

Supplemental Material.

Catalogue of adverse effects associated with the Smart city governance using disruptive technologies

| ADVERSE EFFECTS | DESCRIPTION | REFERENCES |
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| SOCIO-ECONOMIC INEQUALITIES | | |
| Work loss | Various workgroups are forced to change their occupation due to technological development, and automatization of activities. | (Leipziger <i>et al.</i> , 2016; King, Hammond and Harrington, 2017; Sugiyama <i>et al.</i> , 2017; Pereira <i>et al.</i> , 2020) |
| Lack of adaptation of public educational systems | The educational system adaptation is slower than changes in the social, technological environment. The process of introducing new content into the education offer is too long. | (Chang and Yang, 2010; Janse Van Rensburg, Matheri and Meyer, 2019; Wimmer <i>et al.</i> , 2020; Cairney and Speak, 2000) |
| Redefining human resources | The improvement of urban systems requires specialists with appropriate qualifications. | (Avdeeva <i>et al.</i> , no date; Thite, 2011; Yigitcanlar, 2015; Allam and Newman, 2018; Patnaik and Bhowmick, 2019; Wimmer <i>et al.</i> , 2020) |
| Inequalities in the labour market (youth unemployment) | The importance of acquiring cross-cutting ICT skills, as it is a key issue for employability for youth. | (Rizzo and Deserti, 2014; Aina, 2017; Bauer, 2018; Picatoste <i>et al.</i> , 2018; Masucci, Pearsall and Wiig, 2020; Wimmer <i>et al.</i> , 2020) |
| Digital divide | Modern technologies require a certain amount of prior knowledge and skills that not all participants in society possess in the same way. Large empirical studies on the use of digital applications show that social markers such as age, gender, but also net disposable income, education, family status, disabilities, and place of residence are influencing factors for digital literacy. | (Graham, 2002; Partridge, 2004; Hollands, 2008; Janowski, 2015; Viale Pereira <i>et al.</i> , 2017; Joss, Cook and Dayot, 2017; Schuelke-Leech, 2018; Ylipulli and Luusua, 2019; Spicer, Goodman and Olmstead, 2019; Ahad <i>et al.</i> , 2020a; Bleja <i>et al.</i> , 2020; Wimmer <i>et al.</i> , 2020; Masucci, Pearsall and Wiig, 2020; Laura Alcaide Muñoz, 2019) |
| Increased demand for new governmental services | The disruptive technologies implementation impacts the increase of demand for new governmental services. | (Janowski, 2015; Viale Pereira <i>et al.</i> , 2017; Pereira <i>et al.</i> , 2018; Ronzhyn, Spitzer and Wimmer, 2019; Kumar <i>et al.</i> , 2020) |

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| Lack of intersection between the open data value and societal problems. | Little attention has been given to how open data can solve societal problems and how public value can be created | (Bannister and Connolly, 2011; Nam and Pardo, 2011; Zuiderwijk and Janssen, 2014; Wiig, 2016; Pereira <i>et al.</i> , 2018) (Martin, 2014; Schweitzer and Afzalan, 2017) |
| Limits of urban entrepreneurialism | The responsibility for achieving increased quality of life is moved from citizens to emerging technologies. | (Hollands, 2008; Pierson and Thompson, 2016, Levenda, 2019, Thompson <i>et al.</i> , 2020), (Kummitha and Crutzen, 2017) |
| Deepening urban gentrification | The attraction of educated, mobile, middle-class professionals, and IT workers results in the production of highly gentrified neighborhoods and leisure/entertainment provision, thereby excluding traditional communities and poorer residents.eco-gentrification. | (Cucca, no date a; Florida, 2002; Hollands, 2008; Raven <i>et al.</i> , 2019a) (Cucca, no date b; Dooling, 2016; Beretta, 2018; Lytras and Visvizi, 2018; Pérez-delHoyo <i>et al.</i> , 2019a; Raven <i>et al.</i> , 2019b; Bina, Inch and Pereira, 2020) |
| Lack of smart city projects value - abandoned projects | The difficulty of proving the value of smart city projects and interventions, and identifying the causal effects on targeted city outcomes. Difficulties with attributing causality to smart city activities even when the baseline measures reveal progress | (Pérez-delHoyo <i>et al.</i> , 2019b; Benfeldt, Persson and Madsen, 2020), (Söderholm, 2008) |
| INADEQUATE ORGANIZATIONAL STRUCTURE & PROCESSES | | |
| Lack of communication strategy | ICT-based applications can be used to raise the public engagement in public debates about societal needs. | (Berger, Hertzum and Schreiber, 2016; Viale Pereira <i>et al.</i> , 2017; Richard and David, 2018; Molinillo <i>et al.</i> , 2019; Brous, Janssen and Herder, 2020a; Johnson, Robinson and Philpot, 2020, Berntzen and Johannessen, 2016) |
| IoT asset management difficulties | Effective and efficient management of public utility infrastructure networks such as electricity networks and transportation networks is crucial to the functioning, and security of society. The increasing rate of change driven by disruptive technologies results in challenges of adoption. | (Brous, Janssen and Herder, 2020a) |
| Unclear responsibilities toward data management | The wrong assumption of administrators'' that only jobs titled "Data" are responsible for adequate data use | (Blackstock and Lea, 2012; Qian, 2012; Stephan, 2013; Brous, Janssen and Herder, 2020a) |
| Complicated collaboration between | Administrators tend to take actions that protect their interests at the expense of achieving greater joint outcomes | (Viale Pereira <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020) |

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| functions on data governance | | |
| New organizational forms and processes | The adoption of disruptive technologies demands data management and governance that force local government to establish new organizational forms and processes. This also often means changes in the organization as people are asked to perform other tasks in changing social and cultural environments and often in changing organizational structures. | (Speed and Shingleton, 2012; Yazici, 2014; Thompson, Ravindran and Nicosia, 2015; Brous <i>et al.</i> , 2017; Gupta, Panagiotopoulos and Bowen, 2020) |
| Need for new roles | Data management, versioning, labeling, ensuring privacy, and confidentiality call for new roles in local government. | (Gupta, Panagiotopoulos and Bowen, 2020) |
| Need for new teams | A new dedicated team was required to manage data and ensure that contractors delivered data as required. | (Brous, Janssen and Herder, 2020a) |
| Lack of data governance framework | Lack of procedures and processes for data management result in ad-hoc handling data resulting in privacy breaches | (Thompson, Ravindran and Nicosia, 2015; Viale Pereira <i>et al.</i> , 2017; Ahad <i>et al.</i> , 2020a; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020; Janssen <i>et al.</i> , 2020), (Brous, Janssen and Vilminko-Heikkinen, 2016) |
| Lack of interdepartmental synchronization | Various departments and agencies adopt various transformation strategies resulting in the use of diverse applications, platforms, software, and databases. | (Mullon and Ngoepe, 2019; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020) |
| New organizational structure to mitigate unknown risks | IoT may remove the human element out of the process of service delivery and increase unexpected risks such as social reluctance (vandalism, protests, etc). Such unexpected risks need to be managed by a specialized role, or department. | (Scarfo, 2014; Sugiyama <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Brous, Janssen and Herder, 2020a; Gupta, Panagiotopoulos and Bowen, 2020; Wimmer <i>et al.</i> , 2020) |
| Understanding the overall goal of technology adoption | Inter-departmental teams are aware of the goals behind disruptive technology adoption and are aware of the consequences of their activities on the processes in the organization. | (Mitropoulos and Tatum, 1999; Skogstad and le Einarsen, 1999; Damanpour and Schneider, 2006) |

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| Incremental changes to business processes | Significant changes to business processes within the organization although automating business processes remains challenging | (Mihailovic, 2017; Brous, Janssen and Herder, 2020a), (Janssen <i>et al.</i> , 2019) |
| Lack of focus on the cultural dimension | Lack of attention to the cultural dimension of asset management through IoT causes the results are not acknowledged by the organization, success is not rewarded and improvement behaviors do not become embedded in practice. | (Solomons and Spross, 2011) |
| Need for evaluation measures | Procedures and extra security measures were required due to the need to prove the offense. | (Brous, Janssen and Herder, 2020a) |
| Lack of organizational maturity | A mature set of mechanisms is required to publish and share things as well as ensure that they are findable and accessible | (Blackstock and Lea, 2012; Qian, 2012; Brous, Janssen and Herder, 2020a) |
| Wrong responsibility | Shared roles and joint operations performed among departments and organizations may dilute responsibilities. | (Janssen <i>et al.</i> , 2020) |
| Fragmentation of e-government activities | E-government programs have not been directed and managed in a collaborative manner which leads to a lack of accountability and responsibility due to the overlapping roles between government departments. | (Mullon and Ngoepe, 2019) |
| UNDERMINING INSTITUTIONAL POWER AND REPUTATION | | |
| Delusion of democratization | Digital democracy and online participation involve a small and unrepresentative number of citizens for relatively marginal and predefined issues. | (Haklay, 2015; Cardullo, Kitchin and Di Felicianantonio, 2018; Artyushina, 2020; Davies and Procter, 2020; Pereira <i>et al.</i> , 2020) |
| Inquiry of government power | In the digital space, international rules of engagement and the enforcement powers of national authorities must be clarified and jurisdictional boundaries (re)drawn. Missing is the definition and realization of new ICT-enabled governance models, where the balance of power and the roles and responsibilities of governments, societal actors, and the | (Misuraca, Broster and Centeno, no date; Janowski, 2015; Pereira <i>et al.</i> , 2017; Viale Pereira <i>et al.</i> , 2017; Leitner and Stiefmueller, 2019; Pérez-delHoyo <i>et al.</i> , 2019a; Radu, 2020) |

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| | population will have to adapt to these challenging new possibilities | |
| Hollowing out' of the public sector | Hollowing out' of the public sector, loss of democratic control, decreased sensitivity to political/social context | (Misuraca, Broster and Centeno, no date; Pereira <i>et al.</i> , 2017; Chamoso <i>et al.</i> , 2018; Lytras and Visvizi, 2018) |
| Innovation and system integration | Innovation and system integration is still considered a challenge because most of the technicians used to work with individual systems. Governance and leadership need a consensus in creation. | (Viale Pereira <i>et al.</i> , 2017; Pieroni <i>et al.</i> , 2018; Gupta, Panagiotopoulos and Bowen, 2020) |
| Need for strategy and policymaking change | The impact of disruptive technologies on processes and transparency of public organization result in adopting new strategies and modes of policymaking in the city | (Brous, Janssen and Herder, 2020a) |
| LOW DATA SHARING, DISCOVERABILITY, AND INTEROPERABILITY | | |
| Lack of systems integration and automatization | Susceptibility to error is a consequence of the lack of systems integration and automatization | (Viale Pereira <i>et al.</i> , 2017; Brous, Janssen and Herder, 2020a) |
| Weak control real-time and time-evolving data | Difficulties with creating a unified understanding of data semantics, and extract new knowledge based on specific cycle data and real-time data | (Al Nuaimi <i>et al.</i> , 2015; Viale Pereira <i>et al.</i> , 2017) |
| Data access policies inconsistency | Need for a framework for evaluation of the regulation of the distributed data, which needs to be accessible from the owners independently by the organization or the country where the data are collected. The data owners must be able to continuously access the data, or delegate the access rights to a third party in case of specific conditions/ problems. Technically, different users should be able to specify policy rules and those are not affected by when resources or subjects change their temporal, spatial, or status conditions | (Zuiderwijk and Janssen, 2014; Benfeldt, Persson and Madsen, 2020) |

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| Risk of misinterpretation and misuse of data | Very complex data were not made available to the public, because the risk of misinterpretation and misuse was high for these datasets | (Zuiderwijk and Janssen, 2014; Ubaldi, Ooijen and Welby, 2019) |
| Wasting resources to publish invaluable data | Many open data policies focus on the release of data without considering the potential use and value of these datasets. In some organizations, considerable resources are wasted on releasing data that are not relevant, whereas potential interesting datasets are not released | (Zuiderwijk and Janssen, 2014; Ahad <i>et al.</i> , 2020a) |
| Published data bias | Organizations only publish those data which are not sensitive, not very complex, or cannot harm. More sensitive data are kept hidden in the organizations to avoid reputation damage to the organization. This means that only certain types of data are made available to the public, and these data may favor certain arguments | (Zuiderwijk and Janssen, 2014) |
| Unpredictable purposes of published data use | Trust in the government might decrease by opening datasets which have poor quality or datasets that can be used to support other decisions than the decisions made by the government | (Zuiderwijk and Janssen, 2014) |
| Lack of interoperability | The interoperability of systems is seen as the main barrier for the centers, especially the need for personalized solutions that address the reality and specificities of a city | (Shadbolt <i>et al.</i> , 2012; Viale Pereira <i>et al.</i> , 2017; Brous, Janssen and Herder, 2020a; Wimmer <i>et al.</i> , 2020) |
| Missing control of data over its entire life-cycle | The mismatch between the organizational structure and data usage causes data silos, duplication, unclear responsibilities, and missing control of data | (Viale Pereira <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Janssen <i>et al.</i> , 2020) |
| Heterogeneity of data consumers | Consumers of data are often also heterogeneous and different applications might employ different methods of data processing | (Brous <i>et al.</i> , 2017; Brous, Janssen and Herder, 2020a) |
| Lack of data governance framework | Data openness aspect places organizations at risk due to data privacy and data security issues, introducing the need for | (Brous and Janssen, 2015; Brous <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Brous, Janssen and Herder, 2020a) |

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| | specific policies and legal data governance framework and defined data governance structures and processes | |
| LOW DATA AVAILABILITY, QUALITY AND RELEVANCE | | |
| Blurring requirements | Different open data users may have different requirements for different dimensions, while currently, they are usually not aware of what dimension scores for certain datasets can be. Data quality can be high on one dimension, but low on another dimension. For example, information can be complete, but not actual any more | (Gil-Garcia, Helbig and Ojo, 2014; Zuiderwijk and Janssen, 2014; Ojo and Adebayo, 2017) |
| Data resource inconsistency | Multiple sources and various types of sensors challenge the physical and logical infrastructures to store, access and manage data. The effective data documentation, codebooks, and data framework for efficiently storing and managing massive data, quickly and concurrently read and write these data, and realize high scalability and high availability is necessary to develop. | (Blackstock and Lea, 2012; Stephan, 2013; Al Nuaimi <i>et al.</i> , 2015; Ahad <i>et al.</i> , 2020a; Gupta, Panagiotopoulos and Bowen, 2020) |
| Data formats inconsistency | Heterogeneous data formats, multiple and unstructured data formats need for unified data format for a complete and true reflection of reality | (John Carlo Bertot, 2013; Tene and Polonetsky, 2013; Khan, Uddin and Gupta, 2014; Dias <i>et al.</i> , 2019; Ahad <i>et al.</i> , 2020a) |
| Data structure inconsistency | The absence of a universal way to retrieve and transform the data automatically and universally into a unified data source for useful analysis. Data suffers from a lack of structure and consequently consistency, heterogeneity, and disparity. This challenge may also extend to the outputs of analyzing existing data (given the possibility of errors) and reporting the results for use by others, who may not be aware of such issues | (Al Nuaimi <i>et al.</i> , 2015; Ojo and Adebayo, 2017; Brous, Janssen and Herder, 2020a; Curry <i>et al.</i> , 2020) |
| Data timeliness | Governmental organizations that they work for can publish data only after the embargo period has been expired, which reduces the value of the data or depreciates altogether | (Zuiderwijk and Janssen, 2014) |

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| Lack of data quality framework | Trust in the system and the quality of data needs to be systematic and embedded in legal frameworks | (Brous, Janssen and Herder, 2020a) |
| LACK OF HUMAN CAPACITIES | | |
| Lay-offs of civil servants | Internal process optimization can generate social tensions if it leads to significant lay-offs within the public sector | (Jin <i>et al.</i> , 2014; David and McNutt, 2019; Raveendranathan, 2019; Sagara and Das, 2019; Stephens, Khalifa Al Nahyan and Schroeder, 2019; Ahad <i>et al.</i> , 2020a; Kumar <i>et al.</i> , 2020; Nag and De, 2020; Wimmer <i>et al.</i> , 2020) |
| Preparation of civil servants | The long-term evolution and a form of precarisation of employment among the public officers. | (Bansal, Kockelman and Singh, 2016; Degryse, 2016; Schiek and Gideon, 2018; Brunetti <i>et al.</i> , 2020; Plepys and Singh, 2017) |
| The low perceived value of data governance | Actors in a collective tend to ascribe different meanings to the purpose or outcome of the collective action on data governance | (Viale Pereira <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020) |
| Weak fostering capabilities for governing data | Quality of good produced depends on the sustained contribution of (heterogeneous) resources by participants | (Viale Pereira <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020) |
| Low research capabilities | Decision-making on the implementation of disruptive technology in the city calls for pre-operational research on potential costs and benefits of their deployment. | (Brous, Janssen and Herder, 2020a; Gupta, Panagiotopoulos and Bowen, 2020) |
| A decision on outsourcing of data-driven activity | Need to decide on the extent of the outsourced activities, budget, and legal context | (Brous, Janssen and Herder, 2020a) |
| Difficulties in reinvention emerging challenges into needs | Using big data allows cities are forcing to reinterpret their problems as needs, especially based on the fact that decision-making is increasingly data-driven in these organizations | (Okwechime, Duncan and Edgar, 2017; Gupta, Panagiotopoulos and Bowen, 2020) |
| Lack of highly specialized digital skills | Incorporating technology into day-to-day work operations requires diversified digital skills. Digital management became a core skill for public servants | (Viale Pereira <i>et al.</i> , 2017; Ahad <i>et al.</i> , 2020a; Brous, Janssen and Herder, 2020b) |

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| Lack of knowledge and risk awareness | City managers lack knowledge of disruptive technologies resulting in low awareness risk in deploying them into the smart city ecosystem. | (Viale Pereira <i>et al.</i> , 2017; Brous, Janssen and Herder, 2020a) |
| Limited digital leadership skills | Requirements new style of leadership to design interventions on trust in data-driven decision making, adoption of a new work style, and to secure visionary and effective leadership for a future way of working that is not overly constrained by experiences of the past | (Speed and Shingleton, 2012; Yazici, 2014; Van Ooijen, Ubaldi and Welby, 2019) |
| Limited training and education options | Scarcity of possible training options | (Ahad <i>et al.</i> , 2020a) |
| Organizational resistance and reticence to adopt new technologies | Reluctance to change or to learn new technologies is the cultural challenge that must be overcome and explain the public value of ongoing innovations for all participants in the transformation | (Cresswell, Burke and Luna-reyes, 2012; Speed and Shingleton, 2012; Yazici, 2014; Ahad <i>et al.</i> , 2020a; Benfeldt, Persson and Madsen, 2020) |
| The narrowness of capabilities in handling data | Actors are constrained by a lack of skills or competencies in handling data as a resource | (Mullon and Ngoepe, 2019; Benfeldt, Persson and Madsen, 2020) |
| Duplication of function and effort | Problems with the consolidation of skill, favouring interoperability and avoidance of costly duplication | (Mullon and Ngoepe, 2019) |
| Openness for training on emerging technologies | Deep understanding of the process of data-driven decision-making leads to the necessity of openness for and adequate training on machine learning | (Zuiderwijk and Janssen, 2014; Brous, Janssen and Herder, 2020a) |
| LACK OF TECHNICAL CAPACITIES | | |
| Constraints in the scalability of smart city applications and software | The rapid growth of the city's population size demand for dealing with the large volume of data | (Al Nuaimi <i>et al.</i> , 2015; Schleicher <i>et al.</i> , 2016; Viale Pereira <i>et al.</i> , 2017; Zyrianoff <i>et al.</i> , 2018; de M. Del Esposte <i>et al.</i> , 2019) |

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| Limitations of IT infrastructure capabilities | The infrastructure that handles end-to-end data access control from the owner reaching from the sensor network | (Thiesse <i>et al.</i> , 2007; Prasad <i>et al.</i> , 2011; Hummen <i>et al.</i> , 2012; Yazici, 2014; Kranenburg <i>et al.</i> , 2014; Scarfo, 2014; Brous and Janssen, 2015; Brous <i>et al.</i> , 2017; Guo <i>et al.</i> , 2017; Ahad <i>et al.</i> , 2020b; Brous, Janssen and Herder, 2020a) |
| The continuous change of IT infrastructure | Changes occurring in staff and organizational processes can in turn lead to further changes to the IT infrastructure as staff become more aware of the possibilities of Big Data and as new requirements become available. | (Brous, Janssen and Herder, 2020a) |
| LACK OF FINANCIAL CAPACITIES | | |
| Budget volatility | High implementation costs of disruptive technologies force administrators to intensively work on city budgeting, thus increasing employee stress | (Al Nuaimi <i>et al.</i> , 2015; Brous, Janssen and Herder, 2020a) |
| Underestimating costs | The cost of implementing emerging technology may be higher than expected due to the misunderstanding in IT projects, software price estimated in the operation phase. | (Reyes, Li and Visich, 2012; Fan, 2014; Nam and Pardo, 2014; Yazici, 2014; Al Nuaimi <i>et al.</i> , 2015; Brous and Janssen, 2015; Brous <i>et al.</i> , 2017; Viale Pereira <i>et al.</i> , 2017; Ahad <i>et al.</i> , 2020a; Brous, Janssen and Herder, 2020a, Fan, 2014, Tao <i>et al.</i> , 2020) |
| Reduced ROI | Calculating return on investment and payback period | (Reyes, Li and Visich, 2012; Brous and Janssen, 2015; Brous <i>et al.</i> , 2017) |
| Investment in data analytical tools | The data analytical tools to ensure fair and evidence-based decision making usually are too proving to be too expensive. Also, tailored tools require additional costs for training | (Al Nuaimi <i>et al.</i> , 2015; Van Ooijen, Ubaldi and Welby, 2019; Ahad <i>et al.</i> , 2020a) |
| SECURITY AND PRIVACY BREACHES | | |
| Data trustworthiness | Low data quality and loss of ownership may lead to data trustworthiness among all stakeholders | (Brous <i>et al.</i> , 2017) |
| The threat of civil, criminal, and administrative procedures | Data privacy disclosure may lead to potential lawsuits from data owners | (Brous, Janssen and Herder, 2020a) |

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| Potential lost production | Data security breaches and leaks can lead to potential lost production | (Brous, Janssen and Herder, 2020a) |
| The potential loss of intellectual property | Data security breaches and leaks can lead to potential loss of intellectual property | (Brous, Janssen and Herder, 2020a) |
| Over-linkage | Lack of sufficient legal frameworks mean that organizations are often exposed to either over-linkage leading to security or privacy issues, or take unnecessary steps to prevent linkage, reducing the level of benefits | (Brous, Janssen and Herder, 2020a) |
| NEGATIVE ETHICAL IMPACT / UNETHICAL USE | | |
| Ethical impact | The disruptive technologies use may cause ethical issues concerning privacy, datafication, dataveillance, and geosurveillance, and data use such as social sorting and anticipatory governance, inclusivity, trust, transparency, alignment of values. | (Parsons, 2004; Kitchin, 2016; Shahrokni and Solacolu, 2016; Allam and Newman, 2018; Lytras and Visvizi, 2018; Schindler and Marvin, 2018; Lim and Taeihagh, 2019; Nam <i>et al.</i> , 2019; Ronzhyn, Spitzer and Wimmer, 2019, Allam, 2018) |
| Personal harm | Co-proximity and co-movement with others can be used to infer political, social, and/or religious affiliation, potentially revealing membership of particular groups. This issue is used through predictive policing and anticipatory governance, where the profiling of both people and places can reinforce or create stigma and harm. | (Hummen <i>et al.</i> , 2012; Losavio <i>et al.</i> , 2018; Pelton <i>et al.</i> , 2019; Ronzhyn, Spitzer and Wimmer, 2019; Brous, Janssen and Herder, 2020a; Cugurullo, 2020) |
| Anonymization and re-identification | The amount and availability of data increases, the ability to cross-reference, correlate, and de-anonymize or re-sensitize datasets also increases. This leads to re-identification attacks that infringe the privacy of individuals in those datasets and fosters mistrust in city governments and technology vendors. | (Braun <i>et al.</i> , 2018; Sebastian, Sivagurunathan and Muthu Ganeshan, 2018; Potoczny-Jones, Kenneally and Ruffing, 2019; Löfgren and Webster, 2020) |
| LACK OF LEGITIMACY AND PUBLIC TRUST | | |
| Reputational damage | Data security breaches and leaks can lead to reputational damage | (Brous, Janssen and Herder, 2020a) |

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| Reduction of benefits | Lack of trust in IoT means that implemented systems are often not fully exploited resulting in a reduction of benefits. | (Brous, Janssen and Herder, 2020a) |
| Changes to laws | Awareness of data privacy and its breaching consequences may result in the necessity of legal adjustment | (Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020) |
| Unclear responsibility and accountability | Often it is unclear if the data owner or the user can be held accountable for the wrongful use and interpretation of data or low data quality | (Zuiderwijk and Janssen, 2014) |
| Lack of data ownership regulations | Since local governments use private sector suppliers, lack of data ownership regulations is blocking smooth vendor change | (Hossain and Dwivedi, 2014) |
| Uncontrolled use of social media | Using social media may lead to the overrepresentation Of a small group of users generating a large amount of data | (Hogan, 2010; Noulas, 2011; Viale Pereira <i>et al.</i> , 2017; Xu, 2018; Rehman <i>et al.</i> , 2020; Yuan <i>et al.</i> , 2020) |
| Misleading administrative decisions | Low data quality in terms of completeness, availability, and integrity may result in misleading administrative decisions leading to undesired impact or negative consequences for citizens | (Al Nuaimi <i>et al.</i> , 2015; Ubaldi, Ooijen and Welby, 2019, Wahyudi, Pekkola and Janssen, 2018) |
| Decreased transparency | The data-driven approach results in more opacity and undermines government transparency as well as the opening-up the policymaking process to public scrutiny | (Lammerant and Hert, 2016) |
| Privacy breach: datafication, dataveillance, geosurveillance | As the consequence monitoring of location is pervasive, continuous, automatic, and relatively cheap and it is relatively easy to construct travel profiles and histories, that can lead to the privacy breach. | (Kitchin, 2016; Losavio <i>et al.</i> , 2018; Badii <i>et al.</i> , 2019; Kitchin and Dodge, 2019; Tierney, 2019; Lindgren, 2020) |
| LACK OF POLICIES & GUIDELINES | | |
| Lack of policies and implementation guidelines | There are several lessons we have learned for the government. First, although hard-to-link formats are a problem, the regulatory setting of reusability is crucial: data needs an open license to begin to count as open data. Data managers don't | (Shadbolt <i>et al.</i> , 2012) |

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| | have the authority to determine release modes, and policymakers need to understand that licensing restrictions are the biggest obstacle to OGD. | |
| Increase of administrative burden | Initiation of new data management activities and ensuring data security cause an increasing administrative burden | (Viale Pereira <i>et al.</i> , 2017; Benfeldt, Persson and Madsen, 2020; Janssen <i>et al.</i> , 2020) |
| Integration of investments into the comprehensive program of change | Management of transformation processes calls for the assessment of outcomes and the control for objectives, as well as integrating different principles such as viability, accountability, and transparency. | (Ahad <i>et al.</i> , 2020a) |
| New communication patterns | Local government needs to establish new communication streams to address the public value to all citizens and stakeholders having in mind to counteraction to digital divide | (Brous, Janssen and Herder, 2020a) |

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