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Albert Meijer & Marcel Thaens

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The Dark Side of Public Innovation

Albert Meijer[a] and Marcel Thaens[b]

[a]Universiteit Utrecht; [b]Province of North Brabant

ABSTRACT

The positive features of innovation are well known but the dark side of public innovation has received less attention. To fill this gap, this article develops a theoretical understanding of the dark side of public innovation. We explore a diversity of perverse effects on the basis of a literature review and an expert consultation. We indicate that these perverse effects can be categorized on two dimensions: low public value and low public control. We confront this exploratory analysis with the literature and conclude that the perverse effects are not coincidental but emerge from key properties of innovation processes such as creating niches for innovation and accepting uncertainty about public value outcomes. To limit perverse effects, we call for the dynamic assessment of public innovation. The challenge for innovators is to acknowledge the dark side and take measures to prevent perverse effects without killing the innovativeness of organizations.

Introduction

The positive outcomes of public innovation are generally highlighted in both the academic literature and practitioner-oriented publications. Public innovation is needed to make the public sector more efficient, effective and legitimate (Bason, 2010; Borins, 2001; Gieske et al., 2019). Especially in times of fiscal stress, public innovation is presented as the solution for contemporary problems that governments are facing since it enables these government to do more with less (Overmans & Noordegraaf, 2014). There is a strong focus on technological innovation and a belief that technology will make government better, but one also sees all kinds of social innovations in the public sector such as new collaborations with citizens. At a more fundamental level, the need for innovation is highlighted on the basis of the argument that society changes at a high pace and governments need to be flexible—agile—to deal with the changing technologies, changing social environments and changing demands of citizens. One could even conclude

CONTACT Albert Meijer a.j.meijer@uu.nl School of Governance, Universiteit Utrecht, Bijlhouwerstraat 6, Utrecht, 3511 ZC Netherlands.

that there is an "innovation imperative" in the public sector: thou shalt innovate! (OECD, 2015)

Yet, Pollitt (2011, p. 37) pointed out that academics should always be somewhat suspicious of such seemingly "magical concepts." Jordan (2014, p. 79) argues that, since innovation can produce harms and benefits, it ought to provoke ethical concerns for public management scholars. More specifically, Brown and Osborne (2013) stress that public innovation is associated with a range of individual, organizational and community risks. We prefer to use the term "perverse effect" since innovations produce unforeseen negative consequences that are sometimes even exactly the opposite to the intended effect: the objective of public innovation is to strengthen the public sector but it may actually result in a weaker public sector with less public control over government action. We refer to these perverse effects as "the dark side of innovation" since we feel that these outcomes are directly related to key features of innovation processes.

The perverse effects of public innovation may be related to the underlying logic but also to the way the innovation is managed, implemented or influenced by political dynamics. Some undesirable outcomes from innovation processes are known but academic knowledge about these perverse effects is limited and fragmented (see Brandsen et al., 2016 and Larsson & Brandsen, 2016 for important exceptions). Various articles have looked into the failure of pu innovation, but few articles have explicitly explored perverse effects and their underlying logic. This article aims to provide an academic understanding of the underlying dimensions of the perverse effects of public innovation and to present an innovation management approach for limiting these perverse effects. We develop the argument for Western democracies but many of the points raised may also apply to other types of government. Many of the cases we discuss are examples of technological innovation, but we also introduce various examples of social innovation. In the conclusion, we will reflect explicitly on the similarities and differences in the dark side of technological and social innovation.

The article is structured as follows. First, we present the approach we used to map perverse effects of public innovation. Second, we present the exploration of perverse effects we have identified on the basis of our analysis of the literature and the consultation of experts. Third, we develop a framework for mapping the various kinds of perverse effects. Fourth we analyze how this framework relates to key features of public innovation processes. Fifth, we develop an approach to dealing with these perverse effects building upon the European approach of responsible research and innovation and Brown and Osborne's (2013) framework for risk governance in public services. Finally, we end the article with conclusion and an agenda for further research into the dark side of innovation.

Strategy for mapping the dark side of public innovation

The objective of our article is to map the dark side of public innovation. We developed an approach that builds upon the literature about developing theoretical concepts through qualitative research (Gioia et al., 2013). To map the perverse effects of public innovation, we collected a broad variety of insights and examples through an analysis of key sources in the literature and a consultation of experts. We inductively mapped perverse effects, identified underlying dimensions and related these dimensions to key features of public innovation. Please note that the ambition of this article is not to provide a complete overview of all perverse effects but rather to identify how perverse effects are theoretically linked to core features of public innovation.

Firstly, we selected key references on public innovation through a search on "public innovation" and "public sector innovation" in Google Scholar. We selected classical sources, literature reviews and articles specifically focusing on failure or ethical issues. We selected material on social and on technical innovation to identify different kinds of perverse effects. In addition, we included articles that experts in the field referred to as providing important examples (see below for the method of the expert consultation). Our ambition was to inductively identify a variety of perverse effects and to establish a theoretical understanding of the nature of these perverse effects and their relation to key features of public innovation. This resulted in the following set of articles and books: Altshuler and Behn (1997), Ansell and Torfing (2014), Borins (2001, 2002), Bekkers et al. (2006, 2011), Brandsen et al. (2016), Brown and Osborne (2013), De Vries et al. (2016), Fuglsang and Sundbo (2016), Hartley (2005), Jordan (2014), Moore and Hartley (2008), Osborne and Brown (2005), O'Toole (1997), Roberts and King (1996), Sørensen and Torfing (2011), Voorberg et al. (2015), Windrum and Koch (2008), and Zang and Musheno (2017). We analyzed these key sources in the literature on public innovation for information about and examples of perverse effects. We found that there is some attention for risk governance but limited attention for perverse effects. Nevertheless, close reading of this literature resulted in a preliminary list of perverse effects and examples.

Secondly, we consulted experts in the field of public innovation to validate and expand the preliminary list of perverse effects. Experts were identified on the basis of their publications on public innovation in peer reviewed journals and books with renown publishers and through "snow ball sampling" (Noy, 2008) to ask them for other experts. This resulted in a list of 15 experts from six different countries (Denmark, Italy, Netherlands, Norway, Spain and USA). We asked the experts over e-mail whether they knew examples of the perverse effects of public innovation that we had

identified on the basis of our desk research and whether they knew additional perverse effects and examples. This resulted in a confirmation of our perverse effects with some interesting new examples and some additional perverse effects.

The findings from the literature review and the consultation of experts were used to develop an exploratory overview of perverse effects of public innovation. We subsequently analyzed the 10 perverse effects that we had identified to propose underlying (theoretical) dimensions of this variety of perverse effects.

Exploratory overview of perverse effects of public innovation

In line with the literature, an innovation is broadly defined as the implementation of an idea that is perceived as new in the context and results in—more or less disruptive—changes (Bekkers et al., 2011; Fagerberg et al. 2005; Rogers, 2003) and public innovations are the ones taking place within the context of public sector organizations. Public innovation can refer to the use of technologies in the public sector but also to changes in processes, organizations, services, policy approaches, democratic engagement and institutions (De Vries et al., 2016). The key premise is that generation and practical realization of new ideas—often developed through creative, design processes—provides the basis for improvements in the public sector.

The literature on public innovation quite extensively discusses all the advantages of public innovation in terms of gains in effectiveness, efficiency and legitimacy. But as stated before, there is also a dark side connected with innovation. This dark side receives relatively little attention: the failures and conflicts of public innovation often remain obscure (Larsson & Brandsen, 2016). On the basis of their comprehensive literature review of public innovation, De Vries et al. (2016, p. 159) conclude that many articles focused on the positive effects of innovations, and only a few considered specific innovation failures.

The failures of innovation have received some attention in recent literature. Brandsen et al. (2016, p. 307), for example, highlight that innovations are often precarious and vulnerable. The same authors also stress that, interesting ideas are often implemented at a small scale but do not result in broader changes (for a recent overview: Cinar et al., 2019). Our article on the dark side of innovation, however, does not focus on barriers in innovation processes and failures to realize a greater impact but on perverse outcomes. Specifically, for technological innovation, the literature on science and technology studies is abound with examples of these perverse effects such as environment damage, privacy risks, exclusion of vulnerable groups, etc. (Hackett et al., 2017) but a similar overview for public innovation is

lacking. In that sense, our line of analysis is similar to recent papers on the dark side of creativity (Cropley et al., 2010; Gino & Ariely, 2012) and trust (Skinner et al.,2014). On the basis of the analysis of the literature and a consultation of experts, we identified a series of perverse effects of public innovation. We will discuss both technological and social innovations and in our analysis we will reflect on the differences.

Perverse effects are unexpected and undesirable outcomes (Vedung, 1997) and, in our case, they are directly related to public innovation. It is important to note that, similar to failure, perverse effects are (inter)subjective. Dudau et al. (2018, p. 268) indicate that "(…) one stakeholder's innovation failure is another stakeholder's innovation success." This means that the dark side of innovation is constructed in political interactions and whether a new program for social benefits is seen as a success or a failure depends on the outcome of these interactions (Bovenset al., 2001; Marsh & McConnell, 2010). In addition, time plays a role: perverse effects may only emerge after several years, but they may also be tackled and solved by additional learning and amending the innovation. The perverse effects that we mention here should therefore be regarded as types of arguments—on could even call this a "language"—that can be used to highlight downsides of public innovation. The unexpected nature of the effects is also (inter)subjective: innovators will highlight that these outcomes were not foreseen whereas critical stakeholders stress that they had warned about these outcomes.

A first perverse effect is the "lack of stability" that results from the emphasis on continuous innovations. Although change may often be desirable, innovations may disrupt things that actually work well (academic respondent 1). The lack of stability can have negative consequences for people working in an organization in the form of stress but also for customers and external relations since they do not know what to expect from the organization. For China, it has been argued that policy innovation may create uncertainties and threaten social stability, economic growth, and ultimately the legitimacy of the state (Zang & Musheno, 2017). This lack of stability may not only be a problem for China but also for the Western governments.

A second perverse effect is that innovation may result in "illegal practices": if there is no control the emphasis on innovation can result in (semi-)illegal actions (Fuglsang & Sundbo, 2016). Rules have been developed to regulate behavior and for this reason they may inhibit new approaches. A recent example from the Netherlands illustrates this risk. The tax department had opened up an innovation lab to experiment with the use of data science to improve its regulatory processes. The application of data science, however, resulted in a variety of privacy breaches which were only exposed at a later stage (Zembla, 2017).

A third perverse effect is that public innovation may result in "corruption." In innovation projects with public and private parties, regular procedures for collaboration generally do not apply and there may be a risk of corruption (Borins, 2002). There may be too much freedom for individuals and perhaps people are not speaking up when integrity may be at risk. Corruption can occur if there is only attention for stimulating individual initiative as a requirement for innovation and little attention for control. Measures against corruption tend to put much emphasis on rules and procedures and these are generally regarded as barriers to innovation. In addition, a relation of trust instead of strict control may be beneficial to learning processes around public innovation but the intimacy that is created to support innovation also may result in patterns of corruption.

A fourth perverse effect is that public innovation results in a waste of public money. Public innovation projects often fail to deliver on their promise (academic respondent 1) and this can mean that public money is spilled. Jordan (2014, p. 75) refers to "pork projects" that are of doubtful utility but represent flashy changes which may play a part in a public relations campaign to justify increases in budgets or other resources. Osborne and Brown (2005, p. 190) stress that a risk of innovation is that it will cost more than was intended. This perverse effect is very strongly present when innovation is seen as a goal in itself and the outcomes of innovation are not measured (academic respondent 2) and also when the innovation is ICT-driven. Academic respondent 3 mentioned the public service broker and e-voting in Ireland as examples of a waste of money on digital innovation.

A fifth perverse effect of public innovation is "absence of democratic control." Public innovation entails that new solutions are developed and tried out at the work floor. One of our key informers referred to this as a process of de-politicization (academic respondent 4). This also means that these solutions have not yet been approved by democratic representatives. In technological innovation, politics are more or less driven out by the idea that making decisions is just a rational process of having the "right" information (Bekkers et al., 2006). This may not be a problem when the innovation relates to operational issues, but it may be more dangerous when the innovation entails more substantial issues.

A sixth perverse effect of public innovation is "damage to local initiatives." Broersma et al. (2016) indicate that national approaches to citizen participation may force diverse approach to follow one fixed method. The focus on rolling out new generic solutions may be damaging to local approaches when funding is provided for generic solutions and local solutions are not supported (academic respondent 4). An example mentioned by the academic respondent was the compulsory nature of certain projects

for neighborhood participation in the Netherlands. One can also think of centrally enforced standardization of processes or information systems that limits the possibilities for local innovation.

A seventh perverse effect of public innovation is the "disruption of a power balance." A disruption in itself is not necessarily a perverse effect, but it is when public innovation results in a further concentration of power in the hands of the powerful (academic respondent 1). Larsson and Brandsen (2016) stress that the politics of social innovation are often "denied": innovations are presented as purely instrumental changes. Jordan (2014, p. 79) concludes that innovation may entail uses of power that need to be checked against the possibility of abuses. The political aspects and effects on power distributions often remain in the dark. This insight is in line with the work of King and Kraemer (2012) and more specifically with their "reinforcement" theory with regard toward ICT. They state that ICT systems are unlikely to diminish the power of interests who can stop such effects (e.g. through legislation) or who control the development and deployment of ICT itself. Furthermore they conclude that "it is naïve to plan for ICT developments with the expectation that such power effects will result" (King & Kraemer, 2012, p. 293).

An eighth perverse effect of public innovation is undesirability: practices or processes may be developed that produce "negative outcomes for stakeholders." Hartley (2005) refers to innovation that do not constitute an improvement since, for example, increased choices are not desired by service users. In addition, Osborne & Brown (2005, p. 190) indicate that the innovation may be pursued for ideological reasons rather than for its contribution to the efficiency or effectiveness of public services. Similarly, Brandsen et al. (2016, p. 307) stress that a significant part of social innovations represent cultural, economic and social aims and practices that are highly controversial or even seen by many as threatening rather than promising. These innovations may stress the perspective of only a small group of actors—i.e. they are one-sided—or they may conflict with human values. An example that is often highlighted—and that has reemerged around the discussion about robotization—is that innovation results in the loss of jobs. The most extreme example is this respect are concentration camps. These camps qualify as public innovations in many definition but they clearly represent a highly undesirable change. The undesirability in our days often relates to problems of exclusion of certain groups of citizens. Academic respondent 5 mentioned the exclusion of citizens due to legally enforced digitization as an example of a practice that is regarded as undesirable by many actors. Similarly, academic respondent 4 mentioned a case in Ireland where a person was denied €13because she refused to get a public service card.

A ninth perverse effect that we have identified is "the technocratic dominance in public processes." Larsson and Brandsen (2016, p. 295) highlight the denial of politics. This perverse effect especially occurs if the technology used is rather new or complex and requires specific knowledge which many people lack. The lack of knowledge can play a role at the operational level, but also at a more political level. Often politicians do not have enough knowledge to accurately steer, judge or control the way in which public sector organizations use specific technology. This perverse effect comes into play when algorithms are used within a public sector context as O'Neil (2016) points out. More generally, the perverse effect associated with ICT-driven innovations is that they possible lead to a dominance of what is seen as "objective" and "hard" information (Bekkers et al., 2006). Especially when Big Data are concerned there often is a tendency to use the available data to work toward more "evidence based" decision making.

A tenth and final perverse effect is that the public innovation creates "unforeseen security risks" that outweigh the benefits of the innovation. This perverse effect seems to be specifically relevant for technological innovations and a well-known negative effect is the leaking of personal information due to insufficient security measures in the information system. Academic respondent 6 mentioned the example of a new online ticket system introduced by the Hungarian public transportation company in Budapest. The system was not well secured and therefore a hacker was able to break into the system and access sensitive information. Similarly, academic respondent 7 indicated that sensitive personal information had leaked from a system from the Swedish transport authority.

Mapping the perverse effects of public innovation

The list of perverse effects of public innovation that we presented shows a great deal of variation. Some perverse effects are specifically relevant for technological innovation (e.g. technocratic dominanceand unforeseen security risks) but many others are relevant for both technological and social innovation. Many of the arguments are often mentioned in the general literature on the success and failure of governance programs but hardly mentioned in the literature on public innovation (Bovens et al., 2001). We analyzed this list inductively to identify the underlying dimensions of the "map" by forcing up the variety of concepts in their level of abstractness to identify underlying notions (Gioia et al., 2013). On the basis of our analysis, we propose that this variation can understood on the basis of a model of two dimensions: public value and public control. Both are seen as key aspects of government legitimacy: process legitimacy relies on a system of public control and output legitimacy depends on the realization of public value.

The arguments that construct the dark side of public innovation can be understood as emphasizing a move away from the realization of public value and ensuring public control.

The first dimension of the perverse effects of public innovation concerns the failure to strengthen the public sector's value contribution to society (Jorgensen & Sorensen, 2012). This dimension is paradoxical since the aim of public innovation generally is to realize just these type of values (Cels et al., 2012; Moore & Hartley, 2008). However, in the concrete implementation of innovation just the opposite may occur, public innovation may result in a failure to produce public value for society. A move away from the realization of public value for society occurs when money is wasted on public innovation (perverse effect 4). Public money that is, for example, used to purchase expensive modern technology cannot be used to realize other types of public value. Similarly, corruption (perverse effect 3) means that public money ends up in the pockets of officials rather than that is being spend on causes that support the common good. The lack of stability (perverse effect 1) also means that, in the long term, the production of public value is impaired. In addition, the attempt to strengthen public value may harm local initiative and result in less public value (perverse effect 6). Also, undesirable public innovation clearly represents limited—or even adverse—public values (perverse effect 8) while public innovations with important unforeseen security risks also produce negative public values (perverse effect 10).

The second dimension concerns the limitations to public control. A move away from public control occurs when processes of public innovation occur in the absence of the regular systems of administrative and political control: integrity and accountability systems are relatively weak (Bovens et al., 2008; Huberts & Six, 2012;). A waste of money (perverse effect 4) and corruption (perverse effect 3) demonstrate a lack of public control. Illegal practices (perverse effect 2) such as combining datasets to apprehend criminal function under the absence of public control. The absence of democratic control for innovative projects (perverse effect 5) indicates that a protected space for innovations to be tested and developed may stimulate the development of these innovations but it limits democratic control. Similarly, innovation may tip the balance of power and therefore disrupt systems of checks and balances in our democratic states. In addition, technocratic dominance (perverse effect 9) may limit democratic control of ICT-facilitated practices.

On the basis of these two dimensions, we can identify three "dark side of public innovation": (1) wasteful and uncontrolled innovation, (2) wasteful and controlled innovation and (3) valuable and uncontrolled innovation. An overview of the two dimensions is presented in Table 1. The bottom

Table 1. Mapping the light and dark side of public innovation.

	Low public control	High public control
Low public value	Wasteful and uncontrolled innovation	Wasteful and controlled innovation
High public value	Valuable and uncontrolled innovation	Valuable and controlled innovation

right cell presents public innovation without a dark side: valuableand controlled innovation.

These two dimensions help to develop an analytical understanding of these perverse effects. These dimensions—the failure to produce public value for society and the lack of public control—highlight the core problems in the various perverse effects: a lack of input legitimacy (democratic control) and a lack of output legitimacy (no production of public value; Scharpf, 1999). The various perverse effects that we identified in the previous sections occur separately but also interact to produce the three sets of perverse outcomes of public innovation that we identified in Table 1. In the next section, we will now position the two dimensions that we identified inductively in the broader literature on public innovation. We will argue that the two dimensions can be understood as resulting from fundamental features of innovation processes.

Perverse effects and fundamental features of public innovation

Public innovation is a widely debated term but there seems to be an emerging consensus that "perceived novelty" and "adoption of an idea" are key elements (De Vries et al., 2016). Innovation differs from change since it is discontinuous (Osborne & Brown, 2013, p. 3). In comparison with private sector innovation, Moore and Hartley (2008) argue that an important feature of public innovation is the focus on public value rather than profit. These two features seem to be closely related to the dimensions of perverse effects that we identified. In this section, we highlight that theoretical notions about "learning"—as uncertainty in the promise of public value outcomes—and "strategic innovation niches"—as a limitation of public control—help to develop a more profound understanding of the relation between the nature of public innovation and the perverse outcomes that can be produced.

Learning and the uncertainty of public value outcomes

The literature on public innovation stresses that full information about the consequences of innovation—and lack of innovation—is not available. Innovation requires change and the willingness to learn (Bekkers et al., 2011) but the outcomes are not known. That is why the metaphor of the innovation journey is often used. Pollitt (2011) concludes that innovation is

risky business. Many innovations do not work very well, and even some of those that do work turn out to have additional, undesirable and unforeseen consequences—such as the motor car, the hamburger, performance-related pay or—to make a "sore point"—innovative financial derivates that bundle up, inter alia, shaky home loans (Pollitt, 2011, p. 38). Mathisen and Einarsen (2004) identify risk-taking—people can make decisions even when they do not have certainty and all the information desired—as a key feature of public innovation.

An argument on the basis of this literature is that the perverse effects of public innovation are a consequence of (technological and social) turbulence. Christensen (1997, p. 173) stresses that "(…) the information required to make large and decisive investments in the face of disruptive technology simply does not exist." An example is the use of social media monitoring tools by the Dutch police. Introducing these tools was seen as an important innovation in a time when many people were using open and textual social media such as Twitter. The value of these monitoring tools, however, is limited when people increasingly start using visual media such as Snappchat and closed media such as Whatsapp (MEDIA4SEC, 2016). With the wisdom of hindsight, one could argue that the police should not have invested in the development of tools that have lost much of their value shortly after their introduction. At the same time, the police could not have known that the usage of social media would develop in this direction.

Specifically for technological innovation, Tanner (1996) stresses that "things bite back": new technologies result in patterns of usage that generate new risks and questions. Public innovation in itself with its emphasis on experimentation, autonomy and risk-taking generates a set of perverse effects. Using Skinner et al.'s (2014) colorful metaphor, our analysis highlights that public innovation can become a "poisoned chalice." This observation applies to public innovation in general: processes of public innovation are designed as learning pathways but cannot provide certainty about the public value outcomes (Cels et al., 2012).

Strategic niches and the limitation of public control

The literature indicates that innovation can take place under conditions where these various conditions have been downplayed: media and political pressure are being reduced by creating innovation niches that are protected from the environment, procedural constraints are reduced by providing more leeway for people working on innovation and the emphasis on standard operating procedures is relaxed by working in experimental settings (Bekkers et al., 2011; De Vries et al., 2016). Relaxing the restraining

conditions of public sector organizations open up possibilities for innovation but comes at a price: the mechanisms for ensuring public control that are central to the organization of the public sector are temporarily suspended.

The relaxation of mechanisms of public control can be understood as creating a strategic niche for innovation (Kemp et al., 1998). This niche may be needed to advance the process of public innovation, but it also generates the perverse effects associated with a lack of public control. The niche is protected against hostile forces but the public and media may be one of these hostile forces. This shows that the limitation of public control is not a coincidence but often results from the design of innovation processes. Specifically, for technological innovation, the complex nature of the issues creates barriers for public control. Even when innovators provide in-depth reports about their work, public control is still difficult in view of the capacity of publics (politicians, ministers of parliament and citizens) to process this type of information.

In addition, innovation, and thus also public innovation, is often a result of bottom-up initiatives and risk-taking behavior (Isaksen & Akkermans, 2011). In line with the ideas of new public management to stimulate entrepreneurial behavior (Osborne & Gaebler, 1993), employees develop new approaches on the basis of their own practices and insights and not on the basis of a mandated framework. Risk-taking behavior is stimulated in an innovative climate, because it puts new ideas forward (Isaksen & Akkermans, 2011). Mathisen and Einarsen (2004) argue that an innovative climate is characterized by, among other things, freedom seen as the degree of independence and provides the ability for individual discretion. This autonomy is valued from an innovation perspective but means that systems of democratic and administrative control are loosened and thus this can produce uncontrolled innovation processes.

Need for dynamic assessment of public innovation

This article has identified a broad range of perverse effects of public innovation and stresses that these perverse effects do not occur by coincidence but result from fundamental features of these innovation processes: the relaxation of public control and the uncertainty of public value outcomes. One could conclude that these perverse effects are so threatening to core values of public administration such as legality, efficiency, economy and effectiveness that public innovation should be limited if not avoided. At the same time, the advantages of public innovation and even the dire need for public innovation to tackle wicked problems and reduce fiscal stress has also been stressed in the literature and often for very similar reasons: to

enhance efficiency, economy and effectiveness (Bekkers et al., 2011; Borins, 2001; De Vries et al., 2016; Osborne & Brown, 2005; Sørensen & Torfing, 2011). The arguments of the proponents of innovation, who highlight positive outcomes, and the opponents, who highlight the dark side of public innovation, can in that sense even be regarded as two sides of the same coin. This creates a paradox: public innovation is needed but should be avoided. In this final section, we will present some ideas about dealing with this paradox of public innovation.

The dominant approach in dealing with the perverse effects of innovation is the responsible research and innovation (RRI) that has been developed in the context of European union sponsored research and innovation. The basic premise of this approach is that research and innovation should be conducted in much closer collaboration and communication with society to ensure beneficial outcomes. Owen et al. (2012, p. 757, 758): "responsible innovation evokes a collective duty of care, first to rethink what we want from innovation and then how we can make its pathways responsive in the face of uncertainty." The approach aims to go beyond established approaches to the assessment of innovations that map desirable and undesirable effects and develop guidelines for realizing "responsible innovation" through inclusion of multiple stakeholders. Key aspects of responsible research and innovation are democratic governance, institutionalizing responsiveness and reframing responsibility. RRI challenges scientists, innovators, business partners, research funders and policy-makers to reflect on their own roles and responsibilities (Owen et al., 2012). More specifically for public innovation, Jordan (2014) highlights that general principles such as accountability, veracity, fidelity, bureaucratic responsibility, respect for citizens, respect for persons, beneficence, non-maleficence and justice should form a set of aspirations according to which the public can expect the public sector innovator to work.

RRI and Jordan's (2014) work on ethics propose an important set of guidelines for innovation processes but provides little guidance for reflection on desirable public values outcomes. These issues have been tackled explicitly by Brown & Osborne (2013) in their framework for risk governance in public services. They stress that dealing with risk and innovation in public services requires considering the benefits as well as dangers of any given risk in the decision-making process surrounding it (Brown & Osborne, 2013, p. 197). Our approach follows this approach and adds an action-oriented component to it. It builds upon the growing emphasis on more cyclical approaches to innovation processes as they are propagated in approaches to design thinking (Bason, 2010). The need for cyclical approaches is often emphasized on instrumental grounds highlighting that improving an innovation through cycles of prototyping and testing is

bound to result in innovation that have a better fit with practices. At the same time, this principle of developing, prototyping, testing and assessing can also be used to embed reflections on the desirability of the innovation and the perverse effects that may emerge from the innovation process.

The key focus of the dynamic assessment of public innovation is deliberation about public value outcomes. Deliberation open up the possibility to realize and intersubjective assessment of positive outcomes and dark side of public innovation. The deliberation needs to focus on the extent to which the processes of public innovation actually produced desired public value outcomes. The deliberation is not positioned outside the process of public innovation but integrated in it by creating recurring room for reflection. This room for reflection is embedded in the short-cyclical process of innovation and forms part of the assessment of test results of prototypes (Bason, 2010). This room can be used to check whether the innovative practices result in outcomes that are desirable in terms of the public values that are being produced. Explicit attention should be given to the perverse effects associated with the innovation at hand. One could say that the innovative practices are being calibrated to ensure that they deliver on the basis its contributions to the production of public value in a legitimate and effective manner (Moore, 1995). This means that the participation of a variety of (internal and external) stakeholders in the assessment is important such as managers but also frontline workers and clients. One can think of critical thinkers to prevent groupthink, clients to assess the value for clients, non-techies to assess the added value of technology and vulnerable groups to assess external effects. The assessment results in a set of requirements for further innovation but can also result in a termination of the innovation process if perverse effects dominate.

The dynamic assessment of public innovation open up the room for innovation but also guarantees a recurrent assessment in terms of public values. This paper presents building blocks for such an approach but obviously this needs to be developed further as it requires some critical choices in terms of frequency of the assessment, inclusion of critical stakeholders and embedding of the assessment in the process of innovation.

Conclusion

This exploratory article has argued that a range of perverse effects of public innovation result from fundamental features of public innovation processes. Public innovation processes require decision-making in situations of high uncertainty and the choice between different public values and these processes are fostered by limited external control. These conditions are often regarded from an instrumental perspective and characterize an innovation climate but,

as we have shown, they also generate a host of perverse effects which are often already well acknowledged in the literature on the success and failure of governance (Bovens et al., 2001; Marsh & McConnell, 2010). These effects deserve more attention in the management of public innovation to warrant legitimate outcomes and opposition should not just be pushed to the side. The arguments related to the dark side of public innovation need to be taken seriously: this article calls for a more balanced approach to public innovation that takes both opportunities and perverse effects into account.

The article departed from a broad perspective on public innovation and discussed both technological and social innovation. While many of the perverse effects we found applied to both types of innovation, we did see that certain types (e.g. technocratic dominance and unforeseen security risks) appear to be more likely in the case of technological innovation. Waste of money and corruption may also be more likely for technological innovation because often the budget may be higher than for social innovations. We also observed that the barriers for may be higher for technological innovation due to the complex nature of the issues. Overall, with some specific differences, the line of argument seems to hold for both types of innovation.

Our conclusion highlight the need to develop a new approach to protecting key values. We do not reject the need to innovate but question the innovation imperative. The challenge for public organizations is to innovate in a balanced, legitimate and fair manner. More and faster public innovation is not necessarily desirable: there may be a legitimate need for slowing down or limiting public innovation. Uneasy questions should not viewed as barriers that need to be overcome but as opportunities to strengthen the quality of the innovation processes. We built our approach on the guidelines of responsible research and innovation (Owen et al., 2012) and Brown and Osborne's (2013) framework for risk governance in public services and presented the dynamic assessment of public innovation as an approach to protecting public values and reducing perverse effects. A key feature of this calibrated approach is that it reserves space in innovation processes to reflect upon the desirability of these processes in terms of public value outcomes.

The dynamic assessment of public innovation approach that we advocate connects well to the emerging literature on "experimentalist governance" (Sabel & Zeitlin, 2010, 2012). The basic idea of experimentalist governance is that institutions are not fixed and stable but subject to continuous mutations. Experimentalist governance calls for new ways to protect public values since the stable institutional structures that protect them in traditional bureaucratic structures are absent. We have indicated that more cyclical approaches to innovation—design, testing, assessing—may help to create space a more intense reflection on the outcomes of the public innovations and take measures to reduce the perverse effects that we have identified in this article.

This article set out to provide a broad reflection on the dark side of public innovation. In presenting our argument, we have not discussed the role of (institutional, administrative and cultural) context in perverse effects but we have tacitly assumed that these perverse effects can emerge anywhere. We also did not pay attention to the variety of forms of public innovation such as service innovation, policy innovation, management innovation and governance innovation. And we argued that the two dimensions of perverse effects—low public value and low public control—are analytically distinct. Our ambition was to identify the basic mechanism at work in public innovation that may generate perverse effects rather than presenting a full-fledged empirical understanding of when, why and how these perverse risks emerge. In that sense, this article should be regarded as the starting point for empirical research that helps us understand the relations between the two dimensions, the contextual conditions and types of innovations and emerging perverse effects.

A final reflection concerns the paradoxical challenge of realizing innovation without running the risk of producing perverse effects. The dynamic assessment of public innovation builds upon the ideas of responsible innovation but puts an emphasis on the tensions in innovation processes. While the notion of responsible innovation suggests that there is a "right thing to do," our notion of dynamic assessment of public innovation stresses the fact that there are always tradeoffs. In that sense, the fundamental notions of paradox theory—the idea that certain values in social systems cannot be reconciled and will always result in tensions—is also fundamental to public innovation. The combination of conflicting values and uncertainty results in wicked problems (Rittel & Webber, 1973): both the facts and the values are uncertain. These cannot be solved easily with new innovations. As Larsson and Brandsen (2016,p. 299) eloquently put it: "Eldorado is not around the corner." Social learning is needed to deal with this type of problem and social learning is at the heart of the dynamic assessment of public innovation. For the dark side of innovation, this entails acknowledging this dark side and opening up of a learning process about limiting perverse effects. The challenge for innovators is to acknowledge the dark side and take measures to prevent perverse effects without killing the innovativeness of organizations.

Notes on contributors

Albert Meijer (1967) is a Professor of Public Innovation at Utrecht University in the Netherlands. His research interests include public innovation, coproduction, smart cities and e-government.

Marcel Thaens (1968) is the Chief Information Officer of the Province of North Brabant in the Netherlands. Until May 2018, he was a Professor of ICT and Strategic Innovation in the Public Sector at Erasmus University Rotterdam.

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