

Publishers Working with Open Government Data: A Work Framework

Jonathan Crusoe,^{1,2} Karin Ahlin^{3*}

¹ ORCID Nr: 0000-0003-4740-1242

Faculty of Librarianship, Information, Education and IT (including The Swedish School of Library and Information Science), Swedish School of Library and Information Science, University of Borås, jonathan.crusoe@hb.se

² Department of Applied IT, Swedish Centre for Digitalization, Gothenburg University, Gothenburg University, jonathan.crusoe@ait.gu.se

^{3*} ORCID Nr: 0000-0003-4051-6960

Service Research Centre, Karlstad University, Sweden, karin.ahlin@kau.se

Abstract: This paper presents an Open Government Data (OGD) publisher framework, with work roles, field of work, and environmental descriptions. Previous knowledge about publishers' work is fragmented, with gaps and variations, indicating a high level of complexity with variations in approaches and processes. A two-stage research approach, based on Design Science Research, was used to synthesize the publisher framework. First, a tentative framework was synthesized from previous research, empirical material, and public documents. Second, it was reviewed by informed OGD experts, as well as researchers attending a work conference, and evaluated in two international contexts. As a result, the publisher framework includes environments, social units, and fields of work. The publisher framework is ready to be evaluated in other international contexts, where as, practitioners can use it to inform their work.

Keywords: Open government data, publisher, provider, process, publish, release, work framework

1. Introduction

This paper presents a framework, for the work involved to publish open government data (OGD), to become and continue as an everyday publisher of OGD. The framework includes various environments, social units, and fields of work. OGD is interoperable data, generated directly or indirectly by public organisations, that is collected and shared by publishers to be reused without restrictions by users (Attard et al., 2015; Handbook, 2015; Hossain et al., 2016). Publishers, together with the Internet and OGD portals, form an important base, from which, users can create value (Davies, 2010, 2011; Lindman et al., 2016; Zuiderwijk & Janssen, 2014b). OGD publishers are public organisations, (Lassinantti et al., 2019; Safarov et al., 2017) and their value for publishing data is said to be benefits,

such as cost reductions, increased citizen participation, and transparency (Carrara et al., 2018; Hartog et al., 2014; Janssen et al., 2012; Kucera & Chlapek, 2014). However, publishing OGD also has potential downsides, such as misinterpretations, misuse, and privacy violations (Barry & Bannister, 2014; Zuiderwijk & Janssen, 2014a).

The publishing work itself is recorded by practice (e.g., Carrara et al., 2018; ÖppnaData.SE, 2018) and researched, to increase value and decrease potential vulnerabilities (Attard et al., 2015; Lee, 2014; Susha, Zuiderwijk, et al., 2015; e.g., Zuiderwijk, Janssen, Meijer, et al., 2012; Zuiderwijk, Janssen, & Davis, 2014; Zuiderwijk, Janssen, Choenni, et al., 2014). Knowledge about publishing work is fragmented, with gaps and variations. Available data from publishing OGD, indicates a high level of complexity with variations in approaches and processes. For example, activities may be described briefly and incompletely (Naturvårdsverket, 2018) or roles may be left unexplained (Folmer et al., 2011). Some focus on the publishing (Hyland & Wood, 2011), while others focus on the data audit (ÖppnaData.SE, 2018, e.g.). Some prescribe specific activities (Nečaský et al., 2014a), while others give guidelines (Lee, 2014; e.g., Solar et al., 2013). As a result, for any OGD publisher or researcher to understand the work of publishers, several sources must be studied and understood, which can be a time consuming and difficult task. Therefore, it is time to synthesise the work of the publisher as a conceptual framework, to take a first step towards creating a descriptive theory (Gregor, 2002). A conceptual framework is a tentative or incomplete theory, describing a set of concepts and ideas with their proposed relationships (Maxwell, 2012) and our purpose is to create one here. This research is guided by, the following research question:

- How can environments, social units, and fields of work for OGD publishers' work be conceptualised in a framework?

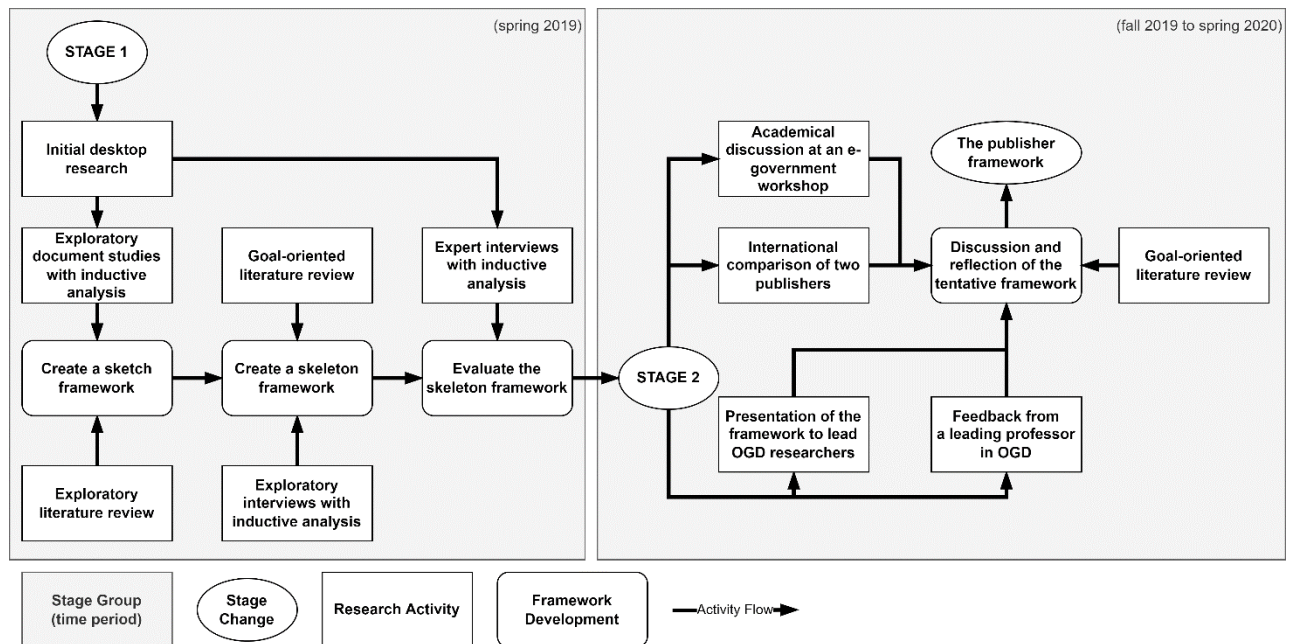
To help reach the described situation, the framework needs to:

- Create a common ground that can help synthesize various OGD work of public organizations.
- Help (potential) publishers understand what it entails to publish and provide OGD.
- Suggest an approach to deal with the complexity of OGD work.

2. Research Approach

The method is based on design science approach and we followed: (1) problem identification and motivation, (2) definition of the objectives for a solution, (3) design and development, (4) demonstration, (5) evaluation, and (6) communication (Peppers et al., 2007). On the whole, the conducted research was iterative and initiated in literature, to find existing knowledge, followed by interviews with knowledgeable publishers and study of documents describing the OGD work provided by OGD experts and publishers. The results of the iteration gave the study robustness, in providing a publisher framework. As highlighted by (Weiringa, 2014), expert opinions can be useful, to eliminate bad design ideas early in the design science process. Experts' negative opinions can often be more useful than experts' positive opinions, to improve the design of an artefact. Figure 1, presents a detailed view of the research process.

Figure 1: Detailed view of the research process.



2.1. Problem identification and motivation

For this study, we define the initial desktop research as, including problem identification and motivation for the solution (Peffer et al., 2007). The problem identification is clarified as, increasing knowledge about the publisher framework, and supporting re-design of associated activities. The motivation for the study is that, the publishers' work is still an embryo, where, few official authorities have fully developed, mature work descriptions (e.g., Naturvårdsverket, 2018; ÖppnaData.SE, 2018; Södertälje, 2019). Today, many publishers instead use, ad-hoc processes for publishing, or a focused process that, leaves important areas uncovered. In either case, the publishers are not aware of the informed choices they can make and the responsibilities they accept.

2.2. Definition of the objectives for a solution, design and development, and demonstration

The conceptual framework is a tentative or incomplete theory, describing a set of concepts and ideas and their proposed relationships (Maxwell, 2012). The method consisted of two stages, which were used in an iterative way. The first stage, consisted of studies of documents including their publication frameworks, a literature review, interviews, and evaluation of a tentative framework by experts. The second stage, evaluated the framework in four activities that then lead to a discussion and reflection, supplemented with a literature review. The evaluation resulted in, feedback and comments that were discussed and reflected on, adding a literature review to supplement. The result was, the final framework presented in this paper. To build a solid conceptual framework, we used the two stages described above in an iterative way. As we engaged in these stages, we clarified parts of the motivation for the study, as well as, progressing with the design and development, the demonstration, and the evaluation of the artefact (Peffer et al., 2007).

Literature Review. We conducted three literature reviews in the stages, in two ways: either exploratory or goal-oriented (Creswell, 2014; Machi & McEvoy, 2012). The exploratory was done to survey the amount, and focus on previous OGD research. We found a vast amount of research that, focused on various parts of the publisher work, still not grasping its complexity. The goal-oriented literature review, was conducted to fill gaps in the framework and to further understand details of it. This literature review took place after the interviews, completing the framework based on findings in the empirical material, not previously addressed.

Framework development and analysis. The framework was built on conceptual mapping, which is an analytical method that includes outlining concepts and their relationships (Maxwell, 2012). In this research, the result of the concept mapping, was a conceptual framework built by searching for and reading documents containing publishing strategies and frameworks at public authorities in Sweden. The framework is built on previous research, interviews with informed respondents, and evaluations by highly ranked OGD researchers. The framework was built iterative, using both inductive and deductive analysis (Patton, 2002). The inductive was primarily used at the initiation of stage 1, building the conceptual framework. Later we used deductive analysis, adding to the conceptual framework by filling gaps and verifying already identified parts.

2.2.1. Design, development, and demonstration.

The design and development phase is fundamental when the first step was initiated. Peffers et al., (2007) emphasise the design and development of the artefact, originates in determining the artefact's desired functionality. Here, the origin point was a tentative framework, which we started to build, by using concept mapping in the first stage (Maxwell, 2012).

Stage 1: The first stage had an inductive focus, including the integration of previous research and empirical material in the framework, which allowed for the comparison and verification of the identified work. The integration helps us understand if the framework continued to be valid, in relation to new information. This stage started with, initial desktop research to identify potential empirical sources. We used documents, such as (Carrara et al., 2018; Naturvårdsverket; 2018; Susha, Grönlund, et al., 2015a), for the initial desktop research, adding to the motivation of the study. Thereafter, we conducted exploratory document studies, using an inductive analysis, and exploratory literature reviews, to create a sketch framework. The sketch skeleton, was then supplemented with goal-oriented literature review, as well as, exploratory interviews. The respondents for these interviews were publishers, working in Swedish public organizations. The sketch framework was then used, to create a skeleton framework that was used as a starting point, to build our publisher framework, melding their parallel pieces into thematic blocks. Thereafter, we interviewed informed respondents. The number of respondents was seventeen; each was selected based on purposive sampling. Purposive sampling is a technique where, the involved researchers rely on their own judgment, when choosing informants (Weiringa, 2014). At the time of the interviews, all respondents worked at public organizations in Sweden, and participated as publishers for the Swedish national Hackathon, Hack for Sweden (HackForSweden, 2019). The interviews were carried out, to understand the publisher's common understanding of their publishing work, as an open interview. The question asked was, how their organization published OGD today? The interviews were all conducted in

person with informants and carried out by one of the researchers. The interviews lasted between 15 to 60 minutes. An inductive thematic analysis, (Patton, 2002), based on the audio recorded interviews was conducted to find patterns and useful themes. The analysis helped to evaluate and develop the skeleton framework by one of the researchers.

Table 1: Public Organizations with Interviewee roles.

Public organisation	Interviewee role
The Swedish Work Environment Authority	Developer
The Swedish Transport Administration	Technical developer
Swedish Intellectual Property Office	Business developer
Statistics Sweden	Developer
Swedish Meteorological and Hydrological Institute	Lead developer
The Swedish Internet Foundation	Business developer
Swedish University of Agricultural Sciences	Researcher
National Agency for Public Procurement	Business developer
The Swedish Enforcement Agency	Lead developer
City of Södertälje	Business developer
The Swedish Police Authority	Business developer
The Swedish Tax Agency	Lead developer
The County Administrative Boards' IT department	Lead developer
The National Heritage Board	Technical developer
The Traffic Lab	Business developer
Västra Götaland Regional Council	Business developer

Stage 2: For the second stage, the analysis was both deductive and reflective. The deductive evaluations include, our use or presentation of the framework in four situations. The evaluations were as follows: (1) the tentative framework was peer-reviewed and academically discussed at SWEG, the 17th Scandinavian Workshop on e-government, (2) the framework was used in an international comparison between two publishers and was evaluated by an OGD manager (Crusoe et al., 2020), (3) the tentative framework was presented to lead OGD researchers that provided feedback, and (4) the tentative framework received feedback from a leading professor of OGD. Finally, the framework was refreshed and rearranged, according to fields of work, roles, and environments. This was done, in an iterative way between the two researchers, discussing how to rearrange the framework. The iteration was done, in a ping-pong manner, with discussions and continuous improvement to ensure research quality. It ended with a goal-oriented literature review, to identify any recent and relevant research that, could further develop the framework.

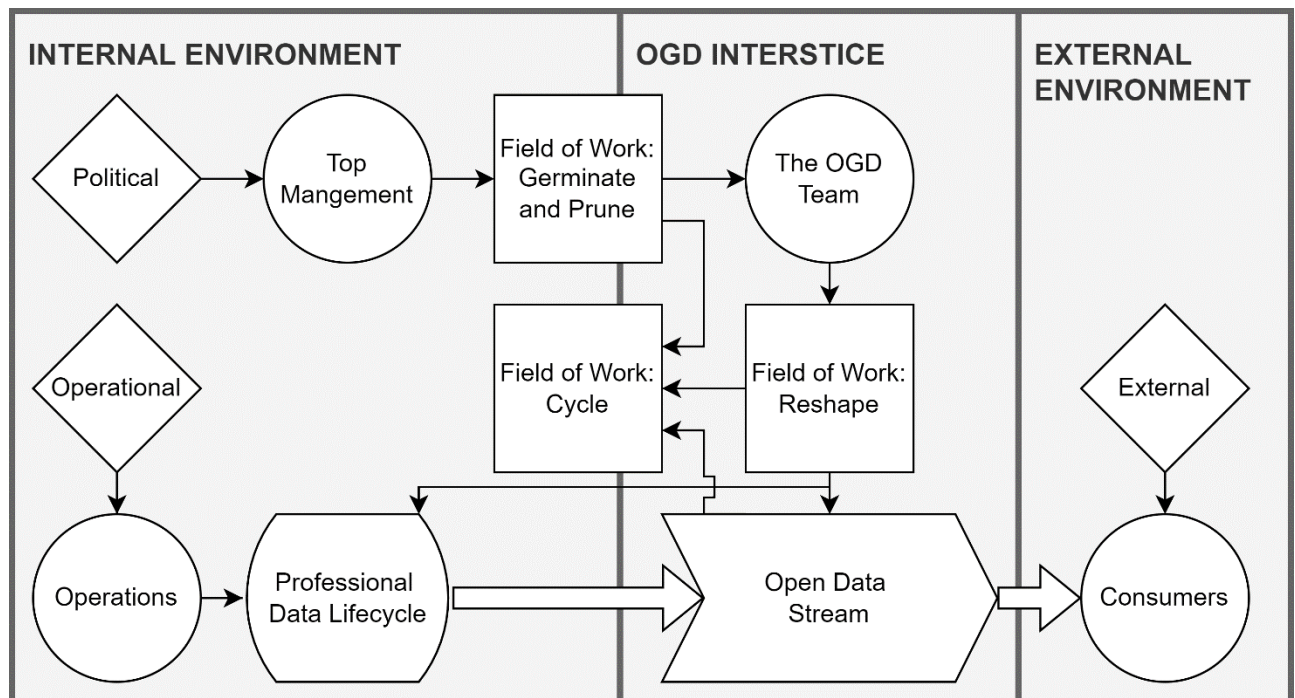
3. Publisher Work Framework

This section first presents an overview of the framework, and then visits each of its holistic parts in turn; environments, social units, and fields of work.

3.1. Overview of Framework

This section presents an overview of the publisher framework, written, based on how publishing generally, can be done, based on previous research and empirical material. Figure 2, presents an overview of publishing process for OGD. The figure is divided into three environments; the internal, the interstice, and the external. For the internal environment, top management can initiate the organization's work with OGD. The operational starting point, is executed by someone close (but not necessarily involved) to the professional data life cycles of the organization. The OGD interstice focuses on developing and maintaining the OGD for release through the open data stream. The consumers or experts are the initiators in the external environment, adding requirements on the published OGD. The publisher's work with OGD is generally questions of reform, leeway, and distance. Reform, since they need to decide how to change their organization to become a publisher, which can extend to their external environment. Leeway, because the work with OGD contains some freedom to act within particular restrictions (e.g., standards and licenses). Distance, as they need to change their organization from how it is now to what they want it to be.

Figure 2: Overview of the publisher framework.



3.2. Environments

The environment is divided into the internal, the OGD interstice, and the external, where the internal contains top management and operations. The output from top management's work is strategic plans, policies, and directions for required IT infrastructure and is encapsulated by the field of work, focusing on, Germinate and Prune. As such, the output can be decisions and guidelines (Carrara et al., 2018). The operations run the professional data life cycle, that results in the data that, can be shared through the open data stream, including parts from other fields of work. Operations consist of infrastructure and operations and builds on existing components in the organizations. It is generally, the day-to-day business. The external environment focuses on the users and end-users who can transform data and use products and services built on OGD.

3.2.1. Internal

The publishing activities happen, in a public organization that has a history. This context does not exist for the purpose of OGD, rather OGD is practicalized to help the context or generate value for the public organization (Denis & Goëta, 2014). The internal historical environment contains financial support, IT-management, and one, to many, professional data lifecycles. It will also contain the fields of work, "germinate and prune", and the cycle once the work with OGD is initiated. This environment requires reform for the organization to become a publisher, but also needs to support the OGD work. For example, the core task, use of data, source of data, and data storage can impact OGD work (Conradie & Choenni, 2014).

Financial support is important, as there are costs associated with user engagement, training, maintenance, and updating of datasets and OGD portals (Lee, 2014). Publishing data is costly and

may reduce income (Hossain et al., 2016). Costs for publishing OGD can vary; create and collect data (small increase), quality and information security (large increase), organise, extract, and store (can cost extra), packet and visualise (new costs), and deliver and market (new costs and developments) (ÖppnaData.SE, 2018).

IT management consists of deciding and adding resources to invest in strategic plans, policies, and required IT infrastructure (Crusoe et al., 2020). IT management for OGD is required, although it can be conducted in many ways, depending on resources, such as numbers and requirements on published datasets or plans on publishing datasets. The timeline for when to create plans and policies varies, where some are created in advance and some during the publishing of datasets or after (Naturvårdsverket, 2018). The plans and policies are diversified in their content, sometimes being part of other plans or policies or created as standalone. The IT management of OGD is often dependent on the existing IT infrastructure, such as implemented information systems or technical components (Crusoe et al., 2020). Adding publishing of datasets requires knowledge on, how the current infrastructure operates and its maintainability, sustainability and scalability (e.g., the non-functional requirements) (Carrara et al., 2018).

The professional data lifecycle represents, the internal data production and use of data in the organization (Conradie & Choenni, 2014; Denis & Goëta, 2014). The operating departments own, extract, and provide the data (Hunnius & Krieger, 2014). The data's accuracy and "truth" are grounded in the practices of those who manipulate and mobilize them (Denis & Goëta, 2014). It contains the activities to: (1) create or collect data, (2) store data, process data, and (3) evaluate data (Carrara et al., 2018; Charalabidis et al., 2018; Esteve Casellas Serra, 2014; SKL, 2017; Trafikverket, 2019; Zuiderwijk & Janssen, 2014a, 2014b). This element also concerns, the information management of the organization (Carrara et al., 2018; Naturvårdsverket, 2018; ÖppnaData.SE, 2018). The professional data lifecycle is opened to the external environment through the addition of the open data stream (see Figure 2).

3.2.2. The OGD Interstice

The OGD interstice consists of, the OGD operations and the OGD stream. It is the environment that exists between the internal and external environment and grows and shrinks, based on the organization's investment into its existence. For example, it could be an IT-department and its collaboration with various social units or a geographical-data department and its collaborations (Crusoe et al., 2020).

OGD Operations are concerned, with the operations of the field of work reshaping and the field of work cycling. The field of work reshaping is initiated with, preparing for the open data stream, like deciding the license, defining how to publish the dataset, investigating the professional life cycle, investigating tools, identifying impediments, and planing for maintenance and retirement (Carrara et al., 2018; Nečaský et al., 2014a; ÖppnaData.SE, 2018; Zuiderwijk, Janssen, Choenni, et al., 2014). The field work cycling contains maintaining the raw data lifecycle, evaluating the raw data lifecycle, and changing the open data streams (Carrara et al., 2018; Hyland & Wood, 2011; Lee, 2014; Naturvårdsverket, 2018; ÖppnaData.SE, 2018).

The **Open Data Stream** is at the core of any OGD initiative. It is an extension of the existing professional data lifecycle. It involves a process of transforming professional data with a long social life to raw data which is open to many uses (Denis & Goëta, 2014). For example, remove comments, charts, and personalized formatting (Denis & Goëta, 2014). The open data stream starts with professional data that is transformed into raw data that, can be shared. In detail, the stream contains activities, such as data extraction, data transformation, convert and harmonize data, repair data, clean and filter data, merge data into datasets, check quality of the data, store, and share the data (Carrara et al., 2018; Denis & Goëta, 2014; Esteve Casellas Serra, 2014; Folmer et al., 2011; Hunnius & Krieger, 2014; Hyland & Wood, 2011; Kucera et al., 2015; Lee, 2014; Naturvårdsverket, 2018; Nečaský et al., 2014a; ÖppnaData.SE, 2018; Petrou et al., 2014; SKL, 2017; Sussha, Grönlund, et al., 2015a; Trafikverket, 2019; Zuiderwijk & Janssen, 2014b). The stream can be manual, automatic, push, and pull in nature (Carrara et al., 2018; Nečaský et al., 2014a). It can also, have different owners and several streams can exist within a single organisation.

3.2.3. External

The publisher will be involved in supporting the discovery and exchange of their data and needs, to adapt their data and data provision to their environment, while cultivating it. In Figure 2, the arrow between the open data stream and consumers, represents the exchange of data. The external environment contains the elements of governance and community.

Governance refers to formal and informal processes and institutions, which can guide and restrain the collective activities of publishers (Keohane et al., 2002). It is the internal and external exercise of direction, control, management, and policy-shaping of OGD systems (McNabb, 2016). It involves laws, regulations, licenses, the OGD principles, and standards, but also government directives, policies, and grants. It sets out the freedom and restrictions of the leeway. Laws are important for the publication of data. It has been identified that, guides and frameworks for managing intellectual property rights and laws, are critical success factors for the publishing of data (Sussha, Grönlund, et al., 2015a). Examples of laws can involve licensing, the PSI-law, intellectual property, privacy, liability, and commercial law (Carrara et al., 2018). Moreover, laws can influence the organization's activities in different ways, such as the Swedish regulation (2010:1770), emphasising that data should be published in a digital format (how) and the law of reuse (2010:566), resulting in public agencies publishing an inventory list of their OGD (what). Other examples are, the archive law (1990:782), describing how data or information should be managed and the Swedish laws of Public Access to Information and Secrecy Act, General Data Protection Regulation, and the copyright law that can block the publishing of data (ÖppnaData.SE, 2018). Additional examples are the Swedish laws of PSI and Freedom of the Press Act, that encourage publishing, whereas the fees and charge regulation (1992:191), can impose the payment for an organization's dataset (ÖppnaData.SE, 2018). The data provision, should allow for good standardized access that, is not discriminatory (ÖppnaData.SE, 2018; Tauberer & Lessig, 2007). Any used license, should be relevant and follow standards, such as common creatives. The organization, can enact limited terms, if it must protect opposing interests. The main rule, is to provide the data for free, but some organizations may require payments, according to laws (ÖppnaData.SE, 2018). As such, the publisher might need to navigate a complex system of rules and reactions (leeway).

The Open Data **community** focuses on hackathons and gatherings, like seminars, workshops, and conferences (Hjalmarsson et al., 2017). One of the organiser's primary aims for hackathons, is to increase the use of datasets, related to a hackathon's problem statements. Therefore, the publishers are often available during the hackathon to provide insight knowledge to the participants. More general knowledge is usually done via seminars, workshops, and conferences. They can be provided on a national central level, like the discussion on the new Open Data law in Sweden, initiated by Internetstiftelsen (2020) or on an international level, such as Open Knowledge Foundation (2020) or Open Data Institute (2021). More common at the national central level, is knowledge sharing via best practices, such as at the Swedish Innovation Agency (2021) or Internetdagarna (2021). Often, regions, cities, or publishers arrange knowledge sharing on a decentralised level. Examples are Västra Götalandsregionen (2021) or the city of Gothenburg (Göteborgs Stad, 2021). Some publishers, like in the domain of public transportations, arrange seminars focusing on their specific OGD (Trafiklab, 2021). Publishers need to consider the requirements from the users, but also, the data provision from other publishers, to ensure consistency and compatibility.

3.3. Social Units

The work of OGD, as in who does what, varies greatly in the empirical material. In this section, we describe a condensed list of roles. Broadly, roles are divided into either the business side or IT-side of the organization (e.g., Kronofogden, 2019). However, we identified that grouping the roles into social units by common purpose of tasks was more efficient and pedagogical. The social units are top management, operations, the OGD team, consumers, and experts. In the following sections, we refer to social units rather than roles, to give room for contextual variations.

Top Management involves roles that, have the right to allocate resources, make decisions, and create strategies for the organization or an organizational unit.

Decision Makers are often political figures, responsible for a department, city, region, or national level (Carrara et al., 2018). The role could be the main sponsor of the OGD strategy and validate the overall approach, while overseeing the implementation (Carrara et al., 2018; Folmer et al., 2011) or solely being accountable for the OGD strategy (Carrara et al., 2018). Another approach is that the decision maker develops the vision and OGD strategy (Folmer et al., 2011).

Operations are, several different organizational units that are working for different purposes and activities. Information or data, may not be the central interest of their day-to-day activities, rather a bi-product. They are the participants of the professional data lifecycle and the possible future owners of an added open data stream.

Information Owners are the most knowledgeable, when it comes to the information (ÖppnaData.SE, 2018). The role is responsible for, some of the organization's information resources and some of the organization's processes (ÖppnaData.SE, 2018) and has input on, what data to publish and license to use (Hunnius & Krieger, 2014; ÖppnaData.SE, 2018). The role is part of the organization that is going to provide data (Carrara et al., 2018) and is responsible for the future data provision and its quality assurance. The person needs to have insight into day-to-day data production and use, legislation, some technical aspects, and organizational choices (Carrara et al., 2018).

However, the role is not responsible for the technical infrastructure. The role can be responsible for identifying information, technical requirements, and discoverability of the data (Folmer et al., 2011).

Contributors are, any civil servant or contractor who works with data within a given public organisation (Carrara et al., 2018). They are responsible for collecting, preparing, publishing, and maintaining the data (Carrara et al., 2018) and they can be a researcher (Zuiderwijk & Janssen, 2014b).

Data Owners, own a dataset or can make decision related to it (Nečaský et al., 2014c). This ownership, gives them the right to influence publishability and license (Nečaský et al., 2014c). On the other hand, the role can work with the data, dataset, and metadata. The role, is responsible for the execution of the new raw data life cycle (Folmer et al., 2011). The role, could be merged with the contributor (Carrara et al., 2018) or is a data record manager that knows the data production processes (Esteve Casellas Serra, 2014). As such, it can sometimes be merged with the information owner.

The OGD Team consists of roles that are important for the implementation and overall OGD maintenance within the organization.

OGD Managers should be given a central position, to allow for the needed mandate (ÖppnaData.SE, 2018). The role can be involved in coordinating and managing the different activities of OGD (Nečaský et al., 2014c). The role is responsible for OGD, requirements (e.g., PSI-law), design and implement strategies (e.g., ambitions and action plans) (Carrara et al., 2018; ÖppnaData.SE, 2018). The holder can be a manager or someone who is dedicated to the topic (Carrara et al., 2018). The person should have, their contact information on the organization's OGD web page since they are the overall contact person for OGD (ÖppnaData.SE, 2018). Instead of a central position, the role could be, a project leader (Folmer et al., 2011). They act as agents of change, within the organization and have to balance between guidance, maintenance, and implementation (Crusoe et al., 2020).

Community Managers are responsible for, user communication (ÖppnaData.SE, 2018) and engagement. This responsibility also, involves marketing and building a community (Folmer et al., 2011). The role could be, merged with the OGD manager (ÖppnaData.SE, 2018).

Developers work with implementing the technical requirements of OGD publication (Carrara et al., 2018; Nečaský et al., 2014c). One example is a website editor (ÖppnaData.SE, 2018).

The **information unit** can either be, centrally organized or organized in organizational units. The unit is responsible for the organization's information, how it is used, and structured (Carrara et al., 2018). It can be intertwined with the operations.

Administrators care for, the organization's information resources and define how information and processes can be described and classified (ÖppnaData.SE, 2018). The role could be, responsible for the coordination of publishing data (Zuiderwijk & Janssen, 2014b).

Consumers (data users and end-users) are the (potential) users of the provided data, such as journalists, students, researchers, and developers (Lassinantti et al., 2019; Safarov et al., 2017).

Experts can be involved at different parts of the OGD work and are specialised in one or several knowledge domains. They act, to support other roles and can be, external or internal.

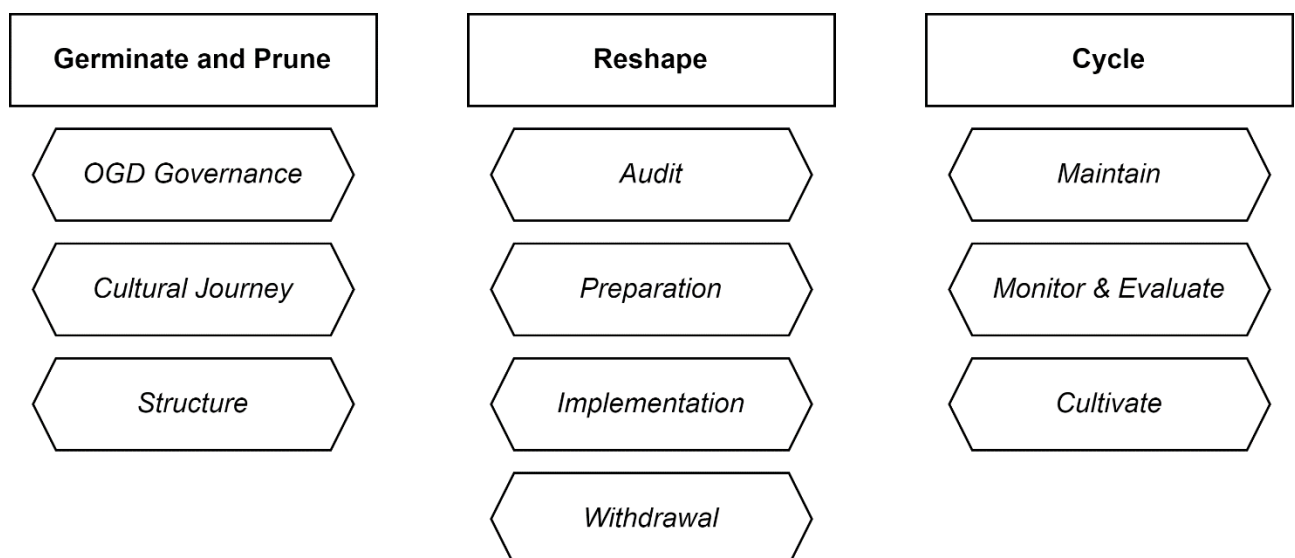
Legal Advisors check the legal status of the dataset and are involved in the requirements of licences for datasets (Folmer et al., 2011; Nečaský et al., 2014c). The role demands, skills and knowledge of law and legislation (Nečaský et al., 2014c) and therefore the role can be, a legislation expert (Susha, Zuiderwijk, et al., 2015).

Trainers teach other people about their new roles or expand existing roles (Crusoe et al., 2020; Susha, Zuiderwijk, et al., 2015).

3.4. Field of Work

Figure 3 presents an overview of the publisher's fields of work, which are Germinate and Prune (covering OGD Governance, Cultural Journey, and Structure), Reshape (with Audit, Preparation, Implementation, and Withdrawal), and Cycle (including Maintain, Monitor and Evaluate, and Cultivate).

Figure 3: Overview of the fields of work framework.



3.4.1. Germinate and Prune

The Germinate (to start development) and Prune (to reduce or remove unnecessary things), refers to work that, changes the OGD interstice. It is initiated by the top management and involves governance, cultural journey, and structure work. The results influence the work of the OGD team and the fields of work cycling and reshaping. It contributes to gaining long-term and sustainable work with OGD (ÖppnaData.SE, 2018), creating an OGD team to conduct the work with OGD (Kronofogden, 2019), and understanding OGD by spreading knowledge. It creates the conditions for OGD work (Crusoe et al., 2020; Kronofogden, 2019). The motivation to initiate publishing can vary. For example, [R1] publish data, to allow users to create services or deliver statistics to manufacturing

organisations, to negate work accidents and [R3] and [R11] initiate publishing, based on strategic decisions.

OGD governance covers strategies, action plans, and routines. Top management can include OGD in vision documents and *strategies*, e-maintenance, or information operations and budgets (SKL, 2017). OGD governance take a position in several important detailed issues: publishing strategies (Carrara et al., 2018), publishing intervals (SKL, 2017), technical ways to publish (ÖppnaData.SE, 2018), management of copyrights (SKL, 2017), fee management (ÖppnaData.SE, 2018; SKL, 2017), standard terms of use (Carrara et al., 2018; ÖppnaData.SE, 2018), the storage of OGD (Carrara et al., 2018). Overall strategic issues to discuss before publishing are: the organization's standpoints (Carrara et al., 2018), the winning strategies for OGD (Hunnius & Krieger, 2014), the role OGD can play for the organization (Charalabidis et al., 2018). Experts might need to be involved to, for example, help explain laws and regulations. We have identified a few approaches to strategy, such as creating a direction (e.g., Lee, 2014; ÖppnaData.SE, 2018), developing a policy (e.g., Charalabidis et al., 2018), being an integral part of the OGD projects (Carrara et al., 2018; e.g., Kucera et al., 2015), developing a vision (Folmer et al., 2011), and developing supportive documents (Folmer et al., 2011; Kucera et al., 2015; Susha, Grönlund, et al., 2015a; Zuiderwijk & Janssen, 2014b).

The OGD team can also create an *action plan*, with the top management. It can take on different expressions, based on the chosen strategy approach. For example, it could contain milestones and actions (SKL, 2017), explain responsibilities, data priorities, and outline expectations on the work (ÖppnaData.SE, 2018), and/or contain a scope, timeframe, and planning (Carrara et al., 2018). The plan can also be used to steer the OGD initiative (Charalabidis et al., 2018; Crusoe et al., 2020).

It is also important that, the top management and OGD team create *routines* that, can support publishing of data. Routines can help the organization (1) avoid the spread of data of lower quality and OGD capabilities into existing and new IT-systems (ÖppnaData.SE, 2018), (2) implement practices that ensure that data protection laws are adhered to and that data cannot be linked back to an individual (an exception, is public spending) (Lee, 2014), and (3) used to enforce publishing and curation of data and introduce incentive schemes for public servants (e.g., explain why a data provider would release data, explain what kind of value is created for the data provider) (Susha, Grönlund, et al., 2015a). An important routine is to, clearly define the publishing process (Susha, Grönlund, et al., 2015a). The OGD manager can organize internal meetings to discuss and define the data publication processes (Folmer et al., 2011; Susha, Grönlund, et al., 2015a). They make the data publication an integral, well-defined and standardized part of daily procedures and routines; standardize the publication process between departments (Zuiderwijk & Janssen, 2014b).

Cultural Journey refers to persuading others to the idea of OGD, educating others about OGD, and conducting pilot projects. Education, information campaigns, and support discussions and dissemination can help *persuading* members of the organization to work with OGD. The initiation of OGD work can involve obtaining support from top management, internal evangelization of the OGD concept, and securing the participation of departments and other stakeholders (Crusoe et al., 2020; Kucera et al., 2015). The support from political leadership, top managers, operational leadership, policy-makers, and government officials within the organization is important (Carrara et al.,

2018; Lee, 2014; Susha, Grönlund, et al., 2015a). However, to gain support, members need to understand OGD. For example, the management needs information about OGD and its possibilities it creates, and the political ambitions that exist on EU and national level, to take a position about how their organization should work (ÖppnaData.SE, 2018).

Education is a recurring theme in an OGD initiative, since members need to develop knowledge about several areas (Crusoe et al., 2020; Susha, Grönlund, et al., 2015a), such as OGD principles, laws, and information inventory. The OGD work requires general knowledge about OGD, technical expertise about current systems, data management, and operational knowledge about how to incorporate OGD (Lee, 2014). Organizational members need to learn how to work need-driven (Kronofogden, 2019) and be familiar with OGD, OGD portals, and actual data (Ayre & Craner, 2017). Support and training help to build the capacity needed to work with OGD (Lee, 2014). The reuse of tools from other publishers, can support this activity (e.g., an OGD guide (SKL, 2017). In addition, the framing of OGD can influence how OGD is taken up by the public organizations. For example, if OGD is framed as an economic issue that is about jobs and growth, chances are that the ministry of economics will be in charge of OGD (Hunnius & Krieger, 2014). The education helps the members, to move the organization towards an open culture. One of the documents referred to this change as the cultural journey (Kronofogden, 2019). Experts might need to be recruited for this work.

Pilot projects can help the organization to learn more about OGD and act as a stepping stone towards extending the work (ÖppnaData.SE, 2018). A pilot project can generate experiences and understand the publication of OGD. The purpose of the first projects is to learn about what OGD is and how you can create it. It is important to involve operations and the information unit (ÖppnaData.SE, 2018).

Structure involves clarifying responsibilities, deciding on public data location, and creating networks. Top management needs to clarify the *responsibilities* for different roles and their division of labour (ÖppnaData.SE, 2018; SKL, 2017; Zuiderwijk & Janssen, 2014b). It is important that, top management gives their support to all responsible personnel (Folmer et al., 2011). Another success factor is to determine, which personnel have the key responsibility for publishing OGD (ÖppnaData.SE, 2018; SKL, 2017; Susha, Grönlund, et al., 2015a). Those personnel should have a clear delegation of decision power and resources to roles. Top management should decide on support, by building insights in the activities of other actors involved in the publishing process (Zuiderwijk & Janssen, 2014b). The clarification of responsibilities involves, appointing an OGD manager for the OGD team (ÖppnaData.SE, 2018; SKL, 2017). It can be one OGD manager for the whole organization or one for each department (Hunnius & Krieger, 2014).

The new OGD team has to create an organizational data portal or decide to use external data portals, which acts like a part of the larger public OGD *infrastructure* (Carrara et al., 2018; Kalampokis et al., 2011; Nečaský et al., 2014b). The OGD team needs to study both the data portal's functional and non-functional requirements (Charalabidis et al., 2018; ÖppnaData.SE, 2018; SKL, 2017; Susha, Grönlund, et al., 2015a). The OGD team need to decide, how they will be part of the public OGD infrastructure that, coalesce as the base of the OGD system.

The OGD team needs to build a *network* in the organization. This network helps to spread and drive the practical everyday work with OGD (ÖppnaData.SE, 2018). It involves an exploration of operations, the information unit, and professional data lifecycles (Carrara et al., 2018; ÖppnaData.SE, 2018). This network then, helps the OGD team meet operational members that need to be taken on a cultural journey (Crusoe et al., 2020; ÖppnaData.SE, 2018; SKL, 2017). This process starts with an initial meeting where several important issues need to be discussed, such as why should we work with OGD and/or create conditions for future OGD work (ÖppnaData.SE, 2018). For example, [R3] and [R8] describe their intention with publishing data as a shift from selling services to data publisher. It is good to have representation from the operations that are responsible for or owns datasets and can retrieve information from the systems, the OGD team, the information unit, and top management (ÖppnaData.SE, 2018; SKL, 2017).

3.4.2. Reshape

The field of work reshape, is concerned with implementing open data streams, connected to professional data lifecycles. It involves audit, preparation, implementation, and withdrawal. Audit is repeated work that occurs over time. Preparation and implementation happen in a project where an open data stream is implemented. [R16] emphasize the importance of previous information classification for preparation. The activity of withdrawal incapacitates or removes, an open data stream.

The **data audit** aims to identify information resources (Naturvårdsverket, 2018), map their flow (Carrara et al., 2018), and identify potential datasets (Kucera et al., 2015). For example, [R9] select the datasets to publish, based on statistics for demand. [R10], [R14], and [R16] publish everything that can be published, without requirements from the users. [R11] has few published datasets and prioritised based on, perceived ease of publishing. The information resources need to be assessed and classified. It can be conducted by the OGD team, the information unit, or operations. Part of this is to *identify* where, information resources are stored and what, they are (Naturvårdsverket, 2018) and check if the data is being used by the organization itself, now or in the future (Zuiderwijk, Janssen, Choenni, et al., 2012). The data audit needs to identify who is collecting, using, and producing the data and what type of data they are gathering in what format (Carrara et al., 2018). For the data audits, there are various approaches: operations carry out a data audit (Carrara et al., 2018; Folmer et al., 2011), the OGD team, contacts operations or arrange workshops (Naturvårdsverket, 2018; Zuiderwijk & Janssen, 2014b), the OGD team, identifies information systems in the organization, the OGD team, analyses requests for information, sent to the organization by the public, and the OGD team, explores internal information use and public information sharing (Nečaský et al., 2014a).

The identified information resources, need to be *assessed* for publication by operations or the information unit (ÖppnaData.SE, 2018). The assessment is based on metadata quality, data owners, potentials of releasing the data and its sensitivity (e.g., containing personal details), and possibility to extract the data (Denis & Goëta, 2014; Esteve Casellas Serra, 2014; Nečaský et al., 2014a; ÖppnaData.SE, 2018). Data that has sensitive content or obfuscated ownership needs to go through deeper assessment, by operations or the information unit with experts. This type of assessment, in-

volves studying the data ownership, confidentiality, privacy, and copyright, fees, terms, and contracts of the data and recording it in the metadata (Kronofogden, 2019; Naturvårdsverket, 2018; Södertälje, 2019).

The information resources need to be *classified*, which involves investigating the information type, version, ownership, and security problems and risks (Kronofogden, 2019; Naturvårdsverket, 2018; ÖppnaData.SE, 2018; SKL, 2017; Södertälje, 2019). The classification can range from negligible, to dangerous (ÖppnaData.SE, 2018).

Preparations create an idea of the end-state, understanding of the current state, and what will be needed to go there; the publishing plan (Kucera et al., 2015; Naturvårdsverket, 2018; Södertälje, 2019). It involves identifying how-to, investigate the current state, and identifying impediments. For example, [R2] and [R5] declare that, they want to publish their data as-is, without any changes and in one format. One consequence of the as-is approach might be that, the data is hard to understand for the user. [R10], [R12], and [R14] publish in various formats, where CSV is in favour. On the other hand, [R4] and [R16] publish datasets via APIs. [R13] are offering their data both to internal and external users and vary their ways to publish, focusing on customer needs. The OGD team, guided by strategies, action plans, and routines needs to decide *how-to* publish the data (Kronofogden, 2019; Naturvårdsverket, 2018; SKL, 2017); what is the raw state of the data to be provided? (Denis & Goëta, 2014). The open data stream, needs to transform professional data to raw data, that can be reused by others while mitigating risks (e.g., misunderstanding and privacy violations). Thereafter, the target level of openness needs to be determined (Nečaský et al., 2014b). The team has to choose standards and specifications for the data, metadata, licenses, IT-systems, and exchange protocols (Nečaský et al., 2014b; SKL, 2017; Södertälje, 2019; Susha, Grönlund, et al., 2015a). The data provision also need, to provide support to the users (Naturvårdsverket, 2018) and descriptions should be published as human and machine-readable (Hyland & Wood, 2011).

The OGD team also needs, to *investigate* the professional data lifecycle and tools (Carrara et al., 2018; Kronofogden, 2019; Naturvårdsverket, 2018; Nečaský et al., 2014b). The IT-system of the data needs, to be further investigated to identify its possibility to extract the data from the original sources (Esteve Casellas Serra, 2014; SKL, 2017), but also, if the dataset can be stored for publication and if it is compliant with, data protection legislation (Zuiderwijk & Janssen, 2014b). One option for storing is that, external suppliers handle the data provision (ÖppnaData.SE, 2018). The investigation also involves planning for maintenance and retirement, which the OGD team can do in collaboration with operations (Kucera et al., 2015; Lee, 2014; Nečaský et al., 2014b). Through the investigation, the OGD team needs to identify and record *impediments* that can block or problematize the publishing of the data (Södertälje, 2019).

The **implementation** involves, making the data *available and accessible* by implementing the data stream, including the *support and documentation* for accessing and using the data in a proper way. Added to this work is, *metadata, as well as registering* it on data portals. It varies greatly, depending on the data being published (Crusoe et al., 2020). One example is [R2], who creates a technical solution for publishing metadata, in order to manage it. The OGD team needs to check the dataset, appoint a contact for the dataset within operations, make the dataset available and accessible for consumers, and implement software tools (Kronofogden, 2019; Naturvårdsverket, 2018, 2018; Nečaský

et al., 2014b; ÖppnaData.SE, 2018; SKL, 2017; Zuiderwijk, Janssen, Choenni, et al., 2012). The team also needs, to write documentation that allows the consumers to understand the data and how to access it. This means that, the team needs to finalize the public metadata (Kronofogden, 2019; SKL, 2017). The documentation should include technical details, such as its context, explanation and how users can work with it as well as the license (Davies, 2010; Kronofogden, 2019; Lee, 2014; SKL, 2017). [R15] emphasise that users vary in their knowledge about the datasets, which makes it hard to write useful documentation. The implementation ends with the creation or revision of a maintenance plan by top management (Kronofogden, 2019; Naturvårdsverket, 2018) and the OGD team needs to register the data's metadata on data portals, such as topic-based, national, and local (Lee, 2014; Naturvårdsverket, 2018; ÖppnaData.SE, 2018; SKL, 2017).

The **withdrawal** includes, stopping the entire raw data lifecycle (no-refresh) or stopping publishing a dataset (terminate). In *no-refresh*, users still have access to the data, while not so for *terminate* (Nečaský et al., 2014b). The withdrawal is initiated, when it is no longer possible to maintain a dataset or other issues, such as changes in legislation, primary data is no longer collected, or the structure or meaning of the data changes (Kucera et al., 2015; Nečaský et al., 2014a). Withdrawal can be initiated by the OGD team, operations, the information unit, and top management (Kronofogden, 2019; Naturvårdsverket, 2018). However, we identified that withdrawal was a rare practical occurrence with little research (e.g., Crusoe et al., 2020). It is important to *inform* the consumers about any kind of withdrawal in advance, as it can impact their solutions and business models.

3.4.3. Cycle

Publishers should feel responsible to maintain their data, to keep it fresh and up to date, to ensure its accuracy to the greatest degree possible and to repair reported problems (Hyland & Wood, 2011). This field of work starts, once an open data stream has been implemented and data is published. It contains the maintenance of the open data stream and the work is, therefore, constant. The field of work contains the maintenance of open data stream, evaluation and monitoring of it, and implementation of changes to the raw data lifecycle. It is recommended that, the process should be automated (Nečaský et al., 2014a), such as using an API [R4], but it can be manual or a mix. For example, [R9] are working with manual processes internally in the organisation to publish the data and are occasionally producing specific datasets on demand.

The **maintenance** should be guided by the maintenance plan, written by information owners (Naturvårdsverket, 2018). Of importance in maintenance is *the flow of the data*, the conditions of *the IT-systems*, and the *presentation* of the datasets. Activities in the maintenance plan can be, to check URIs and URLs (Carrara et al., 2018), update datasets or publish new versions of data or changes made. An example of maintenance is [R5], that have worked with the quality in their forecast data to make it easy to use. A recurring maintenance activity is, to monitor status and health of automated IT-systems and do manual maintenance. For discussions on how to mitigate a dataset, maintenance personnel should contribute with knowledge on the risks of performing this activity (Nečaský et al., 2014b).

Monitor and evaluate overlap. Monitor is enacted by top management, while evaluation by operations or the information unit. The OGD team is also active in both. Evaluation is conducted on

the open data stream (e.g., data provisioning), where the goal is to enable the improvement of the data and/or data provision. The evaluation includes *feedback* from the users that is collected by the Community Manager (Lee, 2014; Zuiderwijk & Janssen, 2014b). Feedback is very important to improve the quality of data and provisioning (Charalabidis et al., 2018; Crusoe et al., 2020), since the users can identify and report errors and other issues (Nečaský et al., 2014b). The collected feedback needs to be analysed (Nečaský et al., 2014b), for example, by how the datasets can be improved (ÖppnaData.SE, 2018). A common way for users to contact publishers is, by using internal support organisations handling questions from users [R4], [R5], and [R12]. The OGD work needs to be regularly monitored and thereby evaluated by different social units (Carrara et al., 2018). The evaluation includes the initiative and its maturity should be measured against defined OGD strategies (Kucera et al., 2015). The evaluation should ensure that, the initiative is in line with planning, international rankings, and other frameworks of evaluation (Lee, 2014). The monitoring could include monitoring the performance of the data and the system, and collection and preparation performance (Carrara et al., 2018), changes in organizational culture (Folmer et al., 2011), achievement of objectives (Lee, 2014). Other parts to monitor are, how the data portal is used (Zuiderwijk & Janssen, 2014a), potential risks (Kucera et al., 2015), and how the published data is reused (Zuiderwijk & Janssen, 2014b). The OGD team should assess the political, social, economic, technical, and operational impact of the OGD initiative, both internally and externally (Charalabidis et al., 2018; Folmer et al., 2011). One way of assessing the impact, is by using indicators beyond the standard set (Folmer et al., 2011). Based on the feedback and assessment, the OGD team, operations, and the information unit can *develop* their OGD work.

Cultivate, refers to the work needed to develop and improve the consumers use of the organization's published data. User engagement is a core pillar of any OGD initiative and enacted by the OGD team towards the consumers (Folmer et al., 2011). Consumers can be involved, when the publisher seeks to identify data demands to identify and prioritize what data to publish, marketing of published datasets, improve their data provision through feedback, and cultivate an active community that reuses the published data. User engagement can help with (1) identifying valuable datasets to publish, (2) improving data quality and provision, (3) raising awareness of the OD initiative, (4) building a sense of trust between the organisation and others, (5) encouraging data users to take ownership as active participants, and (6) encouraging data publishers that their efforts are worthwhile (Lee, 2014). User engagement can take many forms: consultation, social media, hackathons/innovation-days, existing groups, competitions, tutorials, evangelism, internal promotion, and traditional media (Lee, 2014). However, it is not always easy to engage the users. For example, [R3], like other publishers, e.g., [R10], [R12], and [R15], are not aware of who their users are and [R10] use the approach of focusing on finding the users. [R5] find it hard to find the user's requirements. There are three categories of cultivation: communication, awareness raising, and reuse promotion.

Communication is general and involves, for example, explaining changes to datasets and data provision (ÖppnaData.SE, 2018; Trafikverket, 2019). Consumers can be interested to know more about the organization's progress with OGD (Nečaský et al., 2014b).

Raising awareness seeks to increase the knowledge of published datasets to increase use and can be to both internal and external stakeholders (SKL, 2017; Södertälje, 2019). It is a form of marketing

(Kronofogden, 2019; Naturvårdsverket, 2018) that, can involve creating a communication strategy (Kucera et al., 2015; Nečaský et al., 2014b). Datasets can be marketed on the organization’s website, through development events and competitions, events towards universities or developer communities, internal marketing through the internal network or seminars, press releases, blog posts, information days, and app awards (Folmer et al., 2011; SKL, 2017).

The *promotion of reuse* can help increase use, but also drive a continued demand for OGD (Carrara et al., 2018). For example, [R4] used focused campaigns to attract more users, whereas [R15] are working with meet-ups. Both organizations see it as hard to meet the users, due to their geographical scattering and are therefore, offering individual knowledge sharing. [R14] have had projects to identify users, based on their own internal knowledge. It is also possible to promote use by providing incentive schemes and aligning events, competitions, and hackathons with, for example, university curricula, awards, festivals, and direct marketing (Susha, Grönlund, et al., 2015a). [R6]’s idea is that, the use of data should increase with gamification, to move away from its technical perspective and that data should be common knowledge among citizens. The OGD team can provide incentive schemes, to engage consumers and align events, competitions, and hackathons with, for example, university curricula, awards, festivals, and “direct marketing” (Susha, Grönlund, et al., 2015a). Re-use promotion can involve different roles and take many different forms, such as skill-building sessions (Davies, 2010), developing university and continuous education curricula on OGD (Susha, Grönlund, et al., 2015a), organizing events, and ensure community building where the potential benefits of OGD are communicated to users (e.g., by building scenarios for usage) (Susha, Grönlund, et al., 2015a), organizing inter-organizational collaboration (e.g., network meetings) to learn from the OGD initiatives of others (Susha, Grönlund, et al., 2015a), education about how to find government data (Ayre & Craner, 2017), sponsoring user communities (Davies, 2010), start-up incubators (Susha, Grönlund, et al., 2015a), organizing forums around OGD (Kronofogden, 2019), hosting a hackathon to engage local technologists (Ayre & Craner, 2017), discussing datasets or what can be learned from data use (Zuiderwijk & Janssen, 2014a), and collaborative projects can increase the use of data from several publishers (SKL, 2017). Examples of this are [R1], [R3], [R8] and [R9], who gathered knowledge from other publishers by using their best practices to create their own publisher process.

4. Discussion

This section presents a discussion about the publisher framework. As indicated before, previous knowledge about the publishing process is fragmented with gaps and variations, but indicates a high complexity, with variations in approaches and processes (Carrara et al., 2018; e.g., Folmer et al., 2011; Hyland & Wood, 2011; Naturvårdsverket, 2018; ÖppnaData.SE, 2018; Zuiderwijk, Janssen, Choenni, et al., 2014). The complexity and fragmentation make it difficult and time consuming, to understand the work of publishing data. This study contributes with a publisher framework, synthesised from previous research and empirical material. The framework consist of three environments, six social units, and three fields of work and provides a detailed description of them. The framework is more open to variations and scale than Zuiderwijk, Janssen, Choenni, et al. (2014) and

Zuiderwijk, Janssen, & Davis (2014), more detailed than (Folmer et al., 2011), more tested than (Carara et al., 2018), and gives a better overview and dynamism than Nečaský et al. (2014a). At the same time, the publisher framework of this paper is synthesised from aforementioned sources. The following subsections present discussions about the three environments, three fields of work, including social units, limitations and future research, and implications for practice and research.

4.1. Environments

The internal environment in public organizations is driven by laws and regulation, where one example in Sweden is the Swedish regulation (The Swedish Parliament, 2010), emphasizing the publishing of data. The culture is management-oriented and based on laws and regulations, where there is little room for innovation (Keohane et al., 2002; McNabb, 2016; Susha, Grönlund, et al., 2015a). On the other side, is the external environment driven by adding value to the end-users (Susha, Grönlund, et al., 2015a). Since the more flexible external environment adds requirements to the internal, those requirements can be hard to recognize or even fulfil, creating tensions for the environments. The presumptive tensions can be expressed in misunderstandings, discussions, difficulties in agreeing, non-communication, or abandonment.

For the internal environment, it can be hard to initiate the relationship with the external environment (Hjalmarsson et al., 2017). Usually, this relation is non-existing or has low activity before publishing OGD. The first part is to understand, whom to start networking with. The consumers are not well-known to the internal environment, adding problems while finding them and addressing which datasets to add into the data stream based on the consumers' requirements. Another aspect is that, both sides are low on knowledge of each other's requirements. The low grade of shared knowledge can create problems, such as not publishing datasets or the wrong publishing rate. The results can be that, the consumers can not support the end-users, fulfilling their requirements. Another aspect of the relationship is the publisher's motivation for publishing OGD. Some publishers see the publishing as an extra burden, limiting the scope of the existing labour.

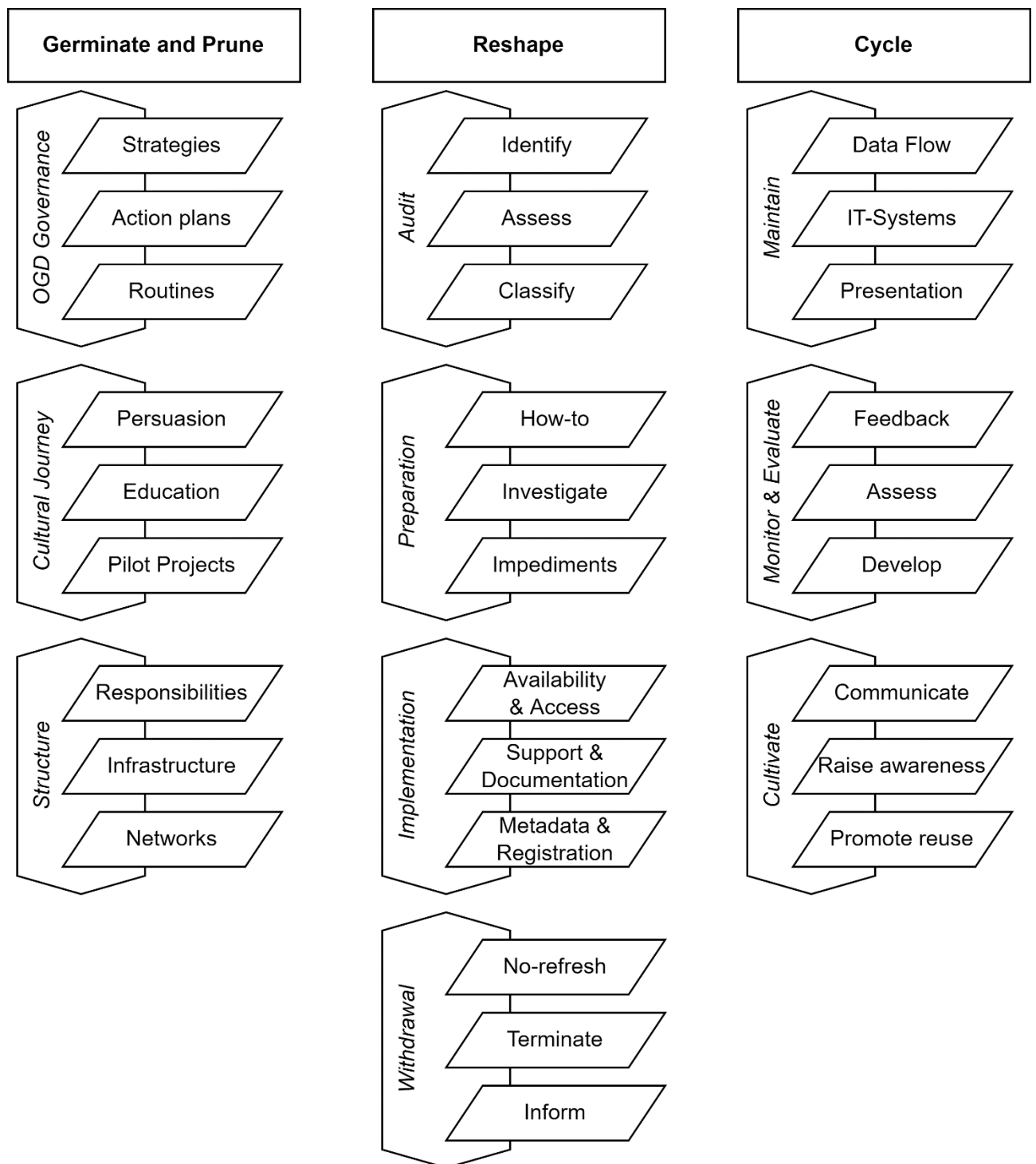
We have previously described that publishing OGD is part of the organisation's existing infrastructure, still adding new requirements to it. The organisation can choose to add the social units and roles into existing social units or roles, or add entirely new ones. Using the existing ones can benefit from current knowledge and resources, still being diminished by habits and cultural aspects, for example, how to divide the labour. Adding new social units and roles can benefit by building up habits and new cultural aspects, that solely are focusing on OGD. However, can it be challenging to fit OGD within the internal environment to the external and, as such, it becomes an interstice, no matter which choice the organisation makes. Another consequence, still not depending on the organisational choice, is that the publishing process is complex and needs to fit into existing processes, both from the infrastructure and information-sharing sides.

4.2. Field of Work

Open data for public organizations, is more than publishing data and involves work of governance, cultural journeys, structures, data audits, preparations, implementations, maintenance, evaluations,

and possibly cultivation. Figure 4, presents this work with its areas in detail. There are many details to fully understand the publishing process. One such example is that, Hunnius & Krieger (2014) emphasize administrative units, as responsible for the general rules of open data. General rules can be licenses or license schemes, data formats, metadata standards, or the target processes for publishing data. The administrative units are often IT-units, IT-providers and consultants, who all have a technical perspective (Hunnius & Krieger, 2014). However, in our framework these responsibilities are dispersed on the OGD unit, information unit, and top management (Crusoe et al., 2020), while the administration unit is a type of process group that focuses on the process groups of inventory of information resources and maintenance. In our research, we have identified that the used terminology often varies, which has created some confusion. The confusion can be a result of generalization from previous research or that, the empirical material shows disparity due to contexts varying in resources, such as how many datasets to publish and thereby the required resources. We have identified that the complexity of the publisher's work originates in (1) interplay and reform and (2) leeway and distance.

Figure 4: Detailed overview of the fields of work framework.



Previous OGD research tends to frame the OGD work as a closed life cycle or value chain (Attard et al., 2015; Charalabidis et al., 2018; e.g., Zuiderwijk, Janssen, Choenni, et al., 2014) and conflate the three fields of work (Kucera et al., 2015; Kučera, 2015; e.g., Lee, 2014), while sometimes admitting the differences of the environments (e.g., Zuiderwijk, Janssen, & Davis, 2014). In our research, we found a complex set of interactions between Germinate and Prune, Reshape, and Cycle. There is an

interplay between the environments and the fields of work, but also the reform. The internal environment, is the base from which Germinate and Prune grows to beget the work with Reshape and its interstice environment, which, in turn, changes and adds to the internal environment. Reshape is a reform process in public organizations that seeks to identify data through data audits and, if identified data is deemed appropriate, initiate a project that prepare and then implements an open data flow. The open data flow needs to be maintained, monitored, and evaluated within certain cycles (which might not include Reshape). At the same time, Reshape brings with it, a cultural journey of persuasion and education (Crusoe et al., 2020). Thus, previous OGD research misses that OGD work is something that is ongoing at several levels and locations at the same time and have different types of rhythms and roles. It also raises questions about the permanency of OGD teams once the reform is finished, the responsibility of operations and maintenance of data flows, and the effect between the professional data lifecycles and attached data flows.

Previous OGD research tends to present, a clear general path from closed to open data (Hyland & Wood, 2011; Santos et al., 2018; Zuiderwijk, Janssen, Choenni, et al., 2014), while noting impediments or tensions for public organizations (Barry & Bannister, 2014; Beno et al., 2017; Conradie & Choenni, 2014; Denis & Goëta, 2014). Practice follows a similar style (e.g., Carrara et al., 2018; Naturvårdsverket, 2018; ÖppnaData.SE, 2018; Södertälje, 2019). This approach helps to encompass the multitude of variations and approaches of Practice, while recognising possible hurdles. Practice makes the process comprehensible, while presenting a series of clear steps needed for the change. It removes the intellectual weight of considering the distance between the present organizations and the wished OGD state, but also, the many options within the leeway of OGD. The distance and leeway are a matter of practice on a case-by-case basis. As such, it fails to fully capture the problems of many OGD initiatives and the difficulties with implementing data flows. It tells the how without answering it. Reshape changes parts of the organization from one state to the other, which is done by moving certain conditions from particular states to others (e.g., data on paper is digitized). The work around this movement is well-described (e.g., data audit, prepare, and implement), but the moves themselves are abated. Reshape looks like a process in practice, because of time and the general actions of change, but in actuality, it is a process that encompasses a collection of moves played out by the OGD team, to move the organization from one state to the other. Data audit finds data and indicates moves, preparation identifies and defines the moves, and implementation conducts and re-evaluate the moves. This characteristic of OGD work, makes it difficult to describe OGD publishing as a process, as it is a realignment and extension of current internal practices, rather than something with unclear input and output, with steps in-between.

4.3. Limitations and Future Research

The publisher framework is developed from previous research, empirical material, and feedback from OGD experts and researchers. Despite this, we can overview limitations. We have not tested the publisher framework in practice. Previous research has been covered, in a broad perspective, where there still can be missed opportunities in newly published literature. The used documents are from Swedish public organizations, covering these contextual aspects. We have, therefore, used feedback from international researchers to fill some of these gaps and tested the framework in Belgium (Crusoe et al., 2020). The framework was published in a popular science article, where the

feedback from the OGD experts and publishers have been positive. The framework is in line with what was previously known and has synthesised a richer understanding of the publisher process.

Based on this study, we see avenues for further research, such as:

- Variations in the framework, for various categories of publishers.
- Variations in the framework, related to consumer requirements
- The impact of organizational culture, structure, and operations on the framework
- The identification of common open data moves of OGD teams, for different start and end conditions.

4.4. Implications

The presented publisher framework, has several implications for practice and academia. For practice, public organizations can understand what it entails to be a publisher. The framework can help them identify important areas of work that previously had been overlooked or not considered, which can allow them to make other decisions and improve their data provision. It highlights the temporary and permanent works of OGD (e.g., reshape vs. cycle). This helps to differentiate between, the work that creates value, and the work that enables this work (data flow vs. publishing data). The framework is also one more step towards open government (Hellberg & Hedström, 2015; e.g., Janssen et al., 2012; Veljković et al., 2014). For consumers, the framework describes in rich detail, the work of publishers, which gives them an idea about why the work with OGD can be a slow and taxing. Consumers can use the framework, to identify areas where they can give feedback and support with expertise knowledge, to ease the work. For academia, the framework gives detailed knowledge that can act as a basis for investigations and identifications of fields of work, social units, and environments. OGD actors and OGD researchers can use the framework to launch local OGD initiatives where the framework act as a guide. Specifically, there are some recommendations from each of the fields of work, for practitioners and academia.

For the *field of work Germinate and Prune*, it is recommended that the publisher's top management find an OGD team and give them the needed responsibilities and authority to reshape the organization, in collaboration with its social units. OGD governance should be developed in collaboration with the team and consider national and international governance, to ensure that the published data is interoperable and safe. It is essential to recognize that, OGD involves a cultural journey where, the OGD team will act as agents of change. Education and persuasion are part of this journey and needs to be supplied recurrently in the social units. Many different roles might need to be involved when auditing data, preparing for publication, and implementing the data flow, and as such the OGD team is recommended to form a network of expertise facilitated by the top management. This network can welcome consumers to, include their perspectives and need in the data provision that, can help increase the usability and utility of data. Consumers can help prioritize data in action plans, by demanding data, but also help with persuasion and education, by feeding the public organization with good examples and opportunities. Academia needs to help the OGD actors untangle the complex relationships between governance, cultural journey, and structure where they can supply best practices similar to Susha, Zuiderwijk, et al. (2015) and Susha, Grönlund, et al. (2015b). (Janssen et

al., 2012) describes the cultural journey as one step towards an open government, changing the culture from closed to open.

For the *field of work Reshape*, it is recommended that top management supplies the OGD team with resources to organize the basic OGD infrastructure, such as portals and data storage. The OGD team is recommended to use a multi-approach to their data audits, where they work to identify data, but also invite others to help them. When it comes to the preparations and implementation, the OGD team is recommended to identify and record moves to help them speed up and improve their data publishing by reusing previous experiences. The recorded moves can help them avoid reinventing knowledge and broaden their pool of alternatives, when faced with difficulties. It also gives them something to trade with other publishers. Consumers can help the OGD team identify data through requests and demands, and help the OGD team provide high quality data by giving feedback about availability and access, support and documentation, and metadata. It is, thus, important for the OGD team to be open to feedback and dialogue. For the open government, this field of work, demonstrates action and enforces the top management to demonstrate their action towards achieving e-democracy. Research on moves could help OGD teams publish data quicker and easier, without the need to reinvent knowledge and experiment.

For the *field of work Cycle*, it is recommended that top management investigates and allocates resources to enable the maintenance of data flows, IT-systems, and presentation of datasets. It is important to clarify, who is responsible for the maintenance of the data flows or they can quickly become useless. Following up through monitoring and evaluations are important to ensure that OGD is progressing and resources are not wasted. The OGD team is recommended to collaborate with others, to cultivate consumers and raise their capabilities. It is okay to contact consumers directly, to retrieve feedback and inform about changes, which could help with trust, but also feed the public organization with good examples of data use. Here, the open government is shaping and re-shaping by iterative work and acting towards higher degree of openness. Researchers can study how to best monitor and evaluate OGD from the perspective of the social units.

4.4.1. How can the publisher framework be used [...]

Besides, the above implications, the framework has some possible uses in practice and research.

[...] *in practice?* Publishers and consumers can use the presented framework for different purposes:

Publishers can use the framework, to understand and plan their work, but also see who needs to be involved and when. The framework also reveals what can be expected of them.

Consumers can use the framework, to understand how publishers work with data publishing and also, where they can get involved.

[...] *in research?* The process framework of the publisher's OGD work is useful to understand fields of work, environments, and social units and support the development of a descriptive theory (see Gregor, 2002). While the framework highlights complexities and relationships, it should not be used to predict the future. Rather, it can be used in case studies as an initial guide, part of an iterative

process, and part of a final product (Eisenhardt, 1989; Walsham, 1995). Each type of use is presented with an example below:

As an **introductory guide**, the framework can guide researchers towards relevant and important roles and work and pay attention to the importance of environments. This guidance can direct researchers towards relevant and important empirical material. It also helps to highlight the possible scope of publishers' work, which can help in the construction of preliminary conceptual frameworks and give some tentative expectations.

As part of an **iterative process**, the framework can be used as a point of comparison to identify similarities and deviations. This comparison allows for the identification of original contributions. It could also be used to generate categories for coding, which would help the researcher get a head start.

As a **final product**, the framework can be used as a modifiable template where further details and descriptions are added. The fields of work and social units can be added, changed, or removed based on empirical material to describe the work of publishers.

5. Conclusion

The publishers' work is in focus, since previous knowledge is fragmented with gaps and variations. For any OGD actor to understand the work of publishers, several sources must be studied and understood, which can be time consuming, difficult, and raise a need to resolve inconsistencies. Therefore, this study has focused on developing a detailed publisher framework with environments, social units, and fields of work using previous research and empirical material.

Publishing data is not solely a technical process, it is a reform of existing practice in public organizations. The data that will be published is existing professional data that should be used by external consumers, adding new requirements to public organizations. Those requirements add new obscure stakeholders into the organization, which, could result in, internal contradictions and tensions between the internal and external environments. Our publisher framework shows an overall work embedded in three environments, the internal, the interstice, and the external. It is a realignment and extension of current internal practices, in relation to something external. It adds new infrastructure, new roles, new relationships, and complexities. The new activities, such as deciding which dataset to publish, can be added into existing roles or justify completely new roles. Those roles are often scattered across the environments, which now need to be consolidated into temporary collaborations to solve publishing problems, overriding existing organizational boundaries. The main findings are based on the field of works, Germinate and Prune, Reshape, and Cycle, which are all adding activities to the organization's existing ones. Examples of activities are creating strategies, education, and data flow.

The significant contribution of this research is the conceptual framework of the publishers' work, including fields of work for the publisher. This publisher framework can act as a foundation for future research about OGD work of public organizations (see Section 3). The proposed avenue could

involve a cost-benefit analysis. At the same time, the framework can be a first step towards the creation of a descriptive theory (Gregor, 2002) for publishers. The identified complexity in the publisher framework, allows for a broader approach to how OGD can be published and opens up the possibility for discussions on its complexity. This can help us understand the different strategies publishers use and how they can be supported and cultivated.

References

- Attard, J., Orlandi, F., Scerri, S., & Auer, S. (2015). A systematic review of open government data initiatives. *Government Information Quarterly*, 32(4), 399–418.
- Ayre, L. B., & Craner, J. (2017). Open data: What it is and why you should care. *Public Library Quarterly*, 36(2), 173–184.
- Barry, E., & Bannister, F. (2014). Barriers to open data release: A view from the top. *Information Polity*, 19(1–2), 129–152. <https://doi.org/10.3233/IP-140327>
- Beno, M., Figl, K., Umbrich, J., & Polleres, A. (2017). Open data hopes and fears: Determining the barriers of open data. In P. Parycek & N. Edelmann (Eds.), *International conference for e-democracy and open government 2017 (CeDEM17)* (pp. 69–81). the IEEE Computer Society.
- Carrara, W., Oudkerk, F., Van Steenberghe, E., & Tinholt, D. (2018). Open data goldbook for data managers and data holders. <https://www.europeandataportal.eu/sites/default/files/goldbook.pdf>.
- Charalabidis, Y., Zuiderwijk, A., Alexopoulos, C., Janssen, M., Höchtel, J., & Ferro, E. (2018). The world of open data. In Springer. <http://www.springer.com/gp/book/9783319908496>; Springer International Publishing. <https://doi.org/10.1007/978-3-319-90850-2>
- Conradie, P., & Choenni, S. (2014). On the barriers for local government releasing open data. *Government Information Quarterly*, 31, S10–S17.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*.
- Crusoe, J., Simonofski, A., & Clarinval, A. (2020). Towards a framework for open data publishers: A comparison study between sweden and belgium. *International Conference on Electronic Government*, 262–274.
- Davies, T. (2010). Open data, democracy and public sector reform. *A Look at Open Government Data Use from Data.gov.uk*, 1–47.
- Davies, T. (2011). Open data: Infrastructures and ecosystems. *Open Data Research*, 1–6.
- Denis, J., & Goëta, S. (2014). Exploration, extraction and “rawification.” The shaping of transparency in the back rooms of open data. *The Shaping of Transparency in the Back Rooms of Open Data* (February 28, 2014).
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.
- Esteve Casellas Serra, L. (2014). The mapping, selecting and opening of data: The records management contribution to the open data project in girona city council. *Records Management Journal*, 24(2), 87–98.

- Folmer, E., Reuvers, M., Quak, W., Broek, T. van den, & Veenstra, A. F. van. (2011). Walking the extra byte: A lifecycle model for linked open data. In *Linked open data-pilot linked open data nederland* (pp. 95-111). Remwerk.
- Göteborgs Stad. (2021). Göteborgs stad öppna data. <http://data.goteborg.se/>. Retrieved on 2021-03-08.
- Gregor, S. (2002). A theory of theories in information systems. *Information Systems Foundations: Building the Theoretical Base*, 1-20.
- HackForSweden. (2019). Hack for sweden. <https://hackforsweden.se/>. Retrieved on 2019-11-07.
- Handbook, O. D. (2015). What is open data? <http://opendatahandbook.org/guide/en/what-is-open-data/>. Retrieved on 2018-11-05.
- Hartog, M., Mulder, B., Spée, B., Visser, E., & Gribnau, A. (2014). Open data within governmental organisations: Effects, benefits and challenges of the implementation process. *JeDEM-eJournal of eDemocracy and Open Government*, 6(1), 49-61.
- Hellberg, A.-S., & Hedström, K. (2015). The story of the sixth myth of open data and open government. *Transforming Government: People, Process and Policy*, 9(1), 35-51.
- Hjalmarsson, A., Juell-Skielse, G., Johannesson, P. others. (2017). *Open digital innovation*. Springer.
- Hossain, M. A., Dwivedi, Y. K., & Rana, N. P. (2016). State-of-the-art in open data research: Insights from existing literature and a research agenda. *Journal of Organizational Computing and Electronic Commerce*, 26(1-2), 14-40.
- Hunnius, S., & Krieger, B. (2014). The social shaping of open data through administrative processes. *Proceedings of the International Symposium on Open Collaboration*, 16.
- Hyland, B., & Wood, D. (2011). The joy of data-a cookbook for publishing linked government data on the web. In *Linking government data* (pp. 3-26). Springer.
- Internetdagarna. (2021). Internetdagarna - internetdagarna 23-24 november. Sveriges största konferens för alla oss som älskar internet. <https://internetdagarna.se/>. Retrieved on 2021-03-08.
- Internetstiftelsen. (2020). Välkommen till goto 10. <https://www.goto10.se/>. Retrieved on 2021-03-08.
- Janssen, M., Charalabidis, Y., & Zuiderwijk, A. (2012). Benefits, adoption barriers and myths of open data and open government. *Information Systems Management*, 29(4), 258-268.
- Kalampokis, E., Tambouris, E., & Tarabanis, K. (2011). A classification scheme for open government data: Towards linking decentralised data. *International Journal of Web Engineering and Technology*, 6(3), 266. <https://doi.org/10.1504/IJWET.2011.040725>
- Keohane, R. O., Nye, J. S., & Donahue, J. D. (2002). Governance in a globalizing world. *Power and Governance in a Partially Globalized World*, 193-218.
- Kronofogden. (2019). Hur gjorde vi? <https://www.kronofogden.se/erfarenhetspsidata.html>. Retrieved on 2019-08-26.
- Kucera, J., & Chlapek, D. (2014). Benefits and risks of open government data. *Journal of Systems Integration*, 5(1), 30-41.

- Kucera, J., Chlapek, D., Klíma, J., & Nečaský, M. (2015). Methodologies and best practices for open data publication. *DATESO*, 52-64.
- Kučera, J. (2015). Open government data publication methodology. *Journal of Systems Integration*, 6(2), 52-61.
- Lassinantti, J., Ståhlbröst, A., & Runardotter, M. (2019). Relevant social groups for open data use and engagement. *Government Information Quarterly*, 36(1), 98-111.
- Lee, D. (2014). Building an open data ecosystem: An Irish experience. In E. Elsa, J. Marijn, & B. Luís (Eds.), *Proceedings of the 8th international conference on theory and practice of electronic governance* (pp. 351-360). ACM Press.
- Lindman, J., Kinnari, T., & Rossi, M. (2016). Business roles in the emerging open-data ecosystem. *IEEE Software*, 33(5), 54-59.
- Machi, L. a., & McEvoy, B. T. (2012). *The literature review - six steps to success*. Corwin Press Inc. <https://doi.org/10.1111/j.1365-2702.2009.02813.x>
- Maxwell, J. A. (2012). *Qualitative research design: An interactive approach*. SAGE Publications Inc.
- McNabb, D. E. (2016). *Public utilities: Old problems, new challenges*. Edward Elgar Publishing.
- Naturvårdsverket. (2018). Tillgängliggöra data och följa upp informationshantering. <https://www.naturvardsverket.se/Stod-i-miljoarbetet/Vagledning/Oppna-data/>. Retrieved on 2019-10-10.
- Nečaský, M., Chlapek, D., Klíma, J., Kučera, J., Maurino, A., Rula, A., Konecny, M., & Vanova, L. (2014a). DELIVERABLE D5.1 methodology for publishing datasets as open data.
- Nečaský, M., Chlapek, D., Klíma, J., Kučera, J., Maurino, A., Rula, A., Konecny, M., & Vanova, L. (2014b). DELIVERABLE D5.1 methodology for publishing datasets as open data. Documentation of practices.
- Nečaský, M., Chlapek, D., Klíma, J., Kučera, J., Maurino, A., Rula, A., Konecny, M., & Vanova, L. (2014c). DELIVERABLE D5.1 methodology for publishing datasets as open data. Master spreadsheet.
- Open Data Institute. (2021). The ODI. Open Data Institute; <https://theodi.org/>. Retrieved on 2021-03-08.
- Open Knowledge Foundation. (2020). Home. <https://okfn.org/>. Retrieved on 2021-03-08.
- ÖppnaData.SE. (2018). Skapa & publicera öppna data - den nationella portalen för öppna data och PSI. <https://oppnadata.se/skapa-publicera-oppna-data/>. Retrieved on 2019-08-27.
- Patton, M. Q. (2002). *Qualitative research & evaluation methods*. Sage Publications.
- Peppers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45-77.
- Petrou, I., Meimaris, M., & Papastefanatos, G. (2014). Towards a methodology for publishing linked open statistical data. *JeDEM-eJournal of eDemocracy and Open Government*, 6(1), 97-105.

- Safarov, I., Meijer, A., & Grimmelikhuijsen, S. (2017). Utilization of open government data: A systematic literature review of types, conditions, effects and users. *Information Polity*, 22(1), 1–24.
- Santos, H. D. A. dos, Oliveira, M. I. S., Glória de Fátima, A., Silva, K. M. da, Muniz, R. I. V. C. S., & Lóscio, B. F. (2018). Investigations into data published and consumed on the web: A systematic mapping study. *Journal of the Brazilian Computer Society*, 24(1), 1–22.
- SKL. (2017). Ramverk, öppna data - SKL.
<https://skl.se/naringslivarbetedigitalisering/digitalisering/digitaldelaktighetoppenhet/oppnadata/stodvagledning/ramverkoppnadata.1183.html>. Retrieved on 2017- 12-04.
- Södertälje. (2019). Södertäljes öppna data. <https://www.sodertalje.se/kommun-och-politik/formedborgare/oppna-data>. Retrieved on 2019- 08-26.
- Solar, M., Meijueiro, L., & Daniels, F. (2013). A guide to implement open data in public agencies. *International Conference on Electronic Government*, 75–86.
- Susha, I., Grönlund, Å., & Janssen, M. (2015a). Organizational measures to stimulate user engagement with open data. *Transforming Government: People, Process and Policy*, 9(2), 181–206.
- Susha, I., Grönlund, Å., & Janssen, M. (2015b). Organizational measures to stimulate user engagement with open data. *Transforming Government: People, Process and Policy*, 9(2), 181–206.
- Susha, I., Zuiderwijk, A., Charalabidis, Y., Parycek, P., & Janssen, M. (2015). Critical factors for open data publication and use: A comparison of city-level, regional, and transnational cases. *JeDEM-eJournal of eDemocracy and Open Government*, 7(2), 94–115.
- Swedish Innovation Agency. (2021). Välkommen till Vinnova, Sveriges innovationsmyndighet. Swedish Innovation Agency; <https://www.vinnova.se/>. Retrieved on 2021- 03-08.
- Tauberer, J., & Lessig, L. (2007). The 8 principles of open government data: [http://www. Opengovdata.Org/Home/8principles](http://www.Opengovdata.Org/Home/8principles). Retrieved on 2021- 03-08.
- The Swedish Parliament. (2010). Förordning (2010:1770) om geografisk miljöinformation.
https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-20101770-om-geografisk_sfs-2010-1770.
- Trafiklab. (2021). Trafiklab. <https://www.trafiklab.se/>. Retrieved on 2021- 03-08.
- Trafikverket. (2019). Härifrån kommer våra öppna data.
https://www.trafikverket.se/tjanster/Oppna_data/oppna-data-vi-erbjuder/harifran-kommer-data-trafikinformation-i-realtid/. Retrieved on 2021- 03-08.
- Västra Götalandsregionen. (2021). Västra Götalandsregionen. <https://www.vgregion.se/>. Retrieved on 2021- 03-08.
- Veljković, N., Bogdanović-Dinić, S., & Stoimenov, L. (2014). Benchmarking open government: An open data perspective. *Government Information Quarterly*, 31(2), 278–290.
- Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4(2), 74–81.

Weiringa, R. J. (2014). Design science methodology for information systems and software engineering. Springer.

Zuiderwijk, A., & Janssen, M. (2014a). The negative effects of open government data-investigating the dark side of open data. In G. P. Cid, S. P. Robertson, J. Zhang, & J. R. Gil-García (Eds.), Proceedings of the 15th annual international conference on digital government research (pp. 147-152). ACM Press.

Zuiderwijk, A., & Janssen, M. (2014b). Barriers and development directions for the publication and usage of open data: A socio-technical view. In M. Gascó-Hernández (Ed.), Open government (pp. 115-135). Springer.

Zuiderwijk, A., Janssen, M., Choenni, S., & Meijer, R. (2014). Design principles for improving the process of publishing open data. *Transforming Government: People, Process and Policy*, 8(2), 185-204.

Zuiderwijk, A., Janssen, M., Choenni, S., Meijer, R., & Alibaks, R. S. (2012). Socio-technical impediments of open data. *Electronic Journal of e-Government*, 10(2), 156-172.

Zuiderwijk, A., Janssen, M., & Davis, C. (2014). Innovation with open data: Essential elements of open data ecosystems. *Information Polity*, 19(1-2), 17-33. <https://doi.org/10.3233/IP-140329>

Zuiderwijk, A., Janssen, M., Meijer, R., Choenni, S., Charalabidis, Y., & Jeffery, K. (2012). Issues and guiding principles for opening governmental judicial research data. *International Conference on Electronic Government*, 90-101.

About the Author

Jonathan Crusoe

He is a doctoral researcher who studies open government data from an ecosystem and reform perspective. In his recently published doctoral thesis, he presents a framework for this purpose. His research is based on international collaborations involving multiple stakeholders.

Karin Ahlin

She defended her dissertation in 2020 at Mid Sweden University on a dissertation entitled "Benefits of Digital Technical Information". Previously, she worked in the IT industry for 25 years after her bachelor's thesis, mainly leading system development projects of economic processes and socially critical systems in the Swedish and European context. Her research area is information sharing and various aspects, such as the benefits of information sharing and theory formation around information sharing and the design of health applications.