University of Southern Denmark

Master Thesis

OPEN DATA FOR THE PEOPLE

A study of the Danish Open Data initiatives from the viewpoint of deliberative democracy theory

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Abstract

Open Data er et af de mest populære emner, når det kommer til digitalisering af offentlig forvaltning. Argumenterne for publiceringen af offentlige Open Data understreger de økonomiske potentialer samt mulighederne for effektivisering og øget transparens i regeringsførelsen. I dette speciale undersøger og diskuterer jeg de danske Open Data-initiativer i perspektivet af deliberativ demokratiteori. Analysen fokuserer på at opdage potentialer, hvor Open Data-initiativer kan bidrage til at støtte det deliberative demokrati i Danmark.

I dette speciale anvendes den hypotetisk-deduktive metode. Det hævdes, at en demokratisk regering som Danmark kan forventes at træffe foranstaltninger for at fremme Open Data-initiativer, som kan bidrage til offentlighedens bevidsthed samt begunstigelse af borgernes inddragelse i demokratiske processer. Jeg viser, at mange potentialer i Open Data-initiativer, som kunne fremme det deliberative demokrati, hidtil ikke er blevet anvendt.

For at undersøge, hvordan Open Data-initiativer kan styrke det deliberative demokrati i Danmark, forsøger dette speciale at besvare fire spørgsmål:

1. Hvilken rolle spiller overvejelser om offentlig information og borgerindragelse i danske Open Data-initiativer?
2. Hvilke modeller af demokratisk engagement understøttes af use casene offentliggjort på OpenData.dk?
3. Hvilke konsekvenser kan konkluderes fra de foregående forskningsspørgsmål for mulighederne for at fremme det deliberative demokrati ved Open Data-initiativer i Danmark?
4. Hvordan kan online praksisfællesskaber bidrage til at fremme brugen af Open Data i Denmark?

For at klarlægge hvordan Open Data og deliberativt demokrati er forbundet, fremlægger specialet først sammenhængen mellem begreber som data, information og viden, hvis

betydninger i omgangssproget er upræcise. Det konkluderes, at fælles viden (*common knowledge*) er en forudsætning for demokratiske beslutningsprocesser. Der gennemgås deliberativ demokratiteori, og især social choice theory, som kaster lys på, hvordan individuelle præferencer kan kombineres i en fælles beslutning, samt hvilke vanskeligheder og paradokser der kan opstå. I den forbindelse lægges der særlig vægt på Amartya Sens tilgang af *informational broadening*, fordi den viser en vej ud af gængse valgparadokser ved at anvende en bredere informationsbase som grundlag for demokratisk beslutningstagning – og det er her Open Data kommer i spil.

Den teoretiske ramme anvendes i en analyse af de danske Open Data initiativer, med henblik på deres bidrag til offentlig information og *informational broadening* ifølge Sen. Ligeledes bliver use casene undersøgt vedrørende den måde hvorpå de understøtter borgernes inddragelse i demokratiske processer. Jeg konkluderer ved at konstatere, at mange potentialer for at fremme det deliberative demokrati ved Open Data-initiativer hidtil ikke er blevet anvendt, især fordi en dedikeret strategi mangler. Desuden bliver værktøjerne til at implementere strategien ikke anvendt med henblik på at understøtte borgernes kompetence i Open Data.

Som et perspektiv indfører jeg afslutningsvis konceptet *praksisfælleskaber*, hvor deling af viden i en gruppe er et centralt element. I deres fokus på samarbejde ligner praksisfællesskaber en fremgangsmåde, der anvendes ved produktionen af open source-software. Deres etablering og vedligeholdelse præsenteres som en måde at øge Open Data-kompetencen. Dette ville forbedre grundlaget for yderligere Open Data-initiativer, der kan bidrage til at styrke det deliberative demokrati i Danmark.

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1. Introduction

Summary: This chapter gives an overview on the subject of this study: Open Governmental Data in the context of democracy and civil participation. Sec. 1.1 reasons for the theories chosen to examine the situation of Open Data in Denmark – in particular, deliberative democracy theories and social choice theory. While sec. 1.2 illustrates the problem background, sec. 1.3 presents the problem formulation and the delimitations of this master thesis. In sec. 1.4, the structure of this work is outlined. The chapter concludes with remarks on terminology (sec. 1.5).

Open Data sounds good. Open Data are "data that anyone can access, use and share" (European Commission, n.d.). Open Data are said to contribute to social, economic and environmental benefits when used by governments, businesses or individuals. Furthermore, Open Data can help make governments more transparent by providing the evidence that public money is being well spent and policies are being implemented. In about the recent ten years, the release of Open Governmental Data has become a popular effort among democracies all over the world: As of 2016, a total number of 128 UN member states provide datasets on government spending in machine readable formats (United Nations, 2016). In numerous cases, Open Data initiatives are part of an integrated approach towards Open Government or e-democracy (Davies, 2010).

Following a postulated tradition of democracy and openness, Denmark is contributing to this trend and increasingly sharing public datasets (Digitaliseringsstyrelsen, 2012). Currently (May 2018), the national platform for public Open Data, OpenData.dk[2], lists around 900 datasets (see Fig. 1), and their number is rapidly raising[3]. The datasets cover topics from traffic flow counts in Aarhus to the locations of public parking meters in Frederiksberg, of drinking water stations in Copenhagen and a population prognosis of Aalborg.

[2] See https://portal.opendata.dk/

[3] During the time of writing (January-May 2018), the number of datasets increased from about 750 to 914 (30.05.2018).

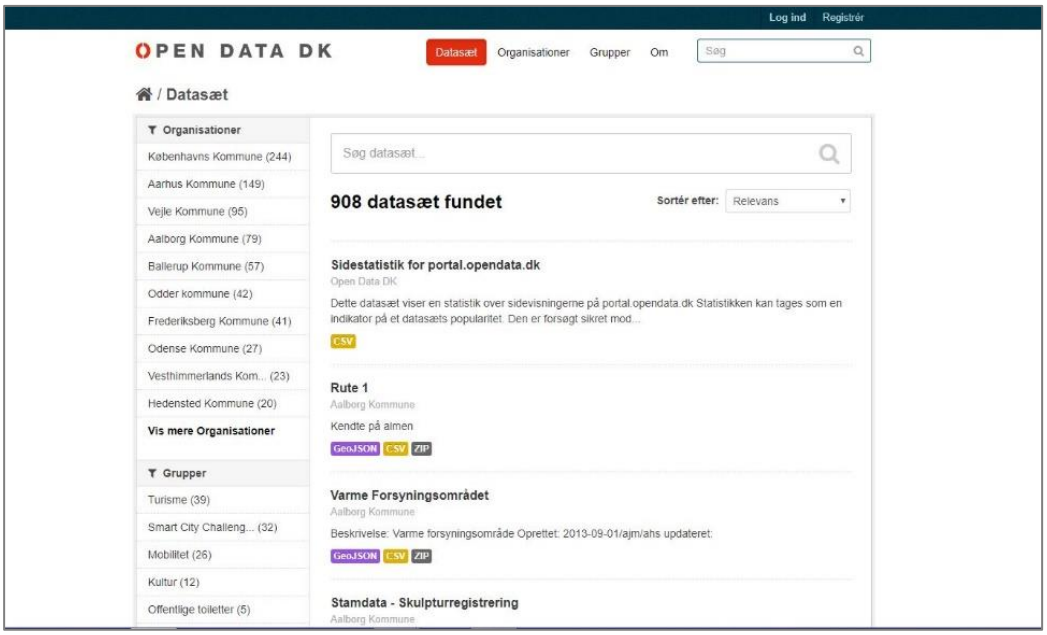

Figure 1: Screen Print of lists of datasets on OpenData.dk, 23.03.2018

But the strategy behind Danish Open Data initiatives remains unclear, as well as their effects, in particular concerning their influence on civil society. Do these Open Data efforts really benefit the citizens? How can these attempts contribute to empower the people by giving them access to information? How do Open Data support deliberative democracy in Denmark? Additionally, there seems to be a disproportion between Denmark ranking first in the European Commission's Digital Economy and Society Index 2017 on the whole, but only 24th in the subarea of Open Data (European Commission, 2017). These questions have led to my professional interest in this field of study.

Furthermore, while the economic concerns of the release of public Open Data have been addressed extensively in literature[4], the consequences with regard to democracy and civil participation have received limited scrutiny (Davies 2010), particularly in Western democracies[5]. In this master thesis, I have thus chosen to examine, how Open Data initiatives in Denmark can contribute to promote deliberative democracy by giving citizen access to relevant information. For instance, Open Data could fuel applications and services which allow

[4] C.f. the MEPSIR study from the European Commission on the exploitation of public sector information (Dekker, Polman, te Velde, & de Vries, 2006) and the study on public sector innovation (European Commission, 2013). For Denmark, c.f. Deloitte (2017), Analyse af efterspørgsel og markedstendenser indenfor offentlige data, http://www.opendata.dk/sites/default/files/odaa/analyse_af_efterspoergsel_og_markedstendenser_inden_for_offentlige_data_1.pdf.

[5] For examples from Great Britain see O'Hara (2012) or Sivarajah et al. (2015), for Austria see Kornberger, Meyer, Brandtner, & Höllerer (2017).

citizens to gain insights into political decision making processes. Visualizations based on Open Data could illustrate, e.g., the budget allocations of a municipality over sectors and time.[6] A possibility would be that citizens could monitor their representatives' voting behavior and compare it to their election promises.[7] Thus, the citizens would be empowered to make more informed choices.

Another reason why I focus my study on the interplay of Open Data, public information and deliberative democracy is the fact that, in public opinion, the access to Open Data often is used interchangeably with the access to information. But this equivalence does obviously not hold true. Therefore, I also will clarify concepts like *data*, *information* and *knowledge*. In brief, information can be seen as data with a context, as "whatever is capable of causing a human mind to change its opinion about the current state of the world" (Butterfield & Ngondi, 2016, p. 268). The access to information, in turn, is a presupposition for civil participation and deliberation.

1.1 Choice of theories

As I examine the informational potentials of Open Data and their impact on democracy in Denmark, I will take the viewpoint of approaches from deliberative democracy theory and social choice theory, as they provide a valuable framework for assessing the value of public information for civil participation, public decision making and policy discussion. My choice grounds on the fact, that these theories emphasize the importance of the *informed citizen* as a necessary condition for civil participation in democratic processes: The citizen needs to be well-informed in order to be able to make informed choices. As Ruijer et al. (2017) put it: "Informed citizens are better able to contribute to democratic processes, better able to understand and accept the basis of decisions affecting them and better able to shape the situations in which they live." For elaborating the importance of information in decision making, I will mainly draw on Amartya Sen's theory on *informational broadening* in the realm of social choice theory. For a broader discussion of the theories, I refer to the theory chapter.

[6] The website www.kenddinkommune.dk provides such a service, based on data from 2017.
[7] The website "They Work For You" (https://www.theyworkforyou.com/) monitors representatives' voting behaviour in Great Britain. The corresponding Danish website "Hvem stemmer hvad?" (http://hvemstemmerhvad.dk/) is currently not updated but has offered a similar service.

In the further course of the work, I will adopt a model of different modes of democratic engagement, established by Davies (2010). I chose this model, because it provides a framework for the categorization of Open Data use cases, according to the mechanisms of public service reform they promote. The framework distinguishes between different modes of civil engagement in democratic processes and the informational role Open Data can play in this context. The modes of democratic engagement include direct political participation on the sides of the citizen (like voting), collaborative and community-based participation (like co-production of public services between social and commercial entrepreneurs and the state) and so-called market participation, which relies on choices on behalf of the citizen in the role as a consumer of a service. The use of this framework allows to identify, which modes of democratic engagement are particularly supported by Open Data use cases in Denmark. It also provides insights on the role the citizens play in these use cases.

As an outlook, I will briefly introduce the concept of *communities of practice* from social learning theory, as it allows to contribute with further insights on knowledge sharing – in this case in the field of Open Data. I will discuss the possible relevance of communities of practice in this context, as it is important, since it has been shown that (potential) users of Open Data rely broadly on online networks (Davies, 2010). The term *communities of practice* was coined by Étienne Wenger[8] and has frequently been applied to provide a perspective on knowledge sharing. Wenger-Trayner et al. (2015) define communities of practice as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger-Trayner & Wenger-Trayner, 2015).

1.2 Problem background

The digitization of the public sphere is one of the strongest currents in the political debate, not only in Denmark, but everywhere. Denmark has always been one of the leaders in this movement. In 2015, for instance, all communication between public institutions and the citizens became digital by default – a situation which seems technically and socially unattainable in the near future for, e.g., Germany, a country that otherwise resembles Denmark in many regards.

[8] Étienne Wenger seems to have changed his name to Étienne Wenger-Trayner after 2009: I will refer to him with his respective name according to the date of publishing.

The technical possibilities brought by the digitization have furthered ideas of Open Government[9] and Open Data. However, claims for economic efficiency and increased transparency are often lumped together (Kornberger, Meyer, Brandtner, & Höllerer, 2017, p. 197).

In this context, in January 2018, the Danish government made the announcement that all climate and weather data collected by the Danish Meteorological Institute (Dansk Meteorologisk Institut, DMI) should soon be open and freely available to all citizens. By then, people interested in the data – like insurance companies or farmers – had to pay for the service. The initiative was declared as being part of a broader digitization, *Strategi for Danmarks digitale vækst*, with an investment potential of 82 million of Danish Kroner for the climate data alone. The reason for the release, as said by the government, was to open up for economic possibilities (Energi-, Forsynings- og Klimaministeriet, 2018). Entrepreneurs will in future be able to use the free data to build applications for the benefit of society.

Political data, however, are currently less commonly available as open data in Denmark. Voting records are currently not accessible, neither are court decisions provided as open data. In particular, data from regional or local sources remain closed, although it is local and regional policy making that often directly affects the citizens' daily life, as Kornberger et al. have illustrated (Kornberger, Meyer, Brandtner, & Höllerer, 2017). As municipalities have begun to introduce digital voting in city councils (Haagensen, 2018), the technical infrastructure would allow to provide the voting results as open data. In this context, too, free and open data would enable to build applications for the benefit of society.

1.3 Problem formulation

When the Danish government started releasing public Open Data around 2009, the promotion of transparency and civil participation were among the declared objectives of the initiative (Digitaliseringsstyrelsen, 2017)[10]. But several studies have shown, that the mere release of public Open Data does not automatically lead to more public knowledge or to a democratic

[9] The term *Open Government* represents the idea of the opening of government and administration to the population and the economy to support greater transparency, participation, cooperation, innovation and community-building. For more information on the Open Government Partnership, see sec. 5.2.

[10] The document was last retrieved in February 2018 and is obviously no longer available online. Though, a copy of the document can still be found on the website of the digitization agency of Greenland, http://digitalimik.gl/da/Styring/Offentlige-data

empowerment of the citizens (Davies, 2010; Jafarkarimi, Sim, Saadardoost, & Hee, 2014, Kornberger, Meyer, Brandtner, & Höllerer, 2017; Ritter, 2014). The question arises, how are these aspirations for transparency and civil participation are translated into practice? And where are still untapped possibilities? The problem formulation of this work is thus:

What are the potentials for the support of deliberative democracy brought about by Danish Open Data initiatives?

In order to find answers to this problem formulation, this thesis is led by the following four research questions:

- ***Which role do considerations on public information and civil participation play in Danish Open Data initiatives? (RQ1)***

- ***Which models of democratic engagement are supported by the use cases published on OpenData.dk? (RQ2)***

- ***Which implications can be concluded from the preceding research questions RQ1 and RQ2 for the potentials to promote deliberative democracy by Open Data initiatives in Denmark? (RQ3)***

- ***How can online communities of practice promote the use of Open Data in Denmark? (RQ4)***

The first of my research questions (R1) targets at examining the considerations on public information and civil participation in Danish Open Data initiatives, in order to shed a light on the political preconditions for the use of Open Data. The aim is to identify possible obstacles to the use of Open Data for public information and deliberative democracy.

The second research question (R2) is concerned with the practical use of Open Data in Denmark: I will here focus on the use cases published on the Danish public Open Data platform OpenData.dk and investigate their impact for democratic participation: Which categories of democratic participation featured outweigh the others? Again, the aim is to detect obstacles to the use of Open Data for public information and deliberative democracy.

Thirdly, after having discussed the concerns around public information and civil participation in Danish Open Data initiatives from different angles in the first two research questions, I will

take an analytical approach (R3) and try to identify potentials to promote deliberative democracy by Open Data initiatives in Denmark.

Finally, as an outlook, I will address a principal aspect of public information and Open Data, focussing on knowledge sharing (R4). To this end, I will introduce the concept of *communities of practice*. As it will be shown in the course of this work, missing knowledge is one of the most prevalent obstacles to Open Data use. In this regard, I will examine in RQ4, which support communities of practice could provide to further the use of Open Data in Denmark.

I will now draw the delimitations of this work, before I will outline my reflections on philosophy of science and considerations about bias.

1.3.1 Delimitations

It is clear, that I will not be able to draw a complete picture of the problem, as the scope of this work is limited. Therefore, it has been necessary to outline the delimitations of the scope of this study and to constraint the methodology and empirical basis which have been considered.

This work deals with the impact of Open Data on democracy in Denmark and focusses on public information and civil participation. It draws upon democracy theories and social choice theory as they provide a fruitful perspective on citizens' information.

This work does deliberately not treat ethical considerations about Open Data, nor issues of data ownership or privacy brought about by Open Data initiatives. Neither, the field of IT security is covered, nor the topic of profiling or data mining, although they stand in close relation to the area of Open Data and pose numerous interesting research questions. But because these themes are too extensive to be picked up parenthetically in this study, they require separate investigation.

1.4 The structure of this work

This work consists of nine chapters. After the introduction, chapter 2 presents the methodology. The theoretical framework is then set out in chapter 3, while chapter 4 illustrates the legal and infrastructural conditions for Open Data in Denmark. Chapter 5 picks up the first research question, as the considerations on public information and civil participation in Danish Open Data initiatives are examined. In the next part of the analysis, in chapter 6, a series of Open

Data use cases are inspected, with respect to the models of democratic engagement they support. Chapter 7 discusses the implications from the preceding research questions and thus the potentials to support deliberative democracy by Open Data initiatives in Denmark. Chapter 8, afterwards, introduces the concept of communities of knowledge and discusses, how this approach could contribute to support Open Data use for public information.

This work closes with a conclusion in chapter 9, followed by a list of relevant websites, references and appendices.

1.5 Remarks on Terminology

Concerning the terminology in this work, I will treat the term *data* as plural, as it is convention in science (except in direct quotes). Proper names, e.g., of Danish authorities, are written *in italics*. The phrases Open Data and Open Government are written in capitalized form when used to refer to them as a certain concept: In this study, Open Data are considered as open public and/or government data, referring to the OECD definition on Public Sector Information as "information, including information products and services, generated, created, collected, processed, preserved, maintained, disseminated, or funded by or for Government or public institutions" (OECD, 2008). For a more detailed definition of Open Data, I refer to the clarification of concepts in sec. 2.4.

Citations in this work are generally in English or in Danish, if they are originally Danish and refer to specific Danish conditions – like for example legal texts or action plans. Own translations of citations are marked, but mostly avoided in order not to distort their meaning. If not available in English or Danish, they citations will be given also in their original language.

2. Methodology

Summary: In this chapter I will explain the methodology applied in the course of this study. Section 2.1 starts with reflections on philosophy of science and the hermeneutic paradigm, before I outline the hypothetico-deductive method chosen (sec. 2.2), supplemented by remarks on bias and objectivity. As a hermeneutical analysis deals with interpretation, an explication and clarification of the central concepts around Open Data are considered necessary. After a brief account of the method of explication (sec. 2.3), a clarification of central concepts – data, information, knowledge – will be given in sec. 2.4.

2.1 Reflections on philosophy of science – the hermeneutic paradigm

This work builds upon the hermeneutical concept of knowledge building: In the course of this study, I will continually bring about various theories and reflections in order to gain further insights in the field of study. These discernments will lead to a new comprehension of the subject which will differ from my previous conception. In this view, the course of understanding forms a circle.

The term hermeneutics derives from the Greek verb *ἑρμηνεύω*, *hermeneuō*, "I explain, I interpret". As the methodology of interpretation, hermeneutics is concerned with problems which arise when dealing with meaningful human actions and the products of such actions, most importantly texts (Mantzavinos, 2016). As described by Heidegger (1967, first published 1927), the hermeneutic circle consists in the relationship between the concrete partial interpretation of something and the comprehension of the whole (the horizon of meaning) in which interpretation is always already present – an idea previously formulated by Friedrich Ast. Heidegger explains further, that the interpretation of a subject is developed on the basis of a preliminary understanding of the subject: Thus, the process of understanding can be described as circular, and all understanding, as essential condition of human existence, is always situated and contextualized (Stangl, 2018).

The hermeneutic paradigm has strongly influenced the humanistic disciplines of science, as their object of study is represented by the human being as a thinking, wanting and acting entity: Georg Henrik von Wright (1971) suggested that human action could not be explained causally.

Instead it should be understood "intentionally", which involves wants and beliefs developed in a social and cultural context.

This approach contrasts with the methodology of explanation in natural sciences, where the human being's actions are seen as a chain of causal processes. The laws of science are thus considered as empirical regularities describing the mathematical-functional structures or relations between physical properties of objects which remain constant in all changes of the values of these properties (Detel, n.d., p. 2).

In contrast to that, hermeneutics plays an essential role in the operationalization of empirical examination of facts, and also the interpretation of empirical results is a hermeneutic process. In the context of empirical methods, the hermeneutic approach is essential for hypothesis formation, as a problem must first be seen, recognized and understood; a situation is only problematic with regard to certain norms, values and goals, but these are only accessible hermeneutically (Stangl, 2018). The following section will draw the point of view of cognitive hermeneutics and the hypothetico-deductive method, which was followed by this study.

2.2 The hypothetico-deductive method

The main thesis of cognitive hermeneutics is that hermeneutics can and should be conceived as an empirical science (Tepe, 2011, p. 602). Føllesdal (2008) argues for that view, as "hermeneutics shares the two defining feature (sic) of the hypothetico-deductive method: (1) setting forth interpretational hypotheses and (2) checking whether they together with our beliefs imply consequences that clash with our material" (p. 375). Detel explains the core of the empirical method as the hypothetico-deductive method, that is, the construction of hypothesis and their examination with available data (n.d., p. 19).

Cognitive hermeneutics distinguishes between empirical sciences aiming to detect regularities, and empirical sciences which are primarily interested in explaining individual facts (as is the case with cognitive hermeneutics) (Detel, n.d., p. 20). In this work, I adapt the viewpoint that texts and other cultural products can be considered as products of intentional actions which require explanatory interpretation.

Whereas cognitive hermeneutics share the application of the hypothetical-deductive method with natural sciences, the difference lies in a methodologically independent explanation of

interpretation, which is based on individual texts/artefacts which are also interpreted by the means of their references and surroundings. The approach of cognitive hermeneutics makes a distinction between cognitive interpretation and appropriative interpretation, which aims at dealing with texts or other artefacts of human production under aspects of practical life. Cognitive interpretation, however, deals with an effort to explain and aims at gaining knowledge. Tepe describes the method with regard to text analysis:

> On the one hand, the study of the text explicitly or implicitly follows the key question: 'What are the properties of the text?' On the other hand, working with the text explicitly or implicitly follows the question: 'What causes the text to have the properties it has?' […] The phrase 'What causes...?' could be replaced by 'How can it be explained that…? (2011, p. 602).

This study follows the hypothetico-deductive method within the meaning of cognitive hermeneutics, as I will set forth interpretational hypotheses on Open Data and their impact on democracy in Denmark. In doing that, I will reason for my decisions, based on literature, and deduce consequences. For the next step, I draw on the approach of falsificationism introduced by Karl Popper: The interpretative hypotheses are checked against the empirical material, e.g., the governmental action plans on Open Data or examples of Open Data use. In Popper's opinion, hypotheses must be falsifiable in order to be scientific. Popper stressed that, regardless of the amount of confirming evidence, we can never be certain that a hypothesis is true "without committing the fallacy of affirming the consequent" (Andersen & Hepburn, 2016). So, if the check leads to negative results, the general hypothesis in the present form is considered falsified. It must thus be rejected or reformulated. If, on the other hand, the hypothesis is confirmed, it is considered provisionally verified. Verification is always provisionally, because the possibility of later falsification always exists. In this sense, only the falsification is final, but not the verification (Atteslander, 2008).

In this work, I will thus try to identify the potential falsifiers of the hypotheses and examine if possible modifications of the hypotheses can generate new insights in the field of Open Data and their impact on public information and civil participation in Denmark. By following the hypothetico-deductive method in the sense of cognitive hermeneutics, the scientific status of the hypotheses is guaranteed, as they are falsifiable and the results are controllable.

2.2.1 Bias and objectivity

As all hermeneutic approaches presuppose a notion of anticipation or "fore-meaning or fore-structure" (Føllesdal, 2008, p. 377), the risk of bias and missing objectivity thereby is always given.

Also, in this work, the hypotheses and the interpretations will be influenced by my preconceptions. My understanding of Open Data as a resource for civil information shapes my approach to the field of study. Of course, there exist different conceptions of Open Data, and especially in the recent past, many ideas about the general dissemination and exploitability of data may have changed. The following tweet (Fig. 2) gives an example of the diverse considerations of the use of data in general.

Figure 2: Tweet from Asmus Leth Olsen on the use of data.
Source: https://twitter.com/AsmusOlsen/status/975336240768839680

Although the tweet does not explicitly deal with Open Data, it is concerned with the dissemination and use of data in general – and in the case of Open Data, the situation is probably similar. The train of thought is easy to follow: The use of data is considered a good thing, if its

outcome is in line with one's political ideology. Thus, the opinions and perceptions on the use of Open Data diverge, as well as political attitudes. The lack of knowledge about the possible impact of Open Data in a democracy may also lead many people to be critical – or unaware – of the topic. That is one of the reasons why a part of this study is dealing with the creation and sharing of knowledge around the field of Open Data.

The fact that I am aware that there are other ways of judging Open Data and the use of data, and the fact that my conception originates from my own values and my philosophy of life, are among the reasons why I will investigate the problem further in this study. This brings us also back to the hermeneutical circle, where newly acquired knowledge generates a new understanding. Here, it is crucial, according to Føllesdal, to be conscious of own understandings and not to let them be locked in one's interpretation. As the main task of hermeneutics is to adapt our understanding to the text (or any other product of human action), we should always be aware of our preconceptions. I will thus try to always respect what Føllesdal (2008) acclaims, when he requires that "[w]e must approach the text with openness, that is with awareness that we have fore-meanings and that the text may have a meaning that is incompatible with our fore-meaning" (p. 377).

2.3 The method of explication

Before constructing interpretational hypotheses, it is essential to clarify the central concepts used in these hypotheses, e.g., data, information or knowledge. These concepts bear already an imprecise meaning in everyday language; thus, explication and clarification are necessary. I will here follow the method of explication, described by Carnap: "By the procedure of *explication*, we mean the transformation of an inexact, prescientific concept, the *explicandum*, into a new concept, the *explicatum*" (Carnap, 1962, p. 3, emphasis in original). The advantage of the scientific concept is that it "can be brought into connection with other concepts on the basis of observed facts… it can be used for the formulation of laws" (p. 6). Thereby, the explication must fulfil a set of requirements: First, the explicatum has to be similar to the explicandum, e.g., as a colloquial concept of information already exists, the scientific may not deviate significantly from it. Secondly, the characterization of the explicatum has to be exact in order to place it into "a well-connected system of scientific concepts" (p. 7). Thirdly, the explicatum is to be useful in the sense that it allows the formulation of universal statements like

empirical laws, and lastly, it should be as simple as possible and as the other requirements permit.

In the following, I will apply the method and clarify the central concepts around the area of Open Data.[11]

2.4 Clarification of concepts: from data to common knowledge

In this section, I will try to delineate the difference between data, information and knowledge as these concepts are understood in this study. To this end, I will always start from the colloquial understanding and proceed to a more concise definition.

Generally speaking, data are the raw material to derive information from – like the numbers on a spreadsheet with the budget allocations of a municipality, an overview of the sources of electricity used or a table with voting results. The NGO Open Knowledge Denmark sketches the relationship in the following: "Data in itself is often an abstract concept for the many, and only when they are made available, understandable and meaningful can they be used to solve actual problems – and make a difference in society" (Open Knowledge Denmark, n.d.).

Floridi (2010) cites the example of a book written in a language unknown to us: we may have all the data, but we do not know their meaning (p. 22). This example illustrates, that we can be aware of the existence and even in possession of information carriers – without being able to derive information, or even knowledge. With regard to Open Data, there may be thousands of accessible datasets out there, but are they meaningful to us? Do they contribute to change our opinion about the current state of the world? If no, the data cannot be considered information, according to the definition mentioned in the introduction (Butterfield & Ngondi, 2016). I will later discuss, how the content of information depends on the *agent*.

To get information (and, as a result, knowledge) from data, the data have to be in a context. Talking of digital data, they have to be processed, summarized, organized and/or analysed – a kind of meaning must be added. In these cases, data are "represented to become information" (Davies, 2010, p. 12). Getting back to our examples, the line-up of numbers and electricity sources can indicate the concrete composition of the power sources at certain point in time.[12]

[11] As theories are grounded on concepts, generally, concepts are further determined by theories – also here, one could take about a circular process, cf. the "theory-ladenness of concepts".
[12] See https://www.electricitymap.org

Set in a broader context, it is possible to deduce information like, which amount of energy was drawn from fossil fuels at a given time – and how much carbon dioxide was induced. The budget of the municipality could be compared with other municipalities' budgets to outline the contrasts in spending between them.[13] The voting results could be merged with demographic data to draw conclusions about voting behaviour.[14]

Before I continue to examine the relationship between information and data, I will take a detour to characterize the special nature of Open Data, as, in this case, the possibility to process the data is crucial.

To fulfil the criteria of openness, Open Data definitions generally require that the data are legally and technically open and available, more specifically that the data

- are accessible in a common, machine-readable format and
- are released under a license which allows people to use the data in any way they want, including transforming, combining and sharing it with others, even commercially. [15]

David Eaves (2009) summarizes the special case of Open Government Data as "the sharing of information government collects and generates freely towards citizens such that they can analyse it, re-purpose and use it themselves". To assess the quality of published data, he laid down the "Three Laws of Open Government Data":

1. If it can't be spidered or indexed, it doesn't exist
2. If it isn't available in open and machine-readable format, it can't engage
3. If a legal framework doesn't allow it to be re-purposed, it doesn't empower

I will now look closer on the process, how information is encoded by data.

[13] See http://www.kenddinkommune.dk.
[14] As Danish voting data are currently not accessible as open data, corresponding use cases cannot easily be constructed. However, the future release of the data in an open format may be imminent, cf. sec. 5.4.3.
[15] Cf. e.g., Davies (2010), Open Knowledge Denmark, https://dk.okfn.org/om-os/, The Sunlight Foundation, https://sunlightfoundation.com/opendataguidelines/ and the European Commision's European Data Portal https://www.europeandataportal.eu/elearning/en/module1/#/id/co-01.

2.4.1 The origin of data

Data, the plural of *datum*, is derived from the past passive participle of the Latin verb *dare* ("to give") and so literally means "something given". The Oxford English Dictionary defines data as "[f]acts and statistics collected together for reference or analysis" (English Oxford Living Dictionaries, 2018) attributing data, as facts, a quality of veracity, representing the truth[16]. A second definition underlines the significance of data for decision making: As a term in philosophy, data are referred to as "[t]hings known or assumed as facts, making the basis of reasoning or calculation" (English Oxford Living Dictionaries, 2018). We can already see, that the notions of *truth* and *facts* seem to play a significant role in characterizing the essence of data.

Additionally, in computer science, data are understood as "[t]he quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media" (English Oxford Living Dictionaries, 2018). Here, the properties of data as being storable, transmittable and machine-readable play a distinct role. The Dictionary of Computer Science demarcates data as "[i]nformation, in any form, on which computer programs operate" (Butterfield & Ngondi, 2016, p. 134). This kind of "machine-readable data" thus bears an informational meaning for the computer system (as it understands the format), but humans may not be able to directly interpret the data – as we (in contrast to the computer system) do not have the key to understand them. This example illustrates, too, how the content of information also depends on the recipient.

2.4.2 The data-based definition of information

As the proceeding explanations show, data and information can hardly be understood separately. Floridi offers a tripartite definition of information, in which the prime point is, that information is encoded by data. He defines that

> σ is an instance of information, understood as a semantic content, if and only if:
>
> 1. σ consists of n data, for $n \geq 1$;
>
> 2. the data are well-formed;

[16] The concept of truth, one of the central subjects in philosophy and debated for thousands of years (Glanzberg, 2016), will not be further discussed here.

3. the well-formed data are meaningful (Floridi, 2010, p. 21).

According to this definition, information consists of data (1), which are put together according to certain rules (2) and comply with the meanings in a certain system of reference (3). The rules in (2) are to be understood in a broad sense, "not just linguistically, as what determines the form, construction, or structuring of something" (Floridi, 2010, p. 21). A two-dimensional picture with linear perspective would in that sense also comply to a consistent pictorial syntax. In contrast to the preceedingly discussed type of *semantic information*, Floridi accounts for another type of information: The *environmental information*[17] "concerns how one thing can carry information about another thing in a system when there is a certain correlation between the two, such as smoke carrying the environmental information that there is fire" (D'Alfonso, 2010, p. 240). Fig. 3 shows a map of information concepts.

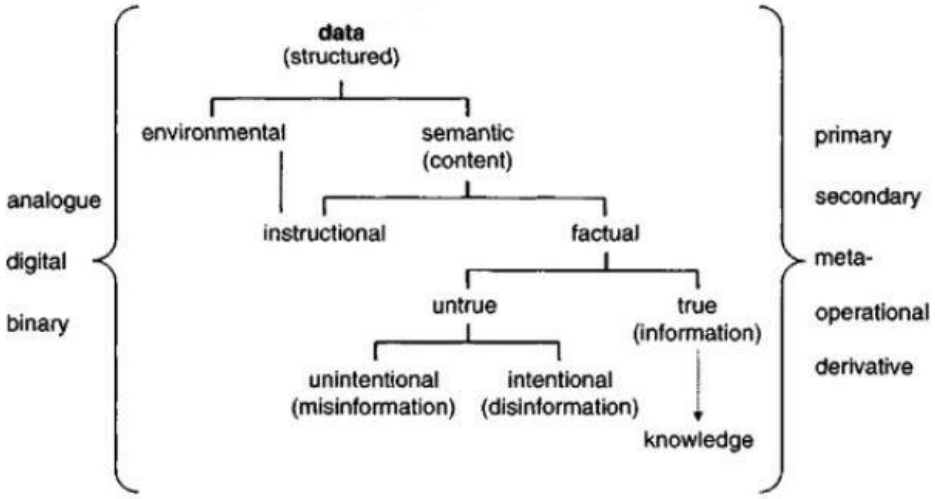

Figure 3: A map of information concepts. Source: Floridi (2010, p. 20)

As far as the receiver of information is concerned, Floridi points out that "data constituting information **can** be meaningful independently of an informee" (2010, p. 22, emphasis mine): Even before Egyptian hieroglyphics could be translated, they were considered information – in

[17] The concept of *environmental information* was also described by Jon Barwise and John Perry (1983), *Situations and Attitudes*, Cambridge MA: MIT Press.

that case, inaccessible information. Concerning data, he here makes the point that "the lack of perceivable data, can be as much a datum as the presence of some noise, exactly like the zeros of a binary system" (p. 23). Even the blank space on a paper, where a word has been erased, is a clear piece of information. Floridi concludes that a complete erasure of all data can only be achieved "by the elimination of all possible differences" and thus defines data as "*x* being distinct from *y*, where *x* and *y* are two uninterpreted variables and the relation of 'being distinct' as well as the domain, are left open to further interpretation" (p. 23, emphasis in original).

The conception of information as "whatever contributes to a reduction in the uncertainty of the state of a system" (Butterfield & Ngondi, 2016, p. 134) applies though to the logical dimension. The formula for uncertainty, in turn, involves probabilities: The more limited the logical boundaries, the greater the probability. That probabilities are subjective, will be outlined in the next section, where the role of the context of information will be reflected.

2.4.3 Information and the role of the context

An important aspect of information lies in the fact that "different agents are capable of extracting different information from the same source" (Devlin, 1991, p. 14). For instance, concerning the surrounding air, a person will be able to get an impression about its humidity, direction or warmth, while a thermostat can detect if the temperature is above or below a certain value set. What is important to note, is that the information that may be picked up depends upon "what kind of device the agent is, and in particular upon the *state* of that agent *vis á vis* (sic) the extraction of the information" or, in other words: "the acquisition of information from a situation depends upon those *constraints* of which the agent is aware, or to which the agent is *attuned*" (Devlin, 1991, pp. 14-15, emphasis in original). Devlin uses another example to illustrate the point that the content of information in a given situation depends on the receiver: concerning a tree stump[18], a person aware of the relationship between the number of rings in a tree trunk and the age of the tree (the constraint) could deduce the information of the age of the tree when it was felled. To someone else, the tree stump could yield information about the weather the night before.

[18] The tree stump example goes back to the mathematician and philosopher Jon Barwise (1942-2000), who also introduced situation theory.

In this context, situation theory – which was first introduced by Jon Barwise and John Perry[19] – offers a frame for understanding, why information always has to be considered in a context: Situations are considered "parts of the world and the information an agent has about a given situation at any moment will be just a part of all the information that is theoretically available" (Devlin, n.d., p. 2). While the potential informational content of a situation is considered nearly infinite, a person's perception must always be considered in relation to this person's knowledge: A person possesses rarely any possible information about the situation she is in. Consequently, she has to act, although only a part of the information is available. Situation theory aims at modelling the information flow with a set of mathematically-based tools to analyse, in particular, "the way context facilitates and influences the rise and flow of information" (Devlin, n.d., p. 5). Thus, situation theory requires that contextual effects and conditions have to be taken into account as they reflect the subjectivity of the cognitive agent (Tobinski, 2017, pp. 47-48). Context, in situation theory, includes several sub-concepts: the interpretation of an utterance may depend not only on such standard features of the context as the speaker, the time and place of utterance, etc., but also on the speaker's connections with objects, properties, places and times, and on the speaker's ability to exploit information about one situation in order to convey information about another (Lindström, 1991, p. 15).

Concerning Open Data, these considerations are especially relevant, as they reflect that any person could draw different conclusions out of published data. The information, in this sense, lies in the reduction in uncertainty resulting from the receipt of the data – not in the objects or the size or complexity of the data themselves (Butterfield & Ngondi, 2016, pp. 134-135).

The next section will deal briefly with the concepts of *knowledge* and *common knowledge*.

2.4.4 From information to knowledge

Put short, knowledge acquisition is a subjective achievement, where knowledge is derived from information or perception by combining experience and information. Knowledge is the result of a process finding new inferences by answering questions like "Which information is relevant for a specific problem?", "Which relations exist between the information and the outcome?"

[19] C.f. Barwise, J. & Perry, J. (1983), *Situations and Attitudes*, Cambridge MA: MIT Press and Barwise, J. & Seligman, J. (1997). *Information Flow: The Logic of Distributed Systems*, Cambridge: Cambridge University Press.

and/or "Are there any patterns in the information?". Knowledge can be considered the basis for decision making, as knowledge provides the foundation for weighing alternative courses of action: "Building knowledge is a process of turning information into choices" (European Commission, n.d.). Concerning the mentioned example with the electricity data, the data are quantifying the climate impact of the daily choices we make. Set in context, the electricity data allow the user to find out, when the charging of an electric vehicle causes less carbon dioxide emissions.

For Devlin, knowledge is a "propositional attitude", a special kind of belief, formed by the acquisition of information. In this sense, knowledge has a distinctive status, as it leads to truth (Devlin, 1991; Say, 1997, p. 348). As Devlin elaborates, knowledge is also related to a person's network of intentions and can lead to action. Epistemic modal logic is one of the field concerned with the reasoning about knowledge, which will not be discussed further here, but I will briefly introduce the term *common knowledge* and stress its relevance in the field of Open Data.

2.4.5 Common knowledge

The concept of common knowledge describes a group phenomenon: all members know something, and at the same time, all members know that all group members know it. These characteristics influence the process of reasoning in a group: An agent in a group must not only consider facts that are true about the world, but also the facts of other agents in the group. In this regard, common knowledge, generally, can prevent acts like insider trading. Fagin, Halpern, Moses, and Vardi (1995) define common knowledge as "the state in which simultaneously everyone knows a fact φ, everyone knows that everyone knows φ, everyone knows that everyone knows that everyone knows φ, and so on" (p. 2).

Common knowledge, in this sense, is a prerequisite for achieving agreement – and as that a prerequisite in a democracy: The idea behind this lies in the understanding that a social contract is a convention. For the emergence and continuation of conventions, common knowledge is crucial: Everyone knows that everyone knows, that conventions are to be kept (Lewis, 2002).

What is important to note in this context of common knowledge, is the fact that a public announcement, whose contents are understood simultaneously by many agents, is impossible to achieve in many practical settings – thus, common knowledge cannot be attained in these settings, mostly because of the problem of timely coordination. But if the demand for

simultaneity is weakened, this paradoxical situation can be solved (Fagin, Halpern, Moses, & Vardi, 1995).

Regarding Open Data, how do they relate to common knowledge? If the data are accessible, the precondition for common knowledge is given – as everybody *could* know them. And – not only the data become known – it becomes known, that (possibly) everybody knows them. Generally, the opening of government data can have two impacts on the availability of politically relevant information: On the one hand, it can lead to new data being released around topics where neither data nor information were available before. On the other hand, the opening of government data can lead to the release of the data underlying formerly available information, removing the role of government as sole interpreter of the data (Davies, 2010, pp. 14-16). To take an example of recent Danish politics into account, Open Data could contribute to objectify the discussion on ghettos in Danish cities: Open Data can point up, upon which data the classification is based – and possibly encourage a public discussion about the legitimacy of the factors.

The significance of information and common knowledge in the context of democracy will be further outlined in the following chapter on theory.

It was the objective of these first three chapters to outline the concepts in the realm of Open Data relevant to this study and the methodology which will be applied in further course of this work. In the next chapter, the theoretical framework will be delineated.

3. Theoretical framework – information and democracy

Summary: In this chapter, I will present an overview of the theories which I consider relevant to provide answers for the problem formulation of this work – to identify the potentials for the support of deliberative democracy brought about by Open Data initiatives in Denmark. In sec. 3.1, an overview of the current state of research on Open Data and democracy is presented. Section 3.2 summarizes theories of democracy and their respective view on civil participation. In subsection 3.2.1, the theory of deliberative democracy is further elaborated, especially concerning the influence of being informed in democratic decision making (sec. 3.2.2). In addition to that, sec. 3.3 brings about social choice theory, especially Sen's theory on informational broadening (sec. 3.3.1). A remark on the reconciliation of deliberative democracy and social choice theory is given in sec. 3.3.2. The chapter concludes with the construction of hypotheses which will be tested in the further course of this work (sec. 3.4).

3.1 Current state of research on Open Data and democracy

The relationship between Open Data and democracy is a young field that has come into the focus of some scholars only in the recent years, especially in the form of case studies (Davies, 2010; Kardan & Sadeghiani, 2011; Keserú & Kin-sing Chan, 2015; Kornberger, et al., 2017; Sivarajah, et al., 2015). Therefore, the impact of open data on fostering democratic processes remains difficult to address, due to the complexity of democratic processes and the diversity of the participating actors like citizens, public administration and mediators.

Nevertheless, approaches exist to assess the effects of Open Data on civil participation and democratic processes. Keserú and Kin-sing Chan (2015) developed a methodological framework based on indicators of social and political change in the ecosystem of Open Data initiatives. The authors, as do many others in this field of research, focus their study predominantly on developing countries. Case studies on Open Data use for civil participation in Denmark are extremely rare. In their study "A Smart City Is a Collaborative Community", Snow, Håkonsson, & Obel (2016) do not centre on democratic processes, but concentrate on economic opportunities, "to ensure the smooth flow of goods and services" (p. 93), facilitated

by technology and Open Data. They perceive the citizens as a co-producer in a role that "is evolving to one in which they co-create the municipal services they receive" (p. 98).

Whereas the release of public open data is generally considered to further democratic processes, Ruijer, Grimmelikhuisen and Meijer (2017) claim that open data platforms often fail to do so, due to an inappropriate design. They base their work on case studies in the Netherlands. As a conclusion, the authors propose a change in Open Data strategies: to take the different roles of citizens and public actors in democratic processes into account and ensure a design that "facilitates the transformation of raw data into meaningful information constructed collectively by public administration and citizens" (Ruijer, Grimmelikhuijsen, & Meijer, 2017).

Tim Davis centres his exploratory study on Open Data, democracy and public sector reform on Great Britain, a country that has been at the global forefront of Open Data initiatives. Davis' conclusion, that many current Open Data uses supporting political purposes are "exploratory and experimental" (2010, p. 2), corresponds to other scholars' findings. As Davis' study is about eight years old, possible changes may meanwhile have occurred in this rapidly growing field. Concerning civil participation in democratic processes, Davis reveals that services relying on Open Data, in most cases, are not used to support scrutiny of formal political processes, but instead for supporting co-production of public services between social and commercial entrepreneurs and the state, and also for creating "improved information services for 'citizen consumers'. These two featured directions of services relying on Open Data emphasize notions of 'personal' over 'collective' democracy" (Davies, 2010, p. 4) – an issue, I will address in the second research question, where I will examine Danish examples of Open Data use.

In summary, it can be said that the current research points to a number of challenges in the field of Open Data, public information and civil participation in democratic processes. One challenge is the difficulty to transform Open Data into meaningful information which concerns primarily system architects and the intended addressees. Two other issues deal with the scientific analysis of the subject. Hitherto, there are only a limited number of examples of Open Data to support public information and civil participation. Another challenge is the methodological complexity in assessing the social and political effects of Open Data initiatives.

I will at several times come back to these challenges of Open Data in the course of this study. In the following, I will first review approaches from the theory of democracy and social choice theory which I will draw upon in the further course of this work to assess to possibilities for civil participation.

3.2 The role of public information and civil participation in theories of democracy

Generally, theories on democracy differ to a great extend in terms of which role civil participation plays or should play in the democratic system. Democracy, all in all, deals with "a method of group decision making characterized by a kind of equality among the participants at an essential stage of the collective decision making" (Christiano, 2015). Descriptive theories commonly focus on analysing democracy as a system. They do not primarily aim at discussing moral foundations of democracy and democratic institutions, as do normative theories of democracy. Normative theories, on the other hand, assume forms of strong, direct citizen participation, basing on the ideas of the French philosopher Jean-Jacques Rousseau's concept of popular sovereignty ("la souveraineté du peuple"). A strong current, especially in normative theories of democracy, is deliberative democracy, in which deliberation is central to decision-making. It is amongst others pushed by Joseph M. Bessette, James Fishkin and the German philosopher Jürgen Habermas.

Protagonists of descriptive democratic theories were Max Weber (1864-1920), Joseph Schumpeter (1883-1950) and Niklas Luhmann (1927-1998). Usually, descriptive democratic theories rank participation of the citizens rather low and emphasize instead the principle of elected officials. Here, the participation of the people is limited to the act of voting. The competition for leadership by prospective decision makers for the people's vote is the vital feature (Pateman, 1970, p. 4). The way the state and the society are conceptualized can be filed under the liberal paradigm: "According to the liberal view, the citizen's status is primarily determined according to negative rights they have vis-à-vis the state and other citizens" [20] (Habermas, 1994, p. 2). Concerning the elected officials, "good government, i.e. 'government

[20] Negative rights require to refrain from certain acts. Roughly speaking, one can say that negative liberty means "freedom from", while positive liberty means "capacity to" (Powell, 2012).

in the universal interest', is achieved "through the sanction of loss of office"[21] (Pateman, 1970, p. 20). Their success is measured by the citizen's approval, the voting decisions have "the same structure as the acts of choice made by participants in a market" (Habermas, 1994, p. 3). Participation, in this case, fulfils "a purely protective function" (Pateman, 1970, p. 21). Several theorists of political science like Bernard Berelson or Giovanni Sartori even advice against too much civil participation, as they presume that more involvement of the broader mass is detrimental to democracy and can lead to totalitarianism (Berelson, Lazarsfeld, & McPhee, 1954; Sartori, 1987), invoking the liberal scepticism about reason.[22]

Sartori justifies his position amongst others with the information processes in democracies, where the "consumer of information relates to an oligopoly of information producer (media), just as the economic consumer relates to an oligopoly of producers of goods" and that the equivalent of the formula "equal voice to all" would have very dubious benefits and staggering costs (Sartori, 1987, pp. 101-102). Berelson, Lazarsfeld and McPhee argue for the benefits for the state of citizens being only partly interested in acts of civil participation, like in voting:

> The voter does have some principles, he does have information and rationality, he does have interest – but he does not have them in the extreme, elaborate, comprehensive, or detailed form in which they were uniformly recommended by political philosophers. [… T]he typical citizen has other interests in life, and it is good, even for the political system, that he pursues them (1954, p. 322).

However, I will in this work adopt the view of other scholars who claim that empirical evidence show "a valuable counterweight to the poor opinion of ordinary citizen found in much political science" and that "citizens both welcome and enjoy the opportunity to take part and to deliberate, and that they take their duties seriously" (Pateman, 2012, p. 9). The reason for my choice is based on the assumption that Sartori's position has to be reconsidered in terms of new communication and information opportunities promoted by Open Data, sometimes described as the "democratization of information". Moreover, like Sen underlines, "the twentieth century has established democratic and participatory governance as the preeminent model of political

[21] Here, "government in the universal interest" can be understood in the sense of Rousseau's *volonté général*, the will of the people as the whole.
[22] This train of thought goes back to Polybius' sequence of anacyclosis, the cyclical theory of political evolution which considers democracy a weak government, tending to degenerate (Lévy, 2018)

organization" (Sen, 1999, p. ix). Recent studies on democratization processes in the EU agree, that the conception of deliberative democracy has become a prime point of reference, adding that "conceptions converge on the importance of communicative processes of opinion and will-formation in which participants seek to convince each other by giving reasons for proposals, and are willing to revise their own opinion in the light of reasons given by others" (Steffek, 2014). This conception argues in the same way as Amartya Sen in his theory on informational broadening, which I will take up later.

3.2.1 Deliberative democracy

In contrary to the liberal paradigm, theories on participatory and deliberative democracy accentuate wider functions of the participation of the people and their need for information. Carole Pateman (1970), known as a critic of liberal democracy, judges public information and civil participation as "central to the establishment and maintenance of a democratic polity" (p. 16). In this view, as Habermas puts it, political rights – pre-eminently rights of political participation and communication – are positive liberties: "They guarantee not freedom from external compulsion but the possibility of participation in a common praxis" (Habermas, 1994, p. 2). The authority of the state should emerge from the citizens' power produced communicatively:

> So, the states *raison d'être* does not lie primarily in the protection of equal rights but in the guarantee of an inclusive opinion and will-formation in which free and equal citizens reach an understanding on which goals and norms lie in the equal interest of all. (Habermas, 1994, p. 2, emphasis in original).

The political opinion- and will-formation does not obey "the structures of market processes but the obstinate structures of a public communication oriented to mutual understanding" (Habermas, 1994, p. 3) – that is why I will further draw on Sen's theory on informational broadening, which I will take up soon. As Pateman (2012) points out, "ordinary citizens, given some information and time for discussion in groups of diverse opinions, are quite capable of understanding complex, and sometimes technical, issues and reaching pertinent conclusions about significant public matters" (p. 9).

Habermas (1994) introduced a proceduralist view of deliberative politics in which widely expanded and differentiated public spheres as well as legally institutionalized procedures of democratic deliberation and decision-making are essential components (p. 8). In the era of Open Data, this requirement can be translated as an instigation to apply the resulting communication and information opportunities to ensure public information and civil participation.

Following this, I will now turn to shed a light on the role of information in deliberation.

3.2.2 Information and deliberation

Deliberation needs information and common knowledge. "To deliberate is to evaluate available lines of action in terms of their consequences, which may depend on circumstances the agent can neither predict nor control", defines Jeffrey (1965, p. 1). He takes one of the most known models of deliberation as a starting point, the Bayesian Model[23], in which "the agent's notions of the probabilities of the relevant circumstances and the desirabilities of the possible consequences are represented by sets of numbers combined to compute an *expected desirability* for each of the sets under consideration" (Jeffrey, 1965, p. 1, emphasis in original). Following the Bayesian principle for deliberation, an act with the maximum expected desirability is to be performed.[24]

It is in the notions of probabilities of the relevant circumstances that information comes into the play: Like mentioned before, information and probability both describe the same fact, from different angles (cf. sec. 2.4.2). The interpretation of probability as "degree of belief" goes back to Bayes. Information, in this sense, initiates an "update on probability" (Schönhammer, n.d.). Schönhammer shows that additional information modifies the probability and, as such, depends on the previous knowledge, on the amount of information available. This point induces practical consequences: If we are uncertain about the probability of a consequence – for example, if our vote for one candidate or another would lead to more protection of the environment – more information could help to refine our preferences.

[23] Thomas Bayes (ca. 1701-1671) was an English mathematician and philosopher who formulated a specific case of probability theory, known as Bayes' Theorem.
[24] In this context, the Bayesian Model is subjective to the agent, as it does not take factual or moral justifications into account.

To clarify how individual preferences are combined into a collective decision, I will now draw on social choice theory, which will be reviewed below. Special consideration is given to Sen's approach which takes the role of additional information into account.

3.3 Social choice theory

Social choice theory, generally, analyses the combining of individual options or preferences in the form of elections and votes into a collective decision to a combined social welfare function. One example would be the collective decision for a law in a given society.

Several models in social choice theory deal with the problems and paradoxes resulting from voting systems and have formulated solutions to cope with them (List, 2013). Nida-Rümelin et al. (2000) mention amongst others the problem of cyclic preference relations, already described by Marquis de Condorcet in 1785. According to List (2013), two of the central questions in social choice theory are: "How can a group of individuals choose a winning outcome (e.g., policy, electoral candidate) from a given set of options?" and "How can a collective (e.g., electorate, legislature, collegial court, expert panel, or committee) arrive at coherent collective preferences or judgments on some issues, on the basis of its members' individual preferences or judgments?".

As one of the best know results from social choice theory, Arrow's (Impossibility) Theorem is considered the mathematical proof of his surprising finding that "there exists no method for aggregating the preferences of two or more individuals over three or more alternatives into collective preferences [in a meaningful manner]" (List, 2013). But, as Arrows employed ordinal preferences in his approach, other theorists like Amartya Sen, underlined that ordinal preferences are insufficient for making satisfactory social choices: Ordinal preferences represent the preferences of an agent on an ordinal scale, according to her choice of which option is better than the other. However, ordinal preferences do not respect, *how much* better one choice is valued compared to another (Hansson & Grüne-Yanoff, 2018). That is why, as List puts it, "[n]owadays most social choice theorists have moved beyond the early negative interpretations of Arrow's Theorem and are interested in the trade-offs involved in finding satisfactory decision procedures" (2013).

3.3.1 Sen's theory of informational broadening

In the following, I will review Amartya Sen's theory on informational broadening, as it provides interesting aspects for the role of Open Data in public decision making.

Sen places his theory in a broad context of individual freedom, development and democratic institutions. In contrary to common conceptions on development, Sen postulates a view in which development not only focusses on the maxim "improve efficiency through market mechanism" (Natarajan, 2016). He states that "[t]he discipline of economics has tended to move away from focussing on the value of freedoms to that of utilities, incomes and wealth" (Sen, Development as freedom, 1999, p. 27). In this context, he argues against this narrowing of focus, as it hinders to increase "the capabilities of persons to lead the kind of lives they value" (Sen, 1999).

Concerning information, Sen claims, that when a social planner seeks to rank different social alternatives in an order of social welfare, it may be justifiable to use additional information over and above ordinal preferences, such as interpersonally comparable welfare measurements – thereby rejecting the previous implicit assumption "that preferences are ordinal and not interpersonally comparable" (List, 2013). Sen argues that

> the Arrow theorem does not in fact show what the popular interpretation frequently takes it to show. It establishes, in effect, not the impossibility of rational social choice, but the impossibility that arises when we try to base social choice on a limited class of information (1999, pp. 250-251).

Seen that way, Arrow's Theorem proofs, according to Sen, that not just the majority rule, but all mechanisms of decision making that rely on the same informational base (individual orderings of the relevant alternatives) would lead to some inconsistency or infelicity (Sen, 1999, p. 251). Correspondingly, in taking a social decision on economic matters, it would be natural for us to consider other types of information. He applies the example of division of a cake for three people in three parts of the same size: If we now would downsize one portion (maybe the one of the poorest person) in favour of the two other portions, this situation could be considered a majority improvement – but is this social betterment in the democratic sense? Sen concludes on Arrow's Theorem with a claim for informational broadening:

> Rules of this kind build on an informational base consisting only of the preference rankings of the persons, without any notice being taken of who is poorer than whom, or who gains (and who loses) how much shifts in income, or any other information (such as how the respective persons happened to earn the particular shares they have). The informational base for this class of rules, of which the majority decision procedure is a prominent example, is thus extremely limited, and it is clearly inadequate for making informed judgements about welfare economic problems. This is not generally because it leads to inconsistency (as generalized in the Arrow's theorem), but because we cannot really make social judgements with so little information (1999, p. 252).

While others argue, that it is impossible to have a coherent framework for reasoned social assessment, given the heterogeneity of preferences and values that different people have, Sen points to the use of a broader informational base than bare preference rankings – which already practically takes place, and which also is a relief of obtuse procedures like in the cake example. "In fact, in making economic judgements we tend, in general, to use much more broader types of information that is permitted in the class of mechanisms compatible with the Arrow framework" (1999, pp. 252-253). In that sense, Arrow's theorem shows that "what is possible and what is not may turn crucially on what information is taken into effective account in making social decisions" (1999, p. 252). Concludingly, informational broadening is key to coherent and consistent criteria for social and economic assessment.

But how to institutionalize informational broadening in a democratic setup? Here, I close the bow to the idea of deliberative democracy. Sen underlines the importance of "preference formation through social interaction" (1999, p. 253): It is important not only to act on the basis of given preferences, but on the development of individual preferences and norms through public discussion: Our ideas of what is just and what is unjust may or may not be influenced by another's view, as "we tend to react to one another's view sometimes with a compromise or even a deal, and at other times with relentless inflexibility and stubbornness" (1999, p. 253).

Consequently, public policy does not only have to attempt "to implement the priorities that emerge from social values and affirmations, but also in facilitating and guaranteeing fuller public discussion" (Sen, 1999, p. 281) which can be helped by a variety of public policies. This approach supports "the idea of the public as an active participant in change, rather than as a passive and docile recipient of instructions and dispensed assistance" and corresponds with

Habermas' claim for the "guarantee of an inclusive opinion and will-formation in which free and equal citizens reach an understanding on which goals and norms lie in the equal interest of all" (1994, p. 2).

I will examine, how the Danish Open Data strategy takes this approach into account in the first research question in chapter 5. Before that, I will briefly address the relationship between social choice theory and deliberative democracy.

3.3.2 Social choice theory and deliberative democracy

Some scholars consider social choice theory and deliberative democracy incompatible "in that one demonstrates the impossibility, instability or meaninglessness of the rational collective outcomes sought by the other" (Dryzek & List, 2003, p. 1). But as Dryzek and List show, – and as Sen (1982) also argues – the traditions can be reconciled. Without illustrating the details, I want to point to several findings in their work, in which they identify the conditions under which meaningful democratic decision making is possible. Dryzek and List rely amongst others on the same "escape-route from Arrow's theorem via introducing more information" (Dryzek & List, 2003, p. 25). One of the main resulting concepts is interpersonal comparability "of preference intensity or of a suitable individual welfare measure" (p. 24). Group deliberations can contribute to agree on an evaluation variable of for assessing individual interest that are interpersonal comparable. Generally, the role of deliberation in this framework is to bring about situations in which collective decision making is meaningful, "suggesting that democracy must in the end have a deliberative aspect" (Dryzek & List, 2003, p. 28).

3.4 Hypothesis construction

The preceding chapters set out the context of data, information and knowledge and outlined a theoretical framework around Open Data, informational broadening and deliberative democracy.

Backing upon the aforementioned theories my hypothesis is:

- ***Open Data have the potential to support deliberative democracy by contributing to informational broadening (H1)***

The following hypothesis H2 can be derived:

- ***The democratic government of a country with an advanced IT infrastructure will apply measures to promote Open Data (H2)***

Relating to Denmark, the conclusion is then that

- ***If Denmark has an advanced IT infrastructure, it is to be expected, that the government will apply measures to promote Open Data to support deliberative democracy (C1)***

The next chapter will now assess whether the precondition for this conclusion C1 is given. To this end, the legal, technical and infrastructural conditions for Open Data in Denmark are examined.

4. The conditions for Open Data in Denmark

Summary: In this chapter, the conditions for Open Data in Denmark are scrutinized. First, in sec. 4.1, the legal basis for Open Data is outlined. Sec. 4.2 takes a glance on the infrastructural conditions, both technically and those of human resources, before a partial conclusion is given in sec. 4.3.

Denmark has long been known as a democratic civil society with a tradition of social trust (Svendsen, Svendsen, & Graeff, 2012). The government refers to "a long tradition of openness" when it started introducing the topic of public Open Data in action plans and strategy papers (Digitaliseringsstyrelsen, 2012). I will here examine the legal and infrastructural preconditions for Open Data in Denmark in order to judge, if the preconditions for the conclusion C1 can be considered fulfilled.

4.1 The legal basis for Open Data in Denmark

The legal basis for the Danish Open Data strategy relies on the Directive 2003/98/EC of the European Parliament and the European Council on the re-use of public sector information, also known as the PSI Directive. The aim of the directive is to make public information available as unbureaucratically as possible in order to overcome competitive disadvantages that EU companies face in contrast to US competitors, which benefit from a sophisticated, well-functioning system of public information (European Commission, 2018a). However, the directive does not overwrite property rights of the Member States, so that the decision whether re-use is authorized remains a matter of choice for the respective individual states or the local public authority.

Denmark has applied a combination of legislation predating the directive as well as new measures specifically addressing the re-use of public sector information.[25] The latest changes in this domain were the Access to Public Administrative Documents Act[26] (Lov om offentlighed

[25] https://ec.europa.eu/digital-single-market/en/news/implementation-psi-directive-denmark
[26] http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=1263

i forvaltningen, Lovtidende A n° 572, 19.12. 1985) and the following two amendments from 2008[27] (Lov om ændring af lov om videreanvendelse af den offentlige sektors informationer, Lovtidende A n° 551, 18/06/2008) and 2014[28], respectively, which followed an amendment in the EU Directive.

The effects of these laws and amendments are reflected in the policies in diverse governmental action plans and strategy papers, like the *Strategi for Danmarks digitale vækst*, *Sammenhængsreformen*, *Den fælleskommunale digitaliseringsstrategi* and the action plans based on the *Open Government Partnership* which are issued regularly. A number of them will be examined in the course of this work.

4.2 The infrastructural basis for Open Data in Denmark

The technical conditions for Open Data in Denmark are excellent, as are those of human resources: The European Commission ranks Denmark first in the Digital Economy and Society Index 2017 (DESI), see Fig. 4. "Denmark made outstanding progress in the use of digital technologies by enterprises and by citizens, leading the EU and the world rankings" (European Commission, 2017), the report summarizes. The index measures progress in digital through five components: technical connectivity (like broadband speed and prices), human capital (skills and internet use), use of internet (citizen's use of content), integration of digital technology (business digitisation and e-commerce) and digital public services (e-government), where the latter also includes indicators on Open Data.

[27] http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=1120
[28] http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=9448

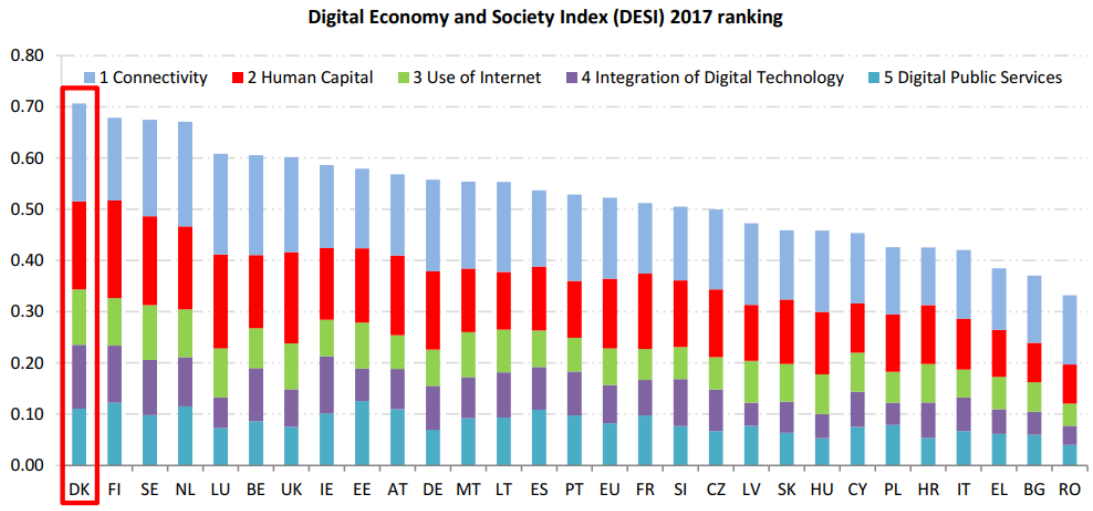

Figure 4: Digital Economy and Society Index (DESI) 2017, Source: European Commission, https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2017

Denmark features thus the widest 4G coverage (100% of households) in Europe. Almost half of all Danish households (49%, June 2016) have a subscription to fast broadband, for which they pay an affordable prize. Concerning human capital, 94% of Danish citizens are online, and "[t]heir digital skills are very advanced" (European Commission, 2017). As the report further states, Danish citizens actively engage in the use of a variety of online services. As to the integration of digital technology, Denmark ranks first in the use of digital technologies by businesses.

Regarding Denmark's efforts in digitization, however, one point is worthy of note. As the European Commission states: "Compared to last year, Denmark made progress in all dimensions, except for Digital Public Services" (European Commission, 2017), namely the category comprising the indicators on Open Data. Although the Commission judges Denmark as "strong in the delivery of online public services", the nation scores one of the last places in Open Data maturity (24th), see Fig. 5, "due to a transition phase towards a new eGovernment portal". Before I proceed to sketch the current state of Open Data in Denmark, I will already now briefly point to two issues relevant to the location of Open Data in Denmark and the understanding of e-government.

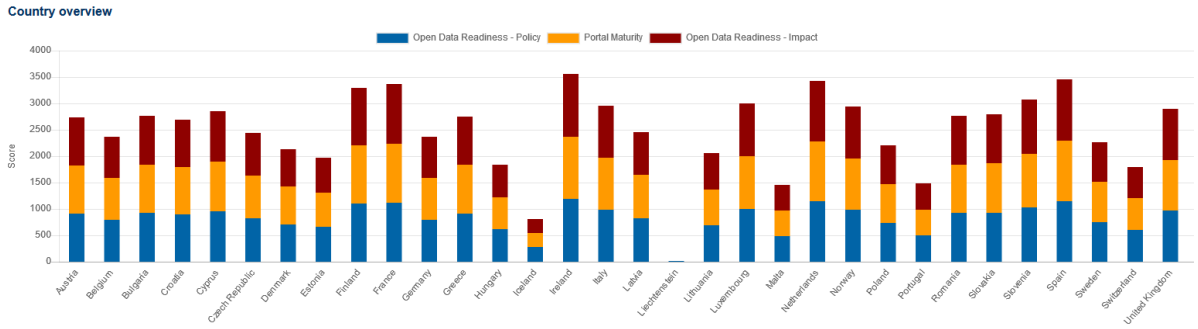

Figure 5: Open Data maturity in Europe – Country overview. Source: Open Data Maturity Report 2017, European Commission, https://www.europeandataportal.eu/sites/default/files/edp_landscaping_insight_report_n3_2017.pdf

1. Location: The DESI-report does not clarify what is meant with the "new eGovernment portal" to which the mentioned transition is directed. This ambiguity reflects one of the problems of public Open Data in Denmark: Despite the existence of an official portal for public Open Data in Denmark, relevant data are spread out over several portals and not accessible via a single point of entry – unlike in other countries like Norway, Sweden or Great Britain. The cited statement does obviously not refer to the portal at portal.opendata.dk, as this service already started up in 2015[29].

2. Understanding of e-government: The concepts of e-democracy and e-government are not used consistently in the literature. Their definitions vary, especially concerning their scope and if they are seen as a *technological* or a *social approach*. This distinction is of importance, as it has consequences for the understanding of what should be covered by Open Data initiatives. While the first conception emphasizes the effects of information and communications technology on the effectivization of bureaucracy and public services, the latter accentuates new possibilities for communication and civil participation. I will come back to that topic later, particularly in sec. 5.5.4.

[29] Mail from [redacted] OpenData.dk, 14. 03.2018

4.3. Partial conclusion

The preceding observations prove that Denmark has an advanced IT-infrastructure. Hence, the precondition for C1 is fulfilled. According to that, it is thus to be expected, that the Danish government will apply measures to promote Open Data.

The next two chapter will examine, to what extend this situation is given and the preceding hypotheses H1 and H2 hold true.

In order to get a complete overview on measures to promote Open Data in Denmark, the chapters 5 and 6 take different perspectives into account. While chapter 5 looks at the Danish Open Data strategy, chapter 6 analyses the practical use of Open Data. More precisely, chapter 5 investigates the role of considerations on public information and civil participation in Danish Open Data initiatives (RQ1). Chapter 6 then explores, which models of democratic engagement are supported by the use cases published on OpenData.dk (RQ2).

5. Analysis of the Danish Open Data initiatives

Summary: In this chapter, an analysis of the Danish Open Data initiatives is given. First, sec. 5.1 examines how the topic of Open Data was introduced and established in Danish policy making. In sec. 5.2, the development of the Danish Open Data strategy in the context of the international Open Government Partnership is scrutinized. Sec. 5.3 discusses the current policy. Sec. 5.4 delineates the actual state, as to what kind of datasets are published, by whom and where. A summary of the findings is given in sec. 5.5. Finally, sec. 5.6 presents a partial conclusion.

The analysis of the Danish Open Data strategy takes place in the light of conclusion C1, that the Danish government is expected to apply measures to promote Open Data. This, in turn, has the potential to support deliberative democracy by informational broadening, according to H1. In order to find out, whether the preceding hypotheses holds true, I will now examine the considerations on public information and civil participation, as they are represented in governmental action plans, officially published initiatives and other documents I consider most relevant for the release and use of public Open Data in Denmark (RQ1).

Because of their importance for a broad range of sectors, digitization and the use of Open Data play a role in several governmental, regional and municipal action plans. Table 1 shows an overview of the mentioned Open Data-related strategy papers and action plans. I will mostly refer to the plans in chronological order to draw a picture of the evolution of the approach to Open Data in Denmark.

Overview on Open Data strategy papers and action plans				
initiative	**issued by**	**postulated aim**	**start date**	**status**
Den fællesoffentlige Digitaliseringsstrategi 2011 – 2015	Government, Regions and municipalities	modernization and more efficiency in the public sector	2011	ended
Offentlige Data i spil	First IT- og Telestyrelsen/Videnskabsministeriet, then Digitaliseringsstyrelsen/Finansministeriet	to open up data from public authorities to be used by the private sector	2011	ended (30.11.2012), to be continued as part of Open Government Partnership
Open Government Partnership: *National Handlingsplan 2012*	Digitaliseringsstyrelsen/Finansministeriet	transparency of public decision making processes, civil participation, increased accountability, efficiency, and innovation	April 2012	ended Oktober 2013, as the following action plan came into effect
Open Government Partnership: *National Handlingsplan 2013-2014*	Digitaliseringsstyrelsen/Finansministeriet	exploit new technologies to enhance transparency, growth and quality of life through open data and digital welfare, new role of public sector	Oktober 2013	was scheduled to end in 2014, but was extended with the following initiative. Ended 1. July 2016
Additional initative *Åbning af offentlige datasæt*	Digitaliseringsstyrelsen/Finansministeriet	to support the opening of public datasets, as well as informing about options for providing data and accessing data	Januar 2015	Ended on 1. July 2016
Open Government Partnership: *National Handlingsplan 2017-2019*	Digitaliseringsstyrelsen/Finansministeriet	more and better open data, more citizen participation, more efficiency in the public sector	December 2017	active
Strategi for Danmarks digitale vækst	Finansministeriet	support companies to use new technologies to create growth and welfare	January 2018	active

Table 1: Overview on Open Data strategy papers and action plans

5.1 The beginning: *Offentlige Data I Spil*

Before Denmark officially joined the Open Government Partnership in 2011, the initiative *Offentlige Data I Spil* was the first programme that set Open Data on the national political agenda in 2009. The initiative was placed in the context of the progressing digitization of public administration and was set in relation to the rise of social media, the web. 2.0 and new technical possibilities which provided new ways for the state and the citizen to interact with each other. The idea was to promote a dialogue between stakeholders to promote the release of Open Data (Digitaliseringsstyrelsen, 2017).

When the initiative *Offentlige Data I Spil* was launched, transparency and civil engagement were among the declared goals of the initiative. The starting point for the program is described as a digital environment "hvor borgere og forbrugerne i langt højere grad inddrages og deltager i udviklingsprocessen" – which corresponds with the idea of deliberative democracy – and where "adgang til offentlige data kan skabe mere transparens i den offentlige forvaltning" (Digitaliseringsstyrelsen, 2017). Generally, Denmark has a long tradition for the involvement of citizens who will be affected by a legal decision (OECD, 2001). Additionally, many

arguments have meanwhile been put forward to support Open Data initiatives, especially addressing the possibilities for an effectivization of the public sector and the economic benefit that lies in public Open Data (Digitaliseringsstyrelsen, 2017; 2012).

In the initiative *Offentlige Data I Spil* the leading view on Open Data is thus twofold: One the one hand, Open Data are judged as a driver for economic growth, "digitalt råstof", as well as a means for transparency, participation and accountability, as "kilde til indsigt". The initiative was thus considered to enable not only companies and entrepreneurs, but also citizens and NGOs to get access to public Open Data for both commercial and non-commercial purposes. The value of Open Data for the democratic progress is underlined: "Tilgængelige offentlige data er et centralt råstof i denne proces - til gavn for såvel Danmarks konkurrenceevne som for den demokratiske proces." The expected results are described as new services and insights: "nye tjenester og anderledes analyser, ny information og bedre indsigt til nytte for både borgere og erhvervsliv". Citizens would be able to translate ideas, wishes and creativity into concrete innovations (Digitaliseringsstyrelsen, 2017).

The announcement of "Offentlige Data I Spil" refers to potential problems of public Open Data use: It mentions uniformity and integration problems in a very general manner ("Det er dog en væsentlig barriere, at der i dag ikke findes en ensartet praksis på området") – it remains unclear, if this statement refers to problems of technical nature or to the missing of a uniform strategy, as both could be the case. As well, issues of Open Data awareness are mentioned, both on the side of authorities and on the side of entrepreneurs ("mange virksomheder og iværksættere ikke ved, at de værdifulde data findes, og at mange offentlige myndigheder ikke er bevidste om værdien af deres data"). Open Data awareness problems on the sides of citizens, which could hamper their ability to participate in democratic deliberation, are not mentioned.

In order to inform and to interact with citizens, the initiative led to an online forum, *digitaliser.dk*, and encouraged people to join the debate in a dedicated group of that forum, the group *Offentlige Data I Spil – initiativet* (ODIS)[30]. The initiative explicitly invited people to contribute to a "wish list", *Ønskelisten*[31], and come with suggestions, which public Open Data

[30] https://www.digitaliser.dk/group/237756
[31] https://www.digitaliser.dk/resource/520345

should be published: "Hvilke offentlige data vil du gerne have udstillet?" (Digitaliserings-styrelsen, 2017). This attitude can be seen as a systematic approach to institutionalize informational broadening, as it facilitates fuller public discussion (Sen, 1999, p. 281). If the respective data are provided, the citizens are being encouraged to develop an individual preference through public discussion, based on the data. If the citizens know, e.g., who precisely would be advantaged or disadvantaged by budget allocations, they would be empowered to take a more informed choice on who should have a bigger piece of the cake.

Among the requested datasets on the "wish list" were political data, geographical data, economic and environmental data, as well as crime data, legal data, and statistical data. Several of the requested datasets are meanwhile published, like topographical data and Denmark's financial budget. For an overview of the request und consequential releases of Open Data, I refer to Appendix A. Remarkably, there were no more posts on the "wish list" since January 2014, although the ODI group and other parts of the forum remain active (c.f. chap. 8).

The ODIS group has public access and currently about 320 members. I will further discuss the forum as a community of practice in chapter 8.

5.1.1 Transferral of accountability for *Offentlige Data I Spil*

When the initiative *Offentlige Data I Spil* took off, it was headed by the IT and Telecom Agency, *IT- og Telestyrelsen* under the Ministry of Higher Education and Science. After the Danish general election 2011 introduced a shift in government[32], the IT and Telecom Agency was abolished. The task *Offentlige Data I Spil* was assigned to the new Digitization Agency, *Digitaliseringsstyrelsen*, now under the roof of the Ministry of Finance.

A few days later, the Open Government Partnership was officially established on the sidelines of a United Nations General Assembly Meeting.

[32] As a consequence of the elections on 15th of September 2011, Helle Thorning Schmidt took over as Prime Minister from Lars Løkke Rasmussen.

5.2 The international commitment: Open Government Partnership

The Open Government Partnership (OGP) was launched by the then US president Barack Obama at the United Nations General Assembly meeting with seven other heads of state and an equal number of leaders from civil society (The White House, n.d.).

The OGP is important in the framework of public information and deliberative democracy, as the participating countries commit themselves to "to promote transparency, empower citizens, fight corruption, and harness new technologies to strengthen governance" (Open Governement Partnership, 2018). As such, the OGP promotes the use of Open Data in the sense of deliberative democracy: "In a well-functioning, democratic society citizens need to know what their government is doing. To do that, they must be able freely to access government data and information and to analyse and share that information with other citizens" (Open Government Partnership, 2018a). Participating member states have not only to deliver action plans which have to be developed with public consultation but are also obligated to deliver independent reports on their progress.

The narrative

The first Danish Open Government Partnership action plan (*National Handlingsplan 2012*) placed the Danish OGP participation within a narrative of a world in development: "Den danske folkestyre trænger til for fornyelse", states the plan and continues in a very general manner: "Det sker I erkendelse af, at verden forandrer sig" (Digitaliseringsstyrelsen, 2012, p. 5) and "ligger i forlængelse af regeringens dagsorden for god regeringsførelse og prioriteringen af udbredelse af demokratiske traditioner og værdier" (p. 6). The plan refers to new technical possibilities for civil participation and to the ensuing commitment "at deltagerlande forpligter sig til initiativer inden for transparens omkring offentlige beslutningsprocesser, borgerdeltagelse og dialog med civilsamfundet, antikorruption og ansvarsplacering samt teknologi og innovation" (p. 6).

Additionally, the role of the public sector is questioned to be subject to change: "Vi skal udnytte de nye teknologiske muligheder til at forandre og forny den offentlige sektors rolle til en mere åben og samarbejdende form og til at fremme god regeringsførelse" (p. 6) and "[d]et handler om ny teknologi – men mest af alt handler det om en ny tilgang til den offentlige sektors rolle" (p. 6). This new role should be based on openness: "Øget åbenhed og offentlighed fører

til bedre politiske beslutninger" (p. 5). In principle, the stage for using Open Data for public information is set, as this standpoint emphasizes the value of informational broadening.

The focus on efficiency

The action plan lists initiatives within five sections: better public services, integrity and anti-corruption, effectivization of public services, creation of a safer society and increased corporate social responsibility. However, the plan mentions better and more effective public services as the focus point. The action plan does not include success criteria for good governance or time frames for the initiatives, so that no mechanism to control the implementation of the initiatives is given.

The Open Data projects in the action plan are mainly categorized under the section of more effective services, as the "re-use of public data" under the headline "Genanvendelse af offentlige data". However, the plan announced the intention to open governmental data, "at gøre den offentlige sektors informationer (data og digitalt indhold) tilgængelige for videreanvendelse af enkeltpersoner, medier, virksomheder mv" (Digitaliseringsstyrelsen, 2012, p. 13). But at the same time, a connection is drawn from information dissemination, the release of Open Data, to the use of open source software in the public sector, within a perspective of efficiency: "Desuden kan man anvende teknologier (open source software og åbne grænseflader), der gør det så let og billigt som muligt at udvikle både helt nye og relaterede tjenester på basis af den offentlige digitalisering" (p. 13). A focus on civil participation is thus hard to detect.

The Open Data projects

Although the action plan underlines the view on Open Data as a two-fold ressource, "en form for digitalt råstof som kan anvendes i udvikling af kommercielle produkter til at skabe bedre offentlige information og service, til at formidle viden og indsigt og til at styrke transparens og demokrati" (Digitaliseringsstyrelsen, 2012, p. 13), the Open Data projects in the action plan sparsely contribute to public information. They include

- regional and local public-private partnerships on Open Data in Region Midtjylland, *Smart Region*[33], and, correspondingly, *Smart City*[34] in Aarhus

- the stimulation of the use and re-use of open source software in the public sector via the platform *Softwarebørsen*[35]

- the consolidation of key data, *Grunddata*, meanwhile called *Datafordeleren*[36]: The project interconnects eight different programmes from CPR-numbers to water course geodata. The project could definitely contribute to public information but is mainly seen in its quality to be "ét fælles og fuldt sammenhængende forvaltningsgrundlag af høj kvalitet" (Digitaliseringsstyrelsen, 2012, p. 17).

- the continuing effort for public Open Data, in the form of the continuation of the initiative *Offentlige Data I Spil*, featuring a list of Open Data sets, *Datakataloget*[37]. This initiative could also contribute to public information. However, it remains unclear, whether businesses or citizens are considered as the target group, as the initiative is launched "med henblik på at give **private** lettere adgang til at anvende flere offentlige data" (Digitaliseringsstyrelsen, 2012, p. 13, emphasis mine). But as support and exchange of experiences are announced, they are not directed to educate the public, but to authorities: "Offentlige myndigheder bistås med vejledningen i indsatsen med at stille data til rådighed, […] og gode eksempler på åbne data og anvendelse af åbne data dokumenteres" (p. 13).

The involvement of citizens

As a supporting initiative for the promotion of open government, again, the establishment of an online-based community is announced to coordinate cooperation, to document and to share experience for interested citizens:

[33] https://portal.opendata.dk/organization/region-midtjylland
[34] https://portal.opendata.dk/organization/about/city-of-aarhus
[35] https://www.digitaliser.dk/catalogue/3
[36] http://datafordeler.dk/
[37] https://www.digitaliser.dk/catalogue/1

> Til at understøtte det samlede Open Government Partnership-arbejde etableres et online-baseret community for embedsmænd og andre, som arbejder med open government-aktiviteter, hvor der kan erfaringsudveksles og samarbejdes, hvor arbejdet med Open Government Partnership kan dokumenteres og løbende udvikles, og hvor hele civilsamfundet kan inddrages. (Digitaliseringsstyrelsen, 2012, p. 11).

The mentioned online community for the promotion of the Open Government Partnership resides on the same website as the group for the public promotion of Open Data, on the forum *digitaliser.dk*. Nevertheless, the initiative did not evoke much reaction. At the time of writing, there exist two relevant groups in the forum, *Government 2.0 - Open Government*[38] (52 members, latest activity in September 2015) and *Open Government Partnership - udarbejdelse af handlingsplan for 2017-2019*[39] with 13 members and two activities at all: the announcement of the open consultation on the consultation portal (June 2017), with direct link to the consultation portal, and the announcement on the main topics in the then forthcoming action plan (September 2017). Included here is a call to action: to send comments to the person accountable for the Danish OGP action plans (the author of the two announcements). His full name, phone number and e-mail-address are mentioned, as well as the deadline, two weeks after publishing date – but no reactions in the forum.

The Outcome of the Open Data projects

Softwarebørsen exists and seems to be frequented by public employees from it-departments. It contains descriptions of and links to software packages and source code. But although open source software shares numerous arguments with Open Data, *Softwarebørsen* cannot be considered as an Open Data initiative in the sense of the OGP.

Smart Region and *Smart Aarhus* have produced series of open datasets and seek input from citizens for further development: "I idebanken vil det være muligt for alle interesserede at komme med idéer til, hvilke datasæt de offentlige myndigheder og institutioner skal arbejde på at gøre tilgængelige". (Digitaliseringsstyrelsen, 2013, p. 15). "Målet for Smart Aarhus er at

[38] https://www.digitaliser.dk/group/524565
[39] https://www.digitaliser.dk/group/3647348

blive en internationalt anerkendt model for byudvikling baseret på partnerskaber" (Digitaliseringsstyrelsen, 2013, p. 35).

Datafordeleren is currently under development and was partly delayed in December 2017 due to data integration problems (Finansministeriet, 2017).

Datakataloget is currently an unsorted list of more than 770 datasets.

5.2.1 The further development of the OGP Open Data initiatives

The following actions plans for the Open Government Partnership continue the narratives from the initial action plan but judge Open Data increasingly in an economic perspective. For example, Open Data are one out of four themes in the *National handlingsplan 2013 – 2014* and are categorized under the headline "innovation, gennemsigtighed og effektivisering" (Digitaliseringsstyrelsen, 2013, p. 9). The meaning of Open Data is summarized in the light of effectivization as socioeconomic gain:

> Den offentlige sektor indsamler, producerer, reproducerer og formidler mange informationer og data med henblik på at varetage sine offentlige opgaver. Det gælder f.eks. oplysninger om økonomi, geografi, vejrforhold, turisme, erhvervsforhold, patentrettigheder og uddannelse. Når data allerede er udarbejdet i forbindelse med offentlige myndigheders løsning af egne opgaver, er der en samfundsøkonomisk gevinst i at udnytte disse informationer så meget som muligt (p. 9).

Mainly one initiative in the following action plans can be considered relevant for public information: The intention is mentioned to release documents of the Danish parliament as raw and machine-readable open data: "Folketinget vil gøre det muligt for borgere, virksomheder og civilsamfundsorganisationer at få direkte adgang til at hente rådata og at bruge dem i nye digitale sammenhænge" (Digitaliseringsstyrelsen, 2013, p. 19). The initiative "Åbning af offentlige datasæt" was later added to the plan and includes the release of Open Data on all government spending (Digitaliseringsstyrelsen, n.d.). The addition of the initiative followed inquiries from citizens: "Dette commitment er tilføjet til handlingsplanen på opfordring fra repræsentanter for civilsamfundet, som bl.a. efterspørger en opdatering af standardlicensen for åbne offentlige data" (Digitaliseringsstyrelsen, 2015).

Both the parliament data and the data on government spending are meanwhile accessible. However, the independent reporting judged, that the initiative does not fundamentally facilitate access to information and criticizes the lack of tools: "Der findes ingen offentlig tilgængelig registrering af retningslinjer eller værktøjer til at understøtte åbne data, og forpligtelsen er ikke formuleret tydeligt nok til at fastslå, helt præcis hvilke værktøjer der er tale om" (Eberholst, 2016).

Generally, all Danish Open Data initiatives in the frame of OPG partnership are evaluated as having a minor or limited impact. The current initiatives with regard to Open Data concern the release of historical data from the Danish National Archive. The current action plan, the *National handlingsplan 2017-2019* does not indicate an official release datum (Digitaliseringsstyrelsen, 2017b). After the delivery of the plan, Denmark was officially reprimanded by the OGP for delayed delivery, for the second time: "according to OGP policies, the Government of Denmark has now acted contrary to the OGP process for two consecutive action plan cycles" (Pradhan, 2017). Obviously, the obligations following the OGP are not taken very seriously.

5.3 The current policy: *Strategi for Danmarks digitale vækst*

The paper on the overall strategy for digital growth in Denmark, *Strategi for Danmarks digitale vækst*, was published by the Danish government in January 2018. Press releases came out simultaneously (and with the same content) on the websites of the ministry of education and the ministry of economics (cf. Appendix B), which stands as author for the paper, on 30th January 2018.

The paper comprises 38 initiatives for digital growth. Almost one billion Kroner have been put aside for the realization of the initiatives until 2025. The strategy has been developed based on the recommendations of the government's Panel for Digital Growth (*Digitale Vækstpanel*) and on discussions in the Government's Council Disruption (*Disruptionråd*). Concerning Open Data, plans are to promote the dissemination and commercial exploitation of public Open Data, "at fremme udbredelsen og den erhvervsmæssige udnyttelse af åbne offentlige data" (Erhvervsministeriet, 2018, p. 47). Apart from the DMI-data, the future release of public Open Data from the transport sector the mobility sector and the food sector are considered (p.49).

Although the strategy was also published by the Ministry of Education, the building and sharing of knowledge around Open Data or possibilities of civil participation brought about by new communication technologies do not play a significant role. The postulated aim with regard to education is to equip people with the right skills to match business demands in a digital environment. These skills, in turn, should help to identify new possibilities for the use of digital technology and contribute to economic growth. In contrary, in the regard of deliberative democracy, it could have been expected, that the strategy includes measures to prepare the citizens to make use of the new possibilities for participation.

However, aims relating to the support of the democratic process are mentioned, as the basis for the education of people in order to prepare them to take part in processes and decisions that affect their lives: "Folkeskolen og ungdomsuddannelserne skal have fokus på øget teknologiforståelse ud fra et *demokratisk* grundsyn om, at borgere skal kunne deltage og have indflydelse på processer og beslutninger, der påvirker deres eget liv" (Erhvervsministeriet, 2018, p. 38, emphasis mine). But even if civil participation here is mentioned, the strategy does not include concrete measures to promote it.

In the next section, an overview of the current state of public Open Data in Denmark is given, before the findings of this chapter's analysis are summarized in sec. 5.5.

5.4 The current state of Open Data in Denmark

Public Open Data in Denmark is spread out on different platforms. Fig. 6 on the next page shows a screenshot of the main portal under Opendata.dk.

In contrast to that, Fig. 7 and Fig. 8 display the Open Data Portals of Norway and Great Britain, which represent portals with a single point of entry.

The Danish portal for Open Data

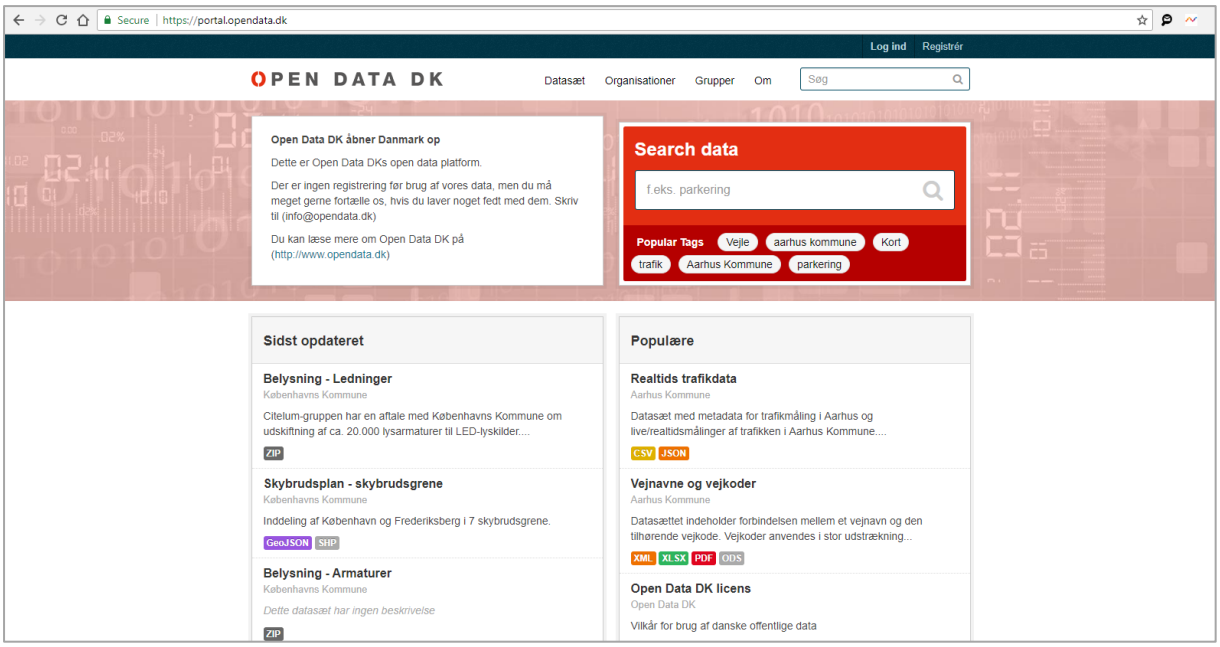

Figure 6: Screenshot from https://portal.opendata.dk, 02.05.2018

The Norwegian portal for Open Data

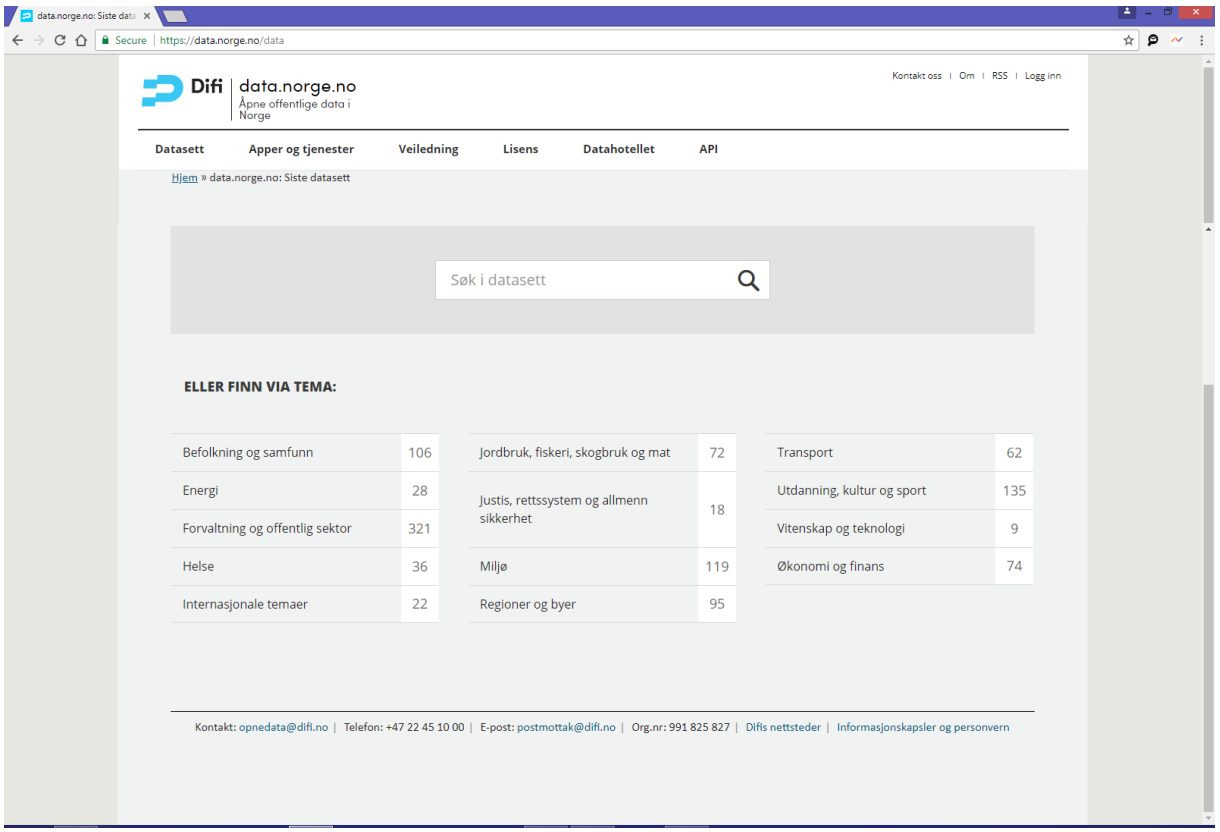

Figure 7: Screenshot from https://data.norge.no/data, 18.04.2018

The British portal for Open Data

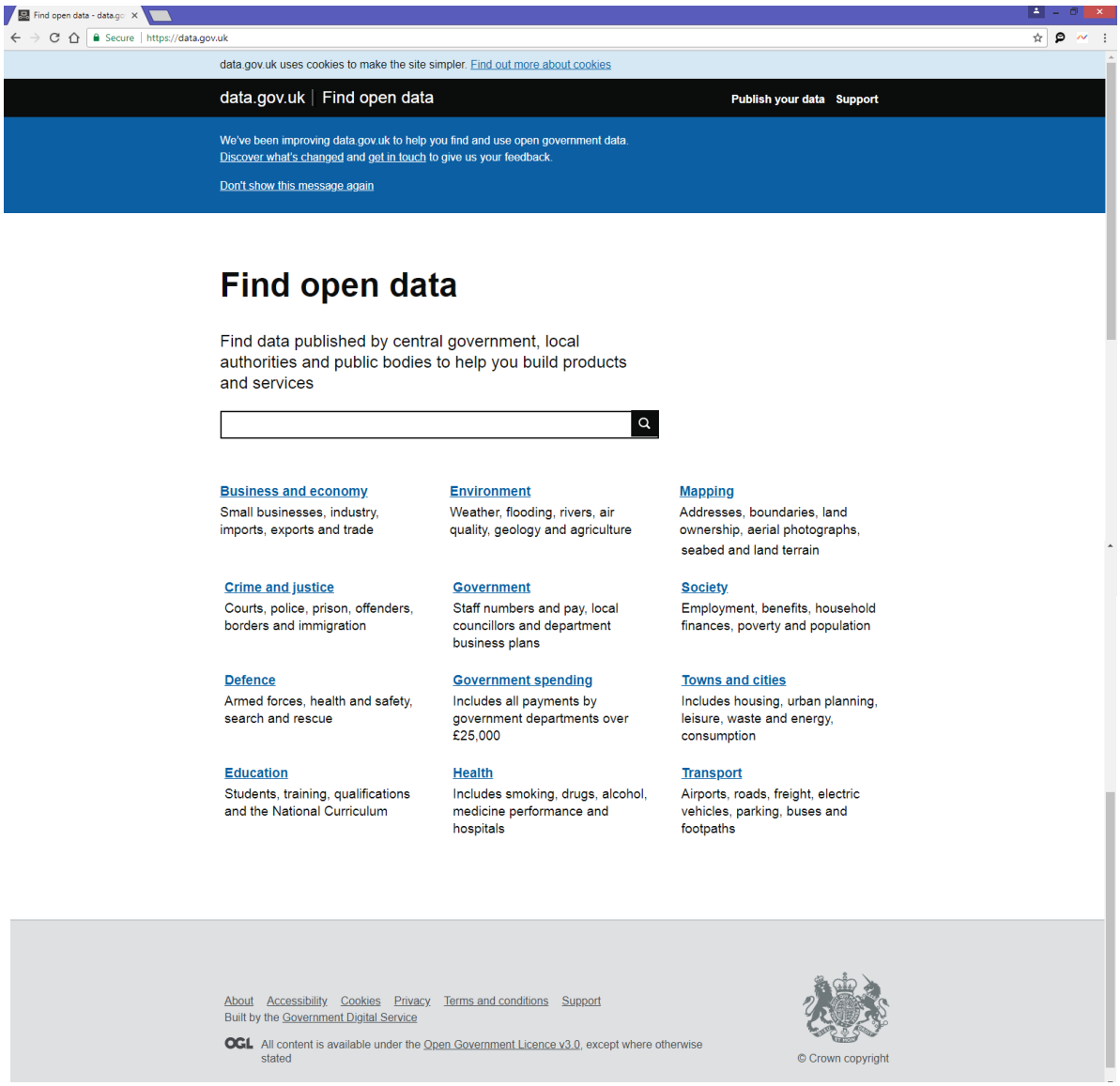

Figure 8: Screenshot from https://data.gov.uk, 18.04.2018

5.4.1 OpenData.dk

The data portal under **OpenData.dk** lists currently around 914 datasets, mainly from the municipalities of Aalborg, Aarhus, Vejle, Odense, Copenhagen and from the region Midtjylland. The service is based on the open source software CKAN[40] from the Open Knowledge Foundation. The platform links to other portals whose datasets are not integrated in the OpenData.dk platform – a fact that hinders potential users to get an overview on the assortment of Open Data and which is explained as follows: ”I Danmark findes der flere forskellige portaler, der hver især tilbyder åbne data indenfor deres fagområde” (Open Data DK, 2015).

The datasets can be sorted by their name, the date of the last update, their popularity and their relevance[41]. The data can also be searched by publishing institution, as well as by assigned groups or tags. The group and tag labels seem rather unstructured. The groups containing the most datasets are *Turisme*, *Smart City Challenge Frederiksberg*, *Mobilitet*, *Kultur*, and *Offentlige toiletter*. The most commonly used tags are *Vejle*, *aarhus kommune*, *Kort*, *trafik* and *Aarhus Kommune*. The fact that there exist two tags for “Aarhus kommune” in different spellings (which each link to different datasets) can be seen as an indication for a missing structure and the neglected maintenance of the portal.

The portal OpenData.dk is driven by the cooperation (*forening*) Open Data DK which originated from a cooperation between the municipalities of Aalborg, Aarhus, Vejle, Odense, Copenhagen and the Central Denmark Region, Region Midtjylland[42]. Open Data DK is also member of a public partnership between the ministry of economics, the organisation of all 98 municipalities (*Kommunernes Landsforening*, *KL*) and the Danish regions, which aims at scrutinizing business possibilities of Open Data (Erhvervsministeriet, 2018, p. 49).

5.4.2 Other Open Data portals in Denmark

Other relevant Open Data portals in Denmark are the following:

[40] http://ckan.org/
[41] The criterium of “relevance” is not further specified on the website.
[42] https://portal.opendata.dk/about

- ***Danmarks Statistik*** (https://www.dst.dk/da/) from the authority in charge of creating **statistics** on the Danish society which include employment statistics, trade balances, and demographics, published as Open Data on an online portal and via an application programme interface (API)

- ***Virk.dk*** (https://data.virk.dk/) from the Danish Business Authority which provides several business-relevant datasets such as business registration numbers (CVR data), local plans or industry codes

-

Danmarks Miljøportal (http://www.miljoeportal.dk/), the portal on environmental data which offers, e.g., data on water quality, soil pollution, agriculture and nature conservation

- the portal of the Danish Geodata Agency, ***Geodatastyrelsen*** (http://eng.gst.dk/), which makes large amounts of geodata available, including basic map data, nautical charts and topographic maps. These data are thought to be included in the portal *Datafordeler* which aims to merge basic data.

- the data portal of the Danish parliament, ***Folketingets dataportal*** (http://www.ft.dk/da/dokumenter/aabne_data), which contains data about parliamentarians as well as data on cases and documents from parliamentary work.

The Open Data on the mentioned portals are generally free to use and to a great part published in a common, machine-readable format, like XML, RDF, CSV, or via a webservice based on databases[43]. Largely, the data are released under a license which allows re-use, even commercially, transforming, combining and sharing: The new *Standardlicens* determines at "Myndigheden giver en verdensomspændende, gratis, ikke-eksklusiv, og i øvrigt ubegrænset

[43] C.f. the technical instructions for Open Data publication on the portal OpenData.dk: http://www.opendata.dk/sites/default/files/odaa/teknisk_vejledning_til_odis1_tilgaengelig_3.pdf

brugsret til data, som frit bl.a. kan: kopieres, distribueres og offentliggøres, ændres og sammensættes med andet materiale, bruges kommercielt og ikke-kommercielt."[44]

Thus, the data fulfil the criteria for Open Data (cf. sec. 2.4).

5.4.3 Further Open Data sources

Further Open Data sources in Denmark are diverse and difficult to detect. In addition to the mentioned portals, there exist various initiatives aiming at making diverse Open Data publicly accessible.

The Danish tax agency SKAT shares **tax lists** of public companies, associations and funds who pay tax in Denmark. Currently, the data for the years 2012 to 2016 can be downloaded by everyone in a free format.[45]

A range of Open Data onsets focusses on **data on cultural heritage**, like the digital atlas of Denmark's historical-administrative geography, DigDag[46], an interinstitutional research project funded by the Ministry of Science, Technology and Development, released in 2009.

At present, Danish **voting records** are not available as open data in Denmark, as they are collected by KMD: The company, formerly named *Kommunedata* and owned by the municipalities (KL) has been sold to an equity fund in 2009 (Computerworld, 2009). It offers paying subscriptions to access the voting data, e.g. for news agencies. Nevertheless, this condition could change, as Denmark is supposed to shift to another it-system for voting in 2019, which will be driven by another company[47] (Kombit, 2018).

After this overview of the current state of Open Data in Denmark, the next section will summarize the analysis of the Danish Open Data initiatives.

[44] For the full text of the license, see https://www.digitaliser.dk/resource/2432531
[45] http://skat.dk/skat.aspx?oid=2167688
[46] See http://www.digdag.dk/, the current status of the initiative is unknown.
[47] Until now, the release of voting records as Open Data has not been officially announced. But the presentation of the new voting system named the feature of a free "snitflade med resultater til fx medier og forskere" (Kombit, 2017). Nevertheless, the choice of the new company provoked displeasure, after it came out that the company is based in Curaçao, a Lesser Antilles island, which is considered a tax haven (Corfixen & Hansen, 2018).

5.5 Findings

5.5.1 A shift of focus

The analysis of the action plans and strategy paper reveals an early shift of focus in the view upon Open Data. In the beginning, the potential of Open Data for public information and insights in political processes is mentioned regularly – this attitude would pave the way for informational broadening through public discussion, as it supports Sen's idea "of the public as an active participant in change" and "public communication oriented to mutual understanding" as Habermas claimes.

Though, this focus cannot be detected in the later papers from about 2012 on.[48] Here, the emphasis lies clearly on the economic potential of Open Data. Open Data as a source for information, as a basis for public decision making, do not play a major role. One reason for this development may stem from the transferral of accountability, when the IT and Telecom Agency under the Ministry of Higher Education and Science was changed to the Digitization Agency under the roof of the Ministry of Finance: The institutional *educational and informative perspective* may thus have been substituted by the institutional *economic perspective*.

Another reason for the shift of focus may be grounded in the lack of knowledge about how the data can be used in practice for public information – an issue which has been repeatedly described in literature (Davies, 2010; Jafarkarimi, Sim, Saadardoost, & Hee, 2014; Keserú & Kin-sing Chan, 2015). This is obviously also the case in Denmark, where "a clear gap between the opportunities offered by the abundance of open data and the citizens' capability to imagine new ways of using such data" has been identified (Open4Citizens Project, 2018)[49].

5.5.2 A deluding metaphor

As could be seen, the metaphor of *data as a resource* is a recurrent figure of speech in the realm of Open Data – if the data should be seen as a "resource for growth" or a "resource for information" is mostly not specified. But when Lars Christian Lilleholt, Minister of Energy, Utilities and Climate, announced the free release of the DMI data in January 2018, he even called them a "treasure chest" (*skattekiste*) which now will be opened (Energi-, Forsynings- og

[48] The time frame coincides approximately with the transferral of accountability from the Ministry of Higher Education and Science to the Ministry of Finance.
[49] Open4Citizens is an EU research project on Open Data with five pilot locations, including Copenhagen.

Klimaministeriet, 2018). Two months later, Nicola Morelli, professor at the institute for Architecture and Media Technologies at the university of Aalborg underlined this perspective as he depicted a designer's view on Open Data in a claim to publish them: "We want to use Open Data like we us tangible materials."[50] This metaphor of Open Data as a resource, a raw material, has repeatedly received differentiated feedback und must be considered with special scrutiny: Open Data are no tangible material, and they are not easily to grasp or to form – as like wood with a sharp knife as the only necessary tool. And, in contrary to raw materials. the stock of Open Data is not limited, but increasing, probably endlessly. Britt Ross Winthereik, professor for Technologies in Practice at the IT-university of Copenhagen, stated: "Vi vil ikke løbe tør for data. Denne metafor forhindrer blikket for den tekniske infrastruktur som skal være på plads og skjuler etiske udfordringer"[51]. As her critical remark points out, the metaphor simplifies the challenges with Open Data und downgrades implicitly their impact as solely economic.

5.5.3 The role of the citizens

As far as the target groups are concerned, in the first strategy papers, citizens and NGOs are explicitly considered possible beneficiaries of Open Data initiatives, emphasizing here the role of Open Data as informational input for public scrutiny and policy discussion. At that time, an online discussion forum was established in order to invite people to contribute and to participate in the discussion about Open Data. The release of Denmark's financial budged goes directly back to citizens' requests. Nevertheless, the forum did not resonate much in the long run (c.f. chapter 8). If the citizens did not find the way to the forum, if they dropped out for certain reasons or if they simply were not interested, remains unclear.[52] But while Open Data awareness on the sides of the authorities and entrepreneurs are reflected in the strategy papers, Open Data awareness on the sides of the citizens is not dealt with.

Moreover, civil participation, when taken up in later action plans, is not seen as taking part in political decision making: Instead, the citizen is described as "partner", when it comes to

[50] Nicola Morelli, Open4Citizens, Speech at Open Data Day 2018, 2.3.2018. ITU Copenhagen
[51] Brit Ross Winthereik, Technologies in Practice research group, Speech at "Digitale dilemmaer – Hvordan forandrer data den offentlige sektor?", 13.3.2018, ITU Copenhagen
[52] It was not possible to find out, how the forum has been made public.

gathering inputs, harnessing "the wisdom of the crowds" and outsourcing tasks from the public sphere. In this sense, one of the evaluations of the action plans is very revealing. It mentions an effectivization of services and a decrease in the number of citizens' inquiries as a success and as a result of civil participation:

> Helt generelt har adgangen til digital service medført et fald i antal borgerhenvendelser. […] Civilsamfundet har desuden bidraget til, at borgerhenvendelser er faldet med op til en tredjedel, fordi frivillige organisationer har støttet den digitale inklusion af borgere, der har brug for ekstra hjælp til at anvende de digitale løsninger (Digitaliseringsstyrelsen, 2013, p. 37).

The new role of the public sector, which has been called out in the strategy papers, seems thus not to be one where the citizens are considered to be empowered to make more informed choices, but to play a role in effectivization of public services.

Same is the case with initiatives like Smart Aarhus. Even though its aim is described as "challeng[ing] the traditional role of citizens" (Snow, Håkonsson, & Obel, 2016, p. 95), it is designed purposely not to challenge the power structure of the city: "Smart Aarhus was careful not to do things that challenged the power structure of the city, but, instead, developed initiatives that municipal organizations could embrace if they perceived value in doing so" (Snow, Håkonsson, & Obel, 2016, p. 103). So, in this case, civil participation is welcomed – for the purpose of effectivization, and only if it does not disturb existing power structures.

5.5.4 Conceptual complications

In the conception of the OECD and the Open Government Partnership, e-government is understood as an overarching concept, including e-democracy (as a social approach) on the one side and e-administration on the other side, as the corresponding technological methodology (OECD, 2003; Kneuer, 2016; Open Governement Partnership, 2018). Nevertheless, the Danish approach to Open Data and Open Government suggests the neglect of the sociocultural aspect included in initiatives around e-government, e-democracy or Open Data. A further trivial indication for this interpretation is that the English Wikipedia page on e-government refers to to the page on *digital forvaltning* in Danish. The explanation equates *digital forvaltning* with e-government:

> Digital forvaltning, er udtryk for det forhold, at informations- og kommunikationsteknologi (IKT) anvendes til løsning af forvaltningsopgaver. Begrebet svarer til det engelske udtryk eGovernment eller e-government (alternativt e-governance) og betegnes derfor af og til som e-forvaltning."

Digital forvaltning thus seems to consist mainly of the "*digitalisering af forvaltningen"*, thus "intern effektivisering af arbejdsprocesserne i offentlige myndigheder" and "*digital selvbetjening*, der vedrører digitale selvbetjeningsløsninger, som offentlige myndigheder stiller til rådighed for borgere, virksomheder eller andre brugere på internettet" (Wikipedia, 2016). There does by now not exist a Danish Wikipedia page on e-democracy.

5.5.5 A missing strategy

At the beginning of the Open Data initiatives, issues were mentioned concerning a uniform practice (*"en ensartet praksis på området"*). Although it remains unclear if a missing strategy is meant, it can clearly be stated, that a strategy in fact is missing. The only statement in this direction can be read in the actual *Strategi for Danmarks digitale vækst*, as it proposes "More and better open data" ("Mere og bedre åbne data") – which does not reflect an approach of deliberative democracy and is reasonably distant from other government's Open Data strategies. The British Open Data strategy, for instance, relies on five basic principles, of which the first principle is "Open Data by Default" (Department for Business, Innovation and Skills, 2014). Instead, the principle "we publish what is economically and politically feasible" seems to be followed, which is backed by a statement of a representative of the authorities in the forum digitaliser.dk: "Det er i høj grad en politisk diskussion, og vi satser på at åbne de datakilder med de mindste barrierer først"[53].

5.6 Partial conclusion

The goal of this chapter was to analyse the role of considerations on public information and civil participation in Danish public Open Data initiatives. The aim was also to find out, if the conclusion C1 holds true – if the government applies measures to promote Open Data to support deliberative democracy.

[53] Blog post from Thomas Maarup on the "wish list" (Ønskelisten) for Open Data in the forum digitaliser.dk, 31.05.2010, https://digitaliser.dk/resource/520345.

As has been shown, the Danish Open Data strategy does not focus principally on enabling citizens to derive information from Open Data in order to support deliberation and participation in democratic processes. Generally, this intention is mentioned, so the basis for informational broadening should be given. However, this approach has not yet led to numerous fruitful initiatives. The online discussion groups for the inclusion of citizens in the discussion about Open Data and Open Government does not seem to have reached the citizens. It is not dealt with the citizens' apparent missing awareness of Open Data which would be a precondition to participate in the discussion. In contrast to that, the citizen's participation as a driver for the effectivization of public services is valued. But even if this approach sets the citizen in a role as "an active partner in change", it is to doubt, if effects like the decrease in citizens' inquiries can be valued as a support of deliberative democracy.

Concludingly, it can be well be stated that the narrative of the initiatives claims to regard Open Data as a source of public information and a foundation for deliberative structures. Though, the consequences of this conception – like the release of the financial budget data – are rare. As well, the citizens are recognized as beneficiaries of Open Data – but not in the sense of deliberative democracy, in which the citizens' participation in deliberation belongs to political practice. In summary, it must be stated that Denmark applies policies to promote Open Data use for public information on democratic processes – but not with that special focus and to a minor degree.

At present, conclusion C1 does not hold and the preceding hypotheses probably must be modified. To get a fuller picture about the Danish government's measures to promote Open Data, the next chapter will explore a series of use cases of Open Data. The use cases will be assessed with regard to the civil participation they promote and the public information they require.

6. Analysis of the use cases on OpenData.dk

Summary: In this chapter, the use cases of Open Data on the portal OpenData.dk are examined and categorized. Sec. 6.1 presents a model of civil democratic participation and draws the line between the different modes of civil participation and their specific information needs. The undersections of sec. 6.2 outline the respective information needs for each mode. Subsequently, in sec. 6.3, the use cases are listed and examined. Sec. 6.4 summarizes the findings and sec. 6.5 presents a partial conclusion.

This chapter presents a further investigation of the measures to promote Open Data in Denmark. I will take up my second research question (RQ2) and examine, which role civil information and public participation play in examples of public Open Data use in Denmark. The aim is to get an idea of how Open Data are being put to practical use and which mechanisms of public sector reform are furthered. To this end, I will consider the use cases listed on OpenData.dk, as the portal is considered to be the main access point for public Open Data in Denmark. The analysis of the Open Data use cases also takes place in the light of conclusion C1, that the Danish government applies measures to promote Open Data to support deliberative democracy.

6.1 Modes of civil democratic participation

By backing up on my accounts on participatory and deliberative democracy before, I will first outline a model of civil democratic participation, relying on the level of engagement of civil participation and the methods of democratic change which are promoted by this form of participation. This model will then be used to categorize and analyse the use cases from OpenData.dk. Concerning the relation between democratic participation and Open Data, each of the modes of democratic engagement requires specific information in order to support an improvement of outcomes – like better public services or a decision on who to vote for or what to lobby on.

Drawing upon Davies (2010), who analysed a series of public Open Data uses in Great Britain, there can be differentiated between three modes of democratic participation, each linked to

mechanisms of public service reform: political participation, collaborative/community-based participation and individual choice/market participation.

- Democratic engagement in the form of **formal participation** in political institutions include acts like voting, petitions and direct lobbying[54]. (A)

- **Participatory collaborative and community-based action** concerns two types of democratic teamwork: collaborations between citizens and state as well as collaborations amongst citizens to solve problems outside the state. One example could be an online service to monitor the amounts of recycled materials in a municipality. It also includes grass root lobbying which refers to "attempts to influence legislation by attempting to affect the opinion of the public with respect to the legislation and encouraging the audience to take action with respect to the legislation" (IRS, 2018). (B)

- Democratic engagement in the form of **individual choice** describes the act of selecting services: With their preferences, citizens send signals which can be interpreted in market processes – maybe leading to an adaption of a service. This could be the case in an Open Data-fuelled application which, for instance, compares child care opportunities in a certain region. The citizens, as "customer" of this service, are here able to choose provision based on their specific preferences. (C)

- I will also add a fourth mode of low-level democratic engagement which I call "**participatory observation**" (D), as I find it useful to classify various forms of civil interest in democratic participation which do not instantly result in participatory intervention but may be a starting point for getting involved.

An overview of the different modes of democratic participation, the specific information needs, and possible impacts of Open Data is shown in Table 2 on the following page.

[54] Direct lobbying refers to attempts to influence a legislative body through a member or employee of a legislative body, or with a government official who participates in formulating legislation (IRS, 2018).

Modes of democratic participation

Form of civil participation	**Political participation (A)**	**Collaborative/ community-based participation (B)**	**Individual choice/ market participation (C)**	**Participatory observation (D)**
Actor as	Citizen	Citizen/ co-producer	Consumer	Consumer
Possible impacts of Open Data	- Supporting scrutiny - Informing citizens as voters - Informing citizens on specific issues - Supporting campaigning and lobbying	- Co-produced planning - Co-produced services - Co-produced information - Co-produced financing (crowd funding)	- Improving the quality of demand (better informed customers) - Improving the quality of provision (competitive innovation)	- Supporting information on history and culture - Supporting education
Example information needs	- Party policies - Performance of politicians - Current performance of departments/local authority etc.	- Performance data for specific services - Local funding arrangements and budgets - Specific details of issues / problems to be solved	- Performance data for specific services/ products - Eligibility for different services/ products - Location, cost, availability of different services/ products	- archive data on cultural heritage, history etc. - possibilities for comparison of cultural/historical developments
Example decisions/actions	- Who to vote for - Who to donate for - Who to lobby on - What to lobby on	- Collaboration between citizens to provide services - Collaboration between citizens, enterprises and state to redesign services	- Which services/ products to use - To establish a new service/product based on demographic/ demand data - To adjust a service/product based on demographic/ demand data	- Decisions to guide further interest
Mechanisms of change/reform	- Changing leadership and policy from the top - Sending signals to policy makers	- Working together to solve problems - Changing individual preferences through dialogue - Distributed innovation	- Market signals increase efficient allocation of resources	- Formation of political consciousness based on cultural/ historic data

Table 2: Modes of civic participation, modified after Davies (2010)

6.2 Participation and information needs

Concerning the relation between democratic participation and Open Data, each of the modes of democratic engagement requires specific information in order to support an improvement of outcomes. The next sections will examine the specific information needs of each mode.

6.2.1 Participation in formal politics (A)

Participation in formal politics means for the citizen, that she has to decide in questions like, who to vote for, who to donate for, or what to lobby on. To get an informational basis to base her decision on, it would be helpful to know about party policies, politicians' performance or the performance of the local authority and its respective departments, amongst others – a clear case of informational broadening. Here, Open Data can support scrutiny for example on the budget allocations of a municipality. Or Open Data can illustrate, how far specific politicians keep their promises, as they enable to track the politicians' decisions in parliamentary polls. Like in the public discussion on alleged ghettos in Danish cities, Open Data can illustrate, upon which data the classification as a ghetto is based, which can lead to a deliberative dialogue about the policies behind the conception of a ghetto.

6.2.2 Collaborative and community-based participation (B)

Collaborative and community-based participation in a society draws on the idea of harnessing the "wisdom of the crowds", similar to the development of open source software. In this case of civil participation, the opening of data targets often at "specialists from outside the bureaucracy can input alongside officials" (Davies, 2010, p. 16). The collaboration to redesign services can not only take place between citizens, but also between citizens enterprises and the state. Open Data can hereby enable co-produced planning (e.g., the collection of inputs for the renovation of a neglected pedestrian street in the city centre), co-produced services (like in the *Smart City* projects) or co-produced information. In this case, the citizen acts as a co-producer.

6.2.3 Individual choice (C)

Market based participation presupposes the understanding of the citizen rather as a customer of public services than as a member of a mobilized public. In this case of civil participation,

information is needed to assess the performance of specific services, their eligibility and/or location, cost, and availability. Thus, the citizen is able to make an informed choice about which service (e.g., child care, schooling institution, public parking service) is to choose. Open Data can here contribute to both improving the quality of demand (as the customers are better informed) and to improve the quality of provision, as competitive innovation is fostered.

6.2.4 Participatory observation (D)

Participatory observation also relies on the perception of the citizen as a customer of services. However, in this case, the act of participation does not go beyond the act of interested observation. Open Data can here contribute to make, e.g., cultural heritage or historical data publicly available, for educational or informational purposes and/or to sharpen the awareness of Open Data.

6.3 Categorization of the use cases

With the preceding model of democratic participation in mind, all use cases on OpenData.dk have been inspected (see Fig. 9 on the next page for a screenshot of the use cases overview on OpenData.dk). The use cases have been examined with regard to their objective and how they use Open Data – and from which domains (Geographic, Social, etc.) [55]. Also, the intended addressees of the use cases were identified. Based on these results, it was assessed which model of democratic participation each use case supports, and which information needs have to be covered to facilitate the participation. Accordingly, each use case was categorized with respect to the model.

Table 3 shows an overview of the categorization. For a more detailed description of the use cases, I refer to as Appendix C. A summary of the findings will be given in the next section, sec. 6.4.

[55] Concerning the domains of the use case, I rely on the six domains identified by the *Measuring European Public Sector Information Resources* (MEPSIR) study: Business, Geographic, Legal, Meteorological, Social and Transport (Dekker, Polman, te Velde, & de Vries, 2006). In addition to these administrative fields, the domains of political and cultural data were added, as they were also used by the examined services.

Screenshot OpenData.dk Use Cases (12.3.2018)

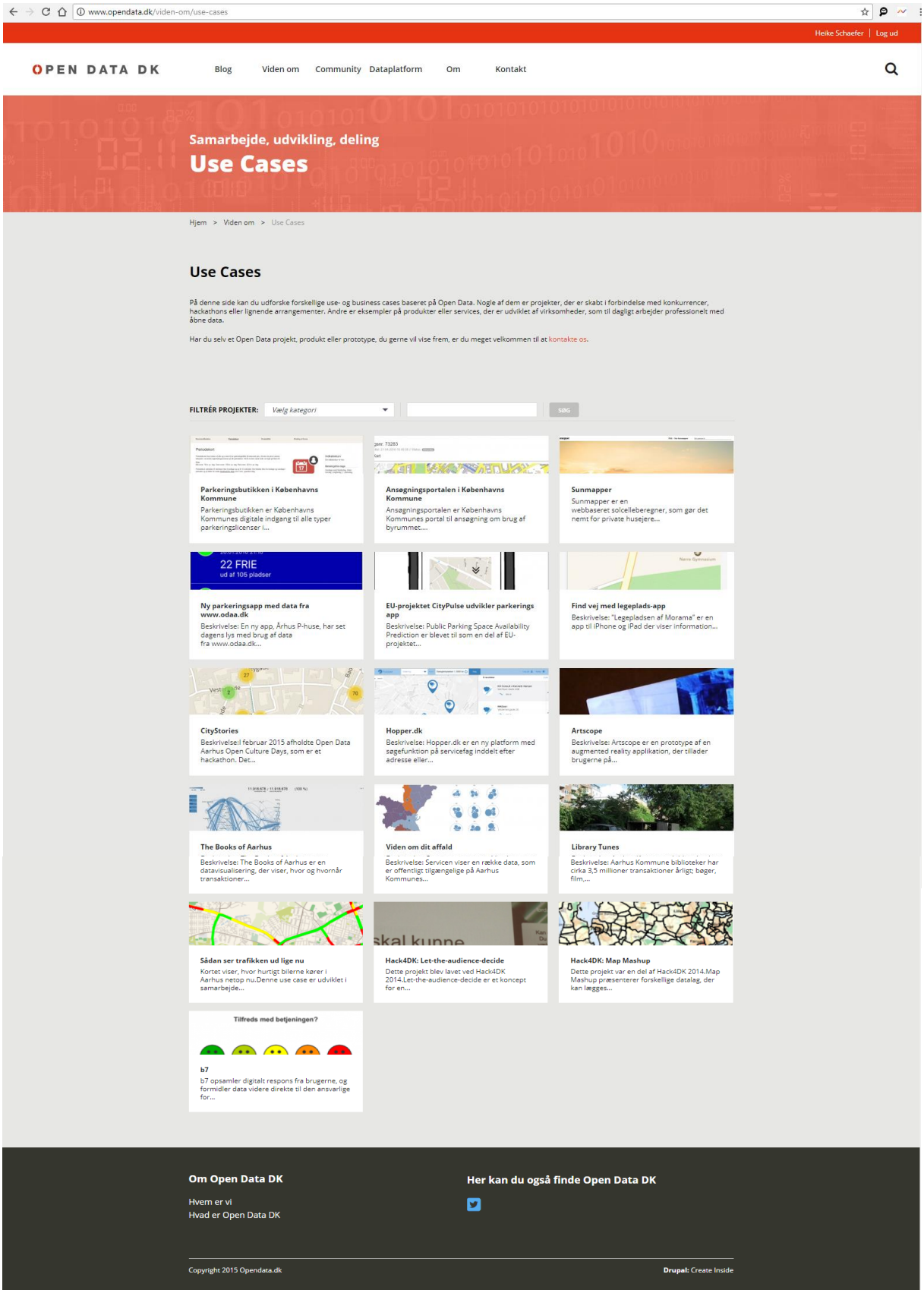

Figure 9: Screenshot OpenData.dk use cases, 12.03.2018.
Source: http://www.opendata.dk/viden-om/use-cases

6.4 Findings

OpenData.dk lists altogether 16 use cases[56], 15 of which have been examined. Every use case was attributed to one to two categories, where A stands for "formal politics/political participation", B for "collaborative/community based participation", C for "individual choice/market participation" and D for "participatory oberservation".

		categories				properties			domains							
	example of open data use	cat. A	cat. B	cat. C	cat. D	in use	EU project	hackathon	Business	Geographic	Legal	Meteorological	Social	Transport	Cultural/Historical	Political
1	Parkeringsbutikken i København	0	0	1	0	1	0	0	1	1	0	0	0	1	0	0
2	Ansøgningsportalen i København	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0
3	Sunmapper	0	1	1	0	1	0	1	1	1	0	1	0	0	0	0
4	Parkeringsapp for Aarhus	0	0	1	0	1*	0	0	0	1	0	0	0	1	0	0
5	Public Parking Space Availability Prediction	0	1	1	0	0	1	0	0	1	0	0	0	1	0	0
6	Legeplads-app	0	0	1	0	1*	0	0	0	1	0	0	0	0	0	0
7	CityStories	0	0	0	1	1**	0	1	0	1	0	0	0	0	1	0
8	Hopper.dk	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0
9	Artscope	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0
10	The Books of Aarhus	0	1	1	0	1***	0	0	0	1	0	0	1	0	1	0
11	Viden om dit affald	0	1	1	0	1***	1	0	0	1	0	0	1	0	0	0
12	Library Tunes	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
13	Real-time traffic map of Aarhus	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0
14	Let-the-audience-decide	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0
15	HistoriskAtlas.dk	0	0	0	1	1	0	1	0	1	1	0	1	0	1	1
		0	**5**	**10**	**5**	**9(4)**	**2**	**5**	**4**	**12**	**1**	**1**	**3**	**4**	**6**	**1**
		* only for iOs-devices														
		** in a beta version														
		*** with data from 2014														

Table 3: Overview of categorization of use cases

It turned out, that by far the most of the examined use cases (10, thus two thirds) can be filed under C, as they address individual choices by supplying information on which services to choose. One example is the mobile application to find information on nearby age-appropriate playgrounds in Copenhagen and Frederiksberg (6). Another case is the webservice for citizens and enterprises to choose and buy an appropriate parking permission in Copenhagen (1). This service, though, can only marginally be seen as contributing to a model of democratic change via individual choice/market participation, as it is mostly targeted to make bureaucratic processes more effective.

Half of the use cases which have been categorized under C (individual choice) can also be judged as belonging to category B (collaborative/community-based participation, 5 of 10). For instance, they do not only provide performance data for specific services, but also specific

[56] One of them (nr.16) was removed after the time of writing (14.3.2018), as it turned out that it didn't use or deliver open data.

details of issues which can be used to work together on solving problems or which may contribute to change individual preferences. Here, an example is the website "Viden om dit affald" from Aarhus which allows the user/citizen to find the way to the next recycling station, detect peak hours[57], but which also contributes with information on how much and what kind of waste normally is delivered at this station. The purpose of the website is stated at the landing page: "Med visualiseringerne på disse sider, ønsker Aarhus Kommune at skabe et generelt og overordnet billede af de affaldsmængder, borgerne i Aarhus leverer på genbrugsstationerne og hvad de smider i det almindelige husholdningsaffald"[58]. This background information may lead the citizen the reconsider her habits or act collaboratively in order to possibly establish a new service, like a waste bin for organic waste. There were no use cases which belong exclusively to B – only in combination with C. This finding suggests that that "the citizen as co-producer" starts from a basis as "consumer". Thus, if collaborative action and community-based participation is sought, data for specific services (to support an individual decision) seem to be a precondition. This leads to the conclusion that participation, e.g., to redesign a service, takes its starting point in a personal concern.

None of the examined applications was filed under A, as none of the use cases targets at changing leadership and policy or sending signals to policy makers. This could be because the use cases stem from official Open Data portal of a state institution, which may not be interested in promoting potentially disturbing applications or services that encourage political participation by the citizens. Or, as the policy analysis suggests, the government may well be interested in civil participation, but has not yet discerned the potential of open data for encouraging civil engagement.

Generally, few of the analysed examples of Open Data use are actually fully in use, only five of 15. Most of the applications that work fully (four of five), concern individual choice participation (C). Concerning the not fully working applications: One is a prototype (*Artscope*), one is in concept status (*Let-the-audience-decide*), one is in a beta version (*CityStories*), one is a planned project (*Public Parking Space Availability Prediction*), one is under maintenance[59]

[57] The service operates with data from 2014, so only peak hours from the past can be seen.
[58] See http://genbrug.smartaarhus.dk/
[59] Status from 4.4.2018

(*Hopper.dk*), one is not more available online (*Sådan ser trafikken ud lige nu*) and two are not being updated, basing on data from 2014 (*The Book of Aarhus* and *Viden om dit affald*) respectively.

Five projects are the results of hackathons[60] in 2014 and 2015. Concerning these use cases, commonly cultural or historical data were applied (6 times), as these have been the declared foci of previous hackathons. Besides that, geographical data were by far the most used (12 times), followed by business and transport data (both 4 times). Political data and legal data were only used in one application, respectively. The addressees were commonly private citizens – often in their specific role as parent/car driver/house owner, or as a citizen interested in culture.

6.5 Partial Conclusion

This chapter assessed the question, which models of democratic engagement are supported by practical applications based on Open Data. The result is, that the use cases featured on OpenData.dk mostly support democratic change via individual choices (C), where the citizen acts like a consumer. This finding seems reasonable, since the site is run by state institutions, which should be interested in making life easier for these institutions, by simplifying administrative issues. In some cases, the use cases encourage the citizen to collaborate with state institutions for the solution of certain problems. These use cases take their starting point in personal concern of the citizens.

Although theses use cases do not encourage direct political participation, they can be judged to contribute to civil information – but not to informational broadening in Sen's sense: In the case of category C use cases, they enable citizens to take informed choices. In the case of category B, the use cases encourage and enable the citizen to be part of a solution and an active part in democratic change – though not in the sense of deliberative democracy. Even category D use cases support civil information, as the associated use cases enable the citizen to get insights on historical or cultural conditions, which could influence one of her decisions. Moreover, uses cases supporting direct political participation and deliberation are lacking. Here lies a vast potential for future applications.

[60] A hackathon is a design sprint-like event where IT developers meet with others, often including subject-matter-experts, and collaborate intensively on developing prototypes, concepts or existing IT projects, often within a specific topic, or centred on some data. The goal of a hackathon is to create usable software (Wikipedia, 2018).

Generally, the examined Open Data use cases seem not to be very robust: A majority of them are neither maintained nor updated.[61] This finding could indicate a lack of professionalisation on the sides of the Open Data users, possibly grounded on missing specific knowledge or absent support from peer users. In this case, communities of practice (see chap. 8) could make an important contribution. Additionally, the use cases which were the result of hackathons seem not to correspond with an existing need in society but can be rather be judged as playful gimmicks. In this case, a large potential could be unlocked by bringing together problem holders with solution holders. This approach has already has been suggested by several scholars and is supported by the EU-project open4citizens[62].

Concerning conclusion C1, it can be stated that all of the use cases represent a promotion of Open Data. To what extent the use cases contribute to promote informational broadening and deliberative democracy, is another question which also leads to question the preceding hypotheses. To wit, most of the use cases cannot be judged to contribute to further public discussion or preference formation through social interaction, as suggested by Sen. Additionally, they do not fully correspond with Sen's view of "the public as an active participant in change, rather than as a passive and docile recipient of instructions and dispensed assistance" (1999, p. 281), as this approach would require public discussion beyond merely sending market signals. In summary, the observations in this chapter lead to the conclusion that

- ***Either hypothesis H1 or H2 must be wrong (C2)***

The next chapter will take up the results of this and the preceding chapter and discuss the implications for the initially constructed hypotheses, as well as the implications for the promotion of deliberative democracy by Open Data initiatives in Denmark.

[61] This insight also applies to almost other example uses of Danish Open Data which could be identified via participatory observation. For a list of all identified use cases, I refer to the List of websites.

[62] F. ex. Nicola Morelli suggested this approach at Open Data Day 2018, 2.3.2018 (ITU Copenhagen). He is part of the EU project http://open4citizens.eu/.

7. Potentials for the support of deliberative democracy

Summary: This chapter attempts to identify potentials for the support of deliberative democracy by Open Data initiatives in Denmark. Sec. 7.1 reviews the preceding hypotheses. In sec 7.2, additional conditions for the support of deliberative democracy by Open Data initiatives are brought up. The chapter closes with a partial conclusion in sec. 7.3, where a modified hypothesis is presented.

After the analysis of the Danish Open Data initiatives and the Open Data use cases have been carried out, I now seek to deduce implications to identify potentials to promote deliberative democracy by Open Data initiatives in Denmark (RQ3). This is done by confronting the preceding hypotheses and conclusions with the observations and findings from the analysis in the previous chapters. In this context, it will be discussed which conditions must be fulfilled, so that the potential to support deliberative democracy is released.

7.1 Review of the hypotheses

The analysis in the two preceding chapters were in the light of two hypotheses:

- ***H1: Open Data have the potential to support deliberative democracy by contributing to informational broadening*** and
- ***H2: The democratic government of a country with an advanced IT infrastructure will apply measures to promote Open Data***

The conclusions were:

- ***C1: If Denmark has an advanced IT infrastructure, it is to be expected, that the government will apply measures to promote Open Data to support deliberative democracy***
- ***C2: Either H1 or H2 must be wrong***

The observations presented in chap. 4 revealed, that the precondition for C1 is given. Concludingly, it is to expect, that the Danish government applies measures to promote Open Data.

As chap. 5 and chap. 6 have shown, the government indeed applies measures to promote Open Data. And according to H1, Open Data have the potential to support deliberative democracy by informational broadening. But, as has been shown, this potential has only been released to a minor degree, as the support of deliberative democracy by Open Data initiatives could only be detected in a few cases. Thus, the hypotheses cannot hold and have to be modified.

If H1 is to be kept, H2 must be restricted: This leads to the question, which additional conditions have to be fulfilled so that H2 holds true – in addition to that it must be about a democratic government with a well-developed IT-infrastructure.

7.2 Identifying additional conditions

7.2.1 A uniform strategy

In order to support deliberative democracy, Open Data initiatives should contribute to establish expanded and differentiated public spheres as well as to institutionalized procedures of democratic deliberation and decision-making (Habermas, 1994). Because of its complexity, this approach requires **a uniform strategy**.

But going back to the findings from the previous two chapters, a missing strategy could be revealed in the Danish approach to Open Data (c.f. sec. 5.5.5). Unlike the British example, the Danish government does not follow the conception to release all data as open data, unless it infringes citizens' privacy – although this aim is set within the PSI Directive. Instead, Open Data initiatives are brought up without being placed in a conceptual framework.

Moreover, as has been shown, the hitherto strategy includes no institutionalized procedure to involve citizens in the process of releasing Open Data. The previous attempts – like the discussion forum on *Digitaliser.dk* have fizzled out (c.f. sec. 5.1). Additionally, public incentives like hackathons did not lead to Open Data use for the support of deliberative democracy (c.f. sec. 6.5). In this regard, hackathons with a focus on public information could be a possibility to involve expert citizens in releasing Open Data in this sense.

Additionally, the broader public should be addressed through specific measures, also at a local level, in order to visualize the possibilities for public information through Open Data. A uniform strategy would also include the necessity for a well-structured and maintained Open Data portal with a single point of entry, in order to simplify the participation of the citizens.

7.2.2 An appropriate toolset

In order to implement a uniform Open Data strategy to support deliberative democracy, an appropriate toolset must be available. With regard to the country's existing IT-infrastructure, the general conditions in Denmark are beyond question (c.f. chap. 4). The difficulty with the toolset seems to be more a matter of **choosing the right tools**: Although an Open Data platform is already existing, the datasets are spread out diverse places (c.f. sec 5.4). Also, the discussion forum should be designed in order to support discussion and deliberation.

7.2.3 Open Data literacy

In addition to a uniform Open Data strategy, **Open Data literacy** is required to make use of the deliberative potential of Open Data initiatives. The lack of Open Data literacy plays a role on the sides of the representatives of the state institutions but particularly on the sides of the citizens. At present, concerning digitization and education, the focus is directed to equip citizens with skills for a successful working life (c.f. sec. 5.3). But besides that, citizens should also be provided with the skills to successfully use Open Data in deliberative democratic discussions. A possible means of doing this would be to cultivate communities of practice (see chap. 8). As Open Data is a complex field, it would be fruitful, if citizens and state representatives could share their specific knowledge in order to contribute to a public sphere, where deliberation thrives.

Concerning the representatives of the state institutions, it could be seen, that the focus of the Open Data initiatives was narrowed at the same time, when the government transferred the accountability for Open Data initiatives from the Ministry of Higher Education and Science to the Ministry of Finance (c.f. sec. 5.5.1). This fact suggests that Open Data initiatives should not only be entrusted to those authorities who particularly focus on the economic aspect. Instead they should be formulated by a broader panel of experts with a more differentiated approach to Open Data.

7.2.4 Efficient control mechanisms

Moreover, in order to carry out an Open Data strategy, **efficient control mechanisms** are crucial. The Danish Open Data initiatives implemented in the OGP, are not always associated with success criteria or a time frame (c.f. sec. 5.2). Neither have the many critical remarks from the independent reporting mechanism led to substantial changes, although the Open Data initiatives have been judged as of minor impact (c.f. sec. 5.2.1). The requests from the OGP were not complied with (c.f. sec. 5.2.1). At present, the control mechanism in the area of Open Data initiatives are inefficient and must be revised.

7.3 Partial conclusion

This chapter dealt with the implications from the two preceding chapters for the potentials to promote deliberative democracy by Open Data initiatives in Denmark. As the preceding discussion has illustrated, it is not sufficient for a government to be democratic and to have a developed IT infrastructure in order to apply measures to support Open Data for deliberative democracy.

Thus, there are several conditions which should complement the hypothesis H2 so that it holds true. The modified H2a can now be formulated:

- ***The democratic government of a country with an advanced IT infrastructure, Open Data literacy and a uniform Open Data strategy based on an appropriate toolset and efficient control mechanisms will apply measures to promote Open Data for public information (H2a)***

Thus, in order to open up the potentials for the support of deliberative democracy through Open Data initiatives, the Danish government should

1. adopt a uniform strategy with an institutionalized procedure to involve the citizens,

2. choose appropriate tools for the implementation of the strategy, including an Open Data portal with a single point of entry,

3. ensure Open Data literacy on the sides of representatives of state institutions AND of citizens,

4. establish control mechanisms for the assessment of Open Data initiatives.

The next chapter presents an outlook by introducing the term communities of practice, which in particular concerns point 3, Open Data literacy, but also point 2, the choice of an appropriate toolset.

8. Outlook: Introducing *communities of practice*

Summary: This chapter discusses how communities of practice can support the use of public Open Data in Denmark. Sec. 8.1 justifies the introduction of the concept of communities of practice. Sec. 8.2 sketches the essence of communities of practice. In sec. 8.3, it is examined to which degree a community of practice exists around the use of Open Data in Denmark. Sec. 8.4 presents a partial conclusion of this chapter.

As the preceding chapters have shown, there are vast potentials for improvement concerning the promotion of Open Data in Denmark for the support of deliberative democracy. An explicit Open Data strategy is a key point in this regard. Another critical issue is Open Data literacy, which concerns the lack of knowledge about the use and the potentials of Open Data for public information, both from the side of the authorities and the side of the potential users and citizens. In this chapter, I will take up the question, how online communities of practice can promote the use of Open Data for the support of deliberative democracy (RQ4).

8.1 The relevance of communities of practice in the field of Open Data

Generally, Open Data use is a complex field, where specific knowledge is required. Platforms for public Open Data seem to be directed to specialists or at least those able and willing to get involved with the topic (Davies, 2010). Several studies agree on the fact that Open Data use by now is an expert matter requiring detailed knowledge (Ritter, 2014; Ruijer, Grimmelikhuijsen, & Meijer, 2017; Huijboom & van den Broek, 2011). In a technology-focused field like Open Data use, online groups and forums (next to events and mailing lists) play an essential role in knowledge sharing (Davies, 2010, p. 4). The existence of an Open Data community is thus a relevant factor to promote the use of Open Data (Ritter, 2014). Davies (2010) stresses that communities of practice were essential for the development of Open Data use in Great Britain:

> Social networks and support from peers were important in inspiring or enabling many OGD [Open Governmental Data] uses. Whether it was the training provided by a Local Information Service (LIS) manager to non-technical users seeking facts for their work, or the supportive

> events and mailing-lists around data.gov.uk, many users noted the importance of communities of practice for enabling their OGD use (p. 31)

The Danish action plans on Open Data also intended to establish an online forum for discussing Open Data use on the website *Digitalisér.dk*[63]. The platform is described as an official social network for knowledge sharing about public digitization in Denmark, hosted by the Danish Digitization Agency under the Ministry of Finance. The description on the website confirms this intention: "Digitalisér.dk er en social netværksplatform for erfaringsudveksling og videndeling om offentlig digitalisering af Danmark, hvor du blandt andet finder vejledninger, software eller driftsinformationer" (Digitaliseringsstyrelsen, 2016). As an intended social platform for knowledge sharing, it is appropriate to examine the forum in terms of a community of practice, as described in particular by Étienne Wenger. Wenger et al. define communities of practice as "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p. 4).

As the theory on communities of practice has turned out to provide a useful perspective on knowledge sharing, I will apply this concept in order to examine the potentials for promoting the use of Open Data for deliberative democracy in Denmark. By that, I will try to identify possible obstacles and potentials for a broader engagement of interested citizens in this community. But before I examine the relevant forum in terms of a community of practice, the concept of communities of practice will be outlined in the next section.

8.2 Étienne Wenger's theory on communities of practice

Communities of practice base on the assumption that learning is a social phenomenon. The concept also relies on the recognition that knowledge is a critical asset that needs to be managed strategically. Whereas initial efforts at managing knowledge had focused on information systems, communities of practice focus on people and on the social structures that enable them to learn with and from each other. Amongst other things, communities of practice enable practitioners to take collective responsibility for managing the knowledge they need. They are

[63] https://digitaliser.dk/

not limited by formal structures, as they allow to create connections among people across organizational and geographic boundaries (Wenger-Trayner & Wenger-Trayner, 2015).

The perspective of online communities of practice relies on the interplay of technology and community, where the component of knowledge sharing is central. Even though the phenomenon it describes is a well-observed one, the term *community of practice* is of relatively recent coinage, (Wenger-Trayner & Wenger-Trayner, 2015). With the definition as described above, as knowledge-based social structures, communities of practice are not a new idea and existing everywhere. The definition allows for, but does not assume, intentionality – that the learning can also happen as an incidental outcome. However, not every community (e.g., a neighborhood) is a community of practice. Seen from a technology perspective, the theory of communities of practice implies that technology will help find peers to share knowledge with and to engage with them meaningfully (Wenger, 1998).

É. and B. Wenger-Trayner (2015) point out three crucial dimensions as conditions for a community of practice:

- the domain
- the community
- the practice

Concerning the **domain dimension**, a community of practice represents not merely a network of connections between people but has "an identity defined by a shared domain of interest" which implies a certain commitment to the domain, and therefore a shared competence that distinguishes members from other people" (Wenger-Trayner & Wenger-Trayner, 2015). Whether the domain is something recognized as "expertise" outside the community, does not matter – it could be a street gang dealing with their domain of surviving on the street. The definition of the domain may be internally controversial and can also have a reach beyond the community's immediate members (Wenger, 1998).

As to the **community dimension**, É. and B. Wenger-Trayner (2015) state that "[i]n pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share information. They build relationships that enable them to learn from each other;

they care about their standing with each other." Mutual learning and interaction, not necessarily on a daily basis, are the crucial criteria. Even if students or persons with the same job have a lot in common, "yet unless they interact and learn together, they do not form a community of practice" (Wenger-Trayner & Wenger-Trayner, 2015). For a community to form, the topic must be of more than a passing interest (Wenger, 1998). Nevertheless, a community of practice does not imply homogeneity of their members, as their diverse backgrounds often even further learning and mutual knowledge sharing, as do disagreements in discussions. Concerning the activity of the members, the ability of some to take leadership is crucial "in moving the inquiry forward" (Wenger, 1998, p. 8). Peripheral participation is legitimate.

The **practice dimension** is addressed by the fact the members of a community of practice are practitioners who develop "a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice" (Wenger-Trayner & Wenger-Trayner, 2015). They are not a community driven by the interest in certain kinds of books or movies, for instance. The development of a shared practice may be intentional or incidental. An example for the latter would be nurses who meet regularly for lunch in a hospital cafeteria who do not realize that their lunch discussions are one of their main sources of knowledge about how to care for patients (Wenger-Trayner & Wenger-Trayner, 2015).

According to Wenger, a community of practice spans all of the three mentioned dimensions and is cultivated by developing each of the elements in parallel. How technology can be applied to support a community of practice, depends on the orientation(s) of the community: "different habitats work for different communities" (Wenger, White, & Smith, 2009). I will now inspect community of practice around the use of Open Data in Denmark.

8.3 Communities of practice in the area of Open Data in Denmark

There exist several online groups around Open Data in Denmark, but one points out to be the most relevant – the group *Offentlige Data I Spil – initiativet* in the mentioned forum *Digitaliser.dk*. In addition to that, the platform *OpenData.dk* also provides an online forum[64].

[64] http://www.opendata.dk/forum/forum

But despite the site has existed since 2015, it only shows 24 posts, the half of which are written from the same person. As nine posts in this forum are direct replies to her from Open Data.dk "staff members", this forum can yet be considered a dialogue between authorities and a specific user and will be neglected here.

The interaction on the platform *Digitaliser.dk* is organized in groups (see Fig. 10 and Fig 11 on the next page). The forum allows participation for each citizen, irrespective of nationality or profession: Anyone with an e-mail address can register as a user and create a group and/or write a posting. Reading in group discussions does not require a registration. At the time of writing (May 2018), there exist 554 groups, some of them with public permission to post, and some of them directed to employees in the public sector with access on invitation only (reading is always possible). The groups address a wide range of topics from operating information for the Danish digital access service *NemLog-in*[65] to groups for the discussion of open geodata, *Geoservicen*[66]. It is not possible to view a list with description of all groups, as the website shows six groups at maximum in no obvious order[67], which makes it difficult for the user to find relevant groups (c.f. an appropriate toolset, sec. 7.2.2).

I will concentrate my exploration on the particular group *Offentlige Data I Spil - initiativet*[68] (see group logo on lower half of Fig. 11), as it directly originates from the public initiative that set Open Data on the national political agenda in 2009 (cf. chapter 5). There exist other groups around public Open Data on *Digitaliser.dk*, but the group *Offentlige Data I Spil - initiativet* (ODIS) is the only one with a general interest in the use of Open Data and with activity in 2018. A related group are the "data hunters" (*Datajægerne*[69], 35 members, last activity in August 2016).

[65] https://www.digitaliser.dk/group/2354775
[66] https://www.digitaliser.dk/group/847257
[67] Further examination revealed that the groups are presumably displayed according to the number of members with the group with the most members first.
[68] https://digitaliser.dk/group/237756
[69] https://digitaliser.dk/group/520340

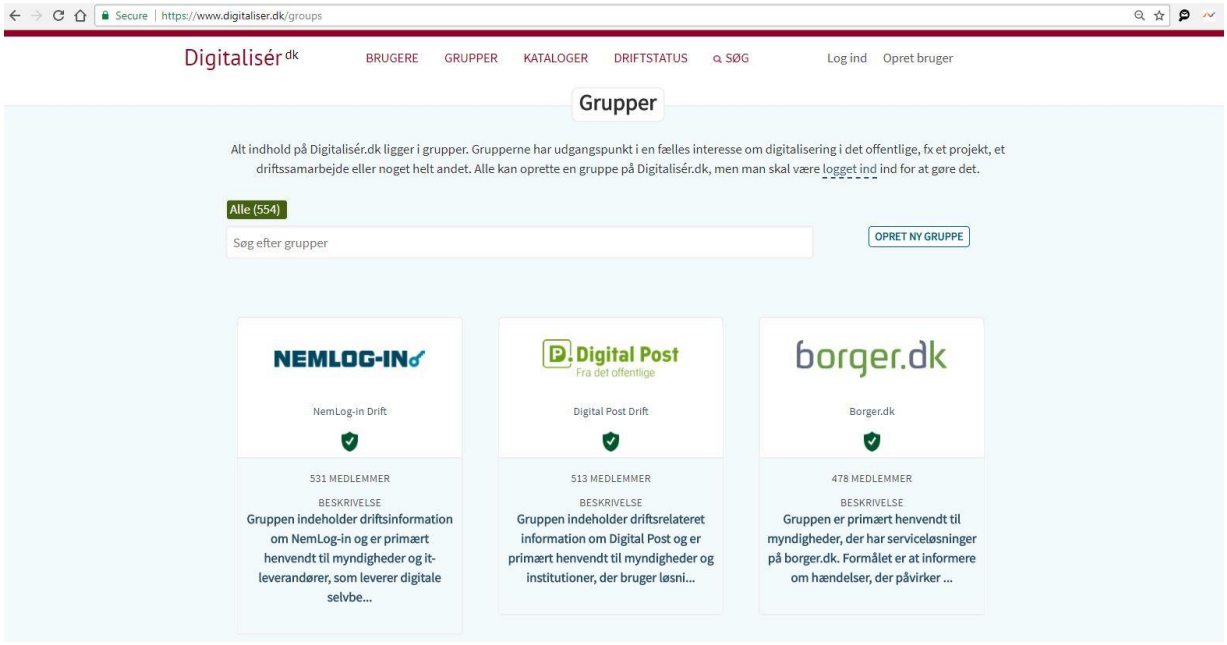

Figure 10: Screenshot of complete visible page at desktop size from https://digitaliser.dk/groups

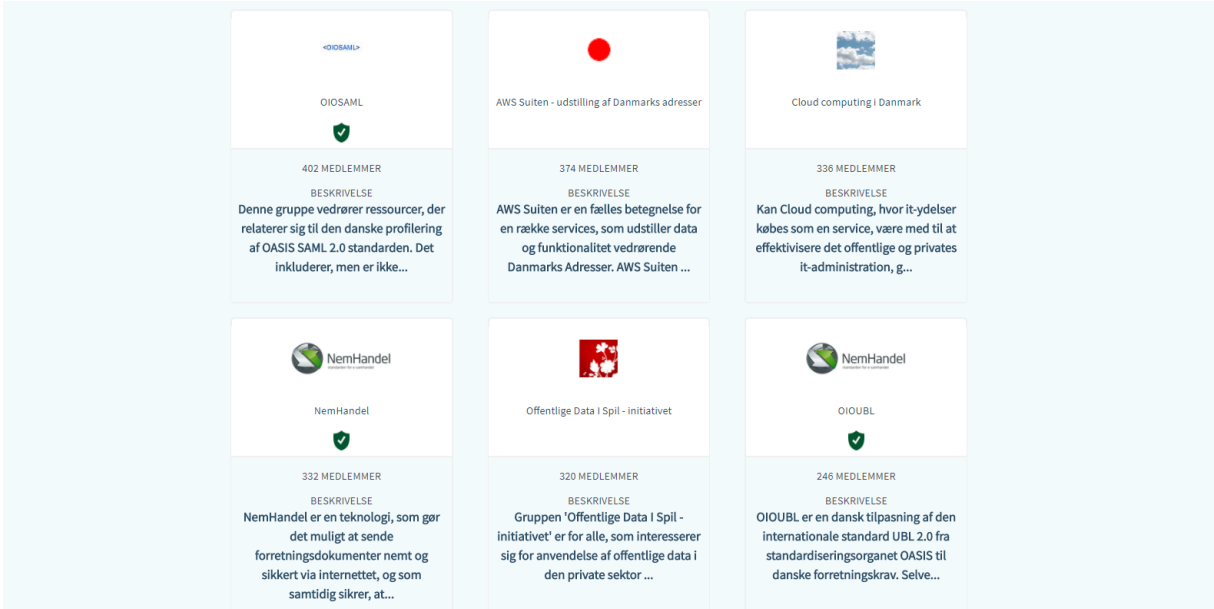

Figure 11: Scrolling down - screenshot of lower half of https://digitaliser.dk/groups

8.3.1 The group *Offentlige Data I Spil - initiativet*

The group *Offentlige Data I Spil – initiativet* (ODIS) has public access and, during the time of study (February to May 2018), grew slowly from 317 to 320 members (see Table 4 in Appendix D). The members can write posts in four different categories, to wit, discussion, resources, news, events (see Fig. 12). As well, a registered user can comment on a post and also comment on individual comments on a post.

Figure 12: Screenshot of Selection dropdown menu

The landing page (see Fig. 13) of the group lists recent activities in chronological, but not in a thematical order, so it is not obvious who has answered to whom or commented on what topic.

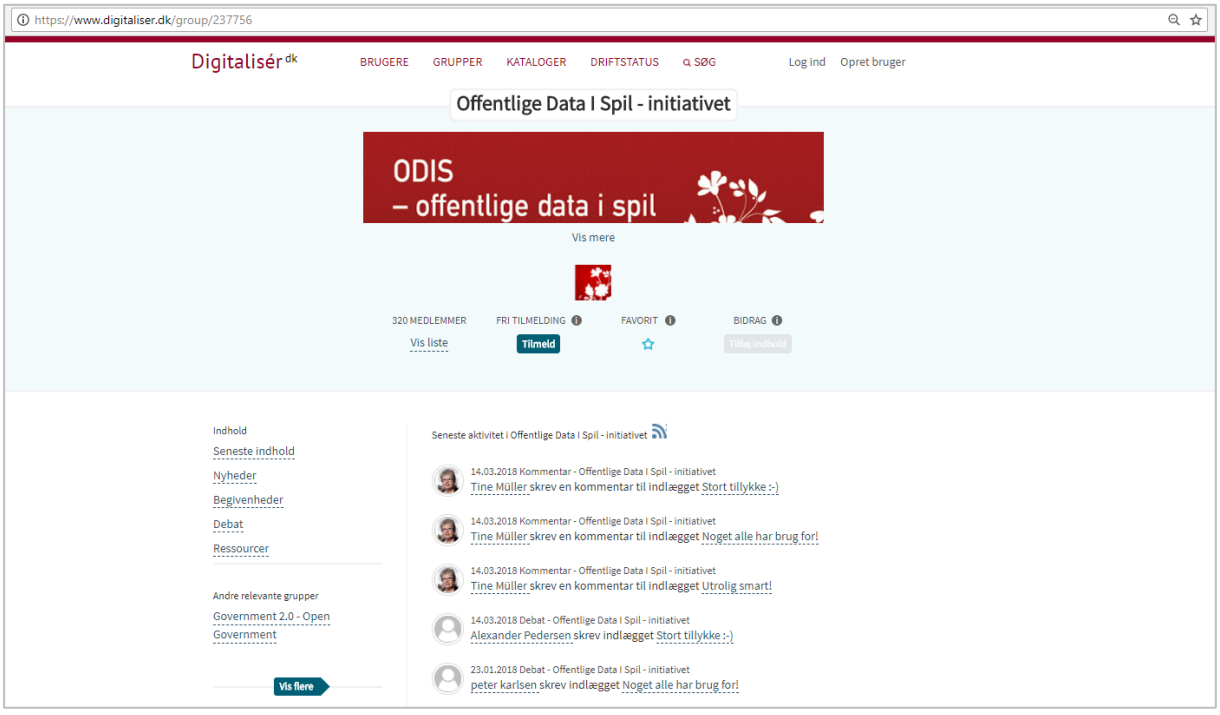

Figure 13: Screenshot from the ODIS group Landing page

Concerning the interaction on the page, an initial wave of discussions and dialogue around the year 2010 shows communication between possible users of Open Data and representatives from authorities responsible for the release. The online activity was in the first years of the group seemingly accompanied by real-life meetings, that are referred to in the posts. Correspondingly,

the events section (see Fig. 14) does not list any current events but five events of the past, one from 2016, two from 2013 and two from 2009. A supposed software error displays a wrong posting date. The interaction between the members slowed down significantly since around 2014 but is nevertheless existing on a very low level.

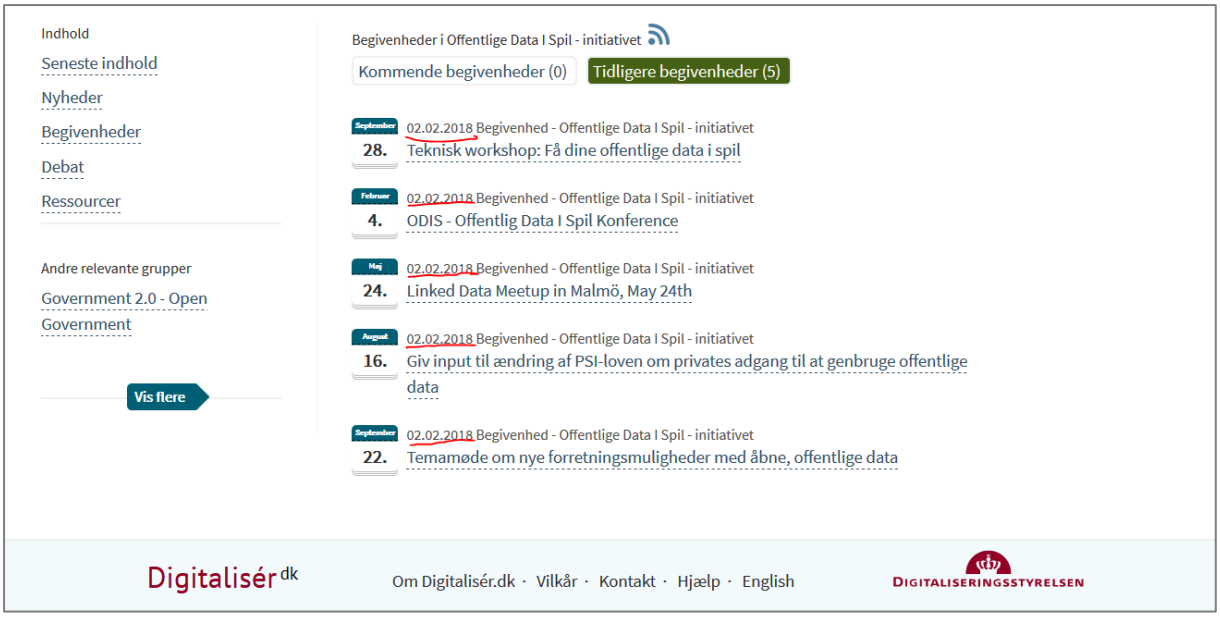

Figure 14: Screenshot of the events section

While the news section contains 91 threads (posts and following comments), the function of the discussion section remains unclear, as it obviously lists all comments in chronological order, but from every category, without a thematical structure.

8.4 Partial conclusion

This chapter introduced the concept of communities of practices. In this context, a relevant discussion group, the ODIS group, was briefly assessed in terms of a community of practice. But already after a short examination, it can be stated that the group bears a potential that is currently unused: It is striking that the group fulfills the three – admittedly fairly broad – conditions to a very different degree.

As has been sketched by the analysis, the group's domain is given with the registered members' obvious interest in Open Data. The members' commitment to the topic seem to come in various degrees and because of diverse reasons but is nevertheless given.

The various interactions of the group members support the assumption that a community actually exists, that the members have built up relationships which would enable them to learn from each other. However, this learning obviously does not lead to a shared practice, at least not in this group. One of the reasons for this development may be the missing of "technology stewardship" (Wenger, White, & Smith, 2009, p. i): A "technology steward" in this sense would overtake the task of being technically and strategically responsible for the well-being of the group, which otherwise is threatened with dissolving. Nonetheless, the ODIS group as a community of practice could be an important starting point to share knowledge about uses of Open Data. But at the moment, this possibility is not utilized. Davies (2010) stated that "[o]ne of the central problems of Open Data use is the need for capacity both in state and society to be able to debate the *meaning* of data, and to find responsible ways of using open data in a democratic debate" (p. 5, emphasis in original). The example of the ODIS group supports this statement.

In summary, besides the missing technology stewardship, several other obstacles could be identified which hamper the ODIS group from being a fruitful community of practice. If the orientation of the ODIS group as a community of practice is giving access to expertise, promoting discussions and providing content in form of different resources (as the description of the forum indicates), then structure is necessary for the members in order to get access. If members want to take part in conversations, they have to be able to find the topic they are interested in – the same applies to resources and expertise: They must be searchable and findable. These obstacles concern the same conditions, which already have been identified as necessary for the support of deliberative democracy when applying measures to promote Open Data:

- a uniform Open Data strategy (including technology stewardship)
- an appropriate toolset (including a well-designed platform for the forum) and
- efficient control mechanisms.

If these conditions would be fulfilled, the ODIS group or a similar community of practice could contribute to further Open Data literacy, and in turn, promote the potential of Open Data to support deliberative democracy.

8.3.2 The dimensions of the ODIS group as a community of practice

I will now examine the ODIS group according to the three dimensions of a community of practice: domain, community and interaction. I will discuss to which extent the characteristics are fulfilled and point to possible obstacles hindering the member's mutual learning and knowledge sharing. The associated tables and figures can be found in Appendix D.

Backing on the Wenger's theory, we can state that the members of the group share a common **domain** of interest – the use of public Open Data in practice. The description of the nature of the groups in the forum directly confirms their orientation as a shared interest: "Grupperne har udgangspunkt i en fælles interesse om digitalisering i det offentlige, fx et projekt, et driftssamarbejde eller noget helt andet."[70]

But beyond the shared domain of interest, how much can we talk about "a commitment to the domain of interest" (Wenger-Trayner & Wenger-Trayner, 2015)? In this case, the act of creating a profile can already be judged as a minor indication of commitment, as it is not required to have one in order to be able to read. A further signal for a commitment is the fact that a majority of the members reveal personal professional details: Nearly three thirds of the members (73%) indicate a job title. 44% show a profile picture. And 18% give a description of themselves in form of biographical notes, thus specifying their respective field of expertise (see Table 5).

The commitment to the group seems to be mainly interest-driven, as most of the group members can be identified as coming from the private sector (38%, see Table 6 and 7 and Figure 17 and 18). 4% come from a research institution, according to their job description. Only almost a third (31%) comes from administrative institutions and may have been obliged by profession to enrol in the group. However, 27% of all members could not be associated to a professional category, as they do not have indicated a job title.

The degree of the activity of the users is another signal for commitment: 14% of the users wrote more than ten posts (see Table 8 and Fig. 19). About half of these productive writers come from the private sector. 5% wrote more than 100 posts (see Table 9-11 and Fig. 20 and 21). Nevertheless, the majority is "lurking": 59% of all users have never contributed to the

[70] https://digitaliser.dk/groups

discussion. According to Wenger, this core-centred distribution is a common pattern: The existence of the so-called *lurkers* or *readers* is considered as richness of the periphery and an offer of learning opportunities to those (1998, p. 9).

The **community dimension** in a community of practice is characterized by the members' engagement in joint activities and discussions. This is the case in the ODIS-group, where the members help each other and share information, like pointing others to relevant sources ("Jeg vil blot gøre dig opmærksom på et memorandum…"[71]) or share their knowledge ("Jeg har lavet en 5 minutters video, som viser hvordan jeg videreformidler OpenData i Drupal og til de ender i en Android app"[72]).

The members also compliment work others have presented in the forum ("Fin ide!"[73]) or discuss controversial topics. This is evident by posts saying "Jeg synes, der er meget god inspiration i oplægget. Det er en vigtig debat."[74] Other posts refer to events in the past ("A lot of very good remarks and observations was shared…. It also seemed the general atmosphere was good and constructive. Glad I could be part of it."[75] Furthermore, invitations to events are pronounced. The writer expresses the hope to meet at that occasion ("jeg håber, at vi ses!"[76]), which underlines the fact that individuals in fact have built a relationship where they can learn from each other's knowledge, which characterizes a community of practice. The number of new members per year reveal a peak in 2009, when 125 members registered (39% of all current members). Afterwards, the response decreased until 2014, then stabilized on a low level, with 15 new members in 2016 and 2017, respectively (see Fig. 21).

Concerning the homogeneity of the members, it is striking, that one person (from the administrative authorities) initiated more than to thirds of all news posts (58 of 85). But when this person stopped posting regularly around June 2014 (only to posts came later), the interaction in the group decreased remarkably. This underlines Wenger's call for leadership "to move the inquiry forward" (Wenger, 1998, p. 8): When the leader leaves and no one overtakes the role, the community starts to disperse.

[71] https://www.digitaliser.dk/news/446768
[72] https://www.digitaliser.dk/news/2527235
[73] https://www.digitaliser.dk/news/3647438
[74] https://www.digitaliser.dk/news/237759
[75] https://www.digitaliser.dk/news/449202
[76] https://www.digitaliser.dk/news/2576099

As the **practice dimension** of the ODIS is concerned, it is difficult to say, if the group has contributed to the evolvement of a "shared repertoire of resources experiences, stories, tools, ways of addressing recurring problems—in short a shared practice" (Wenger-Trayner & Wenger-Trayner, 2015). There is no obvious sign for an agreement on a toolset, as the shared practice – of, e.g., how to use Open Data in an application[77] – remains anecdotal.

[77] https://www.digitaliser.dk/news/2527235

9. Conclusion

Summary: This chapter concludes this work and summarizes its findings – the potentials for the support of deliberative democracy brought about by Danish Open Data initiatives. Additionally, deliberation and citizen participation are set in a broader context of digitization.

This work was addressed to discuss potentials for the support of deliberative democracy brought about by Danish Open Data initiatives. It followed the hypothesis, that Open Data have the potential to support deliberative democracy by enabling informational broadening. Accordingly, it was derived that the democratic government of a country with an advanced IT infrastructure – like Denmark – will apply measures to promote Open Data for the support of deliberative democracy. This work relied thereby on the assumption of the reasonable citizen, supposing that ordinary citizens, given enough information and time for discussion, are quite capable of understanding complex issues and reaching pertinent conclusions about significant public matters (Pateman, 1970).

As could be shown during the course of this work, there are significant potentials for improvement concerning the use of Open Data as a source for the support of deliberative democracy in Denmark. Several additional conditions could be identified, which must be fulfilled in order to use the deliberative potential of Open Data to a greater extend: The executing state institutions must have an explicit Open Data strategy, an advanced level of Open Data literacy, an appropriate toolset to implement the strategy and efficient mechanisms to control the implementation. As the analysis showed, these conditions are not sufficiently met in the case of Danish Open Data initiatives – here are the potentials that can be used to employ Open Data as a support for deliberative democracy on a larger scale.

As to the Open Data strategy, the analysis of the Danish Open Data initiatives could reveal, that considerations on public information and civil participation only play a minor role. Even though theses intentions are mentioned, their outcome with regard to the support of public information and deliberative democracy is limited. One cause could be the lack of an effective control

mechanism concerning the implementation of Open Data initiatives. Further reasons could be the prevailing focus of the initiatives on the economic benefits of Open Data, and the lack of Open Data literacy. The focus of Open Data initiatives on efficiency and economic benefits, however, carries dangers. Sen warns of a too narrow focus on economic development in a democracy:

> Many economic technocrats recommend the use of economic incentives (which the market system provides) while ignoring political incentives (which democratic systems could guarantee). But economic incentives, important as they are, are no substitute for political incentives, and the absence of political incentives is a lacuna that cannot be filled by the operation of economic inducement (1999, p. 184).

It could be shown that the participation of the citizens, a cornerstone in deliberative democracy, is highly valued in Danish Open Data initiatives. However, most participation possibilities around the area Open Data aim at the assessment of public services, emphasizing the role of the citizen as a consumer. In this regard, a large potential could be released, if applications based on Open Data would target at direct political participation or collaborative participation, e.g. by informing citizens as voters (like in the British example TheyWorkForYou[78]) or promoting dialogue on policies, like the mentioned electricity map. Another existing Danish example in this regard is the service www.hvadbrugespengenetil.dk, which calculates for what one's tax payments are used for. These examples illustrate the possibilities of Open Data as a base for informational broadening and as a support of deliberative democracy.

Participation in democratic processes requires knowledge. This statement applies especially, when Open Data serve as the basis for participation. The essential condition for the use of Open Data, in general, is Open Data literacy. If Open Data literacy could be improved, more people would be able to use Open Data to support deliberative democracy. However, the government's early move in order to establish an online forum for knowledge sharing on Open Data has obviously come out of the spotlight. As the examination of a discussion group in this forum has shown, it can be considered a community of practice, a kind of an institution which in similar contexts has proven to provide a useful surrounding to further Open Data literacy. A renewed

[78] https://www.theyworkforyou.com/

effort to strengthen communities of practice around Open Data in Denmark could thus contribute to support the use of Open Data in general and as support for deliberative democracy.

This work attempted to assess the potentials of the Danish Open Data initiatives for the support of deliberative democracy from different viewpoints: On the one hand, the action papers and strategy plans were scrutinized. On the other hand, use cases of Open Data were examined. Additionally, communities of practice around the use of Open Data were thematized. However, the scope of this study was limited. Foreign examples of Open Data strategies with regard to deliberative democracy were only treated briefly. Additionally, it could provide valuable insights to examine the opinions of Open Data, which could be a starting point for further investigations in this field of study. Another approach could be to take up the liberal scepticism about reason – and discuss its implications for the interplay of Open Data and democracy.

Generally, the concept of deliberative democracy grounds on the conception that citizens "learn" to address their issues and develop their arguments in deliberating – a principle which Habermas calls "kommunikative Kompetenz" (Habermas, 1981). In this sense, using Open Data to support deliberative democracy must be considered a contemporary means to assess political problems and should not be neglected – even if the democracy seems to function properly. "When things are routinely good and smooth, this instrumental role of democracy may not be particularly missed", describes Sen, but "the danger of insecurity, arising from changes in the economic or other circumstances from uncorrected mistakes of policy, can lurk behind what may look very much like a healthy economy" (1999, p. 184). Well-fed and well-entertained people may tend to lose their participation possibilities out of sight or even find them irritating. In the same sense goes the popular citation, (mistakenly) attributed to Bismarck: "When people don't know how sausages and laws are made, they will sleep much better." [79]

[79] Fred R. Shapiro revealed that the citation instead goes back to the "lawyer-poet" John Godfrey Saxe and was first published already in The Daily Cleveland Herald, as "Laws, like sausages, cease to inspire respect in proportion as we know how they are made" (Shapiro, 2008).

Deliberation and citizen participation in times of digitization can also be understood in another manner. In which way, is illustrated by the suggestions, the consulting company DareDisrupt recently made to KL, the organisation of the municipalities:

> Kommunerne ønsker at involvere borgere i nogle beslutningsprocesser, høringer og sager. Her giver kunstig intelligens nye muligheder. Virksomheder, der analyserer og processerer store mængder data, kan nu finde frem til personlighedstræk og præferencer og f.eks. politiske holdninger ved at samle data fra f.eks. sociale medier. Det betyder for brands og politiske kampagner, at man kan målrette budskaber meget præcist og sikre grundlag for en højere grad af involvering og inputs. Data og kunstig intelligens vil også kunne bruges til at involvere borgere, der hvor de mest sandsynligt ville være engagerede og gerne ville gøre en forskel. Det er også muligt at *simulere borgerinddragelse og holdningstilkendegivelse* ved at analysere på data om borgernes konkrete adfærd og f.eks. brug af kommunens tilbud (DareDisrupt, n.d., emphasis mine).

It will have to be discussed in the future whether this form of simulated citizen participation would meet democratic principles.

List of websites

Examined use cases

Parkeringsbutikken i Københavns Kommune…….....https://parkering.kk.dk/tilladelser-privat

Ansøgningsportalen i Københavns Kommune……...https://www.kk.dk/tilladelser

Sunmapper……...https://sunmapper.com/

Parkeringsapp for Aarhus..https://itunes.apple.com/dk/app/arhus-p-huse/id1078738194?mt=8

Public Parking Space Availability Prediction..https://www.smartaarhus.dk/projekter/node/167

Find vej med legelands-app

……...https://itunes.apple.com/hk/app/legepladsen-af-morama/id1001294755?mt=8

CityStories……...http://www.citystories.dk/

Hopper.dk[80]……...http://www.hopper.dk/

Artscope……https://vimeo.com/108032966

Viden om dit affald……..http://genbrug.smartaarhus.dk/

Library Tunes……http://www.opendata.dk/viden-om/use-cases/library-tunes

Sådan ser trafikken ud lige nu

……http://www.opendata.dk/viden-om/use-cases/saadan-ser-trafikken-ud-lige-nu

Let-the-audience-decide…….https://www.findfun4free.com/hack-danish-culture/

HistoriskAtlas.dk……https://blog.historiskatlas.dk/

Additional use cases

Comparison of municipality budgets……..…….www.kenddinkommune.dk/

Monitoring representatives' voting behaviour……... http://hvemstemmerhvad.dk/

Electricity Map……...https://www.electricitymap.org/

Calculating the distribution of taxes……..……www.hvadbrugespengenetil.dk/

Find public toilets……....http://beta.findtoilet.dk/

Excerpts from the business register…….http://cvrapi.dk/

[80] When checked (28.05.2018), the site had gone offline, but was previously online.

Foreign use cases

Monitoring representatives' voting behaviour in GB……https://www.theyworkforyou.com/

Danish Data portals

Local and regional open data…….……..…https://portal.opendata.dk/

Statistical data……...https://www.dst.dk/da/

Business data…….https://data.virk.dk/

Environmental data……..http://www.miljoeportal.dk/

Geodata……..http://eng.gst.dk/

Data from the Parliament…….....…http://www.ft.dk/da/dokumenter/aabne_data/

Future portal for basic data…….http://datafordeler.dk/

Foreign data portals

British Open Data portal……https://data.gov.uk/

German Open Data portal……..https://www.govdata.de/

Norwegian Open Data portal……..https://data.norge.no/

Swedish Open Data portal……https://oppnadata.se/

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Appendices

A. Overview on Open Data requests on the "wish list", *Ønskelisten*

(Link back to sec. 5.1)

- Political data:
  - parliamentary data (is partly available as Open Data now under http://www.ft.dk/da/Dokumenter/Aabne_data)
  - voting districts (not available)
  - candidate lists (not available)
  - data about authorities, their results, expenses, IT usage, business processes, flow of information (partly available on https://portal.opendata.dk/)

- Geographical data
  - school districts (not available)
  - timetables (partly available)
  - parishes (available under http://www.digdag.dk/)
  - location of public toilets (partly available)
  - topographical card (available under http://sdfe.dk/hent-data/kortforsyningen/)

- Traffic data
  - timetables for public transport (partly available)
  - black spots for accidents (not available)

- Economic data:
  - company data (partly available under https://datacvr.virk.dk/data/, more is announced)
  - Denmarks financial budget (available under http://www.oes-cs.dk/olapdatabase/finanslov/index.cgi)

- Environmental data:
  - data on noise pollution (not available)
  - weather and climate data (announced)

- Crime data:
  - data on stolen cars (not available)

- Statistical data

  - available under https://www.dst.dk/da/

- Legal data:
  - court judgements (partly available)
  - laws (partly available)

Further requests included research and work data, cultural, nature and leisure data, health data and data on social services, on environmental protection, defence and properties and supplies.

B. Press releases on *Strategi for Danmarks digitale vækst*

(Link back to sec. 5.3)

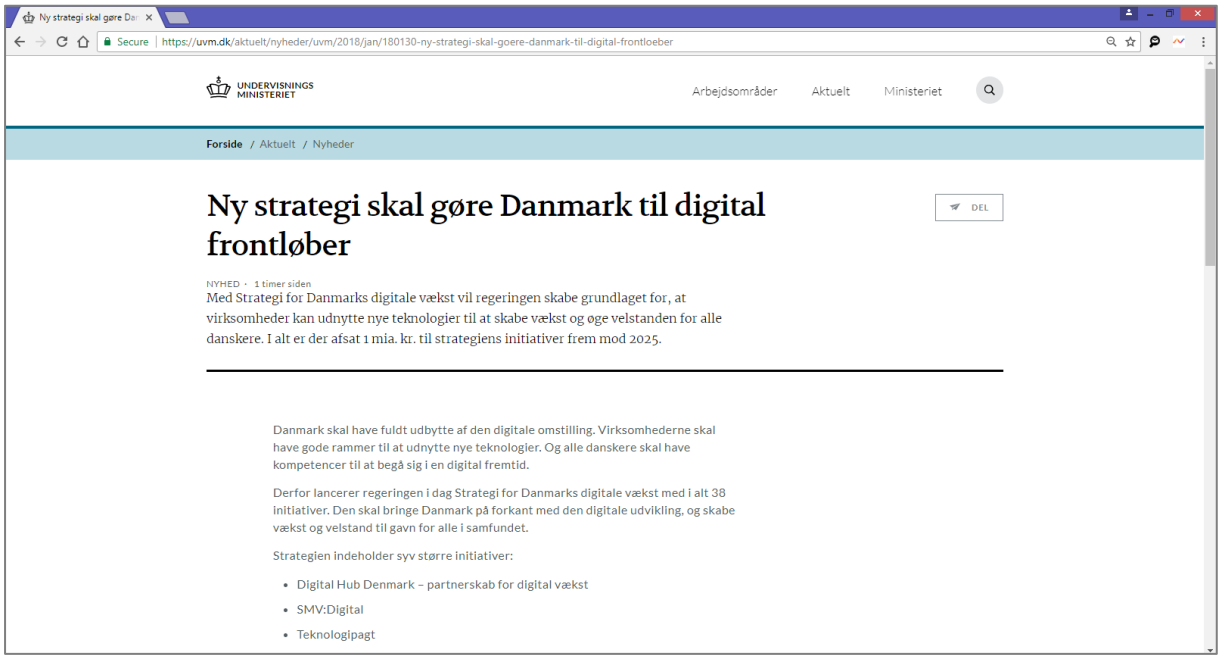

Figure 15: … on the homepage of the ministry of education, Screenshot, 30.01.2018, 14.30

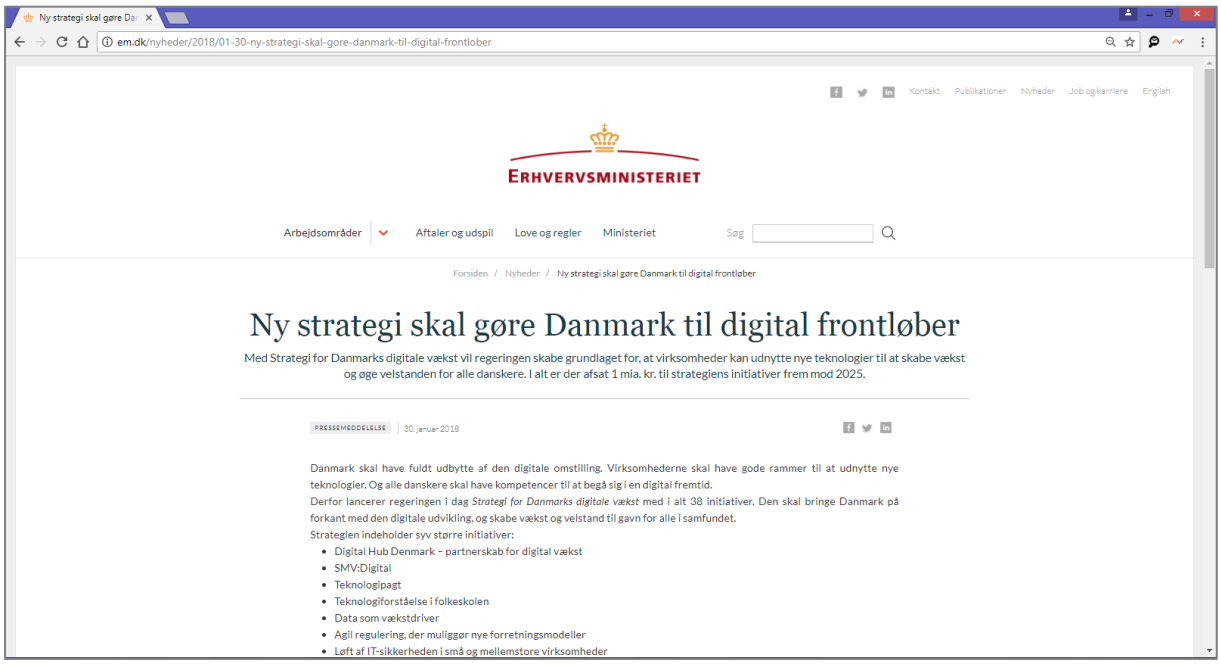

Figure 16: … and on the homepage of the ministry of economics, Screenshot from the same time.

C. Descriptions of use cases on OpenData.dk

(Link back to sec. 6.3)

1. *Parkeringsbutikken i Københavns Kommune*

Description: web-service from Copenhagen municipality to buy/apply for parking permits in Copenhagen

Addressees: citizens with cars in Copenhagen

Use of Open Data: for integration of data from several suppliers on vending machines and payment solutions (”Digitaliseringen og åbne data har muliggjort, at Københavns Kommune har adskillige leverandører på automater og betalingsløsninger”[81]).

Domains: Business, Geographic, Transport

Category: C, individual choice/market participation, actor as consumer of parking space

2. Ansøgningsportalen i Københavns Kommune

Description: web-service from the city of Copenhagen to apply for a planned use of urban space for cultural events, construction work or anything else

Addressees: businesses (and citizens) in Copenhagen

Use of Open Data: Geodata (“data om byrummet”), to increase effectiveness: “Digitaliseringen har bevirket, at den gennemsnitlige sagsbehandlingstid er gået fra flere uger til 2-3 dage, og at man allerede ved ansøgningstidspunkt kan få en forventet sagsbehandlingstid.”[82]

Domains: Business, Geographic

Category: C, individual choice/market participation, actor as consumer of urban space

3. Sunmapper

Description: free web-service to calculate whether it is economically viable to install solar cells on a private home, based on a 3D model of Denmark and taking into account shadows from surrounding objects. Calculates also the price of the solar system, repayment time, reduction of carbon dioxide emissions and gives possibility to receive non-binding offers for the installing. Result of a hackathon in 2014.

[81] http://www.opendata.dk/viden-om/use-cases/parkeringsbutikken-i-koebenhavns-kommune, see also https://pbutikken.kk.dk/privatprodukter

[82] http://www.opendata.dk/viden-om/use-cases/ansoegningsportalen-i-koebenhavns-kommune, see also https://www.kk.dk/tilladelser

Addressees: citizens who own a home

Use of Open Data: diverse geodata and energy data, "en række åbne datakilder"[83]

Domains: Business, Geographic, Meteorological

Category: C and B, as it is not only directed to a citizen/consumer of electricity, but also delivers specific details of issues (energy prices, carbon dioxide emissions)

4. Parkeringsapp for Aarhus

Description: free mobile application for iOS devices (iPhone, iPad, etc.) to locate open parking spaces in several Aarhus car parks

Addressees: citizens with cars in Aarhus

Use of Open Data: uses basically an Open Dataset on open parking spaces from OpenData.dk from the municipality of Aarhus which is updated every five minutes[84]

Domains: Geographical, Transport

Category: C, individual choice/market participation, actor as consumer of parking space

5. Public Parking Space Availability Prediction

Description: planned service to locate open parking space in Aarhus, part of an EU-project. Citizens can indicate open parking spaces[85]

Addressees: citizens with cars in Aarhus

Use of Open Data: uses the same dataset as 4., and real-time traffic data[86]

Domains: Geographical, Transport

Category: C and B, actor as citizen/consumer of parking space and as citizen/co-producer in a collaboration to re-design services/address issues

6. Find vej med legeplads-app

Description: paid application for iOS devices to show information about and navigation to playgrounds in the municipalities of Copenhagen and Frederiksberg[87]

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[83] http://www.opendata.dk/viden-om/use-cases/sunmapper, see also https://sunmapper.com/

[84] The dataset can be seen under https://portal.opendata.dk/dataset/parkeringshuse-i-aarhus, for the app see https://itunes.apple.com/dk/app/arhus-p-huse/id1078738194?mt=8, the description is to find at http://www.opendata.dk/viden-om/use-cases/ny-parkeringsapp-med-data-fra-wwwodaadk.

[85] http://www.opendata.dk/viden-om/use-cases/eu-projektet-citypulse-udvikler-parkerings-app

[86] https://portal.opendata.dk/dataset/realtids-trafikdata

[87] Find the app under https://itunes.apple.com/hk/app/legepladsen-af-morama/id1001294755?mt=8 and the description under http://www.opendata.dk/viden-om/use-cases/find-vej-med-legeplads-app

Addressees: citizens with children and childcare facilities in Copenhagen and Frederiksberg

Use of Open Data: geodata and datasets on playgrounds

Domain: Geographical

Category: C, actor as citizen/consumer of playgrounds, allows no integrative collaboration as app is exclusive for certain devices

7. CityStories

Description: free mobile app for citizens and tourists in Aarhus to experience history in a local context by getting historical cultural information in relation to user's location. Result of a hackathon in 2015. App is still in a beta version.

Addressees: citizens and tourists in Aarhus

Use of Open Data: use of historical articles from Aarhus Stiftstidende[88], which are available as Open Data on OpenData.dk, combined with geodata

Domain: Cultural/Historical

Category: D, cultural information for citizens

8. Hopper.dk

Description: web-platform to search craftsman based on location. Site is currently under maintenance.

Addressees: Danish citizens with need for craftsmen's services

Use of Open Data: geodata and data from business register from virk.dk[89]

Domains: Business, Geographical

Category: C, individual choice/market participation, actor as consumer of craftsmen's services

9. Artscope

Description: instrument for viewing invisible layers on top of artworks, showing layers perceptible with x-ray or infrared. Prototype of an application for the National Gallery of Denmark, result of a hackathon 2014. The museum currently uses an own application, Vizgu, also based on Open Data.[90]

Addressees: visitors to the National Gallery of Denmark

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[88] See the open datasets under https://portal.opendata.dk/dataset/sejrs-sedler and the description under http://www.opendata.dk/viden-om/use-cases/citystories

[89] See datasets under http://datahub.virk.dk/data/search, app description under https://fadeit.dk/da/project/hopper

[90] E-Mail from Jonas Heide Smith, Head of Digital, Statens Museum for Kunst, 13.03.2018

Use of Open Data: Open Data on the artworks, coming from the museum[91]

Domain: Cultural/Historical

Category: D, cultural information for citizens

10. The Books of Aarhus

Description: visualization showing the transaction of materials at libraries of Aarhus municipality[92]. Based on data from 2014, not updated.

Addressees: interested citizens and librarians

Use of Open Data: mainly Open Data on library transactions on OpenData.dk[93], updated on an hourly basis, and Open Data on customers

Domains: Geographical, Social, Cultural/Historical

Category: C and B, actor as citizen/consumer and actor as citizen/co-producer, as it could allow to detect peak hours, which could influence the choice of service and/or give a basis to collaboratively redesign the service – if the data were updated.

11. Viden om dit affald

Description: website[94] showing visualizations on waste and recycling in Aarhus, including categories of waste disposed in different areas, and times of visits to recycling stations. Based on data from 2014, not updated. In Connection with the EU project RADICAL[95].

Addressees: citizens of Aarhus

Use of Open Data: several Open Datasets on waste/recycling from OpenData.dk

Domain: Geographical, Social, Cultural/Historical

Category: C and B, actor as citizen/consumer and actor as citizen/co-producer, as it could allow to detect peak hours at the recycling stations, which could influence the choice of service and/or give a basis to collaboratively redesign the service – if the data were updated.

12. Library Tunes

Description: art project, transforming library transactions in an ongoing musical piece, where every loan creates a tone and every return creates a beat. Was an attempt, currently not in operation.

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[91] See http://www.opendata.dk/viden-om/use-cases/artscope
[92] See http://odaa.datavis.dk/pivot/
[93] See the dataset under https://portal.opendata.dk/dataset/transaktionsdata-fra-aarhus-kommunes-biblioteker
[94] See the website under http://genbrug.smartaarhus.dk/
[95] Rapid Deployment for Intelligent Cities And Living, http://www.radical-project.eu/

Addressees: interested citizens

Use of Open Data: same Open Dataset as (10) on transactions at library of the Aarhus municipality

Domain: Cultural/Historical

Category: D, cultural entertainment and inspiration for citizens

13. Sådan ser trafikken ud lige nu

Description: real-time traffic map of Aarhus which indicates traffic velocity and traffic jams, established as collaboration between Aarhus Stiftstidende and students. No longer available online.

Addressees: citizens with cars in Aarhus

Use of Open Data: Real-time traffic data from OpenData.dk[96] and map data from OpenStreetMap

Domains: Geographical, Transport

Category: C and B, actor as citizen/road user and as possible citizen/co-producer in a collaboration to re-design services/address issues

14. Let-the-audience-decide

Description: concept for a voting platform for users to decide which artworks should be exposed at the Danish National Gallery. Inspired by the dating app Tinder, where the user swipes over a picture to like/dislike it. Result of a hackathon in 2014.

Addressees: visitors to the National Gallery of Denmark

Use of Open Data: same as 9., coming from the museum

Domain: Cultural/Historical

Category: D, cultural entertainment and inspiration for citizens

15. HistoriskAtlas.dk

Description: Digital map with the possibility to show different data layers (county, owner, court and parish) on a map of Denmark. The maps are dating back from 1660 to aerial photos from 2016. Histories and materials from archives are linked to places on the map. Part of a hackathon in 2014. In 2016 driven by an association of 220 Danish institutions.[97]

[96] The dataset can be found here: https://portal.opendata.dk/dataset/realtids-trafikdata
[97] See https://blog.historiskatlas.dk/

Addressees: pupils and interested citizens

Use of Open Data: Historical data from the *DigDag* project

Domains: Geographic, Legal, Social, Cultural/Historical, Political

Category: D, cultural entertainment and inspiration for citizens

16. Tilfreds med betjeningen?

Description: An installation with tablets at the exit of public service institutions which allows citizen to share their satisfaction with the service by pushing one of five smileys.

Addressees: citizens using a public service

Use of Open Data: - (as the service did not use/produce Open Data, the case was removed)

Domain: -

Category: -

D. The group *Offentlige Data i spil*

(Link back to sec. 8.3)

Member list

	name	profile picture	biography	member since	last activity	number of posts*	job title/function	category
1	Arvid Bro Thuestad	1	no	2008	25.08.2011	76	Kontoret for it-kompetencer og tilgængelighed, IT- og Telestyrelsen	administration
2	Cathrine Lippert	1	1	2008	18.11.2016	294	Seniorkonsulent - Digital Transformation · Teknologisk Institut	administration
3	Finn Jordal	1	no	2008	13.12.2017	770	Styrelsen for Dataforsyning og Effektivisering	administration
4	Martin Høegh Mortensen	1	1	2008	07.06.2017	168	Chefkonsulent · Digitaliseringsstyrelsen	administration
5	Aage Romvig	no	no	2009	null	0	no entry	no entry
6	Aage Svanholm	no	no	2011	null	0	Chefkonsulent · Københavns Kommune	administration
7	Adam Arndt	1	no	2008	07.12.2015	103	Specialkonsulent · Digitaliseringsstyrelsen	administration
8	Ahn Louise Larsen	no	no	2010	null	0	Senioranalytiker · AnLU Dataanalyse	private
9	Allan Larsen	no	no	2013	null	0	no entry	no entry
10	Allan Gyldendal Frederiks	no	no	2010	null	0	GIS-koordinator · Syddjurs Kommune	administration
11	Anders Colding-Jørgensen	no	no	2009	null	0	Internetpsykolog (cand.psych.) · Virkeligheden.dk	private
12	Anders Feder	no	no	2009	null	0	no entry	no entry
13	Anders Hecquet	no	no	2018	null	0	Principal Application Architect · DXC Tehnology	private
14	Anders Madsen	no	1	2016	null	0	Marketingchef · Saxis	private
15	Anders Markussen	1	no	2011	null	0	PhD studerende · Datalogisk Institut, Københavns Universitet	researcher
16	Anders Bo Nielsen	no	no	2009	null	0	chefkonsulent · Rigsarkivet	administration
17	Anders Christian Boisen	1	no	2009	null	0	Manager · Rambøll Management Consulting A/S	private
18	Anders Rostgaard Bystrup	1	no	2009	22.03.2010	3	Lord High Fixer · bystrup.net/it/	private
19	Andreas Bøgh Carlsen	no	no	2013	null	0	no entry	no entry
20	Anisette Johansen	no	no	2015	null	0	no entry	no entry
21	Anna Odgaard Ingram	1	no	2009	null	0	Terminolog og projektleder · DANTERMcentret	private
22	Anna Louise Kropp Kehler	1	no	2009	29.04.2009	1	Fuldmægtig · Økonomistyrelsen	administration
23	Anne Kronby Andersen	1	no	2010	null	0	Teamleder GIS & IT · Ringsted Kommune	administration
24	Annesofie Bjerre	no	no	2008	25.08.2009	3	studentermedarbejder · IT og Telestyrelsen, Center for digitalisering - Policy (CDI-P)	administration
25	Anne Sofie Fink	no	no	2017	null	0	Områdeleder · Rigsarkivet	administration
26	Anne Sofie Kjeldgaard	no	no	2010	null	0	no entry	no entry
27	Annette Bosteen Trabjerg	no	no	2018	null	0	Client Service Director · Charlie Tango	private
28	Arne Skovhaug	1	no	2008	null	0	Account Manager	private
29	Asbjørn Lenbroch	1	no	2009	15.06.2009	1	Fuldmægtig · Erhvervs- og Byggestyrelsen	administration
30	August Ussing	no	no	2013	null	0	no entry	no entry
31	Awa Stelter	no	no	2016	null	0	no entry	no entry
32	Benjamin Enzenberg	no	no	2010	24.04.2012	2	Webkonsulent/Projektleder · Fødevareministeriet - Koncernkommunikation	administration
33	Benny Jørgensen	1	no	2009	09.02.2010	3	Business Integration Consultant · Solar A/S	private
34	Bente Steffensen	no	no	2011	null	0	Specialkonsulent · Kort & Matrikelstyrelsen	administration
35	Bergthor Skulason	1	no	2009	02.09.2009	40	no entry	no entry
36	Bertel Torp	no	no	2010	null	0	no entry	no entry
37	Bine Iversen	no	no	2015	02.11.2015	1	no entry	no entry
38	Birgitte vestgaard	no	no	2009	null	0	IT- og telestyrelsen	administration
39	Bitten Clausen	no	no	2009	02.09.2009	21	no entry	no entry
40	Bjarne Heltved	1	no	2008	04.10.2016	8	informationsarkitekt, specialkonsulent · Digitaliseringsstyrelsen	administration
41	Bjørn Hallberg Nielsen	no	no	2017	null	0	Konsulent · Region Hovedstaden	administration
42	Bo Andersson	no	no	2013	06.05.2013	1	no entry	no entry
43	Bo Drejer	no	no	2010	null	0	Account Manager & Advisor · Cyber Com Consulting A/S	private
44	Bo Fristed	1	no	2009	null	0	IT og Kommunikationschef · Århus Kommune	administration
45	Bo Borbye Pedersen	1	no	2009	10.11.2009	4	Partner / Designer · Move Design Aps	private
46	Camilla Grynnerup Fisker	1	1	2009	15.06.2012	164	Projektleder · Digitaliseringsstyrelsen - Kontor for Arkitektur og Standardisering	administration
47	Carsten Agger	1	no	2009	14.02.2018	4	Magenta ApS	private
48	Carsten Ellehauge	1	no	2016	null	0	Chefkonsulent Informationssikkerhed · Uddannelses- og Forskningsministeriet	administration
49	Carsten Frølich	no	no	2011	null	0	no entry	no entry
50	Carsten Høyer	no	no	2009	null	0	no entry	no entry

Table 4: Members of the Group *Offentlige Data i Spil* (to be continued on the following four pages)

	name	profile picture	biography	member since	last activity	number of posts*	job title/function	category
51	Casper Frederiksen	1	no	2010	07.06.2010	1	Bioinformatic Scientist · Københavns universitet, Panum inst.	researcher
52	Casper Schou	no	1	2018	null	0	Indehaver · Findenkaereste	private
53	Cecile Christensen	no	no	2009	null	0	Kontorchef · Center for Digitalisering	administration
54	Charlotte Gall	1	no	2011	18.12.2013	2	Chefkonsulent, cand. jur. · Digitaliseringsstyrelsen	administration
55	Charlotte Sahl-Madsen	1	no	2010	09.11.2010	1	Videnskabsminister · Videnskabsministeriet	administration
56	Christen Hedegaard	no	no	2013	11.03.2014	2	Projektleder Digital Bevaring og IT-sikringskoordinator · Det Kongelige Bibliotek	administration
57	Christian Bering Pedersen	1	no	2009	30.06.2011	2	Konsulent · Accenture	private
58	Christian Gravgaard	1	1	2017	31.10.2017	1	CEO · Gravgaard & Partners	private
59	Christian Hansen	no	no	2012	null	0	no entry	no entry
60	Christian Hauschild	no	no	2015	null	0	no entry	no entry
61	Christian Lanng	1	no	2008	20.12.2009	71	Direktør · Porta	private
62	Christian Schwarz Lausten	1	no	2009	04.11.2011	4	Medstifter og partner · Seismonaut	private
63	Christian Villum	no	no	2013	null	0	no entry	no entry
64	Christian Baagøe Schou	no	no	2010	null	0	no entry	no entry
65	Christian Vindinge Rasmus	1	no	2008	07.12.2011	27	Chefkonsulent · Digitaliseringsstyrelsen	administration
66	Claus Juhl Knudsen	no	no	2009	null	0	no entry	no entry
67	Claus Møldrup	1	no	2009	null	0	Principal Consultant · PA Consulting Group A/S	private
68	Claus Pedersen	no	no	2014	null	0	no entry	no entry
69	Claus Rantzau	1	no	2009	null	0	Senior Business Architect · KMD A/S	private
70	Daniel Franch	no	no	2012	null	0	no entry	no entry
71	Eik Kristensen	no	no	2012	null	0	no entry	no entry
72	Elisabeth Hofstad	no	no	2010	null	0	no entry	no entry
73	Emil Tin	1	1	2011	08.06.2011	9	IT og processpecialist · Cykelsekretariatet, Københavns Kommune	administration
74	Erik Helweg-Larsen	1	no	2009	23.10.2016	5	Forretningsarkitekt · Kommuneproces	private
75	Erik Reimert	no	no	2012	null	0	no entry	no entry
76	Esben Taudorf	1	no	2010	09.08.2013	2	GIS udvikler · Landinspektørfirmaet LE34 A/S	private
77	Esben Toftdahl Nielsen	no	no	2009	30.10.2009	1	PA Consulting Group	private
78	Eskil Sørensen	1	1	2009	08.04.2016	18	Specialkonsulent · Digitaliseringsstyrelsen	administration
79	Frank Roschmann	no	no	2015	27.02.2018	23	Specialkonsulent | IT · Arbejdstilsynet	administration
80	Frank Løvendahl Nielsen	no	no	2009	21.11.2009	2	Software Solution Arkitekt Konsulent · MicroKnights ApS	private
81	Frans Josef Meyer	1	no	2010	null	0	IT Arkitekt · Provector.dk	private
82	Frederik Braun	1	no	2011	null	0	Systemadministrator · Københavns Stadsarkiv / NEA	administration
83	Frederik Kortbæk	1	no	2009	25.06.2009	1	Direktør · FK Consulting	private
84	Frederik Nelsson	1	1	2008	18.02.2013	32	CEO · Utter	private
85	Gert Galster	1	no	2009	08.05.2009	1	Sundhedsinformatiker, læge · SundIT	private
86	Gunnar Peter Jensen	no	no	2009	null	0	Projektleder · Danmarks Miljøportal	administration
87	Hanne Lunddal Jensen	no	no	2009	null	0	MAPICTURE ApS	private
88	Hanne Madsen	no	no	2009	null	0	Geolog/lektor · www.naturformidling.com	private
89	Hans Ravnkjær Larsen	1	1	2010	null	0	geokommunikatør · Geokommunikation	private
90	Hardy Henneberg	no	no	2009	null	0	konsulent · Henneberg Consult	private
91	Heidi Kolding	no	no	2014	01.03.2017	3	no entry	no entry
92	Helle Bjerre	no	no	2015	20.04.2017	2	no entry	no entry
93	Helle Schade-Sørensen	1	no	2009	07.03.2018	74	Chefkonsulent · Digitaliseringsstyrelsen	administration
94	Henning Terkelsen	1	no	2009	null	0	Business Consultant · NETS Danmark	private
95	Henning Aagaard Jensen	no	no	2011	null	0	Digitaliseringskonsulent · Vejle Kommune	administration
96	Henriette Juul Riishøj	no	no	2010	26.01.2010	5	no entry	no entry
97	Henrik Biering	1	no	2009	17.02.2017	7	CEO · Peercraft ApS	private
98	Henrik Bøgh	no	no	2012	null	0	Projektleder · Forsvarets Koncernfælles Informatiktjeneste	administration
99	Henrik Jeberg	1	no	2011	null	0	Divisionsdirektør IM/CIO · SAS Institutite A/S	private
100	Henrik Kærsgaard Hansen	no	no	2013	null	0	no entry	no entry
101	Henrik Theil	1	no	2009	26.11.2012	1	Kommunikationschef · FDIH_Foreningen for Dansk Internet Handel	private
102	Henrik Vindahl	no	no	2010	null	0	Konsulent · Zaqsolutions A/S	private
103	Henrik Hvid Jensen	1	no	2009	10.02.2010	11	Projektchef · Devoteam	private
104	Henrik Liliendahl Sørenser	no	no	2009	20.10.2009	8	Omikron Data Quality	private
105	Ib Larsen	no	1	2017	null	0	IT-Supporter · Ibs kontorservice	private
106	Iben Louise Birkkjær	no	no	2011	30.09.2011	1	no entry	no entry
107	Jacob Andresen	no	no	2009	07.10.2009	6	no entry	no entry
108	Jacob de Lichtenberg	no	no	2009	null	0	no entry	no entry
109	Jacob Høffer Larsen	no	no	2013	null	0	no entry	no entry
110	Jacob Thorn Jensen	no	no	2018	null	0	Analyse- og udbudskonsueltn · Herlev Kommune	administration
111	Jakob Aarøe Dam	1	1	2009	26.11.2009	2	Software udvikler · Cabo Communications A/S	private
112	Jakob Vang Glud	no	no	2016	null	0	CEO · Aarhus	private
113	Jan Nielsen	no	no	2010	null	0	no entry	no entry
114	Jan Olsen	no	no	2016	null	0	no entry	no entry
115	Jane Ørum	1	no	2010	15.05.2014	7	Telegrafinspektør · Erhvervsstyrelsen	administration
116	Jan Juul Jensen	1	no	2008	12.08.2011	2	Senior Solution Strategist · Informi GIS	private
117	Jan Kragh Jensen	no	no	2011	null	0	no entry	no entry
118	Jannie Tindbæk	no	no	2009	25.11.2009	2	Communication Manager · iPaper	private
119	Janus Sandsgaard	1	1	2008	07.01.2016	18	Dansk Erhverv	private
120	Jasper Arildslund	no	no	2009	08.07.2010	3	Senior konsulent · CIBER Danmark	private

	name	profile picture	biography	member since	last activity	number of posts*	job title/function	category
121	Jelena Isayeva Larsen	no	no	2009	null	0	Konsulent · KOMBIT A/S	private
122	Jens Christensen	no	1	2016	null	0	Medarbejder · Pandacig	private
123	Jens Vesti	no	no	2009	04.03.2009	1	no entry	no entry
124	Jens Kristian Villadsen	1	no	2013	13.06.2014	13	Enterprise architect · Region Midt	private
125	Jens Kudsk Jensen	1	1	2009	null	0	Salgschef · Geodata Danmark	private
126	Jens Toke Lausen	no	no	2013	null	0	HubBroker Aps	private
127	Jep Loft	1	no	2009	15.12.2009	1	IBM	private
128	Jes Folden Hyldig	no	no	2009	null	0	no entry	no entry
129	Jesper Jensen	no	1	2017	null	0	SEO-specialist · Spinnaker Nordic	private
130	Jesper Jørgensen	1	no	2010	null	0	It-ansvarlig stedfortræder · Københavns Kommune, Koncernservice	administration
131	Jesper Nissen	1	no	2009	null	0	koordinator · Fredericia Kommune	administration
132	Jesper Osbøl	1	no	2009	null	0	IT arkitekt · HEOS consulting	private
133	Jesper Lund Stocholm	no	no	2009	05.01.2012	5	Civilingeniør · CIBER	private
134	Jette Fugl	1	no	2011	null	0	Bibliotekar · Det Biovidenskabelige Fakultetsbibliotek, KU	administration
135	Joachim Eriksson	1	no	2008	19.12.2014	739	Informationsarkitekt · KL	administration
136	John Holbøll	no	no	2014	null	0	IT konsulent · Dataproces	private
137	Jon Kjær Amundsen	no	no	2012	null	0	no entry	no entry
138	Jon Lund	1	no	2009	26.11.2009	1	Stifter · Jon Lund - www.jon-lund.com/28199052	private
139	Jørgen Jensen	1	no	2010	null	0	no entry	no entry
140	Jørgen Eigil Hammer	no	no	2017	null	0	Technologiarkitekt · Banedanmark	administration
141	Jørgen Elgaard Larsen	1	1	2010	09.03.2014	9	Bestyrelsesmedlem · IT-Politisk Forening	private
142	Julian Hollingbery	no	no	2009	null	0	Facilitator · Kort- & Matrikelstyrelsen	administration
143	Kaare Brandt Petersen	no	no	2009	null	0	no entry	no entry
144	Kaja Jacobsen	1	no	2011	null	0	Specialkonsulent · Københavns Kommune	administration
145	Kalle Nielsen	no	no	2013	null	0	Bibliotekar · Vejle Bibliotekerne	administration
146	Kåre Kjelstrøm	1	no	2009	04.10.2011	21	It-arkitekt og partner · Silverbullet A/S	administration
147	Karsten Brodersen	no	1	2017	22.08.2017	1	Bilsælger · København	private
148	Kasper Outzen	no	1	2016	null	0	Selvstændig · www.TrafikLektioner.dk	private
149	Kasper Weibel Nielsen-Re	no	no	2009	null	0	iPhone- og webudvikler. · Unwire Aps	private
150	Katarina Ritz	no	no	2009	null	0	no entry	no entry
151	Keld Simonsen	no	no	2010	null	0	Direktør · RAP.dk	private
152	Kevin Bengtsson	no	no	2011	null	0	CEO · UdbudsVagten	private
153	Kim Jakobsen	no	no	2010	null	0	no entry	no entry
154	Kim Jonasen	1	1	2011	null	0	Projektleder · DSB Digitale kanaler	administration
155	Kim Schilling	no	no	2009	null	0	no entry	no entry
156	Kim Ahlstrøm Jakobsen	no	no	2013	null	0	no entry	no entry
157	Kim Lindskov Knudsen	no	no	2009	null	0	no entry	no entry
158	Kirsten Hansen	no	no	2009	null	0	no entry	no entry
159	Klaus Hansen	no	no	2010	null	0	Landinspektør, konsulent · FriGIS Aps, Geodata Consult Aps	private
160	Klaus Hornung	no	no	2016	13.09.2016	1	Assistent · Akademiet for de Tekniske Videnskaber	researcher
161	Kresten Bay	no	1	2009	17.03.2011	1	Kontorchef · IT- og Telestyrelsen	administration
162	Kresten Bjerg	1	1	2010	03.02.2012	24	Seniorforsker, pensioneret fra Institut for Psykologi, KU · SiteInvent	researcher
163	Kristian Poulsen	1	no	2009	09.03.2010	6	Civilingeniør · Geodata Danmark	administration
164	Kristian Billeskov Bøving	no	no	2009	null	0	no entry	no entry
165	Kristoffer Olsen	no	no	2008	19.04.2012	20	Senioranalytiker · CEDI - Center for Digital Forvaltning	administration
166	Kurt Andersen	no	1	2012	null	0	Konsulent · Agisea	private
167	Lars Abrahamsen	no	1	2016	07.01.2016	2	Kolding	private
168	Lars Boge	no	no	2014	null	0	no entry	no entry
169	Lars Johnsen	1	no	2008	null	0	Lektor · Syddansk Universitet	researcher
170	Lars Poulsen	no	1	2017	null	0	Freelancer · Worksome	private
171	Lars Villebæk	1	no	2009	12.10.2009	1	Gartner	private
172	Lars Wilkens Henriksen	no	no	2010	null	0	Chefrådgiver · Grontmij | Carl Bro	private
173	Lasse Kjemtrup	1	no	2010	null	0	Projektleder · GeoSjælland	administration
174	Lasse Larsen	no	no	2009	null	0	no entry	no entry
175	Lasse Møller	no	1	2018	null	0	Content Creator · Freelance	private
176	Lasse Schulin-Zeuthen	1	1	2009	06.09.2017	47	Senior Konsulent · Atomic Software ApS	private
177	Lasse Steensgaard	1	no	2009	15.03.2011	1	IT-projektleder · Solutions, NNIT	private
178	Lasse Stilvang	1	1	2009	null	0	Web Developer · LasseStilvang.com	private
179	Lea Haahr	no	no	2018	null	0	Arkivar · Rigsarkivet	administration
180	Lea Skov Lindbæk	no	no	2009	null	0	no entry	no entry
181	Leif Lodahl	1	no	2009	14.03.2015	26	Magenta ApS	private
182	Lene Krogh Jeppesen	1	1	2010	27.09.2012	3	Videndeler og innovatør · Skatteministeriet; Innovation og videndeling	administration
183	Linda Szkotak Rasmussen	no	no	2009	null	0	Senior Business Architect · KMD A/S	private
184	Linda Clod Præstholm	1	1	2009	null	0	Specialkonsulent · Region Sjælland, Arkitektur & Portefølje	administration
185	Lone Randi Faber	no	no	2013	null	0	Projektleder · Region Hovedstaden	administration
186	Mads Buch	no	1	2012	25.09.2012	5	no entry	private
187	Mads Kæmsgaard Eberhol	no	1	2013	18.02.2014	1	Studielektor · RUC	researcher
188	Mads Slott Maarlev	no	no	2016	null	0	Business Advisor · Affecto Denmark	private
189	Magnus Matthiesen	no	no	2017	null	1	Marketing ansvarlig · Macland	private
190	Maria Storgaard	1	1	2014	27.05.2014	4	Administration · Azenty	private

	name	profile picture	biography	member since	last activity	number of posts*	job title/function	category
191	Marianne Krogbæk	1	no	2013	25.07.2013	2	Arkitekt · ITK, Borgerservice og Biblioteker, Aarhus Kommune	administration
192	Marianne Vibo	1	no	2009	16.10.2014	42	Projektkoordinator · Digitaliseringsstyrelsen / Kontor for system og kontraktforvaltning	administration
193	Marie Paldam Folker	1	no	2011	null	0	Projektleder · Teknologirådet	administration
194	Marius Hartmann	1	1	2009	null	0	Chefkonsulent · Erhvervsstyrelsen	administration
195	Markus Wüstenberg	no	no	2012	null	0	no entry	no entry
196	Martin Boel	1	no	2009	null	0	IT udvikler · Topdanmark	private
197	Martin Buch	1	no	2009	29.08.2011	12	Chefkonsulent · IT-Branchen	private
198	Martin Hvidberg	1	no	2009	null	0	Senior Geograf · Aarhus Universitet / Danmarks Miljøundersøgerlser	researcher
199	Martin Kjærgaard Jensen	1	1	2017	null	0	Ejer · Suldrup	private
200	Martin Sandholt	no	1	2012	null	0	Technical Consultant · Doccentra ApS	private
201	Martin Sigaard	no	no	2009	null	0	no entry	no entry
202	Martin Stampe	no	no	2013	null	0	no entry	no entry
203	Martin Skovbjerg Jensen	no	no	2017	null	0	Fuldmægtig · Digitaliseringsstyrelsen	administration
204	Merete Ravn	1	no	2010	null	0	Projektleder · Sorø Kommune	administration
205	Mette Kurland	no	no	2008	01.02.2011	952	Chefkonsulent	administration
206	Michael Danielsen	1	no	2009	null	0	Analyse- og udviklingschef · Geomatic a/s	private
207	Michael Friis	1	no	2009	01.10.2013	42	no entry	no entry
208	Michael Hartmann	1	no	2009	null	0	IT Arkitekt / Afdelingsleder · Traen	private
209	Michelle Bach	no	no	2013	null	0	no entry	no entry
210	Michelle Bea Lund	1	1	2010	06.02.2012	134	Community manager · Version2	administration
211	Mikael Kristensen	no	no	2011	null	0	Business Development Manager · Hjørring, Denmark	private
212	Mikael Kristiansen	1	no	2009	null	0	It-projektleder · Digitaliseringsafdelingen, Integrationsministeriet	administration
213	Mike de Crook	1	1	2010	null	0	IT projektleder · Københavns Kommune, Koncernservice	administration
214	Mikkel Leihardt	1	1	2010	07.12.2011	14	Kontorchef, Strategi og Udvikling · Uddannelses- og Forskningsministeriet	administration
215	Mikkel Freltoft Krogsholm	no	no	2009	null	0	no entry	no entry
216	Mikkel Hippe Brun	1	1	2008	14.04.2015	31	CSO · Tradeshift Network Ltd	private
217	Mimi Pave Musgrove	no	no	2010	null	0	Chefkonsulent · Region Hovedstaden	administration
218	Mogens Henrik Sørensen	1	1	2009	02.04.2013	4	Webkoordinator · Det Nationale Forskningscenter for Arbejdsmiljø	researcher
219	Mogens Henrik Sørensen	no	no	2016	null	0	Specialkonsulent · Søfartsstyrelsen	administration
220	Morten Barklund	no	no	2009	27.02.2009	1	no entry	no entry
221	Morten Falbe-Hansen	no	no	2012	null	0	no entry	no entry
222	Morten Jensen	no	no	2012	null	0	no entry	no entry
223	Morten Lind	1	no	2009	16.02.2015	8	Specialkonsulent · Ministeriet for By, Bolig og Landdistrikter	administration
224	Morten Mejer-Warnich	no	no	2009	null	0	Kontorchef · Digitaliseringsstyrelsen	administration
225	Morten Okholm	no	no	2009	null	0	Erhvervs- og Selskabsstyrelsen	administration
226	Morten Steffensen	no	no	2015	null	0	no entry	no entry
227	Morten Winther	1	no	2009	24.02.2017	5	IT arkitekt · Københavns Kommune	administration
228	Morten Eeg Nielsen	1	1	2010	03.03.2014	45	Teamkoordinator · Region Hovedstaden	administration
229	Morten Kristoffer Hansen	1	1	2008	04.07.2016	289	It-projektleder · Orbicon Informatik	administration
230	Nana Below	no	no	2011	null	0	Forretningsudvikler · Skatteministeriet	administration
231	Nicolai Horn Pedersen	1	1	2012	08.06.2017	2	Webmaster · Helsingør Kommune	administration
232	Niels Andersen	1	no	2010	null	0	Senior Project Manager · Logistics A/S	private
233	Niels Pagh-Rasmussen	1	no	2009	13.05.2011	3	it arkitekt · IBM Danmark	private
234	Niels Erik Kaaber Rasmuss	1	1	2009	22.04.2013	13	Selvstændig · Buhl & Rasmussen	private
235	Niels Kristian Petersen	no	no	2015	null	0	Udvikler, cand.scient. · Danmarks Meteorologiske Institut	administration
236	Niels Schmidt Petersen	no	no	2011	null	0	no entry	no entry
237	Nikolaj Mogensen	1	1	2014	12.02.2014	2	Head of SEO / Owned Media · GroupM	private
238	Nikolaj Thiesen	no	no	2015	null	0	no entry	no entry
239	OIO Sekretariatet	1	no	2009	06.03.2012	5207	no entry	administration
240	Ole Kassow	1	no	2010	null	0	I lead and inspire · http://olekassow.com	private
241	Ole Madsen	1	no	2008	15.09.2017	134	Specialist · Erhvervsstyrelsen	administration
242	Ole Schelde	no	no	2015	null	0	Informationssikkerhedskoordinator · Region Midtjylland	administration
243	Ole Strøm	1	no	2016	null	0	BI Konsulent · Cruised Controlling	private
244	Ole Urup Mogensen	no	no	2010	null	0	no entry	no entry
245	Ole Palnatoke Andersen	no	no	2011	null	0	Konsulent	private
246	Ove Lindholt Hansen	no	1	2009	27.05.2017	9	Direktør · GeoSite og GIS4Mobile	private
247	Paul Mayer	no	no	2016	null	0	no entry	no entry
248	Peder Klement Jensen	1	1	2017	null	0	Overlæge · Bispebjerg hospital	researcher
249	Per Grønning	no	1	2011	null	0	Ejer · Poolworld	private
250	Per Gydesen	no	no	2012	null	0	no entry	no entry
251	Per Kiil	no	no	2010	null	0	no entry	no entry
252	Per Smed	no	no	2017	null	0	Udviklingschef · KOMBIT A/S	private
253	Per Vesterberg	no	no	2018	27.03.2017	2	Projekt Supporter · Digitaliseringsafdelingen	private
254	Per de Place Bjørn	1	no	2008	10.08.2016	163	Informationsarkitekt · Digitaliseringsstyrelsen, Center for Grunddata og It-arkitektur	administration
255	Pernille Carla Lundsgaard	no	no	2013	29.10.2013	1	no entry	no entry
256	Peter Binderup	no	no	2011	null	0	IT Arkitekt og Udvikler · Favrskov Kommune	administration
257	Peter Birkholm-Buch	no	no	2011	02.09.2011	3	no entry	no entry
258	Peter Brodersen	1	no	2009	13.09.2011	4	Datajæger · Findvej.dk	private
259	Peter Gelsbo	no	no	2012	null	0	no entry	no entry
260	Peter Grostøl	no	no	2009	null	0	Solution Architect · CSC Danmark	private

	name	profile picture	biography	member since	last activity	number of posts*	job title/function	category
261	Peter Krantz	1	no	2009	17.06.2009	3	Domstolsverket (i Sverige)	administration
262	Peter Meyland	no	no	2010	null	0	System administrator ·	private
263	Peter Packroff	1	no	2009	20.10.2009	3	Selvstændig · København / Padborg	private
264	Peter Riisager	1	1	2013	19.09.2017	2	www.dingeo.dk	private
265	Peter Ring	no	no	2009	null	0	no entry	no entry
266	Peter Lemcke Frederiksen	1	no	2011	05.01.2012	3	Konsulent · IBIZ-Center, Teknologisk Institut	private
267	Preben Lauritsen	no	no	2009	null	0	Seniorkonsulent	private
268	Preben Lisby	no	no	2013	null	0	no entry	no entry
269	Preben Thorø	no	no	2009	16.03.2009	1	no entry	no entry
270	Rasmus Rasmussen	1	no	2009	null	0	ESDH-koordinator · Frederikshavn Kommune	administration
271	Rasmus Sørensen	no	no	2010	null	0	no entry	no entry
272	René Yde Aagesen	no	1	2017	null	0	Statsautoriseret Revisor · Aalborg	private
273	Rita Lützhøft	1	no	2008	19.06.2012	5	Projektleder · Ballerup Kommune	administration
274	Ronni Nielsen	no	no	2014	null	0	no entry	no entry
275	Rune Mejlvang	1	1	2009	28.02.2011	1	no entry	no entry
276	Rune Stilling	1	no	2008	31.01.2014	53	Udvikler med speciale i søgning, natursprogsbehandling, semantic web	private
277	Rune Arnfeldt Jarden	1	no	2011	23.04.2015	4	Chefkonsulent · ATP / Udbetaling Danmark	administration
278	Samo Olsen	1	no	2009	24.05.2011	6	Konsulent · Mapicture Aps	private
279	Sarah Kirkeby Danneskiold	no	no	2009	16.09.2009	1	no entry	no entry
280	Sean Bronee	no	no	2014	null	0	no entry	no entry
281	Signe Bøtker-Rasmussen	1	no	2010	12.07.2011	19	Studentermedhjælper · Digitaliseringsstyrelsen, Kontoret for it-arkitektur og stand.	administration
282	Signe Lentz Kanstrupgaard	1	1	2010	28.10.2011	16	Fuldmægtig · Energistyrelsen, Ministeriet for Energi, Forsyning og Klima	administration
283	Simon Juhl	no	no	2014	04.04.2017	2	no entry	no entry
284	Simon Mark Pedersen	1	no	2011	null	0	stud.cand.it ·	researcher
285	Simon Warthoe	1	no	2010	null	0	virk.dk	administration
286	Sofie Odgaard	no	no	2013	null	0	no entry	no entry
287	Søren Breddam	1	no	2010	08.03.2012	13	GIS-koordinator · Stevns Kommune	administration
288	Søren Have	1	no	2009	11.12.2009	1	Seniorkonsulent · PA Consulting Group	private
289	Søren Hilmer	1	no	2009	14.10.2009	3	Senior Software Developer · Amplex A/S	private
290	Søren Peter Nielsen	1	1	2009	08.01.2013	122	Ingeniør, IT Arkitekt og Projektleder	private
291	Steen Birknow	1	no	2009	null	0	Produktchef, Business Domaine Architect · KMD A/S	private
292	Sten Fibæk-Jensen	no	no	2009	null	0	Organisations- og udviklingskonsulent · ditmer a/s	private
293	Stine Pontoppidan Myltoft	1	no	2010	null	0	It-konsulent · Servicestyrelsen	administration
294	Susan Oldenburg Christen	no	no	2009	29.03.2011	159	Studentermedarbejder · IT- og Telestyrelsen, Center for Digitalisering -Udvikling	administration
295	Suzan Feldskov	no	no	2013	null	0	IT Arkitekt · Lolland Kommune	administration
296	Tanja Mortensen	no	no	2016	null	0	It-medarbejder · Sønderborg Kommune	administration
297	Therese Hansen	no	no	2009	null	0	no entry	no entry
298	Thomas Andreasen	1	no	2009	18.11.2011	1	projektchef · BRFkredit	private
299	Thomas Angermann	no	no	2009	05.02.2010	1	Udviklingschef · Gentofte Bibliotekerne	administration
300	Thomas Balstrøm	1	no	2010	null	0	GIS-konsulent · Støvnæs Alle 43, 2400 Kbh. NV	private
301	Thomas Gottschalck	no	no	2009	null	0	Management konsulent · Implement Consulting Group	private
302	Thomas Madsen-Mygdal	no	no	2009	null	0	no entry	no entry
303	Thomas Niedoborski Jacob	1	no	2011	null	0	IT Konsulent / Partner · Enkel IT	private
304	Thorbjørn Søndergaard	no	no	2017	28.02.2018	2	GIS-manager · Vejle Kommune	administration
305	Tim Bergholdt Hansen	no	no	2012	null	0	no entry	no entry
306	Tina Iversen	1	no	2009	null	0	Digitaliseringschef · Københavns Kommune - Teknik og Miljøforvaltningen	administration
307	Tina Peirano	no	no	2016	null	0	Studerende · AAU	researcher
308	tine stevnhoved	no	1	2009	15.11.2010	2	Digital Design · Rådet for sikker trafik	administration
309	Tine Müller	1	1	2009	23.06.2017	121	Datajæger · findtoilet.dk	private
310	Tom Praëm-Nielsen	no	1	2018	null	0	Digital Marketingspecialist · Uptime-IT ApS	private
311	Tommy Davis	no	no	2012	null	0	no entry	no entry
312	Tommy Dejbjerg Pedersen	1	no	2009	07.01.2010	2	CTO · Miracle	private
313	Ton Zijlstra	1	no	2009	26.08.2013	8	Independent consultant · Enschede, Netherlands	private
314	Tonny Hjelmberg Laursen	no	no	2012	null	0	Enterprise Chefarkitekt · Copenhagen Business School	researcher
315	Torben Nowicki	1	1	2009	null	0	Konsulent · Kontoret for digitalisering, Københavns kommune	administration
316	Torben Wederkinck	no	no	2010	null	0	no entry	no entry
317	Troels Tofte	no	no	2009	13.12.2017	17	Fuldmægtig · Digitaliseringsstyrelsen	administration
318	Trygve Skjøtskift	1	1	2011	null	0	Senior Manager · Accenture	private
319	Tue Lehn-Schiøler	no	no	2010	null	0	no entry	no entry
320	Uffe Bager	no	no	2009	null	0	IAM Løsningsarkitekt · Identec ApS	private

Identification with the group

(Link back)

Identification/commitment			
members…	yes	no	sum
… having a profile picture:	29	31	60
… giving a biography:	10	50	60
… indicating a job title	304	16	320

Table 5: Indicators for identification with the group

Members by category

(Link back)

Members coming from	
administration	99
private	123
researcher	12
no entry	86
sum	320

Table 6: Total members per Category

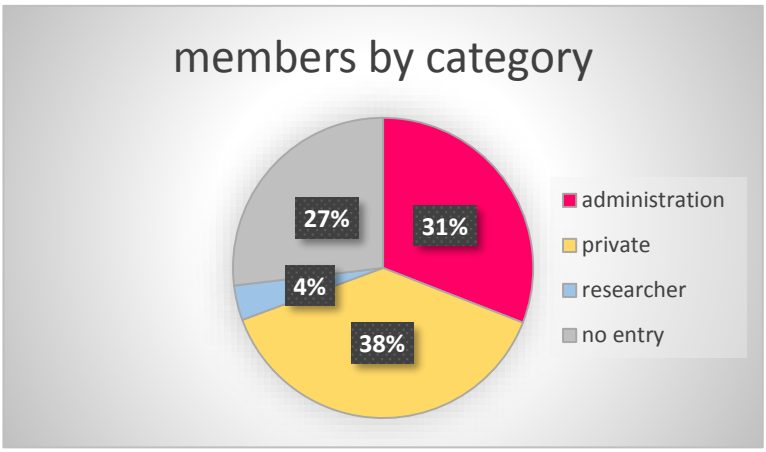

Figure 17: Total members by category

First access to the group					
	from category				
new members in …	administration	private	researcher	no entry	sum
in 2008	1	1	0	0	23
in 2009	8	14	0	6	125
in 2010	5	2	0	3	48
in 2011	1	3	1	0	28
in 2012	0	0	1	2	18
in 2013	1	1	0	2	22
in 2014	0	0	0	3	9
in 2015	0	0	0	0	9
in 2016	1	0	1	0	15
in 2017	1	1	0	0	15
jan-may 2018	0	1	0	0	8
sum:	18	23	3	16	320

Table 7: Registration of new members over time

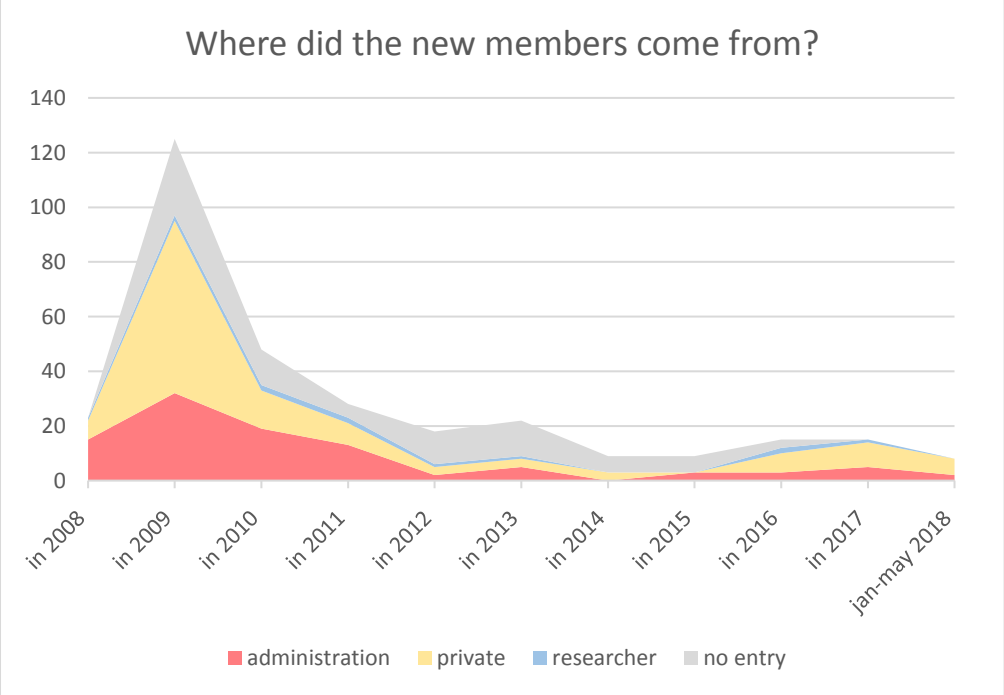

Figure 18: Registration of new members over time and by category

Activity in the ODIS group

(Link back)

Activity	
members with...	
no post	189
1 post	30
2 to 5 posts	45
6 to 10 posts	12
11 to 100 post	29
more than 100 posts	15
sum	320

Table 8: Activity of the group members

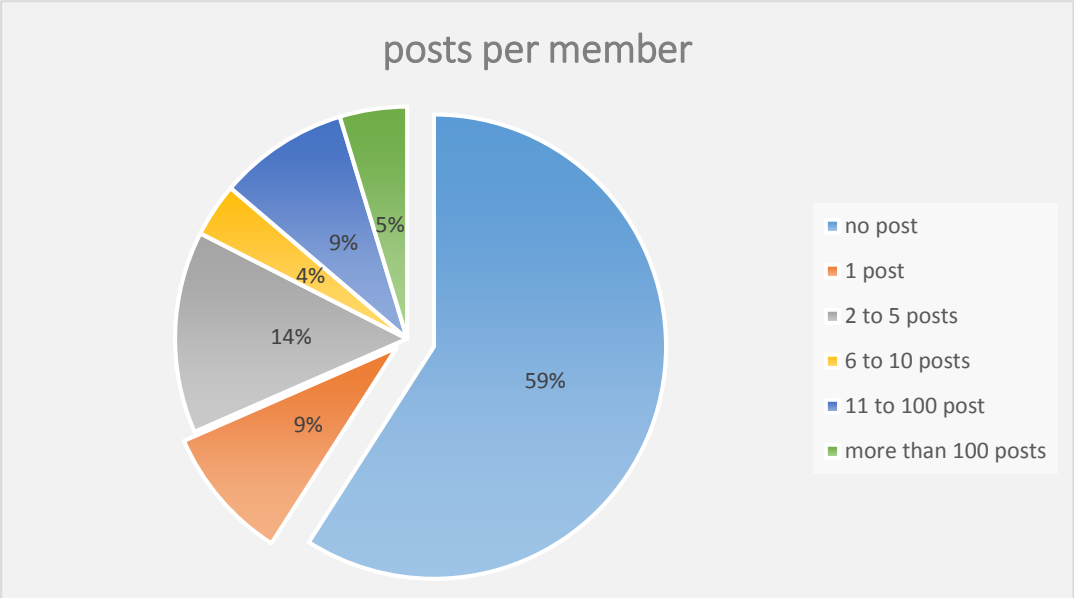

Figure 19: Activity of the group members

Where do the regular poster come from?					
	administration	private	researcher	no entry	sum
members with more than 10 posts	5	3	0	0	8

Table 9: Regular posters by category

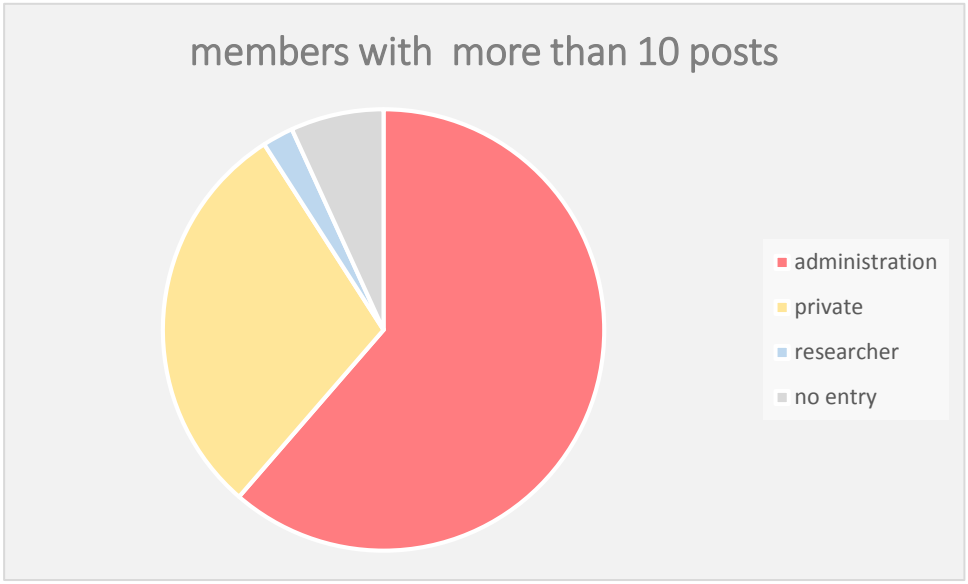

Figure 20: Regular posters by category

Where do the heavy poster come from?					
	administration	private	researcher	no entry	sum
members with more than 100 posts	1	2	0	0	3

Table 10: Heavy posters by category

Where do the no-poster come from?					
	administration	private	researcher	no entry	sum
members with no post	7	11	3	12	33

Table 11: No-posters by category

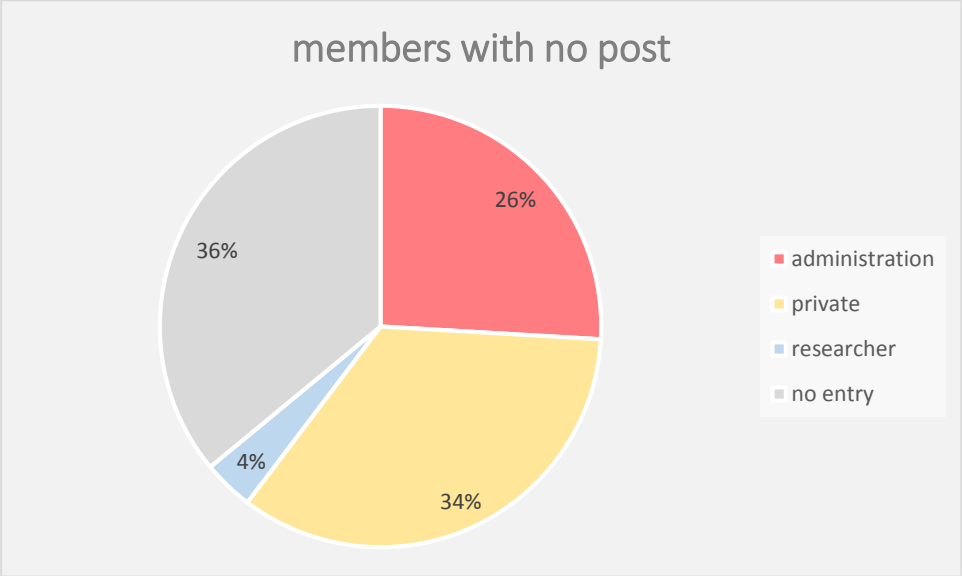

Figure 21: No-posters by category

New members over time

(Link back)

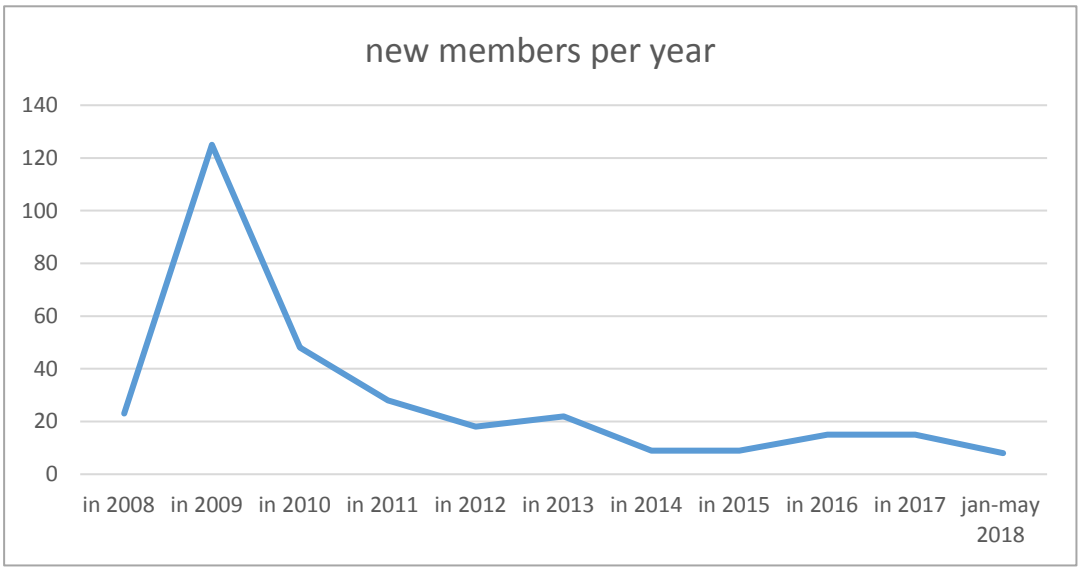

Figure 11: New members per year