The Visual Policy Making Life-Cycle: Supporting Policy Makers with Visual-Interactive ICT Tools for Sustainable Policy Making

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Abstract

The main goal of today's humanity is to balance their environmental, economic, and societal needs for obtaining a sustainable future for later generations.The main actors that are enabled by the public to maintain a sustainable plan for this goal are politicians. The underlying process can be entitled as policy making process.

Due to the fast growth of ICT during the last decades, new methodologies for supporting the planning activities in politics are born. These technologies arise from different scientific research areas like natural sciences, economics, sociology, or psychology. Computer scientists implement theories in software in order to realize the practical usage on real world problems.

During the design of a political agenda, policies are defined that have to guide public and industry in obtaining the overall environmental, economic, and societal needs. Therefore ICT support originating from all scientific research areas mentioned above have to be considered. An optimal solution regarding all different aspects coming from different scientific perspectives should be the goal of a political agenda. The integration of all these perspectives is a challenge on itself. Another challenge is the implementation of an intuitive access to supportive ICT tools, since politicians and even the analysts supporting politicians in the design of their political agendas cannot be experts in all relevant scientific fields. This access can be realized via visual-interactive displays. Graphical user interfaces enriched by visualizations can serve with three main advantages:

1. they can be used to analyze the output generated from ICT tools,
2. they can enable the user to visual-interactively control the ICT tools by changing parameters without knowing how the tools' algorithms work in detail, which is not always relevant for the decision making process, and
3. they can connect ICT tools coming from different domains within one integrative visualization dashboard.

There exist two research areas in the visualization domain that can contribute to the policy making process: information visualization and visual analytics. While information visualization tools can be used to visualize and analyze the generated output (see 1), visual analytics tools can integrate the decision makers in the analytical process by enabling them to visual-interactively control the supporting ICT tools in iterative cycles, and letting them connect ICT tools from different research areas (see 2 and 3).

In the following, we illustrate with an exemplary use case at which stages of the policy making process visualization tools can be used to give decision makers an easy access to complex ICT tools. We introduce the European funded project *ePolicy*[1] that has the goal to realize such a policy making life-cycle in the domain of regional energy planning. In the project, a decision support system for aiding policy makers in their decision process is provided. It is realized by engineering the policy making life-cycle. The life-cycle uniquely integrates global and individual perspectives into the decision process, bringing to policy makers' attention both global concerns (for example - impacts, budget constraints and objectives), and individual concerns (i.e. opinions, reactions), giving guidance towards better policy implementation strategies. Technically these perspectives are integrated via extensive use of optimization and decision support techniques, social simulation, and opinion mining. Goals of the project are to combine these three research areas in a unique way, and to provide an intuitive visual-interactive access to the underlying techniques implemented in ICT tools.

Regarding optimization and decision support techniques, two stages exist that will be supported via visualization techniques; the definition of the optimization problem, and the analysis of the output. For both stages visualization techniques can be used to let non-expert users get access to the analysis tools without getting in touch with e.g., complex solvers, or underlying technical models. Regarding social simulation, an agent-based simulation approach will be implemented. We identified three stages that will be supported via visualization techniques; the analysis of a questionnaire that is used to model the agents, the setting of the parameters of the agents and the environment, and the analysis of the simulation output. Regarding opinion mining, a range of visual analytics approaches exist that are designed to support the visual-interactive access to opinions mined from the web. These approaches require further development and have to be adapted to the domain of policy making.

The identified stages for possible visualization support in the policy making process are just examples to show the benefits of the use of information visualization and visual analytics techniques in the area of policy making. The challenges in the domain of policy making lie in integrating more analytical tools from different domains to make better decisions for a sustainable future. With the support of visualization techniques non-expert users will be able to get an intuitive access to these complex tools.

[1] www.epolicy-project.eu/