Simulation Technologies for Enhancing Citizen Participation

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INTRODUCTION

In the first decade of the 21st century, citizenship is increasingly channeled into and organized through digital communications and experiences (Center for Technology in Government, 1999; Fountain, 2001; Larsen & Rainie, 2002). This article presents an overview of a set of new information technologies—online modeling, simulation, and decision-support technologies that have the potential to transform the way citizens understand complex issues and communicate that understanding to fellow citizens and governmental decision makers.

Those who have thought deeply about democracy and technology tend to understand that new technologies often possess both beneficial and detrimental traits. These traits are also likely to occur with respect to simulation technologies for citizen participation (Shapiro, 1999; Sunstein, 2000). Whether simulation technologies will ultimately be more beneficial than detrimental will ultimately be determined by how the next generation of simulation designers do their jobs. One purpose of this article is to identify factors that these designers should consider.

What defines and makes simulation technologies unique is their ability to act as a new mode of communication. Models, simulations, and decision-support technologies communicate as much through experience as they do through any direct effort to convey a specific message. As Marshall McLuhan (1967) suggested, things are different when the medium becomes a major part of the message. In the case of models, simulations, and decision-support technologies, the medium can be much more than the video presentations that McLuhan identified as having such an impact on our culture. Specifically, these technologies can exist as entire miniature worlds of experience and can possess features that address multiple senses at one time. Moreover, simulations can be designed to specifically stimulate higher cognitive functions as well as our sense of discovery and history.

Although the terms *model, simulation,* and *decision support* are similar (see Key Terms) in that all of them involve some use of representations to help human beings understand processes, each term possesses some connotations that can be useful in different circumstances. For example, *simulations* seems to imply a greater level of experience on the part of the user when compared to models and decision-support technologies. Similarly, the term *decision-support technologies* (or *expert systems*) tend to imply a more *goal-oriented representation* of a problem. Although it is important to understand the subtle differences among these terms, for the purposes of this article I will use the term *simulation* to refer to the entire spectrum of these technologies.

Scientists and engineers have long used computer modeling, simulation, and decision support, but only recently have these technologies been employed in support of citizen participation in policy development. This article describes the uses of, the rationales for, and the trends behind the employment of these simulation technologies in this manner. Specifically, I examine three major factors that are driving the trend toward the use of simulations to promote citizen participation as well as to identify factors that will enable citizens and public managers to make better use these technologies.

BACKGROUND: INCREASING CITIZEN UNDERSTANDING OF AND ENGAGEMENT IN GOVERNMENT

Effective citizen participation is often affected by the citizens' understanding of how their dreams of the future can be realized through public-policy choices. Although many public policy choices are made based on the application of existing knowledge, some policies can only be evaluated based on how different sets of assumptions would affect the future. Specifically, simulations can be very valuable when

- *feedback loops* are too long;
- there are complicated interactions among numerous variables (Brown & Jones, 1998);
- the real-world equivalent of the simulated world is inaccessible;
- exploring numerous "what-if" scenarios in the real world would be too expensive; and
- observations are too rare in the real world.

One can observe many of the circumstances that support the use of simulations in helping citizens and public employees to better understand their world. Examples include understanding

- complex *ecological systems*;
- how different transportation policies impact different values (e.g., travel time, pollution, accessibility, beauty, etc.);
- how to respond in an emergency; and
- the complex trade-offs involved in a budget process.

In addition to overcoming limitations to using the real world as a policy test bed, simulations can also be used to help

- stakeholders recognize problems (e.g., that the flow of pollution will threaten an important water source in 15 years);
- solve computationally difficult problems faster and/or more reliably;
- stimulate new ideas (e.g., what would the neighborhood look like were the city to allow higher density development?);
- develop evidence to justify a position or to provide explanations (Kidd, 1985);
- provide advice or shape the discussion of an issue (Carroll & McKendree, 1987);
- provide a kind of accountability (e.g., experiencing a simulation prevents one from being seduced by someone's overly optimistic vision; Teicholz, 1999); and
- citizens examine trade offs (e.g., between cost and value; Jones, 1997).

There is not enough space to list the extended catalogof simulations that are being used to inform citizens about public policy. O'Looney (2003) provided descriptions of simulations that span numerous areas of public policy and civic knowledge. The number and variety of simulations being used in the planning process has, for example, become so great as to lead the Environmental Protection Agency to commission a study of strengths and weakness of various planning-support software (U.S. Environmental Protection Agency, 2000).

UNDERSTANDING AND ENGAGEMENT

If increasing citizens' *understanding* of government is the first step in enhancing citizens' participation, increasing the capacity to *engage* government officials, programs, and policy-making processes represents the next step. *Engagement-supporting technologies* tend to include communications and data aggregation capacities that help people communicate more about what they know. An engagement simulation might be one that links a simulation experience with online opportunities for communications (e.g., the city council of Kalix, Sweden, facilitated online deliberation by citizens in the redesign of the town center. After looking at renovation plans and options, citizens could give their opinions and vote online; HM Government/UK Online, 2002, p. 26).

Whereas increased understanding is an individual goal, engagement involves a group. Also, engagement tends to occur around more concrete or situation-specific events or challenges such as

- identifying the likely impacts of a land-use plan over a set period of years, and
- identifying areas that should be targeted with public funds for redevelopment.

Because engagement-focused simulations tend to address a more specific domain or problem, they are often more complex and more difficult for citizens to use in comparison to simulations for increasing understanding, which can work as simplified or "teaching model" simulations.

FACTORS LEADING TO AN ENHANCED ROLE FOR SIMULATION TECHNOLOGY IN CITIZEN PARTICIPATION

Factor 1: Citizens Demanding More Participation

As levels of education have risen, so has the desire to participate more actively in government policy making. Similarly, legislative requirements, changing professional norms, and recognition of the value of social capital are legitimizing an enhanced role for citizens in numerous areas of pubic affairs and management (Thomas, 1995). Governmental advantages of citizen involvement include increased problem-solving ability, better channels for communication, improved program implementation, and a more streamlined budget process (Norris, 2002; Thomas, 1995).

Although the benefits of citizen participation are well recognized, the actual promotion and acceptance of online technologies that enhance citizen involvement and par-