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Chapter Seventeen

Automated discretion

Stavros Zouridis, Marlies van Eck and Mark Bovens

17.1 Introduction: 'Computer says no'

The film *I, Daniel Blake,* directed by Ken Loach, describes the administrative struggles of an elderly carpenter who suffered from a heart attack. After taking a work capability assessment he is deemed fit for work, even though his doctor does not allow him to return to work. He gets lost in the bureaucracy, because he is a computer illiterate and most of the forms have to be filled in online and are processed digitally. His case managers, bound by their pre-programmed decision systems, are unwilling and unable to empathize with him and to do justice to his personal circumstances.

The story of Daniel Blake is a rather dramatic illustration of a general trend. The use of information technology (IT) has caused the discretionary freedom within large-scale public executive organizations to shift from professional case managers to programmers and data analysts. This is particularly true of the 'decision factories', those large-scale bureaucracies that routinely make decisions on social benefits, licences, tax returns, fines, subsidies and, to an increasing extent, permits. The same shift also seems to occur in law enforcement organizations that apply data science to optimize their resources and intervention strategies. Whereas previously, these organizations employed massive amounts of 'street-level bureaucrats', today these organizations are more properly understood as 'system-level bureaucracies' (Bovens and Zouridis 2002). In these 'system-level bureaucracies', the basic principle of 'unit production', which involved human judgement for each individual case, has been replaced by 'continuous process production' (Woodward 1958/1975). Decision making by automated decision systems based on algorithms has pushed aside human judgements based on rules of thumb. In colloquial terms: it is the computer that says ´yes´ or ´no´.

This chapter describes how information technology, such as automated decision systems and big data analysis, has transformed large executive organizations into system level bureaucracies. In these system level bureaucracies, the discretionary powers of the street-level professionals have been disciplined by digital systems, and the locus of administrative discretion has shifted to those responsible for programming the decision-making process and translating the legislation into software.

Our analysis is limited to large 'production agencies' (Wilson 1989), such as the internal revenue services, departments for work and pensions, and social security agencies. We make no claims about more traditional street-level bureaucracies, such as the police, social work, schools, or courts – although some of the trends we describe can be observed there too. Intelligent and predictive policing are already transforming police organizations and shifting policing from street-level bureaucrats to systems designers and data analysts (e.g. Guilfoyle 2013). Even although police professionals still do street-level work, computer algorithms decide on where police capacity is send to and how policemen work. Data science allows these organizations both to zoom out and analyse patterns on the macro level and to zoom in and focus on particular cases. For example, doppelganger search using big data analysis is used by Amazon to personalize the offer for individual clients, but it also can be used to detect citizens who commit tax fraud (see Stephens-Davidowitz 2017). These shifts have raised and will raise fundamental questions about the constitutional and democratic checks and balances (Bovens & Zouridis 2002).

We first discuss, in the next section, the rise of system-level bureaucracies, based on our own work and on recent research. In sections 17.3, 17.4 and 17.5 we outline observable changes in the system-level bureaucracy. These are explored in greater detail, based on two recent case studies. In section 17.6, we take stock of our findings. Have the developments described given rise to a 'new' phase in the development of large-scale administrative organizations and, if so, does this not evoke new questions about checks, balances and accountability? We also explore the significance of IT for the future of discretion in public administration.

17.2 The rise of 'system-level bureaucracies'

From street level to system-level bureaucracy

In 2002, Bovens and Zouridis (2002) first presented the 'system-level' bureaucracy as the tentative result of a transformation of a series of large 'decision-making bureaucracies', such as tax departments, social security agencies, and agencies that collect traffic fines. Inspectorates and regulatory authorities, charged with the supervision of permits, benefits and taxes, also come under this heading. The core of the executive tasks of these organizations consists of making decisions that concerned individual situations - good examples would be a tax return, or a traffic fine, an exemption, a building permit, a social security benefit, or a decision on whether or not to prosecute a crime suspect.

For a long time, these organizations exhibited many of the features of what Lipsky (1980) called a 'street-level bureaucracy'. In a street-level bureaucracy, the operational activities – which involve directly interacting with individual citizens and making decisions – constitute the core of the organization. Street-level bureaucrats, who perform their jobs at 'street level', operate in conditions that are shaped by scarcity and discretion.[1] There is scarcity due to the shortage of resources, compared to the task to be done. In order to fully check each individual tax return, far more people would be needed than the tax authorities have available; to gather all the information about each building permit would demand far more capacity than the municipality could muster; and conducting a full assessment of the personal situation of an individual applying for welfare benefits would require more of the social services' time and attention than is available. In short, scarcity is the order of the day, which means that choices must be made.

A second characteristic of street-level bureaucracy is that the rules and regulations leave room for professional discretion at the executive level of the organization. Hence this means that one and the same situation can be weighed differently. For example, is the failure to comply with the fire safety regulations in a permit serious enough to warrant the revocation of the permit?

The 'street-level bureaucracy' has been characterized by Mintzberg (1983) as a professional bureaucracy. The operating core is the most powerful part of the organization. Its job is mainly the deployment of pre-defined standard repertoires, such as a welfare benefit, permit, exemption, fine, tax assessment, prosecution, adjudication. The professionals 'fight' to secure their power to make decisions. IT has changed this type of organization dramatically in the course of a few decades. That transformation began with the introduction of early and rather primitive forms of IT in the sixties and seventies of the previous century. At the time, decision making on such matters as individual benefits, levies and permits was still predominantly the domain of street-

level bureaucrats within municipal services and other public institutions. Street-level bureaucrats formed the core of the implementing organization. They worked on a case-by-case basis, and usually knew the person applying for benefits or a permit personally. In many cases, there was also personal contact between the street-level bureaucrat and individual citizen about the benefit, permit, or levy.

For a number of reasons street-level bureaucrats enjoyed a great deal of discretion. There were at that time virtually no detailed rules in many policy areas in the Netherlands, and a minimum of external checks (Ringeling 1978). In the Netherlands, up to and including the 1980s, there was no independent judge for administrative affairs, extensive audit systems were lacking, and external accountability was largely absent. There were some hierarchical constraints, as the immediate superior of the street-level bureaucrat either supervised the process or signed the decision. Staff positions and senior line positions were limited and played no role of significance in day to day activities. It was primarily the culture of the organization that circumscribed the discretionary power of these bureaucrats. Informal codes shaped the interpretation of the discretionary space – women students, for example, received a lower study grant, because they were supposed to be able to sew their own clothes.

Initially, the primitive level of IT served mainly to set down on paper the decisions of the street-level bureaucrats neatly and legibly with the help of word processors and printers. Over the course of time, IT systems were able to handle more and more tasks: for example, the motivations became standard blocks of text. Later on, algorithms were developed for the decision-making process and included in the system as a tool for the professional. Yesterday's street-level bureaucrat thus evolved into a *screen-level* bureaucrat, mainly engaged in entering forms into the automated system and in checking the decisions that the system spits out. Discretion, to the extent available at all, was applied in the interpretation of the information on the form and the input process itself. What remained was the manipulation of the information to achieve the desired outcome. In the course of the 1990s, the input of the forms was also automated. And with the arrival of the internet, citizens increasingly had to fill in the forms themselves, online, as had Daniel Blake.

The introduction of decision-making systems has fundamentally changed this type of street-level bureaucracy. No longer do the street-level bureaucrats form the core of the organization, but those who build and refine the systems. They have, as it were, become the new street-level

bureaucrats, although they never see an individual case. The management of the organization no longer primarily revolves around the legitimate processing of applications, but around the management of 'production'. The substantive content of the decisions made is controlled via detailed rules and regulations that correspond, as far as possible, with the algorithms in the systems. Where necessary, the law is adapted or concepts are harmonized in the rules and regulations. No longer is there frontline control via the hierarchical structure. The management only checks the 'production' in the quantitative sense. In complex legal contexts street-level bureaucrats can still manipulate the way they feed the system with information and keep discretion with regard to individual cases. In these legal contexts management will preserve some control on the content of the cases or only focus on the hard cases that cannot be dealt with by the information technology. In general the technostructure controls the systems and an independent judge reviews the individual decision in case of appeal. Because of the detailed regulation that is necessary in order to automate decision making processes the independent judge also has limited discretion.

We therefore referred to the organization that evolved at the start of the new millennium as a *system-level* bureaucracy, alluding to the fact that the IT-system may be regarded as the core of the bureaucracy. In system-level bureaucracies the human organization is built around the information system that implements the core task of the organization. As Mintzberg (1983) put it, the organizations have been transformed into machine bureaucracies: no longer is the operating core the most powerful part of the organization – this role has been taken over by the technostructure, which structuralizes the work to be performed. From the point of view of Wilson's framework (1989), organizations have become mere 'production agencies'. Discretion, of the kind previously available, has transformed. First, it shifted to discretion exercised in designing the IT systems. Second, as noted, in some cases the professionals still feed the IT systems and they can thus still control their inputs.

Recent research

The studies on system-level bureaucracies published since 2002 have, in part, confirmed the conclusions drawn back then. Research into 'e-enforcement' by inspectorates has demonstrated, for example, that information technology curtails the discretionary leeway enjoyed by inspectors. However, inspectors still exhibit strategic behaviour, thus safeguarding their discretionary powers

(Koopmans-Van Berlo and De Bruijn 2004). Moreover, research conducted by Jorna and Wagenaar (2007) has revealed that in system-level bureaucracies, leeway for interpretation and freedom of choice is preserved at the operational level. Discretion, instead of shifting, is concealed. Deploying IT causes the personal ties between operational practice and other, more technostructure-oriented practices to be severed. The monitoring of operational practice by legal advisors, the drafting of rules by policymakers, management by middle-level and top-level officials, the judicial reviews of the administrative court and the internal checking process following from objection procedures, all serve to illustrate this. In the analysis framework developed by Argyris (1994), these practices may be connected in two ways: by means of 'artefacts' and with 'participatory boundary practices'. 'Artefacts' are, for example, work instructions, reports or management information systems. 'Participatory boundary practices' require human interaction. IT replaces 'participatory boundary practices' with 'artefacts' and this, according to Jorna and Wagenaar touches on the fundamental significance of IT. On the basis of two Dutch cases, Jorna and Wagenaar demonstrate that, with IT, the personal ties between the said practices are replaced by artefacts, which not only affects 'managerial' practice but can also lead to the disintegration of the organization.

The disintegration theory has been confirmed by the work performed by Marston (2006). Further disintegration can arise in the organization and especially between the bureaucracy and the citizens if IT is combined with outsourcing. The combination of outsourcing and the introduction of automated 'job classification schemes' has led to the de-individualization of income support and helped to combat long-term unemployment in Australia, according to Marston. Note that the organization he describes was one we would call a 'screen-level' bureaucracy – in which bureaucrats engage in making decisions about individual situations, but solely through the entry of data or forms in the automated system. A comparison of Australia with Denmark (Caswell, Marston and Larsen 2010) confirms this conclusion. Following the introduction of the automated systems, professionals 'feel' more like administrative screen-level bureaucrats than professional street-level bureaucrats. Breit and Salomon (2015) have described the introduction of IT in large-scale implementing organizations as the replacement of the 'dyadic relationship' between citizens and bureaucracy by a complex web of relationships between citizens, the bureaucracy and IT. And finally, Wong and Welch (2004) showed, on the basis of their 14-country comparative study, that 'web based' service delivery does not lead to more or enhanced accountability.

17.3 Chains and other new developments

Over the past decades, the system-level practice has continued to develop. There are at least three developments in typical system-level bureaucracies that bear mentioning. In the first place, system-level practice has further expanded in scope. It has now been implemented in various public administration fields; specifically, the inter-organizational chains have been further extended. We describe and explicate this development in the light of two recent Dutch case studies.

In the second place, the way in which the software is built would also seem to have changed, at least if we re-examine the case study on the enforcement of traffic regulations (Bovens & Zouridis 2002). The endless tinkering with IT systems, which has in fact become the core of the organization, remains a valid description of the organization. However, instead of developing new, large-scale systems, today, self-organising teams of IT-engineers continually make proposals on the implementation of smaller applications and links, about which the management then decides. The discretionary powers of these IT engineers would appear to have increased, not decreased, since 2000.

In the third place, a new profession has come into being in the system-level bureaucracy stimulated by the rise of 'big data'. We are referring to the rise of the data professionals. These data professionals also focus on the production process, and not on individual cases, exactly as Woodward predicted and which she termed 'continuous process production'. The data professionals approach the production process from a different perspective entirely than system developers. Data analysts generate information for policy development by means of large-scale analyses: what are the most important trends in the target group, what kind of cases make up the risk category, what are the effects of small nudges on the behaviour of clients or the target group? Just as was formerly the case for the system engineers, these data 'cowboys' have more than ample discretionary leeway. The first stirrings in the direction of regulation on the discretionary freedom enjoyed by data analysts are already being felt.

Chains of system-level bureaucracies

As an organizational form, 'system-level bureaucracy' is a true 'millennial': born in the 1980s, growing up and coming of age in the 1990s and 2000s. Since then, these bureaucracies have been further refined and expanded. We illustrate this in the light of two examples. In 2015 and 2016, two operational practices were studied in the Netherlands, both of which could qualify as system-level bureaucracies (Van Eck 2018). In these operational practices, the computer makes the lion's share of the individual decisions and in fact, implements these. The one case has to do with establishing the right to and payment of child benefits by the Social Insurance Bank. The other relates to establishing a citizen's taxable income and the corresponding assessment from the tax authorities.

Case A Implementation of child benefits

Dutch citizens with children under the age of 18 are entitled to the payment of child benefits. In the implementation of the child benefit scheme, the Social Insurance Bank largely builds on the personal data of citizens that have been recorded in other processes by other government bodies. Following the registration of a birth with the municipality in which the child was born, a birth certificate is generated and the birth is registered in the Municipal Personal Records Database (BRP). The child is assigned an individual, unique number, and the birth of the child and corresponding data are submitted to the Social Insurance Bank in the form of a recurring subscription. An automated application is then prepared and the parents are given the opportunity to verify the application. In standard situations, this is the sole activity citizens need to undertake.

On receipt of the application, the decision is made by the computer in the majority of cases – in 2014, in 77% of all cases. The remainder are made by a civil servant; either because the case has been tagged as a potential fraud risk or because there are international aspects concerned and insufficient data are available in the database. In subsequent years, the computer does all the work in the background. When legal milestones are reached, such as when the child turns six or twelve, the entitlement and the amount change, although the citizens do not receive the underlying decision unless they so request. After the birth of a second or next child, the benefit automatically rises. In 2014, there were just under 2 million claimants in the Netherlands. Notice of the decision as to whether or not a claimant is entitled to receive child benefit payments is then given to the administrative body charged with the payment of an eventual means-tested

supplement. The computers of that administrative body then commence with the preparation of the application for this supplementary benefit. Already, this brings the number of links in the chain of system-level bureaucracies to three.

Case B Establishing a citizen's income

To enable the tax authorities to levy salaries tax and national insurance contributions, the Netherlands Tax and Customs Administration has branches that extend in various directions. In the first place, the tax administration cooperates with employers, benefits agencies and the statistics office. A large part of the task of calculating, withholding and payment of the wage tax owed is performed automatically by the employers and their software packages. The data are then broken down per individual employee. When these data are forwarded to the tax authorities via the UWV, a social security organization, they can be used to prepare the annual income tax assessment. From then on, the procedure resembles that in the case of the child benefits. All the information available to the tax authorities is filled in on the return, and the amount of tax payable is calculated. Citizens subsequently only need to check the data on the form and to make any changes necessary, after which the digital return is verified by means of a digital signature.

Some 90% of the 11 million tax returns submitted annually, are decided by the computer. Based on a pre-defined set of fraud risk rules, the rest are set aside for manual handling by a tax official. The decision determines both the amount of tax owed and establishes a citizen's official income. This is subsequently included in a national income database. In this way, other government bodies that are charged with implementing means-tested schemes, have access to these data. For those who are not required to submit a tax return, the data are determined per individual and automatically included directly in a national database with individual data on a person's income. The number of people who are not required to submit a return but who do pay wage tax, is estimated to be 3.5 million. In addition, we see that in determining the income, the administrative body relies on data generated by other organizations and that the automated decision taken on the basis of these data is a determining factor for decisions taken by other public bodies.

The algorithms

In both cases, decision making is solely a matter of applying algorithms to data provided by citizens or other organizations. These algorithms have not been developed with the aim of processing knowledge or performing analyses, but for calculations, in which the data are applied as variables in the mathematical formulas. They are more like administrative systems than expert systems (Koers *et al.* 1990: 262). Both practices strongly resemble Bing's description of the implementation of the right to 'housing aid' in Norway: 'A trivial type of legal decision fully automated, containing what has been the objective of many knowledge-based systems in the legal domain, though nobody would like to characterise this very conventional system as an example of artificial intelligence.' (Bing 2005: 204)

The information managers determine which data are used, and they program the algorithms. Individual judgements and interference on the part of citizens are seen as disruptions and therefore avoided as far as possible. The content of the decision rules is virtually untraceable in both case studies. The decision rules cannot be isolated from the administrative process even by IT experts. The reason for this is that both cases concern relatively old IT applications, implementations that have grown throughout the years, which have been added to and maintained, with only the outside being given a more modern look. Also, algorithms are built into the digital forms that are completed by the citizens.

An important factor in the use of automated processing systems is the distinction between hard and easy cases. An 'easy' case is easily processed by the system by straightforward subsumption of facts under rules (Koers *et al.* 1990: 262). The hard cases are processed by civil servants. At the Tax and Customs Administration, these are identified on the basis of the so-called fraud risk rules that have been built into the system: could the tax return be inaccurate and does it need to be checked manually? It has been announced that in the future, data analyses will also replace these fraud risk rules. At the Social Security Bank, the difference is mainly due to the practical impossibility of having the computer take decisions in cases where international aspects play a role, such as the birth of a child abroad. Often, the data are not available digitally, or it is simply too complicated or expensive to translate valid interpretations of the law into programming code.

The data

The data that constitute the raw material for the decision were found, in both implementation

practices, largely to derive from the primary processes of other public and private organizations. By-products of the one process can in some cases be determining factors for the decision in another process. Laws are harmonized to make chain collaboration possible. Uniform definitions are developed to ensure that data are 'interoperable'. But even without shared definitions, data are reused if they mean approximately the same thing or if something may be derived from these. As, increasingly, pre-filled forms are being used, citizens can view the data and request that changes be made before the decision is taken. In most situations, the data are not substantively checked but are directly included in the administrations of the recipient party.

The 'system-level' bureaucracy expects citizens to respond in the case of errors and regards this as a means to improve the quality of the data. At the same time, the process citizens must go through to effectuate a change in his or her personal information is not always an effective one.

Also important is the fact that a decision affects the processes of other administrative agencies. The result is a chain reaction, plus that the process is required to be managed with a view to the interests of those other administrative agencies. A disruption in the one can lead to a temporary halt of the 'production' in the other organization.

This also creates a different problem, namely the problem of retroactive effect. Most IT systems have difficulty in giving retroactive effect to a decision. In law, giving retroactive effect to a decision is an important mechanism in rectifying errors. However, in the systems studied, retroactive effect is sometimes difficult to achieve. A decision that is standardized in a piece of data, for example by assigning this a two-digit code, and that is subsequently retracted, proves impossible to delete. The only technological alternative is to insert a note of the inaccuracy.

17.4 System development: Bricolage with software engineers at the wheel

Both the system-level bureaucracy and the screen-level bureaucracy evolved during a period in which public organizations were building large systems. In the Netherlands, many 'large' systems have become well known, such as SAGITTA, used by the customs services; the WSF system for student grants; the BPS used by various police departments; and the GBA for population registration. The organizations aimed at completely automated decision making processes with large scale information systems that are linked to huge registers with personal data. National systems have been developed, for example to distribute funds across educational institutions, but

also to generate tax assessments and to collect taxes. Ultimately, these large-scale systems were to lead to the achievement of the 'e-government ideal', in which all communication and transactions between government and citizens could take place digitally.

With the initial large-scale systems in place came the criticism of the megalomaniac ambitions, followed by the first fiascos. Large sums were spent on the development of systems, projects which, by their very size, posed huge risks, while the governance of these projects was difficult, if not impossible. Various major revisions of systems were abandoned, leading to substantial financial losses. In the Netherlands, criticism of this approach to software development even led to a parliamentary inquiry.[2] The committee of inquiry drew a number of important conclusions, including the fact that the IT enthusiasm of the political world and among policymakers was not matched by IT realism; that building large-scale systems takes a long time; that policy has the tendency to change and that the development of large-scale systems cannot remain continuously flexible; and that this combination of factors could explain a number of IT fiascos.

In response, in system-level bureaucracies we can see the rise of a different approach to software development. It is an approach championed years ago by Ciborra (2002), who pointed to the need of 'bricolage' in the development of information systems. In contrast to the large, managerial driven IT projects, this is characterized by bottom-up ad-hoc software development.

A typical example is that of the CJIB, the Dutch organization tasked with the collection of traffic fines and punitive orders. This is a typical system-level bureaucracy, with information being supplied to the system by the police, then processed, after which the fine is sent – these days even by digital mail – to citizens, with the payment process being monitored completely automatically. The core of this organization is a set of automated systems, while the system is a classic example of what Woodward called 'continuous process production'. Within the organization, the core of the operations is known as the 'business'. Next to the 'business', a small group of creative software developers have deliberately been set apart from the organization. They are housed in a building at a walking distance from the 'business' and have been given the freedom to develop their own ideas for new applications and for improving the existing systems. Periodically, they suggest (small) ideas for applications and changes to refine the 'business'. These ideas are presented to the management, after which agreements are made about their implementation.

Characteristic of this approach is the use of the creativity of the software developers, the distance from the core of the organization, and the small-scale enhancements. In short, 'bricolage' avant la lettre or, as this is called today, 'agile' IT development. This group of creative software developers has no formal decision-making authority, but it does have considerable discretion when it comes to applications development. De facto, therefore, these software developers steer much of the software development.

17.5 Unforeseen discretion: Data analysts

The core of the transformation from street-level to system-level bureaucracy is the transfer of discretion from the handling of individual cases to the design of IT. As this case study shows, it is a shift that has gained further force throughout the past decades. The discretion of the IT developers has been expanded to the exchange of data in 'chains'. They determine which links are made between systems, which data are used and which 'loopholes' in the legislation are acceptable and which need to be repaired. Rather than being subjected to hierarchical control, these IT developers are given the space to propose their own new applications and links, and to implement these.

In today's system-level bureaucracy, there is another group of IT experts with considerable discretionary leeway: the data analysts. They do not modify the system, but they analyse the data in the system, looking for patterns. Based on these patterns, they suggest improvements or develop 'nudges' to gently push citizens in the direction desired by the system-level bureaucracy.[3]

When it comes to data analysis, the most sophisticated organization around is probably the Dutch Tax and Customs Administration. This department not only has access to large volumes of data on all the taxpayers in the Netherlands, but as we described in the above, the tax department is closely linked, both in and outside the public administration with other information sources. These data are increasingly used by data analysts to uncover patterns for various purposes. For example, data analyses can serve to help detect fraud, whether or not in combination with other government agencies such as the police department, municipalities or benefits agencies. Notorious and possibly apocryphal examples are more than amply available. The OECD has compiled an overview of the sources of Big Data that could be used by the tax authorities to profile citizens and enterprises. These not only include the data in their own

databases but also data on citizens' use of the available digital facilities (their browsing behaviour on the website, how long it takes for a person to complete their tax return, how is the app used) and even the data that can be read out via the internet of things.[4]

Data analyses can also be used to distinguish between many commonly made errors and instances of possible fraud, so that the inspection capacity of the tax department can be more efficiently utilized. The above mentioned Central Judicial Collection Agency (CJIB) uses data analyses to winnow out the more promising collection claims from the total non-starters to avoid the inefficient use of, for example, debt collectors. The Tax Administration also utilizes data analyses for quite the opposite reason, for example by creating green lanes for taxpayers whose track record or profile reveals a minimal risk of their committing fraud or attempting to evade taxes. Data analysts can also be tasked with 'risk management': which pattern, for example, is likely to point to a case of VAT fraud? They can also serve to enhance the degree of effectiveness: when does it make sense to pursue redress, which returns should be checked with extra thoroughness and in which cases is there a real chance of deliberate errors?

The Tax and Customs Administration and the major administrative agencies in the field of social security and the municipalities, which, in the Netherlands, have been increasingly tasked with implementing the social security legislation, all take part in a broader network known as System Risk Indication (WRR 2016). As the privacy laws do not allow the large-scale, direct coupling of the files of these public organizations with those of private organizations such as water works or rental car agencies, a special procedure has been developed. A risk analysis can therefore be initiated by one of the partners, but is then performed by a national information agency. This agency links and encrypts the files supplied at the request of the participants, and decrypts any results indicating a heightened risk (WRR 2016: 57). These potential 'hits' are forwarded to the Ministry of Social Affairs and Employment, which assesses the data and informs the requesting organizations of the reported risks. The organization can then institute a further inquiry into the case in question.

As the examples illustrate, data analysts enjoy a considerable measure of latitude in their activities. Although checks on the discretion of the data analysts were present in the latter example, they would nonetheless clearly appear to have very considerable margins of discretion.

17.6 Disciplining digital discretion

Democratic control of system development

For various reasons, the theoretical framework of the system-level bureaucracy is helpful to understand contemporary discretion in large public bureaucracies. The first and most important reason for this is purely theoretical. This concept offers a better understanding of modern practice in large decision factories than does the concept of street-level bureaucracy. The street-level bureaucracy was a useful concept through which to understand the dirty work carried out by the 'frontline professionals' in direct contact with citizens. The system-level bureaucracy makes it clear how the humming, interconnected computers operate as an organization in large production agencies such as the internal revenue service.

However, the concept is more than a mere heuristic tool, as it also has a normative dimension. There has long been great concern about the democratic and constitutional control of large-scale government bureaucracies.[5] Obtaining the best possible understanding of how these bureaucracies function is a key condition for their control. Lipsky's street-level bureaucracy showed how discretion evolved in the 'frontlines'. The combination of resource scarcity due to, among other things, the work load and ambiguous standards, yielded discretionary freedom that became filled with professional routines.

The rise of system level bureaucracies has replaced these professional routines and rules of thumb by algorithms. This has made it more difficult to empathize with hard cases, such as Daniel Blake. In many other respects, it has made the operation of these large production agencies more equitable and efficient. The processing of cases has become much faster and requires far less paperwork. Prejudices and biases of individual street level bureaucrats no longer play a role in the allocation of public benefits.

In system-level bureaucracies, discretion does not result from scarcity and ambiguous standards, but by operationalising standards in parametrized variables in IT systems and by the use of software to manage administrative processes. No longer are the frontline professionals the ones with the power of discretion; this has shifted to the IT developers. This raises several novel normative concerns.

The first issue is whether and, if so, to what extent the democratic checks on the IT developers have been toughened up since the rise of the system-level bureaucracy. This has not yet been systematically explored. The parliamentary inquiry in the Netherlands shows that political control of IT and IT specialists still is quite limited, mainly because of the logic of IT development. Moreover, far more data are exchanged between many different organizations than in the past, a phenomenon in which IT developers play a leading role. Additionally, in the ensuing 'bricolage pattern', the IT developers acquire more space for the development of applications and refinement of systems.

It would appear that the new types of discretion that are evolving in the digital era are accompanied by new needs for constraining and standardizing these. Whether and, if so, the extent to which these new types of constraint are able to effectively guide the work of the 'data chains', 'bricolating' software engineers, and data professionals into democratic and constitutional channels, remains to be seen. And, of course, we have not even touched on the application of Artificial Intelligence, which will lead to the replacement of today's software engineers and data analysts by computers (Powles 2017; Brauneis & Goldman 2017).

Conclusion: The end of decision making discretion?

The scope of our study was limited to large decision-making organizations and the introduction of IT in support of the executive tasks of these organizations. As analysed, IT leads to a loss of discretion in making individual decisions, as the discretionary power shifts to the development of the software. Does this mean that the discretion exercised when making individual decisions relating to public administration is doomed? This certainly looks to be the case in the longer run, although not everywhere at the same pace. Already, the tax assessments of individuals in the Netherlands have been almost completely automated, while those of medium sized and small businesses are still partly the responsibility of implementing staff, who have discretionary powers (Raaphorst 2018). However, the ratio of automated decision making to people is changing, as the taxation of medium-sized and small businesses also becomes increasingly automated.

And even in cases where people are still responsible for making decisions, increasingly, the process is being pre-structured by IT. In the first place, because IT determines which cases are to be dealt with automatically, and which not. Hence, the personnel working at these implementing

agencies only handle whatever the system rejects. A second reason is because the IT system indicates which cases require handling by personnel. In other words, it is a process that is not determined by humans, but on the basis of parameters that determine whether the automated system or a data analyst flags a case as being questionable. Tax assessments of small and medium sized businesses in the Netherlands are still dealt with by humans with discretionary powers, but the computer algorithm decides what cases are attributed to human decision making and what cases are dealt with by the IT system. Strictly speaking, the available discretionary leeway lessens through this use of IT for 'risk management'. For example, the use by the police force of sensing technology will probably curb the discretionary powers of police agents, or at least pre-structure these powers. If the system should note a combination of anomalies in the continuous data analysis, for example by means of camera images with facial recognition, an police officer is sent to investigate.

Hence, IT both draws off discretionary powers and structuralizes those remaining, at least at the level of the individual decision. What remains is the discretionary leeway in the organization of the IT – what should be automated and what not? Which decision-making algorithms should be used via which links and with which other organizations and using which algorithms for data analysis? In a formal legal sense the structures of authority and power do not change. Data scientists and software engineers operate under the formal powers of ministers and top-level managers as do street-level bureaucrats. Whatever new application or inter-organizational link is proposed by the software engineers, it still requires a decision by top-level managers or a minister in order to be implemented. A new nudge based on data analysis requires a decision to adopt it, hence the overall managers formally still control the discretion of the data scientists.

In order to assess the new patterns of discretion in these types of public bureaucracies we need more in-depth empirical research on the interactions between data scientists, software engineers, and the overall management as well as the politico-administrative relations that result from the new technologies. Instead of studying a steadily declining group of administrative personnel with decision-making discretion, far more academic and practical attention should be directed at the way IT is organized in the democratic constitutional state. In the near future, most discretion is indeed digital discretion (ref. XX).

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[1] Although research into street-level bureaucracies, their management and the context of the tasks of street-level bureaucrats has been considerably augmented since Lipsky's original work (see, for example Hupe, Hill and Buffat eds 2015), these organizational features continue to be relevant.

[2] Tweede Kamer, vergaderjaar 2014–2015, 33 326, nr. 5.

[3] In a report on 'big data', the Netherlands Scientific Council for Government Policy describes a number of practices of data analysts (WRR 2016).

[4] Technologies for Better Tax Administration, Using big data in tax administrations, OECD (2016: 49).

[5] See for example Weber (1922); Hayek (1944); but also, for example, Waldo (1948).