# SmartGov

## Advanced decision support for Smart Governance

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**Abstract.** The SmartGov project seeks to strengthen contemporary urban governance by offering decision support and two-way communication between citizens, governments and other stakeholders in (Smart) Cities. There is a huge, but underdeveloped potential of Linked Open Data and Social Media as crowdsourcing tools that complement regular data collection for decision-making. SmartGov will innovatively integrate these data sources with Fuzzy Cognitive Maps (FCMs), to enable quantitative modelling of complex problems and simulation of dynamic behavior of factors underlying these problems. Hence, decision-makers and citizens can effectively utilize (currently inaccessible) Open Data, Social Media feeds and expert-based FCMs to simulate impacts of different scenarios and to improve two-way communication between governments and citizens.

**Keywords:** smart tools and services, smart data, linked open data, big data, social media, smart governance, smart citizens, policy simulation, urban governance, Fuzzy Cognitive Maps

## 1 Introduction

'Smart Cities' provide new ways of designing and managing public services, infrastructure, sustainable mobility, economic development and social inclusion. Two-way communication between citizens and urban policymakers is lacking strongly. This is partly the result of underutilization of citizens' Social Media feeds and useful Open Data sets. The SmartGov project aims to create new support tools that effectively incorporate Linked Open Data and Social Media into Fuzzy Cognitive Maps (FCMs). FCMs will be used in the SmartGov project as a modelling and visualization tool for discussing policy scenarios between citizens and governments. The developed tools will be tested and implemented in four European cities. Limassol (Cyprus) and Quart de Poblet (Spain) are pilot cities and Vienna (Austria) and Amsterdam (Netherlands) are supporting cities.

Table 1 below presents an overview of the main objectives, used methods and expected results of the SmartGov project, which aims to offer advanced decision support tools for Smart Governance.

**Table 1:** Project overview

| **Objectives** | **Methods** | **Expected results** |
|---|---|---|
| Create new governance methods and supporting ICT tools | Research on governance processes for urban planning and mobility | Fuzzy Cognitive Maps: Provide new decision methods, tools and guidelines |
| Simulate impact of policies for urban planning in Smart Cities | Visualization & modelling of complex problems in Smart Cities | Increase transparency and trust through visualization of decision scenarios |
| Support two-way communication with large stakeholder groups | Fuzzy Cognitive Maps: Linked Open Data & Social Media | Create knowledge and awareness for new policies of sustainable mobility |

## 2 Funding & current status of the project

SmartGov is funded by JPI Urban Europe, a joint programming initiative. The aim of JPI Urban Europe is to create attractive, sustainable and economically viable urban areas for European citizens and communities. The strategy of JPI Urban Europe pursuits to coordinate the research of Europe's public funds: to transform urban areas into centres of innovation and technology; to realize eco-friendly and intelligent intra- and interurban transport and logistic systems; to ensure social cohesion and integration; as well as to reduce the ecological footprint and enhance climate neutrality. [1]

The SmartGov project supports the goals of JPI Urban Europe through creating new tools for the simulation of policies for urban planning in Smart Cities. SmartGov is funded with a total budget of 1.232.120 EUR. The project will last 3 years. It started on the 1st April 2016 and will continue until the end of March 2019.

Further information is also available online under: www.jpi-urbaneurope.eu/smartgov

# 3 Consortium

The consortium is an inter- and trans-disciplinary project team: 3 universities, 3 IT service & software engineering companies & 2 pilot cities - which combine different disciplines and knowledge.

## 3.1 Academic partners

The academic partners - Danube University Krems, TU Delft and Cyprus University of Technology - contribute with different research focus to SmartGov:

*Danube University Krems* is specialized in continuing education and applied research. The Department for E-Governance conducts trans-disciplinary research on the effects of technological advances with regard to strategies, structure and processes in the digital network era. The team will contribute with its knowledge in the domains of E-Governance (E-Administration and Government), E-Democracy (E-Participation and Cooperation), Open Data (Information management and organizational change processes) and Data Protection Rights. Danube University Krems is the Project Coordinator of the SmartGov project.

*TUDelft* ranks amongst the top universities in the world in the field of technology. SmartGov will be carried out at the Faculty of Architecture & the Built Environment, Department OTB - Research for the Built Environment. OTB specializes in academic research and policy advice in the field of housing, urban studies, sustainable energy and construction, mobility and transport, urban & regional planning, and GIS technology. Delft University of Technology will lead the evidence review for the development of smart urban governance through integration of FCMs, Social Media feeds, and Open Data.

*Cyprus University of Technology* offers education and high-level research in leading branches of science and technology which have high impact on the economic, technical, and scientific sectors. Cyprus University of Technology is participating with the Software Engineering and Intelligent Information Systems research laboratory. The team will be responsible for developing the FCMs software tool and their interfaces with sources like social networks and linked Open Data.

## 3.2 Companies

3 IT service & software engineering companies companies – Active Solution, Interfusion and Kenus Informatica - combine a diverse range of backgrounds for the development, testing and implementation of SmartGov:

*Active Solution AG* is a leading software and engineering company. The company implements large scale projects for multinational corporations. Its software development team will contribute the expertise for web development, Social Media, GIS,

CAD and embedded systems for SmartGov. Their knowledge from FP7 in Social Media and its use in urban governance is essential for carrying out the project.

*Interfusion Services Ltd* has specific expertise in the field of information technology and socio-humanities. The team supports the project in the important core areas such as e-learning, e-government and policy modelling, and most important: fuzzy cognitive modelling. Interfusion‘s major involvement in the SmartGov project will be within the development of the Fuzzy Cognitive Map software tool and its interfaces, as well as the realization of the piloting.

*Kenus Informatica S. L.* as an IT service company provides know-how in delivering IT services for city councils and other governmental organizations. Kenus will support the project through designing and validating the FCM interfaces. The team will support the technical training and will create according training material to all pilot cities (Limassol and Quart de Poblet) and the supporting cities (Vienna and Amsterdam), as well as first-level support to these cities.

### 3.3 Cities

Two pilot cities are in the consortium, in which the FCM tolls will be tested and implemented:

*Limassol* (Cyprus) already participated in various projects dealing with local energy leadership (SUSREG [2], CONURBANT [3]) and with energy efficiency (FIESTA [4]). In the context of SmartGov Limassol will tackle organizational components that hinder resource-efficient governance, both in terms of citizen-municipality interaction and internal communication, moving to a paper-less pro-active governance model. The policy focus in SmartGov will be increasing energy awareness of citizens, employees, and tourists.

*Quart de Poblet* (Spain) has a leading position among other public institutions in Spain regarding Accessibility and Open Government. Aspects like the availability and access to updated information services about e.g. transport and mobility and infrastructures of the information are considered of high-priority. The focus of Quart de Poblet in SmartGov is to improve information accessibility with regard to transport and mobility.

Further, the project SmartGov is supported by the city of Vienna (Austria) and Amsterdam (The Netherlands). The supporting cities will co-operate during the project with the aim to strengthen the knowledge base, networking and knowledge exchange function of city government to achieve the common goals in the context of Smart Cities.

# 4 Outcomes, tasks and deliverables

The whole project consists of 6 work-packages:

- Work-package 1: Consortium Management
- Work-package 2: Urban Governance and Urban Policy
- Work-package 3: FCM Modelling
- Work-package 4: Social Media for Governance
- Work-package 5: Piloting
- Work-package 6: Scientific Dissemination and Exploitation

## 4.1 Work-package 1: Consortium Management

The outcomes of work-package 1 will ensure the academic excellence, the coordination of the technological progress, as well as administration of management tasks according to the work plan. Tasks and deliverables of work-package 1 consist of the control of the project stages and according reports. The overall project management method of the SmartGov project is PRINCE2 [5].

## 4.2 Work-package 2: Urban Governance and Urban Policy

The tasks of work-package 2 focus on the requirements for contemporary urban governance of smart cities: on the one hand based on an analysis with relevant stakeholders, on the other hand using a systematic evidence review. Further legal frameworks will be examined. The work-package also consists of monitoring and analysing stakeholder experiences with FCM models and its interfaces. Deliverables are reports corresponding to these tasks.

## 4.3 Work-package 3: FCM Modelling

Work-package 3 will deliver specification documents for tasks related to the FCM tool and its interfaces - as designing, testing and implementing. Three releases will guarantee feedback loops for upgrades of technical and user requirements. The software development will be based on SCRUM [6], which allows flexibility to changing user requirements and unforeseen technical difficulties in R&D projects. The final deliverable consists of user and administration manuals for the developed FCMs tools.

## 4.4 Work package 4: Social Media for Governance

The tasks of work-package 4 focus on the development of an engine, which will collect information from Social Media, newspapers and blogs. Advanced tools will cluster and visualize information (e.g. sentiment analysis). Finally this engine will be integrated with the FCM tool. Specification documents for design, testing and imple-

mentation, as well as three software releases are the main deliverables of this work-package.

### 4.5 Work-package 5: Piloting

The piloting work-package aims to monitor, assist and ensure that all pilots successfully tackle a variety of pressing urban policy issues regarding different domains with the developed tools and their methodologies. The deliverables of work-package 5 will offer guidelines, execution documents and a final pilot evaluation report.

### 4.6 Work-package 6: Dissemination and Exploitation

The tasks of work-package 6 include dissemination of project findings of SmartGov to a wide audience of policymakers, practitioners and scientists in Europe, in particular to actors related to pilot and support cities, national organizations and EU bodies. The deliverables consist of reports about strategy and activities of dissemination, communication & exploitation.

## 5 Market value, innovation and impact

### 5.1 Market value

The primary target groups for the SmartGov project tools are local governments, mainly in Europe. There are 8.512 cities in Europe and the research and development results are relevant to all of them. The strategy to reach them in an effective way builds on cluster organizations such as EUROCITIES (a network 130 of Europe's largest cities and 40 partner cities governing 130 million citizens across 35 countries), Major Cities of Europe, ICLEI, the European Metropolitan Network Institute (EMI), the European Urban Knowledge Network (EUKN) and business partners. SmartGov will connect with existing networks of national knowledge platforms, e.g. Platform 31 in the Netherlands, to maximize outreach and the impact of its results.

### 5.2 User-driven innovation

A profound principle applied in SmartGov is the understanding of stakeholders needs as a source and driver of the research and innovation process. This is referred to as user-driven innovation, where the crucial role of citizens in smart cities is taken into consideration. Their needs and demands will play an initial role during policy design and implementation.

Two-way communication between stakeholder groups will show the requirements for effective governance decisions, as well as their acceptance and effectiveness. Innovative ICT-driven networking of stakeholders will offer new and smart ICT decision tools, based on Fuzzy Cognitive Maps.

Involving citizens and further stakeholders to participate in the policy decision making process enables and encourages citizens to exert political influence by affect-

ing decision-makers through suggestions and feedback. Simulating various scenarios will lead to new knowledge about societal and economic needs regarding mobility and create awareness for new policies. SmartGov will show that citizens' and stakeholder needs, suggestions and feedback are fundamental for decision-makers. This can increase trust in inclusive decision making.

Further SmartGov will foster equal rights for information by enabling the administrative staff to more actively provide citizens with detailed information, thus encouraging the latter to participate in decision-making processes.

### 5.3 Impact of novel methods based on Fuzzy Cognitive Maps

SmartGov aims to provide novel and proven methods, sustainable tools and guidelines, which improve efficiency and effectiveness by simulating potential impacts of decision alternatives in urban planning for decision makers. SmartGov will be based on Fuzzy Cognitive Maps which integrate urban Open Data and a Social Media engine.

Further the Fuzzy Cognitive Maps tools will provide powerful visualizations of these simulated scenarios. Displaying scenarios - in an easy and comprehensible way - to decision-makers, but also to involved citizens and stakeholders represents an impact on equal rights for information, transparency and openness.

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