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Digital government inclusion: Exploring strategies for inclusive government automation

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ABSTRACT

The idea of 'digital government inclusion' – which builds upon notions of digital and social equity – implies that every person is equally able to participate in and benefit from digital government applications and procedures. In this article, through a policy stages lens, we explore aspects of government automation that complicate various dimensions of equity and inclusion as well as propose mitigating mechanisms that can improve digital government equity and inclusion. For a broader understanding of digital government inclusion, we start with a historical exploration of how data collection and digital government are inherently intertwined with notions of (statistical) normality. We then identify key findings from the broader literature and the articles included in GIQ's special issue on digital government inclusion that point to challenges as well as some potential tools to confront these issues.

1. Introduction

The idea of 'digital government inclusion' – which builds upon notions of digital and social equity (Ruijer, Porumbescu, Porter, & Piotrowski, 2023) – implies that every person is equally able to participate in and benefit from digital government applications and procedures. Following the idea of social equity, four dimensions can be identified (Gooden, 2015): 1) practical access to Internet and devices, 2) procedural fairness in governmental decision-making, 3) the quality of interactions and participation, and 4) equal outcomes in terms of service provision and protection of rights.

Following from the first dimension, this is closely connected but distinct from the 'digital divide', as the digital divide 'refers to the gap between people who have adequate access to information communication technology (ICT) and people who have poor or no access to ICT' (Lythreatis, Singh, & El-Kassar, 2022, p. 1). Digital government inclusion provides the means through which issues, such as the digital divide, could be addressed. In a context where people increasingly depend on digital tools for their interactions with government, the idea of digital government inclusion becomes crucial for guaranteeing social and economic justice (see Rodriguez, Shachar, & Bates, 2022 for a discussion of this in healthcare).

In this article, we explore aspects of government automation that complicate various dimensions of equity as well as mitigating mechanisms that can improve digital equity and inclusion, while keeping in mind that analog bureaucratic processes also struggle with equity and inclusion. Our main objective is to explore digital government's role in supporting or obstructing inclusion, which we do by considering digital government inclusion (or lack thereof) at each stage of the policy process. We review the relevant literature and identify key findings from the articles included in GIQ's special issue on digital government inclusion. For a broader understanding of digital government inclusion, we start with a historical exploration of how data collection and digital government are inherently intertwined with notions of (statistical) normality.

2. Historical background

Different aspects of collecting and processing data by governments in the present day, to make decisions or give advice, for example, have a long history. At the beginning of the 19th century, many European countries started collecting data on the characteristics of the inhabitants of their territories (Schuilenburg, 2015). This created a more detailed picture of people's lives and living conditions. The data collection

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0740-624X/© 2025 Elsevier Inc. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

occurred in areas such as work, schools, and prisons and was seen as necessary to better govern the territory of the national state (Foucault, 2004, 2008; Giddens, 1990; Scott, 1998). Giddens (1990) considers this form of social control – alongside industrialism, capitalism and military power – the fourth institutional dimension of modernity and at the core of the rise of the nation-state. In this context, he speaks of 'the coding of information relevant to the administration of subject populations, plus their direct supervision by officials and administrators of all sorts' (1984: 183).

The collection of data about the characteristics of the inhabitants of the nation-state was made possible by the development of statistics. Statistical techniques help in describing social phenomena, tell how data should be collected and interpreted for this purpose, and can be used to explain and even predict phenomena (Blalock, 1979; Van Kerckvoorde, 1995). Here, data are used to measure phenomena in terms of, for example, numbers of units by time or space. By processing data with appropriate statistical techniques, underlying patterns are discovered, including trends over time and correlations between different social phenomena. In Scott's (1998) terms, the collection and analysis of data makes society 'readable' – and therefore also 'malleable, controllable and governable' (Schuilenburg, 2024, p. 12).

The Belgian astronomer and demographer Quetelet and the French jurist Guerry were the founders of this approach – and, with the journalist and reformer of the Belgian prison system Édouard Ducpétiaux, the most important figures in the development of statistical studies of deviant and undesirable behavior (Morrison, 1897; Beirne, 1987). Guerry, for example, showed in *Essai sur la morale de la France* (1833) that there are similarities in crime rates between regions in France in terms of the share of population groups, gender, and age in the distribution of types of offenses over the year. He sought explanations for this in phenomena such as poverty, and he also paid attention to factors such as work and education. During the same period, Quetelet was conducting research in Belgium on links between crime and factors such as age, sex, region, education, and socio-economic conditions such as wealth. From his statistics, Quetelet, in his two-volume book *Sur l'homme* (1835a; 1835b), derived his thesis of the 'average man' (*l'homme moyen*), according to which 'every nation, race, and historical era would be represented by a model man who is in every way normal'.

Initially, Quetelet regarded the 'average man' as a 'fictitious being' and 'abstract being', a useful concept for empirical research into the distinction between what is 'abnormal' and 'normal'. In his later work, however, Quetelet argues that the 'average man' should be seen as an actual human being and 'should not be regarded as an impossible man' (Sposini, 2020: 205). Quetelet links numerous positive attributes to the 'average man' and writes that 'an individual who summarises in himself, at a given time, all the qualities of the average man, would represent at once all that is great, beautiful, and good' (1835b: 289). Here, Hacking (1990) speaks of 'making up people' and points out in *The Taming of Chance* that the rise of statistics in the 19th century laid the foundation for what is now seen as the 'norm'. When society became statistical, according to Hacking, the 'average' was considered as the norm and as normal. This gave the outcomes of data collection a normative, prescriptive function. Today, this way of thinking is still as relevant as ever.

3. The digital norm

Several authors have pointed out how in an 'algorithmic society' (Schuilenburg & Peeters, 2021) the notion of the 'average person' persists. For example, Rouvroy and Berns (2013: 7) write how subjects are taken as 'objects of observation, classification, and evaluation' by automated systems that ultimately direct and 'structure the field of action possibilities of others.' As algorithms are increasingly finding their way into governance practices, one particularly active field is the identification of possible welfare fraud (Peeters & Widlak, 2023; also see Goggin & Soldatić, 2022). Huge amounts of data on beneficiaries are algorithmically analyzed to find patterns between certain citizen profiles and a higher statistical probability of committing fraud. Here, like Quetelet, an imaginary average beneficiary is evoked to identify deviants from the norm. Often, the people falling into a higher algorithmic risk category belong to vulnerable target populations, such as beneficiaries of social benefits or people living in already over-policed urban areas (Angwin, Larson, Mattu, & Kirchner, 2016; Richardson, Schultz, & Crawford, 2019).

Likewise, in a different, but perhaps more prevalent application of digital governance, governments also rely on implicit norms of the average citizen. Automated administrative decision-making is widely applied for routine decisions regarding people's eligibility for benefits and services as well as for processing administrative fines and tax returns (Bovens & Zouridis, 2002). As citizens' digital access and intergovernmental data-sharing expands, the use of digital government portals with citizen authentication mechanisms allows public organizations to shift towards a 'digital by default' application for services and benefits (Lindgren, Madsen, Hofmann, & Melin, 2019; Scholta & Lindgren, 2023). And while this means a dramatic reduction in administrative burdens for most citizens, it implies new forms of access barriers for people with less digital literacy and self-efficacy (Döring, 2021; Linos et al., 2022) or with more complex or incomplete registrations (Larsson, 2021) – affecting especially vulnerable target groups with dependencies on social benefits (Giest & Samuels, 2023; Madsen, Lindgren, & Melin, 2022). The people falling out of the digital 'happy flow' (Larsson, 2021) are, again, the ones that do not fit in the 'digital norm' implicitly assumed in many digital government applications. These are the people that the digital state can no longer see (Ranchordás, 2024) and who face numerous burdens and exclusionary mechanisms (Peeters, 2023).

As noted above, this idea of how policies will affect the average citizen and those falling outside of the 'happy flow' (Larsson, 2021) is connected to the work on the digital divide. This work has considered many factors (Chen & Li, 2021; Soomro, Kale, Curtis, Akcaoglu, & Bernstein, 2020), with a recent review highlighting attributes across nine subcategories that influence the digital divide (socio-demographic factors, socioeconomic factors, personal factors, social support, type of technology, digital training, rights, infrastructure, and large-scale events) (Lythreatis et al., 2022). Authors note that education is one of the most prominent factors shaping this divide (also see Okunola, Rowley, & Johnson, 2017). The digital divide represents a key exclusionary mechanism, since without access to digital services or the ability to use them appropriately one falls outside the digital norm and the digital flow. However, the idea of digital government inclusion is broader. It also focuses on other issues, including equal outcomes among those who utilize / encounter these technologies.

Critical studies point out that algorithmic government and automated decision-making are generally problematic in terms of their transparency (Binns, 2018; Bullock, 2019), accountability (Busuioc, 2021; Wessels, 2023), correction and redress mechanisms (Widlak & Peeters, 2020), data bias (Hannah-Moffat & Maurutto, 2010), data and registration quality (Peeters, Rentería, & Cejudo, 2023), and access to human agents (Ranchordás, 2022). While the 'average man' might be doing well in the world of digital government most of the time, this does not apply to everyone – as the discussion above shows. People with less digital skills or connectivity, people with vulnerabilities and dependencies on state services, people disproportionally targeted by enforcement policies, and people with unusual or incomplete data profiles are more likely to face exclusionary mechanisms in digital government services and applications. Although the target groups of services may differ and different vulnerabilities may emerge in each specific digital government application, the assumption of a statistically or bureaucratically 'normal' citizen risks making the state blind to the problems of those who differ from that norm.

More generally speaking, digital government innovations face the risk of falling into a 'reinforcement trap': policies, services, and applications tend to work well for people that are already doing well, while

ignoring the minorities that suffer detrimental effects. This idea is based on the concept of 'reinforcement politics', coined by Kling and Kraemer (1981) to characterize the tendency of organizational computing decisions to reinforce the traditional distribution of services and values.[1] In their early analysis of computing in local government, Kling and Kraemer found that organizations often use computing to emphasize routine decision-making and bureaucratic control – thereby also inheriting the traditional flaws and pathologies that come with them. Here, we expand this idea to the way citizens are affected by digital government innovations that are often driven by organizational interests in efficiency (Løberg, 2021; Vydra & Klievink, 2019) rather than by other value orientations and social justice.

In sum, the relationship between digital norm and digital government inclusion is that if we only consider the digital norm when developing, implementing and evaluating government technologies, then we will likely exclude different groups from service delivery; thus, failing to achieve digital government inclusion.

4. Policy stages and potential limitations to digital government inclusion

Kaufmann defines the notion of life cycle as 'the study and critique of the making, process, and interactions of data – from one material state to another' (2024, p. 29). To set up a structured discussion of digital government inclusion, we focus on a simple model for organizing the policy life cycle – 1) design and development, 2) implementation, and 3) evaluation. This is a simplified model of the seven-stage model of the policy process developed by Lasswell (1971) and Brewer (1974). This policy model was not developed with a specific policy in mind; it serves as a highly stylized, generic description of how the policy process could work. We use these three stages as an organizing device to consider the way in which we can think about digital government inclusion, and/or the ways in which exclusion can manifest when developing digital government processes.

This section is not necessarily an exhaustive consideration of all of the ways in which exclusionary mechanisms could shape digital governance. In a highly stylistic way, it could describe the life cycle of various government policies, such as COVID-19 vaccination programs, the use of facial recognition technology by law enforcement agencies, or the use of automated systems to sort applications for government hiring. It is important to remember that the policy stages work as a feedback loop, as all policy evaluation can start the process again as policies and practices are reformed. This also means that issues that we consider at one stage likely have implications for inclusion or exclusion at the other stages. We also note that digital exclusion and digital inclusion may coexist for the same individuals interacting with government depending on the type of technology, its use, and objectives; thus, digital inclusion may vary by technologies, programs, etc. across the government.

4.1. Design and development stage: epistemic exclusion

There is a growing realization that technology is not a neutral tool and that desirable and undesirable effects of a technology must be considered from the beginning, at the time of its initial development. After all, in the first phase of the design of an algorithmic model for example – the design and development stage – important decisions are already being made that affect the final outcomes of the model. These include decisions on which (a) datasets and (b) type of algorithms to use. The use of these algorithms can then be incorporated into government policies and practices, which is an important aspect of digital inclusion (Zhao & Zhu, 2024).

With regard to datasets, these can be 'found data' (data collected through a passive, non-observational data collection process) and 'automated data' (data generated automatically by devices and systems). Despite the differences between the two datasets, 'garbage in, garbage out' applies, meaning that when there is 'dirty data' (Das & Schuilenburg, 2020; Richardson et al., 2019) in the sets, the outcomes will also be contaminated. A complicating factor here are algorithms that work on the basis of machine learning and find their own way through the datasets in which they not only evade the view of outsiders, but are also often no longer understood or explainable by the 'screen-level bureaucrats' (Landsbergen, 2004) themselves. All this may also mean that the outcomes of the model will be contaminated and thus may increase the likelihood of discrimination and automated ethnic profiling, for example. At the same time, public values such as 'accountability' and 'transparency' may be compromised (Wessels, 2023).

One possible strategy to mitigate the risks of dirty data is to inform the design phase by a greater diversity of voices and forms of knowledge. One could also argue that there is a need for a 'proper democratic exercise' in the development of algorithmic models. This concerns the issue of 'epistemic inclusion' in knowledge production, the inclusion of different forms of knowledge in the design and development process of new digital tools. Technical knowledge of data-level bureaucrats is necessary in the design and development process of new technology, but there are also other forms of knowledge that are relevant at this early stage (Schuilenburg, 2024). Many practical professions, think of policing and medical professions, have experiential knowledge – knowledge that comes from reflection on one's own experiences (e.g., Collins & Evans, 2007; Gillard, Foster, & Sweeney, 2020). Police officers, for example, use their experiential knowledge, also known as 'tacit knowledge', on a daily basis when viewing images from surveillance cameras in the control room or on the street in contact with local residents. This 'lived experience', as the founder of phenomenology Husserl called it, is part of their arsenal of tools to make a decision or choose a solution in concrete situations, and can be valuable because it shows how AI applications are experienced in practice, with all the emotions and feelings that may play a role, including forms of resistance.

'Epistemic inclusion' is also referred to in the literature as 'transdisciplinarity' (McPhee, Bliemel, & van der Bijl-Brouwer, 2018) and 'integration' (Forsberg, 2014; Zwart, 2023; Zwart & Nelis, 2009). The rationale behind transdisciplinarity is that currently a highly specialized technical knowledge of data professionals – the 'coding elite' (Burrell & Fourcade, 2021; Schuilenburg, 2024) – is leading the development of AI. But knowledge from other scientific disciplines and the lived knowledge from the street can also provide valuable insights for good or proper care of complex techniques.

Transdisciplinary is closely linked to putting together the most diverse team possible when designing new AI applications. This is the issue of 'social inclusion.' Research on the role of gender, diversity, and inclusion in the development of AI shows that the coding elite consists mainly of highly educated white men (Harbers, van der Stelt, & 't Sas, 2024). In the Netherlands, for example, only 16 percent in the ICT sector are women. In addition to a higher proportion of women, there is a need to involve 'silenced voices' of weak, vulnerable, or marginalized groups more in the design and implementation of AI applications, in this case young people or victims of algorithmic models. As Kirklies, Neumann, and Hohensinn (2024) note in their Special Issue (SI) article, the way in which technologies are designed can influence the intention to use the platforms differently across social groups. Also, Van Toorn (2024), in her SI article, points to the importance of diverse groups in design as well as to some of the pitfalls to avoid.

It is conceivable to go one step further and also give non-human entities like animals, plants, and forests a place at the table (cf. Latour, 2017, 2018). Indeed, AI's infrastructure, from training algorithms to the apps on an iPhone, cannot function without energy-guzzling servers in data centers, running computer programs and storing data from social media like X and Instagram and Microsoft Windows

[1] We thank Christian Østergaard Madsen for bringing this work and concept to our attention.

software. Looking at AI's carbon footprint, data centers account for just under 4 % of global CO2 emissions – making them a major threat to the climate. An important role can be played here by 'green scientists,' in the sense that they act as the representatives of the interests of these 'speechless' actors and more or less speak on their behalf in the design and application of AI applications (Schuilenburg, 2024).

4.2. Implementation stage: designing out human agency

Often, problems of exclusion only become apparent in the implementation of government automation initiatives. In exploring these problems, we take cues from the literature on administrative burdens which has identified the barriers that citizens face in their interactions with the state and how these may thwart access to services and benefits to which they are formally entitled (Heinrich, 2018; Moynihan, Herd, & Harvey, 2015). One of this field's main contributions is its emphasis on the distributive effects of access barriers such as complex bureaucratic procedures or enrollment procedures for social benefits (Herd & Moynihan, 2018). Even though formal rules and procedures apply to everyone equally, they do not have the same effects on everyone.

Several studies on the intersection of government automation and administrative burdens have made similar arguments. Automation in administrative decision-making has the potential to simplify most people's interactions with the state by, for instance automating the enrollment in social benefits (Fox, Stazyk, & Feng, 2020; Herd, DeLeire, Harvey, & Moynihan, 2013; Scholta, Mertens, Kowalkiewicz, & Becker, 2019), reducing information barriers (Mekonnen, Hussien, Tilahun, Gelaye, & Mamuye, 2019; World Bank, 2016; Xu & Tang, 2020), and improving procedural justice by reducing discretionary spaces (Busch & Henriksen, 2018; Miller & Keiser, 2021; Nagtegaal, 2021). However, the simplification and formalization underlying automated decision-making (Cordella & Tempini, 2015; Kallinikos, 2005) also clash with citizens' diversity of needs, personal circumstances, human capital, and bureaucratic self-efficacy (Peeters, 2023).

Likewise, the use of algorithmic analyses can increase government efficiency by focusing its limited resources on policing 'hot spots' (Bennet Moses & Chan, 2018), regulatory oversight priorities (Yeung, 2018), welfare and tax fraud (Engin & Treleaven, 2019), and risk assessments in probation (Douglas, Pugh, Singh, Savulescu, & Fazel, 2017) or child protection decisions (Gillingham, 2016), but also raises concerns about the biased nature of input data (Richardson et al., 2019) and the lack of transparency of algorithmic models (Binns, 2018). More specifically, we highlight three forms through which digital government practices can have exclusionary and distributive effects in their implementation.

First, government communication and benefit enrollment through digital channels can place complex cases and people with less digital skills or limited access to technology and internet at a disadvantage. While a majority of citizens are processed through a digital 'happy flow', a significant minority may be faced with, for instance, more burdensome application procedures for social benefits due to the non-routine nature of their case (Larsson, 2021; Roehl & Hansen, 2024) or with the consequences of administrative errors in databases upon which decisions are made (Widlak & Peeters, 2020). Two SI contributions consider the burdens that individuals who fall outside the 'happy flow' may face when interacting with digital government and ways to combat them (Alshallaqi & Al-Mamary, 2024; Ruijer, Dymanus, van Kesteren, Boeschoten, & Meijer, 2024).

Furthermore, people with less bureaucratic self-efficacy (Bisgaard, 2023; Döring, 2021) are more likely to experience problems when having to navigate digital applications or communication channels and a lack of personal caseworker interaction (Linos et al., 2022; Madsen et al., 2022), indicating that the benefits of digitalization are likely not equally distributed across all target groups (Ebbers, Jansen, & van Deursen, 2016; Pieterson & Ebbers, 2020).

Second, algorithms are designed to detect patterns in big data sets and identify individual cases that share certain characteristics associated with a higher statistical probability of displaying certain behavior (Hannah-Moffat, 2019). By using variables such as age, gender, level of education, and residence, they can end up targeting already over-policed or otherwise vulnerable communities (Richardson et al., 2019) and producing biased decisions against individuals from minority groups (Angwin et al., 2016). Although such algorithmic assessments usually assist rather than replace human decision-makers, their influence can be amplified due to various behavioral and psychological mechanisms. Humans have a limited capacity to understand both the workings and outcomes of algorithmic analyses, which is associated with confusing risk with blame (Monahan & Skeem, 2016) and correlation with causation (Hannah-Moffat, 2013).

Furthermore, algorithms may be seen as more rational and neutral than human decision-making, thereby triggering an 'automation bias' (Cummings, 2006). Finally, algorithmic outcomes may provide a justification for certain actions that confirm bureaucrats' attitudes towards specific target groups (Alon-Barkat & Busuioc, 2023) – although there is also evidence that frontline workers' discretion is not curtailed by automated systems (De Boer & Raaphorst, 2021) or that they only follow algorithmic recommendations if these are congruent with their own professional judgment (Selten, Robeer, & Grimmelikhuijsen, 2023).

Third, the increased use of intra- and supra-organizational data sharing for both algorithmic risk modeling (Yeung, 2018) and the determination of benefit eligibility (Peeters & Widlak, 2018) not only triggers questions of data quality control (Van Donge, Bharosa, & Janssen, 2022) or back-office interoperability (Bekkers, 2007), but also affects the ability of both operational staff and citizens to understand the reasoning underlying administrative decisions (Peeters & Widlak, 2023) and to correct or seek redress for decisions based on erroneous government data (Busuioc, 2021; Widlak & Peeters, 2020). Schuilenburg and Peeters (2024) speak of a 'data-level bureaucracy' and point out that as the responsibility for data collection, exchange, and analysis is allocated to a separate provision, a separation is created between data ownership on the one hand and primary administrative decision-making processes by all organizations that use these data on the other hand (see also: Peeters & Widlak, 2023). This makes it, in principle, unknown how data analysis or data mutations play out in all primary processes and, conversely, often obscures the informational foundations of decision-making for operational staff – thereby affecting the ability of an organization to provide motivated and proportional administrative decisions (Schuilenburg & Peeters, 2024).

These implementation problems point not only to a particular design problem, given algorithmic government's statistical abstractions of population groups and digital government's one-size-fits-all logic of formalizing and standardizing citizen-state interactions, but also to two other explanatory mechanisms. First, as the discussion above indicates, exclusionary mechanisms tend to emerge as the human factor is designed out or crowded out of administrative decision-making. This may be a result of design choices that reduce operational discretion – as is, for instance, the case in routine processing of relatively simple administrative procedures (Bovens & Zouridis, 2002) or in the separation between data ownership and administrative decision-making of back-office integration (Peeters & Widlak, 2023; Schuilenburg & Peeters, 2024) – but may also follow from the way information technology and algorithmic analyses impact the way human decision-makers use their discretion. These issues are explored in detail in this SI in the case of financial lending, highlighting important design principles to apply in developing these systems (Sulastri, Janssen, van de Poel, & Ding, 2024).

Second, and closely related to issues concerning the evaluation phase of government automation practices, is the difficulty of changing digital government structures. As Bovens and Zouridis (2002) already pointed out, information technologies are designed at the system-level whereas administrative decisions are made at the operational or street-level. In other words, the technologies that shape the incentives and constraints of decision-making for individual citizens are designed at a higher

institutional level and by different actors than those subjected to them. Following insights from institutional analysis (Ostrom, 2005), this explains why it is often so difficult to realize institutional change (Thelen, 2004); it requires the functioning of feedback mechanisms that allow experiences at the operational level to reach decision-makers at higher institutional levels. Moreover, there are usually high financial and other transaction costs involved in any institutional overhaul or reform. Often, therefore, problems inherent to the design of certain government automation practices remain stuck at the operational level, where frontline workers have to cope with them one way or the other.

4.3. Evaluation stage: impeding feedback and adaptation

Evaluation is a key element in the use of automation technologies in government, as it is important to understand whether the technology is aiding the government in achieving its policy goals and whether any shifting from the original intent has occurred. Ensuring inclusion in these processes is crucial as these decisions can include adjudication between different definitions of concepts like fairness (Corbett-Davies, Pierson, Feller, & Goel, 2016). Moreover, different digital systems pose different challenges for accountability and hold different risks for society (Krafft, Zweig, & König, 2022), underscoring the significance of inclusive evaluative processes for understanding these risks and designing effective regulatory systems.

As noted above, there are a number of challenges to transparency and accountability in the use of digital governance, which create exclusions in the evaluation process and limit the ability to assess implications. Outside black-box algorithms, which are opaque by design, even the use of interpretable algorithms pose challenges to inclusion in the evaluation process (Busuioc, 2021). Some systems are proprietary and are, therefore, excluded from a full evaluation process. The complexity of digital systems may act also as an exclusionary barrier in evaluation, potentially limiting who participates in assessments and whose voice is given priority. In the same way that the 'coding elite' makes important choices in the design phase of digital technology, it could also dominate the evaluation of these systems. Townley and Koop (2024), in their contribution to the SI, highlight the issue of exclusion and consider the way in which regulatory agencies could incorporate citizen knowledge to ensure information accessibility. Moreover, the disconnect between data owners and data users creates further information asymmetries, limiting the realization of full evaluation (Peeters and Widlak, 2023).

An inclusive evaluation process also requires knowledge about how automation technologies are involved in government operations. The public is largely unaware of the extent to which digital technologies are used in government (Pittsburgh Task Force on Public Algorithms, 2022). For example, in a November 2021 survey, 20 % of US adult respondents reported that they had heard or read 'nothing at all' about police use of facial recognition technology (21 % reported hearing/reading a lot and 58 % a little) (Pew Research Center, 2022). This is after a number of cities and states had either banned or limited the use of facial recognition technology, starting with San Francisco in 2019. Importantly, individuals whose interactions with the government have involved algorithmic interventions may be unaware of this reality (Metz & Satariano, 2020). Thus, calls for full disclosure of the use of algorithmic systems have proliferated, as online public registries and other disclosure mechanisms would help to demystify the use of these systems and promote inclusion in the evaluation process (Reisman, Schultz, Crawford, & Whittaker, 2018; Selbst, 2017).

Feedback also poses challenges for inclusion in the evaluation process (Levy, Chasalow, & Riley, 2021). The use of dirty data that include patterns of bias can affect the design and implementation of algorithmic systems; however, these biases can be exacerbated through feedback loops, which can occur when decisions based on algorithms are fed back into training data. We can also see feedback when people adjust their behavior to account for the algorithmic system. Evaluation systems may further existing patterns of exclusion if these kinds of feedback are not considered, as the system may appear to be achieving policy goals (at least under some definitions of success).

In a related sense, there is a concern about the quality of human oversight of algorithmic systems, including failure to challenge algorithmic decisions or misjudging the accuracy of automated outputs (Green, 2022). Public participation in evaluation, repeated points of assessment, and external auditors are important to help promote accountability and transparency in digital governance systems. These mechanisms also serve to improve public attitudes towards government generally (Miller & Ruder, 2020) and the use of digital technologies in government. For example, individuals have more confidence in algorithmic decisions if a human is involved in reviewing the decisions (Waldman & Martin, 2022; Keiser and Miller, 2025). However if meaningful, quality oversight is missing, the evaluation procedures could further exclusion in government processes and legitimize problematic systems (Green, 2022).

In Table 1, we summarize our main claims regarding exclusion in digital government.

5. Examples of digital government inclusionary practices

As discussed in Section 4, digital technologies are not neutral and the (dis)values embedded have real consequences for different people and groups. This suggests that these technologies must be designed and implemented with care and consideration of public values such as non-discrimination, accountability, and transparency. In this section, following some of the exclusionary issues highlighted in Section 4, we illustrate some practices that might help in promoting digital

Table 1
Summary of claims regarding exclusion in digital government.

Policy stages and potential limitations to digital government inclusion	
Policy stage	Limitations to digital government inclusion
Design and development stage	
	The use of 'dirty data' can contaminate the development of technologies and outcomes.
	The use of algorithms that cannot be explored can lead to a lack of awareness about the exclusion created.
Implementation stage	
	Government communication and benefit enrollment through digital channels can place some, for example those with less access to technology, at a disadvantage.
	Given the way in which they are designed and the data used, algorithms can end up targeting already vulnerable communities and potentially producing biased decisions against individuals from minority groups.
	Algorithmic decisions could replace professional judgment, potentially perpetuating or exacerbating bias in decision-making.
	The increased use of intra- and supra-organizational data sharing for both algorithmic risk modeling and the determination of benefit eligibility affects the ability of both operational staff and citizens to understand the reasoning underlying administrative decisions and to correct or seek redress for decisions based on erroneous government data.
Evaluation stage	
	As at the design stage, the use of algorithms that cannot be explored can impede discovery of exclusionary issues in government technology use.
	A lack of public knowledge about how automated systems are used in government can also inhibit full evaluation.
	Evaluation systems may further exacerbate patterns of exclusion if different kinds of feedback (e.g., from dirty data or human behavioral adjusting responses to automated systems) are not considered, as the system may appear to be achieving policy goals (at least under some definitions of success).
	Evaluation processes could further exclusion in government processes and legitimize problematic systems if meaningful, quality oversight is missing.

Note: This serves as a summary of Section 4; it is not intended to be an exhaustive list of all potential limitations to digital government inclusion.

government inclusion. Such issues are not new, but have a long and often neglected history within the digital realm. There are numerous initiatives that aim to achieve forms of digital government inclusion at each of the three stages identified above (e.g., He and Liu, 2024 and Ullah, Niu, & Meo, 2024, for example). In this section, we look at some of these best practices with the aim of providing an – albeit incomplete – overview of ways to mitigate the exclusionary mechanisms in digital government outlined above. For the selection of these best practices, we take inspiration from both the articles included in GIQ's special issue on ´digital government inclusion´ as well as other relevant selected readings. It is important to note that our goal in selecting cases was to provide examples, not conduct a systematic analysis.

5.1. Inclusion in the design and development stage

As argued above, other forms of knowledge beyond the technical knowledge of ICT-experts and data-level professionals are needed to strengthen public acceptance of automated systems used by governmental agencies. Hereby, the involvement of stakeholders and citizens in the design and development stage of digital technology should be encouraged. A concrete example of this is the inclusion and involvement of marginalized communities in the research and design of digital technology. Marginalized communities — such as racial, religious, and ethnic minorities; women; migrants and refugees; persons with disabilities; the elderly; the LGBTQ community; and people living in poverty — are often excluded from the design of digital technology (Kempin Reuter, 2019).

In the city of Chicago, scholars Harrington and Dillahunt (2021) conducted a case study consisting of a series of remote co-design sessions with Chicago-based youths. Their goal was to examine co-design and futuring through speculative design fictions and storyboarding as methods to envision utopian and dystopian futures. They held six virtual design sessions, which lasted approximately 2 h each at the Arts Incubator, a local arts engine run by a neighboring university, in South Side Chicago. One of their aims was to research how co-design can support the generation of ideas for a utopian future for Chicago youth. Based on their findings, Harrington and Dillahunt argue that speculative design and design fictions can help to elicit radical visions and social, political, and cultural dimensions that are valuable to equitable design and innovation.

In the Netherlands, the National Police is experimenting with so-called 'ethics tables.'[2] The 'ethics table' is a working title focusing on whether certain techniques should be used to improve security and public safety. These include the use of smart cameras and sensors in the fight against mobile banditry ('Sensing-project') and the employment of facial recognition to combat vandalism and racism in football stadiums. Key questions here are how these techniques can be applied in these contexts in a way that does justice to important public values such as privacy and trust in the police. Initially, only police participants were represented at these ethics tables. However, the Dutch police have since developed this initiative further and actors from outside the police organization are also invited.

In their contribution to the Special Issue on 'digital government inclusion', Kirklies et al. (2024) explore the way in which design can influence the intention to use digital platforms differently across social groups (see also Miller, Song, & Keiser, 2023). Focusing on gender, they find that 1) under the default design, women are less willing to engage with the digital platform, and 2) simple design modifications, such as verbal and visual changes, increase women's intentions to interact with the platform. Their work highlights the importance of considering either the design preferences of a target group or selecting a neutral design. It also points out that identity-affirming messages can be signaled through small visual and verbal cues, though noting that, in their case, only using verbal cues might backfire, suggesting a holistic approach to design is likely superior.

Van Toorn (2024), in her contribution to the SI, analyzes the opportunities and challenges of disability inclusion through a qualitative case study of participatory digital government in Australia. The case is about "Nadia", an artificially intelligent virtual assistant created in 2016 through a co-design approach that ultimately ended in failure, as the project never progressed beyond the design stage. Based on interviews with technology developers, government representatives, and people with disability who had input into the design of Nadia, the article identifies important aspects of digital government culture, organization, and practice that impede disability co-design, namely, a lack of institutionalized support and resistance to sharing power. In doing so, she offers valuable lessons for more inclusive and participatory digital design.

5.2. Inclusion in the implementation stage

The inclusion of the human factor in the implementation of government automation initiatives has been emphasized by numerous authors as a means to improve procedural justice and fair treatment (Ranchordás, 2022; Schuilenburg, 2024), deal with 'hard cases' that fall between the cracks of routinized decision-making (Larsson, 2021; Roehl & Hansen, 2024), help people with limited self-efficacy and digital literacy (Bisgaard, 2023; Chohan & Hu, 2020; Döring, 2021; Madsen et al., 2022), and provide ways for citizens to seek redress and correct administrative errors (Busuioc, 2021; Widlak & Peeters, 2020). Designing out human agency leads to a ´machine-like´ implementation of digital government and automated decision-making that blinds organizations from the reasoning underlying their decision-making procedures in general and from adverse consequences for individual cases in particular (Peeters & Widlak, 2023).

A concrete example of making space for human agency in the roll-out of massive government automation processes is the implementation of COVID-19 vaccine programs (Peeters et al., 2023). In many countries, governments relied on digital systems and government portals to organize the allocation of vaccines to vaccination sites and the appointments of citizens to get a vaccine and documented proof thereof. For instance, citizens and residents of the Netherlands were able to schedule individual vaccination appointments at a time and location of their choice through an online appointment system. This provided the vast majority of citizens and residents with a predictable, reliable, and plannable procedure that involved little paperwork, stress, or waiting times. However, additional mechanisms were organized to provide specific target groups with access to a vaccine. Individual appointments could also be made through a national telephone number for those who did not have access to the government portal.

Furthermore, a small group of people needed to be targeted differently because they faced problems using the appointments system either as a result of health issues (such as elderly people or people with mental health issues) or as a result of a lack of access (such as inmates and people experiencing homelessness). To identify and approach these last two groups, general practitioners, social workers, and other frontline staff were asked to provide government with simple Excel-lists or temporary registration systems on digital devices. The recognition that a fully automated roll-out of the vaccination program would exclude significant population groups led governments in the Netherlands and elsewhere to organize additional modalities with an emphasis on human agency. Thereby, the COVID-19 vaccinations programs provide evidence that governments can actively choose to make a concerted effort for inclusion, especially when reaching vulnerable target groups is at stake. The challenge, of course, is trying to provide the same level of service across the different modalities.

In the SI on digital government inclusion, two contributions

[2] Begeleidingsethiek bij de politie, https://begeleidingsethiek.nl/wp-content/uploads/2023/01/2019-11-Begeleidingsethiek-bij-de-politie-Verslag-Ethiektafels.pdf (visiting date: 21 January 2025).

highlight the role of 'digital intermediaries' or 'data intermediaries' to compensate for the burdens that citizens may face when interacting with digital government (see Giest & Samuels, 2023 for another example). First, Alshallaqi and Al-Mamary (2024) consider administrative burdens connected to digital governance when private, for-profit street-level intermediaries exists to connect people and street-level bureaucracies. In their Saudi Arabian case study, they find that private intermediaries may ameliorate the issues of digital exclusion by providing access; however, they also benefit from maintaining this digital exclusion, placing greater financial burdens on those who are digitally disadvantaged. This points to the value of multiple avenues by which to interact with the government that are free of charge, and also the possible role that non-profits could play in this space, at least in countries with robust non-profit sectors.

Second, Ruijer et al. (2024) explore a Dutch case of the 'living lab methodology' in a vulnerable neighborhood. In a 'living lab', citizens and civil servants work together on an open data initiative to address concrete problems. It offers a collaborative environment to enhance a community's awareness and capacity for interpreting and using data and, subsequently, for enabling people's engagement in processes of joint learning and deliberation. Simply making data accessible is not enough. The role of (public or private) 'data intermediaries' emerges as crucial for the inclusion of people who, initially, might not understand data or have no clear incentive to participate in open government initiatives.

5.3. Inclusion in the evaluation stage

While organizing feedback and learning mechanisms is complex in any aspect of public policy and public administration, digital government inclusion presents some particular challenges. As mentioned above, the opaque nature of algorithms and the designing out of human agency in automated decision-making may make organizations blind to the rationales underlying their own analyses and decision-making (Peeters & Widlak, 2023) as well as to the quality of the data underlying them (Van Donge et al., 2022). However, there are several documented examples of digital government initiatives that have explicitly organized user- and citizen-feedback to improve inclusion.

For instance, in the US, the Rehabilitation Act (Section 508) requires federal government websites to be accessible to people with disabilities. Researchers have explored the utility of a user-centered approach to evaluation to ensure compliance with Section 508 (Jaeger, 2006, 2008). Along with others, this approach specifically brings people with disabilities into the assessment process, gathering and analyzing their feedback about website accessibility. When conducting a multimethod evaluation of federal government website accessibility, Jaeger found that: 'The user testing enriched the findings of the expert testing: The expert testing provided breadth, while the user testing provided depth' (2008: 28). He suggests that the combination of evaluation methods: user-testing, expert-testing, and Webmaster questionnaires, 'helps address the limitations of the methods individually' (2008: 31). This example highlights the value of inclusive evaluation processes to ensure that the issues faced by all users are understood and can be addressed.

In their contribution to the SI on digital government inclusion, Townley and Koop (2024) analyze the way economic regulatory agencies may learn from citizens through digital mechanisms. The regulatory activities of, for instance, energy and financial conduct authorities can be vastly improved by enabling 'customer intelligence', or including information on how and why citizens purchase certain products, what barriers they face in seeking to access certain services, and how they will respond to proposed regulatory remedies and other interventions, as well as 'political input' or acquiring information about the priorities, preferences, and views of citizens in relation to regulated markets. Concretely, regulatory agencies might be interested in citizens' perspective on energy price setting, rules for 'big tech' companies, or access to railway services for people with disabilities. Townley and Koop discuss various citizen engagement tools and analyze them on their capacity for 1) epistemic inclusion (or people's ability digest regulatory information) and 2) social inclusion (or the extent to which relevant population groups are represented). They recommend that regulatory agencies blend strategies and include human monitoring and engagement to make information accessible and understandable.

5.4. Some critiques and potential concerns about inclusionary practices

While these practices have the potential to lead to advancements in inclusion in automated governance, they are also potentially subject to tradeoffs that negate any real movement towards inclusion. For example, many of the examples call for ensuring the involvement of stakeholders and citizens in the development and application of digital technology, particularly at the design and evaluation stages. However, these processes could easily be coopted by powerful, well-resourced interests as opposed to those who would benefit the most from providing input geared towards inclusion. Also, in the implementation stage, the discussion of digital intermediaries points to a possible avenue for powerful interests to play a significant role in the system, as well as have an interest in the continued existence of digital exclusion to protect their role, as noted above. The potential for these processes that are designed to promote inclusion to be coopted by well-resourced interests is an important consideration, and one that practitioners need to bear in mind as a potential issue when developing these types of processes such that incentives may be created to help align the goal of digital government inclusion.

In Table 2, we summarize our main examples of digital government inclusionary practices.

6. Discussion

Because so much attention goes into the design of government automation practices, it is easy to overlook other areas of opportunity to develop inclusive mechanisms. There are several reasons for this. First, digitalization is a system- or even 'data-level intervention' in the decision-making practices of public organizations (Schuilenburg &

Table 2
Examples of digital government inclusionary practices.

Examples of digital government inclusionary practices	
Policy stage	Examples of inclusionary practices
Design and development stage	
	Involvement of stakeholders and citizens in the design and development stage of digital technology. It is important to try to guard against these processes being co-opted by power third party groups.
	Involvement of stakeholders and citizens in the design and development stage of digital technology needs to be coupled with key factors including institutionalized support and mechanisms to facilitate power sharing.
Implementation stage	
	Governments can offer different modalities for applications, enrollments, etc., especially when reaching vulnerable target groups is at stake. The challenge, of course, is to try to provide the same level of service across the different modalities.
	Digital intermediaries can be used to compensate for the burdens that citizens may face when interacting with digital government. However, these intermediaries can create inequalities by charging fees for service, etc. It is also important to recognize the power that this could hand to third party interests, especially those who have a stake in ensuring digital exclusion remains.
Evaluation stage	
	Similar to the design stage, governments can use explicitly organized user- and citizen-feedback to improve inclusion in government technologies. As noted, these could be co-opted by powerful, well-resourced groups, which is an important consideration.

Note: This serves as a summary of Section 5; it is not intended to be an exhaustive list of all potential practices to help achieve digital government inclusion.

Peeters, 2024). Although it is well-documented that digital government affects frontline work (Busch & Henriksen, 2018), the technical design itself is aimed at organizing work and information flows from the top to create an environment that structures and guides individual decision-making. Inherently, it is concerned with the standardization and formalization of working procedures (Bovens & Zouridis, 2002), with organizing forms of intra-organizational data collection (Bekkers, 2007), or with statistical analyses that require a certain level of abstraction (Zarsky, 2011).

Second, a significant part of the discussion is concerned with government efficiency rather than with the implications for citizens and their access to the state (Løberg, 2021; Vydra & Klievink, 2019). This is true for academic debates but especially for the practical considerations of public organizations that may face budget constraints that make automation an economically attractive option, political pressure to improve enforcement efficiency, and accountability concerns to justify administrative decision-making by using information resources and standardization protocols.

Third, the actual design of government automation tools is the specialized and technical work of IT designers and data-level professionals (Bovens & Zouridis, 2002; Schuilenburg, 2024; Schuilenburg & Peeters, 2024). Their expertise is usually more technical rather than legal and more focused on high-level design than on the frontline impact. Conversely, neither the general public nor most civil servants have the technical skills or practical access to understand, monitor, and control the proper design of algorithms and IT tools (Carlson, 2017; Pasquale, 2015).

And fourth, we – often rightly – seek solutions at the same level at which problems occur. If algorithms make biased analyses or predictions, we turn to critically analyze the data input and statistical models (Hannah-Moffat & Maurutto, 2010). And if automated decision processes lead to erroneous, disproportional, or unintended consequences for citizens, we turn to strengthening accountability mechanisms (Busuioc, 2021).

However, a different perspective also emerges from the contributions brought together in this Special Issue and from recent studies that use the citizen perspective to analyze the consequences of digital government. Perhaps we are demanding too much when trying to achieve the perfect design or the perfect predictive model. Exclusionary mechanisms are inherent to any form of decision-making. The legal frameworks that structure decision-making in the classic Weberian bureaucracy can produce pathologies that make procedures opaque and burdensome (Klagge, 1997). The discretionary space used by street-level bureaucrats can lead to discriminatory, biased, or arbitrary decision-making (Andersen & Guul, 2019; Brodkin, 2007; Miller, Witko, & Woods, 2018). And, as we discussed above, the rule-based or learning algorithms of data-level bureaucracies can prove to be straightjackets that stifle an organization's ability to understand and influence the real-life consequences of its decisions. A fundamental weakness of approaches that seek to improve the design of IT tools is that these are top-down interventions that are fundamentally inadequate to understand the differential and distributive effects of digital government on citizens and subsequently unable to adapt to the necessities of those realities. Analyses from the citizen or frontline workers perspective complement our understanding by demonstrating how – probably well-intended – digital government initiatives produce unintended consequences that they often can neither prevent nor easily correct.

Moreover, such bottom-up approaches point towards the importance of additional mechanisms through which the state can relate to citizens. Inclusion appears most often achieved where frontline workers can place a distance between their own decision-making and the digital tools assisting them, and where cases that do not fit the digitalized 'happy flow' are saved from exclusion by organizing alternative, more personal, workflows. These findings are consistent with studies on frontline work in contexts where formalization with the bureaucracy limits capacities to implement policies and provide services. Locally and socially embedded frontline workers emerge as crucial actors to broker the relationship between distant formal rules and procedures on the one hand and citizen's lived reality on the other hand (Bhavnani & Lee, 2018; Peake & Forsyth, 2022). Rather than assuming the possibility of designing a perfect fit between bureaucratic structure and social reality, studies highlight the importance of improvisation and repair (Campos & Peeters, 2022; Masood & Nisar, 2022). There is an acceptance of a fundamental 'brokenness' and an awareness of the need to organize repair mechanisms in the cracks between design and implementation (Jackson, 2014). Likewise, inclusive digital government depends on complementing design-focused solutions with mechanisms that allow frontline workers and citizens to correct or repair undesirable outcomes (Ranchordás, 2022).

7. Conclusions

In terms of concrete ideas for mitigating exclusionary mechanisms, we highlight three concrete ideas – without the pretension of being exhaustive. First, user-based design can help include the perspective of citizens beyond concerns of mere efficiency. Representation, fair outcomes, and attention to digital access and skills can be voiced in the design phase of digital tools and applications.

Second, in the implementation of government automation the idea of access to human agents is important to address the concerns of people who fall through the cracks of digital bureaucracies, who find themselves outside of the 'happy flow', or who lack the skills to navigate digital tools and procedures. The idea of 'data intermediaries' (Ruijer et al., 2024) or frontline workers who broker the relationship between the digital state and vulnerable citizens, is an example of the way government organizations can identify and accommodate to these concerns. They can help citizens navigate digital bureaucracies, for instance, through screen sharing tools to guide people through procedures (Madsen, Lindgren, Rýden, Skaarup, & Hjelholt, 2023).

Third, in terms of evaluation, the organization of feedback mechanisms – by both citizen-users and frontline workers – is a crucial source of information to identify problems and organize adjustments in either design or implementation of digital tools. Not all problems can be foreseen in the design phase. Unexpected issues may emerge over time. Time is often an important dimension in the evaluation process, as different issues may emerge and items that seemed like potential issues may be discovered at the evaluation stage to be inconsequential. Thus, evaluating digital tools on the backend by including multiple stakeholders and on a continuing basis is a key way in which to mitigate exclusionary practices.

As noted, these ideas are by no means exhaustive and will likely continue to evolve as our reliance on digital tools in the public sector and the ways in which we utilize these tools evolves. It will be crucial to continue to center inclusionary mechanisms for digital practices as we design, implement, and evaluate these tools going forward.

Some key limitations to implementing these practices reflect challenges in implementing many policies. These challenges include resource constraints, which could be budgetary in nature but also include staff time and expertise. There might also be an unfavorable political climate, which could limit the adoption of some of these practices. As noted above, another challenge is trying to ensure that input gathered from stakeholders is actually reflective of all stakeholders and is not dominated by powerful interests. These are some of the practical challenges that can arise when trying to achieve digital inclusion.

Future work exploring digital government inclusion could provide insight into how these limitations above might be overcome in the digital space. While some issues, such as financial constraints, cannot be readily overcome, it might be possible to mitigate others. For example, can different types of digital intermediaries or ensuring that these services are free of charge reduce concerns regarding the potential lack of goal alignment and the extent to which powerful interests will

dominate? Or what are the broader policy feedback implications of digital inclusion? It will also be essential for future work on digital government inclusion to continue to question what practices really lead to greater inclusion and which ones are more symbolic without serious consequences that move the needle on inclusion.

CRediT authorship contribution statement

Rik Peeters: Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Susan M. Miller:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Marc Schuilenburg:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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