

FRAMING SIMULATIONS FROM A POLICY PERSPECTIVE

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ABSTRACT

In recent years and accelerated by the economic and financial crisis, complex global issues have moved to the forefront of policy making. These grand challenges require policy makers to address a variety of interrelated issues, which are built upon yet uncoordinated and dispersed bodies of knowledge. Due to the social dynamics of innovation, new socio-technical subsystems are emerging, however there is lack of exploitation of innovative solutions.

In this paper we argue that issues of how knowledge is represented can have a part in this lack of exploitation. For example, when drivers of change are not only multiple but also mutable, it is not sensible to extrapolate the future from data and relationships of the past. This paper investigates ways in which policy simulations can be used as a tool for forward looking approaches addressing the grand challenges. The paper develops a typology of policy simulations and by reviewing simulation practice using scenarios, the authors disclose a variety of policy simulation practice.

To synthesize, we argue that policy simulation practice underpinned by a combination of well-designed modes of futures thinking will provide richer future images that go beyond the probable that is determined by the past and present. This will strengthen the application of policy simulations and enhance the use in a policy context.

INTRODUCTION

Simulations are used in society almost on a daily basis including examples as weather forecast broadcasted by the radio and economic growth forecasts in the daily news. The aim of this paper is to initiate a discussion on how scenario analysis, as a form of policy simulation practice, can help to better cope with the grand challenges our society is facing.

Today's grand challenges, from climate change to unemployment and poverty, go beyond economic and social policies (Boden et al., 2010). The recent economic crisis reminds us of the importance of mobilizing science, technology and innovation not

solely for generating economic benefits, but also for anticipating and responding to the grand challenges (OECD, 2011).

Grand challenges are usually interrelated and operating at a global scale (Cagnin et al., 2011). Often it is not clear what the real causes are and different policy options are competing, causing shifts in problem perception and priority setting. One result of the above described complexity is a type of uncertainty about the future, an uncertainty whose distinctive feature is disagreement amongst experts and stakeholders about the long-term consequences of present-day innovations (Webster, 1999). In addition, uncertainty increases as policy targets move progressively further from the present and it is uncomfortable: fear of the unknown generates resistance to change (Linstone, 1973). But also efforts to control, manage, and engineer the future produce increased uncertainties (Adam, 2006). For instance, developments in science and technology have a strong potential to influence social change. There are, however, many reasons why the practical use of scientific knowledge and technology varies widely between countries. Societies differ, economies differ, and governments deal with international scientific developments in different ways through the policies they pursue (Timmermans, 2001). This analysis indicates that policy systems are shaped by social, cultural and political power as well as by technological rationalism and such indeterminism makes systemic approaches to policy far from linear or predictable.

In order to investigate how policy simulations and simulation practice using scenarios can help to better cope with the grand challenges, we first develop a typology of policy simulation techniques. Secondly we explain a reflexive approach how to learn from policy simulation practice. Thirdly we review simulation practice using scenarios to disclose a variety of policy simulation practice. For example, we look how the applied or perceived modes of thinking about the future are initiating enablers or barriers for the policy simulation process. In this paper we argue that this kind of reflexive inquiry can and does provide a sound basis for challenging current practice, for learning from experience and for better articulating our underlying theoretical premises of policy simulations.

WHAT ARE POLICY SIMULATIONS?

A wide variety of simulations exist in daily life. Examples can be found in weather forecasts, flight simulators, economic growth forecasts, climate change scenarios, etc. The key element that all the examples have in common is that simulations are mirroring a possible (future) reality to provide additional information for current decision-making.

Using a policy perspective, two elements can be distinguished in simulation practice: the scale and main goal. Table 1 presents a typology of policy simulations based on the two elements. Related with the scale, three levels can be distinguished: (i) the operational, looking at the organization itself; (ii) the tactic, looking at the key actors and stakeholders (network) around the organization; and (iii) the strategic, looking at the external macro drivers influencing the operational environment of the organization.

Related with the second element, i.e. the main goal, three learning dimensions can be distinguished: (i) the analytical, with a focus on learning of possible developments; (ii) the instrumental, with a focus on learning in, i.e. how to respond to potential situations; and (iii) the cognitive, with a focus on learning by doing such as training, envisioning, etc.

Table 1: Typology of policy simulation practice

Policy dimension	Analytical (learning of)	Instrumental (learning in)	Cognitive (learning by)
Operational (organization)	validation of routines	optimization and risk planning	training and assessments
Tactic (network)	planning and impact assessment	collaboration and coordination issues	awareness
Strategic (outlook)	complex adaptive systems	experiencing complexity	envisioning (long term)

The typology highlights the diversity of activities that are (or can be) supported by policy simulation practice. Depending on the goal, simulation practice can support quite different learning processes. Although the diversity can be seen as a strength, i.e. the wide variety of its application areas, it is also part of its weakness.

Policy simulations are practiced across many (Gilbert, and Troitzsch, 2005). Practice can range from strong analytical focused applications such as impact assessment to strong participatory focused applications such as envisioning exercises. However, the disciplines of policy simulation practice are not well articulated or disseminated across domains, leading to miss perceptions between client-developer and weak performing practice that does not make best use of experience in other domains. Clearly developing tools

for training is not the same as developing tools for gaining insights in complex adaptive systems.

The fast development of modeling tools induced a shift towards complex models with better dynamic representations and more client-friendly user-interfaces. These fascinating technology driven developments are a clear benefit to better represent reality that is simulated. Still, we argue that equal attention should be given to the theoretical premises underpinning policy simulation models. This is not reflected in the current amount of recent papers published on policy simulations.

LEARNING FROM POLICY SIMULATION PRACTICE

How can we learn from practice? We use the word “practice” to describe the implementation or execution of a concept, plan, methodology or theory. Most practice is based on a set of theories or assumptions. Sometimes those theories are explicit, most often they are implicit. The connection between practice and theory (unlike that between theory and practice) has traditionally been ignored, to the detriment of both (Gundersen et al., 2007).

Reflexive inquiry draws on a social constructionist view of the world and provides a powerful approach that offers insights for academics and practitioners into how we constitute knowledge and realities in our thinking and research practice (Cunliffe, 2003). Reflexivity as a methodology (Alvesson & Skoldberg, 2000), questions representation by suggesting that we are constantly constructing meaning and social realities as we interact with others and talk about our experience. We therefore cannot ignore the situated nature of that experience and the cultural, historical, and linguistic traditions that permeate our work (Cunliffe, 2003). This means that practice, such as policy simulation practice, is rooted in a particular moment and place. In the next section we will look at policy simulation practice using scenarios.

REVIEWING SIMULATION PRACTICE USING SCENARIOS

In the context of this paper, scenarios can be seen as narratives set in the future to explore how the society would change if certain trends were to strengthen or diminish, or various events were to occur. Scenarios substantially differ from predictions, i.e., extrapolations or trends, substituting the criterion of plausibility for probability (Harries, 2003). Although the use of scenarios has gained much adherence, its subjective and heuristic nature leaves many academics and decision-makers uncomfortable (Chermack, 2005). How do we know whether we have credible and salient scenarios? These concerns are legitimate and the use of scenarios would gain in academic standing if more research were

conducted on their comparative performance and underlying theoretical premises (Chermack, 2005). Whilst the scenario literature makes explicit the methodological differences and similarities of various approaches, it tends to pay little attention to the underlying epistemological assumptions (Wilkinson and Eidinow, 2008). For example, scenarios that imaginatively represent plausible futures will meet resistance if they are used as predictions.

The identification of the motivation behind any scenario exercise appears to underpin the scenario typology described by Borjeson et al., (2006) which reviews many other typologies before suggesting an alternative comprising three categories and six types. The categories arise from the kinds of question that a scenario user might use about the future: What will happen? What can happen? How can a specific target be reached? Each of these questions can be seen to evoke the motivation of a particular approach to scenarios. For example, in this typology “What will happen?” scenarios lead to predictive scenarios, in effect, forecasts, which look at what will happen as the likely development occurs. By contrast, “What can happen?” scenarios are normative scenarios - concerned with achieving particular future objectives - which lead to preserving and transforming scenarios. Preserving scenarios are used when the target can be met within an existing structure, while Transforming scenarios feature a form of backcasting, asking what would need to be changed for the target futures to be achieved.

This scenario typology is helpful to understand that policy simulations can be seen as vehicles of our thoughts. Depending on the questions we start with, will lead to different outcomes, i.e. scenarios. In this paper we will use a policy perspective to look at scenario practice. Our analysis is built on (a) a conceptual framework on policy change (De Smedt, 2008) and (b) a recent review of scenario exercises (De Smedt and Borch, 2011). For the context of this paper we will use the conceptual framework and insights and connect it with policy simulation practice.

Instead of framing practice based on theory, policy simulation practice using scenario is deconstructed into seven clusters. This approach is described in detail in De Smedt and Borch (2011). This was the first step and our findings are synthesized in table 2. This table describes for each cluster of simulation practice with scenarios the most common used images of the future and an example of a characteristic technique.

As a second step we focused on the way the future has been represented. Revealing different types of futures and describing how they have been shaped provided insights in some of the theoretical premises, here expressed as modes of futures thinking. So in table 2 these seven clusters of scenario practice are then further

linked to the most characteristic theoretical premises, here expressed as modes of futures thinking.

Table 2: Clusters of simulation practice using scenarios from a policy perspective

Policy perspective	Simulation practice	Types of futures	Simulation technique	Modes of futures thinking
Window of opportunity	Using scenarios	Shaped by surprise and confrontation	Uncertainty matrix	Intuitive
	Developing scenarios	Shaped by convention	Consensus (Delphi)	Bounded rationality
Legitimacy for action	Framing boundaries	Shaped by possible futures	Extreme to inform the middle	Eventuality
	Back-casting from targets	Shaped by probable futures	S&T Roadmaps	Predictive
	Back-casting from principles	Shaped by preferable futures	The natural step	Visionary
Empowering stakeholders	Expert driven	Shaped by expertise and discovery	Expert panels	Technocratic
	Stakeholder driven	Shaped by interaction	Future workshops	Evolutionary

For example, looking at ‘window of opportunity’, we argue that a strong focus on developing scenarios and consensus increases a risk of diluting a sense of urgency. During the scenario exercise, consensus may not be appropriate to promote differences and to stimulate novel ideas. Based on this observation, two clusters of practice can be distinguished: one cluster with using scenarios as the most characteristic feature, and another with developing scenarios as the most characteristic. For the two clusters, the scenario cases have been analyzed to disclose elements of theoretical premises. In the first cluster, we found that the scenarios are used for supporting strategic discussions about futures that are shaped by surprise and confrontation. Examples of supportive techniques are the use of an uncertainty matrix using factors of high-uncertainty and high impact. Based on our reflexive inquiry used to analyze scenario exercises in their context, we can then attribute the most characteristic mode of thinking.

Following this approach we were able to distinguish seven modes of thinking that are underpinning current practice, see De Smedt and Borch (2011) for a more elaborate description of the clusters. In this paper, we want to highlight that acknowledging the theoretical premises, here expressed as modes of future thinking, in current practice is essential for better grounding policy simulations. In addition, using the full spectrum of the

different modes of futures thinking in the design phase will enhance the use of simulations in a policy context.

DISCUSSION AND CONCLUSIONS

In this paper we analyzed the applicability of policy simulations using scenarios as narratives to represent and discuss different perspectives on past, present and future developments. We first developed a policy simulation typology. In developing the framework presented, some relevant questions have been made on the variety of simulation practice and the need for better understanding the policy perspective of simulations. For instance, methodological choice depends on the intention or puzzle to be 'solved'. There are many different aims of policy simulations activities including decision-making, learning, exploration of possibilities, articulation of desirable outcomes, sharing of knowledge, persuasion, encouraging action etc. These aims are set in many different contexts and are concerned with phenomena that behave in many different ways, i.e. have particular ontologies. The commonality is that policy simulations produce knowledge in relation to a simulated (future) time and such instrumental knowledge is generated by social action, e.g. discourse, language, negotiation (Fuller & De Smedt, 2008).

Secondly we used a reflexive methodological approach to review policy simulation practice with a focus on scenarios. Instead of framing practice based on theory, policy simulation practice was deconstructed into several clusters. Following this approach we were able to distinguish seven modes of thinking that are underpinning current practice. In reality, each policy simulation exercise is a mixture of different modes and policy simulation practice is shaped by the image(s) of the future and the techniques applied. Combinations of techniques are possible.

To conclude, we argue that policy simulation practice underpinned by a combination of well-designed modes of futures thinking will provide richer future images that go beyond the probable that is determined by the past and present. Linking practice with theory will enrich the application of policy simulations and enhance the use in a policy context.

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