Applying design methodology in public administration.

A state of the art based upon a systematic literature review.

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Margot Hermus and Arwin van Buuren[1]

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[1] Erasmus University Rotterdam, Department of Public Administration and Sociology.
Erasmus Governance Design Studio

1. Introduction

Recently, there is a growing interest in the application of design approaches, methods and design thinking in public policy, on account of its potential to innovate policymaking and governing practices (Bason, 2016). Governments see themselves increasingly confronted with more complex or wicked problems (such as climate change and migration), while expectations of citizens of public services have increased (Bailey & Lloyd, 2016; Kimbell, 2016; Armstrong, Bailey, Julier & Kimbell, 2014; Christiansen, 2014; Bason, 2014). Design methodology is expected to provide smarter and more agile ways to identify problems, opportunities and solutions. (Armstrong et al., 2014).

Attention for design is not new in public administration. Herbert Simon (1969) defined public administration as one the sciences of the artificial and thus as a design science. A design science distinguishes itself from the natural sciences because it studies the artificial – or manmade – instead of the natural and as such, deals with the contingent instead of the necessary – with how things might be instead of with how things are. Design "is concerned with how things ought to be, with devising artifacts to attain goals" (1969: 133). In his view, the core of designing, and as such of all professional training, is the ability to deal with situations as one encounters them by both diagnosing the problem and devising a way to deal with it. Whether that solution is the design of material artefact, a treatment plan for a sick patient or a social welfare policy makes no significant opinion. Even philosophers that came up with complete (re)designs of (utopian) societies are simply classified as very ambitious planners. The idea of public administration as a design science has since then been picked up by several scholars in the field (e.g. Shangraw & Crow, 1989; Frederickson, 2000; Walker, 2011; Meier, 2006).

The idea of public administration as a design science is thus an old one, but types of research that have followed from it have changed over the years has, resulting in new methods and techniques from the design field now being incorporated in public administration (Bason, 2016; Gasco, 2017). In the 1970s and 80s, policy design studies focused on developing tools and systems that policy makers could use to increase the efficiency of government. In the 1990s, the attention for this subfield faded because of the simultaneously rising focus on policy making in networks or decentralized governance arrangements. Because of this development, the role of the state in policy making became less dominant and as such, the potential of scientifically designed tools and systems seemed less big (Howlett, 2014; Howlett & Lejano, 2012). Considine, Alexander and Lewis (2014) see another problematic shift in the 1990s: from policy design as verb – with a focus on design

processes – towards policy design as noun – with a focus on design content or instrumentation. In analogy with Lasswell's (1971) distinction between analysis *for* policy and analysis *of* policy, there is a difference between design studies that aim to address a societal problem or challenge and studies that analyze the (current) design of institutions, policies, or governance arrangements. Considine et al. (2014) thus see a shifting focus from the process towards the output of design.

As stated above, the interest in the application of design in the field of public administration has renewed. This (partly) due to developments in the – already diverse – field of design studies itself. New forms of design methodology, which allowed for the inclusion of diverse stakeholders, emerged and made the field relevant again for public administration (Dorst, 2015; Howlett, 2014). The use of design methods as is becoming more and more common in public administration in recent years can be seen as a new development that connects with developments within the field of design studies (Bason, 2014; Kimbell, 2010). Writers on design thinking and the design field in general are diverse in their accounts of what design thinking actually is and how it should be applied. Johansson-Sköldberg c.s. (2013) tried to map the design thinking discourse and found that it has different meanings in different contexts, ending up with no less than five different discourses, with different philosophical, epistemological and disciplinarian backgrounds – which do not compete with each other, but develop parallel and as such do not complement each other either. The design field is originally shaped by industrialization and the underlying narratives of production and consumption on markets. Nowadays, a shift is visible from the design of objects towards the design of services, interactions, experiences and changed behaviors (Kimbell, 2010). A second development is the emergence of social design which, in contrast with the market-driven model, focuses on social needs and changes. This model is characterized by a strong role for values and missions, an emphasis on collaboration and an intensive use of networks. Design is seen as a way to address the views and needs of multiple stakeholders and empower the community (Thorpe & Gamman, 2011: 217-9).

In public administration, the use of design methods gives rise to new hybrid policymaking processes that are human-centred (instead of problem-centred), have an openness to inquiry and creativity that helps develop new options, focus on outcomes instead of solutions, have room for experimenting, create systems for post-production instead of standalone services and recognize and exercise a new type of distributed (instead of hierarchical) authority (Kimbell, 2016; Christiansen & Bunt, 2014). The rising popularity of these methods in policymaking, governance and public service delivery, however, raises serious dilemmas and questions (Hillgren et al. 2011). Living labs, policy experiments and other design methods give rise to questions about this explorative style of policy-making and its consequences for public administration research (Gasco 2016; Considine et al. 2012). Applications of design thinking can increase both the societal relevance and the empirical

understanding of the field of public administration, especially since policymakers and citizens show a growing interest in experimentation and new forms of collaboration between governments and societal partners (Van Buuren, 2017). Clarity on the types of design methods used, their opportunities and pitfalls and the type of design product and scientific knowledge they can produce is necessary to evaluate the potential for design thinking in public administration. This paper therefore seeks to study how design is currently applied in public administration. The research question of this paper is: what approaches to design are used in public administration, what characterizes these approaches and what are their outcomes?

In order to answer this question, we conduct a systematic literature review, taking into account all studies published in a public administration journal between 2000 and 2016. We will map for what problems or challenges design is currently used, what methods are used during the design process and what the results of the processes are, both in end products and in (scientific) knowledge. Looking at the different applications, we can identify in which research themes and policy fields these types of methods are already being used, what the potentials and pitfalls of different methods are and what kind of practical applications and theoretical knowledge they contribute to the field. This paper is a work in progress, reporting the first – preliminary – results of the findings so far, based on a limited amount of articles that are analysed on a limited number of dimensions.

2. Research strategy

In order to present a systematic, complete and exhaustive overview of the use of design methods in public administration, the guidelines of the PRISMA framework (Liberati et al. 2009) for doing a systematic literature review are followed to ensure the quality and transparency of the review process. The PRISMA framework distinguishes report and study characteristics as eligibility criteria.

Report eligibility criteria:

- Language: we only selected articles that are written in English, in order to prevent difficulties with translation and the replicability of the review. This is a common choice in systematic reviews (Voorberg et al., 2015).
- Publication status: we searched for peer-reviewed articles published in public administration journals. We searched the Web of Science database using the category public administration.
- Year of publication: we selected articles published between 2000 and 2016.

Search strategy

The search terms need to reflect the many different approaches and views that are not yet linked by an overarching concept or framework – this is a gap this paper hopes to fill. Therefore we first started with the broad term 'design' (1821 hits). Later we will use additional search terms to cover any blind spots, to include that approaches that are not labeled as design practices, but do meet the criteria of this study.

Study eligibility criteria:

Since one of the goals of this study is to come to an understanding of how design is used in public administration, it is not possible to determine study eligibility criteria beforehand: those criteria would likely favor some practices and exclude others. Therefore, an inductive approach is used to ensure that the criteria both fit the literature (i.e. make sure the right articles are in- and excluded) but also enable a systematic approach of said literature. This was done in three phases: first an inductive phase, after which preliminary criteria were composed. These were tested in the second phase. The definitive criteria were applied to all 1821 retrieved articles in phase 3. We describe the three phases shortly.

Phase 1:

The first 278 titles and abstracts of retrieved articles were scanned without any criteria. By writing down reasons for in- and exclusion and summarizing those, preliminary criteria were composed.

Inductive exclusion criteria:

- Only focuses on a specific element of a design (22x)
- Reviews the current design of a policy or institution (52x)
- Compares multiple designs / institutional arrangements (36x)

- Design = research design (8x)
- No mentioning of design (practices) (27x)
- Article without abstract (3x)

Inductive inclusion criteria:

- Description of (a) design process(es) with stakeholder participation (6x)
- Description of a design process within an organization (2x)
- Prescriptive article about the ideal design process (3x)
- Design of tool/institution/framework/policy for general use (7x)
- Scientific design of tool/institution/framework/policy for specific case (3x)
- Normative article about design methods in PA (2x)
- Normative article about role of PA in policymaking (2x)

Composed study eligibility criteria:

1. Use of final logic/reasoning instead of causal.
2. Design goal / ambition with a focus on a specific problem.
3. The end product is specified, coherent and focused towards the central goal/value/problem that the process was focused and changes the status quo.
4. There is a (description of) a design process/method.

A design process or research is focused on attaining a specific value or goal or solve a problem, in a specific context or in general. Design methods are applied to address a problem. A final logic or reasoning is thus more fitting than a causal one that focuses on explaining phenomena and discovering working mechanisms behind solutions. A design process then focuses on a problem with an ambition to design an appropriate solution. The 'looseness' (i.e. the degree to which the problem definition and the form of the end product are open to change) of the design process can differ, but it does not limit itself to amending the current solution. The end product of a design process is a specified and coherent design - so not just a set of recommendations – that fits the studied problem and changes the status quo. In order to come up with the end product, a specific design process and/or method was used, that is described in the study.

Those last two criteria are straightforward when it comes to the design of material objects, but are more difficult to apply when it comes to (intangible) services, systems or policies, raising the question what possible end products of design processes in public administration are – a question that probably can never be definitively answered. It is however important to have this type of criteria, to exclude incremental policy adjustments (that are often constructed with a specific goal in mind) and evaluations or other types of studies that end in reflections but not in a concrete and comprehensive approach. Both types of studies are important and omnipresent in the field of public administration, but do not fit the ambition of the design discourse. The criteria formulated here try to make a clear demarcation, while being open enough in terms of topics and methods to allow for the rich variance of design approaches that is already present in public administration.

Phase 2:

These preliminary criteria have been applied in the scanning of another 522 titles and abstracts of retrieved articles. The criteria turned out to work well: they do not exclude articles that would have been included in the inductive phase of the study. With these criteria, it is possible to differentiate design from non-design studies, while including different types of design practices. They leave room for discussion on one point: what type of end product can a design study have? Studies that result in a theoretical framework, with no direct application for public administration practice, have now been excluded. This could indicate a gray area that might become more apparent when full-text articles are scanned. Criterion 4, the use of a design process or method is often difficult to assess in titles and abstracts, but will probably become more relevant in this phase.

Phase 3:

In the last phase, the articles from phase 1 were scanned again, using the composed criteria. This was not necessary for the articles scanned in phase 2, because the criteria were not changed after testing them. The re-examination of the articles from phase 1 caused a significant amount of studies to be excluded that were included in phase 1 (33 out of 61). These were mostly normative articles about the use of design in public administration, or articles about participation processes without a clear design focus. Most excluded articles lacked a clear end product.

Record selection:

In phase 3, all other retrieved articles were scanned. Of the 1821 articles that were scanned in total, 234 were selected for full-text examination. These articles are read in full and checked against the selection criteria. Thus far, the first 91 articles have been read, of which 50 articles

have been included in the study. Table 2 in appendix 1 provides a short overview of all included articles. Of included articles, the following data will be collected:

- Metadata about authors, year of publication, journal and country of study
- Purpose/aim/problem central to the study
- End product / result of the design process
- Design method
- Steps in the design process
- Involved parties / stakeholders
- Reported outcomes
- Key success and failure factors
- Contribution to research / knowledge

3. Preliminary results

3.1 Study characteristics

3.1.1. Design problems

Public administration scholars apply design to three types of problems or challenges. The first reason for the use of design is that the current policy, governance structure, instruction or other type of 'solution' does not yield the desired results. This category accounts for 21 out of 50 studies. These can be studies into the EU's widely ignored Stability and Growth Pact (Hughes Hallet & Hougaard Jensen, 2012), severe housing problems for migrants in China due to urbanization (Huang & Tao 2015), a local policy program for problematic drug users that did not have the intended results (Askew et al., 2010) or a health care organization that was not successful in bring down the amount of health care associated infections (Kellie et al., 2012). These are design studies are problem-driven and aim to bring a new solution where the current design seems to have stalled. Rather than making incremental changes to the current design, a problem-driven design study aims to come up with a new design altogether.

A second type of design studies aims to improve the current design, not necessarily because it is not functioning, but mostly because the authors see an opportunity or reason for improvement, mostly due to a change in the context. The 20 studies that fall in this category are thus more focused on the solution than on the problem; such as a customizable tsunami detection system (Boulos et al.

2012), a decision model to target investments in social welfare, because wealthy countries are spending increasingly vast resources in this domain (Hajkowicz et al., 2013) or a Model Office System for Medicaid offices, to improve efficiency and consumer-friendliness (Isett et al. 2013). These studies are solution-driven, focused on improving a situation with the promises of a new approach or opportunity.

The remaining 9 articles form the last category: the studies that search for a new way of organizing services or governance around a problem or a new tool or system by including new stakeholders in the process. Including different stakeholders leads to new visions on the problem and/or new solutions. Aylett (2013) describes the design of community-led program that transformed the market for residential solar electricity by enabling bulk purchasing in neighbourhoods. Bridge (2012) describes how the Australian Department of Human Services uses co-design to develop citizen centric services, instead of services that are delivered in silos and that are difficult to navigate for citizens. Another example is an action research experiment that set out to improve (the implementation of) adaptation projects by including social and environmental concerns and integrate local knowledge (Cloutier et al. 2015). With these inclusion-driven studies, the focus is on including the views of different stakeholders and coming to new types of solutions or processes to come up with solutions that are different exactly because of the inclusive nature of the process.

3.1.2. Design products / solutions

Design processes can end in different types of 'products' that are meant to contribute to the problem or challenge at hand. These objects differ in terms of how detailed and specific they are. One subcategory is formed by the (10) articles that offer (a) framework, approach, guidelines or process that practitioners can use to design their response to a problem. These are almost all (9 out of 10) articles that are more solution- than problem-focused and none of the designs are implemented. That is not surprising, because none of the designs is refined enough to be implemented directly. They all need to be fitted to a specific context. Examples of designs are guidelines for compensation packages to improve recruitment of public officials (Andersen et al., 2012), an operational framework for applying scientific knowledge on resilience (Kahan et al. 2009) and a structured approach for designing climate adaptation policies (Buurman & Babovic, 2016).

The largest category (29) of design products is formed by tools, programs, systems, interventions and policies that can be used in practice. A substantial number (12 out of 29) of these studies include the implementation phase in the design process, or resulted in a design that was later implemented by the problem-owner: a program to strengthen HR managers' competencies and increase their value as strategic partners (Gorman et al., 2003), an auction design that ensures farmers sell their irrigation rights in times of drought (Cummings et al., 2004) and a performance review system for a private youth care agency (Lawrence et al., 2016). In 5 studies, implementation either had not started yet, or the process ended before implementation could be reached (although the intention was originally there). For example, a policy that was supposed to resolve conflicts on economic development and groundwater protection in the Elbe River basin in Germany did not get implemented because decision makers felt the outcome would not be beneficial to them (Klauer et al., 2006). In terms of design problems, all three categories are represented. Most studies (15) focused on solving problems in the current design, 10 are more solution-focused and 4 look for new ways of organizing.

The last category of end products provides or governance structures: a governance modality for a lake basin in Turkey that included local residents, excluded by the current design (Adaman et al., 2009), or neigbourhood governance in development projects (Brunner 2004), for example. Out of 8 studies in total, 6 designs were implemented. In terms of design problem, 6 studies were inclusion-driven, 1 was problem-driven and 1 was solution-focused.

3.1.3. Design methods

So far, we have mapped for what problems design is used and with what results. A remaining important question is what different types of design processes can be discerned. The first group (17 articles) use an analytical approach, using (scientific) literature and sometimes additional analytical methods, such as game theory (Chen et al. 2008), to come to a design. The largest group (21 articles) uses participatory methods to come to their design, varying from co-design (Bridge 2012) to action research (e.g. Kellie et al., 2012; Cloutier et al., 2015; Ford & Murphy 2008) and a design experiment (Askew et al., 2010). The end product of participatory studies was implemented 14 times. 5 times there was the intent to implement, but either this had not happened yet at the time of the article or the process was abolished prematurely (mostly due to changes in stakeholder commitment). Analytical studies on the other hand were never implemented.

Two smaller groups are studies that use mapping- or scenario methods (5 articles) and studies that supplement analytical analyses with empirical data (7 studies; mostly interview- or survey data). These last studies are not participatory because stakeholders can only provide input on questions asked and they cannot influence the design process itself. Huang & Tao (2015) for instance held a survey amongst migrants in China to identify the problems they faced in the current housing system and used it as input for the housing provision system they designed. Haynes et al. (2013) designed a system that uses text messages to collect unpaid fines. They used an adaptive trial design. People with unpaid fines participated in the experiment and as such, they provided feedback on the used system. But they were not invited to contribute to the design on their own terms. The combination of analytical methods with empirical input led 4 (out of 9) times to an implemented result; one time there was intent to implement. The use of scenario or mapping methods led 1 out of 5 times to implementation: Fitch (2009) described how a group of nonprofit agencies providing services to senior citizens prototyped a shared point of access, to facilitate interagency case management and the coordination of services. They used concept mapping and influence diagrams to identify the most relevant factors and processes and the relationship between them.

3.2 Logics of design in public administration

As becomes clear from the selected articles, there is great diversity in problems to which design is applied in public administration research, as well as the methods that are used. The resulting design solutions are, as a consequence, also manifold. That does, however, not mean that there are no commonalities to be detected between groups of articles. We compared the 50 articles in the preliminary selection on all characteristics mentioned in the previous section. In doing so, we found four different logics of design applications in public administration.

3.2.1 Analytical design

The first logic, that includes 20 out of 50 articles, we can call the analytical design logic. In this logic, the ambition of a design process is to systematically conduct an analytical design process which is mainly evidence-based and as rational as possible. If there are stakeholders involved in the design process, they are only providing input that the researchers take into account when they complete their design at the drawing-board, so to speak. The end product is typically a framework, set of guidelines, tool or policy that is meant for the (supra-)national level or as a generic solution. None of the designs in this logic are implemented. This logic consists of two subtypes: the problem-driven and the solution-driven designs. The current selection has 10 solution-driven analytical designs and 10 problem-driven designs. An example of a solution driven analytical design is the study of Ho (2000) who shows how wage subsidies can serve as a tool for enhancing efficiency and equity

in a rapidly changing labour market. Branscomb et al. (2012) designed a policy program that the US can use to reduce the risks associated with the transportation of hazardous materials, which become more urgent after some serious incidents.

3.2.2. Governance design

The second logic is the logic of governance design. In this logic design processes are defined as processes of collaborative design in which stakeholders are involved in a creative and solution-oriented process in order to collaboratively solve a (controversial) issue. The 7 studies in this group all use a participatory method that gives stakeholders the opportunity to not only provide input or feedback on topics chosen by the researcher, but to contribute their own views, knowledge and experiences. These are studies focused on local cases, worked on by multiple organisations and/or types of stakeholders. They are inclusion-driven designs that use the views of stakeholders and their local knowledge to look for new perspectives on problem and/or solution. In two cases, the design process was even initiated by citizens instead of public servants or researchers (Brunner, 2004; Aylett 2013). Governance design processes result in governance arrangements or (inclusive) policies that represent a new way of policy making and / or governance in the problem area. Of the included articles, 5 designs were implemented. In two cases all involved parties originally had the intent to implement the solutions, but tensions between stakeholders resulted in abolishment of the projects. An example of a successful design is a Strategic Plan(ning process) in the Spanish city Alcobendas. Local governments search for ways to combine efficient delivery of public services with democratic quality, despite financial constraints. In this city, a participation process was organized in which citizens could contribute to both the identification of priorities for the city and the plans to implement them, resulting in a Strategic Plan that integrates innovations and initiatives of the local civil society in the actions of local government (Iglesias Alonso 2014).

3.2.3. Management design

The third logic closely resembles the second in the sense that the 6 articles in this group all use participatory methods and put emphasis on the local knowledge and experience of stakeholders. The difference is that these studies focus on processes that are organized within the context of organizations in the public sector, with the aim to come to managerial innovation or optimization. Typically, the stakeholders are all part of the same organization, but work at different levels. The goal of these studies is to develop a policy program, tool or reform that is supported by the employees that have to work with it. So far, all 6 articles are implemented, often through some kind of action research. Clairborne & Lawson (2011) describe two two year consultation programs in public child welfare agencies to implement supervisory teams that are both management tools and organizational redesign mechanisms. The agencies had tried top-down supervision via an

organizational intervention, but this turned out insufficient. Workplace problems, such as defensive behavior from professionals, makes top-down supervision difficult. The open-ended, reiterated design process that was controlled by team members made it possible to successfully implement supervision teams.

3.2.4. Consultation design

The fourth logic, consultation design, forms the middle ground between the open, participative processes of governance and management design and the expert-driven or evidence-based approach of analytical design. The 8 studies in this logic resemble the participative logics in the sense that they focus on local problems or on the problem of specific organisations and always involve stakeholders. However, stakeholders only provide input for or feedback on the design. The design itself is made by researchers, thus resembling the studies in the analytical design logic. Because these studies are conducted either in cooperation with or in commission of the problem owner, most designs are implemented (5), or intended to be implemented in the future (1). Two design processes were meant to include implementation, but ended prematurely because of resistance among stakeholders. One time local stakeholders felt they were included too late, when there was already an almost completed design in which they did not recognize their views (Bell & Stockdale 2016). The other case is described in section 3.1.2 and was abolished because decision makers had expected the outcome of the process to be according to their preferences. When this turned out to be different, they rapidly made the decision before the participation process had ended (Klauer et al. 2006). A successful example of a consultation design is the development of a performance indicators report for the Boston Emergency Medical Services. The report was developed by the management of the organisation and the researcher. Employees were asked for their feedback, which was used to improve the report.

The four logics presented in table 1 cover 41 out of 50 articles that were selected so far, which means 9 articles do not fit either one of the logics that we have distinguished thus far. The main reason articles don't fit is because the logics are based on a combination of the implementation status of the design, its specificity (i.e. tailored to a specific/local case or meant for use on a larger (national/supranational) or generic level) and the extent to which stakeholders are included in the design. These three aspects can be combined in various ways. The four logics presented here represent the most frequent occurring combinations.

Table 1: Overview of the four logics

	Analytical Design	*Governance Design*	*Management Design*	*Consultation Design*
Degree of participation	Information	Cocreation	Cocreation	Consultation
Type of issues	Mixed	Policy problem	Management problem	Mixed
Role of expert	Problem solver	Broker	Action researcher	Consultant
Main input	Scientific knowledge	Stakeholder views	Actionable knowledge	Mixed
Process logic	Quasi-rational analysis	Participatory dialogue	Participatory action research	Mixed

4.Preliminary observations and conclusions

First of all, the vast majority of design-based studies in public administration do not present a fully developed design methodology. Most studies that were retrieved in the original search are looking for the "design of policy" instead of developing "design for policy". Moreover, many studies are comparative and/or evaluative: they compare designs and evaluate them.

It is also interesting that the studies that present a design attempt are often not very clear about the design problem they try to solve and the ultimate design they deliver. Many studies mention a few elements of a design process but are not explicit describing the results of the design process they describe. In other words: design logics are most often only partially applied.

The reasons for doing design vary from a need for improvement, an opportunity for applying an interesting solution or a need to include stakeholders to a policy process and to come to consensus-based solutions. Especially the second category is interesting because here we see a solution-focused approach: there is an idea about a possible solution, and authors describe the results of their attempt to apply that solution. This type of design studies is quite at odds with the traditional design studies in which the problem of the (end) users is put central to the design process.

The ultimate results of the described design processes differ highly. A large part really develops a concrete tool or policy instrument. Other studies develop more abstract frameworks or governance

structures. But in generally these results are quite concrete and really applicable in practice. The ten articles that present an instrument or approach to design concrete strategies or interventions can be seen as a form of meta-design: the design process results in a design tool or instrument, sometimes more abstract (in terms of guidelines), sometimes more concrete (a ready-to use how-to-do approach).

In terms of methods we see most often a combination of classical methods (to collect data) and more participatory methods (that facilitate dialogue and involvement of stakeholders). It is interesting to see that more creative methods – which are quite common in the design studies – are not used very often. Participatory methods are often applied to ensure support of stakeholders, rather than to come to new, innovative solutions based on new perspectives on the problem at hand. This is most visible within the logic of management design: studies in this logic are focused on implementing organisational reforms and management or supervision tools that are not necessarily innovative, but need the support of lower level employees to function successfully. Some of these design processes were even initiated because top down implemented reforms or tools were not successful.

Both the logics of analytical design and to a lesser extent consultation design represent design processes that are completely or to a large degree controlled by the researcher as an expert. This means that both the problem definition at the beginning and the final design are defined by the researcher(s). If stakeholders have influence, it is by providing input for the design or feedback on a draft version. This limits the potential for finding new, innovative solutions. The governance design logic represents the most innovative designs, because the processes are open to stakeholders and because of the intent to come to new, innovative, inclusive policies or governance arrangements, they are more often involved in the problem definition. The downside of these articles is that they often focus more on the design (or: participation) process and less on the actual design.

Based upon this partial results, we can conclude that the current way in which design is applied in PA is highly diverse, but mostly resembles more traditional research methods and therefore does not optimally use the potential of design. The design studies included in this research apply design the way Herbert Simon (1969) intended: to devise artefacts to attain goals. However, the promise of smarter solutions to wicked problems and better public services that gained design its recent popularity in public administration, does not yet seem carried out. In fact, in many of the studied articles, this innovativeness (combined with room for creativity, abduction and iteration, cf. Van Buuren & Voorberg, 2017) did not seem of particular interest.

That means that there are many opportunities to strengthen design-based studies in PA. Especially by paying significant attention to the problem and the formulation of its definition which determines the type of solution that will be designed and as such can either limit or stimulate innovation and inclusiveness. Similar considerations should be made with regards to the design process. If the process is to tackle a wicked problem, or to result in a smarter policy or public service, the process has to allow out-of-the-box-thinking and maybe even experimentation.

Applying design does not only hold promise for the practice of public administration, it can also contribute to the science of public administration and policy by providing opportunities to translate scientific knowledge into applicable interventions and test their working. Design products can subsequently contribute to the development of public administration theory, especially when they are (experimentally) tested. To do so, it is important that the way these types of studies are designed, implemented *and* reported facilitates systematic knowledge accumulation. That means that both the design process and the ultimate end product need to be described properly, that the assumptions behind a design are explicated and that the effects of a design are properly evaluated, instead of being made subordinate to theoretical perspectives.

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Appendix 1: Overview of included articles

Table 2: Short overview included articles

	Article	Probleem /goal/challenge	Method	End product / design
1	Abrams et al. 2013	Enhance efficiency of Boston Emergency Medical Services' service provision by performance indicator.	Participatory approach with strategic elements	Performance indicator rapport
2	Adaman et al. 2009	Policy change led to degradation lake basin and alienated local people.	Analytical with empirical input	Governance modality
3	Ahlqvist et al. 2012	Create policy perspectives in a dynamic context of societal drivers, market development and enabling technologies.	(innovation policy) roadmapping	Sectoral/ regional roadmaps for policy perspectives for innovation policies
4	Andersen et al. 2012	Public organization want to attract employees with high public service motivation.	Analytical with empirical test	Guidelines to design compensation packages to improve recruitment
5	Askew et al. 2010	High percentage of problematic drug users despite programs/policies.	Design experiment / participatory	Local drugs policy intervention
6	Aslam 2001	Enhance effectiveness of north-south technology transfer through the clean development mechanism	Analytical	Japanese model for technology transfer
7	Avery 2000	Decision for outsourcing is often without careful consideration	Analytical	Process for evaluation of option to outsource for specific laboratory
8	Aylett 2013	Citizens wanted to set up a program for neighborhood-scale bulk purchasing to reduce cost of residential solar electricity.	Participatory approach	Community-led program that transformed the market for residential solar electricity.
9	Bell & Stockdale 2016	Minister wanted to turn area into national park.	Consultation exercise participatory	Failed to implement policy due to local resistance
10	Boulos et al. 2012	Providing more timely and informed response to near-field tsunami's	Analytical	Customizable tsunami detection system
11	Branscomb et al. 2012	Reduce risks associated with transportation hazardous materials.	Analytical	Policy program
12	Bridge 2012	Government delivers services often in silos. Citizens have difficulty navigating.	Co-design	Citizen centric services

13	Brook et al. 2016	Climate change, despite efforts to limit global warming.	Analytical	Commitment to be incorporated in UN Convention
14	Brunner 2004	Local community initiatives want to be incorporated in development projects.	Participatory process	Neighbourhood governance
15	Bryson et al. 2002	African American men do not fare well compared to white/Hispanic/Asian peers. No effective problem formulation.	Stakeholder analysis / mapping	Stakeholder analysis tools to help govts act and think strategically / make wicked problems more tractable
16	Buurman & Babovic 2016	Governments need to make climate adaptation investment decisions, but there are many uncertainties.	Adaptive policy making (mapping)	Structured approach for designing climate adaptation policies + example.
17	Caloffi & Mariani 2011	Increasing competition global markets, progressive loss of innovativeness of enterprises + economic crisis	Evolutionary approach (analytical + empirical)	Innovation poles (clusters; policy to stimulate innovation)
18	Chen et al. 2008	Emergency manager in urban areas have limited resources and could face multiple crises.	Game theory (analytical)	Framework for deploying response agents
19	Claiborne & Lawson 2011	Top-down compliance-oriented leadership directed at frontline professionals is suboptimal. Intervention developed: suboptimal.	Inquiry-based communications (participatory)	Set up and implementation of supervisory teams.
20	Clement et al. 2015	Poor performance of biodiversity institutions. Adaptive governance is seen as solution, but neglects institutional context.	Context-driven approach (pragmatism) (participatory)	Approaches to reform landscape policy/governance.
21	Cloutier et al. 2015	Environmental quality can be strengthened by including social and environmental concerns. Adaptation projects prove difficult to implement. How can local knowledge be integrated?	Action research experiment	Adaptation measures that include social/environmental concerns + local knowledge.
22	Cook 2016	Distorting influence of minority factions / special interests on public governance.	Analytical	Constitutional redesign: administration as 4th power.
23	Cummings et al. 2004	Government needs design for auction so that farmers sell irrigation rights in times of drought.	Laboratory + field experiments (analytical + empirical)	Auction design.

24	Dantu et al. 2008	Phishing attacks have changed from passive to active. Limited success in restricting.	Analytical	Classifier
25	Doberstein 2016	Difficult to realise collaborative advantage because of multitude of actors, org, interests.	Collaborative governance	Collaborative homeless policy
26	Dobmeyer et al. 2002	Monitor clients progress through court-ordered chemical dependency treatment	Participatory	Performance management system
27	Fitch 2009	Elderly and caregivers have difficulty coordinating services among human service agencies.	Information system development - mapping	Shared point of access (information system)
28	Ford & Murphy 2008	E-government is central to renewing local democracy. Knowledge is often mismanaged.	Participatory, cyclical research design	Web-based portal to support leverage of expertise across local authority boundaries
29	Giovanelli et al. 2015	Performance evaluation systems are fundamental tools, but difficult to design for public sector.	Participatory / action research	Performance evaluation system for local public healthcare authorities
30	Gorman et al. 2003	Economic downturns and technological advances have reshaped county. Strategic HR management more important, but not available.	Customized needs assessment, participatory / action research	Program to build competencies needed for HR managers to serve as strategic partners.
31	Hajkowicz et al. 2013	Governments in wealthy countries are spending increasingly vast resources on social welfare.	Analytisch (multiple criteria analysis)	Decision model to target investments.
32	Haynes et al. 2013	Unpaid fines are difficult and costly to collect.	Adaptive trial design – Analytical with empirical input	Text messages as alternative method
33	Ho 2000	Rapidly changing technology and external trade relations can make relations between capital and labour very difficult.	Analytical	Wage subsidies as tool for efficiency and equity
34	Hoefer & Sliva	Growing shortage of suitable nonprofit managers.	Analytical + empirical input??	Training intervention targeted at identified gaps
35	Huang & Tao 2015	China experiences unprecedented urban revolution. Migrants suffer severe housing poverty.	Analytical + empirical input	Migrant housing provision system + reform agenda

36	Hubbard 2000	Shift in how development assistance is viewed by funding agencies.	Analytical	Potential impact approach (assessing future project performance)
37	Hughes Hallet & Hougaard Jensen 2012	Stability and Growth Pact widely ignored / failed.	Analytical	Alternative framework to supplant SGP. Division of labour between fiscal and monetary policy.
38	Hurley et al. 2004	Transform four separately incorporated health services into 1 service.	Participatory	Project abolished.
39	Iacobucci & Trebilcock 2007	Due to competition arising from new technology, extensive economic regulation of the telecommunications industry has become less appropriate.	Analytical	Framework for institutional reform.
40	Iglesias Alonso 2014	Governments have to combine delivery of efficient public services with local economic development and democratic quality, despite financial constraints.	Participatory	Strategic planning (process) that includes local citizen initiatives.
41	Isett et al. 2013	Improve efficiency and consumer-friendliness of Medicaid offices	Iterative redesign - participatory	Model Office System
42	Juliano 2013	Crisis big pharma: high costs, little advances	Analytical	New policy initiative: non-profit drug development cooperations
43	Kahan et al. 2009	Growing interest in resilience, but scientific knowledge is difficult to apply due to lack of coherence.	Analytical	Operational framework for stakeholders at all levels
44	Kavtaradze & Casu 2015	Ecopolis settlements in Russia operate without any academically correct science reference or research.	Sustainable design / participatory?	Urban ecopolis strategy
45	Kellie et al. 2012	Health care associated infections. Local trust was not meeting targets. Top-down initiatives were insufficient.	Action learning leadership intervention	Initiative to support nurses in role identification, identifying best practices and influencing other stakeholders.
46	Kemp 2016	US does not ratify international environmental treaties.	Analytical	Model to create effective, legally binding treaty that allows for US participation.
47	Klauer et al. 2006	Conflicts over economic development and groundwater protection in Elbe River basin.	Participatory/ scenario, IANUS	Compromise policy alternative (process stopped prematurely)

48	Klenk & Hickey 2012	Improve design of formal research networks to produce more socially relevant science.	Exploratory concept mapping Delphi exercise	Ideal features cross-sector research network natural resource sector
49	Knott & Miller 2006	Rent-seeking /moral hazard by political elites through public agencies	Analytical	Generic political system that limits opportunities for rent-seeking.
50	Lawrence et al. 2016	Private youth care agencies make changes to survive contracting environment, not always beneficial for employees / communities. High level of workforce turnover.	Design team intervention, participatory	Agency-wide value based employee performance review