Stakeholder engagement in policy development: Observations and lessons from international experience

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AUTHORS
Natalie Helbig
Center for Technology in Government, University at Albany, USA
nhelbig@ctg.albany.edu

Sharon Dawes
Center for Technology in Government, University at Albany, USA
sdawes@ctg.albany.edu

Zamira Dzhusupova
United Nations Development Program, Kyrgyzstan
zdjusupova@gmail.com

Bram Klievink
Delft University of Technology, Faculty of Technology, Policy and Management
a.j.klievink@tudelft.nl

Catherine Gerald Mkude
Institute for IS Research, University of Koblenz-Landau
cmkude@uni-koblenz.de

ABSTRACT
This chapter provides a starting point for better understanding how different approaches, tools, and technologies can support effective stakeholder participation in policy development. Participatory policy making involves stakeholders in various stages of the policy process and can focus on both the substance of the policy problem or on improving the tools and processes of policy development. We examine five international case of stakeholder engagement in policy development to explore two questions: (1) What types of engagement tools and processes are useful different stakeholders and contexts, and (2) What factors support the effective use of particular tools and technologies toward constructive outcomes? The cases address e-government strategic planning in a developing country, energy policy in a transitional economy, development of new technology and policy innovations in global trade, exploration of tools for policy-relevant evidence in early childhood decision making, and development of indicators for evaluating policy options in urban planning. Following a comparison of the cases, we discuss salient factors of stakeholder selection and representation, stakeholder support and education, the value of stakeholder engagement for dealing with complexity, and the usefulness of third-party experts for enhancing transparency and improving tools for engagement.

1. Introduction

Complex public problems are shared and dispersed across multiple organizations and domains (Kettl, 2002). Consider, for example, the array of concerns associated with improving air quality or assuring the safety of food products. The formal governmental responses to these specific public needs are addressed through public policies. Policy might focus on different geographic locations, processes, or products, or could specify how certain outcomes are defined, observed, and assessed. Moreover, individuals, families, communities, industry, and government itself are all affected by policy choices, and they all have interests in both the decision-making process and the final decisions (Bryson, 2004).

In light of seemingly intractable and complex social problems, public administrators have shifted toward governance activities that allow citizens and stakeholders to have deeper involvement in the policy making process and the work of government (Bingham, Nabatchi & O'Leary, 2005). Governance models which focus on quasi-legislative activities such as participatory budgeting, citizen juries, focus groups, roundtables or town meetings (Bingham et al., 2005; Fishkin, 1995) create opportunities for citizens and stakeholders to envision their future growth (Myers & Kitsuse, 2000), clarify their own policy preferences, engage in dialogue on policy choices, or bring various groups to consensus on proposals (McAfee, 2004). The models vary based on degree of involvement by the general population, whether they occur in public spaces, if the stakeholders are actually empowered, and whether they lead to tangible outcomes (Bingham et al., 2005).

Stakeholder engagement objectives may also vary by their point of connection with the policy process (Fung, 2006). The policy process is complex and there are many different ways to conceptualize how it works. The stages heuristic of public policy making is one of the most broadly accepted (Sabatier, 1991). Although the utility of the stages model has limits, and numerous advances in theories and methods for understanding the policy process have been made, the stages heuristic continues to offer useful conceptualizations (Jenkins-Smith & Sabatier, 1993). While specification and content of the stages varies somewhat throughout the literature, however (as shown in Figure 1) models often comprise some combination of problem identification, agenda setting, formulation, adoption, implementation, and policy evaluation (Lasswell, 1951; Easton 1965; Jones, 1977). More recent conceptualizations involve feedback across the various stages.

Research in both the public and private sectors has identified a number of benefits associated with stakeholder engagement in governance. Stakeholders' interests illuminate the multiplicity of factors that underlie policy problems, decisions, and implementation. Direct engagement of stakeholders increases public understanding of the issues and the consequences of different choices. Accordingly, engagement generates more options for policies or actions. Engagement brings more information into the deliberation process from different kinds of stakeholders so that decisions are more likely to avoid unintended consequences and fit better into existing contexts. Engagement also reveals both conflicts and agreements among different stakeholder groups. While taking stakeholders into

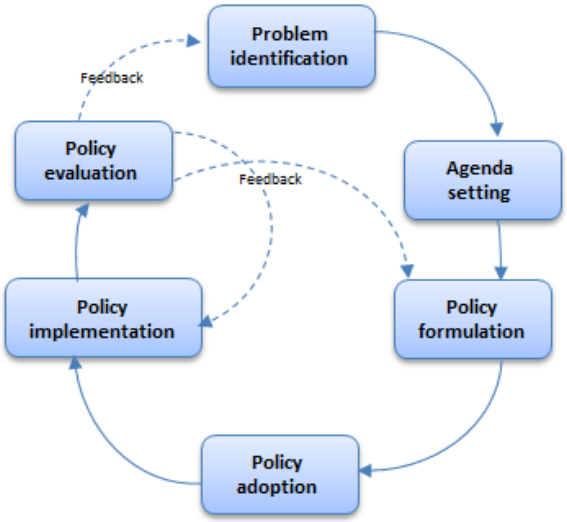

Figure 1. Stages of the Policy Process

account is a crucial aspect of solving public problems, policy development includes both powerful and powerless stakeholders within the process (Bryson, 2004). Some stakeholders have the power, knowledge or resources to affect the policy content, while others are relatively powerless but nevertheless are affected, sometimes in dramatic ways (Brugha & Varvasovszky, 2000). Thus, open and even-handed stakeholder engagement, especially among those with conflicting viewpoints, can sometimes resolve differences and build trust in the policy making process and help secure public acceptance of decisions (e.g., Klievink, Janssen & Tan, 2012).

In the last 20 years, specialized technologies, electronic communication and advanced analytical, modeling, and simulation techniques have been developed to support governance processes. Administrators, analysts, and planners must decide how and when to engage citizens and stakeholders in governance, particularly during the different stages of policy making. They must also consider which mechanisms to use for managing the relationships (Bryson, 2004) and must select from a variety of tools and techniques. In this chapter, we begin to explore two questions: (1) What types of engagement tools and processes are useful for different stakeholders and contexts, and (2) What factors support the effective use of particular tools and technologies toward constructive outcomes?

The next sections start by reviewing the foundational elements of stakeholder theory and its relation to governance, including a summary of tools and techniques used to identify stakeholders and analyze stakeholder interests and ways to classify types of engagement. We then offer five case stories of stakeholder engagement in complex and dynamic settings across the world including e-government strategic planning in a developing country, exploring different uses of evidence in early childhood decision making, developing technology and policy innovations in global trade, and involving citizens in the design of energy policy and transportation planning. The cases vary in both policy content and in the extent to which newer technologies were used to deal with the complexity of the engagement process, their accessibility and understandability to outsiders, and the advantages and disadvantages they offer to expert stakeholders as compared to laymen. We then compare the cases, discuss their similarities and differences, and conclude with a discussion of the usefulness of different tools and processes for different stakeholders and contexts and the factors that support their effectiveness.

2. Foundations of stakeholder engagement

Stakeholder engagement, as a concept, originated within organizational studies as an approach to managing corporations (Freeman, 2010; Bingham et al., 2005; Donaldson & Preston, 1995; Mitchell, Agle & Wood, 1997). This approach has since been adapted for use by public sector organizations to highlight the importance of stakeholders in various aspects of the policymaking process (Bingham et al., 2005). Bingham et al. (2005) situate stakeholders as part of “new governance” concepts where government actively involves citizens as stakeholders in decision making through activities such as deliberative democracy, participatory budgeting or collaborative policy making. Research on stakeholder inclusion in government processes has been found to enhance accountability, efficiency in decision making processes and good governance (Ackerman, 2004; Flak & Rose, 2005; Yetano, Royo & Acerete, 2010). The growing popularity of stakeholder analysis reflects an increasing recognition of stakeholder influences on decision-making processes (Brugha & Varvasovszky, 2000).

2.1 Defining stakeholders

The term “stakeholder” is defined differently by different disciplines. Most definitions mention similar stakeholder categories such as companies and their employees or external entities such as suppliers, customers, governments or creditors. In the public sector, the definition of stakeholder emphasizes

categories of citizens defined by demographic characteristics, life stages, interest groups, or organizational boundaries (Bingham et al., 2005; Ackerman, 2004; Yetano et al., 2010). Stakeholders can be both internal to the government (e.g., the government organizations responsible for policy implementation) and external to it (e.g., the industries, communities, or individuals to be affected by government actions or rules).

In this chapter we use Freeman's (1984) definition of stakeholder as any group or individual who can affect or is affected by the achievement of an organization's objectives. In the public sector, "organization" is understood to mean a government entity or body with responsibility for public policies or services. In the simplest terms, those who can affect or may be affected by a policy can be considered to be stakeholders in that policy. In traditional expert-based approaches to policy making, the needs of stakeholders are indirectly addressed by public agencies and acknowledged experts (Bijlsma, Bots, Wolters & Hoekstra, 2011; De Marchi, 2003). In these expert-based approaches, internal and external stakeholders may be consulted, but in participatory approaches, stakeholders are not only consulted but are also involved in a structured way to influence problem framing, policy analysis, and decision-making. Bijlsma et al. (2011) define participatory policy development as the "influence of stakeholder involvement on the development of substance in policy development, notably the framing of the policy problem, the policy analysis and design, and the creation and use of knowledge" (p. 51).

2.2 Stakeholder identification and analysis

Stakeholder identification and analysis is an important first phase in stakeholder engagement processes (Freeman, 2010). Analysis typically involves five steps (Kennon, Howden & Hartley, 2009): identifying stakeholders, understanding and managing stakeholders, setting goals, identifying the costs of engagement, and evaluating and revisiting the analysis. Through these various steps, an analysis helps to distinguish stakeholders from non-stakeholders and to identify the ways that stakeholders need to be engaged during different parts of the policy cycle. Over time, the mix of stakeholders in a particular policy issue is likely to change, as new stakeholders may join the engagement activities, while others may drop out (Elias, Cavana & Jackson, 2002) or shift among different types. Joining, dropping out or moving among types thus dynamically change the configuration and analysis of stakeholders over time.

Various techniques for stakeholder identification and analysis are reviewed in the literature. These techniques focus attention on the interrelations of groups or organizations with respect to their interests in, or impacts on policies within a broader political, economic and cultural context. These techniques also provide ways for analysts to understand stakeholder power, influence, needs and conflicts of interest. Bryson (2004) characterized stakeholder identification as an iterative process highlighting the need to determine the purpose of involving stakeholders and cautioning that these purposes may change over time. He describes a stage approach to selecting stakeholders: someone or a small group responsible for the policy analysis develops an initial stakeholder list as a starting point for thinking about which stakeholders are missing. Brainstorming and the use of interviews, questionnaires, focus groups, or other information-gathering techniques can be used to expand the list. Bryson (2004) notes "this staged process embodies a kind of technical, political, and ethical rationality" (p. 29). He also lists a variety of analysis techniques, such as power and influence grids (Eden and Ackermann, 1998), bases of power diagrams (Bryson, Cunningham & Lokkesmoe, 2002), stakeholder-issue interrelationship diagrams (Bryant, 2003), problem-frame stakeholder maps (Anderson, Bryson & Crosby, 1999), ethical analysis grids (Lewis, 1991), or policy attractiveness versus stakeholder capability grids (Bryson, Freeman & Roering, 1986). Each of these tools is used in different situations to help understand and identify various aspects of stakeholder interests.

2.3 Stakeholder engagement

Stakeholder engagement methods are the means by which stakeholder views, information, and opinions are elicited, or by which stakeholders are involved in decision-making. Engagement can take various forms. The International Association for Public Participation identified five levels of stakeholder engagement: (IAP2, 2007). At the simplest level, *informing*, stakeholders are merely informed, for example via websites, fact sheets, newsletters, or allowing visitors to observe policy discussions. The level of engagement in this form is very low and suitable only to engage those stakeholders with low urgency, influence, importance or interest (Bryson, 2004). Various methods are available for *consulting*, including conducting interviews, administering surveys to gather information, opening up draft policy documents for public comment, or using web 2.0 tools to gather ideas. The main goal of this form of engagement is to elicit the views and interests, as well as the salient information that stakeholders have with regard to the policy concern.

Involving stakeholders is a more intensive engagement where stakeholders work together during the policy development process. Some tools used to ensure that ideas, interests, and concerns are consistently understood and addressed include scenario building (Wimmer, Scherer, Moss & Bicking, 2012), engaging panels of experts such as the Delphi method (Linston & Turoff, 2002), or group model building that includes simulating policy choices, games, or role playing (Andersen, Vennix, Richardson & Rouwette, 2007; Vennix, Akkermans & Rouwette, 1996). Models, simulations, or scenarios can be used as boundary objects (Black & Andersen, 2012; Star & Griesemer, 1989) to enable diverse sets of stakeholders to have a shared experience and to exchange localized or specialized knowledge in order to learn, create common understanding, and identify alternative choices. All these levels focus on the flow of information among actors, but the direction and intensity varies.

The most intense engagement is realized through full collaboration with or even empowerment of stakeholders. In the IAP2 spectrum of public participation, *collaboration* means stakeholders' advice and recommendations will be incorporated in the final decisions to a maximum extent (IAP2, 2007). *Empowerment* means that the final decision-making is actually in the hands of the public. Realistically, collaboration and empowerment exist within institutional and legal parameters. For example, the policy making body (usually a government agency) will need to put some constraints or boundaries around the policy options that comport with the limits of its legal authority. For both levels, consensus building approaches are essential. This can be done through citizens juries (Smith & Wales, 2000), the enactment of a stakeholder board (urbanAPI[1]; Klievink et al., 2012), or by setting-up Living Labs (Tan, Bjørn-Andersen, Klein & Rukanova, 2012; Higgins & Klein, 2011) in which stakeholders collaboratively develop, implement, and evaluate solutions within a given context. All of these approaches not only assist in incorporating stakeholders' views into the policy process, but they also enhance acceptance by stakeholders because they were part of the deliberation process (e.g. see Klievink & Lucassen, 2013).

3. Cases

Below we offer five case stories about stakeholder engagement in policy making. The cases were recommended by a diverse set of eGovPoliNet consortium partners who shared an interest in tools and techniques to support the policy process. The main goal of the case stories is to highlight the roles that stakeholders can play in policy development and to discuss how different methods, tools and technologies could be used for engaging stakeholders in the policy process. Each case describes a situation where stakeholders were involved in the problem definition, agenda setting, and formulation

[1] UrbanAPI is an EC FP7 project focused on interactive analysis, simulation, and visualization tools for agile urban policy implementation http://www.urbanapi.eu/.

stages of the policy cycle. In all cases a trusted third party, generally university researchers, facilitated the process and applied the tools. The cases vary in policy content and in the extent of technology use in the engagement process. They represent different policy domains, and governments at different stages of development with different political systems. The first three cases focus on substantive policy choices for e-government strategic planning, alternative energy policy, and global trade inspection. The last two concentrate on stakeholder involvement in improving tools to support the policy making process. Of those, the first focuses on connecting policy makers and modelers in building a supportive framework for assessing early childhood programs and second involves stakeholders in defining assessment indicators to be built into a model that supports urban planning decisions.

In this section, we describe these diverse situations as the foundation for the comparison in presented in section five where we identify similarities and differences that suggest approaches, tools, and techniques that are useful and effective in different contexts and with different kinds of stakeholders.

For each case below, we present the key characteristics of the policy-making situation and assess the purpose of stakeholder engagement. With respect to stakeholder identification and analysis, we cover both the identification of stakeholders (types) involved, and the methods used for identification and analysis. With respect to stakeholder engagement (see §2.3), we analyze the engagement approach followed in each case, as well as the type of participation and the methods of stakeholder engagement. We also inventory which tools and technologies were used and describe the results and outcomes of each engagement process.

3.1 E-government strategic planning in Afghanistan

The EGOV.AF project was a joint initiative of the Afghanistan Ministry of Communications and Information Technology (MCIT) and the United Nations University – International Institute for Software Technology – Center for Electronic Governance (UNU-IIST-EGOV). One goal of EGOV.AF was to develop a nationally-owned EGOV strategy and program (Dzhusupova et al, 2011). In many developing countries, two major challenges to long-term sustainability of e-government initiatives exist, (1) too much reliance on donor funding (Ali & Weerakkody, 2009) and (2) lack of understanding regarding citizen demand for e-government services (Basu, 2004). To mitigate these challenges, a strategy of the EGOV.AF project was to reach out to stakeholders in a systematic way before putting together a national e-government policy. Afghanistan is one of the poorest countries in the world (World Bank, 2012) plagued by a recent history of war and conflict, with a significant digital divide between rural and urban areas. Thus, identifying important stakeholders and understanding their interests, expectations, capacity and influence was very important, but also very difficult.

In 2011, the UNU-IIST-EGOV team engaged in action research with the Ministry of Communication and Information Technology through the development of a stakeholder analysis tool and execution of a series of stakeholder identification exercises, analyses, and workshops. The MCIT was the project owner and lead agency, while the UNU-IIST-EGOV provided mentorship, additional experience, expertise to apply stakeholder analysis tools and engagement methods, and capacity to facilitate the process.

Historically, standard exercises at the MCIT around e-government planning had focused only on consultation with technology stakeholders, such as consulting companies. Initially, the MCIT did not see the value in involving citizens, local provinces, international organizations, academics, or non-profit organizations that focus on governance. The case was made by UNU to engage people outside of government to address several factors: many of the non-profits are advocates for transparency and

good governance, donor organizations assert influence over the process through special programs and funding, and the provincial governments work closely and most directly with citizens.

To expand MCIT's limited understanding of this broad set of stakeholders, they conducted a series of consultation and involvement activities. The first instance of engagement with stakeholders was a survey that asked questions about their interests, needs, activities, and conditions. The team also collected additional contextual information from websites and professional contacts. The second stage of engagement occurred after the analysis of the survey. Using the stakeholder analysis tool developed by UNU, the MCIT identified from the survey results a set of interested and relevant stakeholders, defined the roles for major stakeholders in the policy process and developed communication strategies. Later these stakeholders were invited to attend two stakeholder workshops. One workshop was designed as a 'visioning' exercise and another designed to elicit 'strategy development'. During the workshops, MCIT and UNU-IIST-EGOV were able to provide participants with general knowledge about approaches and methodologies regarding strategy development, provided examples from other countries, and facilitated discussions focused on e-government in the local Afghanistan context. Participants in the workshops were encouraged to share their ideas and to discuss and prioritize strategic goals and tasks for e-government based on the mutual consensus among them. The last stage of the stakeholder engagement was to complete a series of face-to-face meetings and e-mails in which the MCIT collected suggestions on strategic actions. Additional feedback was taken through an e-forum set up on the government website to collect comments on a draft national strategy.

The key result of the overall project was the successful completion of a nationally owned EGOV vision and strategy agreed upon by most important stakeholders. The most critical points of the vision and strategy was to better respond to Afghan citizens' expectations that e-government would bring convenient public services, transparency, accountability and responsiveness and would help to deter wide spread corruption. The project provided evidence that stakeholder engagement in national-level planning processes was possible, and that involving stakeholders can increase commitment, build consensus, and demonstrate transparency and openness in the strategic e-government planning process.

3.2 Renewable energy policy for Kosice, Slovakia

The process of developing an energy policy in Kosice self-governing region (KSR) in Slovakia is surrounded by political, economic and environmental challenges. High dependency on imported energy from Russia and Ukraine, presented KSR with economic and political vulnerabilities. The emergence of domestic small to medium enterprises (SMEs) within the energy sector has provided new opportunities for employment and new technologies for utilizing local energy sources. Control of energy production with respect to emissions also impacted the policy-making environment. Any change in the sources of energy would likely affect the pricing of energy consumption and directly affect citizens and businesses. This case is not only a matter for policy makers and the authorities devising new energy policies, but also affects the KSR government entities, energy importing companies, local SMEs, and citizens. Creating a new policy in such an environment required considerations of a wide variety of stakeholders, the goal was to ensure the new policy would be realistic, supported, and agreed upon.

This case describes a pilot of the Open Collaboration for Policy Modeling (OCOPOMO) project[2]. The main objective of the OCOPOMO project was to develop an online environment for, and ICT tools for, policy modeling in collaboration with stakeholders (Wimmer et al., 2012). Presenting complex information on

[2] http://www.ocopomo.eu/in-a-nutshell/piloting-cases/kosice-self-governing-region-slovakia

policy choices for renewable energy requires some technical expertise and is influenced by individual beliefs. The pilot project in Kosice focused on capturing stakeholders' views on alternative renewable sources of energy versus traditional energy production and consumption. It provided an understanding of various choices in relation to different policies for promoting the use of renewable energy, the perceived market potential for different energy sources, barriers hindering different kinds of energy generation in the region, and the motivating factors leading citizens and companies towards renewable energy sources. It also provided an early understanding of employment, financial and environmental impacts of any potential policy (Furdík, Sabol & Dulinová, 2010). This pilot was the first time that Kosice used advanced ICTs in policymaking and the first time the region involved a range of stakeholders other than policy makers, experts, and key representatives from private heat producers and distribution companies.

The project team met with regional government committees and identified and analyzed relevant stakeholders ranging from heating producers to distribution companies, building construction experts to technology experts, to household associations, citizens, and city employees. Desk research and surveys were used to identify the stakeholders, their roles and expectations in the engagement process. The local authorities were mainly responsible to identify the stakeholders. The project team and the local government applied action research to engage these stakeholders in the process and involvement was by invitation only. Several methods of engagement were used. Workshops were used to clarify tasks and expectations of stakeholders in the engagement process. Collaborative scenario development enabled stakeholders to provide evidence documents and to generate scenarios related to the policy problem. This method also allowed stakeholders to collaborate among themselves by exchanging views and concerns about the policy problem and possible solutions. Conceptual modeling transformed stakeholder-generated scenarios and evidences into formal policy models for simulation and then transformed the model-based scenarios into narrative scenarios to enable understanding of simulation results to stakeholders and steer further collaboration on the results. This process was iterative as new scenarios emerging from the discussions of results could be evaluated and simulated again.

The stakeholders first met with the project team and were given a tutorial of how the OCOPOMO online platform is used and they were free to use the platform for about one month. The online platform provided background and supporting materials to inform stakeholders of the different policy options available. After reviewing existing options, stakeholders could propose several scenarios – for example, they could propose a type of renewable energy and discuss what should be done from the stakeholder's own perspective. Scenarios, based on these stakeholder proposals, were later turned into formal policy models for simulation. The CCD (Consistent Conceptual Description) tool was used to perform this task.

The next phase began almost one year later with another face-to-face meeting to inform stakeholders of the purpose of the second iteration. Given the length of time between the first exercise and the second, some stakeholders were involved in the first face-to-face but not second, and some started in the second. In the second iteration, stakeholders were presented with simulation results of their policy choices. Additional background documents were provided to help educate them such as a Return on Investment (ROI) of different energy sources proposed. Stakeholders, particularly policy owners provided comments on the model-based scenarios and then published one new evidence-based scenario. The topics which were most discussed leading to the new scenario included detailed technical pros and cons of a local versus central heating system, Return On Investments (ROIs), legislation proposed by heat producers that would affect customers who decided to disconnect from the central heating system, and financial tools for investments in building renovation or installation of new heat sources.

The project was successful in highlighting the need for and usefulness of more innovative approaches to policy development processes. These innovative approaches proved to be particularly important with diverse stakeholders with different interests in an existing problem and potential solutions (Wimmer et al., 2012). The added value of OCOPOMO to traditional approaches is the added confidence for policy makers about the expected outcomes of a policy in respect to stakeholders involved. Moreover, the stakeholder engagement process in Kosice was positively viewed by the stakeholders themselves. It enabled better understanding of the policy problem through background documents provided in the platform, and it also provided a tool where different stakeholders' views and expectations could be explicitly captured.

3.3 Redesigning the European Union's inspection capability for international trade

The European Union is implementing a risk-based approach (RBA) policy to government supervision of international trade lanes. As part of this approach, the risk posed by cargo entering and leaving the EU is analysed on the basis of cargo information submitted electronically in a single declaration by operators prior to departure or arrival. However, this policy can only be effective if the data that circulate among the supply chain partners are accurate, timely, and of sufficient quality to be relied upon, which is currently not the case (Hesketh, 2010). This case draws from two projects: Extended Single Window: Information Gateway to Europe (ESW), funded by the Dutch Institute for Advanced Logistics (DINALOG), and Common Assessment and Analysis of Risk in Global Supply Chains (CASSANDRA), funded by the 7th Framework Program of the European Commission. The goal of both projects was to improve supply chain visibility.

Transparency is important for both government and commercial interests; it relates to having access to the transaction data necessary to know what is actually happening in the supply chain. However, major challenges exist in today's global supply chains, including lack of trust and understanding between public and private entities and among private entities (Klievink et al., 2012) about existing laws and ways of working among European Union countries and other countries. Without the involvement of international trading businesses and other stakeholders, and without their active contribution to data sharing solutions that enable the RBA policy, the policy will not lead to the intended results for government and may lead to unnecessary increases in the administrative burden of legitimate traders.

To overcome these challenges, the project team assembled an international consortium of government bodies that included multiple European customs organizations, in addition to universities, IT providers, logistics operators, and standardization bodies. The project team conducted desk-research and a survey based on Bryson (2004) to elicit stakeholders' interests, urgency, influence, and importance. (The total number of entities involved in international supply chains is so large that it was necessary to choose stakeholders that would reasonably represent the range of actors. Therefore, selection was based on criticality and representativeness. For example, the consortium involved representatives of a several very large and medium-sized freight forwarders. This was done to ensure different perspectives within this stakeholder group without having to involve the hundreds of parties that can be involved with the cargo on any single ship. Stakeholders were also grouped according to trade lanes. This approach limited the total number of actors by using the trade lane as a boundary. To ensure diversity in interests, ten different global trade lanes were modeled, including lanes between Shenzhen (China) and Felixstowe (UK), Penang (Malaysia) and Rotterdam (Netherlands), Alexandria (Egypt) and Barcelona (Spain), and Bremerhaven (Germany) and Charleston (US). Using this method, the stakeholders were able to see the common themes across trade lanes that are important for each of the key stakeholder groups.

In order to engage stakeholders to innovate within a real life setting, a Living Lab approach was used. Tan et al. (2010) describe a Living Lab methodology as bringing together multiple stakeholders, across multiple locations, and seeing stakeholders as co-innovators. A Living Lab methodology is suitable for situations where a neutral party, often academics, act as honest brokers to bring the different stakeholders to consensus. Each living lab group used real trade lanes to model the physical flow of data, information system landscape, and administrative burden in order to configure, demonstrate and refine the entire system with the stakeholders. The consortium team created visual models and data-flow diagrams of the existing and to-be situations to enable the stakeholders to sort out the policy and data sharing issues among themselves. Another goal was for stakeholders to come to common understanding of their respective situations, ultimately joining up different systems of different stakeholders in order to capture the data they collectively needed. The overall dataset was visualized in a dashboard with role-based access. The dashboard enabled discussion of how the system would impact the day-to-day processes of the various businesses and inspection authorities.

Involving stakeholders early helped increase commitment and consensus to this initiative. However, decision-making remained relatively slow due to the considerable time it takes to design technical tools, models, and diagrams, and to constantly update them to reflect the feedback from stakeholders' advice and recommendations. By providing a comprehensive overview of the roles, the data sources, and the work processes using them, parties came to an understanding of how the innovations were used. Through this, they over time build trust towards those potential vulnerabilities that the innovation might bring, would not be exploited. This facilitated acceptance and uptake by the various stakeholder groups. In addition, not all of the potential answers the Living Lab groups provided are also enabled by existing European legislation. Alignment between the business stakeholder groups, national governments, and European bodies is still needed. One of the outcomes of the project is therefore a consensus-based agenda for further policy development.

3.4 Understanding Child Health Outcomes in New Zealand

The next case examines the Modelling the Early Life-Course (MEL-C) project in New Zealand, which was supported by a public good research grant provided to researchers at the University of Auckland, New Zealand (Milne et al., 2014). Life-course studies examine "the biological, behavioral and psychosocial pathways that operate across an individual's life course, as well as across generations, to influence the development of chronic diseases" (Ben-Shlomo & Kuh, 2002). An abundance of research evidence can be found about the early life-course of children and the determinants of health. The goal of the project was to develop a decision support software tool for policy makers to test different policy scenarios against realistic data and to consider this evidence alongside other policy-relevant information such as politics, other evaluations, or expert consultations. The main purpose was not to develop a specific policy but to develop a process and tool for better identification and use of data in this policy domain.

In an environment where a great deal of information about a policy exists, the tool is meant to help bridge the research-policy translation gap (Milne et al., 2014). The lack of research evidence uptake by policy makers is well documented (Lomas, 2007; Van Egmond, Bekker, Bal & Van der Grinten, 2011). One main factor is the lack of uptake is the 'translation gap' – characterized as the mismatch between the knowledge that research produces and the knowledge that policy makers want (Milne et al., 2014). Milne et al. (2014) identify two solutions to bridge the gap – knowledge brokers (Frost et al., 2012; Knight & Lightowler, 2010; Lomas, 2007) and research-policy partnerships (Best & Holmes, 2010; Van Egmond et al., 2011). Knowledge brokers act as translators, turning the research evidence into information that is easily understood and usable by policy makers. Research-policy partnerships involve a more intense interaction between both groups, where they work together to produce the evidence

needed for policy purposes. Previous work focused on database interventions aimed at knowledge translation where all relevant documents synthesizing research results could be found (Milne, et al., 2014) However, with the online databases the onus is still on policy makers to search for relevant papers, assess their content for relevance, and evaluate their importance for the policy question under consideration" (p. 8). The MEL-C project took a different approach with a decision-support tool "where the evidence is embedded in a working model and can be interrogated to address specific policy questions."

Using a micro-simulation model, the tool incorporates longitudinal data to determine the normal transition of children through their life course and the impact of policy interventions on their outcomes. Two representatives each from four New Zealand government ministries – Health, Education, Justice, and Social Development – formed a 'policy reference group' for the project (Milne et al., 2014). The representatives were selected because they represented people who could understand the aims of the project and were data and technology savvy. Thus, the boundary for engagement was limited to the translation-gap, and did not extend to the behavior of the children modeled within the system. The main strategy for involving policy makers was to hold regular, face-to-face meetings for almost two years to discuss the development of the MEL-C tool, including the simulation model and graphical user interface. The discussions were facilitated and documented by the task leader for end-user engagement.

The simulation model was shown to stakeholders who then provided feedback and became collaborators in the development of user interfaces and the types of key policy questions that the model needed to be able to address. The results of this specialized form of stakeholder engagement included a much more useful decision-support tool than might have been developed otherwise, an ongoing process of collaborative refinement, and a set of potential users and advocates for the tool.

Results of the model are beginning to be explored. For example, for child health service use outcomes it was found that appreciable improvement was only effected by modifying multiple determinants; structural determinants (e.g., ethnicity, family structure) were relatively more important than intermediary determinants (e.g., overcrowding, parental smoking) as potential policy levers; there was a social gradient of effect; and interventions bestowed the greatest benefit to the most disadvantaged groups with a corresponding reduction in disparities between the worst-off and the best-off (Lay-Yee et al., 2014).

3.5 Transportation and urban planning indicator development in the United States

Understanding how choices today will impact life in the future is a major concern for policy making in any area. In transportation and urban planning, it is even more important because the infrastructure created is not easily changed, once roads and buildings are built and patterns of living start to evolve around them. The urban planning context is fraught with different stakeholders who often have fundamentally opposing beliefs and value systems (Pace, 1990; Borning, Friedman, Davis & Lin, 2005). They embody widely divergent opinions regarding urban development and land use. Each stakeholder group is likely to have its own philosophies about different forms of land use in urban environments, and different views about how long-term planning should occur, what situations constitute problematic conditions, what solutions should be sought for those problems, and what constitutes successful outcomes.

Under these contentious conditions, advanced computer simulation tools that show the long-term potential effects of different choices can contribute to legitimation of the policy process as well as to well-considered decisions. However, in order to achieve this, the model itself must be considered

legitimate. In other words, its structure, inputs, processes, and outputs must be transparent and understandable to all stakeholders. Our last case, UrbanSim, is a land use modeling system, developed over the last twenty years, that helps policy makers and stakeholders understand the 20-30 year impacts of different choices regarding land use and transportation on community outcomes including effects on the economy and the environment. It has been used widely in the US and Europe and is of growing interest globally. The system estimates not only the direct effects of different infrastructure and policy choices but also estimates how individual and group responses to those choices will affect the outcomes (Borning et al., 2005; Borning, Waddell & Förster, 2008).

UrbanSim simulation results are mainly presented to users as indicators. These indicators are variables that convey information about an attribute of the system at a given time. Indicators in UrbanSim include such variables as the population density in different neighborhoods, the ratio of car trips to bus trips for the region, and the projected cost of land per acre in different parts of the region. These and other indicators are presented under different possible scenarios over the course of the full simulation, generally 30 years. Indicator values are presented in tables, graphs, charts, or maps (Friedman et al., 2008). These indicators allow stakeholders to assess and compare the results of different policy scenarios on a consistent set of dimensions. For example, if a city has the goal of supporting more walkable densely populated urban neighborhoods as an alternative to sprawl surrounding the city center, then changes in the "population density" indicator in different neighborhoods could be used to assess the simulated outcomes of different policies over time (Borning et al., 2005).

In recent years, enhancements to UrbanSim have concentrated on making the model more realistic and meaningful to stakeholders by expanding, categorizing, and differentiating the stakeholder values represented by the indicators. The UrbanSim team had two goals: to make advocacy for different views more explicit and contextualized, and to improve the overall legitimacy of the system by incorporating these values in a wider range of indicators in the simulations. The involvement of stakeholders, essentially a process of co-development of the model, was guided by an overarching theory of Value Sensitive Design (Friedman, 1997). A key feature of value sensitive design is designing technology that accounts for human values with an emphasis on representing direct and indirect stakeholders (Borning et al., 2005).

The UrbanSim team partnered with three local organizations in the Seattle, Washington region to develop and test new ways of expressing their values to model users through the choice of indicators and related technical information. The partners (a government agency, a business association, and an environmental group) were selected to represent a range of known issues and stakeholder views about development in the region. The goal was to create for each group a narrative Value Indicator Perspective that explained the values of most importance to that group and to select, define, and incorporate key indicators representing those views in the model. Stakeholders were convened in separate groups so that they could work independently to formulate their indicators perspectives. This was an important design choice because the goal was to present each group's values and desires by essentially telling a story advocating particular values and criteria for evaluating policy outcomes (Borning et al, 2005). The team engaged each stakeholder group through a series of face-to-face meetings and semi structured interviews to help them craft and write both narratives and descriptions of indicators that closely matched their core values and views.

To assess the extent to which these approaches enhanced the legitimation of the model, a separate group of citizen-evaluators reviewed each grouping of stakeholder selected indicators and along with associated technical documentation as well as the indicators in the system as a whole. They considered

coherence, informativeness, usefulness for supporting diverse opinions, usefulness for advocating for differing views and values, and usefulness for supporting the democratic process. The evaluation showed positive scores on all measures and also produced additional findings about the usefulness of different kinds of information (technical compared to advocacy), the importance of explicitly presenting and balancing diverse views, and the overall perception of transparency and lack of bias in the modeling system itself.

4. Case Comparison

Table 1 presents key elements of each case story based the following points of comparison: (a) situation and approach, (b) types of stakeholders and type of participation, (c) methods for stakeholder identification, (d) methods for stakeholder engagement, (e) tools and technologies used, and (f) results.

Table 1 Case Comparison

	Case 1	Case 2	Case 3	Case 4	Case 5
Policy area	**E-government**	**Renewable energy**	**International trade**	**Child health**	**Urban planning**
Length of project	1 year	3 years	3 years	5 years	1 year
Primary country (ies)	Afghanistan	Slovakia	European Union and trading partners	New Zealand	United States
Development status	Developing	Transition	Developed and developing	Developed	Developed
Level of government	National	Municipal	Multi-national	National	Regional
Approach	**Action research --** involving trusted 3rd party facilitates new connections between stakeholders and government	**Action research --** involving collaborative scenario building through an online tool, supplemented with in person meetings	**Action research –** creation of a Living Lab where stakeholders themselves, facilitated by 3rd parties, developed solutions and implement them	**Research-practice partnership** – researchers and policy makers worked together through iterative discussion, demonstration and enhancements	**Action research –** using value sensitive design where stakeholder values are made explicit in the co-developed of enhancements to the technology & model system
Purpose of stakeholder engagement	Ensure ownership, commitment, and transparency, in pursuit of **balancing stakeholders' interests**	**Build consensus** to support a realistic policy that would be widely accepted	Attune the system towards the interests and existing practices of the stakeholders, thereby **building commitment and supporting consensus among stakeholders to new policies**	**Facilitate synthesis of research findings** and **improve the usefulness and usability of a decision-support tool** for policy makers	**Enhance the legitimacy of a modeling system** used in contentious policy areas
Stakeholder types involved	Representatives from central government, local governments, public service providers, IT & consulting firms, NGOs, universities, think tanks, resource centers; international organizations (donors & sponsors)	Policy makers, representatives from energy-related companies, expert groups, representatives from citizens and housing associations	Involvement of 'exemplary' actors from main stakeholder groups: government, international traders, IT solution providers, standards organizations	Expert group drawn from public agencies responsible for children's health	Representatives of selected nonprofit, government, and business interests known to have strong views of development in the region
Method for identifying stakeholders	Online surveys; Interviews; Analysis of interests, needs and	Desk research, survey research, qualitative and quantitative data analysis.	Detailed stakeholder map for specific trade lanes (including commercial,	Convenience sample of policy makers in the domain known to the developers	Convenience sample of organizations known to represent a range views about

	capabilities	Face-to-face meetings	government, logistics and information functions)		urban development in the region
Type of participation	Involving	Involving	Involving/ collaboration	Involving	Involving
Method of stakeholder engagement	Face-to-face workshops	Face-to-face workshops Collaborative scenario building	Face-to-face meetings; consensus building workshops; interviews, joint specification of trade lane and of solution	Face-to-face meetings between developers and policy maker/users	Separate face-to-face meetings, interviews, joint document preparation with each stakeholder
Tools and technologies used	Stakeholder analysis tool; Online forum; e-mail	OCOPOMO platform and Consistent Conceptual Description (CCD)	Visual models; data-flow diagrams; logistics-flow diagrams; games	Micro-simulation modeling	Simulation model
Results/ Outcomes of engagement process	--Increased commitment and consensus among key stakeholders --Increased transparency and openness of the strategic planning process	--The stakeholder engagement process was perceived among stakeholders as a useful and an important process in policy analysis. --Engagement enabled understanding of the policy case among stakeholders, and the tool facilitated the sharing of views to support stakeholders' views in a new policy.	-- A dedicated group innovation setting enabled the stakeholders to better understand the needs between them, which enables "trust" and propagate solutions that weren't possible a year ago; -- Making stakeholders part of the fact-finding and solution-development process supported commitment of stakeholders to the solution; -- Joint process supports consensus among stakeholders (at least in the same trade lane)	--The engagement facilitated the development of a decision-support tool for policy making. --This engagement also established a group who were able to be early adopters of the decision-support tool, and who are able to advocate for it.	--A framework and template for defining, presenting, and incorporating value-based indicators in the model --A method that allows different stakeholders to advocate for different values, but for all stakeholders to view the implications of those values in a standard set of agreed upon indicators that measure their long-term effects

5. Discussion

In this section, we return to our two guiding questions: What types of engagement tools and processes are useful for different stakeholders and contexts? And what factors support the effective use of particular tools and technologies toward constructive outcomes? The extant literature reveals a rich history of examining the role of participation in democratic theory and complex governance (Fung, 2006; Fung, Graham & Weil, 2007). Various analytical tools in the literature address participant selection, modes of communication, and involvement and many of these were present in the cases. The cases confirm previous research regarding the importance of stakeholders and the need for careful and goal oriented stakeholder selection and engagement. The cases also demonstrate the importance of support and education for participants and the role of trusted facilitators, contributing to the knowledge in this field. This section presents the key findings of our case comparison.

Identifying and representing relevant stakeholders. New governance means bringing in stakeholders who are not traditionally part of the policy making process. Fung (2006) describes a continuum of types of stakeholders in new governance, including state representatives (described as expert administrators

or elected representatives) and mini-publics (described as professional and lay stakeholders with organized interests). Professionals are paid participants (such as lobbyists) or not-for-profit organizations. Lay stakeholders are those who volunteer their services such as individuals serving on school councils or neighborhood associations. The cases show that effective stakeholder engagement requires a nuanced understanding of who are the relevant stakeholders with respect to the specific goal of the engagement. Each case represents a complex policy area where the different stakeholders selected or invited to engage in the policy process represented particular aspects or viewpoints about a complex problem. Our study confirms that stakeholder analysis helps policy makers understand differences in stakeholder behavior, intentions, preferences, inter-relations and interests. It also helps them assess the influence and resources different stakeholders bring to decision-making or implementation processes (Varvasovszky & Brugha, 2000). We found that ordinary citizens were seldom involved in these cases. Despite the common rhetoric of "citizen" participation, the cases show how it is often impractical to engage members of the public or representatives of the full range of relevant stakeholders. In these situations, policy modelers and policy makers needed to appreciate the limitations of stakeholder engagement and aim for results that take advantage of less-than-complete stakeholder participation.

For example, in the UrbanSim case, only three organizations participated in the co-development of new indicators. The modelers did not treat these stakeholder views as complete or definitive but rather they used this limited experience to create a value-based indicator framework to guide further development of new indicators and future applications of the UrbanSim model. In the International Trade case, the main stakeholder groups were each represented by up to four 'exemplary' actors. In this way, the key positions of these groups were reasonably well represented in the various activities in the project. These representative actors also served as a starting point to identify specific trade lanes where innovations could take place, and thereby also created awareness of other stakeholders that play a role in those trade lanes. In the Kosice energy policy case, stakeholder identification was done using a technique similar to that proposed by Bryson (2004). The local government was mainly responsible for identifying relevant stakeholders that were invited to the engagement process. Other complementary techniques such as surveys were used to assess stakeholders' roles and expectations. In the International Trade case, similar techniques were applied.

Providing for participant support and education. In order to participate in meaningful ways, stakeholders in our cases needed to be educated regarding the purpose of the engagement, the processes and tools to be used, and the ways in which stakeholder input would be considered. For all the cases presented, stakeholders, including those that were often not directly involved in policy making (e.g., citizens, smaller companies), were made aware of the policy problem in some depth, presented with opportunities to deliberate the different policy choices, and presented with the information necessary to understand the expected outcome from implementation of different policy options.

In the case of EGOV Afghanistan, stakeholders were provided with the results of an EGOV readiness assessment exercise for them to understand the crucial problems to be solved through the implementation of a national e-government policy. Workshops offered them general knowledge about approaches and methodologies for strategy development. In Kosice, participants were provided with the energy policy problem and background documents for additional information about the policy such as the energy conceptions proposed for various cities in the region and studies of return on investment (ROI) for various combinations of heat energy sources. The descriptive scenarios and background documents were important for stakeholders to understand the policy issue, its boundaries, and its challenges. In UrbanSim, the stakeholders were guided through the process of creating narrative value

statements as well as ways to describe and document indicators in accurate, neutral language. All of these education and support activities made the stakeholders' deliberations and input more usable and more relevant to the problem at hand.

Using stakeholder engagement methods to reveal and explain complex policy problems and contexts. Our cases illustrated that stakeholder engagement is an important process in policy development as evidenced in the literature reviewed in section 2.3. Engagement helped in all cases to assure that policy processes and policy decisions were well grounded and responsive to both social values and practical needs. Action research and living labs helped assure that involvement was not based on an over-simplified view of the policy problem, Different tools acted as boundary objects to facilitate knowledge sharing, consensus building, listening, and negotiating. Models of many kinds were used to break down complex processes and revise mental models.

In very intractable public problems like trade lanes, in order to understand how various actors would be affected by different policy options, it was important to understand how information flowed between actors. The specificity of the models used, as well as their comprehensiveness in representing the actual situation, facilitated a focused debate between businesses and government agencies, forcing each party to be clear about their precise activities and relevant policy concerns. As a result, no stakeholder could hide behind a policy that allegedly forced or blocked a certain solution, and the consensus process could focus on the policy options that were feasible in practice. The Kosice energy policy problem required a balance of diverse interests of stakeholders both supplying and consuming energy. This presented policy makers with challenges in identifying and engaging those interests that will affect the implementation of the new policy. Collaborative scenario building engaged both categories of stakeholders. This method was particularly important for policy makers to increase the level of certainty of the policy choice by understanding the intersecting interests of these stakeholders. Formal policy modeling and simulation were also important to inform all stakeholders and policy makers of the different possible outcomes of their scenarios. In the child health case, stakeholders were educated about the concepts and assumptions underlying the policy modeling tool being developed. They also learned from each other about the policy questions of greatest importance to child health and development. The methods used in these cases are similar to those identified in literature (Andersen et al., 2007; Vennix et al., 1996) and can be employed to contribute to many different policy development efforts.

Using trusted third parties to enhance transparency of the process and improve the tools of engagement. Negotiating, brokering, and collaboration skills and expertise with engagement tools are all essential for achieving new forms of governance (Bingham et al., 2005). The tools and technologies used in our cases have different characteristics that affect choice and suitability, including available expertise and financial resources, level of participation, type of policy problem, and the geographic location or dispersion of stakeholders. The cases also address a factor that is less often critically addressed, namely the ways that 'trusted' third parties, such as researchers, are used in stakeholder engagement. In these situations, researchers were not only doing academic research on engagement, they were also crafting, testing, and improving meaningful tools toward practical outcomes. As 'brokers' in the process, researchers and the tools and technologies they use can inhibit or promote better models of engagement in policy making and governance.

In the case of EGOV Afghanistan, the use of online surveys by the UNU-IIST team solved the issue of trying to reach a distributed set of stakeholders separated by geography and also provided a confidential way to gather information about stakeholder interests; while the stakeholder analysis tool provided by UNU-IIST helped MCIT to understand stakeholder preferences and concerns and to assess

their potential to influence the policy process. The technology tools used were not intended to 'socialize' the interests of stakeholders but to gather intelligence by a trusted third party that could be used in the strategic planning process. By comparison, the intention of the online OCOPOMO platform used in the Kosice case was to bring the stakeholders themselves into a virtual meeting place where they could see the interests of other stakeholders. This technology choice, implemented by expert researchers, was intended to facilitate knowledge sharing in a multi-directional way. In the UrbanSim case, the stakeholders' values and interests were intentionally developed in isolation from one another because the goal was to represent the distinct values of each stakeholder type within the model. The simulation mechanism, built by the academic experts, could then model and report indicators showing how these different interests might interact over time. In the International Trade case, a neutral party designed the modeling approach and helped the stakeholder groups in each trade lane model their own existing situations. This approach facilitated joint problem identification and solution development. In the New Zealand child health case, researchers helped policy makers discover policy-relevant material while the policy makers helped the researchers understand what formats and other factors made that material relevant and usable. Each example demonstrates the role of trusted, independent experts who can select technology options, tools, and techniques that introduce transparency into the process and are technically and practically suitable to the situation. The researchers/modelers were trusted independent brokers who gathered data, facilitated engagement, and built models or systems to transparently reflect the reality of the stakeholders.

6. Conclusion

All of the cases we reviewed above used an active approach, assisted by third-party experts, to bring stakeholders together in workshops, through a collaboration platform, or in living labs to support interaction in problem identification, co-development of solutions, and foundations for gaining commitment or consensus by different types of stakeholders. These experiences go well beyond eliciting stakeholders' positions and requirements, leaving the interpretation and balancing to be done by the policy maker independently. The approaches used in these cases supported the stakeholders directly in gaining a shared understanding of the problem, providing some insight into the position and reasoning of other stakeholders, laying the groundwork for potential negotiation or other ways to find common ground with respect to the policy issue, and in some cases establishing or reinforcing trust among different stakeholders as well as trust in the participation process. In line with the literature on this topic, the cases also illustrate some of the cautions and limitations of stakeholder engagement, with particular emphasis on the realistic limits of involvement and representation, and the consequent necessity to match stakeholder selection and engagement methods to a well-defined goal within the larger policy process.

We find that a careful identification of stakeholders is required, and the selection depends on the goals of engaging stakeholders. The appropriate selection of stakeholders to involve can evolve over time, the identification and engagement of stakeholders is a continuous process, as Bryson (2004) suggests. To illustrate this in one of the cases; in the International Trade case, the process started with a set of stakeholders needed to identify and initiate the demonstration trade lanes. These provided grounds for further identifying other stakeholders that play a role in those trade lanes or that were relevant to the initial set of stakeholders. These needed to be engaged also in order to meet the goals of engaging stakeholders. The goals themselves can also evolve along the changing stakeholder involvement. In this case, especially in the beginning, stakeholders were involved to elicit their views and interests in the matter, whereas during the process this shifted toward engaging stakeholders to ensure commitment and to facilitate building consensus among the stakeholders. There are similarities among the cases such

as the use of surveys and convenience sampling as methods to identify stakeholders, face-to-face meetings and workshops as methods of engagement and use of modeling techniques as tools and technologies. Although the literature provides various available methods and techniques used in stakeholder engagement processes, the cases illustrate that the approaches, tools and technologies selected in each case are highly influenced by the purposes and expected outcomes of the engagement effort. Therefore, we emphasize that every stakeholder engagement needs to be tailored with well-selected processes and tools that suit the overall purpose and expected outcomes.

As frequently highlighted in the literature, stakeholders involvement in policy processes can help build consensus by balancing stakeholder interests and preferences, increasing their commitment for policy implementation, and ensuring transparency and openness of the process. Often, these advantages of stakeholder engagement are linked to the idea of empowering stakeholders as much as possible (i.e., stakeholders make key decisions). However, our study shows that all of these advantages can also be gained by *involving* stakeholders, with less emphasis on empowerment. We posit that these benefits can be realized when stakeholders understand their roles and the objectives of their engagement, enabling them to bring their own interests to the table while also gaining an understanding of other interests and factors that influence decisions and results. Therefore, our findings on the importance of offering support and education for participants in order to enable them to understand their role and the engagement process are an important contribution to the literature. In a similar vein, the role that trusted (third party) facilitators could play in the engagement process is often underestimated in the literature, but is clearly an important ingredient in the cases presented in this chapter.

Tools can take many different forms, some using technology and some not – the important factor is to match the tool to the objective and the capabilities of the stakeholders involved. Making this match requires an understanding of the capabilities of the stakeholders to use such tools and technologies, sometimes also in a specific country context. Furthermore, as the UrbanSim and child health case show, stakeholders can contribute not only to policy analysis and choices, but can also make significant contributions to improving the effectiveness of policy processes, and the validity and usability of models, and other tools.

Based on these findings, our study offers some practical insights for policy makers (and researchers) that want to engage stakeholders for policy development. The first critical step is identification of salient stakeholders or stakeholder types. The literature reviewed in this chapter as well as the five cases offer various approaches to identify stakeholders. As concluded above, the method used to identify stakeholders is closely related to the intended purpose of stakeholder engagement. For example, when aiming to learn from stakeholders about a specific domain, a convenience sample of relevant actors is a suitable method. However, if the goal is to ensure commitment or to build consensus, the methods employed need to be rigorous in identifying all key stakeholder groups. Desk research, surveys, interviews and stakeholder or interests mapping tools are useful approaches to do this. Iterative stakeholder identification often helps create a more complete array of relevant stakeholders. Our research in combination with the relevant literature also shows other purposes for stakeholder engagement that guide the selection of stakeholder types. For example, transparency of the process, facilitating adoption, improving usefulness and usability of tools and enhancing legitimacy are purposes of stakeholder engagement we found in the cases.

Once the relevant stakeholders have been identified and the objective of involving them is clear, the approach to stakeholder engagement needs to be selected. Whereas the literature presents various options, all the cases we covered were in an advanced stage and almost all employed some form of

action research, in which stakeholders (especially practitioners and policy makers) worked closely with each other and with researchers in a collaborative way. This was found in all cases, as all cases were focused on *involving* stakeholders. In case the objective is to primarily *inform* or *consult* stakeholders, other approaches are more suitable, and some suggestions have been provided in the background section. When involving stakeholders, policy makers and researchers will have to carefully consider what role the engaged stakeholders will have; involving stakeholders to work in real-world complexity as much as possible will benefit from action research or living labs, but requires that the material, objectives, activities, etc. be carefully prepared and designed, as stakeholders do not always have a clear idea of what their involvement should look like or contribute to. On the other hand, complexity can also be broken down to make the matter more comprehensible for stakeholders. For this, modeling tools and simulations can be used for both purposes. In either case, tools and models can function as boundary objects that stakeholders can view, discuss or manipulate to better understand how a particular decision might play out. However, the conceptual capacity stakeholders that will need to have affects the kind and amount of work that should go in to preparing the engagement.

While much remains to be learned about stakeholder engagement in policy modeling. this chapter provides a starting point for better understanding how different approaches, tools, and technologies can support effective stakeholder participation toward better policy choices and outcomes. The cases presented here demonstrate that stakeholder engagement processes, tools, and technologies are versatile and useful to both policy makers and to the stakeholders themselves. With careful selection and application, they can work in a wide variety of situations including different policy domains and kinds of problems, different political systems, and different levels of social and economic development.

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