

Gaming and simulation for transforming and reengineering government. Towards a research agenda

Marijn Janssen & Bram Klievink

Abstract

Purpose – In their process of transformation, governments have to deal with a host of stakeholders and complex organizational and technical issues. In this viewpoint article, an argument is made in favour of using gaming and simulation as tools designed to aid the transformation and reengineering of government. Based on the argument, a research agenda is proposed.

Design/methodology/approach – A combination of literature research, argumentation and illustrations.

Findings – Simulation and gaming have the potential to be used to activate and involve stakeholders at all layers of government in transformational efforts. These tools should be closely connected to visualization and interaction options, to facilitate communication and participation. Because the various stakeholders involved have different views and different approaches, it is both necessary and difficult to involve them in identifying problems and developing solutions. Given the considerable potential of these tools, more research is needed on the use and development of participative simulation and gaming tools.

Research limitations/implications – Although gaming and simulation have been used in many domains, they have yet to be tried in the area of e-government. More research is needed into the instruments that can help governments in their transformation processes.

Practical implications – E-government projects should be supported by tools like gaming and simulation to facilitate the participation, involvement of and communication among the various relevant stakeholders, to create a shared understanding of the problems and of future scenarios.

Originality/value – The primary value of this viewpoint lies in the analysis of the potential opportunities of gaming and simulation in terms of transforming and reengineering government and the research agenda that follows from this analysis.

Article Type: Viewpoint

Although many efforts have been made to bridge the gap between citizens, businesses, policy-makers, public managers, technical experts and other stakeholders playing a role in e-government initiatives, involving these various groups in the development and decision-making phases of such initiatives remains a complicated affair. Stakeholder involvement in complex decision-making processes articulates one of the fundamental problems in transforming government. The participation of stakeholders in transformational processes can improve the solutions to complex e-government problems and generate support among the stakeholders involved. Many projects

have failed due to a lack of communication and understanding. However, involving all the relevant stakeholders is difficult, since e-government initiatives need to address societal, economic, organizational and technological aspects.

Involving stakeholder groups means that complex situations and issues have to be condensed into meaningful representations, which in turn can be interpreted correctly by a wide variety of stakeholders. However, because the situations involved are often very complex and different stakeholders may operate from different perspectives, opening up relevant information on a specific issue is difficult. Providing such information to stakeholders and involving and finally them is a complex socio-technological process that should – in addition to providing the information – support the contextualization and translation of complex information, to enable the participation of stakeholders, for which instruments are needed that are able to support abstraction and communication.

Instruments supporting transformation

Because real-life experimenting is often too costly and risky, collaboration and interaction can be facilitated by gaming and simulation. Modelling and simulation use abstractions of processes to analyze and assess the quantitative and qualitative impact of alternative policies and arrangements (e.g. Eldabi et al., 2002). Modellers and decision-makers are often confused as to which methods, tools and techniques are best for a given situation. The number of existing techniques is immense (e.g. Kettinger, Teng, & Guha, 1997). Different modelling tools may be used at various stages of e-government projects, from problem analysis to the policy and decision-making processes. How such tools can best be used depends on the specific needs and intentions of stakeholders and initiators.

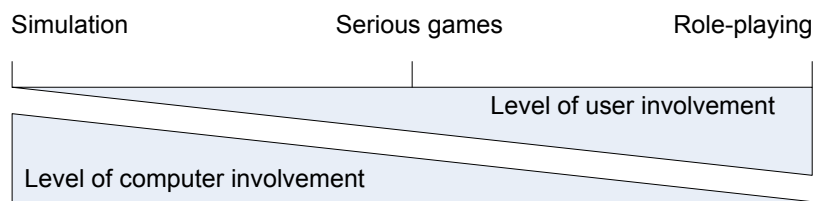


Figure 1. Types of support instruments based on user and computer involvement

The available tools can be categorized based on the level of human and computer involvement (see Figure 1). Simulations that are designed and run by modellers have no active user involvement whatsoever, whereas role-playing games are characterized by user interactions and no, or almost no, computer involvement. In between these two extremes, we find serious games, in which people interact with computers to facilitate learning and understanding.

Simulation

Simulation is a typical decision-support tool that can be used for quantitative and qualitative analyses in e-government (e.g. Janssen, Joha, & Zuurmond, 2009), allowing decision-makers, modellers and other stakeholders to understand the essence of a system or policy, to identify opportunities for change (often based on what-if analyses) and to evaluate the effect of proposed changes on key performance indicators (Law & Kelton, 1999; Sol, 1982). This approach makes it possible to experiment with a system in a simulated environment, making it less risky and more efficient to study the system and its impact prior to implementation. Simulation makes it possible to determine the likely consequences of policy actions, investments, decisions and process changes before they are actually implemented.

Simulation is one of the most widely used methods in operations research and management science (Law & Kelton, 1999). It is used in various domains, including defence and healthcare

(Naseer, Eldabi, & Jahangirian, 2009). Today, there are many simulation packages that enable the generation of simulations based on pre-defined building blocks. Most of them have advanced visualization features. There are even open source simulation environments, for example DSOL (<http://sk-3.tbm.tudelft.nl/simulation/index.php>). Complex systems are by necessity conceptualized in many different ways, because different stakeholders have different backgrounds, education, skills, knowledge and experiences. This biases and influences the internalization of complex situations. For qualitative analyses and user involvement, animation and visualization are used employed. In most cases, various views on the complex system under investigation can be visualized and the level of detail can be defined based on pre-determined requirements.

Serious games

Serious games involve both user and computer and are based on computer games, originating from the gaming industry, for non-entertainment purposes. They can promote engagement and learning and allow users to become acquainted with various situations and problems (Johnson, Vilhjalmsson, & Marsella, 2005). Typically, learners (i.e. players) carry out missions in an artificial world and interact with players and simulated characters, thus exploring the numerous possibilities that serious games represent, for instance the ability to learn how to manage crises situations in all their aspects. These types of games have captured the attention of politicians and public managers, as they offer a way to involve users in policy-making. Despite their obvious potential, these types of games have thus far rarely been used in e-government. Developing these types of games is often relatively costly, while they are usually only suitable for specific situations. Development costs are likely to fall in the future due to the emergence of serious gaming platforms that allow elements to be reused and new games to be developed rapidly.

Role-playing games

To increase people's understanding of a situation and to find ways for improvement, gaming can be used to let stakeholders experience what is going on. In gaming sessions, people often play a role that is different from the one they play in real life, to ensure that they gain insight into the position of other actors. One of the side-effects of this approach is that players become less defensive, which results in a more open, neutral and collaborative setting. Role-playing is used in a wide variety of situations, in particular in education. It is characterized primarily by the fact that human participants play a role in situations that is an abstraction of reality (Meijer & Hofstede, 2003). Players are allocated certain roles that they play during the game, which is guided by game rules and interventions. The game designer's intention is to confront the participants with certain problems and to encourage them to work together to solve these problems.

To date, games have rarely been used in the area e-government, with the exception of the integrated service delivery game (Klievink & Janssen, 2009), where the issues involved in multiple channel service delivery are simulated and participants play the role customer, call centre employee, physical office employee, back office employee, etc., in an integrated service delivery. One of the advantages of such games is that they can be used to analyze and reflect real-world systems better and allow alternatives to be tested without having to change reality in a relatively friendly environment outside the daily working situation.

Benefits of using simulation and gaming

There are many benefits associated with the use of the instruments described above. Such instruments can help analyze a situation from various perspectives and at various levels of details. Simulation makes it easier to decompose a problem and examine it at whatever level of detail that is required. Different types of stakeholders, like citizens, public managers, technological experts and even politicians can be involved by creating specific views, showing their concerns and

matching their knowledge and background, providing a more effective and efficient way to increase stakeholder participation.

These instruments help create a shared understanding of a problem and of the alternative policies and arrangements, which may increase the understanding and ultimately the acceptance of alternatives. In addition, they may help increase the number of possible alternatives and improve the quality of decision-making. Mobilizing user knowledge and experiences with the aim of creating better solutions to a problem may very well lead to more innovative and clearer solutions. Because at least qualitative knowledge is necessary to interpret the quantitative results and implications, qualitative and quantitative analyses need to complement each other, Despite these promises, the potential benefits remain largely unproven and it remains unclear how these benefits can be obtained. Furthermore, thus far the use of these instruments in the transformation of government has been very limited and few experiments have been carried out. Building models and participating in transformation processes are time-consuming and costly, and it may be unclear to potential participants what the contribution to or influence on the decision-making process is exactly. Consequently, there is a tension between the need to participate and improve the success of decision-making and transformation processes on the one hand, and the aim to operate efficiently and effectively with scarce resources, which makes it important to enhance the quality of participation in an efficient way.

Towards a research agenda

The complexity of the problems involved and the temporal requirements of participating can easily result in the failure of transformation processes. Table 1 provides an overview of the various research issues, divided into three categories: organization, application and technology.

Table 1. Research agenda

| Area | Research issues |
|--------------|---|
| Organization | User involvement, activation and retention Communication with a large, heterogeneous set of stakeholders Collaboration among stakeholders to improve the understanding and quality of alternatives Creation of a shared understanding and commitment to decisions Interface improvement Easy-to-grasp and understandable visual representations Web-based visualization and interfacing Model testing, limitations and shortcomings Game-based approach to experimentation with alternatives Combination of experimental results with organizational key performance indicators Future scenario creation, management and experimentation Creative solutions and innovations Automatic analysis of and use feedback and content generation |
| Applications | Domain models capturing certain areas and the reuse of components and concepts Development and use of open source simulation and gaming environments Automatic mapping and analysis of real-life situations Input analyser and interpreter of complex data Model validation mechanisms Output formatting and sophisticated visualization mechanisms to include multiple views and levels of abstraction Automatic creation of improvements |
| Technology | Integration with real applications to capture and use data Real-time simulation Agent-based simulation |

Although they can be very useful in e-government transformation processes, instruments like gaming and simulation have as yet rarely been used in this area. In this paper, we have presented an argument in favour of using these instruments in e-government transformation processes. The intended use of the instruments influences the type of modelling and (real-world) phenomena that need to be included. More research is needed to develop such instruments for the various areas of e-government – including multi-channel service delivery, enterprise application integration, shared services and cross-agency processes – for the purposes of identifying value-added processes and ensuring stakeholder participation to benefit optimally from the opportunities provided by new technologies.

The goal of this viewpoint is to promote the development of effective gaming and simulation instruments, with the aim of expanding our ability to explore, assess and understand e-government. To do so, a complex domain needs to be condensed into a relatively simple representation. Nevertheless, stakeholders need to have a basic grasp of the core concepts and principles of the domain under investigation, and more research in this area is necessary. One of the key challenges in future research is how to translate complex data into visual representations that are easy to understand by a diverse set of stakeholders.

References

- Eldabi T, Irani Z, Paul R.J & Love P.E.D. (2002). Quantitative and qualitative decision making methods in simulation modelling. *Management Decision*, 40(1-2): 63-73.
- Janssen, M., Joha, A., & Zuurmond, A. (2009). Simulation and animation for adopting shared services: Evaluating and comparing alternative arrangements *Government Information Quarterly*, 26(1), 15-24.
- Johnson, W. L., Vilhjalmsson, H., & Marsella, S. (2005). Serious Games for Language Learning. How much Game, How much AI? In C.-K. Looi, G. Mccalla, B. Bredeweg & J. Breuker (Eds.), *Artificial intelligence in education*: IOS Press.
- Kettinger, W. J., Teng, J. T. C., & Guha, S. (1997). Business Process Change: A study of methodologies, techniques, and tools. *MIS Quarterly*, 21(1), 55-79.
- Klievink, B., & Janssen, M. (2009). *A Simulation Game for Public-Private Service Delivery*. In: Proceedings of the 10th Annual International Conference on Digital Government Research, Partnerships for Public Innovation, DG.O 2009, Puebla, Mexico.
- Law, A. M., & Kelton, D. W. (1999). *Simulation Modeling and Analysis*. New York: McGraw-Hill.
- Meijer, S., & Hofstede, G. J. (2003). *Simulation games for improving the human orientation of production management*. Paper presented at the Current trends in production management. Proceedings of IFIP WG 5.7 Working conference on human aspects in production management, Aachen.
- Naseer, A., Eldabi, T., & Jahangirian, M. (2009). Transforming Government: People, Process and Policy *Cross-sector analysis of simulation methods: a survey of defense and healthcare*, 3(2), 181-189.
- Sol, H. G. (1982). *Simulation in information systems development*. University of Groningen, Groningen, the Netherlands.