PLANNING FOR INTELLIGENT CITIES
Integration and Spatial Intelligence

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FIREBALL, a FP7 ICT project
Connecting smart city, open innovation, and future Internet communities

Why collaboration of cities, open innovation, and future Internet is important?
How it can be achieved?

FIREBALL establishes a coordination mechanism through which a network of Smart Cities across Europe engages in long term collaboration for adopting User Driven Open Innovation to explore the opportunities of the Future Internet. The coordination process will be grounded in exchange, dialogue and learning between Smart Cities, who are considered as key demand-side drivers of Future Internet innovation. It also will be grounded in bringing together the Future Internet, Living Labs and Smart Cities constituencies. Now that Future Internet driven network infrastructures and applications are in the pipeline, and which potentially

http://www.fireball4smartcities.eu/?page_id=2
Contents

1. Introduction: Concepts and problem outline
2. Planning Intelligent Cities at URENIO: Integration
3. The PEOPLE project: Planning a smart commercial district
Cities: Spatial agglomeration of population and activities. Two driving dichotomies: (1) Physical space vs. institutional and socioeconomic space, (2) Market forces vs. government intervention and planning. Now, a digital spatiality over the cities has given birth to a series of new concepts:

Digital cities, referring to digital representation of cities, virtual cities, cities on media, cities of avatars, second life cities, simulation (sim) cities.

Intelligent cities, referring to web-based communication and digital networks within the city sustaining innovation and human capabilities. Web spaces of collective intelligence; networks of distributed intelligence; crowdsourcing; citizens empowerment through IT.

Smart cities, referring to smart environments, smart communication spaces, city-based sensor networks, embedded systems into buildings, smart meters, smart phones, and mobile devices. A spatial intelligence based on real-time interaction. Data and information-based innovation ecosystems.
Functional and government differentiation of urban space
Planning at (1) city and (2) district levels
DIGITAL CITIES:
Two layers systems (physical – digital)

Layer 1: CITY DISTRICTS
People, Activities, Infrastructure

Layer 2: APPS + MEDIA + VIRTUAL SPACES

- Industry
- Port
- Transport Hub
- Central Business District
- University/Campus
- Technology District
INTELLIGENT CITIES – SMART CITIES: Almost identical concepts
Three layers systems (physical – institutional – digital)

Layer 1: CITY DISTRICTS
People, Activities, Infrastructure

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

Layer 3: APPS + EMBEDDED SYSTEMS + SOCIAL MEDIA
4 TYPES OF APPLICATIONS
- INTELLIGENCE
- E-LEARNING
- CO-CREATION
- MARKETPLACE

INTELLIGENT CITIES – SMART CITIES: Almost identical concepts
Three layers systems (physical – institutional – digital)
1. **L1- City**: Description of the city or district – CHALLENGES or PROBLEMS TO ADDRESS

2. **L2-Innovation ecosystem**: Analysis of knowledge creation and innovation PROCESSES and PRACTICES related to city districts and challenges

3. **L3- Digital spaces, smart spaces**: Selection of SOFTWARE, web 2.0, social media, crowdsourcing tools, sensor networks, cloud, mobile apps suitable for L1 challenges and L2 practices

4. **Smart city strategy: L1-L2-L3 integration**: Knowledge functions on P-I-D space. Spatial intelligence. Solutions to city challenges

5. **Solutions and services development**

6. **Business models** for new services sustainability

7. **Measurement**: KP Indicators - Scoreboards
PLANNING INTELLIGENT CITIES: Integration a key issue of spatial intelligence of cities

1. The city: Defining challenges
2. Innovation ecosystem(s): Institutions and processes addressing the challenges
3. Digital space: Technologies and solutions for smart environments

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

5. Solutions and services development for districts, utilities, government.
6. Business models for sustainability of services
7. Measurement index: Documentation of impact, innovation, intelligence
2. Planning Intelligent Cities at URENIO: Integration solutions
Intelligent cities are systems of innovation combining innovative clusters, technology learning institutions, and digital innovation spaces. The platforms enable the creation of digital spaces facilitating five key innovation processes.
**Layers** are spatialities at Physical – Institutional – Digital space (PID)

**Platforms** are knowledge facilitators at PID space: Concepts, methods, tools, apps

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**THE INTEGRATION PROBLEM:** Platforms enabling Strategic Information – Learning – Innovation - Dissemination
PLATORM 1: Strategic intelligence

A system for strategic information / foresight inking (i) a community of users, (ii) rules for information management, and (iii) business intelligence tools

**Community**
- Population of the community
- Geographic area of reference / Physical space
- Social group of reference / type of cluster
- Human network of information gathering and elaboration
- Data from sensors
- Network-based information collection, dissemination, feedback

**Routines - Agreements**
- Sources of information and validation procedures
- Rules concerning the collection of information
- Rules concerning the community of dissemination
- Users’ rights, access and privileges
- Information processing, analysis. Knowledge model
- Sustainability of information services

**Digital space: BI tools**
PLATFORM 2: Technology learning / absorption

A system for technology learning linking (i) a community of technology providers, (ii) institutions of technology transfer, και (iii) technology brokering and intellectual property management tools and e-services.

**Community**
- A community of technology providers
- University Labs
- Research fields
- Technology district
- Network of technology providers
- Network of technology recipients

**Routines – Agreements**
- IPR management rules
- Technology transfer / licensing agreements
- R&D valorization and commercialization agreements
- Spin-offs
- Technology dissemination rules
- Technology demonstration
PLATEFORM 3: Collaborative innovation

A system for people-driven innovation based on (i) a community of users, (ii) institutions for collaborative innovation, and (iii) crowdsourcing applications and web-tools

**Community**
- Community of innovators
- Living Labs
- R&D and technology providers
- Innovation funding community
- Government institutions
- End users, citizens, stakeholders
- Real life environments

**Ideas exploration:**
Crowdsourcing for ideas, user evaluation of ideas

**Product innovation:**
- **Co-creation** by bringing together creative communities;
- **Exploration** by engaging users at the earlier stage of the co-creation process;
- **Experimentation** thought live scenarios and artefacts in real life situations

**Co-funding** though crowdfunding and investors alliances
PLATFORM 4: Dissemination / Promotion

A promotion / commercial system based on (i) physical spaces and a community of vendors, (ii) marketplace operation rules, and (iii) online marketplaces.
Intelligent City Planning: Using Platforms at city districts / sectors

PLATFORMS – KNOWLEDGE FUNCTIONS (and / or)

1. Strategic intelligence – Foresight
2. Technology transfer – Learning networks
3. Innovation through collaboration
4. Dissemination – Global markets

OUTPUTS
- GDP
- Employment
- Sales/ Exports
- Resource saving
- Skills
- R&D
- IP
- New products

Measurement Scoreboard
3. The PEOPLE project: Planning a smart commercial district
PEOPLE consist of four Pilot Smart Open Innovation Urban Ecosystems (PEOPLE Pilots) created to become seeds towards sustainable smart cities based on ICT services.

The Pilots are structured in four layers:

1. **Basic layer**: Hold all necessary infrastructures for running the Pilots foreseen. People will build its results onto this layer.

2. **Citizens Layer**: Methodology (processes, standards and indicators) for create and manage People smarts Urban Ecosystems based on a user-centric open innovation approach.

3. **Services Layer**: ICT Services portfolio really integrated, composed, adapted and/or deployed at each Pilot. This services answer to the actual interests and needs of the different stakeholders in the Pilot and are focused in Smart mobility and urban information management and Social integration.

4. **Monitoring layer**: Statistical data from each Pilot will be analysed for carrying out modelling and simulation activities in order to appraise behaviours and user patterns that will allow for the identification of new service opportunities towards the future sustainability of the Pilots and the creation of new ones. The idea is that these models are global, and the result of the joint knowledge generated during the project.
FOUR PILOTS

Vitry-sur-Seine, Paris, FR

Abando District, Bilbao, ES

Technology Park University of Bremen, GE

City of Thermi, Thessaloniki, GR
1. L1: Describing the City and the Challenges (Eastern Thessaloniki)

- **Growing city of Thermi**
- **A commercial district / Malls and entertainment**
- **An innovation district** (CERTH, Technopolis, Incubators, Museum of Science, Universities)

Eastern Thessaloniki
- 31.570km²
- 50,000 residents
- Activities of supra-local character
2. L2: Defining the innovation ecosystem (a commercial ecosystem)

8 million visitors per year
200 mE turnover
1. Objectives: Problem to solve
- Create a platform for smart commercial/entertainment district
- Increase the commercial hinterland of Thermi’s CBD
- Take advantage of the huge commercial activity of MED COSMOS

2. Survey for solutions
- Initial ideas in PEOPLE DoW
- OPEN SOURCE SOLUT.
  - Literature review -20 solutions
  - Meetings and proposals by stakeholders
  - Data models for different solutions

3. Constraints
- Estimation about achievable Process and Results indicators
- Applications development costs
- Data and content creation costs
- Business models for sustainability
4. Integration: Search for spatial intelligence

I. Connecting service providers and users: A public consultation
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Table 1: **SELECTED APPS AND SERVICES**

198 responses

Public consultation: Evaluation by 200 users + use cases by stakeholders
Integration

II. Connecting applications and e-services

- 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
Integration

III. Connecting communities–innovation ecosystems–smart marketplaces

Communities

- Commercial community
- Local vendors
- Larger marketplaces
- End users / consumers
- Citizens
- Local trade association

Innovation Routines

- Organisation and management of the digital marketplace
- Promotion of products and services rules
- Learning the art of digital marketing
- Marketing alliances
- Cooperative suppliers selections

Digital Marketplace

- Business Directory
- Virtual marketplace
- Product / services offer
- Promotion coupons
- Find the best offer

- Recreation virtual guide
- Public screen access points
- Finding a parking place
- Environmental pollution visualization and alert
- Citizens' environmental requests
5. Solutions and services development
Core service: SMART MARKETPLACE based on CROWSOURCING

The service aim to sustain the local marketplace and local businesses. It will consist of five subsystems / applications:

- **A business directory** which will present the local businesses and professionals (about 400) on the city map.
- **A virtual representation of the local marketplace and shops.**
- **A coupon site containing promotional codes**, from local retailers and professionals, offering discounts to specific products and services.
- **An Optimisation Engine** - “Best buy” based on open data available from the relative price watch system.
- **A review engine** that assists customers in gathering local shopping information, posting reviews, assessments and opinions of local shopping.
The service supports the creation of virtual tours of recreation facilities using interactive maps, 360° panoramas, video and three-dimensional images, and the access is made by PCs, smart phones and public displays. It can be complemented by a series of sub-applications that present exhibitions and guide to exhibits of the Center for Science & Technology Museum on smart phones. A free Wi-Fi networks is prerequisite.
The service is based on Parking Finder Tool which provides real-time parking for garages in city’s center. In the simplest form this application will inform about available parking places in the area (location, price etc), and in more advanced form will include dynamic real-time information based on sensors about parking at different places (e.g. on-street metered parking). The application can be accessed through the web or smart phones.
Information service based on a network of wireless sensors that measure air pollution (CO2, nitrogen oxides, microparticles, pollen) and send measurements to a central hub. Data are presented to citizens on digital and physical displays, screens and balloons at different locations.
The service enables residents to report local problems. Users can also make suggestions for improving the environment of their neighborhood. With this form of community activism, residents are encouraged to become active citizens by reporting and improving aspects of the city’s environment. Users may add comments, suggest solutions, or add video and pictures and they can be informed about the solving stage of the reported problem. E-mail alerts will be also available.
5. Solutions and services development
IT architecture

Users

Social Media

Open Linked Data

Microformats, Ontologies

Data Sources

Citizens
Retailers
Sensors
External Web Services

Computers (desktop or mobiles)
Large Touchscreens
Smartphones

QR-Codes

Presentation Tier
Template Engine
HTML5
CSS3
Javascript
Mobile Framework
Sencha Touch
PhoneGap

Common Services Interfaces
(Authentication, Location-Based Services, Maps, internationalization, Accessibility)

Application Server

Application Tier (PHP)
Virtual Marketplace
Parking Spaces Availability
Tourism & Recreation Facilities Guide
Air Pollution Monitoring
City Fix

Interface for Queries and Data Exchange

Data Tier (MySQL)
Databases & Files Storage
7. Monitoring and Improvement Cycles: Measuring the impact of e-services on the commercial ecosystem