Supplemental Material 2.

Catalog of unintended consequences associated with the Smart city Governance using disruptive technologies

UNINTENDED CONSEQUENCE	DESCRIPTION	REFERENCES
SOCIAL AND ECONOMIC		
Work loss	Various workgroups are forced to change their occupation due to technological development, and automatization of activities.	(Leipziger *et al.*, 2016; King, Hammond and Harrington, 2017; Sugiyama *et al.*, 2017; Pereira *et al.*, 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 *et al.*, 2020; Cairney and Speak, 2000)
Redefining human resources	The improvement of urban systems requires specialists with appropriate qualifications.	(Avdeeva *et al.*, no date; Thite, 2011; Yigitcanlar, 2015; Allam and Newman, 2018; Patnaik and Bhowmick, 2019; Wimmer *et al.*, 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 *et al.*, 2018; Masucci, Pearsall and Wiig, 2020; Wimmer *et al.*, 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 *et al.*, 2017; Joss, Cook and Dayot, 2017; Schuelke-Leech, 2018; Ylipulli and Luusua, 2019; Spicer, Goodman and Olmstead, 2019; Ahad *et al.*, 2020a; Bleja *et al.*, 2020; Wimmer *et al.*, 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 *et al.*, 2017; Pereira *et al.*, 2018; Ronzhyn, Spitzer and Wimmer, 2019; Kumar *et al.*, 2020)

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 *et al.*, 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 *et al.*, 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 *et al.*, 2019a) (Cucca, no date b; Dooling, 2016; Beretta, 2018; Lytras and Visvizi, 2018; Pérez-delHoyo *et al.*, 2019a; Raven *et al.*, 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 *et al.*, 2019b; Benfeldt, Persson and Madsen, 2020), (Söderholm, 2008)
ORGANIZATION STRUCTURES AND 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 *et al.*, 2017; Richard and David, 2018; Molinillo *et al.*, 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 *et al.*, 2017; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020)

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 *et al.*, 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 *et al.*, 2017; Ahad *et al.*, 2020a; Benfeldt, Persson and Madsen, 2020; Gupta, Panagiotopoulos and Bowen, 2020; Janssen *et al.*, 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 *et al.*, 2017; Benfeldt, Persson and Madsen, 2020; Brous, Janssen and Herder, 2020a; Gupta, Panagiotopoulos and Bowen, 2020; Wimmer *et al.*, 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)
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 *et al.*, 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 *et al.*, 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)
PUBLIC SECTOR		
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 Feliciantonio, 2018; Artyushina, 2020; Davies and Procter, 2020; Pereira *et al.*, 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 population will have to adapt to these challenging new possibilities	(Misuraca, Broster and Centeno, no date; Janowski, 2015; Pereira *et al.*, 2017; Viale Pereira *et al.*, 2017; Leitner and Stiefmueller, 2019; Pérez-delHoyo *et al.*, 2019a; Radu, 2020)
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 *et al.*, 2017; Chamoso *et al.*, 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 *et al.*, 2017; Pieroni *et al.*, 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)
DATA		
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 *et al.*, 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 *et al.*, 2015; Viale Pereira *et al.*, 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)
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	(Zuiderwijk and Janssen, 2014; Ahad *et al.*, 2020a)

	releasing data that are not relevant, whereas potential interesting datasets are not released	
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 *et al.*, 2012; Viale Pereira *et al.*, 2017; Brous, Janssen and Herder, 2020a; Wimmer *et al.*, 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 *et al.*, 2017; Benfeldt, Persson and Madsen, 2020; Janssen *et al.*, 2020)
Heterogeneity of data consumers	Consumers of data are often also heterogeneous and different applications might employ different methods of data processing	(Brous *et al.*, 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 specific policies and legal data governance framework and defined data governance structures and processes	(Brous and Janssen, 2015; Brous *et al.*, 2017; Benfeldt, Persson and Madsen, 2020; Brous, Janssen and Herder, 2020a)
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	(Gil-Garcia, Helbig and Ojo, 2014; Zuiderwijk and Janssen, 2014; Ojo and Adebayo, 2017)

	dimension. For example, information can be complete, but not actual any more	
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 *et al.*, 2015; Ahad *et al.*, 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 *et al.*, 2019; Ahad *et al.*, 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 analysisıo 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 *et al.*, 2015; Ojo and Adebayo, 2017; Brous, Janssen and Herder, 2020a; Curry *et al.*, 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)
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)
CAPACITIES		
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 *et al.*, 2014; David and McNutt, 2019; Raveendranathan, 2019; Sagara and Das, 2019; Stephens, Khalifa Al Nahyan and Schroeder, 2019; Ahad *et al.*, 2020a; Kumar *et al.*, 2020; Nag and De, 2020; Wimmer *et al.*, 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 *et al.*, 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 *et al.*, 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 *et al.*, 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 *et al.*, 2017; Ahad *et al.*, 2020a; Brous, Janssen and Herder, 2020b)
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 *et al.*, 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 *et al.*, 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 *et al.*, 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 *et al.*, 2015; Schleicher *et al.*, 2016; Viale Pereira *et al.*, 2017; Zyrianoff *et al.*, 2018; de M. Del Esposte *et al.*, 2019)
Limitations of IT infrastructure capabilities	The infrastructure that handles end-to-end data access control from the owner reaching from the sensor network	(Thiesse *et al.*, 2007; Prasad *et al.*, 2011; Hummen *et al.*, 2012; Yazici, 2014; Kranenburg *et al.*, 2014; Scarfo, 2014; Brous and Janssen, 2015; Brous *et al.*, 2017; Guo *et al.*, 2017; Ahad *et al.*, 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 *et al.*, 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 *et al.*, 2015; Brous and Janssen, 2015; Brous *et al.*, 2017; Viale Pereira *et al.*, 2017; Ahad *et al.*, 2020a; Brous, Janssen and Herder, 2020a, Fan, 2014, Tao *et al.*, 2020)
Reduced ROI	Calculating return on investment and payback period	(Reyes, Li and Visich, 2012; Brous and Janssen, 2015; Brous *et al.*, 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 *et al.*, 2015; Van Ooijen, Ubaldi and Welby, 2019; Ahad *et al.*, 2020a)
SECURITY AND TRUST		
SECURITY AND PRIVACY BREACHES		
Data trustworthiness	Low data quality and loss of ownership may lead to data trustworthiness among all stakeholders	(Brous *et al.*, 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)
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)
ETHICAL IMPACT		

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 *et al.*, 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 *et al.*, 2012; Losavio *et al.*, 2018; Pelton *et al.*, 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 *et al.*, 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)
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 *et al.*, 2017; Xu, 2018; Rehman *et al.*, 2020; Yuan *et al.*, 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 *et al.*, 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 *et al.*, 2018; Badii *et al.*, 2019; Kitchin and Dodge, 2019; Tierney, 2019; Lindgren, 2020)
POLICIES		
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 have the authority to determine release modes, and policymakers need to understand that licensing restrictions are the biggest obstacle to OGD.	(Shadbolt *et al.*, 2012)
Increase of administrative burden	Initiation of new data management activities and ensuring data security cause an increasing administrative burden	(Viale Pereira *et al.*, 2017; Benfeldt, Persson and Madsen, 2020; Janssen *et al.*, 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 *et al.*, 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)

References:

Ahad, M. A. *et al.* (2020a) 'Enabling technologies and sustainable smart cities', *Sustainable Cities and Society*. Elsevier, 61(May), p. 102301. doi: 10.1016/j.scs.2020.102301.

Ahad, M. A. *et al.* (2020b) 'Enabling technologies and sustainable smart cities', *Sustainable Cities and Society*. Elsevier Ltd, 61. doi: 10.1016/j.scs.2020.102301.

Aina, Y. A. (2017) 'Achieving smart sustainable cities with GeoICT support: The Saudi evolving smart cities', *Cities*. Elsevier Ltd, 71, pp. 49–58. doi: 10.1016/j.cities.2017.07.007.

Allam, Z. (2018) *CONTEXTUALISING THE SMART CITY FOR SUSTAINABILITY AND INCLUSIVITY, New Design Ideas*.

Allam, Z. and Newman, P. (2018) 'Redefining the Smart City: Culture, Metabolism and Governance', *Smart Cities*. MDPI AG, 1(1), pp. 4–25. doi: 10.3390/smartcities1010002.

Artyushina, A. (2020) 'Is civic data governance the key to democratic smart cities? The role of the urban data trust in Sidewalk Toronto', *Telematics and Informatics*. Elsevier Ltd, 55, p. 101456. doi: 10.1016/j.tele.2020.101456.

Avdeeva, E. *et al.* (no date) 'Human resource development in the implementation of the concept of "smart cities"'. doi: 10.1051/e3sconf/2019.

Badii, C. *et al.* (2019) 'Privacy and security aspects on a smart city IoT platform', in *Proceedings - 2019 IEEE SmartWorld, Ubiquitous Intelligence and Computing, Advanced and Trusted Computing, Scalable Computing and Communications, Internet of People and Smart City Innovation, SmartWorld/UIC/ATC/SCALCOM/IOP/SCI 2019*. Institute of Electrical and Electronics Engineers Inc., pp. 1371–1376. doi: 10.1109/SmartWorld-UIC-ATC-SCALCOM-IOP-SCI.2019.00250.

Bannister, F. and Connolly, R. (2011) 'New problem for old? Defining e-governance', *Proceedings of the Annual Hawaii International Conference on System Sciences*, pp. 1–10. doi: 10.1109/HICSS.2011.317.

Bansal, P., Kockelman, K. M. and Singh, A. (2016) 'Assessing public opinions of and interest in new vehicle technologies: An Austin perspective', *Transportation Research Part C: Emerging Technologies*. Elsevier Ltd, 67, pp. 1–14. doi: 10.1016/j.trc.2016.01.019.

Bauer, J. M. (2018) 'The Internet and income inequality: Socio-economic challenges in a hyperconnected society', *Telecommunications Policy*. Elsevier Ltd, 42(4), pp. 333–343. doi: 10.1016/j.telpol.2017.05.009.

Benfeldt, O., Persson, J. S. and Madsen, S. (2020) 'Data Governance as a Collective Action Problem', *Information Systems Frontiers*. Springer, 22(2), pp. 299–313. doi: 10.1007/s10796-019-09923-z.

Beretta, I. (2018) 'The social effects of eco-innovations in Italian smart cities', *Cities*. Elsevier Ltd, 72, pp. 115–121. doi: 10.1016/j.cities.2017.07.010.

Berger, J. B., Hertzum, M. and Schreiber, T. (2016) 'Does local government staff perceive digital communication with citizens as improved service?', *Government Information Quarterly*. Elsevier Ltd, 33(2), pp. 258–269. doi: 10.1016/j.giq.2016.03.003.

Berntzen, L. and Johannessen, M. R. (2016) 'The Role of Citizens in "Smart Cities"', in *Management - international conference. At: Slovakia: Faculty of Management, University of Presov*, pp. 213–234. doi: 10.1016/b978-0-12-816816-5.00010-3.

Bina, O., Inch, A. and Pereira, L. (2020) 'Beyond techno-utopia and its discontents: On the role of utopianism and speculative fiction in shaping alternatives to the smart city imaginary', *Futures*. Elsevier Ltd, 115, p. 102475. doi: 10.1016/j.futures.2019.102475.

Blackstock, M. and Lea, R. (2012) 'IoT mashups with the WoTKit', in *Proceedings of 2012 International Conference on the Internet of Things, IOT 2012*, pp. 159–166. doi: 10.1109/IOT.2012.6402318.

Bleja, J. *et al.* (2020) 'Smart Cities for Everyone-Age and Gender as Potential Exclusion Factors', in *2020 IEEE European Technology and Engineering Management Summit, E-TEMS 2020*. Institute of Electrical and Electronics Engineers Inc. doi: 10.1109/E-TEMS46250.2020.9111741.

Braun, T. *et al.* (2018) 'Security and privacy challenges in smart cities', *Sustainable Cities and Society*. Elsevier Ltd, 39, pp. 499–507. doi: 10.1016/j.scs.2018.02.039.

Brous, P. *et al.* (2017) 'Factors influencing adoption of IoT for data-driven decision making in asset management organizations', in *IoTBDS 2017 - Proceedings of the 2nd International Conference on Internet of Things, Big Data and Security*. SciTePress, pp. 70–79. doi: 10.5220/0006296300700079.

Brous, P. and Janssen, M. (2015) 'A systematic review of impediments blocking internet of things adoption by Governments', in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Springer Verlag, pp. 81–94. doi: 10.1007/978-3-319-25013-7_7.
Brous, P., Janssen, M. and Herder, P. (2020a) 'The dual effects of the Internet of Things (IoT): A systematic review of the benefits and risks of IoT adoption by organizations', *International Journal of Information Management*. Elsevier Ltd. doi: 10.1016/j.ijinfomgt.2019.05.008.
Brous, P., Janssen, M. and Herder, P. (2020b) 'The dual effects of the Internet of Things (IoT): A systematic review of the benefits and risks of IoT adoption by organizations', *International Journal of Information Management*. Elsevier, 51(September 2018), p. 101952. doi: 10.1016/j.ijinfomgt.2019.05.008.
Brous, P., Janssen, M. and Vilminko-Heikkinen, R. (2016) 'Coordinating Decision-Making in Data Management Activities: A Systematic Review of Data Governance Principles', *In: Scholl H. et al. (eds) Electronic Government. EGOV 2016. Lecture Notes in Computer Science, vol 9820. Springer, Cham*. Available at: https://doi.org/10.1007/978-3-319-44421-5_9.
Brunetti, F. *et al.* (2020) 'Digital transformation challenges: strategies emerging from a multi-stakeholder approach', *TQM Journal*. Emerald Group Publishing Ltd., 32(4), pp. 697–724. doi: 10.1108/TQM-12-2019-0309.
Cairney, T. and Speak, G. (2000) 'Developing a'Smart City': Understanding Information Technology Capacity and Establishing an Agenda for Change'. Available at: http://trevorcairney.com/wp-content/uploads/2012/11/IT_Audit.pdf.
Cardullo, P., Kitchin, R. and Di Feliciantonio, C. (2018) 'Living labs and vacancy in the neoliberal city', *Cities*. Elsevier Ltd, 73, pp. 44–50. doi: 10.1016/j.cities.2017.10.008.
Chamoso, P. *et al.* (2018) 'Tendencies of Technologies and Platforms in Smart Cities: A State-of-the-Art Review', *Wireless Communications and Mobile Computing*. Hindawi Limited, 2018. doi: 10.1155/2018/3086854.
Chang, H. S. and Yang, H. M. (2010) 'Public acceptance of the Cyber Taipei initiative and cyber-government services', *Habitat International*. Elsevier Ltd, 34(2), pp. 210–218. doi: 10.1016/j.habitatint.2009.09.005.
Cresswell, A. M., Burke, G. B. and Luna-reyes, L. (2012) 'The Dynamics of Opening Government Data T HE D YNAMICS OF O PENING', p. 34. Available at: http://www.ctg.albany.edu/publications/reports/opendata.
Cucca, R. (no date a) 'Il Mulino-Rivisteweb The Unexpected Consequences of Sustainability. Green Cities Between Innovation and Ecogentrifi-cation'. doi: 10.2383/38269.
Cucca, R. (no date b) 'Il Mulino-Rivisteweb The Unexpected Consequences of Sustainability. Green Cities Between Innovation and Ecogentrifi-cation'. doi: 10.2383/38269.
Cugurullo, F. (2020) 'Urban Artificial Intelligence: From Automation to Autonomy in the Smart City', 2(July), pp. 1–14. doi: 10.3389/frsc.2020.00038.
Curry, E. *et al.* (2020) 'Catalog and Entity Management Service for Internet of Things-Based Smart Environments', in *Real-time Linked Dataspaces*. Springer International Publishing, pp. 89–103. doi: 10.1007/978-3-030-29665-0_6.
Damanpour, F. and Schneider, M. (2006) 'Phases of the adoption of innovation in organizations: Effects of environment, organization and top managers', *British Journal of Management*, 17(3), pp. 215–236. doi: 10.1111/j.1467-8551.2006.00498.x.
David and McNutt (2019) 'Building a Workforce for Smart City Governance: Challenges and Opportunities for the Planning and Administrative Professions', *Informatics*. MDPI Multidisciplinary Digital Publishing Institute, 6(4), p. 47. doi: 10.3390/informatics6040047.
Davies, J. and Procter, R. (2020) 'Online platforms of public participation -- a deliberative democracy or a delusion?' Available at: http://arxiv.org/abs/2009.14074 (Accessed: 23 October 2020).
Degryse, C. (2016) 'Digitalisation of the Economy and its Impact on Labour Markets', *SSRN Electronic Journal*. Elsevier BV. doi: 10.2139/ssrn.2730550.
Dias, P. *et al.* (2019) 'Planning and managing data for Smart Cities: An application profile for the UrbanSense project', in *2018 IEEE International Smart Cities Conference, ISC2 2018*. Institute of Electrical and Electronics Engineers Inc. doi: 10.1109/ISC2.2018.8656835.
Dooling, S. (2016) 'Ecological Gentrification: Re-negotiating Justice in the City', in *Ségrégation et justice spatiale*. Presses universitaires de Paris Ouest, pp. 167–183. doi: 10.4000/books.pupo.2142.
Fan, P. F. . W. L. L. . Z. S. Y. . & L. T. T. (2014) 'The research on the internet of things industry chain for barriers and solutions', (441).
Florida, R. (2002) *'The Rise of the Creative Class' by Richard Florida The Rise of the Creative Class Why cities without gays and rock bands are losing the economic*

development race.
Gil-Garcia, J. R., Helbig, N. and Ojo, A. (2014) 'Being smart: Emerging technologies and innovation in the public sector', *Government Information Quarterly*. Elsevier Inc., 31(S1), pp. I1–I8. doi: 10.1016/j.giq.2014.09.001.
Graham, S. (2002) 'Bridging Urban Digital Divides? Urban Polarisation and Information and Communications Technologies (ICTs)', *Urban Studies*. Sage PublicationsSage UK: London, England, 39(1), pp. 33–56. doi: 10.1080/00420980220099050.
Guo, H. *et al.* (2017) 'Big Earth Data : a new challenge and opportunity for Digital Earth ' s development Big Earth Data : a new challenge and opportunity for Digital Earth ' s'. Taylor & Francis, 8947. doi: 10.1080/17538947.2016.1264490.
Gupta, A., Panagiotopoulos, P. and Bowen, F. (2020) 'An orchestration approach to smart city data ecosystems', *Technological Forecasting and Social Change*. Elsevier Inc., 153. doi: 10.1016/j.techfore.2020.119929.
Haklay, M. (2015) 'Beyond quantification: a role for citizen science and community science in a smart city', *Presented at: Data and City Workshop, Maynooth University. (2015)* . Data and City Workshop.
Hogan, B. (2010) 'The Presentation of Self in the Age of Social Media: Distinguishing Performances and Exhibitions Online', *Bulletin of Science, Technology & Society*. SAGE Publications, 30(6), pp. 377–386. doi: 10.1177/0270467610385893.
Hollands, R. G. (2008) 'Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?', *City*, 12(3), pp. 303–320. doi: 10.1080/13604810802479126.
Hossain, M. A. and Dwivedi, Y. K. (2014) 'What improves citizens' privacy perceptions toward RFID technology? A cross-country investigation using mixed method approach', *International Journal of Information Management*. Elsevier Ltd, 34(6), pp. 711–719. doi: 10.1016/j.ijinfomgt.2014.07.002.
Hummen, R. *et al.* (2012) 'A Cloud design for user-controlled storage and processing of sensor data', in *CloudCom 2012 - Proceedings: 2012 4th IEEE International Conference on Cloud Computing Technology and Science*. IEEE Computer Society, pp. 232–240. doi: 10.1109/CloudCom.2012.6427523.
Janowski, T. (2015) 'Digital government evolution: From transformation to contextualization', *Government Information Quarterly*. Elsevier Inc., 32(3), pp. 221–236. doi: 10.1016/j.giq.2015.07.001.
Janse Van Rensburg, N., Matheri, A. N. and Meyer, J. (2019) *Bridging the Digital Divide in an African Smart City, 2019 IEEE International Smart Cities Conference (ISC2)*.
Janssen, M. *et al.* (2019) 'Challenges for adopting and implementing IoT in smart cities: An integrated MICMAC-ISM approach', *Internet Research*, 29(6), pp. 1589–1616. doi: 10.1108/INTR-06-2018-0252.
Janssen, M. *et al.* (2020) 'Data governance: Organizing data for trustworthy Artificial Intelligence', *Government Information Quarterly*. Elsevier Ltd, 37(3), p. 101493. doi: 10.1016/j.giq.2020.101493.
Jin, J. *et al.* (2014) 'An information framework for creating a smart city through internet of things', *IEEE Internet of Things Journal*. Institute of Electrical and Electronics Engineers Inc., 1(2), pp. 112–121. doi: 10.1109/JIOT.2013.2296516.
John Carlo Bertot, H. C. (2013) 'Big Data and e-Government: Issues, Policies, and Recommendations', in *The Proceedings of the 14th Annual International Conference on Digital Government Research*. Quebec City: ACM.
Johnson, P. A., Robinson, P. J. and Philpot, S. (2020) 'Type, tweet, tap, and pass: How smart city technology is creating a transactional citizen', *Government Information Quarterly*. Elsevier Ltd, 37(1), p. 101414. doi: 10.1016/j.giq.2019.101414.
Joss, S., Cook, M. and Dayot, Y. (2017) 'Smart Cities: Towards a New Citizenship Regime? A Discourse Analysis of the British Smart City Standard', *Journal of Urban Technology*. Routledge, 24(4), pp. 29–49. doi: 10.1080/10630732.2017.1336027.
Khan, M. A. U. D., Uddin, M. F. and Gupta, N. (2014) 'Seven V's of Big Data understanding Big Data to extract value', in *Proceedings of the 2014 Zone 1 Conference of the American Society for Engineering Education - 'Engineering Education: Industry Involvement and Interdisciplinary Trends', ASEE Zone 1 2014*. IEEE Computer Society. doi: 10.1109/ASEEZone1.2014.6820689.
King, B. A., Hammond, T. and Harrington, J. (2017) 'Disruptive Technology: Economic Consequences of Artificial Intelligence and the Robotics Revolution', *Journal of Strategic Innovation & Sustainability*, 12(2), pp. 53–67.
Kitchin, R. (2016) 'The ethics of smart cities and urban science', *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*.

Royal Society of London, 374(2083), p. 20160115. doi: 10.1098/rsta.2016.0115.
Kitchin, R. and Dodge, M. (2019) 'The (In)Security of Smart Cities: Vulnerabilities, Risks, Mitigation, and Prevention', *Journal of Urban Technology*. Routledge, 26(2), pp. 47–65. doi: 10.1080/10630732.2017.1408002.
Kranenburg, R. Van *et al.* (2014) 'Co-Creation as the Key to a Public, Thriving, Inclusive and Meaningful EU IoT', *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Springer Verlag, 8867, pp. 396–403. doi: 10.1007/978-3-319-13102-3_65.
Kumar, H. *et al.* (2020) 'Moving towards smart cities: Solutions that lead to the Smart City Transformation Framework', *Technological Forecasting and Social Change*. Elsevier Inc., 153, p. 119281. doi: 10.1016/j.techfore.2018.04.024.
Kummitha, R. K. R. and Crutzen, N. (2017) 'How do we understand smart cities? An evolutionary perspective', *Cities*. Elsevier Ltd, 67, pp. 43–52. doi: 10.1016/j.cities.2017.04.010.
Lammerant, H. and Hert, P. (2016) 'Predictive profiling and its legal limits: Effectiveness gone forever', *Amsterdam University Press/WRR*. Available at: https://research.tilburguniversity.edu/en/publications/predictive-profiling-and-its-legal-limits- effectiveness-gone-fore (accessed on 18 February 2019).
Laura Alcaide Muñoz, M. R. B. (2019) 'Demographic Profile of Citizens' Interest, Evaluation and Opinions of Local Government Apps in Smart Cities', in *18th International Conference on Electronic Government (EGOV), San Benedetto del Tronto, Italy*.
Leipziger, Danny *et al.* (2016) *Institute for International Economic Policy Working Paper Series Elliott School of International Affairs The George Washington University Disruptive Technologies and their Implications for Economic Policy: Some Preliminary Observations DISRUPTIVE TECHNOLOGIES AND THEIR IMPLICATIONS FOR ECONOMIC POLICY: SOME PRELIMINARY OBSERVATIONS*.
Leitner, C. and Stiefmueller, C. M. (2019) 'Disruptive technologies and the public sector: The changing dynamics of governance', in *Public Service Excellence in the 21st Century*. Springer Singapore, pp. 237–274. doi: 10.1007/978-981-13-3215-9_8.
Levenda, A. M. (2019) 'Thinking critically about smart city experimentation: entrepreneurialism and responsibilization in urban living labs', *Local Environment*. Routledge, 24(7), pp. 565–579. doi: 10.1080/13549839.2019.1598957.
Lim, H. S. M. and Taeihagh, A. (2019) 'Algorithmic decision-making in AVs: Understanding ethical and technical concerns for smart cities', *Sustainability (Switzerland)*. MDPI AG, 11(20). doi: 10.3390/su11205791.
Lindgren, P. (2020) 'Multi Business Model Innovation in a World of Smart Cities with Future Wireless Technologies', *Wireless Personal Communications*. Springer, 113(3), pp. 1423–1435. doi: 10.1007/s11277-020-07314-1.
Löfgren, K. and Webster, C. W. R. (2020) 'The value of Big Data in government: The case of "smart cities"', *Big Data & Society*. SAGE Publications Ltd, 7(1), p. 205395172091277. doi: 10.1177/2053951720912775.
Losavio, M. M. *et al.* (2018) 'The Internet of Things and the Smart City: Legal challenges with digital forensics, privacy, and security', *Security and Privacy*. Wiley, 1(3), p. e23. doi: 10.1002/spy2.23.
Lytras, M. and Visvizi, A. (2018) 'Who Uses Smart City Services and What to Make of It: Toward Interdisciplinary Smart Cities Research', *Sustainability*. MDPI AG, 10(6), p. 1998. doi: 10.3390/su10061998.
de M. Del Esposte, A. *et al.* (2019) 'Design and evaluation of a scalable smart city software platform with large-scale simulations', *Future Generation Computer Systems*. Elsevier B.V., 93, pp. 427–441. doi: 10.1016/j.future.2018.10.026.
Martin, C. (2014) 'Barriers to the open government data agenda: Taking a multi-level perspective', *Policy and Internet*, 6(3), pp. 217–240. doi: 10.1002/1944-2866.POI367.
Masucci, M., Pearsall, H. and Wiig, A. (2020) 'The Smart City Conundrum for Social Justice: Youth Perspectives on Digital Technologies and Urban Transformations', *Annals of the American Association of Geographers*. Taylor and Francis Ltd., 110(2), pp. 476–484. doi: 10.1080/24694452.2019.1617101.
Mihailovic, A. (2017) 'Liberalising Deployment of Internet of Things Devices and Services in Large Scale Environments', *Wireless Personal Communications*. Springer New York LLC, 92(1), pp. 33–49. doi: 10.1007/s11277-016-3837-0.
Misuraca, G., Broster, D. and Centeno, C. (no date) 'Digital Europe 2030: Designing scenarios for ICT in future governance and policy making', *Government Information Quarterly*, 29, pp. S121–S131. Available at:

https://www.academia.edu/17616994/Digital_Europe_2030_Designing_scenarios_for_ICT_in_future_governance_and_policy_making (Accessed: 24 October 2020).
Mitropoulos, P. and Tatum, C. B. (1999) 'Technology adoption decisions in construction organizations', *Journal of Construction Engineering and Management*, 125(5), pp. 330–338.
Molinillo, S. *et al.* (2019) 'Smart city communication via social media: Analysing residents' and visitors' engagement', *Cities*. Elsevier Ltd, 94, pp. 247–255. doi: 10.1016/j.cities.2019.06.003.
Mullon, P. A. and Ngoepe, M. (2019) 'An integrated framework to elevate information governance to a national level in South Africa', *Records Management Journal*. Emerald Group Publishing Ltd., pp. 103–116. doi: 10.1108/RMJ-09-2018-0030.
Nag, B. and De, D. (2020) 'The Indian Automobile Industry: Technology Enablers Preparing for the Future', in. Palgrave Macmillan, Cham, pp. 301–321. doi: 10.1007/978-3-030-18881-8_12.
Nam, K. *et al.* (2019) 'Blockchain technology for smart city and smart tourism: latest trends and challenges', *Asia Pacific Journal of Tourism Research*. Routledge, pp. 1–15. doi: 10.1080/10941665.2019.1585376.
Nam, T. and Pardo, T. A. (2011) 'Conceptualizing smart city with dimensions of technology, people, and institutions', in *ACM International Conference Proceeding Series*. New York, New York, USA: ACM Press, pp. 282–291. doi: 10.1145/2037556.2037602.
Nam, T. and Pardo, T. A. (2014) 'The changing face of a city government: A case study of Philly311', *Government Information Quarterly*. Elsevier Inc., 31(SUPPL.1), pp. S1–S9. doi: 10.1016/j.giq.2014.01.002.
Noulas, A. . S. S. . M. C. . P. M. (2011) 'An Empirical Study of Geographic User Activity Patterns in Foursquare: .', in *Proceedings of the Fifth International AAAI Conference on Weblogs and Social Media*. Available at: http://eds-1a-1ebscohost-1com-1000038n70286.han.bg.pg.edu.pl/eds/detail/detail?vid=4&sid=d2b0e785-d44f-4c7c-922b-339d8c8a62ac%40sdc-v-sessmgr02&bdata=Jmxhbmc9cGwmc2l0ZT1lZHMtbGl2ZQ%3D%3D#AN=edsbas.A4EACEF9&db=edsbas (Accessed: 4 September 2020).
Al Nuaimi, E. *et al.* (2015) 'Applications of big data to smart cities', *Journal of Internet Services and Applications*. Springer-Verlag London Ltd, 6(1), pp. 1–15. doi: 10.1186/s13174-015-0041-5.
Ojo, A. and Adebayo, S. (2017) 'Blockchain as a next generation government information infrastructure: A review of initiatives in D5 countries', in *Public Administration and Information Technology*. Springer, pp. 283–298. doi: 10.1007/978-3-319-63743-3_11.
Okwechime, E., Duncan, P. and Edgar, D. (2017) 'Big data and smart cities : a public sector organizational learning perspective', *Information Systems and e-Business Management*. Springer Berlin Heidelberg, (June). doi: 10.1007/s10257-017-0344-0.
Van Ooijen, C., Ubaldi, B. and Welby, B. (2019) 'A data-driven public sector: Enabling the strategic use of data for productive, inclusive and trustworthy governance', *OECD Working Papers on Public Governance*, 33. doi: 10.1787/09ab162c-en.
Parsons, W. (2004) 'Not Just Steering but Weaving: Relevant Knowledge and the Craft of Building Policy Capacity and Coherence', *Australian Journal of Public Administration*. John Wiley & Sons, Ltd, 63(1), pp. 43–57. doi: 10.1111/j.1467-8500.2004.00358.x.
Partridge, H. L. (2004) 'Developing a human perspective to the digital divide in the "smart city"', *Australian Library and Information Association Biennial Conference*.
Patnaik, J. and Bhowmick, B. (2019) 'Revisiting appropriate technology with changing socio-technical landscape in emerging countries', *Technology in Society*. Elsevier Ltd, 57, pp. 8–19. doi: 10.1016/j.techsoc.2018.11.004.
Pelton, J. N. *et al.* (2019) 'The Coming Age of the Smart City', in *Smart Cities of Today and Tomorrow*. Springer International Publishing, pp. 1–27. doi: 10.1007/978-3-319-95822-4_1.
Pereira, G. V. *et al.* (2017) 'Delivering public value through open government data initiatives in a Smart City context', *Information Systems Frontiers*. Springer New York LLC, 19(2), pp. 213–229. doi: 10.1007/s10796-016-9673-7.
Pereira, G. V. *et al.* (2018) 'The role of smart technologies to support citizen engagement and decision making: The SmartGov case', *International Journal of Electronic Government Research*, 14(4), pp. 1–17. doi: 10.4018/IJEGR.2018100101.
Pereira, G. V. *et al.* (2020) 'South american expert roundtable: Increasing adaptive governance capacity for coping with unintended side eects of digital transformation', *Sustainability (Switzerland)*. MDPI AG, 12(2). doi: 10.3390/su12020718.

Pérez-delHoyo, R. *et al.* (2019a) 'Unexpected consequences in the operation of urban environments', *Kybernetes*. Emerald Group Publishing Ltd., 48(2), pp. 253–264. doi: 10.1108/K-02-2018-0096.
Pérez-delHoyo, R. *et al.* (2019b) 'Unexpected consequences in the operation of urban environments', *Kybernetes*, 48(2), pp. 253–264. doi: 10.1108/K-02-2018-0096.
Picatoste, J. *et al.* (2018) 'Smart cities for wellbeing: youth employment and their skills on computers', *Journal of Science and Technology Policy Management*. Emerald Group Publishing Ltd., 9(2), pp. 227–241. doi: 10.1108/JSTPM-04-2017-0014.
Pieroni, A. *et al.* (2018) 'Smarter City: Smart energy grid based on Blockchain technology', *International Journal on Advanced Science, Engineering and Information Technology*. Insight Society, 8(1), pp. 298–306. doi: 10.18517/ijaseit.8.1.4954.
Pierson, K. and Thompson, F. (2016) 'How you buy affects what you get: Technology acquisition by state governments', *Government Information Quarterly*, 33(3), pp. 494–505. doi: 10.1016/j.giq.2016.06.003.
Plepys, A. and Singh, J. (2017) 'Evaluating the sustainability impacts of the sharing economy using input – output analysis', pp. 66–84.
Potoczny-Jones, I., Kenneally, E. and Ruffing, J. (2019) 'Encrypted dataset collaboration: Intelligent privacy for smart cities', in *Proceedings of the 2nd ACM/EIGSCC Symposium on Smart Cities and Communities, SCC 2019*. New York, NY, USA: Association for Computing Machinery, Inc, pp. 1–8. doi: 10.1145/3357492.3358630.
Prasad, K. H. *et al.* (2011) 'Data cleansing techniques for large enterprise datasets', in *Proceedings - 2011 Annual SRII Global Conference, SRII 2011*, pp. 135–144. doi: 10.1109/SRII.2011.26.
Qian, X. (2012) 'Security-enhanced Search Engine Design in Internet of Things', 18(9), pp. 1218–1235.
Radu, L.-D. (2020) 'Disruptive Technologies in Smart Cities: A Survey on Current Trends and Challenges', *Smart Cities*. MDPI AG, 3(3), pp. 1022–1038. doi: 10.3390/smartcities3030051.
Raveendranathan, K. C. (2019) 'Future directions: IoT, robotics and AI based applications', in *Modern Optimization Methods for Science, Engineering and Technology*. IOP Publishing. doi: 10.1088/978-0-7503-2404-5ch15.
Raven, R. *et al.* (2019a) 'Urban experimentation and institutional arrangements', *European Planning Studies*. Routledge, 27(2), pp. 258–281. doi: 10.1080/09654313.2017.1393047.
Raven, R. *et al.* (2019b) 'Urban experimentation and institutional arrangements', *European Planning Studies*. Routledge, 27(2), pp. 258–281. doi: 10.1080/09654313.2017.1393047.
Rehman, A. U. *et al.* (2020) 'A trustworthy siot aware mechanism as an enabler for citizen services in smart cities', *Electronics (Switzerland)*. MDPI AG, 9(6), pp. 1–19. doi: 10.3390/electronics9060918.
Reyes, P. M., Li, S. and Visich, J. K. (2012) 'Accessing antecedents and outcomes of RFID implementation in health care', *International Journal of Production Economics*. Elsevier, 136(1), pp. 137–150. doi: 10.1016/j.ijpe.2011.09.024.
Richard, E. and David, L. F. (2018) 'The future of citizen engagement in cities—The council of citizen engagement in sustainable urban strategies (ConCensus)', *Futures*. Elsevier Ltd, 101, pp. 80–91. doi: 10.1016/j.futures.2018.06.012.
Rizzo, F. and Deserti, A. (2014) 'Small scale collaborative services: The role of design in the development of the human smart city paradigm', in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. Springer Verlag, pp. 583–592. doi: 10.1007/978-3-319-07788-8_54.
Ronzhyn, A., Spitzer, V. and Wimmer, M. A. (2019) 'Scenario technique to elicit research and training needs in digital government employing disruptive technologies', *ACM International Conference Proceeding Series*, pp. 41–47. doi: 10.1145/3325112.3325231.
Sagara, H. and Das, K. (2019) 'Technological disruptions and the indian IT industry: Employment concerns and beyond', in *Digitalisation and Development: Issues for India and Beyond*. Springer Singapore, pp. 119–143. doi: 10.1007/978-981-13-9996-1_4.
Scarfo, A. (2014) 'Internet of things, the smart X enabler', in *Proceedings - 2014 International Conference on Intelligent Networking and Collaborative Systems, IEEE INCoS 2014*. Institute of Electrical and Electronics Engineers Inc., pp. 569–574. doi: 10.1109/INCoS.2014.98.
Schiek, D. and Gideon, A. (2018) 'Outsmarting the gig-economy through collective bargaining–EU competition law as a barrier to smart cities?', *International Review of*

Law, Computers and Technology. Routledge, 32(2–3), pp. 275–294. doi: 10.1080/13600869.2018.1457001.
Schindler, S. and Marvin, S. (2018) 'Constructing a universal logic of urban control?: International standards for city data, management, and interoperability', *City*. Routledge, pp. 298–307. doi: 10.1080/13604813.2018.1451021.
Schleicher, J. M. *et al.* (2016) 'Enabling a smart city application ecosystem: Requirements and architectural aspects', *IEEE Internet Computing*. Institute of Electrical and Electronics Engineers Inc., 20(2), pp. 58–65. doi: 10.1109/MIC.2016.39.
Schuelke-Leech, B. A. (2018) 'A model for understanding the orders of magnitude of disruptive technologies', *Technological Forecasting and Social Change*. Elsevier Inc., 129, pp. 261–274. doi: 10.1016/j.techfore.2017.09.033.
Schweitzer, L. A. and Afzalan, N. (2017) 'Four Reasons Why AICP Needs an Open Data Ethic', *Journal of the American Planning Association*. Routledge, 83(2), pp. 161–167. doi: 10.1080/01944363.2017.1290495.
Sebastian, A., Sivagurunathan, S. and Muthu Ganeshan, V. (2018) 'IoT Challenges in Data and Citizen-centric Smart City Governance', in. Springer, Cham, pp. 127–151. doi: 10.1007/978-3-319-76669-0_6.
Shadbolt, N. *et al.* (2012) *Linked Open Government Data: Lessons from Data.gov.uk*. Available at: www.enakting.
Shahrokni, H. and Solacolu, A. (2016) 'Real-time ethics - A technology enabled paradigm of everyday ethics in smart cities: Shifting sustainability responsibilities through citizen empowerment', in *International Symposium on Technology and Society, Proceedings*. Institute of Electrical and Electronics Engineers Inc. doi: 10.1109/ISTAS.2015.7439410.
Skogstad, A. and le Einarsen, S. (1999) *The importance of a change-centred leadership style in four organizational cultures*.
Söderholm, A. (2008) 'Project management of unexpected events', *International Journal of Project Management*, 26(1), pp. 80–86.
Solomons, N. M. and Spross, J. A. (2011) 'Evidence-based practice barriers and facilitators from a continuous quality improvement perspective: An integrative review', *Journal of Nursing Management*. Blackwell Publishing Ltd, 19(1), pp. 109–120. doi: 10.1111/j.1365-2834.2010.01144.x.
Speed, C. and Shingleton, D. (2012) 'An Internet of cars: Connecting the flow of things to people, artefacts, environments and businesses', in *Sense Transport'12 - Proceedings of the 6th ACM Workshop on Next Generation Mobile Computing for Dynamic Personalised Travel Planning*, pp. 11–12. doi: 10.1145/2307874.2307883.
Spicer, Z., Goodman, N. and Olmstead, N. (2019) 'The frontier of digital opportunity: Smart city implementation in small, rural and remote communities in Canada', *Urban Studies*. SAGE Publications Ltd, p. 004209801986366. doi: 10.1177/0042098019863666.
Stephan, E. G. . E. T. O. . W. A. S. . S. C. . M. M. C. . B. L. K. . & S. W. J. (2013) 'A linked fusion of things, services, and data to support a colla- borative data management facility', *9th international conference conference on col- laborative computing: networking, applications and worksharing (Collaboratecom)*.
Stephens, M., Khalifa Al Nahyan, S. S. bint S. bin and Schroeder, C. M. (2019) ' Perspective — Future Disruptive Governments: Catching up with Technological Advancements and New Horizons ', in. Emerald Publishing Limited, pp. 1–39. doi: 10.1108/s2048-757620190000007001.
Sugiyama, M. *et al.* (2017) 'Unintended side effects of digital transition: Perspectives of Japanese experts', *Sustainability (Switzerland)*. MDPI AG, 9(12). doi: 10.3390/su9122193.
Tao, D. *et al.* (2020) 'A systematic review and meta-analysis of user acceptance of consumer-oriented health information technologies', *Computers in Human Behavior*. Elsevier Ltd, 104(January 2019), p. 106147. doi: 10.1016/j.chb.2019.09.023.
Tene, O. and Polonetsky, J. (2013) 'Big data for all: Privacy and user control in the age of analytics', *Northwestern Journal of Technology and Intellectual Property*, 11, p. 239. Available at: https://scholarlycommons.law.northwestern.edu/njtip/vol11/iss5/1.
Thiesse, F. *et al.* (2007) *Association for Information Systems AIS Electronic Library (AISeL) Connecting Mobile Phones to the Internet of Things: A Discussion of Compatibility Issues Between EPC and NFC Recommended Citation 'Connecting Mobile Phones to the Internet of Things: A Discussion of Compatibility Issues Between EPC and NFC'*. Available at: http://aisel.aisnet.org/amcis2007http://aisel.aisnet.org/amcis2007/158.
Thite, M. (2011) 'Smart cities: Implications of urban planning for human resource development', *Human Resource Development International*, 14(5), pp. 623–631. doi: 10.1080/13678868.2011.618349.
Thompson, M. *et al.* (2020) 'Re-grounding the city with Polanyi: From urban entrepreneurialism to entrepreneurial municipalism', *Environment and Planning A: Economy*

and Space. SAGE Publications Ltd, 52(6), pp. 1171–1194. doi: 10.1177/0308518X19899698.
Thompson, N., Ravindran, R. and Nicosia, S. (2015) 'Government data does not mean data governance : Lessons learned from a public sector application audit', *Government Information Quarterly*. Elsevier Inc., 32(3), pp. 316–322. doi: 10.1016/j.giq.2015.05.001.
Tierney, T. F. (2019) 'Big Data, Big Rhetoric in Toronto's Smart City', *Architecture and Culture*. Taylor and Francis Ltd., 7(3), pp. 351–363. doi: 10.1080/20507828.2019.1631062.
Ubaldi, B., Ooijen, C. Van and Welby, B. (2019) 'A data-driven public sector: Enabling the strategic use of data for productive, inclusive and trustworthy governance', *OECD Working Papers on Public Governance*, (33), p. OECD, Paris. Available at: https://doi.org/10.1787/19934351.
Viale Pereira, G. *et al.* (2017) 'Increasing collaboration and participation in smart city governance: a cross-case analysis of smart city initiatives', *Information Technology for Development*. Routledge, 23(3), pp. 526–553. doi: 10.1080/02681102.2017.1353946.
Wahyudi, A., Pekkola, S. and Janssen, M. (2018) 'Representational Quality Challenges of Big Data: Insights from Comparative Case Studies', *In: Al-Sharhan S. et al. (eds) Challenges and Opportunities in the Digital Era. I3E 2018. Lecture Notes in Computer Science, vol 11195. Springer, Cham.* Available at: http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-3-030-02131-3_46.
Wiig, A. (2016) 'The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia', *Urban Geography*. Routledge, 37(4), pp. 535–553. doi: 10.1080/02723638.2015.1065686.
Wimmer, M. A. *et al.* (2020) 'Transforming government by leveraging disruptive technologies: Identification of research and training needs', *eJournal of eDemocracy and Open Government*. Department for E-Governance and Administration, 12(1), pp. 87–114. doi: 10.29379/jedem.v12i1.594.
Xu, C. (2018) 'Smart Sensors, Cyborgs, and Cybernetics: A Critical Reading of Smart City Technologies', in, pp. 107–132. doi: 10.1007/978-3-319-73247-3_6.
Yazici, H. J. (2014) 'International Journal of Information Management An exploratory analysis of hospital perspectives on real time information requirements and perceived benefits of RFID technology for future adoption', *International Journal of Information Management*. Elsevier Ltd, 34(5), pp. 603–621. doi: 10.1016/j.ijinfomgt.2014.04.010.
Yigitcanlar, T. (2015) 'Smart cities: an effective urban development and management model?', *Australian Planner*. Routledge, 52(1), pp. 27–34. doi: 10.1080/07293682.2015.1019752.
Ylipulli, J. and Luusua, A. (2019) '"Without libraries what have we? : Public libraries as nodes for technological empowerment in the era of smart cities, AI and big data', in *ACM International Conference Proceeding Series*. Association for Computing Machinery, pp. 92–101. doi: 10.1145/3328320.3328387.
Yuan, Y. *et al.* (2020) 'The Missing Parts from Social Media–Enabled Smart Cities: Who, Where, When, and What?', *Annals of the American Association of Geographers*. Taylor and Francis Ltd., 110(2), pp. 462–475. doi: 10.1080/24694452.2019.1631144.
Zuiderwijk, A. and Janssen, M. (2014) 'The negative effects of open government data - Investigating the dark side of open data', in *ACM International Conference Proceeding Series*. Association for Computing Machinery, pp. 147–152. doi: 10.1145/2612733.2612761.
Zyrianoff, I. *et al.* (2018) 'Scalability of Real-Time IoT-based Applications for Smart Cities', in *Proceedings - IEEE Symposium on Computers and Communications*. Institute of Electrical and Electronics Engineers Inc., pp. 688–693. doi: 10.1109/ISCC.2018.8538451.