have also highlighted the need for an ecosystem approach to government in general and open data platforms in particular. In an ecosystem approach, open data re-use does not automatically follow as the logical next step after open data publication. Re-use of the open data needs to be consciously fostered.

7.3.1.2 *Autopoietic knowledge management epistemology as an OGD lens*

To define different types of OGD platforms, we applied the autopoietic knowledge management epistemology as a lens.

Knowledge epistemologies are defined as basic assumptions about knowledge on which the addressed concepts and theories are based, and vary in their perceptions of the notion of knowledge and the management and development of knowledge (Von Krogh & Roos, 1995). In the autopoietic epistemology, knowledge management systems are “created in an autonomous, simultaneously open and closed, self-referencing, and observing manner” (von Krogh & Roos, 1995). Autopoietic systems are often explained as biological cells, which are able to constantly renew themselves by reproducing their constitutive components. The process of interpreting incoming data in conversations is the cornerstone of knowledge development (Skok & Kalmanovitch, 2005).

We repurposed and reinterpreted the knowledge epistemologies in the context of OGD platforms. In applying the knowledge epistemologies lens, we focus on the data-sharing relationship between the government and its external ecosystem parties. Although the perception of the operating environment of the epistemology was originally limited to one organization, this environment now crosses organizational borders and includes all relevant ecosystem parties.

Using the autopoietic epistemology implies looking at OGD platforms as living organisms rather than as machines for processing information. In the autopoietic view, OGD ecosystems are dynamic, self-renewing systems, co-evolving with the environment. Feedback loops, consisting of both knowledge-sharing routines and complementary resources and capabilities, are the basis for a learning platform. In an autopoietic system, the government’s role entails more than merely making parties join the ecosystem; it also includes keeping them around the table and making the ecosystem thrive.

We characterized the autopoietic knowledge management epistemology according to the clustered network dimensions defined by Dawes et al. (2016), see Table 33. We grouped the dimensions if they focused on a similar element, i.e. the platform (‘dynamics over time’ and ‘environmental influences’), the actors, or the interactions (‘interactions and interdependencies’ and ‘feedback and communication among stakeholders’). For each grouped dimension, we propose a question to be answered in the OGD ecosystem context, and we provide the answer for autopoietic OGD ecosystems. For

more information on why and how we clustered the network dimensions, see Chapter 2.

Table 33. OGD ecosystems in the autopoietic knowledge management epistemology (based on Dawes et al., 2016; Skok & Kalmanovitch, 2005; von Krogh & Roos, 1998)

Dimension	Question	Autopoietic OGD ecosystems
Dynamics over time and contextual responsiveness	How does the environment or context influence the way in which the open data platform is organized, and how does the open data platform evolve over time?	Dynamic co-evolution with context occurs automatically: changes in the environment will by default elicit the OGD platform to adapt accordingly. Emerging and needs-driven parts of the platform are not one-off initiatives, but result automatically from platform use.
Enabling actors	Which parties form the open data ecosystem, and what are their interrelationships?	OGD platform actors form a self-organizing network or ecosystem characterized by complex ecosystem interdependencies. Actors take up their roles for the longer term, or new actors come up and compete with existing ones.
Interactions and communications	What do the dialogical processes look like in which discussions between open data ecosystem parties take place?	Feedback from actors re-using the data and from their interactions forms the basis for a learning platform.
Government intervention	What is the content and scope of the role the government plays in the ecosystem?	Government acts as the keystone orchestrating the open data ecosystem by creating value and fostering the health of the ecosystem.
Sustainability	What are the constraints to the long-term viability of the open data ecosystem?	Focus on making the entire ecosystem thrive.

In a previous study (Danneels, Viaene & Van den Bergh, 2017), which examined OGD cases studies including, but not limited to smart cities, we found no examples applying the autopoietic view on OGD ecosystems.

7.3.2 Methodology

For imagining what an autopoietic OGD ecosystem in a smart city context might look like, we conducted a focus group in which the participants conducted a thought experiment. A focus group is a research technique that collects data through group interaction on a topic determined by the researcher (Morgan, 1996). A thought experiment manipulates the worldview by posing a “what if” question. In rigorously answering this “what if” question, the resulting answer is either a consistent model or a contradiction. If a consistent model is achieved, it can be concluded that the scenario is possible; if a consistent model cannot be constructed, then the scenario is not possible (Cooper, 2005). A thought experiment is more likely to succeed if the thought experimenter is knowledgeable about the relevant aspects of the actual world, as this adds to the rigor with which thought experimenters attempt to answer the ‘what if’ questions.

The focus group was organized with smart city and open data representatives, as these profiles are expected to be familiar with the topic of open data in smart cities. Using a snowball sampling approach, we invited 20 participants with this profile from 8 Belgian cities, 2 city IT service providers, 1 intercommunal organization and 1 region. Out of these, a total of 11 participants from 7 cities, 1 service provider, 1 intercommunal organization and 1 region took part in the focus group. Most cities represented in the focus group ranged between 60.000 and 120.000 inhabitants. Therefore, the ‘what if’ question in the focus group also focused on an imaginary smart city of a smaller size.

The focus group set-up, in line with Kehoe and Lindgren (2003), consisted of several stages. After a short introductory stage with rules of the game, the pre-focus stage gave an introduction to the topic of open data and smart cities, and corresponding definitions. During the task-orientation stage, the participants did an exercise to get acquainted with the autopoietic ecosystem dimensions in Table 33. These dimensions were discussed during the focus stage, and a vision of open data in smart cities was formulated. In the conclusion stage, the OGD ecosystem that emerged from the discussion was evaluated, and barriers to its realization and other comments were discussed. The focus group was closed with a debriefing stage.

7.3.3 Discussion

Focus group transcripts were analyzed and classified by means of the ecosystem dimensions described in Table 33, based on Dawes et al. (2016). During the focus group, a vision on an autopoietic open data ecosystem in a generic (utopian) smart city was formulated by the panel. We provide an overview, per dimension, of the most noteworthy elements the focus panel formulated in the thought experiment in Table 34.

Dynamics over time and contextual responsiveness. The participants agreed that having one OGD platform infrastructure for each smart city is not enough. The OGD platform should be a system of systems. Each lower-level system can have a more precise focus, which immediately covers part of the ‘finding a needle in a haystack’ problem. Other characteristics mentioned for the platform ranged from scalable, user-friendly and assuming privacy-by-design in order to be trustworthy.

Enabling actors. On the one hand, different actors (listed in Table 34), with a clear image of what each actor had on offer, were listed as indispensable for an autopoietic OGD ecosystem. On the other hand, a parallel discussion was held on the different roles to be taken up in the OGD ecosystem. In this case, it was harder to define which actor had to take up which role. This led to the conclusion that in an ecosystem, the actors can take up different roles over time or even at one point in time.

Interactions and communications. If different actors take up different roles over time, they will have different interactions with the platform. They can either act as a user, a provider, or a developer. Interactions between the actors can either run through the platform or in parallel via alternative channels. The panel stated that the interaction of different actors in itself would be a value-adding element in the OGD ecosystem.

Government intervention. The type of government intervention is believed to differ greatly for different levels of government. Local governments can supply data and approach other actors to do the same, but regional government will be necessary to facilitate connections between different cities and standardize the approach. Local government is thus not regarded as the ideal orchestrator of the ecosystem. Moreover, the participants doubted whether any level of government should take up this task, or whether it should be a decentral

construction (such as blockchain), or a neutral platform owned and managed by a separate third-party.

Table 34. An autopoietic OGD ecosystem in a smart city context

Dimension	Autopoietic OGD ecosystems	Focus group quotes
Design characteristics of the platform: Dynamics over time and contextual responsiveness	<ul style="list-style-type: none"> • System of systems • Mechanism to find a needle in the haystack • Fool-proof (usability) • Privacy by design • Trust • Memory 	<i>“Thinking of the platform as an infrastructure layer is too concrete, I don’t think this is where we need to go. If you have standards, and you have open data, there will not be something like one platform, but multiple platforms existing next to each other.”</i>
Enabling actors	<ul style="list-style-type: none"> • Citizens, incl. civic organizations • Visitors • Local government • Regional government • (Local) companies, business • Public transport organizations • Schools, universities, research institutions 	<i>“It is difficult to say which parties should be part of the ideal ecosystem. Some of the parties are also defined in a really broad way. I believe it all depends on the challenge that is on the table.”</i>
Interactions and communications	<ul style="list-style-type: none"> • Combining data from different parties will bring real added value • Relationships between parties can change over time • Regular interactions between different parties to understand needs and ensure sufficient value for everyone 	<i>“I believe we should always be aiming for the autopoietic OGD ecosystem, because the power of data is in its combination with data from other parties. Only then re-use will really take off.”</i>
Government intervention	<ul style="list-style-type: none"> • Local government can bring the data • But regional government will have to act as a facilitator • Government as one of the parties in the ecosystem 	<i>“We could build such an ecosystem within the boundaries of one city quite easily, but if we would do this I would immediately wonder: is this the right thing to do? This is not the type of ecosystem that will have the biggest effect.”</i>
Sustainability	<ul style="list-style-type: none"> • Neutral connector • Win-win-win: over time, what each party gives and takes should be balanced 	<i>“The crucial role will be the connector, building connections between parties, platform and data. And I think there can be several connectors.”</i>

Sustainability. For each actor to share its data, and to keep doing so, the potential advantages have to be clear and provide enough value. This statement should be true over time, and thus the net present value of a future system should be positive for each actor. This presents a new way of thinking for government, which is perhaps still more focused on obliging parties to become part of the system rather than winning them over.

7.3.4 Conclusion

In this appendix, we have developed and structured a first image of what an autopoietic open data ecosystem could look like in a smart city context. From the focus panel experiment we conclude that autopoietic open data systems in smart cities can be realized if they provide an answer to certain design characteristics. A panel of smart city and open data representatives co-developed and validated the model, set in a generic smart city setting.

By no means the result of the experiment should be an endpoint or norm for OGD platforms. We intended it to be the start of deeper investigation and a stimulus and handle for smart cities to start developing autopoietic forms of open data ecosystems, a type that is advocated by many open data thought leaders but currently lacking support of actual case study examples.

The method and setting of this study imply several limitations to its conclusions. First of all, the panel consisted of a small sample of Belgian open data and smart city representatives. The experiment was framed in a generic smaller city in Belgium, so we should be careful with generalizing the outcome to larger cities in an international context. Secondly, to ensure consistency of the panel we did not include the user side of open data systems. Therefore, more panels with the same objective, but consisting of developers, companies, other governmental layers, and/or citizens seem to be a viable avenue for future research.

Finally, the panel put several barriers on the table, that could possibly hinder the realization of an autopoietic open data ecosystem. Chief among those mentioned barriers is the current lack of coordination among cities and higher governmental levels. Furthermore, the panel indicated the need of a trustworthy neutral party that is able to join the different ecosystem actors in a smart city around open data initiatives and manage the platform

independently. If autopoietic open data systems are to become a reality, these barriers need to be resolved, for OGD to deliver their full potential.

7.4 Appendix D: Interview guides

Interview guide VDAB: General

Introduction	
	Can you quickly introduce yourself?
	How long have you been in the organization?
	What's your professional background? (previous jobs in- & outside the organization)
Experience	
1	Did VDAB have experience with open services?
3	What was the motivation for VDAB to start with the open services experiment?
probe	<i>What were the opportunities?</i> <i>What were potential concerns that held you back?</i>
4	Which open services does VDAB have?
probe	<i>Where does the service originate from? (VDAB internally – partner suggestion)</i>
5	Which skills or practices were important during the open services experiment?
probe	<i>Were operational skills or practices (related to business processes or technical processes) important? Which ones?</i> <i>Were management skills or practices important? Which ones?</i> <i>Were relational skills or practices important? Which ones? (e.g., for adaptations or additions over time)</i>

Interview guide VDAB: Per Case:

With X = focal organization for each case

Experience	
1	How well did VDAB know organization X before the start of the open services experiment?
probe	<i>Does VDAB collaborate with organization X during the normal course of business?</i> <i>Has VDAB conducted other experiments with organization X?</i>
Type of co-creation	
3	What was the motivation for organization X to start using VDAB's open services?
probe	<i>What were the opportunities?</i> <i>What were potential concerns that held you back?</i>
4	Which open services does organization X use?
probe	<i>How much implementation effort did this require?</i>
Capabilities	
5	In the collaboration with organization X for the implementation and use of the open services, what were the most important skills and practices for VDAB?
probe	<i>Were operational skills or practices (related to business processes or technical processes) important? Which ones?</i> <i>Were management skills or practices important? Which ones?</i> <i>Were relational skills or practices important? Which ones? (e.g., for adaptations or additions over time)</i>
6	Which were the most important skills or practices for partner organization X?

probe *Were operational skills or practices (related to business processes or technical processes) important? Which ones?*
Were management skills or practices important? Which ones?
Were relational skills or practices important? Which ones? (e.g., for adaptations or additions over time)

Looking back

- 7 What was the most difficult part (from VDAB's point of view)?
- 8 What would VDAB do differently?
- 9 What would VDAB advise to other organizations that want to use open services?

Looking forward

- 10 What is VDAB's vision or ambition with regards to the open services?
- 11 What is, according to you, organization X's vision or ambition with regards to the open services?

Interview guide partner organizations:

Introduction

Can you quickly introduce yourself?
 How long have you been in the organization?
 What's your professional background? (previous jobs in- & outside the organization)

Experience

- 1 Did your organization have experience with open services? Were there a lot of implementation efforts involved?
 - 2 How well did your organization know VDAB before you started using the open services?
- probe** *Does your organization collaborate with VDAB during the normal course of business?*
Has your organization conducted other experiments with VDAB?

Type of co-creation

- 3 What was the motivation for your organization to start using VDAB's open services?
- probe** *What were the opportunities?*
What were potential concerns that held you back?
- 4 Which open services does your organization use?
- probe** *How much implementation effort did this require?*

Capabilities

- 5 For the implementation and use of the open services, what were the most important capabilities for your organization?
- probe** *Were operational skills or practices (related to business processes or technical processes) important? Which ones?*
Were management skills or practices important? Which ones?
Were relational skills or practices important? Which ones? (e.g., for adaptations or additions over time)
- 6 For the implementation and use of the open services, what were the most important capabilities for VDAB?

probe *Were operational skills or practices (related to business processes or technical processes) important? Which ones?*
Were management skills or practices important? Which ones?
Were relational skills or practices important? Which ones? (e.g., for adaptations or additions over time)

Looking back

- 7 What was the most difficult part?
- 8 What would your organization do differently?
- 9 What would your organization advise to other organizations that want to use open services?

Looking forward

- 10 What is your organization's vision or ambition with regards to the open services?
- 11 What is, according to you, VDAB's vision or ambition with regards to the open services?

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