Engineering the POlicy-making Life CYcle

Objective ICT-2011.5.6 target a ICT solutions for Governance and Policy Modeling

Duration 36 Months
Proposal Number N 288147
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<th>Beneficiary name</th>
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<tbody>
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<td>ALMA MATER STUDIORUM Università di Bologna</td>
<td>UNIBO</td>
<td>ITALY</td>
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<td>The University of Surrey</td>
<td>SURREY</td>
<td>UK</td>
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The Vision

- To support policy makers in their decision process across a multi-disciplinary effort aimed at the engineering of a policy making life-cycle that integrates, in a unique way, global and individual perspectives on the decision process.

- To evaluate the economic, societal and environmental impacts during policy making (at both the global and individual levels).

- To derive social impacts through opinion mining on e-participation data.

- To aid the policy maker, citizens and stakeholders with visualization tools.
General Scheme

Case study: the Emilia Romagna Regional Energy Plan 2011-2013
The e-POLICY project aims to equip policy makers with integrated models, optimization, visualization, simulation and opinion mining techniques that improve the outcomes of complex global decision making.

- Obj 1 Integration of regional and individual level modelling
- Obj 2 Insert impact assessment during the regional plan construction
- Obj 3 Insert social impacts from opinion mining into the individual and the global models
- Obj 4 Support the policy making life cycle with visualization tools
Policy Making Life Cycle
Expected Outcomes

- A flexible **tool for optimization and decision support** for policy making at global (regional) level taking into account objectives, constraints, financial issues and impacts on environment, economy and society
- An **agent-based simulation approach** at individual level for identifying the best policy implementation strategies
- A **game theoretical approach for the interaction** between the global and the individual levels
- **Techniques for opinion mining for social impacts** derived from e-participation data
- A **novel application of visual analytics techniques** for supporting policy makers in the decision process and helping citizens and stakeholders in providing a more informed evaluation; in particular geo-referenced visualisation will be considered
- An **open source tool integrating the above mentioned components** that is open, accessible and reusable in other policy contexts
- **Extensive activities** aimed at achieving the **highest level of dissemination of project results** and preparing for the exploitation of the proposed solution overall and of each individual components
Workplan

WP1  Project Management

WP2 Policy modeling: components of the regional planning problem and system specification

WP3 Global policy modelling: optimization and decision support

WP4 Individual policy modelling: agent based simulation

WP5 Integration of the global and individual levels: game theory based interaction

WP6 Opinion mining on e-participation data for deriving social impacts

WP7 Visual analytics techniques for supporting the policy making process and e-participation

WP8 System implementation, validation and assessment

WP9 System Demonstration on the Regional Energy Plan

WP10 Dissemination and Exploitation
Workplan at a glance

WP1: Project Management

WP2: Policy Modeling
- WP3 Global Policy modeling
- Optimization and decision support
- WP4 Individual Policy modeling
- Agent based simulation
- WP5 Game-theory based interaction
- WP6 Opinion mining on e-Participation data

WP8: System Integration, Validation & Assessment

WP10: Dissemination and Exploitation
**Title Policy Modeling:** components of the regional planning problem and system specification

**Leader:** RER - **Type:** RTD

**Objectives:** Deep analysis of complex decision problems arising in the field of regional planning including impacts on environment, society and economy, constraints, objectives, implementation strategies. System specification

**Overall MM:** 40

M2.1 Policy modeling components and system specification identified – Month 15

M2.2 Means of project evaluation available – Month 20
Title **Global policy modelling: optimization and decision support system**

**Leader:** UNIBO - **Type:** RTD

**Objectives:** Definition of a global (regional) policy modelling aimed at computing alternative, consistent and optimal political scenarios. Use of hybrid reasoning and optimization techniques, such as linear, non-linear programming, constraint programming, robust optimization and multi-criteria decision making.

**Overall MM 35**

M3.1 Global policy prototype implementation is completed and tested – Month 33
**WP4**

- **Title**: Individual policy modelling: agent-based simulation
- **Leader**: SURREY - **Type**: RTD
- **Objectives**: Create a multi-level agent-based model that will allow policymakers to explore the consequences of different types of policy instrument and thus enable them to make better choices.
  
  Develop an agent-based simulation, with agents representing the main actors. The agents will be given behavioural rules modelling their likely individual responses to policy instruments (including the effect of influences from other actors, e.g. as a result of collective actions, imitation etc.).

- **Overall MM 38**
- **M4.1** Agent-based simulation prototype completed and calibrated Month 38
WP5

**Title** Integration of the global and individual level: game theory interaction

**Leader:** UCC - **Type:** RTD

**Objectives:** Provide methodologies and techniques for modelling the interaction between the global and individual levels through the use of stochastic game theory and reinforcement learning. The evolution of a policy, framed as a consultative democratic process, will be modelled as a series of stage games in which each agent builds a model of the preferences of other agents in the context and from this computes its best response used to refine the current stage game in order to converge on an overall equilibrium.

**Overall MM:** 19

M5.1 Testbed Prototypes and Learning Methods implemented and tested Month 34
WP6

- **Title**: Opinion mining on e-participation data for deriving social impacts
- **Leader**: INESC - **Type**: RTD
- **Objectives**: Mine the sentiment of the public regarding the current scenario (ex-ante evaluation) and the space of possible decisions (ex-post evaluation), toward more informed decision making.
- Given e-participation data, the WP will develop a learning framework whose output can be integrated within the decision support environment developed in WP3 and the individual level modelling developed in WP4.
- **Overall MM 40**
- **M6.1 Prototype of the opinion mining tool tested – Month 33**
WP7

Title: Visual analytics techniques for supporting the policy making process and e-participation

Leader: FRAUNHOFER IGD - Type: RTD

Objectives: Support both the policy maker in its decision process and citizens and stakeholders in providing an informed evaluation of policy options. Since decision makers are often no IT experts, they have to be guided via visual-interactive interfaces. Visual analytics techniques will support the e-participation tools by providing a friendly access to data.

Overall MM 28

M7.1 Visual analytics prototype implementation is completed and tested Month 34
Title **System Integration, Evaluation and Assessment**

**Leader**: UNIBO - Type: RTD

**Objectives**: Define the overall system requirements of the project. Produce the project proof of concept: a decision support system for policy makers working at global and individual level considering economic, environmental and society impacts, objectives and constraints. Target the regional energy plan as a mean for assessing the usability, flexibility and effectiveness of the system.

**Overall MM 36**

- M8.1 Overall system architecture available Month 12
- M8.2 Overall prototype functional and regional energy plan are faced by the decision support system Month 36
Title **System Demonstration on the Regional Energy Plan**

**Leader**: ASTER - Type: RTD

**Objectives**: Define the overall system requirements of the project. Produce the project proof of concept: a decision support system for policy makers working at global and individual level considering economic, environmental and society impacts, objectives and constraints. Target the regional energy plan as a mean for assessing the usability, flexibility and effectiveness of the system.

**Overall MM 31.5**

**M8.1** Definition of the pilot scenario and related data collection completed Month10

**M8.2** Complex problems from regional energy plan are solved by the decision support system Month 36
WP10

Title Dissemination and Exploitation

Leader: PPA - Type: MGT

Objectives: To disseminate the project scientific outcomes and promote the use of the developed tools and methodologies to public bodies and SMEs.

Advisory and Dissemination Board partially formed will be enlarged during the project.

Overall MM 37

M8.1 e-POLICY PUDF Month 28
## Competences of the partners

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Country</th>
<th>Main skills</th>
<th>Contribution to the project</th>
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<tr>
<td>1</td>
<td>ALMA MATER STUDIORUM Università di Bologna (UNIBO)</td>
<td>ITALY</td>
<td>Hybrid Optimization techniques, constraint and integer programming metaheuristics</td>
<td>Scientific and financial coordination. WP2-7-9 leader</td>
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<td>2</td>
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<td>Policy modelling, game theory and mechanism design</td>
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<td>Social Simulation, policy modelling, data analysis.</td>
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<td>Machine Learning and Logic Programming</td>
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<td>Information visualisation and visual analytics (interactive and semantics-based visualisation of decision-critical information)</td>
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<td>technology transfer, research results dissemination</td>
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<td>Multi-objective optimization statistical learning</td>
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## Effort Table

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### Project Timing

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<td>T1.1 Communication Management</td>
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<td>T1.2 Organization of Kick-off and Periodical Meetings</td>
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<td>T1.7 Coordination of Knowledge Management and Other Innovation-related Activities</td>
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<td>T4.1 Agent-based model to simulate the policy implementation and policy instruments</td>
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<td>T4.2 Model calibration</td>
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<td>T4.4 Identification of the most effective policy instruments for the case study</td>
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<td>T5.1 Game theory: Iterative Learning Game Theory</td>
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<td>T5.3 Game theory: Reinforcement and Stochastic Learning</td>
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<td>T5.5 Learning Method Development</td>
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<td>T5.6 Demonstration of Testbed</td>
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<td>T6.1 Social impact analysis of the policy implementation</td>
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<td>T6.2 Definition of the &quot;Rules of participation&quot;</td>
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<td>T6.4 Identification of knowledge extraction, representation, and mining techniques</td>
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<td>T6.5 Prototype implementation</td>
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<td>T6.6 Test of the learning prototyped and integration with other</td>
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<td>T7.2 Design of concepts for visual analytics techniques (MB/MB/MB)</td>
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<td>T7.3 Visual analytics prototype implementation (MB/MB/MB)</td>
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<td>T7.4 Visual analytics prototype Evaluation (MB/MB/MB)</td>
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<td>T8.1 Evaluation of the Testbed prototype system architecture</td>
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<td>T8.2 Integration of tools and algorithms, techniques</td>
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<td>T8.3 Functional and Performance evaluation of the integrated prototype</td>
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<td>T9.1 Definition of the pilot scenarios: The Regional Energy Plan</td>
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<td>T9.2 Identification of interested groups, thematic grids, and e-participation tools</td>
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<td>T9.3 Definition of the community network</td>
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<td>T9.4 Demonstration methodology</td>
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<td>T9.5 Demonstration of the prototype on the Regional Energy Plan</td>
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<td>T10.1 Set up Advisory and Demonstration Board and organise workshops</td>
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<td>T10.2 Coordinate publications and disseminate actions</td>
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<td>T10.3 Prepare exploitation plan</td>
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### ePolicy
Budget

Total cost
3.189.966

Requested EC contribution
2.559.162