

Data-driven government: Creating value from Big and Open Linked Data

Track: E-government

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Abstract

The collection of more and more data results in the rise of a data-driven government. Although traditional administrative and policy-making process are data intensive, only recently the ability to collect and process big and open linked data (BOLD) at a large scale has resulted in the possibility to create a data-driven government. Data-driven government refers to sensing and the subsequent collecting and processing of data for operational decision-making or policy-making. There is a need for multidisciplinary research to expand our knowledge of data-driven approaches.

1. Introduction

The ability to collect more and more data using low-cost devices enabled by Internet of Things (IoT) result in a data-driven government. Some of the data is opened for the public [1, 2], whereas other data is for use within the government [3]. Data needs to be shared, processed and analyzed with traditional and advanced methods towards operational decision-making and policy-making.

Data-driven government refers to sensing and the subsequent collecting and processing of data to use for operational decision-making or policy-making. Ideally, all kinds of data are collected in machine-readable data formats having clearly defined semantics. This data can be used for internal purposes to make decision about granting permits and service provisioning, but also for opening the data to the public to create transparency, and accountability or to enable participation and even business innovation.

BOLD refers to the combination of big data and Linked Data under the openness concept. While Big Data can be characterized by its size and diversity, Linked Data can be characterized by its enhanced semantic capabilities [4], and Open data can be characterized by its free accessibility and can be combined with all kind of (closed) data sources to infer and generate value [5][p. 11-31]. This can result in recommendations for improving the public sector,

business model innovation and the creation of transparency and accountability.

The move to a data-driven government and the rise of all kinds of heterogeneous data has resulted in the demand for new approaches for organizing, storing, processing, analyzing, curating, linking and visualizing results of data. These approaches all form part of data value chains, which enable data users to extract value from the data [5] [p.115-136]. Although there is a huge potential, there are also a number of challenges to exploiting data and its value [6] and the impact of public organizations is not yet understood. All these developments impact the operation of governments and their relationship with the public. There are changes needed at the technical, organizational, managerial and political level that impact the capabilities needed [5] [173-194], the making of policies and traditional institutional structures.

2. Data-driven government

Data-driven government is based on the collecting of data by government using IoT devices, surveys, social media and so on, and the subsequent use of algorithms and data analytics to process them for supporting policy-making or for ((semi-)automated) operational decision-making. Thereafter the results are used for making decision or developing policies. This in turn has an impact on the society as depicted in figure 1. As data is collected from the society the whole cycle starts over again.

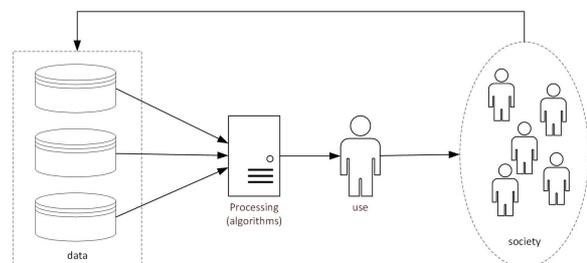


Figure 1: Overview of data-driven government

There are many data sources, including social media, cameras, temperature, pollution, cost etc. The essence of this cycle is that the data is leading and can be used for many applications. The curation of data is important and understanding the quality. The data can be utilised by applying artificial intelligence (AI) and algorithms to make sense of them. This can be algorithms who can predict (predictive policing) the next crime and/or tackle societal problems like pollution and energy consumption. The curation, openness and auditing of algorithms are important research direction [7]. The results of the data analysis can be used in the policy-process, but the data can also be opened for the public to validate the results, conduct other analysis and so on.

3. Paper overview

Data-driven government is a broad domain covering a wide variety of aspects. Data needs to be collected, shared and analyzed. This minitrack is aimed at discussing theories, methodologies, experience reports, literature and case studies in the field of Big & Open Linked Data (BOLD), Information Processing, Data Analytics, and Data Value in Government.

In the paper “A Collaborative Governance Approach to Partnerships Addressing Public Problems with Private Data” Iryna Susha and J. Ramon Gil-Garcia investigate the collaboration dynamics of a new business model focused on accessing private sector data and using it to address complex public problems. The authors propose a framework to explain specific complexities. They found that it can be useful, but there are also some limitations which result in recommendations for further research.

A data-driven government is highly dependent on people and the organizational capabilities. Fatemeh Ahmadi Zeleti and Adegboyega Ojo investigate open data capabilities and relationships between them in their paper “Qualitative Structural Model for Capabilities in Open Data Organizations”. The authors integrate Capability-based Theory and Dynamic Capability Theory. The capability model helps to make better use of open data.

The use of data encounters many challenges. Folmer’s et. al. paper named “Enhancing the Usefulness of Open Governmental Data with Linked Data Viewing Techniques” describe an action design research project to improve Linked Open data within the context of the Dutch Kadaster (land registry) open data platform. The authors found that users lack knowledge and skills to use tooling to use data. They propose four components

to improve uses, namely 1) Data Stories 2) FacetCheck 3) 3D visualization and 4) BI integration.

4. Conclusions

Data-driven government is a new domain in which the data is used for creating public value. We need research covering both organizational and technical aspects and combining theory and practice. Papers taking interdisciplinary approaches and covering a multitude of aspects are strongly needed to understand data-driven government better.

Finally, a new generation in data-driven government has already started by exploiting advanced technologies like AI and BOLD towards data-driven policy making. For this, new models and algorithms are needed to analyze this data with the ability of interconnection among these different models.

4. References

- [1] J. Attard, F. Orlandi, S. Scerri, and S. Auer, "A systematic review of open government data initiatives," *Government Information Quarterly*, vol. 32, no. 4, pp. 399-418, 2015.
- [2] C. Alexopoulos, E. Loukis, and Y. Charalabidis, "A methodology for determining the value generation mechanism and the improvement priorities of open government data systems," *Computer Science and Information Systems*, vol. 13, no. 1, pp. 237-258, 2016.
- [3] J. R. Gil-Garcia, S. Chun, and M. Janssen, "Government information sharing and integration: Combining the social and the technical," *Information Polity*, vol. 14, no. 1, 2, pp. 1-10, 2009.
- [4] M. Janssen, R. Matheus, and A. Zuiderwijk, "Big and Open Linked Data (BOLD) to Create Smart Cities and Citizens: Insights from Smart Energy and Mobility Cases," in *Electronic Government*, vol. 9248, E. Tambouris *et al.*, Eds. (Lecture Notes in Computer Science: Springer International Publishing, 2015, pp. 79-90.
- [5] Y. Charalabidis, A. Zuiderwijk, C. Alexopoulos, M. Janssen, T. Lampoltshammer, and E. Ferro, *The Multiple Life Cycles of Open Data Creation and Use. In The World of Open Data*. Cham: Springer, 2018.
- [6] J. Attard and R. Brennan, "Challenges in Value-Driven Data Governance," in *On the Move to Meaningful Internet Systems. OTM 2018 Conferences (OTM2018)*, vol. 11230, H. e. a. Panetto, Ed. no. LNCS Cham: Springer, 2018.
- [7] M. Janssen and G. Kuk, "The challenges and limits of big data algorithms in technocratic governance," *Government Information Quarterly*, vol. 33, no. 3, pp. 371-377, 2016.