Parliamentary Open Big Data: A case study of the Norwegian Parliament´s open data platform

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Abstract. The paper presents a case study on the use of open big data in the Norwegian Parliament. A set of policy documents was examined to find motivation for publishing open data. The case study was based on an examination of the parliament website, combined with document studies and interviews. The paper concludes that third parties have used open data to create new applications that generate value for their users. Applying our findings to the open government benchmarking framework, we identify some national barriers and possible solutions to further promote the use and publication of open data.

Keywords: open data; big data; parliament; case study

1 Introduction

According to Open Knowledge International [1], open data is data that can be freely used, modified, and shared by anyone for any purpose". During the last decade, governments have promoted the use of open data by making data available in open data repositories. By making data available, it is possible for third parties to generate value by analyzing, visualizing and combining with data from other sources.

Laney [2] defines big data as data having high volume, high velocity and/or high variety. High volume refers to large amounts of data demanding both specialized storage and processing. High velocity refers to streams of real-time data, e.g., from sensor networks or large-scale transaction systems. Finally, high variety is about dealing with data from different sources having different formats.

Marr [3] finds the real value of big data is not in the large volumes of data itself but in the ability to analyze vast and complex data sets beyond anything we could ever do before. The introduction of new analysis techniques combined with new database technology has lowered the threshold of utilizing big data.

According to the Norwegian government´s Digital Agenda [4], there are more than 1000 open datasets currently available in Norway. Most of them are found in the centralized data.norge.no repository, but several major organizations keep their own open data repositories, such as Statistics Norway, the weather service Yr.no, the Norwegian Central Bank, the Norwegian Labour and Welfare Administration, the Norwegian Mapping and Cadastre Authority, the Norwegian Public Roads Administration, the national Brønnøysund Register Centre, the Norwegian Parliament and many municipalities and county municipalities. There is no central registry over all available open data, which

makes it difficult to get a complete overview. The various open data portals have links to applications and use cases, and many of them also have tutorials and guidelines for use.

The Norwegian Parliament has been actively using information and communication technology to increase transparency [5]. The website of the parliament provides access to documents used for decision making, minutes of meetings, and even webcasts of the meetings. The expansion to also provide access to the underlying data through application program interfaces and standard data formats shows the continuing commitment of the Norwegian Parliament to contribute to a transparent society.

The rest of the paper is organized as follows: Section 2 provides background, followed by Section 3 discussing theoretical perspectives on open government data. Section 4 discusses the methodology, and Section 5 presents our findings. The findings are discussed in Section 6, and finally, Section 7 provides a conclusion with a discussion of limitations and proposals for future work.

2 Background

Governments strive to reach acceptable levels of mutual government–citizen understanding by innovating with emerging computing technologies, such as open data and big data [6] to make a significant impact on societies through promoting government transparency and accountability, empowering citizens, and improving participation and public services [7,8]. The emergence of open data and big data has received increasing interest from governments, which has been interpreted as a set of perceived potential benefits for governments and the whole society towards further democracy [9]. However, governments also experience barriers to widely adopt open data.

Benefits of open data for governments are categorized into political and social, economic, and operational and technical [10]. Political and social benefits of open data for governments include transparency and trust, democratic accountability, public engagement, self-empowerment of citizens, equal access to data, enabling the creation of new governmental and social services for citizens, improving citizen services, and improving policy-making processes. Economic benefits of open data for governments include stimulation of innovation by enabling the development of new products or services, contributing to the creation of a new sector adding value to the economy, and availability of information for companies and investors. The operational and technical benefits of open data for governments include enabling reuse of data instead of collecting it again; thus, removing duplicate efforts and costs. Furthermore, open data contribute to optimizing administrative processes, supporting decision-making by enabling comparisons, making it easy to discover and access the data, creation of new data based on combining several data items, ensured integrity and external quality of data, and the ability to merge and integrate public and private data.

The barriers to adopting open data for governments are categorized into institutional, task complexity, and technical [10] The institutional barriers include the focus on barriers and neglect of opportunities, conflict between public values (transparency vs. privacy values), lack of uniform policy for publicizing data, no clear process for dealing with user input, and debatable quality of information. The transparency offered by open government data platforms makes it possible for the public to have a clear sight over the government's activities and decisions; however, excessive use of linked open data (discoverable open data) with big data analytics may put governments in a problematic privacy situation (e.g., surveillance) [11]. Task complexity barriers include the meaning of data is not explained, duplication of data and that data is available in various forms or before/after processing making question marks around the sources, and users might not be aware of its potential uses. Another complexity barrier to adopting open government data is that the heterogeneity of the government agencies' infrastructure makes it difficult to implement a large-scale open data infrastructure [12]. The technical barriers include not having the

data in a well-defined format that is easily accessible, lack of standards, no central portal or architecture, and no standard software for processing open data.

Apparently, the majority of the barriers are related to the concept of open data per se; perhaps the concept is blurry and raises complexity and privacy issues. According to the European Open Data Portal (EODP)[1], open data is data that anyone (i.e., governments, businesses, and individuals) can access, use and share to create social, economic and environmental benefits. The openness of open data lies in its format and license; open data should be made available in a standard machine-readable format, and people are permitted unlimitedly to make different uses of it (i.e., transforming, combining and sharing it with others, or using it for commercial purposes). The EODP related the openness of open data to cost where open data must be free to use, but not necessarily free to access. For entities implementing government open data platforms, they incur costs for creating, maintaining and publishing useful open data, as well as the provisioning of real-time big data.

The World Wide Web Foundation (W3F) asserted that the open government data initiatives build on the involvement of government, civil society, and private sector [13]. The potential impacts of open government data depend on the choice and implementation of open government data policy [14]. In the US, the policies for creating, managing, disseminating and preserving digital government information were too complex and existed before the emergence of open data and big data technologies; thus, these policies failed to address the use of government open and big data [15]. As a result, it was recommended to develop a "Big and Open Data governance model" to address related issues, such as privacy, data accuracy and reuse, archiving and preservation, resources for data curation (accumulation, modification, integration, and manipulation), and developing data standards and sustainable data platforms [15]. In Australia, the government had an ambition and a plan to establish a policy for open data, but the Australian government faced technical, legal and cultural barriers [8]. The Australian government lacked the consistency of how the open data would be formatted, had no clear sight to ensure sufficient de-identification of data about individuals in a manner that does not violate the Australian Privacy Act requirements [8]. The cultural barrier to open and big government data in Australia is manifested in the public service culture of favoring secrecy of information as a default position [8]. In the UK, the open government data implementation faced significant issues related to data sharing policy, standardization of open government data and systems, lack of awareness about open government data, and government responsibility in providing the resources needed for open government data implementation [16].

3   Theoretical Perspectives on Open Government Data

Due to the newness of the open data phenomenon, few seminal articles contribute to understanding the different elements of open data policies and factors that influence their impact. Through a comparative approach, a study by Zuiderwijk and Janssen [17] developed a framework arguing that policy environment and context (i.e., levels of government organizations, motivations and objectives, legislation, and political and cultural contexts) influence the policy content (i.e., amount of open data, type and quality of open data, and requirement for accessing open data). As a result, the policy content influences the extent to which performance indicators of open government data are met (i.e., usages, risks, and benefits). The performance indicators can tell which public value is created and its impact on society. The framework was used to compare seven Dutch governmental policies for open data, and the takeaways from this comparison were that policies should have both internal and external focus, focusing on the impact and stimulating the use of open data, and creating a culture of open data. The framework is argued to help to implement open

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[1] www.europeandataportal.eu

government data policies and to improve existing open government data policies.

Another seminal study by Veljković, Bogdanović, and Stoimenov [18] argue that the problem with comparing (or benchmarking) open government initiatives is the lack of open government conceptual clarity. Based on this argument, the authors of the paper developed a conceptual model of open government based on a set of indicators related to five pillars of open government: Collaboration, open data, data transparency, government transparency, and participation. The indicators related to each pillar are demonstrated in Table 1.

Table 1. Components of open government conceptual model (adapted from [18])

Open government pillars	Open government indicators
Collaboration	Collaborative solutions for: -Government-to-Government -Government-to-Citizen -Government-to-Business
Open data	Open data characteristics: -Complete -Primary -Timely -Accessible -Machine processable -Non-discriminatory -Non-proprietary -License-free
Data transparency	-Authenticity -Understandability -Reusability
Government transparency	-Procedures -Tasks -Operations -Regulations
Participation	-Open dialog

An earlier study by Zuiderwijk and Janssen [19] relies on "coordination theory" to identify coordination needs and challenges for open data and uses a set of coordination mechanisms to address those challenges and needs towards improving policy-making and decision-making. The principal argument of Zuiderwijk and Janssen is that the activities of the open data community are to a large extent uncoordinated. This stems from a number of factors. These factors are:

(1) various stakeholders are involved in the open data process (i.e., open data publishers, open data facilitators, users of open data, and open data legislators);

(2) open data publishers often lack a clear sight over what is done with the data, which value they can create and how they can be used for improving their own policies and decisions; and

(3) the fact that open data publishers and users are often not aware of each other's needs and activities (i.e., the format of data preferred by users and how to stimulate the use of open data).

Thus, coordination is argued to be important, as it leads to a better understanding of the open data process and results in integrated actions, improved performance, and improved policies. Zuiderwijk and Janssen identified six specific coordination challenges:

(1) inappropriate regulatory environment;
(2) fragmentation of open data;
(3) unclear boundaries of responsibilities;
(4) lack of feedback on open data use;
(5) lack of interconnected processes; and
(6) lack of standardized and planned processes.

They argue that the coordination challenges may be solved, not guaranteed though, by a mix of three coordination mechanisms:

(1) coordination by standardization;

(2) coordination by the plan; and

(3) coordination by feedback.

4 Methodology

Our study is exploratory; an exploratory case study is a suitable method to address the "how" research questions [20] and understand the phenomenon in its natural context [21]. Our study started with: (1) a review of general benefits of and barriers to open and big government data; (2) a review of open and big government data initiatives in the US, UK, and Australia and the barriers experienced by those initiatives; and (3) a review of theoretical perspectives on open government data. Our study is also interpretive, as the data collection was not guided by pre-assumptions from literature or theory, and the theory-guided our analysis of the empirical findings [22]. The empirical inputs to our study relate to the context of Norway and involved: (1) document analysis by looking into on document studies found on the Norwegian Parliament's website and snowballed websites via Google describing services created using the Norwegian Parliament's open data, in addition to published Norwegian policy documents describing the need for open data; and (2) two e-mail interviews; one with an officer at the Norwegian Parliament and one with an informant at the communication department in the Parliament. The communication department is responsible for the open data platform and management of "Holder de ord", the largest user of Parliament open data. The use of e-mail interview method is appropriate in occasions when the informants are busy to be interviewed synchronously and it gives the informants the opportunity to have enough time to think and answer the interviewer's questions at their convenience [23, 24, 25]. The purpose of analyzing the documents was to get an overview of available data, and the interviews provided evidence about the motivation and intended results of using open and big government data. The findings from the case study were analyzed using the benchmark conceptual model for open government [18].

4.1 Policy Documents as Driver for Open Data

Searching for open data at the government website revealed seven reports to the parliament (white papers), three official Norwegian reports and two planning and strategy documents. Thematically, the documents are tagged in the following areas: business, the EU, research and education, health and welfare, immigration, climate, municipalities, culture, crisis management, and transportation. The first document appeared in 2012. Table 2 provides an overview of the policy documents mentioning open data. The policy documents cover a wide range of areas and discuss how open data can be helpful in different ways. While the individual mentions might not be large sections of each document, this range shows that open data is seen as an essential part of digitizing the public sector, when it comes to facilitating public sector efficiency, innovation and business development, information dissemination/availability/accessibility, transparency and crisis management/crime prevention. Several of the documents describe hackathons as essential for promoting the use of open data.

Table 2. Overview of Norwegian policy documents mentioning open data

	Document	Content	Objectives for open data
Reports to the Parliament (Whitepapers)	Digital Agenda [4]	Goals and objectives for digitizing the public sector, open data as an enabler, use cases	Transparency, smart cities, information, business development
	White Paper on Medicinal Products - Correct use – better health [26]	Open pharmaceutical information to facilitate user-centric health services, and also improve the quality of medicinal information	Information, business development, transparency, quality
	Collaboration in the Nordic countries [27]	Collaboration on open data-driven applications in the Nordic countries through a Nordic hackaton	Innovation, business development
	Norway and the United Nations: Common Future, Common Solutions [28]	Describes UN projects on open data and social media	Information, crisis management
	Visual art [29]	Describes open data's potential for visual arts and museums, using digital catalogs and indexes	Availability, accessibility
	National plan for transport [30]	Potential of open data to improve transport solutions	Efficiency
	Between Heaven and Earth - Norwegian space policy for business and public benefit [31]	Potential of open data from space projects	Business development
Official Norwegian Reports (NOU´s)	NOU 2013:2 Barriers to digital value creation [32]	Open data as an enabler for value creation through new and improved applications	Business development, efficiency, transparency democratization
	NOU 2016:7 Norway in transition [33]	Open data as a source for work and business statistics	Business development, employment
	NOU 2017:11 Future organization of the Police force [34]	Develop open data solutions for crime prevention and investigation	Crime prevention
Planning and strategy reports	Ministry of Culture: Strategy for Open Data [35]	Strategy for creating and publishing open data from cultural institutions.	Transparency, information, business development
	Strategy for Open Research [36]	Principles and guidelines for secure sharing of research data	Quality of research, access to data, business development

The primary policy document for open data in Norway is the 2016 "Digital Agenda for Norway" [4], which outlines the goals, objectives and overall strategy for digitization of the Norwegian public sector. The digital agenda follows up on earlier digitization plans, and provides a brief historical overview: In 2011, government agencies were asked to publish data in machine-readable formats, and in 2012 all-new digital services should have built-in mechanisms for exporting data sets to machine-readable formats, and to facilitate access through APIs. To facilitate access to open data, the Agency for Public Management and eGovernment (DIFI) have established data.norge.no as host for open data, for those who are not running their own. The digital agenda also discusses guidelines and regulations for open data publishing, as well as the Norwegian Open Data License for the use of open data.

5   Findings on Open Data in The Norwegian Parliament

The Norwegian parliament's open data platform is run as a companion website to the main stortinget.no site. Data is accessed through an application program interface (API). The open data platform was developed as part of a major overhaul of the website, where data on voting in parliament was made accessible. The first version of the platform had voting data and data on the cases that were being voted on, as well as questions from members of parliament. Since the launch, there has been continuous development.

In 2014, the platform was expanded to include information about the individual members of parliament and XML versions of documents and meeting referendums dating back to 2008. Early 2015 another extension was implemented, this time with data on Parliament meetings, meeting agendas and data on public hearing processes, as well as meeting minutes dating back to 1998. The biography section for members of parliament was also expanded. The latest update came in 2017 when the platform received an overhaul including user registration, and all documents and publications from the Norwegian Parliament was published. In total, more than 20.000 documents were made available.

The current platform contains the following data: Parliament sessions and years, counties (members of parliament are elected from their county), topics, political parties represented in parliament (past and present), committees, members of parliament bio (past and present), members of government, questions raised, cases, voting sessions and decisions, meetings, agendas, hearings, list of speakers, publications. Data can be combined using API calls so that users can e.g., list all speakers from a party on a specific topic or case, data on how representatives vote on specific issues, etc. There are plans for further expansion, and the respondent reports that the next step is to make data available as downloads as well as through the API. This is because journalists and other non-technical users find the API challenging to use and have asked for downloadable formats and a more straightforward user interface, so they can access the data without having to hire programmers to do the work. The need for technical competence is reported as a significant obstacle to increased use. There are also plans for including even more datasets.

5.1 Parliament's Motivation and Drivers for Open Data

According to the interview respondent from the parliament, the motivation for the open data platform was both external and internal. There was much pressure for opening up data on voting in parliament, especially from the people behind the service "Holder de ord?" ("Do they keep their words?") (see section on use for details), as well as from journalists making freedom of information requests and wanting easier access to data. Internally, motivation was driven by the need to become more efficient. Before the launch of data.stortinget.no, a lot of data had to be manually filed, hard-copied and sent to the institutions using it.

Both internal and external motivation should be seen in the context of the open data movement that emerged a decade ago. Several key people from industry, IT, news and academia pushed for more openness and freely accessible data both from the government, government institutions, agencies, and research institutions. The main argument was that data is valuable, can lead to innovative services as well as increased transparency, and that taxpayers had already paid for the data to be made, so they should not have to pay again to access it. As a result, the Norwegian Mapping and Cadastre Authority made all their geographical data available in 2013, the national Meteorological Institute publishes open weather data, and research institutions are pushing towards open access publishing of both data and research publications.

5.2 Use Cases of Data from Parliament

Several organizations make frequent use of data from the Norwegian parliament:

Holder de ord (Keeping promises) is an independent organization made up of volunteers and funded by freedom of speech organizations and the open source community. Their volunteers combine voting data with the programs of political parties to examine if they vote in accordance with their programs, as well as other related issues. Data published at "Holder de ord" is used by citizens and media alike to examine how parties and individual members of parliament vote. As the organization is closely related to the Norwegian open source movement, all the code for the service is available on Github[2]. The service started in 2012 to monitor climate policy, but as the Parliament released more data the service soon expanded to cover all political topics.

The interview respondent says they have around 40.000 annual visits. While many are from media, researchers, and organizations, they also have a large user base of regular citizens interested in politics. In recent years, statistics from the site have been on the front page of major national newspapers and featured in several radio broadcasts from the national Norwegian Broadcasting Corporation (NRK).

Samstemmer.net is another example. The application won the hackathon *apps4Norway* by making a database of how questions and voting by members of the parliament. While the project is no longer active, the source code is available on Github[3].

Briatte.org[4] was made by Francois Briatte and is a network visualization of the ties between members of parliament, based on the bills they sponsor. The visualization mostly shows that natural allies sponsor the same bills but a closer examination reveals some surprising ties between parties that rarely agree on anything in the media.

Talk of Norway is a research project conducted by the University of Oslo experimenting with various machine learning techniques applied to data from the Parliament to explore how parliament sessions work. The project is a collaboration between language technology and political science scholars.

Hackathons: Several hackathons initiated by the Agency for Public Management and eGovernment (Difi) have used data from parliament. More recently, the hackathon *Hack4.no*, a collaboration between the Norwegian Mapping and Cadastre Authority and the University of South-Eastern Norway, has used parliamentary data on several occasions. The 2017 second runner-up used data from the Parliament to create an app in collaboration with the Office of the Auditor General of Norway.

Media use: While some media outlets, such as the Guardian's data journalism team, have become proficient users of open data, Norwegian media are falling somewhat behind. A couple of the major newspapers and the national Norwegian Broadcasting Corporation (NRK) use open data in some stories, but the potential is far more significant. One example where data from parliament contributed is the website krisepakke.no, where the newspaper Klassekampen worked with several local newspapers to track where funding allocated to companies suffering from the 2015 fall in oil prices finally ended up. While this is an excellent example of data journalism, most of the collection processes were based on manual freedom of information queries, indicating that the

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2 https://github.com/holderdeord
3 https://github.com/eiriks/samstemmer.
4 http://briatte.org/parlviz/stortinget/

potential for open data is far higher than what is currently realized when it comes to the media's role as watchdog.

6   Discussion

The Norwegian Parliament has made an effort to make its data open despite few limitations. We revisit the benchmark conceptual model for open government [18] presented in Table 1 and rely on it to assess how well the open data from the Norwegian Parliament fulfill the goals of open government. Table 3 builds on Table 1 and is based on observations from the Parliament open data website. The evidence from our study indicates that the open data from the Parliament meets the open government indicators, except being discriminatory (i.e., difficult to access by non-technical users). Furthermore, there are no interactive means of interactive communication (e.g., social media, blogging, photo and video sharing, etc.), where people can share their ideas, give their feedback on various matters of concern, and be involved in the policy-making process.

Table 3. Open government indicators revisited

Open government pillars	Open government indicators (mapped to our case)	Evidence found
Collaboration	Collaborative solutions for: Government-to-Government	Allowing collaboration with Nordic countries, solving transport problems, supporting crime prevention and investigation
	Collaborative solutions for: Government-to-Consumer	Supporting researchers
	Collaborative solutions for: Government-to-Business	Support for work and business statistics, and providing open data hosting platforms for businesses
Open data	Open data characteristics: Complete	Yes, within boundaries of the open data initiative
	Primary data	Yes, open data platform is connected to archival systems, so data is the same
	Timely publication of data	Data is published as soon as it becomes available
	Accessible	Accessible through API
	Machine processable	Format is XML
	Non-discriminatory	No, non-technical users still cannot download and make use of the data. Planned updates will make data more accessible
	Non-proprietary	Yes: Published under Norwegian open data license[5]
	License-free	Yes: Published under Norwegian open data license
Data transparency	Authenticity	Yes, parliament is verified publisher and in control of repository
	Understandability	Partially: Data requires some technical competence for use, making it challenging to for example journalists with no technical background
	Reusability	Yes, handled by Norwegian open data license
Government transparency	Procedures Tasks Operations Regulations	The framework for transparency is in place through open data license and guidelines for open data found in the digital agenda. In the parliament transparency is satisfactory.
Participation	Open dialogue?	No explicit feedback mechanism except contact information to people responsible for repository. Heavy users ("Holder de ord," some journalists) have an on-going dialogue with data owners, and suggestions are implemented at regular intervals.

While the Norwegian Parliament in isolation does well on the open government indicators, there are several coordination challenges were evident if we look at

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[5] http://data.norge.no/nlod/en/2.0

open data at the national level (see Table 4). These challenges have been identified by [19] and are said to be addressed, not guaranteed though, by three coordination mechanisms: standardization, plan, and feedback as discussed earlier in this paper. However, these mechanisms require in-depth coordination-related knowledge [19].

Table 4. Coordination challenges at the national level

Coordination challenge	Examples from Norwegian open government
Inappropriate regulatory environment	The regulatory environment is in place to some extent. What is lacking is a stronger push to make government agencies publish open data sets
Fragmentation of open data	Norwegian open data is scattered across a wide range of repositories, there is no published central register of open data, and while a standard for publication is suggested, it is not necessarily followed by everyone.
Unclear boundaries of responsibilities	In the government, there is no central responsibility for open data. Agencies are free to decide what and whether to publish anything
Lack of feedback on, and discussion of, data use	
Lack of interconnected processes	
Lack of standardized and planned processes	

Furthermore, the identified challenges are mostly related to a lack of central organization. While there has been a push towards publishing open data, as shown in the examination of policy documents, there is still no central organization with the mandate to force agencies to publish their data despite the infrastructure, regulation and resources/support are in place. Explanations from the literature were that motivations to develop open data policies are diverse across the government organizations, some are willing to create an open data policy, and some others are skeptic and concerned about the risks associated with open data [17]. This requires promoting a culture of openness based on recognizing the fundamental principle of institutionalizing public ownership of open data [17] The institutionalization of the openness culture should not happen by the legal pressures only, but also by social and political pressures as well as by having entrepreneurs within the government organizations [17] Thus, we propose that the next step for open data in Norway should be creating and institutionalizing a culture of openness at a national level to push more agencies, municipalities and counties to publish their data. Cases such as the Norwegian Parliament could be used to demonstrate the potential outcomes of open data sets.

7   Conclusion and Future Work

This paper discusses the use of big and open data in a parliamentary setting. In 2013 the Norwegian Parliament decided to publish a number of data sets related to what is happening in the Parliament. We have looked into the intentions behind the release of these data sets and have also discussed if the release fulfilled the intentions of the decision-makers. We have also provided some ideas for utilizing these data in a broader context. We present findings from Parliament and use policy documents to examine the motivation and push towards open data in Norway. Finally, we propose that government should orchestrate a national push to get more agencies to publish their data and that the national repository data.norge.no is given responsibility for mapping and linking to all open data repositories in Norway, in order to facilitate open data becoming big and open data. This recalls the need for Big and Open Linked Data (BOLD) while preserving the privacy and freedom of the citizens [11].

7.1 Limitations

The policy documents listed in Table 2 was obtained by searching for "big data" and "open data" on the national government website. The search was limited to policy documents (Official Norwegian Reports, government white papers and related documents). The authors know several public sector initiatives related to big and open data, and the number of policy documents discussing the use of big and open data will increase. Still, the policy documents shows the that big and open data is discussed within a wide range of policy areas.

The paper is limited to a study of the Norwegian Parliament, their open data efforts, and how the data is used by others. The study does not compare what other parliaments are doing, but the paper may provide some ideas for other researchers interested in their parliament policy and use of open data.

7.2 Future work

The following presents some possibilities for further work, using the open data provided by the Norwegian Parliament.

(1) Providing more straightforward access to data, user-guides and analysis software. As one of the respondents says, many requests for data come from journalists and other with little or no technical knowledge. To expand on the use of open data, providers should work on developing simpler access to datasets, guides for how to use and combine data, as well as easy to use software that can help people to find usage areas for the data.
(2) Linking the data to other open data sources represents an opportunity to make applications that may deliver results beyond the aims of the decision makers. Data from parliament can be linked to statistical and economic data to provide a better understanding of the impact of policy decisions.
(3) Making better visualizations. Visualization is a powerful tool for making results of open data analysis more understandable for ordinary citizens.
(4) Promoting a culture of openness to be institutionalized through social, political, and entrepreneurial pressures.

Future work may also include a comparison of open data policies and practices of other parliaments, and also how open data policies and practices change over time.

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