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RESPONSIBLE AI AND POWER: INVESTIGATING THE SYSTEM LEVEL BUREAUCRAT IN THE LEGAL PLANNING PROCESS

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Abstract Numerous statements and pamphlets indicate that governments should increase the transparency of ICT- implementations and algorithms in eGovernment services and should encourage democratic control. This paper presents research among civil servants, suppliers and experts who play a role in the automation of spatial policymaking and planning (e.g. environment, building, sound and CO2 regulation, mobility). The case is a major digitalisation programme of that spatial planning in the Netherlands. In this digital transition, the research assumption is that public and political values such as transparency, legitimacy and (perceived) fairness are difficult to validate in the practice of the design process; policy makers tend to lose sight of the algorithms and decision trees designed during the ICT -implementation of eGovernment services. This situation would implicate a power shift towards the system level bureaucrat. i.e., the digitized execution of laws and regulations, thereby threatening democratic control. This also sets the stage for anxiety towards ICT projects and digital bureaucracies. We have investigated perceptions about ‘validation dark spots’ in the design process of the national planning platform that create unintended shifts in decision power in the context of the legal planning process. To identify these validation dark spots, 22 stakeholders were interviewed. The results partially confirm the assumption. Based on the collected data, nine validation dark spots are identified that require more attention and research.

Keywords:

system
level
bureaucrat,
street
level
bureaucrat,
algorithms,
business
rules management,
validation

1 Introduction

The danger of unattainable algorithms in eGovernment services has been highlighted by popular and scientific heralds alike (Kool, Timmer, Royakkers, & Est, 2017; van den Hoven, Miller, & Pogge, 2017; Vereniging van Nederlandse Gemeenten, 2019). For example, the UK-based TV show *Little Britain* portrayed the citizen as a powerless victim of digitalised procedures already in 2004 with a series titled “computer says no”. For this research, we focus on the Dutch situation in which the problem domain seems well recognisable. The Raad van State, the highest Dutch National advisory council has been addressing the problem of ‘dehumanization’ of government services in many reports, e.g. (van den Hoven et al., 2017). This growing anxiety with what computers can do to us in a bureaucracy grown beyond our control sparked a wave of pamphlets on digital ethics, computer ethics and general principles for government services (European Commission, 2019, 2020; gemeente Eindhoven, 2019; van den Hoven et al., 2017). The Dutch National society of municipalities and cities, the ‘Vereniging van Nederlandse Gemeenten’ (VNG) announced the agreement on digital principles and values (Vereniging van Nederlandse Gemeenten, 2019). The Dutch National Digital agenda 2020 included a whole chapter on ethical values and principles for digitalisation (Digitaleoverheid, 2020). The European Commission recently published a “white paper on Artificial intelligence and administrations” that lists several requirements (European Commission, 2020). This pamphlet promotes the use of AI in administrations, but points at issues of trust at the same time.

Yet, there still seems to be a gap between such general ethical ideas on digital public values and the operationalisation in current government processes. The Dutch Government Review board recently published a report including an auditing framework for algorithms that at least provides an ‘auditing framework for algorithms’ (Algemene Rekenkamer, 2021). We also observe, from the practitioner’s side, that vendors claim transparency and open standards in their offerings without much substance, so one needs to dig deeper to determine the fairness of algorithms.

From a scientific perspective, the landscape seems partly covered. There is a body of knowledge in Business Rules Management (BRM) that is already touching on eGovernment services (Schlosser, et.al 2014). There has been twenty years of research on AI and Law addressing the automation of legal bureaucracies, see for

example the Jurix, ICAIL, and IFIP conferences that started in the eighties. A growing population of researchers addresses the field of digital ethics (van den Hoven et al., 2017), (Vetzo, Gerards, & Nehmelman, 2018), and (van Engers & de Vries, 2019). Janssen et al., (2020) recently argued for a distinction between rule-based AI algorithms and Machine Learning-based algorithms in government applications, because of the demands on transparency. His focus was on the nature of the AI. Machine learning could be used to improve the design of the rule-based systems, however (Janssen et al., 2020). We stated earlier that there is a gap between high level ethical norms regarding transparency, fairness, discrimination regarding algorithms and the applicability of these norms in practice by civil servants. The theory according to Lipsky (1980) and Bovens & Zouridis (2002) states that the power of the system level bureaucrat will increase because of the instalment of algorithms in digital systems or platforms that automate the decision space of the street level civil servant, the street level bureaucrat. On the one hand, we adhere to the definition of Lipsky (1980) of a street level bureaucrat: *“a public employee that deals directly with citizens in the course of their jobs, and who have substantial discretion in the execution of their work.”* On the other hand, we adhere to the definition of Zouridis, van Eck & Bovens (2020) of a system level bureaucracy/bureaucrat: *“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”*.

The transition of street level bureaucracy towards system level bureaucracy complicates the execution of legislation, because a translation has to be done in order to implement the legislation in the information systems replacing the system level bureaucrats. This translation offers room for a power shift towards the information systems as well as that such a translation and its output need to be validated thoroughly. If the latter fails, organizations could face severe consequences, such as lawsuits, high fines, negative publicity as well as political downfall (Smit, Versendaal, & Zoet, 2017; Smit, Zoet, & Berkhout, 2017). We, therefore, investigate the potential ‘validation dark spots’ in the design process where legislation is translated into information systems. With validation dark spots we mean those areas in the design process where participants of that design process identify potential unintended shifts in power between these two levels, i.e., street-level bureaucracy versus system level bureaucracy. Bajec & Krisper (2005) describe BRM research as follows: *“we presume that the ultimate goal of business rules research is to find a way and facilities that support automatic propagation of changes to business policies, respectively the business environment, to information*

systems used within organizations. The term validation is used to describe the integrity of the translation of law and regulations as well as internal business policies into information systems. Formally, it is referred to as the 'verification' and 'validation' capabilities (Smit & Zoet, 2018a; Zoet & Versendaal, 2013). Smit, Zoet, and Berkhout (2017) applied verification and validation capabilities on governmental legislation in search of levels of compliance of the actors involved. They came up with 28 verification capabilities (Smit, Zoet, et al., 2017). Other, similar studies and results, which focused on the identification and classification of verification capabilities for BRM are detailed in the work of (Corea, 2021). However, such research has only been partially conducted with regards to the validation capability. Therefore, we specifically seek validation dark spots in this study where the translation process from political/legal norms and values into information systems affect the position of the street level bureaucrat. An adequate case is found in the Dutch Omgevingswet, which is further detailed in the following sections. To investigate this case in search for validation dark spots, the following research question is addressed in this paper: *'What are the validation dark spots in the decision power shift from street-level bureaucracy towards system-level bureaucracy caused by digitization in the context of the Dutch Omgevingswet?'*

2 Background and Related Work

Within our object of study, we aim at the area of services where government affects the life events of citizens by means of permits and urban design decisions. A life event is defined as a *"A social experience or change with a specific onset and course that has a psychological impact on the individual."* Examples are starting a new business, parental divorce, house relocation or school changes (Goodyer, 1991). The business rule-based algorithms are used to balance interests concerning economy, safety, mobility, housing, and ecology. Broad policy intentions are set in regulations and those are translated into an information system that deals with permit information and permit processes. The planner provides contextual information for the citizen when this person is asking for a permit to build or develop an object in the region. This information addresses both the permit requirements, the situational context and the process. The citizen will start providing relevant information digitally (forms) in a permit process. The translation of policy intentions to regulations that are in turn being translated into information systems is not without problems (Smit, Versendaal, et al., 2017; Smit & Zoet, 2018a, 2018b; Smit, Zoet, & Versendaal, 2018). The

traditional policy maker offered policy goals up for decision making on the political platform and the resulting consensus was used and translated into juridical articles and norms. These norms were then interpreted, assessed, and adapted to the current situation by the street level bureaucrat for each individual case in a paper or email procedure. The system level bureaucrat, on the other hand, regards the current state of the data itself, as aggregated in a spatial data infrastructure, and applies business rules and standards in digital services to achieve the consensus policy goals and adapts the outcome of case decisions to the dynamic status of the data for each individual case. The assessment process is increasingly being automated by standard business rules in the balancing algorithms (Zouridis et al., 2020). This would be fine if all the translation steps were verifiable and could be validated by policy makers. To investigate this phenomenon, we want to determine to what extent and on which aspects decision power is being transferred from the street level civil servants towards the system designers when spatial planning legislation is being translated into information systems and algorithms. To do so, we need to define what decision-power in the context of spatial planning comprises.

2.1 Definitions of (decision) power in spatial planning

Bovens and Zouridis (2002) define the ‘street level bureaucrat’ as the executionary arm of government. The terms used for the level of freedom of the street level bureaucrat is the discretionary power to apply regulations on specific cases with autonomous space for interpretation. The European legislative level may set the framework for Natura2000 biodiversity, for example, and the Provinces may set the protected contours of that biosphere, but the individual street level civil servant decides on the legitimacy of the compensation actions offered against a building permit in that area.

The Omgevingswet programme (Koninkrijksrelaties, 2018) was introduced in politics and towards citizens as a simplification of the environmental legal arena to decrease complexity and increase user friendliness. Twenty-two regulations regarding, for example, soil, air quality, Natura2000, biodiversity, and water quality would be reduced to one all-encompassing legal structure as was applied in New Zealand. The digital platform Omgevingswet would take over some of that executionary role by introducing forms and decision trees based on business rules that guide the citizen through permit processes and pre-calculated levels of compensation required. The level of freedom of the street level bureaucrat in our

example of compensation for a building permit would be replaced by the team that designs the forms and the business rules behind them. Discretionary power can be based on two different sources: 1) The translation from general rules as set at a higher level of jurisdiction into the specific application of a case of that rule, and 2) the semantic room for interpretation. Together these add up to the effective decision power that is left after digitalisation of the process. The distinction between these two is not always straightforward and the legislator is not precise enough in its instructions (Peters, 2016; Teuben, 2004). It is also clear that when the business rules driving the relevant forms for obtaining the permit are translated into information systems, the translation is carried out by other specialists than the civil servants who represent the government agency.

3 Research Method

Bovens and Zouridis (2002) define the system engineer as a central role in the information system design process, but the question is what this role actually represents. In the case of the Omgevingswet digital platform, there are system engineers, legal knowledge engineers, legal planning experts, business rule specialists, domain specialists, programme managers, umbrella organisations of cities and regions, consultants and supplier-side developers who all have influence in the design process. The introduction of the Omgevingswet digital platform is chosen as the case for this explorative research because it represents more than just another case. Unlike many other studies about BRM in social security, immigration services, or tax returns, this platform will digitalise the main government service process of all Dutch cities. It is therefore a true situation of ‘street level bureaucrats’ and much less controllable by a small group of super experts hired by, for example, the National Tax office in a centralized approach. This legal planning platform is complex and thousands of civil servants, lawyers, developers, consultants, and project managers have been involved. The Platform is to be launched, after two failed deadlines, in 2021 when all 350 Dutch cities will have to transfer permit procedures to this digital platform.

To identify the relevant validation dark spots in the context of the development of the Omgevingswet digital platform, we interviewed 22 representatives from various stakeholder groups. The interviews took place between January 2020 and February 2021. The first eleven interviews were carried out online due to COVID-19

restrictions. The respondents were all given the same description of the ‘system level bureaucracy’ based on Lipsky (1980) and van Bovens and Zouridis (2002) in advance. The first eleven interviews were conducted using a semi-structured approach. This works best when discussing certain topics while maintaining proper space for participants to digress on similar relevant topics or arguments (Pervan & Maimbo, 2005). This approach is in line with the explorative nature of this study. All interviewees have experience with the design process of the Omgevingswet digital platform. In total, three IT experts, three policy advisors, two BRM system suppliers, two GIS system suppliers, and one BRM scientist were interviewed. An interview protocol was standardized and utilized across the eleven semi-structured interviews, featuring 5 themes being: 1) role of the system designer, 2) room for interpretation of policies in the design process by the system designer, 3) room for decision power to make changes to the design of the policies that must be implemented in order to digitize them, 4) measures to control the quality of the system design (validation), and 5) the Omgevingswet. Each theme featured multiple questions to guide the interview and enable comparability of the results across all interviews to get a holistic view of the phenomenon of validation dark spots. In total, the protocol featured twenty-six questions. Additionally, the focus of the interview was scoped towards the Omgevingswet digital platform creation process over the last three years. The interviews were transcribed and thematically coded by one researcher and reviewed by another researcher. Furthermore, 11 non-structured open-ended interviews were conducted a few months after the first 11 interviews to gather more contextual information about the Omgevingswet platform, which were also conducted online. These interviews were only guided by the concept of the Dutch Omgevingswet and the Omgevingswet platform in development. In total, four National programme managers, two platform architects, one regional project manager, one expert on water management policies, one legal expert, one GIS expert and one BRM-system supplier were interviewed using this technique. The interviewees for the latter 11 interviews were selected based on their involvement from different perspectives as well as that they did not yet participate in the first round of 11 interviews.

4 Research Findings: the Validation Dark Spots

Based on the interview data and thematic coding, nine validation dark spots could be identified. These are further detailed in the subsections below.

4.1 The perception of power shifts

We first needed to establish whether the interviewees indeed perceive and recognize the coming of a system level bureaucracy as described by Lipsky (1980) and Bovens & Zouridis (2002). Most of the respondents agreed that a larger part of the environmental law shall transform towards a system that resembles a system level bureaucracy because of the characteristics as described by Bovens and Zouridis (2002). However, there appears to be a difference in opinions between the more technical oriented designers and the policy designers with respect to the effect of that transformation. The policy designers seem to think that the decision process will be automated entirely, including the balancing and prioritization of variables. The technically oriented designers think that the processes around permits are being digitalised without touching on the balancing and prioritising itself. During the intake of a case, the initiator of the permit request is confronted with a decision tree of choices and variables that then feed a workflow of steps along relevant authorities and governmental experts. The case is then processed by these experts, depending on its complexity. The confusion about the level of automation of the decision has several origins:

- The design of the decision tree is not without choices that affect the decision itself;
- The technical people are more aware of the limitations of the technology whilst the non-technical interviewees experience a ‘feeling of being taken over’ by the technology;
- The case-handling is supported by templates created by central government. Smaller cities copy these templates due to a lack of financial and knowledge resources. By doing so, these smaller organizations standardize their decisions unintentionally, which in turn shifts more influence towards system level bureaucrats designing the templates.
- The technically oriented system designers tend to make a distinction between simple and repetitive cases that could be automated and complex and more unique cases for which human intervention will always be required. They see the value of

automation on top of digitalisation for reasons of efficiency. Policy experts do not always see where automation may be applicable to save resources.

Upcoming paragraphs describe and discuss the identified dark spots.

4.2 The mapping problem between the case and the platform characteristics

The first validation dark spot concerns the mapping between the use case and balancing rulings. The policy making respondents voiced their concerns about the ability of the platform to map ‘their’ reality into the correct and relevant decision trees. The ‘permit checker module’ of the platform that enables initiators to test if the activity can be performed free of permit restrictions, is a good example of this phenomenon. Legal experts take the position that once the computer says “no”, you do not require a permit based on the decision tree, norms and values’, the initiator is now allowed to proceed, even when the decision (or decision tree) was based on faulty assumptions or the wrong application of norms. This means that the capturing of the relevant data through fill-in forms beforehand (knowledge acquisition and elicitation in terms of BRM) is vital in the eyes of legal experts in order to maintain constitutional and legitimate.

4.3 Contextual information and complexity

The second validation dark spot concerns the mapping between the activity, its consequences for the environment, the specific context of circumstances and the relevant algorithms in the forms. As it turns out, the more complex the case is, the more the relevancy of contextual information and contextual factual data has to be taken into account. This sounds logical, but it puts a strain on the ability of pre-designed forms and reference regulation models to capture the relevant contextual information in the appropriate manner. The desired separation between a platform that facilitates the exchange of case related information by using information capturing forms and the street level bureaucrat handling the case and making decisions based on the fair balancing of the desired environmental values gets blurred. This is because it becomes increasingly hard to separate the context from the balancing act. As a consequence, the design of the facilitating platform precludes more elements of decisions and balancing at system level if it is to handle more complex cases, thereby shifting power towards the system bureaucrat. This

finding is confirmed by Smit et al., (2018a; 2018) where he described the elicitation process in BRM research.

4.4 Validation of standardization

The third validation dark spot as mentioned by the respondents concerns the influence of standardisation. There is a structural tension between governments trying to maintain open standards and commercial suppliers that require a timespan for profit. Larger organizations have a legacy of already installed systems and dislike quick versioning of standards. Innovative, and often smaller, organizations tend to adapt new sophisticated standards faster. The design of software that is capable of handling geospatial and textual objects around spatial planning is relatively new and the standards that can handle the level of detail are rapidly evolving and changing. This is not unusual as a pattern in digitalisation, but it is relatively new to the domain of business rules and norms in legal planning systems. We observed a heated debate around the semantic standard for activities and announcements in the environment (STAM) (Interprovinciaal Overleg, 2020), the template for official governmental publications (STOP) (Interprovinciaal Overleg, 2020), and template for environmental planning documents (TPOD) (Interprovinciaal Overleg, 2020) in The Netherlands. One of the issues concerned the notion of standardisation of the annotation field related to a permit for an activity regarding an object. Some parties in the debate defended the position that the annotation of the decision ground should always be retrievable afterwards, thereby requiring further standardisation, while others argued that the annotation is exactly the level of freedom and decision power that should be left with the street level bureaucrat without any restrictions due to standardisation. Another interesting part of the standardisation concerns the business rules themselves, standardized in the standard for business rules applications in environmental planning (STTR) (Interprovinciaal Overleg, 2020). Some respondents complained that the intended reduction of environmental regulations was in fact replaced by an increase of business rules, which are used to determine the exact nature of the case and the exact values and norms that would apply on that case. Unfortunately, the design of the business rules as part of the algorithm is often done later in time, after the city has written its environmental policy for that election period. The design of these business rules in sequence after the national laws and regional or city policies are created often creates a translation problem. The technical modellers are often confronted with ambiguities and

semantic problems and require assistance from the lawyers and domain specialists to avoid faulty interpretations. The technical designers would strongly advise to include their modelling expertise earlier at the design of the policies, especially when these are written in texts. All respondents confirmed that the standardisation discussion was very technical and very dynamic and required effort to follow, especially for non-experts.

4.5 Understanding Between lawyers and programmers

The fourth validation dark spot identified by the respondents concerns the difference in reference frameworks between the text-oriented legal experts and the object-oriented spatial GIS experts. Earlier research in business rules and AI & Law hinted at misunderstandings between the culture of law and the culture of ICT (Boer, van Engers, Peters, & Winkels, 2007). This notion could have effects on the validation process and power shifts. Two contributions in the body of knowledge came to the same conclusion about this gap from completely different perspectives, see: *“In addition to challenge 2B, the current value of the ability to validate the cohesion between business decisions and business logic by legal subject-matter experts is low* (Smit et al., 2018) and the work of (Boer et al., 2007). The problem was again confirmed in this research by both the key suppliers of BRM software for the Omgevingswet platform and the national programme manager of the entire platform, for example, one of the interviewees stated: *“the legal guys do not understand the notion of an object infrastructure”*. It was also observed that, for example, legal experts tend to judge each case in its own right, whereas IT specialist are trained to think and act in the paradigm of platforms, object classes, attribute values of those classes and exceptions. The respondents were very concerned for the future viability of the Omgevingswet platform because of the separation of the two ‘tribes’ (legal versus IT-oriented professionals) in the National programme. Legal professionals come from the old text-based legislation publication process and the notion of the GIS platform version control for all legal values is very hard to explain to them. Every object has attribute values for that particular day and the next day they can and will change, much unlike a published law in the early days. This, potentially dangerous, validation gap was also confirmed by the National Council for the Digital agenda of provinces (Interprovinciaal Overleg, 2020). Based on this, a programme with the goal to establish an open public registry and more knowledge sharing about business rules was initiated as a result.

4.6 'Rich' policy or policy contours only

The fifth validation dark spot concerns the level of detail of policy making. Some interviewees argued for environmental planning in a very broad sense, setting the contours for norms and values, but leaving much space open for local and use-case based discussions. The idea is that there should be more room for manoeuvring for flexible solutions, e.g., such as windmill not in my backyard-situations and problems. Others argue for a 'rich' environmental planning, with more strict and more detailed norms to protect scarce green space and maintaining an absolute minimum biodiversity. The provincial environmental policy act is therefore different for each of the 12 Dutch provinces and reflects the political debate in each region. The outcome has a differentiating effect for the shifts in power and the need for validation in each province. The richer and stricter the act, the more mapping effort and the more validation effort is required.

4.7 Technical platform neutrality

The sixth validation dark spot concerns the neutrality of the (technical) platform in being only a carrier of environmental policy decisions versus the extent to which elements out of the domain policies such as norms and values are mixed with the standardisation of the business rules in the knowledge acquisition forms. As explained earlier, the translation of legal texts into digital algorithms is not yet without problems. Some interviewees make a clear distinction between templates of fill-in forms, model-regulations, and 'clean' business rules. Others do not. The arguments against mixing these levels of preparation or automation are transparency and scalability and the autonomy of cities to carry out their own policies. Nationally provided templates and reference model regulations should help civil servants in cities to run their own implementation of their own policies. However, the domain knowledge with environmental norms and values and the business rules tend to get mixed up.

4.8 The issue of knowledge resources

The seventh validation dark spot concerns the scarcity of knowledge in combination with that of human resources. We apply cameras to reduce the amount of police officers required to measure compliance to speed limits, but the business rules applied there are relatively simple. In spatial planning there are many variables and

issues, and it requires both domain knowledge and ICT knowledge when legislation is mapped into systems, these competencies are also required when the systems are being used operationally. Digitalisation is often introduced to increase efficiency, and the introduction of information systems always includes the influence of system designers into the process. But the effect in legislative and enforcement processes is yet little understood. Bovens et al., (2018) states that even simple design decisions, such as inspection method and inspection timing and placing could already be defined as a form of discretionary power. The interviewees, from the supplier side, explicitly stated that Dutch cities often hired their skills, because they simply could not afford to have this level expertise in-house.

4.9 The outsourcing of knowledge

The eight validation dark spot concerns an issue stated by the interviewees, that is related to the knowledge scarcity as described earlier. It is about the fact that, for the last twenty years, the cities in the Netherlands have increasingly outsourced their knowledge in spatial and environmental planning to commercial organizations. This is a known problem and questions are raised by city councils about the democratic control already. The introduction of digital algorithms in the spatial planning process is increasing this anxiety of the actors in the field.

4.10 Timing and dynamics of release management

The ninth validation dark spot concerns the timing of legal ‘releases’ of the Omgevingswet platform. Interviewees have argued that many components are still in the early development stage and should not be released to the public yet. Many external reports have declared the platform as too complex and argued for downscaling ambition and complexity. The National government is accused of clumsiness and fragmentation and overambition. Others argue that one must start somewhere, and that this platform is just the first of many such operations in eGovernment. It is unclear what influence this dynamic release debate has on the power and validation discussion, but it should be mentioned as an important ‘background noise’ affecting all variables in some way.

5 Conclusion

The overall conclusion of the investigation has been that there is a noticeable shift of power in view of the interviewees. But, in this arena of spatial planning at least, it is less clearly cut and more complex than could be expected. There is a strong notion to maintain platform neutrality and maintaining autonomy at the level of the city planners, who are the main street level bureaucrats in our case. The shift of power is often indeed caused by unintended side-effects, such as ambiguity of legal texts, scarcity of knowledge, mapping problems of contextual data and case knowledge acquisition/elicitation. The issue of standardisation between the rule of law and the business rules behind the balancing algorithms is of special research interest since it seems that it is here where system level decision power resides the most. Interviewees acknowledged that it takes great effort for non-experts to maintain an overview of the consequences of the design decisions made about the service platform at that level of abstraction. The power shift seems to increase if the automation is applied on cases that are more complex. Further research is supported by the National council of provinces, who acknowledge the gap between the culture of text orientation and the culture of object orientation and the risk for ethical values and norms regarding digitalisation. We aim for a validation framework that is understandable by policymakers and regional politicians. To do so, bridging BRM research and eGovernment research seems productive.

6 Discussion and Future Research Directions

Based on this study and the resulting conclusions we can identify points for discussion and point out future research directions. The sample size of 22 interviewees representing different groups of stakeholders is rather small, therefore we argue that future research should incorporate a larger sample size as well as research methods to do so in order to be able to generalize the findings from this study towards other similar digitalization projects. Overall, future research should provide more factual and objective means of measuring the influence of digitalization of intelligence in administrative eGovernment processes because we see this is a growing practice. The Dutch board of regional councilors have agreed on the notion that the gap between the culture of Law and the culture of object-based platform design should be bridged. This notion would justify future research on similarities between legislation and business rules. In addition, the validation capabilities and the dark spots should provide criteria for a more objective validation

framework that should be in place at the start of the implementation of the Omgevingswet platform. It is interesting to observe that the digital ethics and algorithms discussion is now evolving from a GIS platform validation problem towards a Digital twin validation. These parallels are opening new grounds for investigation in future studies. Lastly, another question is what will happen to the client or citizen of these services when they are faced with the computer as substitute for a desk. We have investigated the ‘supplier side’, but this research did not involve the effect on the client side as well, which should be taken into account in future research.

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