A planning roadmap for intelligent cities: case study on revitalizing a commercial district

Kakderi, Christina
Komninos, Nicos
Tsarchopoulos, Panagiotis
Cyber cities, from cyberspace, cybernetics, governance and control spaces based on information feedback, city governance; but also meaning the negative / dark sides of cyberspace, cybercrime, tracking, identification, military control over cities.

Digital cities, from digital representation of cities, virtual cities, digital metaphor of cities, cities of avatars, second life cities, simulation (sim) city.

Intelligent cities, from the new intelligence of cities, collective intelligence of citizens, distributed intelligence, crowdsourcing, online collaboration, broadband for innovation, social capital of cities, collaborative learning and innovation, people-driven innovation.

Smart cities, from smart phones, mobile devices, sensors, embedded systems, smart environments, smart meters, and instrumentation sustaining the intelligence of cities.

Schaffers et al. (2011)

How can we achieve this???
Strategies for planning an intelligent city

1. Differences in the notion of intelligent cities
2. New cities vs. existing cities with persistent complex urban problems
3. Focus on architecture and components
4. It is no one-way – custom made solutions

Critical elements for a planning strategy
• Context and problem definition
• People, stakeholders, local communities’ engagement
• Co-creation/ crowdsourcing/co-development
• Technology base and infrastructure
• Sustainability
• Monitoring and evaluation
Current situation and problem to address

PEOPLE Project (CIP ICT PSP)
Thermi, Thessaloniki Agglomeration area
31.570 km²
53,070 in 2011

Lit. Review  Case study  Roadmap  Conclusions  3
The innovation ecosystem and the open innovation approach

**Preparation Cycle**
- Preliminary identification of Stakeholders per Pilot
- Preliminary gathering of feedback about services to be developed
  - Strategy for gathering feedback. Meetings, surveys, interviews, etc.
- Identification of stakeholders per service
  - Once identified the services to be deployed during the 1st Innovation Cycle. Identification of stakeholders (users, providers, potential exploiters, traders and distributors, administrators, enablers) per service.

**1st Innovation Cycle**
- On end users
  - Identification of at least three different groups per service to be deployed during the cycle.
- Open Innovation Communities
  - Identification of Open Innovation Communities per service (taking in mind the stakeholders already identified and Open source communities)
- Definition of the strategy for its involvement.
- RELEASE OF SERVICES
  - Feedback from users and stakeholders
    - Surveys, interviews, validation and co-design sessions

**2nd Innovation Cycle**
- Activation of Open Innovation communities per service
  - Based on user feedback from previous cycle, definition of modifications and new functionalities. Involvement and activation of the Open Innovation Communities around these functionality requests.
- Identification of new services’ stakeholders
  - In the case that new services were to be released during this cycle. Activation of these stakeholders.
- RELEASE OF SERVICES
  - Feedback from users and stakeholders
    - Surveys, interviews, validation and co-design sessions

**3rd Innovation Cycle**
- Activation of Open Innovation communities per service
  - Based on user feedback from previous cycle, definition of modifications and new functionalities. Involvement and activation of the Open Innovation Communities around these functionality requests.
- Identification of new services’ stakeholders
  - In the case that new services were to be released during this cycle. Activation of these stakeholders.
- RELEASE OF SERVICES
  - Feedback from users and stakeholders
    - Surveys, interviews, validation and co-design sessions

1st November 2010 – 31st October 2011
1st November 2011 – 31st March 2012
1st April 2012 – 31st July 2012
1st August 2012 – 31st October 2012

Lit. Review  Case study  Roadmap  Conclusions
Available technologies for smart commercial districts

Services Layer Specification

• Mobility apps: e.g. Google Transit, OpenTrip Planner, Parking Finder Tool, Bicycle sharing system

• Apps related to commerce: Price Watch System for Consumer Goods, Groupon, Local Shopping Offers & Discounts, Social shopping

• Applications related to tourism: Virtual City Tour, Mobile city Guides, Mobile Museum Tour

• Urban information management apps: QR Codes, Sensor network for environment protection
Scenario building: a smart commercial district in the City of Thermi

- Facilitating Parking in the City Centre
- Attracting visitors into the City
- Promotion of recreational facilities
- Smart Parking
- SMART MARKET PLACE
- Environmental reporting
- Monitoring pollution
- Better and Healthier Urban Environment

Lit. Review | Case study | Roadmap | Conclusions | 6
Development of applications and technical infrastructure

Lit. Review  Case study  Roadmap  Conclusions
Sustainability of the proposed solution

Two parts of selected business model

• Total Cost of Ownership: includes cost for use, maintenance, upgrades, support services, training, software scaling, customisation (change), and modification

• Open source approach. The release of the applications under the GPL v3 open source license is the first step for the creation of an open source community that will develop services for smart / intelligent cities. Within this community developers from all over the world will improve the existing services and also will develop new ones. The applications will be hosted on the cloud and they will be offered to municipalities or local communities for a using a subscription fee (monthly or annual).
Monitoring and evaluation

Evaluation indicators for the following categories

- Activation of stakeholders
- Activation of lead users
- ICT services
- Data models and information flows
A planning roadmap towards intelligent cities

1. The city: Defining challenges & communities
2. Innovation ecosystem: Institutions and user-driven processes addressing challenges
3. Digital space: Technologies and solutions for smart environments

4. Components integration and spatial intelligence
   Knowledge functions at physical – institutional - digital spaces
   - Collective intelligence
   - Learning networks
   - Collaborative Innovation
   - Dissemination

5. Development of applications and solutions for districts, utilities, gov.
6. Business models for sustainability of e-services
7. Measurement:
   Documentation of impact, innovation, intelligence

Lit. Review | Case study | Roadmap | Conclusions | 10
Step 1. The city: Defining challenges and communities

Innovation Economy
- 1 - City sectors: Manufacturing, commerce, business services, education, research, health, tourism
- 2 - City districts: CBD, historic centre, techno park, mall, university campus, port area, airport city

City Infrastructure – Utilities
- 3 - Mobility, transport and parking
- 4 - Energy saving, smart grid
- 5 - Water management and saving
- 6 - Broadband, wired and wireless

Quality of life
- 7 - Social and digital divides / Education
- 8 - Environment
- 9 - Social care services
- 10 - Safety and security in the public service

City Governance
- 11 - Decision making / citizens participation / democracy
- 12 - Government services to citizens
- 13 - City planning and city management
- 14 - Monitoring and benchmarking

Lit. Review | Case study | Roadmap 1/7 | Conclusions
Step 2. Innovation ecosystem: Platforms and crowds addressing challenges

Layer 1: TYPICAL CITY DISTRICTS
People, Activities, Infrastructure

Layer 2: INNOVATION ECOSYSTEMS OF DISTRICTS
4 FUNDAMENTAL PROCESSES: WATCH - LEARN - INNOVATE - MARKET

Layer 3: EMBEDDED SYSTEMS + SOCIAL MEDIA
4 TYPES OF APPLICATIONS
INTELLIGENCE E-LEARNING CO-CREATION MARKETPLACE
Step 3. Digital space: Horizon scan on technologies and solutions for smart environments

- Fiber Optics
- 3G
- WiMAX
- WiFi
- xDSL
- WiFi

**Information**
- To the citizen
- To producers
- City events
- Location of activities

**e-Government**
- Online city services
- Online administration
- e-Democracy

**e-Techologies**
- Knowledge repository
- Exploitation eTools
- Online tech transfer

**e-Innovation**
- Collaborative spaces
- New product development tools

**e-Entrepreneurship**
- e-Marketplaces
- e-Location
- e-Business

**Network**

**Applications**

**Visualisation**
- The city
- Cultural heritage
- Monuments
- Place & environment

**Web-technologies**

**e-Services**

**Conclusions**
Step 4. Strategy: Integration of components and spatial intelligence

- Communities and knowledge – intensive activities
- Scenario definition
- Co-operation based institutions for distributed problem solving
- Digital communication spaces to max problem solving capacity
Step 5. Development of applications and solutions

An Open Source Community for Intelligent / Smart Cities
ICOS website supports a community offering open source solutions in the field of intelligent cities / smart cities. The community will serve to showcase existing projects, provide a forum for discussing projects and processes, and guide developers’ groups in open source creation, contribution, and release.

Innovation Economy of Cities
City Infrastructure — Quality
City Governance

Virtual City Market
Empowers the city local marketplace by bringing together customers and merchants.

Improve my City
Improve my city allows citizens to report, vote and track non-emergency issues.

OpenBlock
OpenBlock is a hyper-local news & data platform.

About The Intelligent Cities Open Source Community
Why and how to join

Who can participate
ICOS is addressed to anyone interested in intelligent / smart cities development and tools for applications and solutions which have been successfully implemented in other cities, mainly open source applications. Learn more »

Benefits
The continuous evolution of web technologies from the static Web to the Social Web, the Real-Time Web, the Semantic Web, and eventually the Intelligent Web in the future, has widen substantially the options for constructing the digital space of cities. Learn more »

How to contribute
Developers can upload open source applications for intelligent cities using a simple web form. The applications are related to: 1) the Innovation Economy of Cities, 2) City Infrastructure / Utilities and 3) City Governance. Learn more »

Lit. Review  Case study  Roadmap 5/7  Conclusions  15
Step 6. Selecting a business model of sustainability

- PPPs for revenue-sharing
- Capacity reselling
- Leasing and financing
- Crowdfunding
- Advertising
- Revenue-generating or cost-cutting
- Public funding
- Data monetization
Step 7. Measurement of spatial intelligence of cities

<table>
<thead>
<tr>
<th>SMART ECONOMY (Competitiveness)</th>
<th>SMART PEOPLE (Social and Human Capital)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Innovative spirit</td>
<td>• Level of qualification</td>
</tr>
<tr>
<td>• Entrepreneurship</td>
<td>• Affinity of lifelong learning</td>
</tr>
<tr>
<td>• Economic image and trademarks</td>
<td>• Social and ethnic plurality</td>
</tr>
<tr>
<td>• Productivity</td>
<td>• Flexibility</td>
</tr>
<tr>
<td>• Flexibility of labor markets</td>
<td>• Creativity</td>
</tr>
<tr>
<td>• International embeddedness</td>
<td>• Cosmopolitanism / Open-mindedness</td>
</tr>
<tr>
<td>• Ability to transform</td>
<td>• Participation in public life</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMART GOVERNANCE (Participation)</th>
<th>SMART MOBILITY (Transport and ICT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Participation in decision-making</td>
<td>• Local accessibility</td>
</tr>
<tr>
<td>• Public social services</td>
<td>• (Inter-)national accessibility</td>
</tr>
<tr>
<td>• Transparent governance</td>
<td>• Availability of ICT infrastructure</td>
</tr>
<tr>
<td>• Political strategies and perspectives</td>
<td>• Sustainable, innovative and safe transport systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMART ENVIRONMENT (Natural resources)</th>
<th>SMART LIVING (Quality of life)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Attractivity of natural conditions</td>
<td>• Cultural facilities</td>
</tr>
<tr>
<td>• Pollution</td>
<td>• Health conditions</td>
</tr>
<tr>
<td>• Environmental protection</td>
<td>• Individual safety</td>
</tr>
<tr>
<td>• Sustainable resource management</td>
<td>• Housing quality</td>
</tr>
<tr>
<td></td>
<td>• Education facilities</td>
</tr>
<tr>
<td></td>
<td>• Tourism attractiveness</td>
</tr>
<tr>
<td></td>
<td>• Social cohesion</td>
</tr>
</tbody>
</table>

Vienna Centre of Regional Science (2007)
The roadmap ensures balance between the three major components of intelligent/smart cities. It also achieves:

• The **targeting** of smart city environments, applications and e-services **on the real problems and challenges of cities**

• The **actualization of community’s collective intelligence** through bottom-up participative processes engaging stakeholders, end-users, citizens, developers and organisations in the selection design and development of solutions and e-services

• The **interconnection** of smart environments and e-services with the physical space, social structure, infrastructures and functioning of cities
Thank you!

Contact details:
Kakderi Christina
christina@urenio.org
ckakderi@arch.auth.gr
www.urenio.org