

HOW TO BUILD SUCCESSFUL ICT TOOLS FOR POLICY MAKING

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INTRODUCTION

There are different categories of ICT tools used for policy making: *Visualization tools, Argumentation tools, Engagement and e-Participation tools, Opinion Mining and Monitoring tools, Information Market tools, Simulation tools and Serious Games, Persuasive or Influence tools, Social Network Analysis tools, Semantics tools, Web Intelligence tools, Integrated Big Data Analytics tools.*

Big data allows policy design and implementation to be more citizen-focused by taking account of citizens' needs and preferences, and can thus improve civic engagement¹. But the current big data and social media frenzy should not make one overlook other ICT-based tools for public policy.

Generally speaking, the policy goals of ICT-based tools are no different from the goals of more traditional tools like econometric models and non-linear time series models used for economic impact assessment, Delphi analysis and scenario planning when it comes to forecasting, examining, and educating people concerning the effectiveness, potential outcomes and impacts of specific public policies.

LESSONS LEARNED

This document summarizes lessons learned on how to build successful ICT tools for policy making. These lessons are derived from the experience in the development of ICT tools in several EU funded research projects (such as SYMPHONY) as well as the review of existing and successful tools such as America's Army, MarketPlace, C-ROADS, World Climate, UrbanSim, UNEP Web Intelligence, SIMCITY.

1) Put the user at the center:

- Start early and continuously involve policy-makers in all stages of development of the platform (interaction between tool developers, scientists and users);
- Involve targeted policy-making units to provide expertise to support the development of the models and scenarios;

¹ While we acknowledge that big data also presents new technological and legal challenges and poses moral and ethical dilemmas to policy-makers and society, we do not discuss these aspects here.

- Make model assumptions, inputs, and methodology transparent and adjustable to suit users' needs;
- Develop different interfaces for experts and non-experts (e.g. educational and professional version of C-ROADS: C-Learn and C-ROADS Pro), reduce complexity and computation time for online version or application and ensure consistency with the more complex "pro" version.

2) Constantly improve the product and service:

- Integrate real-time feedback from the developers/support team and allow easy user feedback loop: encourage feedback from users and take it into account for constant improvement (e.g. if the tool is used for education, instructor can provide important feedback and help creating links between the tool and real life applications);
- Make the tool available as open source to allow wider use and further development (specific extensions or plug-ins or versions for specific users);
- Have content, models and scenarios reviewed by an external scientific review committee;
- Build on the experience from interactive entertainment industry to design tools preserving the underlying complexity of the subject matter, realism, purpose and the educational value, while presenting an intuitive and enjoyable interface appealing to the targeted audience.

3) Get professional help:

- Develop the tools by or in collaboration with Marketing or Management departments in universities (such as MarketPlace, World Climate, C-ROADS);
- Develop the tools by or in collaboration with the interactive entertainment industry (such as SIMCITY);
- Develop the tools around important needs within the public policy sector and therefore directly develop them within public agencies (such as America's Army simulation game and UNEP Live Web Intelligence tool).

4) Create a learning experience:

- Blend multimedia content with hands-on sessions where users/teams need to take decisions within a limited time;
- Integrate a series of quests and stories related to real-world challenges and provide issue-specific solutions;

- Allow the user to get real world experience by seeing reactions, listening to customers' needs and getting customized reports from e.g. labor unions;
- Integrate micro-simulations or skill-and-drill exercises (short interactive and game-like exercises for mastering critical skills), which can be played multiple times to improve understanding without being used for assessment or grading. They can consist of a) animated lectures explaining the principles or b) interactive challenges allowing for practicing the skill. The instructor should be able to customize the micro-simulations.

5) Make it intuitive and enjoyable:

- Design easy access and registration procedure as it gives the user a first touch and feel of the tool;
- Enable support for multiple user accounts and groups;
- Provide introductory videos, help pages, tutorials and/or user guide, explanatory bubbles (explaining the parameters, the scale etc.);
- Enable possibility to:
 - Create customized workspaces based on user preferences;
 - Upload input data for a model;
 - Visualize the results as 2D or 3D maps, charts, and tables in a web browser;
 - Export or archive the results in different formats or as tables or maps (see UrbanSim);
 - Use application programming interfaces (APIs);
 - Listen, monitor and report on user conversations;
 - Watch, listen, monitor, organize results and report.
- Allow a class of students to work in teams: members can make their game decisions together or from remote locations, with real-time chat windows available, easy sharing of files between team members (such as scenarios, presentations and reports).

6) Specific points for simulations/games:

- Allow users to choose between different policy measures or to define what specific scenarios they want to explore by using a scenario editor;
- Provide a set of indicators and a range of benchmarking;
- Enable user interface which provides feedback on progress and score, depending on how well the user has been doing etc.;

- Allow users once simulations/games are completed to evaluate different scenarios from a policy perspective.

7) Specific points for Big Data tools:

- Offer a multi-criteria data search interface (refining the query, filtering and sorting) by type/source, geography, demographics, topic/keywords, popularity, language;
- Enable real-time data processing and monitoring and use of historical data;
- Provide visualization capabilities at various levels of data aggregation, charts and maps associated with relevance scores.

WHERE TO GO NEXT

Ideas on how the EU could trigger higher (and better) outcome (i.e. policy-ready tools) from the development of ICT tools for policy and society:

- Set up tenders and advertise contests and awards for innovative ICT-tools for policy and/or for society;
- Offer second and third phase funding (with different terms of reference) for tools which show promising potential at the end of the first phase;
- Offer incubation funding and services to successful teams/projects;
- Encourage collaborations with players from the interactive entertaining industry and with Marketing or Management departments in universities.

EXAMPLES OF TOOLS

UNEP Web Intelligence (based on webLyzard)

- Web intelligence tool for aligning global environmental indicators with related communication flows across online channels (pre-uneplive.unep.org/redesign/webintelligence);
- Provides analysis of public opinion trends on air quality, biodiversity and climate change and other environmental dimensions from news and social media, corporate stakeholders, policy makers, and environmental organizations;
- Is fully integrated into the UNEP Live knowledge management platform;
- Automatically distinguishes factual information from individual, emotionally driven expressions of opinion;
- It helps to capture stakeholder perceptions in real time, to identify opinion

leaders, to structure the online dialog, to understand contested issues, to track the evolution of public dialog over time, to identify key indicators that are shaping public opinions and to help stakeholders to meet environmental goals and foster sustainable development.

C-ROADS (Climate Rapid Overview and Decision Support)

- Free online system dynamics computer-based simulator (climateinteractive.org/tools/c-roads) that helps policy-makers understand the long-term climate impacts of actions that reduce greenhouse gas emissions;
- Developed by Climate Interactive, MIT, Ventana Systems, UML Climate Change Initiative, and Todd Fincannon;
- Designed for the World Climate Simulation role-play exercise and for interactive group presentations;
- Used at top government, corporate, and NGO levels, and by individuals participating in or monitoring the UNFCCC negotiations;
- Since 2008, C-ROADS has helped policy-makers and other stakeholders to understand the impact of the emission reduction pledges countries have proposed to the United Nations by rapidly computing the impact of these pledges and determine whether collectively they are enough to stabilize temperature below 2°C;
- Climate Interactive was named as the top energy and environment think tank in the US by Prospect Magazine's 17th Annual Think Tank Awards;
- The simulator is available for download to Windows and Mac and runs online.

UrbanSim

- Simulation platform for evaluating the impacts of land use regulations and transportation infrastructure on urban development and travel for supporting planning and analysis of urban development (urbansim.com);
- Based on a computational representation of metropolitan real estate markets interacting with transport markets, modeling the choices made by households, businesses, and real estate developers, and how these are influenced by governmental policies and investments;
- Designed in 1998 by Paul Waddell at the Department of City and Regional Planning, UC Berkeley and developed over many years and with support of six National Science Foundation grants;

- Integrates data science, simulation and visualization tools;
- UrbanSim Cloud Platform runs UrbanSim models on the cloud, and provides a web browser user interface that support rapid prototyping and design of alternative scenarios and compelling 3D visualization of results.
- Released as open source software and provided as an annual subscription, with new features and data updates incorporated as they become available.
- Widely used by planning agencies, cities, counties, non-governmental organizations, real estate professionals, planners, researchers and students across the United States and internationally.