RE-USE OF PUBLIC SECTOR OPEN DATA
- CHARCTERISING THE PHENOMENA

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Abstract

Despite the growing number of open data, re-use of this data is not reaching the expected levels and now this phenomenon seems hampered in its evolvement. Therefore, this study sets out to characterize the re-use of open data from public sector in order to increase our elaborate understanding of this practice, and does so by performing a literature review inspired by the processes for defining concepts, and contextualized within the historical evolvement of European open data policies. Apart from the identification of three main research approaches towards open data re-use and an elaborated definition of re-use, the findings led to the creation of a framework enabling us to see *open data re-use as an iterative value-creating process in two different contexts*, the public task context and the non-public task context. This process builds on three categories of meta-activities for re-use practice: 1) gaining access to and understanding data, 2) handling and re-purposing the data, and 3) creating broader value of data, as well as indications of value for whom. Lastly, implications of this re-use process and framework was discussed, along with implications of an identified practice-policy mismatch that risk hampering the future evolvement of open data re-use.

Keywords: open data re-use, open government, open data, PSI-directive

1. Introduction

The ICT enabled transformation of citizen's democratic right to government data and information, previously managed primarily in paper formats and by specific information requests, has led to the idea and realization of the very same data being open in digital formats and accessible for immediate use by citizens. 'Open' in this sense has been defined as "*Open data and content can be freely used, modified, and shared by anyone for any purpose*" (Open Knowledge, 2016). As such, it has brought on broad changes to the way public sector organizations are handling their data and information, e.g. adjusting policies to account for changes in working processes and technical systems (Zuiderwijk, Janssen, 2014), finding ways to shift from business models based on trading data to making it open and free (Peled, 2011), and to align archiving and record management to a new openness agenda (Borglund, Engvall, 2014). This change is described as a transformation where most focus has been on the technical data aspects rather than on the social aspects of use (Jaeger, Bertot, 2010, Davies, 2010, Zuiderwijk, Janssen & Dwivedi, 2015). Based on arguments related to

the current immaturity of open data and the importance and necessity of primarily getting data 'out there' on the web, the aspect of the re-use of open data is still under-researched and largely undefined (Barry, Bannister, 2014). In general, research shows that we have limited insights about the stakeholders related to open data (Gonzalez-Zapata, Heeks, 2015), while reports about various re-use barriers keep piling up (Afful-Dadzie, Afful-Dadzie, 2017, Bachrach, 2009, Dawes, Pardo & Cresswell, 2002, Gascó-Hernández et al., 2018, Jaeger, Bertot, 2010, Janssen, Charalabidis & Zuiderwijk, 2012, Ruijer et al., 2017, Smith, Sandberg, 2018, Zuiderwijk et al., 2012, Whitmore, 2014). Also, even if rather large amounts of open data are getting increasingly accessible, the re-use of open data still falls short of producing sustainable impact (Juell-Skielse et al., 2014) and is not reaching expected levels of use (Zuiderwijk et al., 2015b).

The reasons for the low levels of insights about open data re-use can partly be explained by the challenge of investigating users and use effects in early stages of ICT developments when the real users are few. However, it might also stem from interests that favour the initiation and future possibilities of new technologies rather than the fine-tuning of the user aspects. From a historical point of view, information systems development has been described to have a tendency to concentrate "*on specific aspects of the system, project, or organization with little attention to how the system is used and whether the users are pleased with the outcome*", while failing to adhere to demands for "*evaluating success from the user's perspective*" (Petter, DeLone & McLean, 2012, p. 354). In the case of open data, research has shown that the main interest of open data managers is the economic potential to reduce costs and create jobs in the private sector, leading to "*a considerable gap between such expectations and current realities*" (Barry, Bannister, 2014, p. 129) causing problems for the realization of open data re-use. To deal with this, arguments for increasing the understanding of the public value and use of open data has emerged (Bannister, Connolly, 2014, Dawes, Helbig, 2010, Evans, Campos, 2013). Then again, open data has been found to be "*one of those expressions that is often used without being defined … [e]ven where it is defined, definitions are sometimes loose or vague*" (Barry, Bannister, 2014, p. 129); akin to the view that open government data is still in the process of a "*continuous renegotiation over its meanings and practices*" (Charalabidis, Alexopoulos & Loukis, 2016). Arguably, since re-use of open data is a subset of all the endeavours aiming to create valuable outcomes of the realization of open data, re-use as a concept can also be seen to be vague in its form and content and in need of defining and characterizing measures.

Hence, characterizing the phenomena of re-use of open data from public sector, not only contributes to important knowledge about of open data practice, but also has bearing on our scientific knowledge and efforts to remain objective towards the object of study. Bellamy and Taylor (1998) argues in their work about governance and the information age that the field itself suffers from a technological determinism that often leads to both utopian as well as dystopian images of the future, which can serve as a foundation for not seeing the complexity and relying on too easy images of the future possibilities, but which are "*not useful for academic research, however, if it serves to pre-form our scholarly thinking*" (p. vi.). They argue that we need to take a closer look at the human interactions at stake if we are to understand the changes brought about by the information society, in this case the opening up of government data (Bellamy, Taylor, 1998). And a current technological deterministic approach within the open data area has been pointed out as the reason for relying on assumptions about the goals of

open data re-use (Worthy, 2015). Moreover, because open data as a resource rests on a democratic foundation due to the relation with freedom of information legislations (Janssen, 2011, Janssen, 2012), it is arguable also important to properly characterize the re-use of open data since it enables citizens right to access data and information from public sector. There is no point in aiming for open data if it is not being used, and to be able to support that progress, we need to fully understand the concept.

Therefore, this study sets out to characterize the phenomenon of re-use of open data from public sector in order to increase our elaborate understanding of this practice, a knowledge that could enhance the possibilities for addressing the challenges of the slow uptake of open data. Hence, this paper is structured accordingly. First a background to the history and legal frameworks behind re-use of open data is provided. Secondly, the chosen literature review method, using an analytical framework inspired by creating definitions, is described. Third, the results from the study are presented, which are then used for formulating a framework for re-use of open data as part of a larger discussion on implications related to re-use of open data. At the end, some concluding remarks are made together with some suggestions for future research on open data re-use.

2. Background to re-use of open data in EU

In order to better understand todays situation of open data re-use, a background to the emergence of open data re-use is important for contextualizing the phenomena.

2.1. Historical background to open data re-use

In Europe, the legal framework for open data emerged from an aspiration in the late 1980s to increase the European position in the emerging international information market and thus targeted the information industry (Janssen, 2011). Early economic estimations of the open data potential also mainly focused on private firms in the IT-industry, or the "*major players in the content industries*" (PIRA International, 2000, p. 12), as it was called before content creation was opened up through the emergence of the mobile application's business model. Since then, strategic EU reports about open data primarily covers the aspect of IT-skilled people and companies (Berends et al., 2017, Carrara, Fischer & van Steenbergen, 2015, Carrara et al., 2015, Dekkers et al., 2006, OECD, 2006, Vickery, 2011). In the first PSI-directive, the targeted re-users were stated to be "*small emerging companies*" (European Union, 2003, p. 90), which later was amended to a looser concept of service developers: "*This rapid technological evolution makes it possible to create new services and new applications*" (European Union, 2013, p. 1). Voices have been raised towards this strategic way of defining the re-users arguing, "*data is not just for developers*" (Davies, 2010, p. 5), and that open data efforts should take a broader use perspective (Dawes, Helbig, 2010), although the European focus also does acknowledge perspectives such as citizen's participation, scientific progress and aiming to address broad societal challenges (European Commission, 2011). However, critical researchers argue that specific strategies for re-use should not be intertwined with the legal foundations of open data (Cerrillo-i-Martínez, 2012).

2.2. The legal framework – The PSI directive

The conditions for open data re-use is formalized in the EU directive "*on the re-use of public sector information*", also called the PSI-directive, (European Union, 2003, p. 90,

European Union, 2013). This directive sets re-use of open data in relation to three broad perspectives. First, the citizen's democratic right to information, which in many countries are defined as laws regulating citizens 'freedom of information' (FOI) rights. That is, information that is covered by the FOI-regulation of each member state is the same information that could be available for re-use, and thus sets the legal boundaries for what constitutes possible open data re-use (Janssen, 2011). Hence, open data can be seen as a resource to which all citizens (in countries that has laws enabling citizens right to information) have legal rights. Secondly, the PSI-directive also includes outspoken priorities (Cerrillo-i-Martínez, 2012) for re-use of open data. In the directive, the drivers are mainly contextualized for an internal market and taking a clear economic perspective (Zuiderwijk, Janssen, 2014), particularly towards new service innovation (Lourenco, 2016). Arguments has been put forward stating that this approach holds a technological deterministic way of enabling re-use, and that demands for a broader and more long-term holistic perspectives need to be taken (Bannister, Connolly, 2012). Also, calls for a more nuanced discussion on the democratic aspects has been put forward (Hansson, Belkacem & Ekenberg, 2015, Jaeger, Bertot, 2010). Lastly, the emergence of re-use of open data is related to the emergence of a broader open government discourse, aiming to increase government transparency and enable citizen's participation in governmental affairs (European Union, 2013).

2.3. Defining re-use of open data in legal terms

In a more practical sense, the directive defined actual re-use as an activity in relation to the use of public sector information undertaken by public sector employees to fulfil their public task: "*Public sector bodies collect, produce and disseminate documents to fulfill their public tasks. Use of such documents for other reasons constitutes re-use*" (European Union, 2003, p.90); thus, re-use is seen as a form of secondary use of public data. However, when extending the scope for re-use in the amended directive (European Union, 2013), the directive also includes specific use situations where public sector employees can act as re-users; when they go beyond performing the public task, e.g. to provide public sector information for pure commercial reasons following market rules. That is, re-use in this governmental context, is an activity that enables citizens and public sector employees to use public sector data for purposes that go beyond what is defined as the public task.

2.4. The EU data value chain

The idea of the re-use process within the European Union has largely been influenced by one of the first consultancy reports on the commercial potential of PSI, which then was presented in a technically oriented data value chain (PIRA International, 2000). This value chain consisted of the data centred activities: data creation, collection and storage, processing and packaging, and delivery. However, at this time no clear boundaries for what actually constituted re-use and what was part of the public task was clearly defined. This process was later picked up and slightly altered in a number of on-following reports that informed the EU policies (Dekkers et al., 2006, OECD, 2006, Vickery, 2011), and together with a broader focus on data such as big data (DG Connect, 2013), now forms the base of what today is the promoted process within the European Union, via reports from the European Data Portal (Berends et al., 2017, Carrara et al., 2015). Today, this process has kept a strong focus on the data itself and includes the activities: data creation, data validation, data aggregation, data analysis, data services and products, and aggregated services. Also, in these EU-reports, the developers of applications (often mobile) are the only ones clearly named re-users,

while the rest of the potential re-users are bundled together under the label 'enrichers' (Berends et al., 2017, Carrara et al., 2015).

3. Method

In order to characterize open data re-use, the chosen method is a literature review of research about re-use of open data, which is inspired by principles of how a definition is set up. Defining a phenomenon is a known and fruitful way forward to reduce ambiguity. Recently, literature reviews that aims to overview and structure open data research has emerged (Charalabidis, Alexopoulos & Loukis, 2016, Hossain, Dwivedi & Rana, 2016, Zuiderwijk et al., 2014a, Zuiderwijk et al., 2014b) and also more specifically targeting the utilization of open data (Safarov, Meijer & Grimmelikhuijsen, 2017). These kinds of broad literature reviews are described as contributing with a summary of the prior research and to clarify the main research areas within the fields as a whole (Rowe, 2014). While these literature reviews give us a broad understanding of the area as such and in which way it has evolved, they do not examine particular questions in detail. Compared to the above studies, this literature study rather takes a narrower path, aiming to characterize the phenomena of re-use of open data from public sector. Also, this study brings an overview of the current literature related to open data re-use in order to form a clear representation of the insights which is considered key elements of any literature review (Rowe, 2014).

The European PSI directive (European Union, 2003, European Union, 2013) context is also used for forming an understanding of the historical policy background related to re-use of open data, while still acknowledging cases of re-use from other parts of the world since the phenomena as such is global. However, the European open data polices are found to share key concepts and goals as the US open data policies (Lourenco, 2016). Exploring the depth of a specific concept, and in particular key defining characteristics that sets the boundaries for studying this certain unit of analysis is deemed important for any qualitative research (Miles, Huberman, 1994).

The literature review process for this endeavour can be described as the results of a longer research on open data re-use as a phenomenon, where complementary literature searches has been undertaken to systematize the review. The process of identifying the relevant literature has consisted of multiple approaches to outline the scope of documents to be included in the study (Webster, Watson, 2002). This process is described in Table 1, while the list of research papers used in this analysis, in total 77 papers, can be found in Table 3. Performing a literature review in this way, not starting from scratch but from an existing collection of papers, obviously has some limitations that needs some attention. One limitation is that the existing papers might have been collected or found with a somewhat different purpose or interest than that of this paper or is subject to the author's own bias. However, in this case, the author has had a long-term interest to investigate and understand open data usage in broad terms, and especially to look beyond the often-prioritized ICT-community. Yet another limitation is the focus on the term 're-use' and 'open data' in various forms, which might exclude authors that writes about this phenomenon in more general terms of 'data use'. This might be especially the case for open data users that takes no interest in the fact that this data originates from public sector. It would be interesting for future researchers to more thoroughly include this broader and more difficult search.

Table 1: The process for identifying and selecting documents

Setting criteria's for including and excluding literature	• The research papers must have a clear focus on the practice or concept of re-use of public data in open formats going beyond e.g. analysis of number of downloaded data, studies of open data initiatives leading to possible re-use of open data, or papers with a main focus on the development of technologies related to the re-use of open data. • Only journal articles of conference papers are included. • Very similar papers from the same author have been reduced to the most relevant paper for this study.

Searching for documents that fits the criteria's	• The authors own collection of open data articles from previous research endeavours on the re-use of open data between 2012 and 2017 was searched through to form a base for this paper. These articles, in total 67 papers, has been found using a variety of search methods over the years:
	     o Searches on "re-use" in mainly Scopus.
	     o Publications from authors with a known interest for the open data re-use process have been investigated.
	     o Forward and backwards searches (Webster, Watson, 2002) has been conducted on papers with a clear focus on the re-use of open data.
	     o Special issues on e.g. open government or open data has been searched.
	     o A number of journals with a known interest in publication of open data papers has been followed, e.g. Government Information Quarterly and Information Polity.
	     o Special searches for articles focused on open data and typical user groups (such as developers, journalists and researchers) have been done.
	 • A complementary search was done in the Scopus database searching for the phrases "re-use" and "reuse" in the title or author keywords, in combination with the phrases "open data", open government data", or "public sector information" in the title, abstract or keywords. In total, 13 individual documents were found relevant for this study, whereof 10 were not part of the previously found papers. The total result per search term:
	     o 'Open data' + 're-use'/'reuse': 72 papers, of which 12 were relevant.
	     o 'Open government data' + 're-use'/'reuse': 15 papers, of which 4 were relevant.
	     o 'Public sector information + 're-use'/'reuse': 29 papers, of which 1 were relevant.

For the analysis of the documents, it was deemed important to understand what good characterizations are made up of, and here the basis of a definition was used as guiding framework. Definitions are generally known for being a central part of forming valid scientific theories and knowledge, and are a way of describing and understanding contemporary phenomenon (Hartman, 2004).

According to Hartman (2004), a definition generally requires two different notions to be valid for scientific use. First, it is important that the scope of the defined term is correct and not too broad or too narrow. Setting the boundaries for what should be included as well as excluded from the definition, and the concept, is therefore vital. Secondly, it is important to make sure that the definition is not vaguely formulated but rather precise in its description and specifications of its given boundaries and meaning. If a definition is too vague or unspecified, not only is it difficult to understand the concept in question, but it also hampers attempts for justification of theories related to the defined concept. So, when setting up a definition, these two entities must be given thoroughly attention, and it's common that definitions of abstract or new concepts are created with the use of 'other words'; a process where the concept is divided into different defining elements which also functions as sufficient conditions for the concept (Hartman, 2004). That is, the different elements of the definitions must be true for all cases that fall under the concept that is to be defined. Moreover, from a research ethic point of view, definitions are also seen as not only being constituted of facts or proposals from meta structures, such as public policy generating organizations, but also from what is perceived as real by people affected by the phenomena that is to be defined (Eliasson, 1995).

Since this study uses the process for defining concepts as an inspiration for categorizing the concept of open data re-use in order to counteract the perceived ambiguity with this contemporary phenomenon, three areas of analysis have been identified as especially important, see Table 2 for an outline and arguments.

Table 2: Areas of analysis and correlating arguments

Area of analysis	Arguments for analysis	Section
Identifying research approaches to the re-use of open data	This clarifies how people writing about open data re-use and thereby being affected it, perceives this phenomenon, as well as its foundation and important perspectives. Understanding current research approaches is also generally valuable for getting an overview of the research area for future research.	See 4.1.
Categorizing the re-use activities	This minimizes the vagueness of open data re-use by clarifying what specific actions are perceived as being included in the concept. Also, by elaborating on these categories, we also increase our understanding of the nature of re-use of open data and related implications.	See 4.2.
A definition of open data re-use	This brings together findings related to how open data re-use is perceived, its foundation, and related perspectives, with the identified and clarifying general descriptions of included activities and clarifying descriptions. Formulating a definition also enables better possibilities for future justification of theories related to the open data re-use phenomenon.	See 4.3.

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In order to contextualize the phenomena in broad terms, and thus following a hermeneutic research tradition of acknowledging the social and historical context of social phenomenon (Hartman, 2004), a historical background to the emergence of open data re-use in Europe was also provided in order to enable a more valuable discussion about the phenomena and possible future implications.

4. Results - Characterizing open data re-use

This section investigates the characteristics of open data re-use and aims to increase our general understanding of the concept by looking at the phenomena from different angles. First, a base is set by investigating current research approaches towards re-use of open data, from which we can learn high-level characteristics for re-use and then later base a discussion on future research on. Secondly, the scope and boundaries of open data re-use is investigated in order to further understand how re-use is carried out and how different types of re-use can be characterized. Lastly, a definition of open data re-use is suggested based on the previous sections.

4.1. Identifying research approaches to the re-use of open data

The perspective by which open data re-use is studied is of importance for the characterizing of the concept for re-use of open data since it increases our understanding of important aspects and elements. This section is also important for understanding important roads forward for future research. Hence, the identified papers about open data re-use were characterized based on their research aim. From this, three high-level research approaches were found and outlined, see Table 3 for included papers in each approach. In addition to differences in overall research aim, the research papers could also be seen to be divided into three types of research approaches related to their data: 1) papers based on a literature review or conceptual papers, 2) papers based on data from constructed re-use situations or experiments, and 3) papers based on data from real re-use situations. This additional categorization enables us to form an insight about their research foundation and how close the research contributions are to the real practice of re-use.

Table 3: *Categorization of current research focused on open data re-use*

Research aim	Research approach
Understanding open data re-use from an open data process perspective [33 papers]	**Literature reviews & conceptual papers [4]:** (Chan, 2013, Evans, Campos, 2013, Jaeger, Bertot, 2010, Kucera, 2017, Zuiderwijk, Janssen & Davis, 2014)
	Data from constructed re-use situations or experiments [7]: (Conradie, Mulder & Choenni, 2012, De Mendonça, Maciel & Viterbo, 2015, Gavrilis, Ioannides & Theofanous, 2015, Henninger, 2017, Iemma, Morando & Osella, 2014, Ruijer et al., 2017, Saxena, 2018a, Zuiderwijk, Janssen & Susha, 2016, Zuiderwijk et al., 2015b)
	Data from real re-use situations or real re-users [17]:(Afful-Dadzie, Afful-Dadzie, 2017, Arcidiacono, Reale, 2016, Benitez-Paez et al., 2018, Cuca, 2016, Davies, 2010, Dawes, Helbig, 2010, Gascó-Hernández et al., 2018, Graves, Hendler, 2014, Hellberg, Hedström, 2015, Janssen, Charalabidis & Zuiderwijk, 2012, Jetzek, Avital & Bjorn-Andersen, 2014, Martin, 2014, Raman, 2012, Susha, Grönlund & Janssen, 2015, Zuiderwijk et al., 2012, Zuiderwijk, Janssen &

	Dwivedi, 2015, Zuiderwijk et al., 2015a, Zuiderwijk, Jeffrey & Janssen, 2012, Worthy, 2015)
Understanding opportunities and challenges of re-use of open data in various application areas [29 papers]	**Literature reviews & conceptual papers [3]:** (Bachrach, 2009, Bazilian et al., 2012, Beale, 2012) **Data from constructed re-use situations or experiments [4]:** (Johansson, Lassinantti & Wiberg, 2015, Sirkiä et al., 2017, Warsta et al., 2017, Whitmore, 2014) **Data from real re-use situations or real re-users [15]:** (Abella, Ortiz-de-Urbina-Criado & De-Pablos-Heredero, 2015, Anonymous, Rufat, 2015, Ayre, Craner, 2017, Bezuidenhout et al., 2017, Brandt, de Boer, 2015, Cutcher-Gershenfeld et al., 2016, Desouza, Bhagwatwar, 2012, Donaldson, Martin & Proffen, 2017, Eckartz, van den Brock & Ooms, 2016, Giovani, 2017, Hielkema, Hongisto, 2013, Hjalmarsson et al., 2014, Khayyat, Bannister, 2017, Lassinantti, Ståhlbröst & Runardotter, 2019, Linders, 2013, Murray-Rust, 2008, Ruijer, Grimmelikhuijsen & Meijer, 2017, Sands et al., 2012, Saxena, 2018b, Smith, Sandberg, 2018, Specht et al., 2015, Yoon, Copeland & McNally, 2018)
Understanding the broader societal transformation based on open data re-use [15 papers]	**Literature reviews & conceptual papers [11]:** (Bannister, Connolly, 2011, Cerrillo-i-Martínez, 2012, Gurstein, 2011, Harrison et al., 2012, Janssen, 2012, Maguire, 2011, Maier-Rabler, Huber, 2011, Margetts, 2011, Marsh, 2011, Meijer, Curtin & Hillebrandt, 2012, Smith, Seward, 2017) **Data from constructed re-use situations or experiments [0]:** - **Data from real re-use situations or real re-users [3]:** (Arcidiacono, Reale, 2016, Baack, 2017, Bates, 2012, Rudmark, Arnestrand & Avital, 2012)

4.1.1. Understanding open data re-use from an open data process perspective

The first and most frequent approach is '*Understanding open data re-use from an open data process perspective'*, which in different ways evolves around the key aim of making the opening up process more prominent and effective. Understanding open data re-use is here seen as a driver for motivating public organizations to open up more data, and as a support for policy making that enables possibilities for more data. Examples are efforts of improving open data related ICT solutions (Gavrilis, Ioannides & Theofanous, 2015, Iemma, Morando & Osella, 2014, Zuiderwijk, Janssen & Susha, 2016), experiments where non-users such as e-government experts and policymakers elaborate on re-use (Zuiderwijk et al., 2015b), reflections on the success of open data initiatives and how re-use is enabled (Chan, 2013, Saxena, 2018a), or conducting studies of re-use to improve our understanding of open data (Dawes, Helbig, 2010, Hellberg, Hedström, 2015, Jetzek, Avital & Bjorn-Andersen, 2014). Another common focus is to identify various barriers and factors important related to open data use (Benitez-Paez et al., 2018, Dawes, Helbig, 2010, De Mendonça, Maciel & Viterbo, 2015, Donaldson, Martin & Proffen, 2017, Gascó-Hernández et al., 2018, Graves, Hendler, 2014, Henninger, 2017, Jaeger, Bertot, 2010, Kucera, 2017, Martin, 2014, Raman, 2012, Ruijer et al., 2017, Susha, Grönlund & Janssen, 2015, Zuiderwijk, Janssen & Susha, 2016, Zuiderwijk et al., 2012, Zuiderwijk, Jeffrey & Janssen, 2012, Zuiderwijk, Janssen & Dwivedi, 2015). Even though this group does not display a unified front regarding the exact definition of re-use, the majority uses the concept of *re-use*.

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4.1.2. Understanding the opportunities and challenges of open data re-use in various application areas

The second approach is '*Understanding the opportunities and challenges of open data re-use in various application areas*', which compared to the previous group is situated within a certain application area of use rather than in the open data process. Even though the application areas consist of different branches such as chemistry, public transport, energy, archaeology, astronomy, open innovation, bio-tech, journalism, environmental science or the military industry, they centre around the idea of using open data to excel their particular branch or area. Here, researchers investigated how open data could be used to create business advantages (Abella, Ortiz-de-Urbina-Criado & De-Pablos-Heredero, 2015, Whitmore, 2014), leverage international aid work (Brandt, de Boer, 2015, Linders, 2013), or improve current work with water management (Sirkiä et al., 2017, Warsta et al., 2017). Moreover, attempts were made to understand innovation processes (Eckartz, van den Brock & Ooms, 2016, Hielkema, Hongisto, 2013, Hjalmarsson et al., 2014), intermediary's role for increasing open data use in local communities (Yoon, Copeland & McNally, 2018), or how democratic insights could be reached (Anonymous, Rufat, 2015, Ruijer, Grimmelikhuijsen & Meijer, 2017). Research also reveals that various types of open data re-users often align in their ambition towards the same goals and application areas (Lassinantti, Ståhlbröst & Runardotter, 2019). Scientists in particular argued for the potential of using open data to solve their existing research problems (Bachrach, 2009, Bazilian et al., 2012, Beale, 2012, Bezuidenhout et al., 2017, Donaldson, Martin & Proffen, 2017, Murray-Rust, 2008, Sands et al., 2012, Saxena, 2018b, Specht et al., 2015) or addressing 'grand challenges' as in science related to seeing the earth as a system (Cutcher-Gershenfeld et al., 2016). Notably, many of these scientists often included their own publication of open research data in their quest for using other types of open data. On the whole, even though most of the application areas were seen to fall outside the public sector context, there are also those that align with public tasks, such as water management and enhancing democracy. Compared to the first research approach, this group is less prone to articulate the re-use of open data as *re-use*, many talk about data use, which not necessarily need to be open data from public sector organizations, but can also include data from other sources.

4.1.3. Understanding the broader societal transformation based on open data re-use

Lastly, the final research approach, '*Understanding the broader societal transformation based on open data re-use',* extends from an interest in the societal transformations and the effects on citizens due to the current emergence of the open data phenomenon. Even though practical re-use might not be the focus of attention, a broad re-use of open data is the state that acts as a prerequisite for the research efforts. Most of these papers are drawn towards including a degree of political arguments, aiming to reflect on current high level strategies and operational approaches undertaken that relates to open data; hence forming an on-going discussion about possible societal effects of open data and the broader societal transformations it leads to. Research focuses on various areas such as possible democratic implications (Cerrillo-i-Martínez, 2012, Maier-Rabler, Huber, 2011, Meijer, Curtin & Hillebrandt, 2012) and especially based on a lack of focus on public values (Harrison et al., 2012). Closely related is research that question if open data only empowers the already empowered (Gurstein, 2011), or if the current dominance of the ICT-sector as re-users implies a shift in power from trusting

governments to trusting 'tekkies' (Margetts, 2011). A study of open data activists in Italy, centres on citizen's increasing participation and collaboration with public sector organizations (Arcidiacono, Reale, 2016). Compared to the other research approaches, this group is focused on the broad effects of open data usage and societal change whether it is called data use or re-use.

4.2. Categorizing the re-use activities

Understanding the scope and boundaries of the re-use process of open public sector data is a necessary insight if we are to characterize and define the concept of open data re-use. By investigating the scope and boundaries of open data re-use activities that was perceived as being included in the concept, three broad meta-activities were identified. These broad areas of activities were also seen not to function in a one-way direction process, but rather as areas of activities that the re-users went back and forth between in an iterative manner during the overall re-use process (Anonymous, Rufat, 2015, Dawes, Pardo & Cresswell, 2002, Reggi, Dawes, 2016, Specht et al., 2015).

4.2.1. Gaining access to and understanding the data

In this spectrum of activities, re-use centres around getting access to the data and understanding what it says and how it can be used, setting an exploratory touch to the re-use while not changing the data in any way. The outcome of the re-use here can be seen to be general knowledge and understanding, primarily giving value to the user itself. The contextualization here is very much that of the originating public sector use of the data.

Gaining access to data is described as physical access to the data (Jaeger, Bertot, 2010), in which access to computers, Internet and supportive technology such as software is needed (Bezuidenhout et al., 2017, Gurstein, 2011, Jaeger, Bertot, 2010, Raman, 2012). Generally, access to open data is seen as the basis for transparency (Marsh, 2011), and together with possibilities for participating in the public discourse, this is seen to empower citizens by their legal rights to data (Harrison et al., 2012). Knowing how to search in data portals is yet a challenge, since many new users prefer to start their searches at Google instead (Henninger, 2017) or are even unaware of the existence of open data (Afful-Dadzie, Afful-Dadzie, 2017). When data is located, the users perform activities such as downloading and storing the data (Graves, Hendler, 2014), registration of a personal account (Janssen, Charalabidis & Zuiderwijk, 2012) and choosing appropriate data formats (Whitmore, 2014). However, just having access to data is not enough for re-use, since being able to understand and interpret the data is seen as an essential key for enabling value creating re-use (Bannister, Connolly, 2011, De Mendonça, Maciel & Viterbo, 2015, Evans, Campos, 2013, Margetts, 2011, Specht et al., 2015, Zuiderwijk et al., 2012, Worthy, 2015). For example, reading the metadata in order to get a grip of the data content and characteristics is a known activity for understanding the data (Specht et al., 2015, Zuiderwijk, Jeffrey & Janssen, 2012, Whitmore, 2014). In some cases, visualizations of the data are also provided to enhance understanding (Graves, Hendler, 2014). Jaeger and Bertot (2010) has labelled this ability as user's intellectual access to data, and Raman (2012) sees this as a matter that often separates poor and less resourceful people from those with better education and stronger financial background. In line with these arguments, Margetts (2011) also points to the challenges for common people to use open data, since all citizens will not have the technical skills to interpret the open data, and argues that the access to

intermediaries which can interpret the data, will be a key issue for enabling a broad benefits of open data re-use.

Moreover, in order to create an understanding of the data, different forms of collaborations were also noticed; users are seen to have a dialogue and collaborate with both data publishers (Gascó-Hernández et al., 2018, Khayyat, Bannister, 2017, Reggi, Dawes, 2016), and with other data users (Yoon, 2018) in order to contextualize the original data. Generally, this phase matches the description of retaining the data as your own by keeping copies of the data (Smith, Seward, 2017).

Table 4: Summary of 'Gaining access to and understanding the data'

Prerequisites for use	Physical access to computers, internet, proper software for reading data and sometimes a registered account. Basic computer skills for understanding e.g. different kinds of data formats and search techniques.
Examples of re-use	- Downloading, storing and retaining the data - Interpreting, analysing, and contextualizing the data and its provided metadata and additional visualizations of the data - Collaborating with both other data users and with data provides in order to understand the data
The open data context	Here the data remains unchanged and mostly in its original context, even though data searches and understanding are influenced by the re-users aim with using the data.
Value outcome of re-use	Re-use creates knowledge and insights, which leads to value and empowerment to the re-user and their collaborating peers.

4.2.2. Handling and repurposing the data

Within this meta-activity, users are seen to take on a more practical data use, and to handle and change the data in different ways in order to fit their intended use. This re-use of open data can relate both to the original public sector context but also for a completely new context. Here, the re-use of open data is mainly centred on what they want to use the data for, while primarily creating value for themselves and their peers.

Among users of open data, a lot of attention is given to activities that lie beyond gaining access to and understanding the data. Within open data use in science, the need to "*adopt, adapt, and combine*" (Bazilian et al., 2012, p. 149) data to the integration, synthesis, and analysis of data is seen as key activities when aiming to create specific research outcomes from open data (Specht et al., 2015). Other users exemplify more data wrangling activities such as verifying and complementing data, aggregation into databases, linking data, making simulations, mashups and visualizations (Brandt, de Boer, 2015, Dawes, Helbig, 2010, Graves, Hendler, 2014, Murray-Rust, 2008). Important to notice is that open data often is combined with data from other sources than public data portals (Specht et al., 2015, Susha, Grönlund & Janssen, 2015, Zuiderwijk et al., 2015a). There are also cases where the improvement of the data becomes both the end result for developers as well as the mean for sharing the improved data with other people so that they will have better chances of creating something useful and valuable (Dawes, Helbig, 2010). Also, in their elaboration of the social aspects of openness, Smith & Seward (2017) pictures open data re-use as activities relating to

revising the data by redesigning, versioning, contextualizing it, or repurposing it, as well as remixing the data by combining it with other data, or sharing your versions with peers. However, it is stressed that this phase does not only require the data users to have necessary ICT skills for handling data wrangling software (Graves, Hendler, 2014), but also that you need to understand the new context that the data is intended to be used in (Brandt, de Boer, 2015, Reggi, Dawes, 2016). Hence, this leads to situations where the re-users need to understand either the public sector context, if their use falls within that context, or other contexts, if the data is to be used for other purposes than what relates to the public task.

Like in the previous meta-activity, collaborations aiming to enhance and handle the data take place, however with more focus on working together with other open data users (Baack, 2017, Hjalmarsson et al., 2014, Linders, 2013, Reggi, Dawes, 2016, Specht et al., 2015).

Table 5: Summary of 'Handling and repurposing the data'

Prerequisites for use	Access to software for handling and wrangling data, as well as storage capacity for the data. ICT skills to handle data wrangling and data visualisation software.
Examples of re-use	- Improve the structure or presentation of the data, by e.g. visualizations or cleaning the data. - Combining the data with other data, or separating the data into smaller entities. - Standardize data from different sources - Sharing data with peers - Collaborating with peers
The open data context	Here the data is changed to better fit the new purpose and context.
Value outcome of re-use	Re-use creates not only knowledge, but also leads to better possibilities for leveraging the open data towards future outcomes, and thus empowers the re-user and their collaborating peers.

4.2.3. Creating broader value with open data

Within this meta-activity, the re-use of open data takes on a more direct focus on creating value for a broader audience by using data for developed solutions and entities that are directed towards end-users. As with the previous meta-activity, this re-use can relate to both the original public sector context of the data but also for a completely new context. Here, the re-use activities centres on using data for reaching other people, thus creating value both for the end-users and for themselves.

In this phase, the prepared and contextualized open data are embedded into broader frames. For example, data mash-ups and visualizations are often natural elements of journalistic stories (Anonymous, Rufat, 2015, Baack, 2017, De Mendonça, Maciel & Viterbo, 2015, Graves, Hendler, 2014), part of mobile applications or webpage services (Cuca, 2016, Desouza, Bhagwatwar, 2012, Eckartz, van den Brock & Ooms, 2016), as well as part of the results from open data use in research (Bazilian et al., 2012, Specht et al., 2015). Data has also been seen to be shared 'as is', but then framed by new or

improved channels for data access or functionality such as an API (Davies, 2010, Smith, Seward, 2017). However, framing e.g. visualizations or other data constructs in order to create value for others, not only requires technical skills for analysing and developing the data, but also knowledge related to the specific application area, e.g. chemistry, transport or archaeology. More general skills like business skills (Giovani, 2017, Jetzek, Avital & Bjorn-Andersen, 2014, Zuiderwijk et al., 2015a, Whitmore, 2014), analytic experience (Baack, 2017) or insights into the processes of participatory democracy (Harrison et al., 2012, Meijer, Curtin & Hillebrandt, 2012, Ruijer, Grimmelikhuijsen & Meijer, 2017) are also deemed important. 'Trained brains', critical thinking and linguistic skills are claimed to have the utmost importance for enabling leverage of open data use (Anonymous, Rufat, 2015), as well as having the knowledge of creating meaningful public discourses (Marsh, 2011).

Frequent engagement into different forms of collaboration and co-creation of the final outcome was seen between different people engaged in the open data re-use (Ayre, Craner, 2017, Conradie, Mulder & Choenni, 2012, Reggi, Dawes, 2016, Specht et al., 2015) but also collaborations with end-users (Brandt, de Boer, 2015, Reggi, Dawes, 2016). Yet another interesting aspect here is a number of examples of open data re-use situations which also incorporates the re-users in the role of becoming open data providers of their own data (Bachrach, 2009, Beale, 2012, Giovani, 2017, Linders, 2013, Specht et al., 2015), hence leading to an increased social praxis of openness.

Table 6: Summary of 'Creating broader value with open data'

Prerequisites for re-use	Access to software for analysing and developing data and related ICT skills. Also, skills and expertise from the targeted application area are important.
Examples of re-use	- Framing prepared and contextualized data into ready constructs such as services, journalistic articles, research results or democratic debates. - Collaborating and co-creating with peers and end-users around the open data construct. - Exercising complementary skills such critical thinking, linguistics, and business knowledge.
The open data context	Here the prepared and modified data is embedded in a broader frame and construct related to the new purpose of the data and its application area.
Value outcome of re-use	Re-use leads to empowerment of the re-users in their role as 'owners' of the open data construct, but also generates broad value to citizens and organizations in their role as end-users of the open data construct.

4.3. Defining the re-use of open data

In order to further characterize and enhance our knowledge about open data re-use, as well as enabling later justifications of theories related to this concept, efforts for defining open data re-use as a concept is made based on the two previous sections. Forming a definition brings yet another level of concretization and clarity by minimizing vagueness, even though stated definitions might change and evolve alongside the evolvement of the concept.

The first section of the definition aims to bring in the historical and legal context derived from the view on re-use as pictured in policy documents, which is considered important in hermeneutic research approaches when aiming to create understanding of social phenomenon (Hartman, 2004). This also sets specific boundaries for re-use of open data on a rather high level and incorporates the strong relation to the original public sector context as seen e.g. in the identified research approach towards the open data process. The second section aims to minimize vagueness about what specific activities are included in re-use and thus adheres from section 4.2, but is also given importance from the high number of research papers dedicated to understand the practice of re-use in different application contexts. This expands and clarifies situations for what should be considered re-use of open data. The last section of the definition is mainly influenced by the perspectives identified in the research approach that discussed open data re-use from a broader societal perspective, while often spotting important foundations and prerequisites for broad open data re-use. The definition of re-use of open data from public sector thus follows as outlined below.

Re-use of open data from public sector is when citizens use public data in open formats, data which was originally intended for addressing public tasks by public sector employees, for new purposes beyond the public task as well as for purposes that relate to the original public task.

Re-use of open data from public sector can be acted out in three complementary and independent areas; gaining access and understanding the open data, handling and repurposing the open data, and creating broader value for citizens and society based on open data.

Re-use of open data from public sector relies on democratic rights as well as technological foundations for data openness, and enables the empowerment of the re-users based on their physical and intellectual access to the data.

Hence, this definition aims to clarify and characterize the phenomena of re-use of data from public sector in open formats, also called open data, and does so by embracing the legal definitions, by acknowledging its scope and boundaries, as well as by acknowledging important foundations and the re-users' thresholds for effective open data use.

5. Discussion about re-use of open data

This study aimed at characterizing the phenomena of open data re-use in order to contribute to addressing the challenges of the slow uptake of open data. In this section, implications of the results are discussed and elaborated on.

5.1. Grasping the complexity of re-use of open data

When looking at the results from the literature review, it can be seen that one important matter to discuss is the repurposing of the open data from public sector, and the fact that this was done to target two broad and rather different contexts. First, re-use was seen to target various application areas such as energy efficiency, journalism or biotech,

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thus residing outside the public task contexts. Secondly, re-use also remained in a context that relates to the public task, focusing e.g. on public transports, accountability of public sector employees or enabling citizens to participate in public decision making. Moreover, it was seen that the three meta-activities for re-use created value in different ways, for different people and also in an iterative manner, thus also making it possible to better understand open data re-use. In order to enhance clarity about these complexities a framework is provided, see Figure 1.
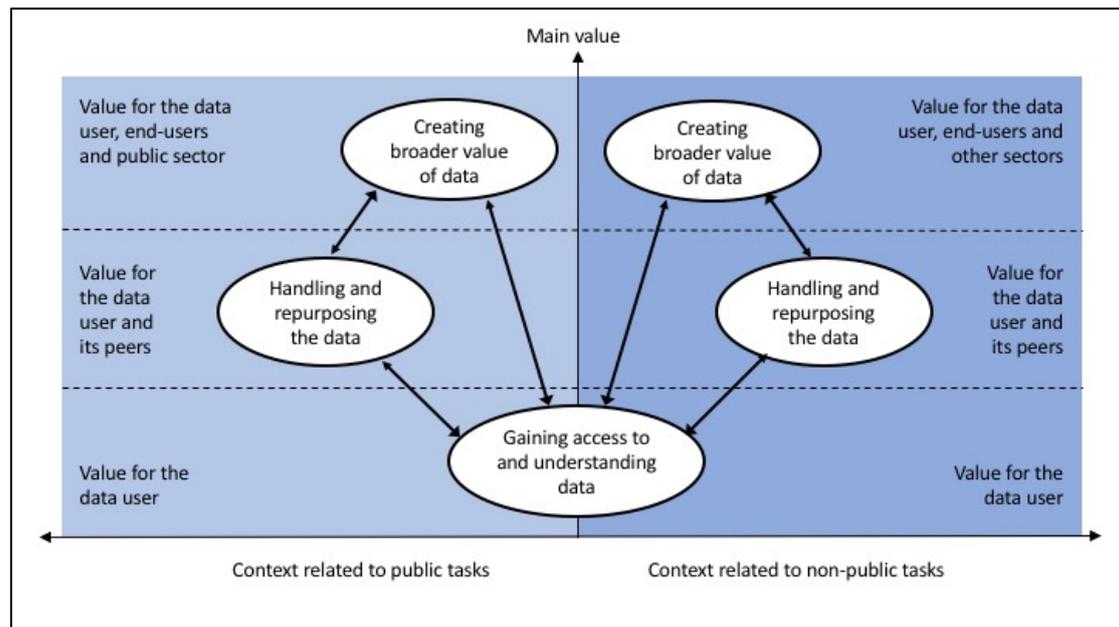

Figure 1. Open data re-use as an iterative value-creating process in two different contexts.

This framework clarifies open data re-use as an iterative process that is happening in two different contexts throughout three different meta-activities, which opens up for a discussion about some related implications.

5.1.1. Implications of the double context of open data re-use

Seeing open data re-use in the light of two different contexts opens up questions related to both how these types of re-use best can be supported, but also what the consequences of this might be. Starting with the former, it is clear that understanding the process of repurposing the open data becomes important. Because if the re-use focuses on a context that relates to the public context, the re-users is helped by increasing their knowledge of the public tasks, e.g. for understanding the processes in which citizens are allowed to participate in public decision making, so that their new take on it can be as efficient as possible. Or when creating solutions for public transports (e.g. new apps for real-time traffic information), they become co-creators of the public sectors attempt to enable efficient and appreciated transport infrastructures for their citizens. Altogether, re-use of open data in this context probably makes open data re-users dependent on a continuous dialogue with the public sector, which somehow creates a grey zone for the enactment of public tasks and the responsibilities that are connected to it. When re-users remain in public task context, it is arguably also easier for the data providers to form supportive measures for this kind of open data re-use since it somehow aligns with their own interests and knowledge.

When comparing to re-use in the contexts that resides outside the public task responsibilities, which requires understanding of processes and contexts in other application areas, the same need for a dialogue with public sector representatives will probably not be necessary. These re-users most likely will need to gain their expertise elsewhere. Also, it will probably be more difficult to support these re-users since this context and application areas does not fall under any public responsibilities. Nor is this kind of re-use as likely to cause debates relating to any grey zone of responsibilities towards the citizens. Hence, finding ways to both acknowledge and comprehend the effects of these two different contexts for re-use, and how they best can be supported and advanced, is arguably a challenge for the future.

5.1.2. Implications of generic re-use activities

The results also showed that some generic data activities could be seen, such as data analysis, data wrangling and data visualization. However, seeing these activities in the light of the three types of meta-activities, and in two contexts also brings forward some considerations. For example, it was clear that data visualizations often were spoken of in rather general terms such as that visualizations generally are an important aspect of re-use and that it increases the understanding of the data. However, when adding the three meta-types of re-use, it is clear that the issue visualizations are more complex and can be used for different purposes. One of those purposes (in 'Gaining access to and understanding the data') is to increase the understanding of data in the public task context, hence, the visualizations interprets the public sector context (if it has been provided by the data provider). Another purpose of visualizations is to enhance the value for the re-users during the repurposing process as well as the end-users of the final construct (may it be an app, a research result or a journalistic article) and is then interpreted and created from another context. By blurring these two scenarios, there is a risk that the opportunity to support re-users who aim for a non-public task context will have less support in understanding the data early in the process. This opens up questions concerning, and possibilities for, letting other people than data providers, early in the re-use process, have access to providing visualizations aiming for increasing the understanding of the data and its potential future use from various applications areas.

Another example here is the fact that many re-users did not only use open data from public sector, but mixed that that with other types of data from other sources (e.g. in 'Handling and repurposing the data'). Likewise, this also opens up questions concerning how to support users in these efforts and the challenge to not only support wrangling and analysis of data in formats that comes from a public sector context, but to go beyond that and provide generic support for these kinds of data activities.

5.1.3. Implications of value creation in different phases of re-use

Since it was seen that re-use of open data created value for not only the individual re-users, but also e.g. for peers participating and collaborating around that data, or for the end-users of the final 'construct', this also is also a matter to discuss. Knowing the history of open data in Europe, a lot of the focus concerning the value of open data has been placed in a broad economic perspective, often concerning the potential for commercial benefits and an increasing market growth. However, putting more focus on other values created during the process of re-use, such as increasing the comprehension and self-confidence in being able to handle and being creative with data is yet an important value, or like the value that comes from collaborating and learning around

open data while exercising skills like critical thinking, business knowledge or knowledge from particular expertise areas, are perspectives that risk falling short in the dominating economic discourse. And if these perspectives are downplayed, there is also a risk that people that are inspired and motivated by these values also fall short in trying to motivate a broad open data re-use. Hence, taking efforts to further explore and learn about what values are created, and for whom, is arguably an important way forward when aiming for ways to enhance the uptake of open data.

5.2. Putting a definition of re-use of open data to effective use

The derived definition of re-use of open data arguably comes with the challenge of understanding how and why it creates any benefits, and for whom. Since it was boiled down from embracing the legal definitions, by acknowledging its scope and boundaries, as well as by acknowledging important foundations and the re-users' thresholds for effective open data use, two broad suggestions for effective use of the definition can be made.

First, one clear benefit for researchers for using a definition (or any other clarifying entities) is that it helps in keeping a scholarly objective to the studied object. This might be especially important when dealing with phenomenon that is surrounded by high rhetoric's, which open data arguably is, and within research fields (information systems) known for a tendency for technological determinism and utopian as well as dystopian stories (Bellamy, Taylor, 1998). Moreover, relying on a definition when researching open data re-use makes it easier to be clear about how and what aspects of the phenomena really is investigated, e.g. if the research focuses mainly on the access to data rather than on the part where data is used for creating broader value for others, or if the research don't include certain aspects such as the citizens democratic right to data. This arguably creates benefits not only for the researchers that perform the research, but also for the readers of that research who will have better chances of understanding and acting upon its contributions.

Secondly, by including the foundations for re-use, democratic and technological, as well as the thresholds related to the re-users physical and intellectual access to data, it is made clearer that open data re-use is a phenomenon with ethical dimensions. Hence, in order to fully incorporate the concept of open data re-use, it is for example important to acknowledge the democratic dimensions when discussing which citizens actually have access to open data, both regarding issues related to access to e.g. internet and software, but also which users has the necessary skills for effective usage. This ethical dimension is also arguably important for understanding the arguments made for the broader societal transformations that many researchers points to, e.g. those pointing to the changing power aspects in society.

5.3. A practice-policy mismatch for re-use of open data

The identified research approaches for open data re-use, and especially the one focused on investigating opportunities and challenges for various applications areas, clearly reveals a mismatch towards current open data policies and strategic focus in Europe. The strong historical legacy of the ICT-industry in the EU strategies, which was also evident in the promoted data value chain that describes overall re-use activities, does not match the broad variety of application areas and different types of open data re-use seen in this study. Looking at the data value chain (see section 2.4), one could probably argue that 'products' could be a long range of different things, even though e.g. business

intelligence, research results or journalistic discoveries seldom go by that name, or that 'enrichers' also incorporates most citizens' particular qualities, but altogether it arguably forms a rather shallow representation of the complex and diverse nature of open data re-use. This study also shows that the issue of the repurposing of the data both towards the public task context and towards other contexts, further adds to a more complex picture of open data re-use and its broader societal effect that what current EU policies can account for. For these reasons, it is arguably important to question the legitimacy of using the historical legacy of the idea of the ICT industry as the main field for re-use, and as a story for the evolvement of open data re-use in the future.

Some possible implications of this simplified representation of open data re-use as in the data value chain, are likely to affect national open data initiatives and their priorities regarding what types of re-use should be supported and motivated. Moreover, using technically skilled 'developers' as the role model for re-users, will probably also affect much of the efforts that are made for enabling a broad scope of citizens to learn the skills important for using open data. In particular, the strong focus on the data and economic incentives rather than on a diverse re-use risk becoming a blindfold for the larger questions related to citizen's democratic right to, and the technological thresholds for using open data today.

6. Concluding remarks

Therefore, this study sets out to characterize the phenomenon of re-use of open data from public sector in order to increase our elaborate understanding of this practice, a knowledge that could enhance the possibilities for addressing the challenges of the slow uptake of open data. By reducing the current ambiguity about the concept and clarifying the practice of re-use of open data, we are better equipped to formulate appropriate support structures and systems for effective open data re-use, but also to understand potential implications and possibilities of this broad digital transformation. To achieve this research aim, an analytical framework inspired by the process of defining a phenomenon was used. In order to contextualize the study, a brief historical description of the evolvement of open data in Europe was added as a background to the study.

Apart from the identification of three main research approaches towards open data re-use and an elaborated definition of re-use, the findings led to the creation of a framework enabling us to see *open data re-use as an iterative value-creating process in two different contexts*, the public task context and the non-public task context. This process builds on three categories of meta-activities for re-use practice: 1) gaining access to and understanding open data, 2) handling and re-purposing the open data, and 3) creating broader value of open data, as well as indications of value for whom. Lastly, implications of this re-use process and framework was discussed, along with implications of an identified practice-policy mismatch that risk hampering the future evolvement of open data re-use.

It is clear that open data re-use is a complex and broad area that deserves proper attention to its characteristics in order for this practice to thrive. Given the large amounts on investments made for releasing open data, and the reports on a possibly declining interest for this new open resource, it's arguably time for acknowledging re-use of open data, or just use of data in digital formats, for its inherent complexity but also possibilities. A good start could be to treat this practice not as just one re-use activity, but as a compilation of multiple activities that resides in the context of several

foundational prerequisites for empowerment to happen. Also, even though this study has not had a special focus on the actual re-users, it is hard not to notice the broad range of users and usage areas, that goes way beyond just being interested in creating new products and services. Hence, creating more appropriate supporting structures for enabling a broader and more inclusive re-use of open data seems crucial since the diverse open data re-use is already out there, we just have to embrace it.

6.1. Some suggestions for future research

Based on the findings in this paper, some suggestions for future research can be made. First, to further address what we can learn from the identified research streams and their contributions to the broader understanding of re-use of open data can be seen to form a base for our future understanding of open data re-use and its societal impact. This can include investigating how these streams of research can inform each other, or what research is missing. Secondly, to look deeper into the effects of the open data re-use that relates to the public task context and the grey zone for responsibilities towards citizens' rights and possibilities that emerge is important for understanding the larger societal transformation that this kind of open data re-use contributes to. However, it is also important to look more closely into how re-use in a non-public task context best can be supported and thus evolved. Third, to further explore and understand in what ways the current policies and supportive measures address the broad scale of re-use and their respective contexts. For example, to further investigate the implications of the current priorities in the policies in relation to a diverse open data re-use towards a public task context and a non-public task context. Lastly, to further elaborate on the empowerment aspects in relation to the technological and democratic foundations of open data will hopefully provide means for a broader and more effective use of open data.

6.2. Some critical reflections on the conducted study

The use of a literature review in this way to investigate the characteristics of a phenomenon calls for some reflections about its generalizability. Even if the context of the European PSI-directive offers an understanding of the background to open data re-use, it also opens up valid questions about the applicability of the definition in contexts outside Europe. The impact of the policies and European strategies on the definition, since these are constructs that can change over time, pose for an area where the legitimacy of the definition can be further strengthened by research based on other policy contexts. Even if research from both Europe as well as outside Europe has been used to create a broad understanding of the concept of re-use of open data, further research in this area is welcome. Also, since open data still is in its early days, and practice therefore is dynamic in its nature, the definition of open data re-use might change in the future. Hence, more studies on the practice of open data re-use that leverages our knowledge about this concept will also be a good way to further our efforts in defining open data re-use from public sector.

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