The Transparent Smart City

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The Transparent Smart City

How city councils and city administrations can apply smart technology for increased transparency – with case evidence from Norway

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Abstract : Transparency is seen as one important property of open government. The growing importance of government transparency is shown through legislation being passed by most democratic countries during the last few decades. Transparency is based on legislation, regulations and other policy documents. Information and communication technology can help improving the transparency of political decision-making. In smart cities, technology can support transparency in a number of ways, ranging from making documents available online to transparency in the decision-making process. The purpose of this chapter is to provide government officials and other interested parties with an overview of the technologies that are available for transparency in smart cities, and to present lessons learned from cases the authors have been involved in. These lessons can be valuable for decision-makers working towards smart city developments.
Keywords: Smart cities, transparency, eGovernment, local government, Internet

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1 Introduction

Smart cities refer to “places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems” (Townsend, 2013). Central to this concept is the idea of using information and communication technology (ICT) to improve living conditions and democracy (Bianchini & Avila, 2014). Democracy is about participation, and good participation requires knowledge (Yang & Pandey, 2011). Without the ability to drill down into information used for decision-making processes, the participation will be superfluous, and decision-making will be left to politicians alone.

Citizen participation is seen as an important element of smart cities. A smart city sees the value of participation and wants their citizens to take part in the public discourse (Berntzen & Johannessen, 2016). A key aspect of participation is that of transparency. Transparency is about access, not only to information, but also to the decision making process itself. Transparency is also closely connected to accountability (John C. Bertot, Jaeger, & Grimes, 2010), and transparency can aid in reducing corruption (Kolstad & Wiig, 2009).

Transparency is often mentioned as an important principle of democracy (Seger, 2008). Full transparency implies that the government is not hiding anything from its citizens. At the same time, it is always a conflict between transparency and privacy (Hunt & R.A., 2006). The government is handling a lot of information related to individual persons who need some protection of their own privacy. Sometimes businesses need privacy for reasons of competition. In procurement processes, it would not be fair to let other competitors get access to information submitted by one competitor before a procurement decision is made. Government employees also have some rights of privacy. Issues of national security will need to be kept confidential. Therefore, it will always be a demand for legislation and regulations to make an appropriate balance between secrecy, privacy and transparency.

Many democracies have implemented “Freedom of Information” in their legislation (McDonald & Terrill, 1998). United States got its “Freedom of Information Act” in 1966 (US Freedom of Information Act, 1966), United Kingdom in 2000 (UK Freedom of Information Act, 2000) and Germany in 2005 (German Informationsfreiheitsgesetz, 2005).

In 2004, Norway included the issue of transparency into its constitution (("Kongeriget Norges Grundlov.," 2004), and updated its “Freedom of Information Act” in 2006 (Bernt & Hove, 2009; Parliament, 2006; Police, 2005).

Lidberg (Lidberg, 2009) compared the Freedom of Information legislation and practices in Sweden, South Africa, United States, Australia and Thailand. For each country he also provides an overview of the evolution of Freedom of Information legislation. These are only some current examples of the increasing focus on transparency as an important pillar of modern democracies.

One issue is the legal right of access to government information; another issue is how easy it is to get access to that information. Technology, especially the Internet and the World Wide Web provides opportunities to enhance transparency. Documents and other information can be put on-line; meetings of public bodies can be webcasted. Benchmarks can be facilitated by open data. Processes can be explained and monitored on the Internet, requests for non-published information can be sent through e-mail or other messaging services.

Technology may support transparency in a multitude of ways. In its simplest form, documents and policy proposals may be made available online. But technology can also provide better insight in the political decision making process itself. The decision making process can be visualized through a timeline, political meetings may be announced, and then broadcasted on the Internet. The minutes and information on implementation progress may be readily accessible by the public. Open mail records of public institutions show citizens what is happening inside the government organization. Geographic information systems may help transparency by making spatial information easier to comprehend. Open data provides new opportunities for innovative applications that may help citizens to understand the society and thereby participate in a more meaningful way. However, transparency efforts only help reduce corruption if the users are able to understand and process the information that is made available (Kolstad & Wiig, 2009). This is why transparent smart cities also need to consider user-centered design (Garrett, 2010).

While democracy and participation requires knowledge, it can also be argued that skills, processes and accessibility are important elements. This is why we introduce the concept of user-centered design. If transparency technologies are not easy to use and accessible to the average citizen, the potential value of these technologies are more difficult to realize. Thus, we briefly discuss some issues with the examples mentioned in the chapter.

The purpose of this chapter is to provide government officials and other interested parties with an overview of the technologies that are available for transparency in smart cities, and to present some lessons learned from various cases the authors have been involved in. This could aid practitioners in creating usable and valuable transparency initiatives that can have positive implications both for democracy and for economic growth. We argue that by digitizing government information, cities can lay the foundation for creative and novel ideas by citizens, which ultimately can help create better and smarter cities.

The structure of the chapter is as follows: In the theory section we present a brief overview of smart cities and transparency, as well as some concepts we argue are essential to transparent smart cities. We present six categories of transparency, and show examples of how technology can be applied to support these categories. Finally, we argue that user-centered design needs to be considered as essential in order for these technologies to be adopted and used.

2 Smart Cities

Smart cities have received a lot of attention in recent years. A search for "smart city" in the academic databases Ebscohost and Scopus shows 211 journal articles written between 2010 and 2016. Of these, 88 are from the social sciences, and the rest from various natural sciences, such as computer science and engineering. The move towards smarter cities is motivated by a number of factors related to improved quality of life:

> *"Projects of smart cities have an impact on the quality of life of citizens and aim to foster more informed, educated, and participatory citizens. Additionally, smart cities initiatives allow members of the city to participate in the governance and management of the city and become active users*". (Chourabi et al., 2012)

Smart cities refer to "places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems" (Townsend, 2013). Doran and Daniel (2014) see the Smart City as an "Interaction of systems enabled through ICT's" (p.60). The systems they address are economic, environmental and social systems, seen as essential for improved quality of life. This systemic view is reminiscent of the triple-helix model, where a city's smartness is measured on how networked it is in terms of knowledge production, economic matters and governance (Allwinkle & Cruickshank, 2011). Urban challenges addressed with smart solutions are seen as "wicked problems" – problems and challenges that require coordination and collaboration between several disciplines and organizations (Goodspeed, 2015). Angelidou (2015) expands on existing definitions through a comprehensive literature review, and adds four objectives for smart cities: Human capital (citizen empowerment and knowledge creation), social capital (social and digital inclusion), behavioral change (sense of ownership and meaning) and a humane approach to change, where technology responds to the needs and interests of the user.

Smart cities have become a popular area of research over the past few years, and the topics range from urban planning via eParticipation to sustainability. Examples include a study of how to use augmented reality for heritage-based tourism (Garau, 2014), GIS-based solutions for citizen participation (Roche, 2014), a framework and application for getting citizens involved in sustainable city planning (Stratigea, Papadopoulou, & Panagiotopoulou, 2015). Others examine the correlation between cities' social media use and participation in smart city planning, finding that cities using social/networked media channels are more successful (Sáez-Martín, Haro-de-Rosario, & Caba-Perez, 2014).

On the technology side, the Internet of Things (IoT), such as sensors in smartphones, and (big data) analytics are popular topics. Many mobile devices have built in sensors, e.g., a GPS sensor or accelerometer. These sensors can be

useful for things such as traffic monitoring (Bhoraskar, Vankadhara, Raman, & Kulkarni, 2012). The data collected can be analyzed using a range of techniques, and used for predictions, pattern recognition, forecasting, visualizations and decision-support (Liao, Chu, & Hsiao, 2012). One study shows how to apply data mining and predictive analytical techniques for predicting the number of vacant properties in a city (Appel et al., 2014). Massa and Campagna (2014) show how geographic data extracted from social media can improve urban planning in a smart city context, and present a methodology for social media geographic information analytics. A similar study mines data from the location-based social network *Foursquare* to identify under-developed neighborhoods (Quercia & Saez, 2014).

3 Transparency

Freedom of Information Acts", introduced in legislation during the past decade, send strong signals to all stakeholders that decision-making should be transparent.

Transparency and freedom of information legislation is important for several reasons (James, 2006):

- It is a prerequisite for democratic participation. Knowledge is imperative to being able to influence decision-making. Democratic participation again enhances the quality of decision-making by the government
- Quality can also be improved by drawing attention to errors and omissions in background information.
- It helps combat corruption.
- It makes government on all levels more accountable. By making the political decision-making process transparent, it is easier to keep decision makers accountable for their actions. This is not only important in the electoral context, but also in the day-to-day political decision-making.

The political decision making process is often modeled as an iterative process consisting of the following stages (Birkland, 2001):

- Issue emergence. The point at which an issue becomes more visible and important to citizens and policy makers, when some stirrings of government and interest group activity begin to be evident. Often issues emerge when national policies are seeking a local implementation, or when the local administration wants to rewrite current policy because it does not longer work according to the initial assumptions.
- Agenda setting. The process by which problems and alternative solutions gain or lose public and elite attention, or the activities of various actors and groups to gain greater attention or to prevent them from gaining attention.
- Alternative selection. The analysis and construction of policy alternatives.

- Enactment. The act of putting a decision into effect. Typically when the local government vote on an issue.
- Execution. The local administration implements the decision, and the policy is put to work
- Evaluation. At some time the administration or local government decides to evaluate if the policy is working according to the initial assumptions.

Figure 1 illustrates the political decision making process.

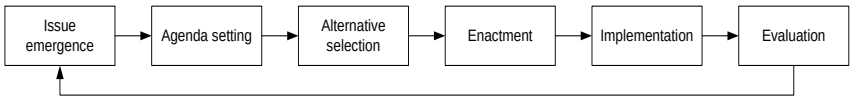

Fig. 1 Political decision-making process

Political decision-making processes may be quite complex and may be difficult to understand for those affected by the decisions. Therefore, transparency is regarded as a positive measure to increase the awareness of issues, stakeholders and the decision-making process itself. The decision-making process is normally based on documents containing policy analysis, background material and a proposed policy. Elected representatives discuss this information in meetings, and make a decision. The representatives may have their own interests which may interfere with the decision making process. Therefore, transparency is not only including documents, but also supplementary information, meetings, processes, and stakeholders.

concerns can be handled by relevant legislation and regulations. It is possible to rule that all background information, access to the decision-making process itself, and information about the decision makers should be open and accessible to the public.

Transparency may also be an important issue in the context of the daily running of government operations, and also an important part of the judicial processes of most democratic countries, but this chapter focuses on political decision-making made by elected representatives.

Transparency in policy-making is primarily a question of legislation, regulation, and administrative procedures, and even while technology may support transparency, technology does not play a role in itself.

3.1 Legislation and regulations

During the last four decades, there has been an increasing awareness of the democratic importance of transparency in democracies all over the world. In 1970 the Norwegian Parliament passed its first “Freedom of Information Act”

(Parliament, 2006) establishing the right for citizens to examine government documents.

This act applied to all activities conducted by administrative agencies. For the purposes of the act, any central or local government body was considered to be an administrative agency. The act established that all case documents of public administration are public, with a few exceptions. The most important exceptions were documents related to national security, documents that could compromise business, documents related to criminal investigations, documents related to appointments and promotion of public officers and some other well-founded exceptions.

Exceptions could also be made for documents written for internal preparation of cases. However, this did not apply to case documents or enclosures presented to elected municipal or county municipal bodies.

Case documents were defined as documents drawn up by an administrative agency, as well as documents received by or submitted to such an agency. The Act also defined case documents to include logically limited amount of information stored in a medium for subsequent reading, listening, presentation, or transfer.

In 1992 the Norwegian Parliament passed a new Local Government Act ("The Norwegian Parliament Local Government Act," 1992). Before 1992 local council meetings were open to the public, but committee meetings were not. The new act introduced a principal rule that all meetings of popular bodies should be open to the public. The committee writing the proposal for the new act used the following reasoning for more openness (Reports, 1990): “Meetings open to the public contribute to create better insight, and better understanding of what happens within local and regional government”. Even more important, was the introduction of a right for the public to record proceedings of open meetings to magnetic tape, video tape, etc. or broadcast proceedings by radio or television as long as recording or broadcasting does not have a disturbing effect on the meeting.

In 2003, the Norwegian Parliament also passed the Environmental Information Act ("The Norwegian Parliament Environmental Information Act," 2003) establishing the right for the public to obtain environmental information and participate in decision-making processes associated with environmental issues. The Statistics Act ("The Norwegian Parliament Statistics Act.," 1989) also has some relevance to government transparency. By collecting, analyzing and presenting statistical information, it is possible for citizens to get a better overview of how government measures up. The Statistics Act regulates the collection of national statistics, and in particular instructs government agencies and government itself to report on a multitude of different issues.

In 2004 the Norwegian Parliament voted on the following amendment to the Norwegian constitution: “*Everyone has the right to access State and municipal documents and to be present at sittings of courts and elected assemblies.*” This right may be limited, but only “*in regard of the right to privacy or other weighty considerations*” (Police, 2000, 2004; Reports, 1999).

In June 2005 the Norwegian Government made a proposal for a new "Freedom of Information Act" to the Norwegian Parliament (Police, 2005). The Parliament passed the new "Freedom of Information Act" in 2006 (Parliament, 2006), and the Act was put into force from January 1st 2009. The new Act is more specific on the aims: to increase openness and transparency (Bernt & Hove, 2009). The number of organizations and agencies that are affected by the legislation is increased, the number of exceptions is reduced, and the remaining exceptions are further restricted.

3.2 Categories of transparency

Policies promoting transparency is found in government documents on different levels of commitment and importance. On top of the hierarchy is the constitution, followed by acts, regulations, policy documents and plans. This research has examined relevant sources to find where politicians have expressed their commitment to transparency.

Based on the sources examined in the cases (see research method section), it has been possible to identify and categorize six different categories of transparency.

Document transparency	Access to government documents relevant for decision-making processes. Document transparency also includes efficient methods to find relevant documents (findability).
Meeting transparency	Access to meetings where decisions are made. This includes access to agenda, the time and location of the meeting, the proceedings, and the minutes.
Process transparency	Access to information describing the decision-making process, including when and how citizens may have their say.
Benchmarking transparency	Access to data that makes it possible to benchmark similar government entities, e.g. municipalities or ministries.
Decision-maker transparency	The right to know economic and other interests of decision makers, including whom they are meeting and for what purpose.
Disclosure transparency	The right to ask questions related to information not in documents or meeting agendas

In the following subsections, the identified categories of transparency are discussed in more detail. In the next section suggestions are made on how each type of transparency can be supported by information and communication technology.

Document transparency

Document transparency is about access to government documents. Most decisions are based on information contained in policy documents, and such documents are crucial for democratic participation. But other documents may also be important, especially mail records that disclose mail received and sent by the government entity. Government entities are required to publish their lists of in- and outgoing mail, and many, if not most, municipalities publish the full records on their web sites.

Access to government documents are protected by article 100 of the Norwegian Constitution (("Kongeriget Norges Grundlov.," 2004):

> "Everyone has a right of access to documents of the State and municipal administration and a right to follow the proceedings of the courts and democratically elected bodies. Limitations to this right may be prescribed by law to protect the privacy of the individual or for other weighty reasons."

More detailed rules are given in the Freedom of Information Act ((Parliament, 2006).

Meeting transparency

Most policy decisions are made in meetings of public bodies. In order to make sure that decisions are made in democratic way, meetings should be open to the public. To be able to attend a meeting of a public body, the meeting must be properly announced, with an agenda and the time and place of the meeting. During the meeting itself, it should be possible to follow the proceedings and the votes. After the meeting, the minutes should be publicly available.

The principle of open meetings of the Parliament is included in article 84 of the Constitution ("Kongeriget Norges Grundlov.," 2004).

The principle of open meetings on local and regional level is adopted in the Local Government Act. Meetings of public bodies are generally open to the citizens, and the act contains specific rules to limit meetings behind closed doors.

Process transparency

Process transparency is an explanation of the processes leading to decisions, but also procedures for appeal and processing times where appropriate. The process may be important for understanding when and how to influence the decision-making process. So far, process transparency has not been included in legislation, but the concept of process transparency has recently appeared in several government publications, e.g. in the latest Norwegian eGovernment Program (The Norwegian Ministry of Government Administration, 2012) where the government

commits to the following statement: “The public sector is to provide good information on case procedures, appeals and time needed for case processing”

Benchmarking transparency

Benchmarking is a method to compare similar government entities with each other (Keehley, Medlin, MacBride, & Longmire, 1997). The idea is to find out which entity performs better and identify best practice. The results can be used for learning and improvement. Benchmarking is based on quantitative data. If such data is publicly available, it is possible for citizens or interests groups to perform their own benchmarking of results. Many sources of data may be used for benchmarking, including annual reports, results from user surveys, demographic information etc.

Statistics Norway collects data from government entities and municipalities every year and stores such data in databases.

- KOSTRA was established in 2001 as a database containing information on municipalities and counties. The database includes both demographic and performance data, e.g.: municipal fees, purchase of external services, property management, financial key numbers, kindergartens, public schools, health, care, social services, children protective services, environment, culture, churches, water, renovation, public transport, municipal housing, commercial sector support, and fire protection. KOSTRA is available as a smartphone app, which allows for easy comparison between different municipalities’ spending on the published statistics.
- StatRes was established in 2005. The database contains statistical information about use of resources and results of ministries and their agencies. StatRes data is freely available from the Statistics Norway web site.
- Bedrekommune.no (Better municipality in English) is a web service set up by the Norwegian Association of Local and Regional Authorities (KS), where users can access statistics from citizen satisfaction surveys in municipalities. Currently, you can compare citizen satisfaction on kindergartens, child services, library services, planning processes, infrastructure, various health services as well as the general citizen satisfaction survey which measures how satisfied citizens are with the municipality they are living in.

Decision-maker transparency

Transparency of decision makers is about who they are and what conflicting interests they may have in their role as decision makers. One aspect is to provide a complete list of the elected representatives involved in the decision-making, including such things as voting records. It is also possible to have rules for disclosure of owner interests, board memberships etc. for representatives. Decision

makers often spend public money to do their job, and travel expenses and other allowances may be of public interest. Leadership has a special role when establishing the political agenda. It may therefore be of public interest to know who the leadership is meeting with, and for what reasons.

The Public Administration Act ("The Norwegian Parliament Public Administrations Act

", 1967) has a requirement for impartiality among public sector employees. The Local Government Act ("The Norwegian Parliament Local Government Act," 1992) applies the same rules to political representatives with some extensions.

Political representatives are not required by law to disclose their owner interests or other interests. But the Norwegian Parliament has established a mandatory register of such interests for all members of Parliament. The Norwegian Association of Local and Regional Authorities (KS) has established a similar register for local and regional representatives. This register is not mandatory, but representatives are advised to register their interests.

Disclosure transparency

Is open government only a question of access to documents, meetings and data? Open government is also about being open about intentions and thoughts. Sometimes, information is not published as documents, just because there are no written documents.

The Parliament has established “question time” where representatives can ask either written or oral questions to the members of the Government. Some municipalities have established a fixed point on their agenda where citizens may ask questions to the mayor. Some political leaders have established some kind of informal meeting place, e.g. one hour every week in the city library, where citizens may ask questions and comment on current issues.

The right to ask questions may be a valuable supplement to the other categories of transparency.

4 Research method

Three case studies previously conducted by the authors form the empirical basis of the chapter. The cases are 1) Development of eGovernment transparency indicators in the eGovMon project 2) Digital planning dialog – A case study on the development of digital tools for transparency and democracy in Norwegian municipalities, and 3) a study of urban planning in a Norwegian municipality, where document storage and access were central elements of the case. In addition, we present various tools and techniques that have been used to further transparency in

Norwegian eGovernment. The tools we discuss are mostly government-initiated and driven. However, private initiatives have sometimes been the driver behind development, especially when it comes to the Norwegian open data repository.

- Data.no – The Norwegian open data repository
- Kostra – statistical database for resource use in Norwegian municipalities
- Board membership registry – voluntary registry for board members
- Bedrekommune.no – User satisfaction surveys from Norwegian municipalities
- Samarbeidforarbeid.no – A 2011 initiative for citizen input on a range of policy issues.

The data in the three cases consists of interviews, online content from various platforms and systems, as well as municipal council documents related to the cases. Individual findings from the three cases were discussed in meetings between the authors. The findings are structured according to the different forms of transparency presented in section 3.2.

In addition, the authors conducted a literature review, which consisted of a keyword search for smart city/cities in Google Scholar, Scopus and Ebscohost. The review was conducted in January 2016, and revealed 88 social science journal articles on smart cities. Papers from conferences attended by the authors were also included in the literature review.

5 ICT support for transparency

How can information- and communication technology (ICT) be used to enhance transparency, but also to improve the efficiency both from a citizen perspective and an administrative perspective? By offering self-service access to information, citizens can access information independent of time and geographical location. From the administrative perspective, self-service is cost efficient, since costs are negligible when information is online. In the context of this chapter, we define ICT as web-based systems with the objective of presenting information to citizens. We begin this section with a brief overview of open data and data journalism, as open data presents important guidelines for how data should be made available, and data journalism illustrates how the data can be used to increase transparency. Sections 5.2 through 5.7 presents the categories of transparency and tools that have been applied in the different categories.

5.1 Open data and data journalism for transparency

Public entities are some of the largest producers of data in the world, in domains ranging from traffic and pollution to the location of public restrooms in a specific city (K. Janssen, 2011). While the field of open data has gained attention in recent years, calls for governments to release these data sets have been heard since the 1980's (K. Janssen, 2011). The purpose of making data sets available is to "make local, regional and national data (and particularly publicly acquired data) available in a form that allows for direct manipulation using software tools as for example, for the purposes of cross tabulation, visualization, mapping and so on" (Gurstein, 2011).

In recent years, the availability of open data have grown rapidly, as pressure rises for governments to open up and publish their data (M. Janssen, Charalabidis, & Zuiderwijk, 2012). Transparency is an often-cited reason for this push towards open data. Many governments have opened data portals where government entities can publish their data sets in open and machine-readable formats. Data.gov in the US, data.gov.uk in the UK, and data.norge.no in Norway, to name but a few. In Europe, the European Directive on re-use of public sector information (PSI directive) was introduced to facilitate re-use of public data (K. Janssen, 2011). However, many governments limit their openness to data sets that are seen as safe. In 2011, the Dutch government was criticized for their lack of openness by the national ombudsman, and there are other similar examples from other countries (M. Janssen et al., 2012). In the Norwegian context, some municipalities make some data available, but the selection is random, and you rarely find data sets that allows for comparison between municipalities. Even so, the data.norge.no web site lists more than 60 applications as examples of how open data can be utilized. These examples cover topics ranging from topographic hiking maps to public transport planning and transparency efforts[1]. Transparency, accountability, increased participation and increased trust are listed as some of the most important benefits of open data (M. Janssen et al., 2012).

Data journalism is one use of open data that potentially has great implications for transparency. Data journalism is a form of investigative journalism that relies on statistical data, open data repositories and other digital sources (Appelgren & Nygren, 2014). Data journalism is a convergence between different fields, such as statistics, computer science and data visualization (Coddington, 2015).

The British newspaper *The Guardian* has been on the forefront of data journalism, publishing a number of stories based on open data from various sources[2].In

[1] http://data.norge.no/app

[2] http://www.theguardian.com/data

2009-2010, the Guardian published 460.000 pages of government expense reports online, and asked the citizens to examine them and look for questionable items. The project led to several critical news articles, and some members of parliament paid back parts of the money they had claimed in travel expenses (Coddington, 2015). The *Knight foundation* pushes for data-driven journalism and recently granted $250.000 to the data&society research institute, in order to research "how these systems affect individuals, civil rights and liberties, and institutions across society" [3]. The Pew research center is another example of how data can affect journalistic practices[4]

As parts of section 5 shows, Norwegian journalists often use the various transparency technologies as sources when writing about government and politics.

5.2 Document transparency

Documents used for policy development can easily be made available on the portal of the government entity. Normally, such documents are already available as word processing documents, and little effort is needed to publish such documents. Supplementary documents not in electronic form may need to be scanned and converted into a suitable format before publishing.

Records of incoming and outgoing mail are normally kept by some kind of document handling system, which often supports export into formats suitable for publishing. Paper documents received by government may be scanned and published in electronic form if they contain material of public interest. The central government has recently introduced a web based mail record system where mail records for all ministries are available to the public.

Documents may be published in a number of different formats. HTML documents are readable by web-browsers, while other formats require some kind of program for reading. Popular formats include PDF (Portable Document Format) produced by Adobe Acrobat and similar programs. PDF is today an open standard, and has gained a lot of popularity due to its independence of operating system platform. A less accessible, but still often used format is the one used by Microsoft Word. This format may also be read by downloadable readers, but has limited platform support.

An important aspect of document transparency is findability: How easy it is to find the relevant documents through either navigation or use of a search mechanism.

Perhaps the best way of increasing findability is to publish the documents as open data, by providing access to an interface where documents can be searched for and retrieved. The Norwegian Parliament has recently opened their databases

[3] http://bit.ly/2affmKC

[4] http://www.journalism.org/

for public use at http://data.stortinget.no. Documents such as PDF's receive one of five stars in the rating system developed by Tim Berners-Lee (2015), as they are not easily machine-readable. Machine-readable structured data receives two stars, three if it is published in an open format such as csv. Four star data should be published using open standards from the World Wide Web Consortium (RDF, SPARQL) so that the data is more easily identifiable. Finally, five star data should include the above, as well as be linked to other data in order to provide context.

A wide range of stakeholders uses document data. In our earlier research, we have seen that opposing political parties use documents to support their own political views, interest groups use documents (sometimes selectively) to build their case for or against a specific issue, the media use documents to explain and illustrate stories about political issues. In this sense, document transparency has proven to be important for informing the public.

5.3 Meeting transparency

First of all, the location and time of political meetings must be published, so that citizens are able to find out where and when debates are taking place. Such information may be published on government web sites. The meeting agendas themselves also contain important information on what issues are to be discussed and decided upon. Also meeting agendas may be published on government web sites.

The calendar of meetings can be published online. The calendar can be linked to individual agendas for each meeting, with further links to relevant documents. Figure 2 shows one example of a meeting calendar for all the different committees and councils of a municipality.

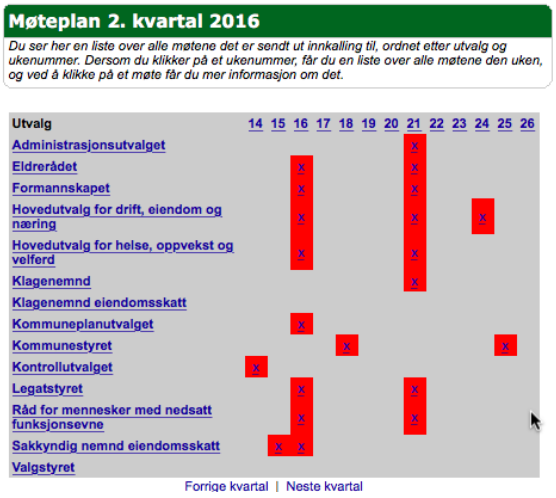

Fig. 2 Meeting transparency – the meetings of political bodies and the week numbers

The citizens should also be able to follow the proceedings of the meeting, or be provided with detailed transcripts of the debates. The meetings themselves can be webcasted. Citizen can then follow the online proceedings of the meeting or watch the proceedings at some later time. Figure 3 shows a webcast from a local council meeting. The agenda is shown on the left, and it is possible to view one particular item on the agenda.

Meeting technologies such as webcasting is usually used by politicians who are not able to attend a meeting, and also by interest groups who want to follow the political discussion on a case they are involved with. While few meetings have many viewers, webcasting is still important in that it allows people who are unable to attend the actual meeting to follow the discussions. In some rare instances, members of an interest group have made contact with politicians supporting their case, feeding them with arguments to use in the debate.

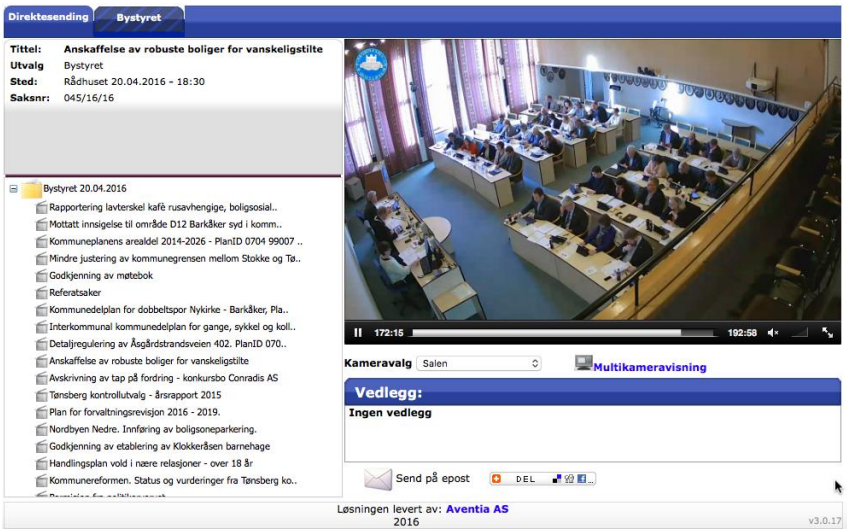

Fig. 3 Webcasting of city council meeting – City of Tønsberg

5.4 Process transparency

Use of information and communication technology can help visualizing decision-making processes by using flow diagrams, maps, and timelines. Figure 4 shows an application for spatial planning named “Digital Planning Dialogue”. This application was developed to give stakeholders access to all relevant information related to spatial planning through an enhanced interface to a geographic information system. The enhancements include on the left side a list of all relevant documents related to the plan. These documents are pulled from the document handling system. Below the map, a timeline shows the steps of the planning process, including where the process is at the moment.

Digital planning dialogue has been used by a range of stakeholders in planning and construction. For individual citizens, the tool has made the planning process easier to understand, and has led to a more streamlined process for example when it comes to building extensions to homes. For professional planners, the tool provides easy and timely access to planning documents, and the mapping functionality has made it a lot easier to find all the relevant plans for a specific area.

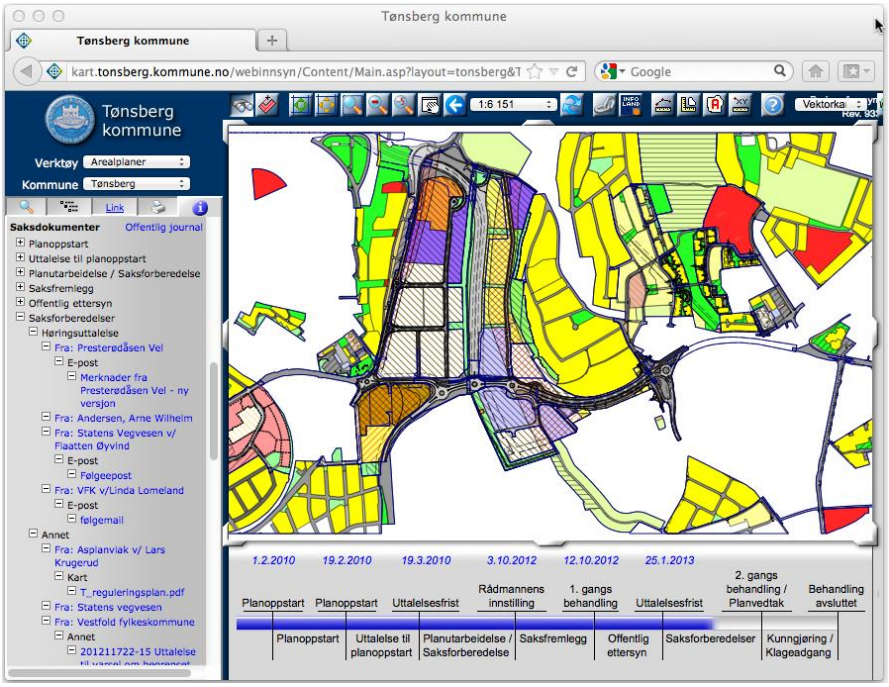

Fig. 4 Process transparency visualized by a timeline.

5.5 Benchmarking transparency

The databases KOSTRA and StatRes described in the previous section are accessible through the world-wide-web. A reporting tool is available that makes it possible to generate results as tables. Citizens can easily compare municipalities' spending and other statistics on the services that municipalities are responsible for producing. Examples include kindergarten, healthcare, schools and social services. Tables may be downloaded to personal computers in several formats (e.g. Excel) for further analysis. Figure 5 shows the comparison of costs per pupil in primary school for five different municipalities and three different years. Recently, KOSTRA was also made available as a mobile application.

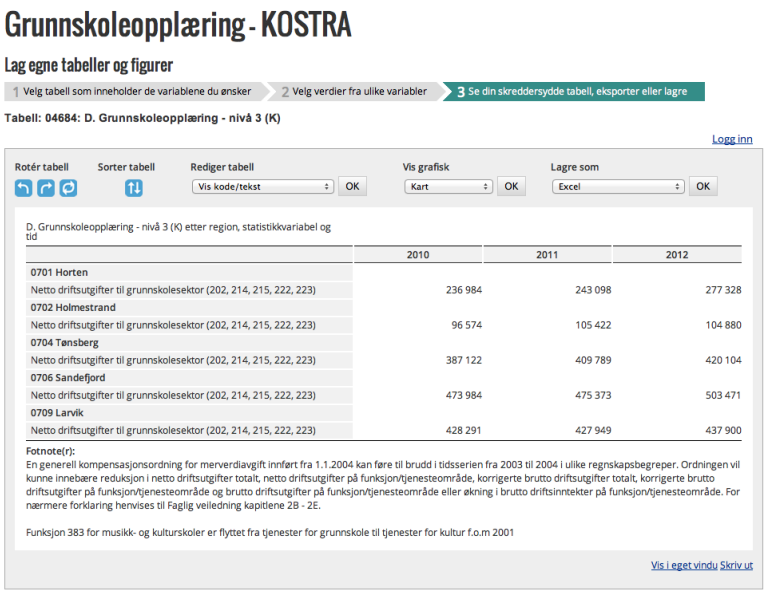

Fig. 5 Example on report generated from KOSTRA

Bedrekommune.no allows citizens to compare how their municipality scores compared to others. Figure 6 shows an example from the kindergarten user satisfaction survey. Users can click on their municipality on the map, or access the report directly to compare the indicator scores for each municipality.

Fig. 6 Example on report from bedrekommune.no

Benchmarking tools are most often used by public officials and the media, to compare how a municipality scores compared to other, similar ones. When new statistics are released, local media are fond of using them as ranking tools. Low-scoring municipalities are then pressured by their local newspaper to improve. Business have been known to use KOSTRA statistics when they consider opening a branch in a new city, and individual citizens will sometimes use bedrekommune.no to check how the services they use (such as kindergarten), compare to others. However, the egalitarian nature of Norway does not lead to extensive use by individual citizens.

5.6 Decision maker transparency

Decision maker transparency may also be facilitated by use of ICT. Meeting calendars can be placed online. Voting records can be shown online.

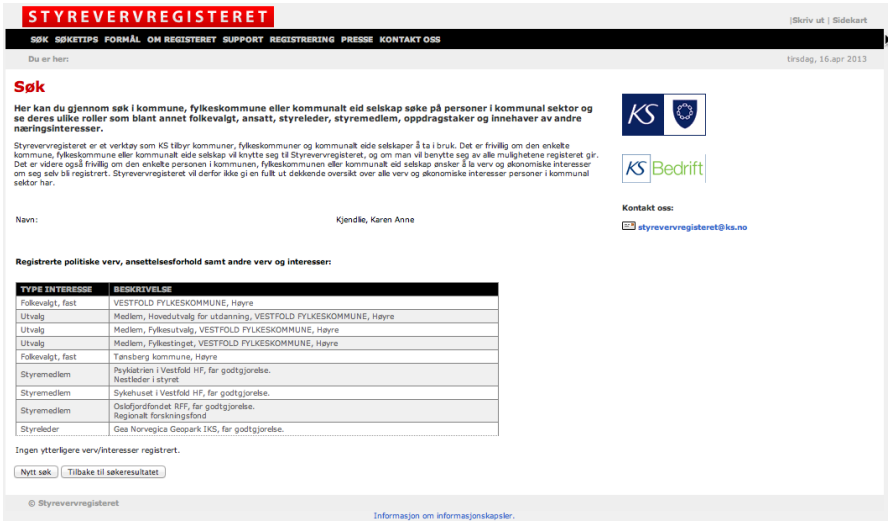

Fig. 7 Decision maker transparency – register of owner and other interests

As earlier described, The Norwegian Association of Local and Regional Authorities (KS) has established a register of owner and other interests of political representatives. An example of is shown in figure 7. The table shows the different offices and interests of one representative. The register is not mandatory, but it is still heavily used. Every citizen (and the media) can use this register to check for conflicting interests.

Another example, which relies on data from the open data repository of the Norwegian parliament, is the service "*Holder de ord*"[5] (are they keeping their promises). The web site is a volunteer effort run by people from the media, academia and ICT, and compares the political parties voting in Parliament with their published policy program documents. Users of the service can access propositions made in parliament, and compare the promises made by each party to what they voted for/against in parliament. The site also provides statistics on word frequency as well as how often the different political parties cast the same vote. It is interesting to note that the two major parties, representing the left and right, agreed on 51% of the cases voted on in 2012-2013. These services are mostly used by the media, as sources for data-driven journalism. Political opposition parties also use the KS registry to uncover potential issues of camaraderie.

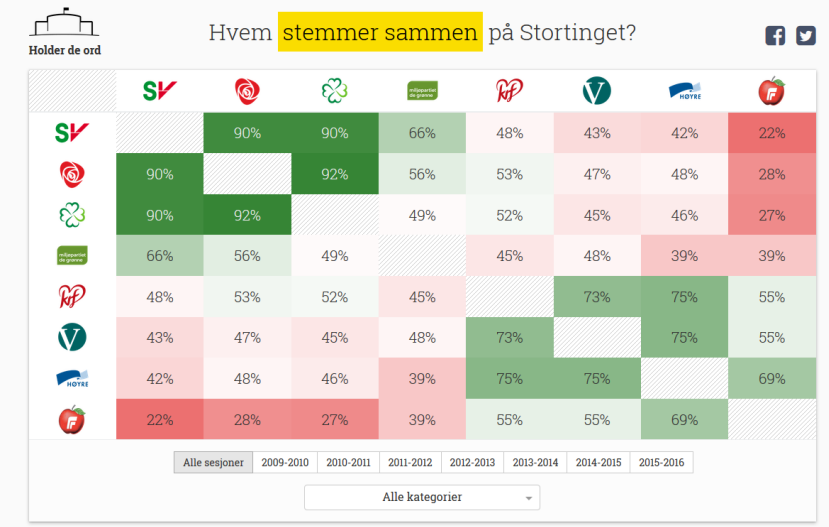

Fig. 8 Screenshot from *Holder de ord* showing how often the different political parties agree

5.7 Disclosure transparency

Information technology is especially well suited to for asking questions related to policy issues. In addition to e-mail, other technologies facilitate communication with a larger audience. Norwegian municipalities use Net-meetings or chat services for real time communication, while discussion forums or blogs (weblogs) may be used as an asynchronous alternative. For political bodies having imple-

[5] https://www.holderdeord.no/

mented a fixed item on the agenda, it is possible to receive questions through e-mail or even use a chat function or social media to receive questions online.

In the urban planning case, the city council invited every citizen in the municipality to participate in a survey. The participants answered questions about their current use of the area of the planned development, as well as their opinions on how the area should be developed in the future. They survey findings were published on the municipalities web site, and used in the planning process. There are potential challenges with this kind of transparency efforts. In the urban planning case, 688 out of a population of 40.000 actually replied to the survey, a low number despite several efforts to promote it. This led decision-makers and activists alike to questions its validity. The results were also inconclusive, with half of the respondents voting for a park, and the other half for residential construction. This led to the survey being used by both sides as support for their own views.

Another example of disclosure is the web site samarbeidforarbeid.no (collaboration for work), an initiative set up in 2010 to invite citizens to discuss and present ideas on how to create more jobs. While this was a national initiative, similar services can be set up on the city level in order to invite citizens to contribute on a range of issues.

The input from disclosure tools is most often collected in a document and treated as part of the political hearing process, or in the case of the urban planning survey, used for discussion in political meetings.

Fig. 9 Screenshot from *Samarbeidforarbeid.no*

6 Challenges with current tools – the need for user-centricity

There are many tools available for increased transparency, and some of these tools have been presented in this chapter. However, there is a challenge with many of them. Being transparent and providing data is not enough to ensure equal access. In one example from Canada, technically savvy people and some landowners used the newly opened GIS-based land registry to take land away from less knowledgeable landowners (Gurstein, 2011). In the urban planning case, people were confused about where to find data, because they were not familiar with the political process, culture and archiving system:

> "*A couple of days ago I wanted to see what the council actually said about this plan they have developed for reducing traffic in the city. The local newspaper mentioned the case, but as usual they were not very good at presenting what was actually said and done in the meeting. So I went to the council's web site to check for myself. I found this link for video from council meetings, but I couldn't find this particular case anywhere in the minutes. I was not able to find any text or documents either. I was expecting to be able to just search for some keywords, but that is not possible. You need to know when the meeting was, the case number and the committee discussing it, or else you're out of luck*" (Interview, urban planning case)

This example clearly shows that even if information is available, it is often structured in a way that makes it difficult, or even impossible to find for a layperson that is unfamiliar with the logic of the system, or the inner workings of government. eGovernment projects tend to be focused around the service being delivered, and rarely take citizen needs into account (Anthopoulos, Siozos, & Tsoukalas, 2007). Gurstein (2011) calls for an "effective use" approach that would "be one that ensured that opportunities and resources for translating this open data into useful outcomes would be available (and adapted) for the widest possible range of users."

In order for transparency initiatives to be effective, the technology needs to be available, but even more important is that the users understand how it works. The system must have the functionality that users require. Usability, designing the system to be intuitive for the user, is also essential (John C. Bertot et al., 2010). Thus, user-centered design is an important aspect to consider when designing ICT for transparency.

Public sector scholars have adopted user-centered design and user centricity for some time. A literature review found studies of user involvement in design, requirements gathering, literacy and citizen engagement. It concluded that while user involvement may be difficult and costly, as services that are not designed form a user-centered perspective tend to have a much lower rate of adoption (John

Carlo Bertot & Jaeger, 2008). In systems development, user-centricity has been discussed since the 1970's, when Kling (1977) pointed out that many technically perfect systems failed to meet user expectations and the purpose they were designed for. User-centered design can be defined as taking "every individual user's capabilities into consideration and fully satisfy his or her needs related to the system to be developed" (Iivari & Iivari, 2011). The objective is to create information systems that serve the needs of the individual user, by focusing on user involvement in the creation of user interfaces, involving users when making design considerations, and by having system developers with extensive business knowledge (Karlsson, Holgersson, Söderström, & Hedström, 2012).

User-centered design involves four dimensions: representation of users, representation of work practices, user involvement and system personalization. These dimensions have different views. Some argue for creating "ideal" users from an aggregated average, survey or similar, others for involving real users in every project (Berntzen, 2015). The same applies to representation of work, where some argue for observation of local work practices, and others for applying models of work processes. For user involvement, system designers have to agree on why and how the users should be involved, who to involve, and where the power to make decisions lie. Finally for personalization of systems, designers have to decide on how much personalization the system allows for (Iivari & Iivari, 2011). Each of these approaches has different benefits and challenges. In public sector projects, there is an additional challenge as the user groups are many and diverse, and there can be very large differences in the objectives of citizens using the system and the government officials at the other end (Axelsson, Melin, & Lindgren, 2010).

7 Discussion – How to bring about the transparent smart city

The categories of transparency presented in this chapter have been useful as a starting point for assessing how well municipalities have utilized information and communication technology to enhance transparency.

The following checklist was created as a tool for raising awareness among municipal executives. The categories and the checklist, deriving from the egovmon and digital planning dialogue cases, have been used to improve several municipal websites and electronic services. The checklist provides an overview of technological functionalities that can aid in achieving the different forms of transparency.

Document transparency	• Online records of incoming and outgoing mail • Online case documents • Online records of decisions/minutes • Search mechanism
Meeting transparency	• Time and place of meetings • Online agendas • Online proceedings (webcasts)
Process transparency	• Process descriptions • Visual tools, e.g. timeline
Benchmarking transparency	• Online planning documents • Online annual reports • Links to relevant statistics collected by Statistics Norway and other government agencies responsible for collecting and publishing statistical information • Online results of user surveys
Decision maker transparency	• Online list of members of decision making body • Online voting records • Online calendar of leadership
Disclosure transparency	• Questions by email, survey or social media • On-line (real-time) questions (net-meetings or chat) • Discussion forums/blogs where citizens can ask questions

However, even if many systems have proven to be useful there are challenges with usability and a lack of user-centricity in their design, and these issues should be addressed in order to further transparency.

For *document and meeting transparency* applications, our cases reveal that systems are designed from the perspective of the public servants, and instead of being user-centric, are designed to fit with governments' internal processes. For example, documents in municipal web sites are usually archived by case number, committee and other metadata that is difficult for the uninitiated to understand. This means that users have to understand these processes and accompanying archival standards in order to find information. One way of addressing this could be to publish documents as open data, in repositories that are designed for easy access and findability. These documents should preferably be published as linkable open data (5 stars in Berners-Lee's framework). Another user-centric approach would

be to increase the searchability of documents, so that citizens could find documents by keyword searches, and have links to other relevant documentation appear in the search results.

Increased focus on *process transparency* could help alleviate this challenge. In the digital planning dialogue tool for example, the political process is illustrated, which makes it easier for citizens to understand what they need to do, and when to do ut. However, users still need to understand the different stages of the process in order to fully utilize the data. The digital planning dialogue and similar systems are still designed from the point of view of government, while citizens are more interested in getting an answer to the question "what am I allowed to build on my own property?"

The *Benchmarking and decision-maker transparency* systems presented here are mostly web-based systems, and designed following usability guidelines. This means that access and finding the data is not as much of an issue as is understanding the data. Gurstein's (2011) example where those with the proper knowledge and skills were able to take advantage of the less knowledgeable clearly shows the potential risks of not educating the public about the meaning of published data. Publishers should provide help texts and case examples along with the data, and be aware of the potential risks of publishing data.

Disclosure transparency systems need to be explicit about how input is being used, and formalize a process for data input. In the urban planning case, participants kept claiming decision-makers did not hear them. Interviewed politicians pointed out that there is a difference between being heard and being listened to, but this was never communicated to the public. This led to several protests, as those who opposed the policy thought their input would have a stronger impact in the decisions that were made. This could easily have been avoided, with better communication.

These examples show the limitations with current technologies. While they offer useful information they require knowledge and skills that are not held by everyone. In order for transparency efforts to be truly transparent, government needs to involve stakeholders and design for users and citizens rather than for internal purposes. A user-centric approach, coupled with clear objectives for the information being released, would help overcome this barrier.

The link between transparency and smart cities lies in both the technology and the objectives that should follow the release of government data. Data-driven journalism is but one example of how transparency efforts following a user-centric approach can help create a more informed citizenry. Open data efforts such as hackathons allow citizens to use government data to create novel and useful applications that make city life better in many ways[6] . The different categories of transparency illustrates different types of data that can be released, and if the data is published in open formats, allows for a range of creative applications. This digiti-

[6] http://houstonhackathon.com/

zation of information makes it easier to both find and use, as opposed to the analogue equivalent of making information available through visiting an archive and browsing documents. Digital information, published in linkable open data formats and in repositories that are designed following user-centric principles, can help address the smart city objectives of a more informed and participatory citizenry (Chourabi et al., 2012) and addressing wicked problems that require collaboration and input from several disciplines (Goodspeed, 2015).

8 Conclusion and further research

In this chapter, we have presented six categories of transparency derived from several case studies in Norwegian municipalities. We have presented examples of digital systems that can be used to promote transparency in these categories, and argue that a user-centric approach is needed for these systems to reach their full potential and be usable for all citizens.

While data has been available also in analogue form, digital and reusable data has a lot more potential for being put to creative and novel uses, which is why we argue that digital services for transparency can help achieve the smart city objective to "*foster more informed, educated, and participatory citizens"* (Chourabi et al., 2012). Transparency initiatives such as the ones presented here can help fulfil this objective. The tools presented in this chapter provide citizens with information that can be helpful in numerous ways. Coupled with crowdsourcing initiatives for idea generation and input, they can become important tools in the move towards smarter cities.

As with all research, this chapter has some limitations, which opens up possibilities for future research. First of all, our review of existing technologies for transparency is limited to one country, with its specific culture and context. This means that our findings cannot necessarily be translated to other countries without addressing local context and culture. Thus, we call for studies comparing digital transparency efforts across borders and cultures.

Second, while we introduce the concepts of open data and data journalism to illustrate important uses of data, a thorough discussion of these concepts is beyond the scope of a single chapter. There is also a need for more research on the impact of open data and data journalism, beyond single case studies of success (or failure) stories. In the Norwegian context, we see that many newsrooms, especially in local media, are not fully utilizing the possibilities offered by digital technologies, such as connecting spatial data with maps, connecting different sources, interactive visualisations etc.

Finally, we know little about what actually happens with the input from citizens on a broad level. There are many programs aimed at generating input from citizens, some of which are presented in this chapter. However, there is a need for

more research into the impact and use of this input. Thus, we propose a research agenda for how cities can formalize input form processes such as the ones outlined here. This would help create smart city programs where transparency and open data efforts are coupled with the needs of individual cities.

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