

## Chapter 42

# Design of an ICT Tool for Decision Making in Social and Health Policies

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### ABSTRACT

*The governance requires technical support regarding the complexity in deciding health policies to assist people who require long-term care. Long-term care policies require the use of ICT simulation tools that can provide policy makers with the option of going into a decision theatre and virtually knowing the consequences of different policies prior to finally determining the real policy to be adopted. In this sense, there is an absence of simulation tools for decision making about long-term care policies. In this chapter, the authors propose the foundations and guidelines of SSIMSOWELL, a new scalable, multi-agent simulation tool that increases the prediction capacity of governance in the long term care policies, improving the decision making in short, medium, and large term in different European regions. The simulation tool implements a previously validated Social Sustainability Model (SSM). The main goal of SSIMSOWELL is the prediction of policy impacts and the development of new governance models, since it increases the budgetary efficiency and the sustainability of long term policies. In addition, it improves the capacity of policy makers in modelling, planning, and evaluating social-health policies at different scales, ranges, and times in the European Union.*

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## INTRODUCTION

The European Commission has recognized the complexity in deciding health and social policies to assist people who require long-term care without knowing its consequences in the short, medium and long term (European Commission, 2003, 2008). The complexity of these decisions and policies requires the use of Information and Communication Technologies (ICT) simulation tools. These simulation tools can provide policy makers with the option of going into a decision theatre and virtually knowing the consequences of different policies prior to finally determining the real policy to be adopted. In this way, prediction of impacts of healthcare and social welfare policy measures would be greatly improved.

In order to develop ICT simulation tools for healthcare policies, a close collaboration between different research fields is necessary. On the one hand, a comprehensive and faithful model of the entire health and social welfare system is required. In this model, all the existing inputs should be taken into account, the relationships among, patients, health actors, health subsystems and performance outputs should be clearly defined, and the evolution over time of the required performance metrics should be quantified. On the other hand, a scalable simulation tool based on a distributed computer platform is required, in order to simulate the model of the health and social welfare system on population sizes and periods of time of different orders of magnitude.

Health and social welfare systems are complex adaptive systems where social and biophysical agents are interacting at multiple temporal and spatial scales (Janssen & Ostrom, 2006). The main challenge for the study of governance of these systems is improving our understanding of the conditions under which cooperative solutions are sustained, how social actors can make robust decisions in the face of uncertainty and how the topology of interactions between social and biophysical actors affect governance. Con-

ventional approaches, based on empirical studies from laboratory experiments and fieldwork, do not explicitly include non-convex dynamics of ecosystems, non-random interactions of agents, incomplete understanding, or empirically based models of behaviour in collective actions. On the contrary, agent-based simulation addresses the previous features explicitly and is therefore potentially useful to address the current challenges in the study of governance of social-ecological systems. Therefore, multiagent based simulation systems seems to be the best strategy for developing a simulation tool for social welfare and health policies.

On the one hand, we have previously worked on developing a transitional theoretical model, named Social Sustainability Model (SSM) (Garcés, Ródenas, & Sanjosé, 2003); linked to health and social systems to address the issue of long-term care, as a way for overcome the complex problems which threaten sustainability of health and social welfare systems. (Commission of the European Communities, 2009; Guillén, 2010). On the other hand, we have previously worked on the development of scalable simulation tools based on distributed computing applied to fields such as crowd simulation (Vigueras, Orduña, Lozano, Chrysanthou, 2011; Vigueras, Lozano, & Orduña, 2010). Also, we have worked on mechanisms for social decision making applied to solve different problems such as meeting scheduling or urban mobility, all of them within the field of multiagent-based social simulation (Grimaldo, Lozano, & Barber, 2008; Grimaldo, Lozano, & Barber, 2010). Since the scalability of Multi-Agent Systems for simulating social behaviour of crowds of humans is still an open issue (CROSSROAD, n.d.; IMPACT, n.d.), it is necessary a careful design of the simulation tool, taking into account hardware and software architectures, in order to ensure the scalable simulation of the proposed model.

In this chapter, we propose the foundations and guidelines of a new scalable multiagent simulation tool (named SSIMSOWELL) for decision making

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