Digital Government: Looking Back and Ahead on a Fascinating Domain of Research and Practice

HANS J. SCHOLL, The Information School, University of Washington, Seattle, WA

Digital Government refers to the use of information technology to support government operations, engage citizens, and provide government services, as the Digital Government Society declares in its mission statement. While modern information technologies provide the necessary underpinnings expressed by the terms “digital” or the outdated “electronic,” for this public-sector phenomenon, technology in and by itself is not sufficient to capture the scope and various dimensions of Digital Government, which, unobserved at first, and later even disputed, continue to have increasingly transformational influences on the business of government in all its aspects, on all levels, and in all branches. In this disquisition, the evolution of Digital Government is portrayed and discussed from its humble beginnings to the intermediary present along with a projection and a preview of where this fascinating multidisciplinary domain of research and practice might lead in the next two decades. It is claimed that the transformation of the business of government is just beginning, and it is argued that major and undeniable instances of transition can be observed in the next decade.

CCS Concepts: • **General and reference** → **General literature**; • **Information systems** • **Social and professional topics** → **Management of computing and information systems**; **Computing / technology policy**; **Network access control**; **Government technology policy**; • **Applied computing** • **Security and privacy**

Additional Key Words and Phrases: Digital Government Evolution, Digitization, Innovation, Reformation, Transformation, Digital Citizen, Digital Divide, Digital Participation, Digital Representation, Digital Government Research Directions, Multi-disciplinary Research, Government Surveillance, Privacy in the Digital Age, Dark Digital Government, Challenged Democracies

ACM Reference format:

Hans J. Scholl. 2020. Digital Government: Looking Back and Ahead on a Fascinating Domain of Research and Practice. *Digit. Gov.: Res. Pract.* 1, 1, Article 7 (January 2020), 12 pages.
<https://doi.org/10.1145/3352682>

Hans J. Scholl serves as a full professor in Information Science with a specialization in Information Management, which investigates the interplay of information, technologies, organizations, and people. He is a foundational member, past president of the Digital Government Society, and the draft writer and proposer of its mission statement. For years, he also served as the chair of the IFIP working group 8.5 (Information Systems in Public Administration). In the first decade of the 21st Century, he founded and continues to co-chair the influential Digital Government Track at HICSS. In 2018, the UK-based think tank Apolitical named him one of the 100 most influential individuals in Digital Government worldwide.

Author’s address: H. J. Scholl, The Information School, University of Washington, Mary Gates Hall, Suite 470 D, MS 352840, Seattle, WA 98195-2840, USA; email: jscholl@uw.edu.

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2639-0175/2020/01-ART7 \$15.00

<https://doi.org/10.1145/3352682>

1 INTRODUCTION: DIGITAL TRANSFORMATION AND GOVERNMENT

The term *digitization*, as used in the 1990s, referred to a “process from preparation and conversion to presentation and archiving” of analog hardcopy documents of all kinds into digital, that is, machine readable and transferable formats [14, p. 1]. At the beginning of this conversion process from analog to digital, and then two decades into it, media like hardcopies still played major, and sometimes legally exclusive, roles. More than two decades later, however, vast amounts of formerly analog documents were successfully digitized and had become accessible and searchable despite sometimes complicated conversion procedures and high costs. In parallel, and for an even longer period of time, new documents of all kinds have been created first and foremost in digital form. An ever-rising number of digitally created documents have never been converted or will never be converted into any analog formats such as printed hardcopies. With the advent of automatically executed smart contracts or exclusively cashless transactions, for example, when purchasing a beverage on a commercial flight, the era of analog transaction processing and documentation is visibly nearing its end. Society’s increasing reliance and functioning on the basis of digital data, documents, structures, and processes has been referred to as *digitalization* [9]. Digitization, then, can be viewed as an overture and important stepping stone to the first phase of societal digitalization, to which governments, non-governmental organizations, and organizations in the private sector spearheaded by the high-tech industries were instrumental catalysts and contributors.

At the end of the second decade of the 21st Century in the developed and many developing nations, instantly finding, accessing, storing, and disseminating informational digital assets and performing transactional or other processing activities on and with these digital assets by means of networked information and communications systems have become the daily routine and the regular way of “doing business” for private-sector and non-governmental organizations, governments, as well as for individuals. Members of generation Z (born between 1995 and 2015, also known as Gen Z) are what some have called “digital natives.” Individuals in this age group reportedly have the greatest difficulties finding their ways through analog documents and using hardcopy-based procedures and methodologies [27].

Coincidence or not, Gen Z and the first phase of societal digitalization span the same period of time. The latter began around 1995, shortly after the commercialization of the Internet and the popularization of the World Wide Web, and which came to a close around 2015, when a critical mass of developments signaled the next phase of digitalization cryptocurrencies such as Bitcoin and Ethereum based on Distributed Ledger Technologies such as Blockchain as well as applications of Machine Learning, Data Science, the Internet of Things (for example, Smart Grids), Artificial Intelligence, and Decision and Data Visualization began to become beacons and facilitators for shaping its next phase. A (related) marker and defining moment for the end of the first phase of digitalization can also be seen in the massive and unprecedented impact of social media on the business of government, for example, by enabling cleanly targeted and unchecked interferences of foreign powers on general elections and referendums of a nation, which signal the beginning of a radically new phase in the digitalization story of government including elements of cyber warfare widely visible since about 2015.

Unsurprisingly, the first phase of societal digitalization (1995 to 2015) can also be viewed as isochronal to the first phase of Digital Government, which has been characterized as the period of harvesting “low-hanging fruits” and gaining “quick wins,” some of which materialized in the digital replication and mimicking of frequently ineffective and even broken paper-based processes, to which some critics sarcastically referred as gigantic “manu-mation” efforts [16], but also, and maybe more effectively, through massive digitization campaigns of historical documents and information resources along with initial online transactional services, which would, however, at the time mostly not provide the same ease of use and performance elegance that people were accustomed to from using the private-sector informational and transactional counterparts.

Nonetheless, at the end of the first phase of Digital Government, as a standard method of business, citizens in many countries were able to directly access or request a vast array of detailed public data at the convenience of their own personal devices. It provided for electronically filing tax return forms, paying taxes and utility bills,

receiving tax refunds directly at personal or business bank accounts, registering vehicles, boats, and other devices, renewing driver's, car, boat, and other licenses or permits, and voting online. Businesses were requested to exclusively electronically access request for proposals, file their bids, make and collect payments, receive permits, access government-held data, and schedule government inspections and other services in real time. Government-internal (intra-agency, inter-agency, and inter-jurisdictional) business processes have been adjusted, digitalized, and accelerated. Compared to how the business of government was conducted in the mid-1990s, the observable and measurable changes were tremendous. However, despite this remarkable success in digitalization, business processes still followed a quasi-paper-based blueprint, and major methods of interaction and procedures have not yet exploited the full potential of the facilitating new technologies, or radically new processes and procedures had not been invented. While societal digitalization seemingly translates into a major transformation of how society and their members act and interact, digital transformation might need some more time and effort to be fully reflected and incorporated into democratic government. Constitutional and other legal considerations play a main role when it comes to transforming government digitally in a way that its democratic principles such as the system of checks and balances and the respective need for the division of powers is to be preserved. It is an interesting synchronism that the second phase of societal digitalization (and with it, the second phase of Digital Government) begins at a time when also this new journal ACM DGOV is launched, which inherently carries an obligation to be a critical academic companion and analyst of this next (probably more transformational) phase of Digital Government and beyond.

In the following, this contribution describes and comments on the evolution of Digital Government Research (DGR) during the first phase of public-sector digitalization, the domain's academic characteristics, its outlets, research directions, its major players and affiliations, and its future role as enabler, critical company, recommender, whistle blower, and chronicler of the second phase of Digital Government, which promises (or, threatens) more deeply rooted and more radical transformations also to the underlying democratic model of government and governance, which were developed over centuries in Western democracies, however, which might be more challenged in the process than currently anticipated.

2 THE BEGINNINGS OF THE DIGITAL GOVERNMENT RESEARCH TRADITION

Almost unlimited enthusiasm and exuberantly optimistic projections regarding the betterment of the human cause have been reliably recurring companions of every new wave of technology innovation. Typically, after the initial euphoria has tapered off, a clearer understanding of benefits, costs, and limitations is observable, and more realistic and more moderate projections are found. In this regard, Digital Government has been no exception. Technologists have always been happy to propagate euphoric views and expectations, and they may have even strongly believed in them themselves. However, while the invention of controlled and self-propelled aircraft-based flying of the skies was an unprecedented and a steep leap in human capability and reach, it did not even take two decades to use this liberating capability to shoot down other planes from the sky and bomb enemy positions in World War I. Without exception and for any technological advance that humans were able to fashion towards desirable ends, they swiftly also found other designations, and mostly nasty ones, to where the innovation could also be applied. In all fairness, however, innovations developed with an initial destructive intent were later also used for more peaceful, productive, and benevolent purposes. For example, drones have been used for search and rescue operations and other productive purposes like delivery of medical supplies. In other words, the uses of technology breakthroughs apply across the whole spectrum of potential uses and/or (abuses). As pointed out before, Digital Government, that is, innovations through modern networked computing, the Internet and the Web, or, in general, information and communication technologies (ICTs) and their uses for the purposes of public administration are no exception from the rule.

While ICTs were used in government as early as in other sectors of society, relatively little academic attention was paid to their uses and roles in public administration [5, 19]. Adopting naming conventions used in

business school-type information systems research, the term of “public management information systems” or PMIS was introduced [7, 8] into the academic debate, however, without getting much traction or receiving much attention. Before 1995, some mere twenty academic publications could be identified, which had a focus on ICTs in public administration (see Reference [35]). Bannister and Grönlund counted 65 publications prior to 1995, which were found via the search term “e-government” in a Google Scholar search [5]. The difference between the two numbers can be explained through the wider net, which the Google Scholar search casts as opposed to the narrower filter provided by the strict inclusion criteria of the Digital Government Reference Library (DGRL). In any case, the topic of ICTs in the public sector was certainly not of premier interest at the time. This lack of scholarly attention was likely also influenced by an expressed skepticism about and an outright underestimation of the potentially beneficial influence of “technology” on administrative “reform” [19, 20]. On the contrary, it was argued that ICTs would rather maintain and perpetuate the status quo. As late as 1996 and in all earnest, some scholars still claimed that “mainframe” computing was superior and preferential to networked PC-based computing in American local government [25].

Against this backdrop, it appears unstartling that the spark, which ignited and started Digital Government Research (DGR), came from elsewhere rather than from inside Public Administration Research and its incumbent researchers. Two initiatives, one in the United States and another one in Europe, which were launched without initial connections to each other, provided the necessary thrust to start DGR:

- (1) In 1998, the U.S. National Science Foundation (NSF) issued the first call for research grant proposals in Digital Government and began holding annual workshops (as of 1999) for grant holders, which culminated in what later became the Annual International Conference on Digital Government (or, short, dg.o, which was first held in 2000) [10]. Also, under the auspices of NSF, the Digital Government Society of North America was formed a few years later (2006).
- (2) A little later than in the U.S., European nation states and the European Union (EU) under its fifth and sixth framework programs also began funding DGR-related research programs. The IFIP Working Group 8.5 (Information Systems in Public Administration), which was founded as early as 1987, became a major organizer of digital government-related workshops and, most notably, the EGOV conference under the leadership of Roland Traunmüller and Klaus Lenk [21], which was first held in 2002. This conference also served as platform for presenting results from funded DGR.

On either side of the Atlantic Ocean, the opportunity of funding for DGR drew the attention of scholars from a range of disciplines such as computer science and engineering, human-computer interaction research (HCI), data visualization research, information systems research, communications, geography, and others whereas traditional public administration scholars were still little interested in these particular research and funding opportunities. The topical areas of, for example, NSF-funded DGR were diverse and included meta-data generation for geographic imagery [41], individualized Web-based government services [26], visualization of geospatial data [22], digital campaigning and voting [17], information sharing of law enforcement agencies [13], and human-centric design for government services [1], to mention a few.

As a side effect of these research funding programs, researchers from multiple disciplines who had never met at any conference or other academic venue before began to learn about each other’s research and disciplinary backgrounds. Intended or not, it created a climate of curiosity and appreciation of the multi-disciplinary perspectives on public administration and its unique challenges, which had never before been in explicit focus of any of these disciplines. Moreover, scholars from different backgrounds and epistemological affiliations began sharing ideas and research findings. Funding for DGR-related programs was maintained for about a decade in the U.S. and somewhat longer in the EU. It can be seen as absolutely instrumental for the launch of the study domain in its early phase. Without the initial funding, it is debatable whether or not this vibrant DGR domain had ever developed to what it is at the end of the second decade of the 21st Century.

3 RESEARCH OUTLETS AND RESEARCH DIRECTIONS IN THE FIRST PHASE

The boost from funding of mostly applied research, which was focused on ICT-based innovation projects in the public sector, led to a sharp increase in peer-reviewed publications. From a total of less than one hundred peer-reviewed publications in DGR overall before the year 2000, the number rose to 1,138 for the five-year period from 2000 to 2004. The rapidly growing number of research reports also required an increased number of high-quality and widely respected publication outlets. Since at the time DGR represented only a small niche, or even a very special topic within the above-mentioned disciplines, the study domain, while in the process of forming a community with fairly diverse disciplinary backgrounds, was in need of finding its own dedicated publication outlets. One way of meeting these needs for outlets of high quality and recognition inside academia was found in becoming part of and player in already existing outlets of premier standing, which would appreciate and share the growing interest in DGR. Two journals and one conference met these criteria. Elsevier's *Government Information Quarterly (GIQ)* (founded in 1984), then under the leadership of Charles McClure and John C. Bertot, and IOS Press' *Information Polity (IP)*, founded in 1988, then under editor-in-chief John Taylor, on the journal side as well as the annual *Hawaii International Conference on System Sciences (HICSS)*, founded in 1968, under the leadership of the late Ralph Sprague were open and welcomed furnishing a platform for the novel topics of DGR.

Due to the particular multi-disciplinary composition of the DGR community the reputational hierarchy between journals and conferences as seen in other disciplines, where either journals outshine the conferences (for example, in Public Administration, Political Science, or Information Systems Research), or top conferences trump journals (like in HCI or computer science and engineering), in DGR no such rank order was established, which has remained to the day of this publication. Rather the aforementioned two journals and the Digital Government Track at HICSS have since maintained their on-a-par lead position in the study domain [30, 31, 37].

However, the three highly ranked outlets, as it became quickly clear, would not be able to cope with the growing surge of DGR publications alone. Initially, quite some disciplinary journals dedicated one-time special issues to then new phenomenon of electronic or digital government (for example, *Communication of the ACM* in 2003). Yet, additional outlets were needed for providing the burgeoning DGR domain with publication space. Between 2001 and 2007, a number of new DGR journals and conference outlets was established among which were the already cited dg.o and EGOV conferences, and later the ICEGOV conference as well as smaller tracks at the AMCIS, ECIS, and PACIS conferences. Also, new journals were established, for example, *The Journal of E-Government* (later renamed into *Journal of Information Technology and Politics (JITP)*, now published by Taylor & Francis/Routledge), the *International Journal of Electronic Government Research (IJEGR)*, published by IGI Global, *Transforming Government: Policy, People, Process (TGPPP)*, published by Emerald, the *Electronic Journal of e-Government (ECEG)* published by Academic Conferences and Publishing International, and Inderscience's *Electronic Government: an International Journal (EGaIJ)*. Within the first decade of the 21st Century, academic DGR had soared from 144 to a total 3,697 peer-reviewed publications (<http://faculty.washington.edu/jscholl/dgri/history.php>—accessed March 22, 2019). After 2010, and with exception of this journal, only one other DGR-dedicated journal was introduced, which was IGI Global's *International Journal of Public Administration in the Digital Age (IJPADA)*.

Several studies have analyzed the topical directions in DGR in its first phase (1995 to 2015). A 2007 paper investigated, what topics were central to DGR, and identified six high-level variables and their relationships and interactions as most central to DGR: (1) government operations, (2) government services, (3) citizen engagement, (4) public policy in context, (5) information use, and (6) technology use. It argued that research was the more central to DGR the more these high-level variables (and their sub-variables) were studied including their relationships and interactions [29]. Empirical studies confirmed this perspective and demonstrated strong research interest in improving government services, technology use, and citizen engagement [3] in the earliest phase. In the middle and later sections of the first phase the research interests expanded to the whole set of high-level

variables, in which the topics most frequently studied were management and transformation (operations), participation and democracy (citizen engagement), government services, and technology uses followed by information uses [30, 33].

4 PROFESSIONAL AFFILIATIONS AND LEADING SCHOLARS IN DGR

The aforementioned professional organizations, the Working Group (WG) 8.5 inside the International Federation for Information Processing (IFIP) and the Digital Government Society of North America have remained the major affiliations, around which the academic DGR community organizes. The major focus of both organizations has remained the same, that is, organizing and conducting its respective conferences. Over the years the two organizations have gone through a number of adjustments and modifications. In 2010, and with the departure from its former conference organizing partner, the community of the WG 8.5 created an IFIP-independent organizational format, which basically mirror-imaged the working group but also gave the community an independent arm for legally and fiscally organizing its business under the roof of Academic Conference Organization (ACO) based in Lausanne, Switzerland. The dual working group has a membership of over one hundred active scholars from all over the world. Membership is linked to in-person participation at the WG's conferences, and no formal membership fee is collected. In 2017 the dual WG joined forces with the Austria-based CeDEM organization and merged its two conferences, EGOV and ePart, the latter of which was launched in 2009, with the CeDEM conference to form the combined EGOV-CeDEM-ePart conference. So far, and despite its global reach the EGOV-CeDEM-ePart conferences and their predecessors have always been held in Europe.

In 2013, the Digital Government Society of North America decided to expand its reach beyond the North American continent and consequently shortened its name to Digital Government Society (DGS). Shortly after and for the first time, the dg.o conference was held outside North America in 2016 (Shanghai, China). In 2018, a first national DGS chapter was constituted (China). The Society collects a moderate annual membership fee, which is folded into the conference registration fee. DGS has not published member numbers. However, based on the number of conference participants the Society's number of active members can be estimated as under one hundred, very few of whom are also members of the dual WG.

When analyzing the membership numbers of the two DGR affiliations, they appear to be on the low side. As one benchmark, in March of 2019 the major listserv of the DGR community, that is, the EGOV-List, <http://mailman11.u.washington.edu/pipermail/egov-list/>) had over 1,300 subscribers. The Digital Government Reference Library (DGRL), which contains the references to the vast majority of peer-reviewed DGR publications in the English language, is another benchmark. It lists over 4,000 authors, over 10 percent of whom are "prolific" scholars with more than 20 publications each. The latter group has been referred to as the core community of DGR. Before this background, the two major affiliations, the dual WG (ACO/IFIP) and DGS together are estimated to have organized less than 50% of the core community of the study domain.

The DGRL also allows for the identification of leading scholars in DGR in terms of number of entries in the reference library. Google Scholar, then, helps assess the relative impact of these most prolific researchers. The most recent study on this particular subject was conducted in 2016 and found the following ten scholars the most prolific in DGR (number of DGRL entries in parentheses): Marijn Janssen (122), Ramon Gil-Garcia (97), Theresa A. Pardo (86), Hans J. Scholl (75), Maria A. Wimmer (67), Vishanth Weerakkody (61), Christopher G. Reddick (56), Yannis Charalabidis (52), Yogesh K. Dwivedi (51), and Åke Grönlund (45) [34]. When looking at the impact of prolific DGR scholars in terms of number of Google Scholar citations, a slightly different list emerges for the top ten DGR scholars (citation numbers in parentheses): John C. Bertot (5,096), Marijn Janssen (4733), Theresa A. Pardo (4,450), Ramon Gil-Garcia (3,868), Lemuria Carter (3,328), Sharon S. Dawes (3,235), Hans J. Scholl (2,627), Eric W. Welch (2,619), Vishanth Weerakkody (2,591), and Maria A. Wimmer (2,338) [34]. Also, the Hirsch index, or h-index, is used for determining academic impact in terms of number of highly cited contributions (h-index numbers in parentheses): John C. Bertot (37), Marijn Janssen (35), Ramon Gil-Garcia (31), Theresa A. Pardo (31),

Table 1. Top Digital Government Scholars Based on Indicator List Appearances

Scholar Name	In Top-Ten DGR List (1 = yes; 0 = no)	In Top-Ten Google Scholar Citation List (1 = yes; 0 = no)	In Top-Ten h-index List (1 = yes; 0 = no)	In Top-Ten i10-index List (1 = yes; 0 = no)	In Top-Ten "Signature" List (1 = yes; 0 = no)	Total of Top-Ten Indicator List Appearances
Hans J. Scholl	1	1	1	1	1	5
Maria A. Wimmer	1	1	1	1	1	5
Marijn Janssen	1	1	1	1	0	4
Ramon Gil-Garcia	1	1	1	1	0	4
Theresa A. Pardo	1	1	1	1	0	4
Vishanth Weerakkody	1	1	1	1	0	4
John C. Bertot	0	1	1	1	1	4
Sharon S. Dawes	0	1	1	0	1	3
Eric W. Welch	0	1	0	0	1	2
Björn Niehaves	0	0	1	1	0	2
Kim N. Andersen	0	0	1	0	1	2
Albert Meijer	0	0	1	0	1	2
Victor Bekkers	0	0	0	1	1	2
Christopher G. Reddick	1	0	0	0	1	2
Yannis Charalabidis	1	0	0	0	0	1
Yogesh K. Dwivedi	1	0	0	0	0	1
Åke Grönlund	1	0	0	0	0	1
Lemuria Carter	0	1	0	0	0	1
Flavio Corradini	0	0	0	1	0	1
Ralf Klischewski	0	0	0	0	1	1
Luis Luna-Reyes	0	0	0	0	1	1

Vishanth Weerakkody (29), Sharon S. Dawes (27), Hans J. Scholl (25), Maria A. Wimmer (24), Björn Niehaves (24), Kim N. Andersen (22), and Albert Meijer (22) [34]. The so-called i10-index (that is, counting papers with at least 10 citations) is used for identifying what is in a scholar's research "pipeline." In this regard the top-ten DGR scholars are the following (i10 number in parentheses): Marijn Janssen (115), John C. Bertot (98), Ramon Gil-Garcia (70), Theresa A. Pardo (69), Vishanth Weerakkody (65), Björn Niehaves (63), Victor Bekkers (61), Maria Wimmer (54), Hans J. Scholl (53), and Flavio Corradini (49) [34]. Finally, the so-called "signature" list provides an interesting perspective on individual contributions and personal impacts by showing the number of single or lead co-authored (signature) publications among a scholar's top-ten most cited publications, which is as follows ("signature" number in parentheses): John C. Bertot (8), Sharon S. Dawes (8), Christopher Reddick (8), Kim N. Andersen (8), Ralf Klischewski (7), Albert Meijer (7), Luis Luna-Reyes (7), Victor Bekkers (6), Hans J. Scholl (6), Eric W. Welch (6), and Maria Wimmer (6) [34].

As Table 1 shows, seven scholars appear on at least four of the top-ten indicator lists, and two even on all five. It is fair to conclude that when taken together the frequency of a scholar's appearance in the top-ten indicator lists signals both their influence and the impact of these scholars' work. As an illustration, these seven scholars held or are still holding important offices at the study domain's affiliations and top outlets. For example, editors-in-chief (Bertot, Janssen/GIQ and Weerakkody/IJEGR), HICSS Digital Government Chair/Co-chair (Bertot and Scholl), DGS/DGSNA President (Bertot, Pardo, Scholl), Chair of IFIP WG 8.5 (Janssen, Scholl, and Wimmer), and ACO President (Scholl and Janssen).

In 2018, based on their own polling the British Think Tank *Apolitical* (<https://apolitical.co/lists/digital-government-world100>) identified and announced five of the seven as among the 100 most influential individuals in Digital Government worldwide (Gil-Garcia, Pardo, Janssen, Scholl, and Wimmer) missing out only on Bertot and Weerakoddy. However, the Think Tank's ranking confirms in large part also the findings derived from the 2016 data.

5 FUTURE TRENDS IN DIGITAL GOVERNMENT PRACTICE AND RESEARCH

As alluded to in the Introduction, the second phase of Digital Government, which began in the mid of the second decade of the 21st Century, promises (and, maybe, as said, threatens) to be more transformational than the first phase. As argued earlier, deep societal and organizational transformations do not necessarily exclusively result from sudden revolutionary impacts that topple and obliterate previous structures, processes, and relationships, they can also emanate from a large number of smaller incremental changes that reach a critical mass [28]. These two change mechanisms can also interact with each other.

Smart Approaches (City, Government, and Governance). Human life on this planet is undergoing a major transition from a predominantly agricultural and rural experience to a predominantly post-industrial and metropolitan experience. In the two centuries between 1950 and 2050, the rapidly growing human population has been estimated to transition from a 30 percent to a 75 percent urban/metropolitan population share [32]. According to the World Bank by 2017 the urban/metropolitan population share has already passed the 55 percent mark (<https://data.worldbank.org/indicator/sp.urb.totl.in.zs>.—accessed March 22, 2019). With the human experience becoming an increasingly and soon overwhelmingly urban/metropolitan one, large changes are unfolding. Metropolitan areas have become increasingly crowded, and the maximum carrying capacity of urban centers is being reached. With this phenomenon, all kinds of challenges of a new order of magnitude arise: housing, transportation, safety, energy, healthcare, clean air and water, safe sewage and waste handling, and food and other life supplies have to be provided via ever more-sophisticated, ever more capable, but also increasingly vulnerable infrastructures. As a response to this challenge the notion of “smartness,” for example, smart cities, smart governments, and smart governance, have been developed in academia and practice [2].

In smart approaches, advanced technologies like the *Internet of Things (IoT)* are facilitators for organizing and coordinating life and movements via *smart objects* in densely populated areas, for example, by smart sensor grids, which help steer traffic flows with minimal, if any, congestions, or, smart electrical grids, which automatically balance loads and take advantage of low tariffs. Smart approaches, many of which are *Data Science*-based, rely on the use of *Artificial Intelligence (AI)* and *Machine Learning (ML)* in combination with big structured and unstructured data to identify patterns and predictive models, which inform and evaluate decisions of human actors or non-human actors in real time. Closely related and also used in combination with the aforementioned smart approaches are *Distributed Ledger Technologies* such as *Blockchain*, which are used in smart approaches for guaranteeing unfalsifiable records of transactions, speed, and utmost transparency in transactional procedures. These smart approaches have an enormous potential for transformational uses in Digital Government, for example, in allowing for *smart contracting*, in which contract clauses are automatically executed if the predefined and built-in conditions are met. Greatly lowered transaction costs and high transaction speeds are expected outcomes.

As discussed elsewhere [38], the transformational potential of smart approaches requires smartness in the governance models of the emerging smart landscape. Obviously, with algorithm-based decision making and contracting along with the intelligent joining and sense-making of vast arrays of data near real time, the traditional governance models of checks and balances and the division of powers might be challenged or even circumnavigated. The democratic decision-making processes as well as the legislative processes are deliberately slow. Also, the interpretation of the law in the courts deliberately allows for some latitude to be able to address a specific case, and it is slow for several reasons, systemic and case-load related. In contrast, smart contracts execute automatically with no wiggle room only based on pre-designed conditions. In other words, while the

digital transformation in society, at large, and, in government, in particular, leads to a dramatic acceleration in transactional and informational processing, the traditional structure and system of governance has remained on a far slower clock. Moreover, neither unintentional nor intentional breaches in the division of powers or the system of checks and balances can quickly be discovered and counterbalanced. This, in and by itself, already enacts a digital transformation, although not necessarily a desirable nor intended one.

It follows that the models of governance also need to adjust more smartly and more flexibly with the rapidly unfolding digital transformation. Governments not only need to be quick and flexible in creating new regulations, which maintain the status quo of democratic governance as we know it, but which at the same time makes the new regulations adjustable and avoids the stifling of potentially beneficial uses of novel technologies. An example of and role model for smart governance is the worldwide first provider regulation of Distributed Ledger Technology in Gibraltar, which has switched the regulatory paradigm from rule-based to principle-based [36]. This type of regulation implements detailed regulatory oversight and compliance enforcement in a case-by-case fashion, which allows the regulator to follow the provider's business behavior and transaction history, and it helps identify potential pitfalls in advance even before economic or other harm can result. It has also been argued that recurring reviews of regulatory outcomes are a characteristic of smart governance and smart regulation [38]. Statutes, regulations, and even laws, come with specified outcomes and mandatory review and expiration dates included, which makes the whole governance process more effective, although it also makes it more elaborate and potentially more time-consuming. However, smart governance and smart regulations also benefit from data science-based Artificial Intelligence and data analytics-informed Machine Learning algorithms, which are able to automatically track and flag potential compliance breaches in real time.

6 DIGITAL GOVERNMENT AND THE “DARK SIDE OF THE MOON”

As noted elsewhere (<http://faculty.washington.edu/jscholl/hicss53/>—accessed March 22, 2019), over the years the leading DGR conference, that is, the HICSS Digital Government Track, has served as an early sensor and bellwether of new trends and novel topical directions in the study domain of DGR. For decades, emerging topics have been tracked, and the Track itself emanated from the Emerging Topics Track, which it ultimately replaced in 2006. In recent years, a new minitrack under the name of “Dark Digital Government” was established, which morphed into the minitrack of “Challenged Democracies.” Also, minitracks dedicated to “Cyber Deception” and “Insider Threats” have meanwhile debuted. In other words, it has become clearer than before that novel digital technologies can also be used for transformations towards other ends than those of the Western-style democracy model. The aforementioned abuse of social media by foreign powers to meddle with general elections and national referenda is another case in point. While so far DGR has overwhelmingly focused on affirmative and confirmatory research, which demonstrated and discussed the positive outcomes of Digital Government initiatives, it has been understood for some time that also problematic outcomes of type B (successful, but not desirable) and type A (desirable, but unsuccessful) deserve research attention [38, p. 171]. Clearly, what are “problematic outcomes” and what are “desirable outcomes” remain in the eye of the beholder. However, from a Western perspective, certain digital government initiatives might be found utterly “problematic” and “undesirable,” although very “successful,” that is of type B, whereas researchers working from non-Western perspectives might celebrate the outcomes as non-problematic and highly desirable. Two cases in need of attention, investigation, and discussion are China's “Social Credit System” (SCS) and India's “Aadhaar” system. Although envisioned and being built towards slightly different ends, the two systems, once completed and up and running provide the governments of the two most populous countries an unprecedented, real-time, and sweeping oversight of sensitive data on each and every single citizen. While India's Aadhaar (Hindi for “foundation”) is a quasi-obligatory national registry with a unique personal 12-digit identifier, it also collects demographic data, and it stores fingerprints and iris scans for each registered individual [39]. By the end of 2017, the registry contained complete records for 99 percent of the 1.3 billion Indian citizens. Provisions of social and financial services is linked to the citizens'

Aadhaar IDs [39]. While the use of big data of this magnitude and completeness has been presented as a safeguard against crime and service abuses as well as a guarantor of individual identification and authentication in transactions of all kinds, it also widely opens the backdoor to total surveillance, real-time tracking, and eradication of major elements of individual privacy by government and by private firms, with which the data are shared.

However, China's SCS [11, 15, 18] has been built with an intention that goes even far beyond even the Indian Aadhaar ID system. The SCS does not halt by identifying, authenticating, and collecting demographic data on each Chinese individual, it also tracks each citizen's government interaction, online commercial [12] and financial activity [23, 40], social behavior and action, and judicial and criminal record. The system credits and ranks individuals with points for (government-defined) desirable behavior patterns, and it subtracts credits in case of (government-defined) undesirable behavior patterns [24]. A citizen whose social credit index (the SCI) falls below a certain threshold can automatically be barred from moving around by train or airplane, since such "untrustworthy" citizens find themselves unable to secure a ticket purchase anymore. The same holds true for admission to public resources and institutions such as libraries, movie theaters, or other amenities. The system is also combined with other surveillance systems that track individual movements via face recognition systems. The amount of data points collected for each Chinese subject on a daily basis is gargantuan, and SCS will be in full-flung operations for the country's entire 1.3 billion population by 2020 [6]. The intent behind the SCI is to steer Chinese citizens towards compliant as well as acceptable social and financial behaviors. From a Western perspective, this far-reaching extent of surveillance combined with automatic reprimanding and even punitive action against citizens would be a constitutional nightmare. However, in reality the technical capability of combining big, open, and linked government data on citizens with private data on consumer/citizens is not far from becoming as advanced in Western democracies as it is already now in the Chinese SCS [4]. It remains left to public debate and decision making to what extent this technical capability can and should be legally exerted, and what constitutional and other regulatory safeguards need re-formulation, amendment, and implementation to maintain citizens' rights as laid down in, for example, the first (free speech and expression) and fourth (secure persons and houses free from unreasonable searches and seizures) amendments of the U.S. constitution. In both, Western democracies and in non-Western models of government, analytics of big data already allow with great precision the accurate prediction of consumer/citizens' preferences, dislikes, and their probable future behaviors and actions.

When considering the rapidly evolving metropolization and rise of megacities, in which the vast majority of humanity will live soon, the uses of systems like the Indian Aadhaar and Chinese SCS might become not only a possibility but rather also a necessity elsewhere, although the Western model is hard to envision with the integration of any corrective or punitive elements. Incognito human existence and individual privacy as once conceived and promoted will have great difficulty to be maintained in a cashless world, in which every transaction requires identification and authentication, and in which every individual step of the way can be tracked.

7 SUMMARY AND CONCLUSION

Digital Government has undeniably passed into its second phase, in which digital transformation of major proportions has begun to occur and will predictably continue to occur in society at large and inescapably in government as a consequence as well. Government will be both a driver and a facilitator of this transformation; however, depending on the model of governance, the safeguards and implementation will differ, despite some stunning convergence. Digital Government Research, and in it, this new journal need to play important roles to chart out the path ahead and clarify the choices, which societies and communities have.

Undeniably, also, the systems of, for example, China and the West compete fiercely, economically, but also in terms of ideas and concepts regarding the individual and her/his roles, rights, obligations, and their ultimate destiny and determination. Digital Government Research needs to engage in these discussions and provide insights

regarding problematic and unproblematic outcomes of digital initiatives and developments, which require a deep understanding of the technological and algorithmic underpinnings and their projectable and observed impacts on societal governance models, on public and private organizational structures and processes, on communities, and on individuals' lives. Digital Government Research also needs to engage with other disciplines, including traditional disciplines such as Public Administration and Political Science, which provide a rich tradition of understanding in their respective areas, which overlap with Digital Government as a practice area, but which might lack the forward-looking capabilities that Digital Government Research at least can provide in part.

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Received April 2019; accepted July 2019