



INTERACTIVE ANALYSIS, SIMULATION AND VISUALISATION
TOOLS FOR URBAN AGILE POLICY IMPLEMENTATION



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PROJECT IDEA AND PERSPECTIVES

The urbanAPI project had started in the context of European initiatives for the improvement of policy-making as a more transparent process, which is consequently easier to understand. The project aims to support activities, such as issue identification, policy analysis, consultation, decision and evaluation in urban planning as well as land management policy.

For this purpose, a policy meta-model, a formalised vocabulary, a set of rule languages to define data integration and abstract simulation models are introduced.

Furthermore, the urbanAPI approach will transpose elements of agile ICT development to the urban policy making process: Multiple activities can run in parallel, and all activities are kept synchronised. In such a process, risks are identified earlier, conflicts are understood better, and knowledge gained in one activity can directly be used for all other activities.

A novel ICT toolset is developed on this formal basis. The urbanAPI toolset allows fast development and deployment of participative policy support applications. These applications can be used for decision support, conflict management, analysis and visualisation and they rely on innovative interaction platforms.

Concepts known from web 2.0 and semantic web technologies, such as linking, tagging, rating and adding of semantic annotations are supported directly.

Applications created with the urbanAPI toolset make use of a comprehensive data integration system, in order to make use of the vast data resources related to urban planning, like geospatial and statistical datasets. The local initiatives of the four urban regions collaborating in this project are encouraged to participate during the planning process, to contribute to the final solutions, to understand and to finally deal with the expected impacts on environment and inhabitants.

Based on this toolset, adapted urban planning applications will be created, deployed, evaluated and used to support policy makers, planners and stakeholders at different governance and spatial levels (urban quarter level, municipal level, urban region level).



Urban planning: Demonstration of a 3D city model on a multitouch table

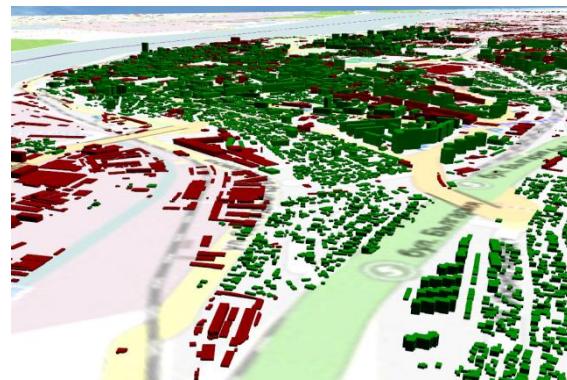
THE URBANAPI OBJECTIVES AND APPROACH

Policy making and public participation are the leading aspects in our work. Concerning this, our objectives in urbanAPI are consisting of the following aspects:

- ➊ To support public participation in urban planning policy.
 - ➋ To enhance the transparency of planning outcomes at the local scale.
 - ➌ To achieve a better identification of benefits and outcomes for the population by exploring socio-economic interaction in public spaces.
 - ➍ To conduct enhanced prediction of urban development and societal trends and possible impacts of policy measures for the achievement of a more sustainable implementation of government policies.
- ➎ Design and implementation of a toolkit for rapid development and deployment of participative policy making applications.
 - ➏ Creating a family of domain-specific rule languages enabling urban planning domain specialists to define policy models and their requirements, to integrate required data sets and to define the presentation of content to be delivered.
 - ➐ Allowing domain experts to use the family of rule languages to create policy support applications.
 - ➑ Performing real-time simulations with interactive reaction times.

In addition the ICT and Policy Modelling objectives include:

- ➒ The development of an object-oriented meta-model for the creation of policy making domain models including a model of geometric (topological, multiple representations/scale) and functional relations (feedback, conflicts).



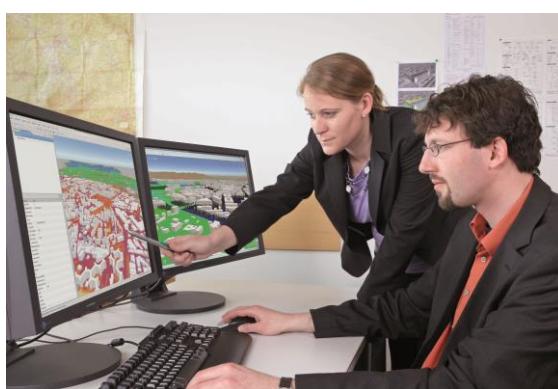
Example of harmonised Ruse data providing building footprint and basic floor information, 3D image - based on a cadastre-layer of Ruse municipality providing building information

CONCEPT

The enhanced ICT tools proposed by **urbanAPI** offer the potential to provide urban planners with the tools and artificial intelligence needed to actively manage the urban environment. These tools will provide planners with the information they precisely need to fully expose the socio-economic and environmental impacts associated with alternative options for territorial development. Thereby, they create conditions in which the political mandate and the basis for more effective management are secured.

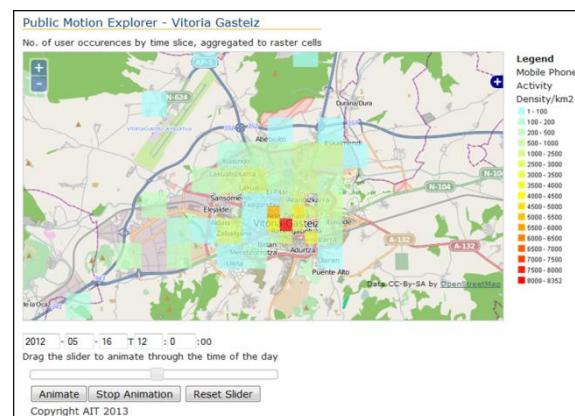
The **urbanAPI** tools will provide advanced ICT-based intelligence in **three urban planning contexts**.

First, **urbanAPI** will directly address the issue of stakeholder engagement in the planning process by the development of enhanced virtual reality visualisation of **neighbourhood** development proposals.



Urban planning with urbanAPI tools

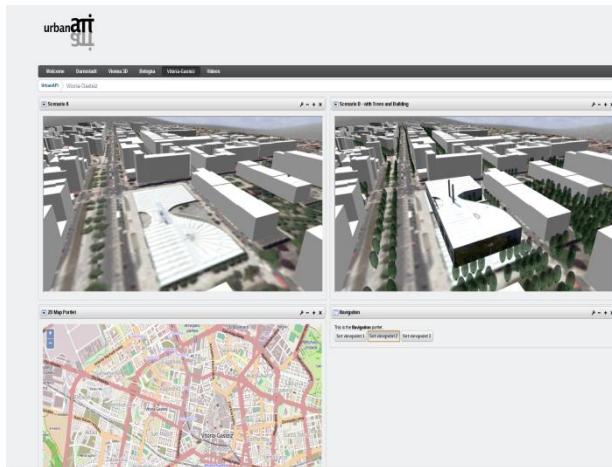
Second, at the **city-wide scale**, **urbanAPI** will develop mobile (GSM) based applications that permit the analysis and visual representation of socio-economic activity across the territory of a city, and in relation to the various land-use elements of this city.



Web application: Dynamic mapping of the diurnal population distribution pattern (through mobile phone activity density) in Vitoria-Gasteiz

Example of city-wide scale application: mobile communication device locator allows describing activity dynamics within a city during a day

Finally, **urbanAPI** will develop ICT simulation tool applications in the **city-region** context addressing multiple challenges in response to the simultaneous demands of the expanding urban population of certain European cities as well as the declining and frequently ageing population elsewhere.



urbanAPI portal: Comparison of two alternative scenarios in Vitoria-Gasteiz, Spain

Such applications collectively provide vital decision-making aids for urban planners in the management of the territory as well as for the associated responsibilities in political negotiation and wider stakeholder engagement regarding the future development of the territory.

Each of the participating cities will provide scenarios for two of these applications, to address a broader perspective, to learn from each other and to be able to compare the results.

urbanAPI will provide a toolset that enables the city planning authorities to effectively use interactive simulation and visualisation instruments. Moreover, it will facilitate the direct participation of stakeholders and citizens.

The proposed generic ICT applications will be built from a set of common libraries for **data integration, policy modelling, simulation and visualisation**. They are supposed to be easily adapted to changing requirements by making use of the integration of the relevant data sets in order to inform the practitioners and to gather feedback from the public.

PROJECT STATUS AND NEXT STEPS

During the first year of the project, a requirements analysis commenced with respect to each of the city partners' applications. Question surveys and a user workshop provided the basis for the elaboration of project goals and the identification of user needs and requirements.

Furthermore, the application scenarios for each of the cities were created as the basis for the development of the urbanAPI tool sets. The results of this analysis are presented in the deliverable on user requirements. This is made publicly available on the project web site.

The city requirements provide the basis for the design and implementation of the urbanAPI ICT tool set to support the defined scenarios for the user community. In respect of the different applications and user expectations the appropriate data is being defined and acquired in order to operationalise the scenarios. Data preparation, harmonisation and integration has commenced for those data sets already available from the participating cities.

However, this task has proven to be more difficult than expected as some cities do not have appropriate data available, and others use proprietary data formats, so that existing standard solutions could only be partly

applied, and specific solutions have had to be developed.

The data management, visualisation, and interaction requirements will be realised via the Fraunhofer IGD CityServer3D. A code camp held at the beginning of the development activities provided the opportunity for discussion of the integration of existing systems with the new tools, as well as integration with the applications from IGD and AIT.

A common urbanAPI concept was outlined, defining the client as a standard web-browser which loads a web application from CityServer3D. The web application can make use of all state-of-the-art web technologies including X3DOM to display 3D contents over the WebGL-API. The CityServer3D hosts all the data required including 3D-city models, terrain models or data related to the buildings themselves. The required development and integration work was completed in the second project year.



urbanAPI developers: Team at the Code Camp in Darmstadt April 23-27, 2012

Pre-existing tools and development extensions have commenced and early demonstrators were realised for the urban planning application in Vitoria Gasteiz, Spain, using a 3D scenario creator, as well as an application of the public motion explorer in Vienna.

The third application concerning the urban growth simulation has also commenced and early performance tests established. In the second project year the other scenarios for all three applications involving the other urbanAPI cities have been developed.

A Web portal has been developed to provide a common integration environment for all the applications developed. This can be dynamically configured to support each of the applications and all the scenarios of the participating cities where appropriate.

For three cities 3D VR applications were developed for different application scenarios. Functionality supported includes: visualisation of the 3D city model, annotations in the 3D scene, integration of additional pre-defined objects, parallel viewing of alternative scenes, with synchronised or independent navigation.

The public motion exploration was also developed for three cities. The quality of data that could be acquired was quite different for each of the cities. Therefore, the results are not fully satisfactory for some scenarios so far. Based on the experience gained, the consortium has defined the needs of data and their quality for reasonable usage and will follow up to acquire additional data sets to reach a higher standard for the motion

analysis to provide better results to the end users.

The application for urban growth simulation is developed for one of the cities and will provide simulation tools for the re-urbanisation of an old industrial area addressing aspects of land use, housing and infrastructure needs, as well as commercial use.



urbanAPI portal: Visualisation of Vienna, Austria

In the next step, at the beginning of the third project year a review and evaluation cycle with the end users of the participating cities as well as members of the Stakeholder Board will be performed for each of the scenarios following the assessment method developed.

A system introduction, hands on training session and an online evaluation questionnaire will be offered to all of the users. Following those results and feedback from the users, a second iteration round for updates and improvements of the tool set and the applications, as well as additional functionality according to upcoming requirements will be the main focus of activity during the last year of the project.

In the first year, an assessment methodology has been developed for the evaluation of feedback in respect of both, user perspectives as well as technical evaluation, to be further detailed, implemented, and applied in the review cycles.

Using the assessment methodology of the project, the evaluation design process is followed which includes evaluation design for all urbanAPI tools and applications, consultation with cities, test case preparation and implementation.



Plenary Meeting, Vitoria-Gasteiz, September 21-24, 2013

A detailed evaluation design for all urbanAPI applications has been prepared and verified by the city partners which provide the basis to perform both, technical and user evaluations. This evaluation design is documented as part of the deliverable on User evaluation in cycle 1. User evaluation will be performed during the beginning of the third year. The results and the feedback will be used as basis for the second development cycle in the 3rd year of the project. A second review and evaluation cycle is planned towards the end of the project.

IMPACT OF URBANAPI RESULTS

The expected results of the urbanAPI project containing its three applications, which use the ICT tool set, will have an impact on policy making as following:

- ➊ Improving the prediction of urban planning policy provisions by incorporating multiple input variables and providing outputs in various forms in order to support the effectiveness of a policy impact assessment.
- ➋ Using innovative ICT technologies and tools for facilitating urban planning, policy modelling and decision making.
- ➌ Ensuring compliance with EU standards and the INSPIRE Directive as well as contributions to the EU Digital Agenda 2020.
- ➍ Aligning with the DG CONNECT SISE initiative.



Urban planning: Advanced 3D city model

- ➎ Engaging directly with stakeholders and end user communities concerning the validation of ICT tools according to user requirements.
- ➏ Development of generic ICT tools for the use in urban planning by cities throughout Europe.
- ➐ Improving the transparency of decision-making in relation to sustainable development of the urban territory.

GENERAL INFORMATION

The project urbanAPI commenced on September 1, 2011 and will end in August 2014. urbanAPI is an ongoing small and medium scale focused research project (STREP), co-funded by the European Commission within the Framework Program 7 under Objective ICT-2011-5.6 Solutions for governance and policy modelling

The project is established together with nine partners from six different European countries. The partners include representatives from four application cities, two urban planners and policy modellers, and three development groups.

The project is coordinated by the Fraunhofer Institute for Computer Graphics Research IGD, Darmstadt, Germany.



urbanAPI has established a Stakeholder Board to obtain further inputs from the community. Further goals are secure evaluation and feedback on the project developments and to support the dissemination of the results via the user communities.

General information concerning the project as well as a list of the publicly available results and deliverables can be obtained at the urbanAPI website <http://www.urbanapi.eu..> For further information, please, contact the urbanAPI Project Office or the Coordinator.

URBANAPI CONSORTIUM



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University of the West of England, Bristol, Centre for Research in Sustainable Planning and Environments and Centre for Complex Cooperative Systems (UWE)



Austrian Institute of Technology GmbH - Department Foresight and Policy Development (AIT)



GeoVille GmbH



AEW srl



City of Bologna (COBO)



Agency for Sustainable Development and Eurointegration
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