# Intelligent Tools for Policy Design

**FUPOL**
politics 2 steps ahead

## Deliverable 2.1 – FUPOL Guidelines on Policy for Cities and Municipalities

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| **Editor(s):** | Susanne Sonntagbauer |
| **Contributors:** | Susanne Sonntagbauer, Anna Hassapi, Silvana Tomic-Rotim, Haris Neophytou, Miquel Angel Piera Eroles, Miguel Antonio Mujica Mota, Elena Palmisano |
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| | | ethical issue | |

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Table of Content

# 1 Management Summary

The objective of the FUPOL project is the development of a new governance model to support the policy design and implementation lifecycle. The innovations are driven by the demand of citizens and political decision makers to support policy domains in urban regions with appropriate ICT technologies. Urban policy domains are very important, since more than 80% of the whole population in Europe lives in urban regions and the share will further grow in the future.

Deliverable D2.1 is a first version of the guidelines on policy for cities and municipalities which will further be amended according to the progress of the project. The target group of the deliverable is composed of policy makers, city authorities and administrative staff as a support tool for the implementation of the FUPOL approach.

The aim of this document is an analysis and assessment of various policy domains D2.1 provides a brief description of more than 10 policy areas selected according to their simulation and participation possibilities,
The priority assigned to a policy domain is driven by

- The linkage of the domain to a major urban challenge such as urban sprawl, slums, etc.,
- The availability of data, which is a requisite for a successful simulation,
- The domain related pilot city priority
- The European and worldwide priority according to current urban development.

Due to the assessment criteria land use, housing and segregation were selected as priority policy domains and described in detail in the first project year. Tourism and participatory budgeting is foreseen to be elaborated in detail in D2.6. In order to measure the impact of policy strategies indicators for the relevant policy domains are specified.

To enable the active and passive e-participation of the citizen in urban politics recommendations for the integration of the public by using social media are also described.

There are significant dependencies between the content of D2.1 and other deliverables, like D2.2, D5.1, D5.2, D3.1 and D4.1, which have to be respected to enable the development of a governance model.

# I. PART ONE – PROJECT OVERVIEW, METHODS AND DEFINITIONS

## 2 Document Guideline

### 2.1 Purpose of the Document

The objective of this document is to design general guidelines on policy for cities and municipalities, including

- Terms and definitions
- An overview of all policy domains relevant for cities and municipalities
- Interdependencies between policy domains
- Major drivers and challenges of urban policies
- A detailed description of three domains according to their ranking coordinated with pilot users ("Land Use", "Housing" and "Segregation")
- Processes for the implementation of these domains
- Recommended policy analysis methods by domain (qualitative and quantitative) – this refers to key performance indicators measuring policy implementation progress
- A first assessment of domains and topics concerning the technical feasibility including an analysis of other projects and approaches
- Identification of a first set of data for FUPOL data base
- Checking of data availability
- Definition of the indicators/measurements
- Security requirements
- Legal ethical issue

## 2.2 Target group

The target group of Deliverable 2.1 consists of policy makers and city administration officials, because it contains guidelines how the FUPOL approach could be implemented in city administrations and its limitations. The project internal target groups are the other team members dealing with simulation and WP3.

## 2.3 Masterplan of the FUPOL Guidelines on Policy for Cities and Municipalities

The deliverable D2.1 is the first version of the guidelines, which will further be amended as the project evolves. The master plan outlining the coverage of the various policy domains is as follows:

|  | D2.1 (M8) | D2.6 (M24) | D2.11 (M36) | D2.13 (M44) |
|---|---|---|---|---|
| Land Use | FULL | AMENDED VERSION | AMENDED VERSION | FINAL |
| Housing | FULL | AMENDED VERSION | AMENDED VERSION | FINAL |
| Environment | SELECTED TOPICS | AMENDED VERSION | AMENDED VERSION | FINAL |
| Economy | BASICS |  |  |  |
| Urban Segregation | FULL | AMENDED VERSION | AMENDED VERSION | FINAL |
| Participatory Budgeting | BASICS | FULL | AMENDED VERSION | FINAL |
| Transport and Movement | BASICS |  |  |  |
| Tourism | BASICS | FULL | AMENDED VERSION | FINAL |
| Community Facilities | BASICS |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Some policy domains will not be covered in detail, because they do not have significant simulation / participation possibilities.

## 2.4 Dependencies between D2.1 and other Deliverables

The picture below shows the conceptual dependencies between the content of D2.1 and other deliverables related to simulation
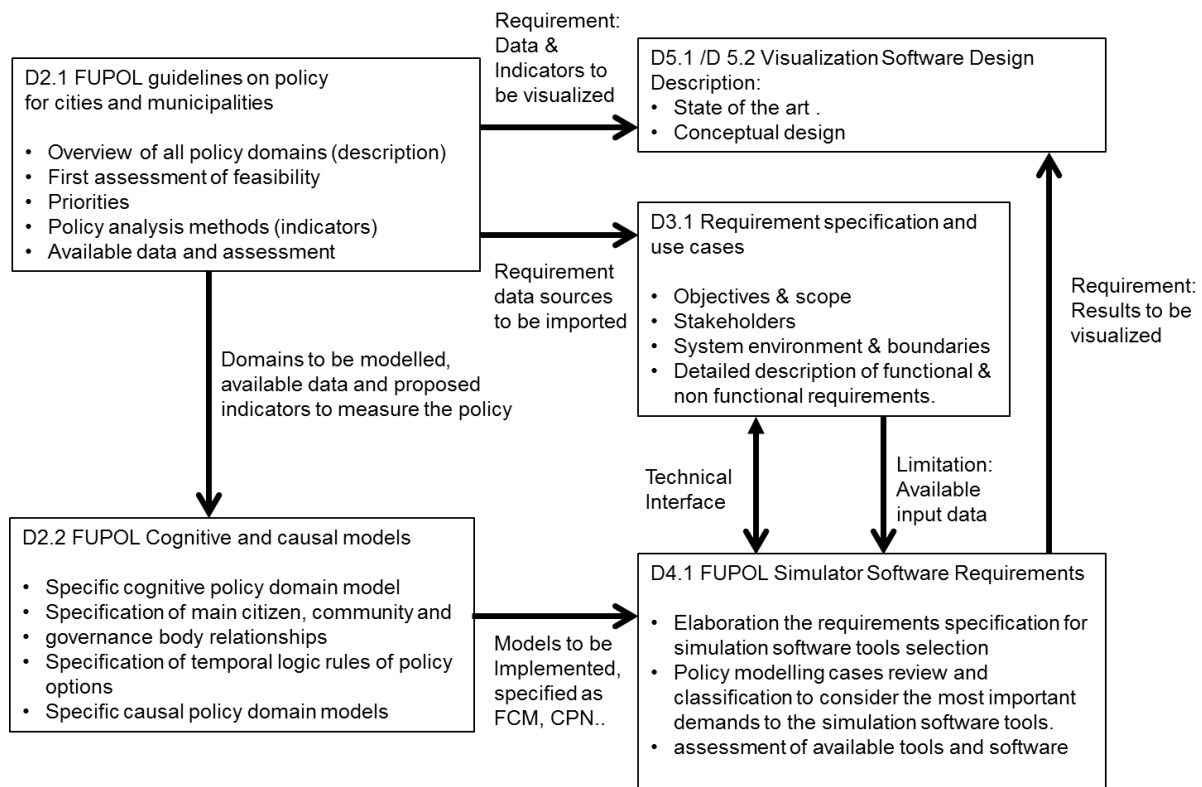


### 2.4.1 D2.1 – D5.1/D5.2

Indicators to be visualized: D2.1 contains the available data and policy indicators to be visualized. D5.1 provides a concept, how to visualize them.

### 2.4.2 D2.1 – D2.2 Domains to be Modelled

D2.1 contains a verbal description of the policy domain, the main policy issues, available data and proposed indicators to measure the policy. The sequence of models to be developed in D2.2 is guided by the priorities in D2.1 (which have been fixed in collaboration with pilot cities).

The available data described in D2.1 may influence the feasibility of the proposed model in D2.2. Data, which are not available  have to be collected – this means a burden to potential users.

### 2.4.3  D2.1. – D3.1 Data Resources to be Imported

In D2.1 data and sources are described which have to be imported in D3.1.

### 2.4.4  D2.2 – D4.1 Models to be Implemented, Specified as FCM, CPN etc.

D2.2 specifies cognitive models, causal models specified in Coloured Petri Net Formalism and agent behaviour.  D4.1 will elaborate the resulting requirements specification for the simulation software tools and consider the state-of-the art (available tools and software) before recommending certain tools/software packages.

### 2.4.5  D4.1 – D5.1/2 Results to be Visualized

D4.1 defines, which simulation results need to be visualized. Simulation results to be visualized could be different from the original indicators, specified in D2.1 It could be for example that some of the indicators defined in D2.1 cannot be simulated and only a subset is made available by the simulation software. On the other hand it could be a requirement to visualize more than originally defined in D2.1 to provide a better understanding of the simulation process to users.

### 2.4.6  D3.1 – D4.1 Technical Interface

D3.1 & D4.1 will jointly define a technical interface for exchange of data.

### 2.4.7  D3.1 – D4.1 Limitation Available Input Data

Although it is unlikely, it could be that some of the data defined in D2.1 cannot be imported by the core platform (or it is too complicated). The resulting limitation

needs to be defined in D3.1 since it has implications on the recommended model implementations in D4.1

## 2.5 Benefits

This deliverable contributes to a better understanding of barriers to and prerequisites for the successful implementation of scientifically-based quantitative computer-simulation models as planning or decision support tools in urban decision making.

Computer simulations are thought to be particularly appropriate in the urban decision making context because they can capture the current state of an urban area and model its development options by manipulating scenarios both integratively and quantitatively. Unfortunately, hardly any of the few computer simulation models so far available are in operational use for urban planning in an e-governance context.

Main reason for the lack of practical application for computer-based planning and decision support tools considering e-governance are do not align well with the specific practical social application contexts. It must be recognized that planning processes and related decision making are political and therewith negotiation processes, in which the input of scientific knowledge is one source for argument in decision making among others. Decisions are not taken solely based on rational arguments. Other types of knowledge and different interests, values or power relations of the involved stakeholders play a role. The scientists are one actor group among others involved into planning. Thus, the use of computer models has been up to now very limited and restricted to certain types of planning, e.g. delivering regularly forecasts for transportation capacity planning, in which scientific knowledge is used to legitimize political arguments.

E-participatory modelling is a challenge: coping with the exchange and integration of the heterogeneous knowledge, interests and demands of scientists, citizens and practitioners while modeling is a difficult task.

So far, empirical investigations into the effects of e-participatory modelling on the production or implementation of computer simulations in urban planning have been lacking. This deliverable contributes to introduce the background to foster e-participation in urban modelling trying to provide answer to questions such as:

- What are the e-participation urban modelling characteristics?
- What functions does participation fulfil in producing computer simulations and compiling scientific knowledge in the context of urban development problems?
- What improves or impedes its implementation chances?

## 2.6 Structure of the Document

The document contains:

Chapter 1:   Management Summary

**PART ONE – PROJECT OVERVIEW, METHODS AND DEFINITIONS**

Chapter 2:   Document Guideline – provides background information about the Document

Chapter 3:   The Generic FUPOL Workflow

Chapter 4:   Cities, Policy, Participation, Support Tools, Security and Data Protection – definitions and methods

**PART TWO – POLICY DOMAINS AND PROCESSES**

Chapter 5:   Policy Domains – an overview of urban policy areas relevant to FUPOL

Chapter 6:   Major Drivers and Challenges of Urban Policy

Chapter 7:   Assessment of Policy Domains – describes domain selection criteria and Why land use, housing and segregation have been selected as a priority

Chapter 8:   Land use – detailed description

Chapter 9:   Housing – detailed description

Chapter 10:  Segregation – detailed description

**PART THREE – SOCIAL MEDIA**

Chapter 11:  Social Media and its Use for the Policy Modelling

**PART FOUR – DATA AND INDICATORS**

# 3 The Generic FUPOL Workflow

In order to provide an overview of the approach the overall process workflow is explained in this chapter. Domain specifics are described in the following chapters.
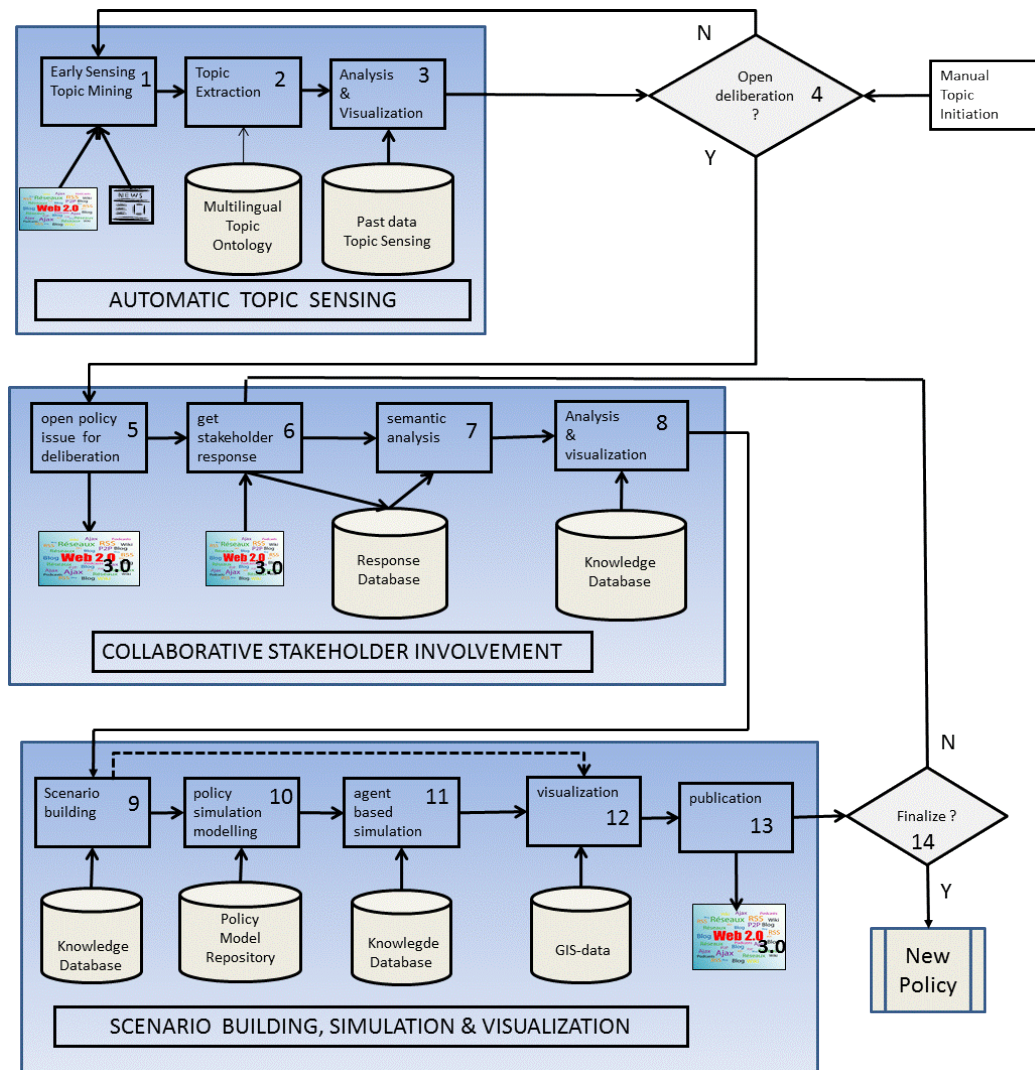


Source: FUPOL DOW Annex 1

## 1. Automatic "Hot Topic" Sensing

In the first step the political blogosphere will be searched to find-out current "hot" political topics within a predefined scope (regional, national, EU) and weigh them according in a subsequent analysis. The information is harvested with a web-crawler, which starts with a list of predefined URLs to visit (seeds). As the crawler visits these URLs, it identifies all the hyperlinks in the page and adds them to the list of URLs to

visit, called the crawl frontier. URLs from the frontier are recursively visited according to a set of policies.

## 2. Topic extraction

In this stage topics are extracted from the raw text data and clustered. Topic clustering is the process of information clustering based on topic extraction. The proposed new approach is applying background knowledge during pre-processing in order to improve clustering results. The raw text will be classified and linked with the topic, so user can drill down at any time to see the single stakeholder opinion.

## 3. Analysis and Visualization

The characteristics of the various clusters will be analysed, clusters will be weighted and results will be visualized in a user-friendly and understandable way. (e.g. mountain visualization). Analysis and Visualization will include a visual tool to compare with previous results to show shifting of political "hot-topics" across time and alert on emerging topics.

## 4. "Open deliberation"?

At this stage the government has to decide, whether it wants to pursue the topic further. If not they can repeat the topic sensing process at a later time to check, whether any new topics came up or a major shift in citizens priorities occurred.

## 5. Open policy issue – crowd sourcing

A policy issue is opened for public deliberation on the Web, various social networks etc. During an initial period, e-citizen have the opportunity to answer to an open question (e.g. how the public transports of the city should be developed). The ICT-framework will enable open deliberations as well as crowd sourcing, as an act of outsourcing tasks to the public through an open call. This may include already an outline of different policy scenarios or it could be open (e.g. "How should public transport be improved"). Public authorities initiate this process through simultaneously publishing the policy issue on classical websites and various Web 2.0/ Web 3.0 applications and social networks through a single entry. It means a

message is entered once and then further distributed by a multichannel message agent.

## 6. Crowd Sourcing (Citizen, companies NGOs....) response

Citizens and other stakeholder response is collected from various channels. Response could be free text and/or multiple choice (yes/no, like/do not like). The creativity of citizens and stakeholders is used to generate new ideas and insights into the topic. ("Crowd-sourcing"). The response as well as the analysis attached are stored in a response database for further analysis.

## 7. Analysis

The large number of potential contribution needs to be aggregated and summarized. This data aggregation step is crucial for e-governance since it expresses the voice of the citizen. The text response is analysed with advanced analysis tools and used together with the multiple choice response by subject matter experts to build policy alternatives and scenarios. It will be determined whether a document or a section thereof is subjective or objective and whether the opinion expressed is positive or negative. Furthermore, the strength of the expressed opinion will be determined.

## 8. Analysis & Visualization

The large number of potential contribution needs to be aggregated and visualized. This data aggregation step is crucial for e-governance since it expresses the voice of the citizen. The presentation and visualization is and still to a large extent unexplored and new research field. Results of the Opinion extraction as well as the underlying raw data will be classified and linked with the topic, so user can drill down at any time to see the single stakeholder opinion. Likewise they will be linked with related results of a classical survey (if available).

## 9. Work-out scenarios

Based on the analysis & visualization policy scenarios are worked out to be simulated. It is possible to skip the following steps 10 and 11 in case no simulation is needed.

## 10. Policy Simulation Model

An agent-based policy model to accommodate the scenarios is build out of a pre-designed standard model for the specific policy area.

## 11. *Agent based Scenario Simulation*

The scenarios and its potential impact over a timeline are simulated using available data and eventually data from other public administration obtained through. For this purpose the integrated toolbox will also contain a repository, where public data from other governments can be found for certain policy domains.

## 12. Visualization of the Results

Visualization comprises expert users (civil servants, political operators) and other political stake-holders (citizens, enterprises....), expert users and stakeholders will get additional insight into the topics from the simulation of the various alternatives and may change their original opinion.

## 13. Publication

The results of the simulation are published an advertised in order to get feedback from stakeholders again or to prepare finalization of the development lifecycle.

## 14. Finalize?

A decision has to be made, whether to get stakeholder response again or finalize the policy design lifecycle. The possibility to return to step (6) get stakeholder response has been introduced to show the results of the simulation to stakeholders and eventually get a different feedback from them. (They may change their opinion, once they see the impact of their original opinion).

# 4 Definition, Methods and Support Tools

The current chapter is dealing with the definitions and concepts such as urban areas, methods of participation, security requirements, data protection and methodologies which are relevant to the FUPOL project. They are used in the whole document and therefore described at the beginning in this chapter.

## 4.1 Cities

As FUPOL will be primarily developed for urban areas in the current chapter definitions of urban structures which are relevant to the project are provided.

### 4.1.1 What is a city?

A city is a relatively large and permanent settlement. Although there is no agreement on how a city is distinguished from a town within general English language meanings, many cities have a particular administrative, legal, or historical status based on local law. (City, 2012)

Cities generally have complex systems for sanitation, utilities, land usage, housing, and transportation. The concentration of development greatly facilitates interaction between people and businesses, benefiting both parties in the process. A big city or metropolis usually has associated suburbs and exurbs.

Such cities are usually associated with metropolitan areas and urban areas, creating numerous business commuters traveling to urban centres for employment. Once a city expands far enough to reach another city, this region can be deemed a conurbation or megalopolis.

### 4.1.2 Exurbs

Exurbs are settled regions beyond the boundaries of the suburbs of a city or major metropolitan area. In some cases, exurbs may be rural in nature, although some are more densely built, but **all have a relatively low population density**. Many

suburbs begin as exurbs, and many exurbs are slowly swallowed up by the suburbs of the regions they neighbour as population growth expands, leading to increased demand for usable land. (What are exurbs?)

The emerge of these exurbs are due to various reasons. In the 1960s and 1970s, when car ownership became viable for most people started leaving the cities for fear of rising crime rates. A general opinion is that that exurban living is better for children, giving them a chance to go to better schools and to live in a community where people are more familiar with each other. Some prefer the quite environment in a privately owned garden instead of the noise of the town.

The character of exurbs differs a lot. Some host wealthy and highly educated residents in contrast with urban residents, while others have a more middle-class character, housing people who simply want a bit more space than would be available in the city or the suburbs.

In general, exurbs are faced with two following major problems:

- Due to the lack of major industry, the residents are forced to commute for work, which increases the mobility costs.
- Rising cost of living, which is caused by migration of people with higher incomes from the city which results in conflicts between "native" and "new" residents.

### 4.1.3 Metropolis

A metropolis is a very large city or urban area which is a significant economic, political and cultural centre for a country or region, and an important hub for regional or international connections and communications. These cities should have at least one million inhabitants.

New York City is often cited as the quintessential metropolis, exerting a significant impact upon global commerce, finance, media, art, fashion, research, technology, education, and entertainment and being widely regarded as one of the economic and cultural capitals of the world. (Metropolis, 2012)

### 4.1.4 Conurbation

A conurbation is a region comprising a number of cities, large towns, and other urban areas through population growth and physical expansion, which have merged to form one continuous urban and industrially developed area. In most cases, a conurbation is a polycentric urban agglomeration, in which transportation has developed to link areas to create a single urban labour market or travel to work area. (Conurbation, 2012)

The term "conurbation" was coined as a neologism in 1915 by Patrick Geddes. He drew attention to the ability of the new technology of electric power and motorised transport to allow cities to spread and agglomerate together, and gave as examples "Midlandton" in England, the Ruhr in Germany, Randstad in the Netherlands and New York Tri-State-Area.

**Examples:**

**The Ruhr**, by German-speaking geographers and historians more accurately called Ruhr district or Ruhr region, is an urban area in North Rhine-Westphalia, Germany. With 4435 km² and a population of some 5.2 million (2009), it is the largest urban agglomeration in Germany. It consists of several large, formerly industrial cities bordered by the rivers Ruhr to the south, Rhine to the west, and Lippe to the north. In the Southwest it borders to the Bergisches Land. It is considered part of the larger Rhine-Ruhr **metropolitan region** of more than 12 million people. (Ruhr, 2012)

**New York Tri-State Area** is the expansive concept of the New York metropolitan area (the Tri-State Region) centred around New York City, including 30 counties spread between New York State, New Jersey, Connecticut, and Pennsylvania, with an

estimated population of 21,961,994 in 2007. Approximately one-fifteenth of all U.S. residents live in the Greater New York City area. This conurbation is the result of several central cities whose urban areas have merged together. (Conurbation, 2012)

**San Diego–Tijuana** is a conurbation on the border between the two large coastal cities of San Diego and Tijuana, Baja California, Mexico. The 2010 population of the region was 5,105,769, making it the largest bi-national conurbation shared between the United States and Mexico. (San Diego-Tijuana, 2012)

The **Taiheiyō Belt** is the largest conurbation in Japan in every term, extending from Ibaraki Prefecture to Fukuoka Prefecture, running almost 1,200 km, with the total population of 82.9 million.

**A conurbation can be confused with a metropolitan area**. As the term is used in North America, a metropolitan area can be defined by the Census Bureau or it may consist of a central city and its suburbs, while a conurbation consists of adjacent metropolitan areas that are connected with one another by urbanization.

Internationally, the term "**urban agglomeration**" is often used to convey a similar meaning to "conurbation".

A conurbation should also be contrasted with a

## 4.1.5 Megalopolis

where the urban areas are close but not physically contiguous and where the merging of labour markets has not yet developed. The term was used to describe the huge metropolitan area along the eastern seaboard of the U.S. extending from Boston, Massachusetts through New York City; Philadelphia, Pennsylvania; Baltimore, Maryland and ending in Washington, D.C. (Megalopolis, 2012)

## 4.2 Policy

A policy is typically described as a principle or rule to guide decisions and achieve outcomes. Policies are generally adopted by the Board of or senior governance body within an organization whereas procedures or protocols would be developed and adopted by senior executive officers. A policy can be considered as a "Statement of Intent" or a "Commitment". For that reason at least, the decision-makers can be held accountable for their "Policy". (Policy, 2012)

Policy addresses the intent of the organization, whether government, business, professional, or voluntary. Policy is intended to affect the 'real' world, by guiding the decisions that are made. Whether they are formally written or not, most organizations have identified policies.

The term is suitable for government, private sector organizations, groups and individuals. Presidential executive orders, corporate privacy policies, and parliamentary rules of order are all examples of policy. The termini "policy" differs from rules or law. While law can compel or prohibit behaviours, policy merely guides actions toward those that are most likely to achieve a desired outcome.

Policies can be understood as political, management, financial, and administrative mechanisms arranged to reach explicit goals. Urban policy means therefore to reach the goals set by the urban authorities.

The "Policy cycle" in the political science comprises the following phases:

- Policy Identification
- Policy Formulation
- Consultation and Adoption
- Implementation and
- Evaluation

## 4.3 Participation

The engagement of citizens in the policy making process results in better policy-making and is a core element of good governance. The idea behind is to get more ideas and information to meet the challenges of policy making under conditions of increasing complexity, policy interdependence and time pressure.

Furthermore it strengthens the trust in politicians and governments and contributes to an increase of the quality of democracy. This should help to reverse the steady erosion of voter turnout in elections, falling membership in political parties.

There are some key guidelines which are fundamental for the engaging of citizens in policy making, such as:

- **Rights -** Citizens' rights to access information, provide feedback, be consulted and actively participate in policy-making must be firmly grounded in law or policy. Government obligations to respond to citizens when exercising their rights must also be clearly stated.
- **Commitment** to participation in policy-making is needed at all levels (politicians and government administration).
- **Clarity -** Objectives and limits of the participation during policy-making should be well defined from the beginning. Especially the roles and responsibilities of citizens (in providing input) and government (in making decisions for which they are accountable) must be clear to all.
- **Time –** The time period of the participation has to be specified.
- **Resources –** Adequate financial, human and technical resources are required, especially government officials must have adequate human resources (skills, training) as well as an appropriate organizational structure.
- **Objectivity –** The Information provided by government during policy-making should be complete and objective.
- **Co-ordination** - Initiatives should be coordinated across all government levels to avoid duplication and ensure policy coherence.

- **Accountability** - Governments have an obliged for the use of citizens inputs. Measures to ensure that the policy-making process is open, transparent and amenable to external scrutiny and review are crucial.
- **Evaluation** - Governments need the tools to evaluate their performance in order to adapt to new requirements
- **Active Citizenship -** Governments benefit from active citizens delivering a lot of impacts for decision making.

Participation differs between
- Active Participation and
- Passive Participation

**Active participation** is the involvement either by an individual or a group of individuals in their own governance or other activities, with the purpose of exerting influence. This active participation is executed by traditional surveys, round-tables, social media and e-participation.

**Passive participation** is to find out the citizens opinions about specific topics by crawling of media, social media, blogs etc.

In the FUPOL project active as well as passive participation will be implemented especially in the area of hot topic sensing, topic extraction and crowd sourcing. The integration of social media into urban politics, the evaluation of the participation and the engagement strategy of citizens in FUPOL is described in detail in chapter "Social Media.

|  | **E-Participation** | **Traditional Participation** |
|---|---|---|
| Active Participation | blogs | traditions surveys |
|  | e-participation website | round tables |
|  | social media | plebiscite |
|  |  | referendum |
|  |  |  |
| Passive Participation | social media analysis | traditional surveys |
|  | crawling of media | media |
|  | blogs | newspaper |
|  |  | analysis |

## 4.4 E-Participation

### 4.4.1 Definition

Public participation can be defined as "the practice of consulting and involving members of the public in the agenda-setting, decision-making and policy forming activities of organizations or institutions responsible for the policy development".

E-participation is defined as the use of ICT's for supporting the provision of information to the citizens concerning government activities and public policies, the consultation with the citizens and also their active participation.

The development and increasing penetration of information and communication technologies, and internet in particular, in many countries have enabled the extensive application of the above principles through electronic media.

All actors face five challenges when building an urban simulation model fostering e-participation:

1. Societal pressures and expectations of actor groups
2. Heterogeneity in the practices of actor groups
3. Complexity and "messiness" of the issue to be modelled: urban sustainable development and planning in this context
4. Imprecision and open-endedness of final users and concrete practice Applications
5. Change and innovation processes implied for both science and planning.

Next figure illustrates the importance of considering the 5 interconnection of the 5 challenges to foster e-participation in FUPOL.
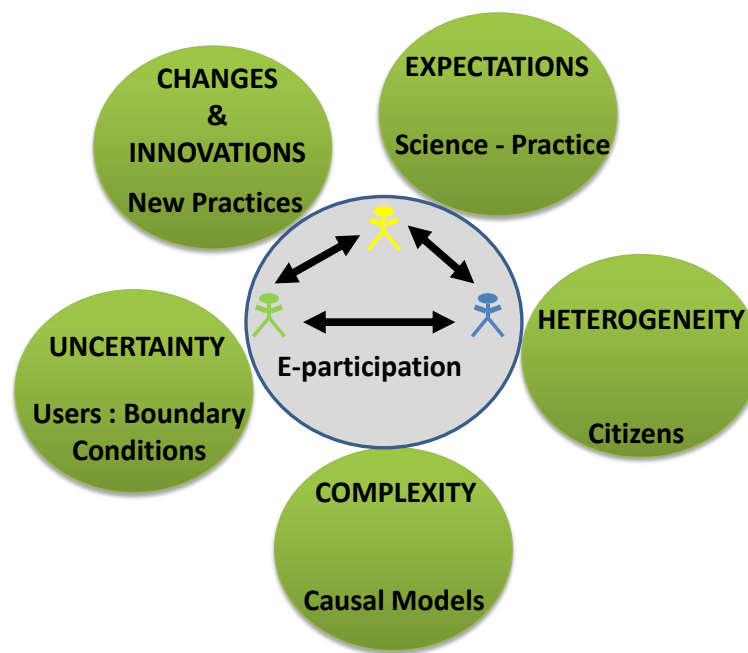
Figure 1 Challenges to Foster E-Participation

The participation process involves heterogeneous practices in knowledge production as well as producing and using a model. In terms of the model, this means dealing with heterogeneous knowledge and data on an input/output level. This involves multiple representations and outputs from the modelling results in both from science and practice as well as individual needs. In terms of the process it means: an exchange (integration and evaluation or interpretation of different types of knowledge).

Knowledge input from practitioners e.g. to the system definition or definition of indicators (such as conceptual models) had to be converted in order to be used in the model.

## 4.4.2 E-Participation: "Knowledge is socially constructed"

Most urban simulation models for policy decision making have been developed as a result of a deep cooperation between scientists and practitioners, which has contributed somehow producing relevant and useful results for practice and for coping with actual urban problems under certain boundary conditions. Unfortunately,

urban model results suffer from uncertainty due to unexpected changes in the social context which usually is affected by a multidisciplinary dynamics with economical, cultural, environmental and social roots (among others) that interact between them.

E-Participatory is seen as mutual learning process, in which both sides, the policy decision makers but also the non-politicians actors learn about the complex urban system from and with each other. This shall be reached by making heterogeneous and implicit knowledge, values or assumptions on the boundary conditions and other involved parties communicable and negotiable while modelling. Mutual understanding about the problems to be addressed or their solutions shall be generated. Further, participatory modelling shall contribute to capacity building among the involved non-scientific actors. They shall learn about the complex system modelled and its behaviour as also the impact of their actions or decisions on it. Through participatory modelling the credibility, acceptance and ownership for the model or its results shall be gained among prospective users.

Citizen participation is essential to generate acceptance and a feeling of ownership for the model and its results among the different actors, and further increase legitimacy of the model's application and results in practice.

In order citizens would be involved in the design of urban policies under an e-participation paradigm there are 2 key factors that the new urban modelling approach should consider in order to place citizens at the centre of e-participation:

1. Transparency of the full cycle including the planning process to unprecedented scrutiny. This is both difficult and controversial. How can an almost infinite list of alternative urban investments proposed by local governments, states, and other entities be examined systematically and an investment plan adopted that reflects a democratic process based on a robust assessment of the alternatives?

2. Hyper-Comprehensiveness: Among the pitfalls of overly ambitious modelling are increasing model complexity, additional data requirements, and in some

cases the credibility of the overall modelling effort. In FUPOL, we should avoid to model more and more aspects of the urban environment because these aspects are important to someone — even though they might have little relation to land use and housing (in this first FUPOL scope). Consider for example crime, this  is clearly an important factor in residential location choice, in transportation choice, and others. In FUPOL we will try to work with data on current crime rates — and perhaps more importantly, on people's perceptions of crime — but we should avoid the development of predictive model of crime in the future under different possible scenarios. The ontology proposed will be able to evaluate aspects regarding major determinants of the crime rate: Economic conditions, Family stability and moral instruction, in order to update boundary conditions introduced by end-users.

E-Participation should be seen as

- a challenging negotiation and social learning process between the different actor groups (scientists, citizens and practitioners) in urban planning
- a combined research, software development and application process.

Research challenges that should be properly tackled by the modelling methodology to foster e-participation for e-governance in urban modelling policies must consider four dimensions:

1. The cognitive dimension, which concerns the production of knowledge.
2. The normative dimension, which involves interests, values and priorities, focused on setting and negotiating priorities and doing a value-judgment. The general evaluation questions are: Is it good? Is it in our interest? Does it comply with goals and priorities?
3. The contextual dimension, related to the specific demands of the application context, focusing on other specifications of the application context. Here, such criteria as operationality, relevance, feasibility come into play. In particular the practical application of the political dimensions plays a role: Are the results

politically relevant? Can they be legitimatized? How boundary conditions specified by citizens and end-users can be ranked according to future hypothesis and uncertainties.

4. The social dimension, which covers the relationship between the actor groups looks at the relationship of different actor groups according to

   a. Competence Credibility: a group, organization, institution is perceived to be knowledgeable, as a function of their collective record of accomplishment, of originality, as well as of their perceived experience and ability to communicate clearly and unambiguously.

   b. Safety Credibility: the degree to which the adopter feels comfortable in the group, based on "similarity in educational status, technical capability, cultural background, recreational activities, and work ethos/philosophy."

An open question in FUPOL is how semantic information from social networks will be used to understand the relationships between groups?

### 4.4.3  Strengths, Difficulties and Risks

The negotiations between science and practice are necessary in order to temper different expectations and demands regarding the model, its possibilities and constraints. However, the process does not guarantee the implementation of a computer model and its results in practice, and it must be designed with care.

The focus of participatory modelling has to be chosen clearly, with an emphasis on either providing a model for use as an operational in which citizens are placed at the centre of e-participation, or a research tool for the scientific community. Providing an "all-in-one" tool that fulfils the demands of both scientific investigative and practical use appears unrealistic. In addition, using sophisticated and complicated computer simulation models in practice restricts the procedure to users who possess the appropriate skills and to certain planning activities and tasks. If these models are to be deployed in collaborative planning processes involving heterogeneous actors (politicians, the public, etc.), they need to be selected and designed very carefully.

Participatory modelling success is supported by

- Building trust in scientists among citizens and practitioners
- Boundary objects which should be understood by the actor groups and support communication
- Intermediate persons, i.e. persons who are familiar with both worlds, science and planning and are able to facilitate communication between them. (refer to last call of 5 researcher and practitioners as members of the CROSSOVER Animators Committee).

Main difficulties for participatory modelling is a lack of experimental data on:

- How can the communication, negotiation and consensus-building processes among heterogeneous stakeholders, involved with the planning or decision making processes be supported?
- What are adequate methods, procedures or tools in this context?

Participatory modelling success is impeded by

- Traditional boundary conditions: institutional settings, financing of projects and relationships between science and practice in general.
- Lack of adequate methods and procedures, in particular in dealing with combined software development and research processes.

### 4.4.4  Planning with Actors

In the last few decades (spatial) planning has been undergoing such a change from a "synoptic, rational" to a more "integrative, incremental and collaborative" understanding. Nowadays, both styles are in use. Described in extreme terms: in the synoptic,  rational paradigm, planning is conceptualized as more or less linear process, in which the staff of planning authorities either prepare plans within given policy frameworks or prepare political decisions for formal decision makers (governmental, legitimized) which are then implemented into practice. Under this classical approach, the modelling focus is on planning for actors.

In FUPOL, the focus is on planning with actors (stakeholders, citizens, NGOs) under an incremental and collaborative perspective, in which planning is understood as iterative process between different actor groups (the public: citizens, NGOs) that must be involved, integrating different perspectives, different sources of knowledge, values and interests to cope with conflicting heterogeneous perceptions. Thus, planning can be understood as a sequence of different options generated in a design phase and chosen from these options in the course of deciding. Planning can thus be understood as sequences of preparing decisions and choices.

The involvement of or collaboration with actors can be seen as a social learning process. The purposes for the involvement are multiple. It can help to improve the knowledge about the planning topic and to deal with conflicting values and goals of actors. Further it can help to create acceptance and ownership and ensure political legitimacy in order to enhance the chances of the implementation of plans into practice.

### 4.4.5 Boundary Conditions

Boundaries are important aspects of social learning systems since they offer opportunities for learning, but they can also hinder it: they can either adopt a model in response to demands from planning, or change the planning practice in order to use an existing model effectively. Boundaries can arise from different enterprises: goals and problems thought to be worth tackling, different ways of engaging with each other, differences in repertoires, for example, how to produce and validate knowledge or use a simulation. The boundaries are seen as a matter of negotiation and power relations rather than a given a priori.

E-participation can be seen as a Participatory modelling may be understood as a "boundary process". The different actors bring their individual knowledge or experience, but also the knowledge and the social competence of their communities

of practice. Boundary conditions and their effects on social learning requires the following dimensions:

- Coordination: Processes and objects must be aligned in different practices in ways that allow coordinated actions. They must accommodate the practices involved and provide enough standardization for people to know how to deal with them locally.
- Transparency: The experimentation processes given must access to meanings they have in various practices.
- Negotiability: Decision making should provide a two-way connection. Boundary conditions bridge practices to the extent that they make room for multiple voices. Things become negotiable.

E-Participation in decision making is fuelled but also challenged by the heterogeneity of the involved actor groups.  In a broader perspective boundary conditions are present, when heterogeneous practices have to work together or need each other and at the same time have to stay autonomous and distinct from each other for different reasons.

In FUPOL, it is proposed to fix city problem description by a common instantiation of the city characteristics, allowing citizens to test their ideas/opinions by changing the boundaries conditions, in such a way that the following aspects could be preserved:
- Allowing learning to take place across the practices
- Expanding influence of a practice into another practice
- Protecting a practice from influences from another.

### 4.4.6  Social Knowledge through E-Participation

The context and process of producing and using knowledge matters in order to attribute a meaning to the knowledge or model and prove its validity. Thus the practice of knowledge production is important. As a consequence, the simulation results obtained by experimenting with the causal urban models can only have

meaning or validity in the boundary conditions used to evaluate users' ideas. For analysis and interpretation of knowledge production by means of simulation it is important to note:

1. Knowledge versus data or information: Data are understood as context-independent and must be interpreted with regard to a certain use in order to become information. Information becomes knowledge by attributing and validating according to a certain context: "Knowing that something is true". The recipient of the information gives it meaning. When modelling, information for the model may be gathered in a certain format designed for a certain purpose. The information becomes knowledge when put to use within a model, producing results, and discussing, interpreting and validating those results.

2. Tacit (implicit knowledge) versus explicit knowledge: This distinction refers to the implicit or explicit nature of knowledge and is therefore connected to the way in which it can be exchanged. Explicit knowledge is the knowledge that is communicated. Implicit knowledge is important for action. It is "knowing how" to do things, e.g., "methods and procedures." It cannot be uttered or made totally explicit. It is learned differently and exchanged differently than is explicit knowledge. Implicit knowledge is further connected to underlying rules, axioms, theories which themselves are seldom made explicit. Implicit knowledge is "carried" as social competence and individual expertise by the actors.

3. Knowledge for action is value-laden: Different knowledge types can be distinguished in the context of sustainable development: system knowledge, objective knowledge, and transformation knowledge.

    a. System knowledge is knowledge of the status quo in a complex system under investigation. Which elements are constitutive, how do they interact?

b. Objective knowledge helps to set goals. In which direction will the system develop?

c. Transformative knowledge includes the transformation from state of the art to the desired objectives.

E-participation in FUPOL through the use of transparent and legitimate causal models will be the basis to generate socially robust knowledge which will be validated and negotiated by the public in its application context in order to be politically credible and useful.

## 4.5 Decision Support Tools in Urban Planning

The terms "decision support tools," "planning support" or "spatial planning support tools" share the purpose of supporting the planning process on a content level, delivering and producing information and knowledge, facilitating communication and negotiation processes between heterogeneous actors involved in the planning process. They differ in their technology, scope and which phases of planning they apply.

This planning style delivers the required integrative approach in order to cope with uncertainty and complexity inherent in urban development. FUPOL will focus especially on those tools intended to deliver simulations or future urban development scenarios in a quantitative way, by a stepwise specification allowing reversibility and adaptation while implementing plans. The ways in which planning is done in this complex and uncertain setting may be described in phases and tasks considering:

1. Different aspects, subsystems or sectors of the urban area as well as their complex interactions (socioeconomic, technical, natural)

2. Different spatial and temporal scales (e.g. act locally, think globally)

3. Different sources of knowledge, values and interests to cope with conflicting heterogeneous perceptions and the goals of urban actors which must be integrated.

In FUPOL Planning would be understood as a sequence of different options generated in a design phase and chosen from these options in the course of deciding. One important aspect in FUPOL is the concept of context dependence in the planning process, in which a community of practice is seen as a social container of competencies that make up a social learning system. In a community of practice, citizens share cultural practices, reflecting their social learning in a group.

Social learning can be defined as "an interplay between social competence and personal experience". Social competence combines three elements:

1. Enterprise: Collectively developed understanding of what the community is about. To be competent is to understand the joint enterprise sufficiently to contribute shared visions, typical problems, etc. In the spirit of a learning system a community shows leadership, pushing its development along and maintaining a spirit of inquiry.

2. Mutuality: The community is based on mutual engagement, establishing norms and relationships of mutuality. To be competent is to engage with the community and become trusted as partner in interactions. In the spirit of a learning system it means that people know each other enough to understand how to interact productively and when to ask for help or advice. They must trust each other, not only personally but also in their ability to contribute to the joint enterprise.

3. Repertoire: A shared repertoire of communal resources, e.g., language, routine sensibilities, artefacts, tools, stories or styles. This encompasses methods and procedures. To be competent is to gain access to the repertoire of the community.

In the spirit of a learning system it means that the community must reflect on its repertoire and be able to understand its own state of development from multiple perspectives, re-examine assumptions and patterns, and uncover hidden possibilities.

Knowing (or producing knowledge) is understood as "an act of participation in complex 'social learning systems". People participate in three distinct modes in a social learning system (also known as a community of practice):

1. Engagement: doing things together
2. Imagination: constructing an image of themselves and their communities
3. Alignment: making sure local activities are sufficiently aligned with other processes in the practice that they can produce effective results beyond their own activity.

Generally, the functions of a model in planning can vary widely, particularly with the increased use of collaborative planning processes. In already known application contexts, specifics can vary over the time that the model is in use; different problems have to be addressed. Thus, nonacademic actors involved in e-participation do not necessarily represent the potential users and are not necessarily related to future applications. The question of representation of "absent users" enters the picture at this point.

The challenge is to produce, on one hand, a generic integrative and quantitative model (complex and complicated, per se) and on the other hand, to make it compatible with specific applications contexts as yet unknown, e.g. geographical information and data in terms of scale (temporal). Here challenges of flexibility and compatibility of the model for specific applications must be met.

## 4.6 Legal Ethical Issues and Privacy

Ethics forms part of the wider context in which the law operates. Ethical considerations, like law, are *normative* in nature, i.e. they deal with minimum standards of behaviour in a societal context. Law and ethics differ in that the former are mandatory (there are sanctions for non compliance), whereas ethics are essentially aspirational in nature. Ethical frameworks also tend towards a more general framework intended for individual reflection, whereas legal rules apply on a clear societal basis and tend to be more specific in nature.

Ethical issues are not considered applicable in the FUPOL context, however privacy and data protection issued are very important, since the FUPOL toolset could be used to assemble personal profiles on a large scale across several social media. The issue came up frequently in discussion with politicians and citizens.

### 4.6.1 Privacy

The term privacy might be interpreted from different point of views. Philips uses the following categorization  (Phillips, 2004).

• *Freedom from intrusion:* constitutes the classical notion of privacy and is closely linked to the original definition of privacy by Warren and Brandeis (Warren and Brandeis, 1890) who defined privacy as "the right to be left alone". Gurses and Berendt characterize this view as "Privacy as hiding" and thereby focusing on the aspect of confidentiality (Gurses, S. and Berendt, B, 2009).

• *Identity management:* Identity management is a about constructing different social identities. This refers to the definition of privacy by Westin (1967) who regards privacy as an individual's right "to control, edit, manage, and delete information about them [selves] and decide when, how, and to what extend that information is communicated to others". This perception of privacy is also picked up by the EU Directive 95/46/EC, by demanding transparency when processing personal data.

• *Surveillance:* "...focuses less on harms to specific individuals and more on the practices of creating and managing social knowledge, especially the knowledge of population groups.". Thus this view concentrates on the segmentation and classification of population groups and their scoring.

• *Constructing the public/private divide:* concerns on institutions or other entities trying to influence what personal data are regarded public and what is private.

The above categorization needs more development in order to be responsive to the needs of users of social networks and other Web 2.0 applications.

'Privacy' is an umbrella term incorporating several distinct, but related concepts. Banisar has identified four key aspects (Banisar, 2000):

1. Information privacy
2. Privacy of communications;
3. Bodily privacy;
4. Territorial privacy – "concerning the setting of limits on intrusion into the domestic and other environments, such as the workplace or public space."

For the purposes of FUPOL, privacy aspects 1 (Information privacy), 2 (Privacy of communications) and 4 (Territorial privacy – "concerning the setting of limits on intrusion into the domestic and other environments, such as the workplace or public space.") are most relevant. Aspect 4 is considered relevant by the author as cyberspace can in some cases be considered both public and private space, depending on the privacy settings of each user.

### 4.6.1.1 Data Protection and Retention

Personal data protection deals with the protection of personal information relating to an individual against its unauthorized and illegal collection, recording and further use

and it also grants the individual certain rights, i.e. the right of information, the right of access and gives him the possibility to submit to the Office complaints relating to the application of the Law.

The Data Protection Directive (95/46/EC) applies to 'any operation or set of operations which is performed upon personal data,' called 'processing' of data. Such operations include the collection of personal data, its storage, disclosure, etc. The Directive applies to data processed by automated means (e.g. a computer database of customers) and to data that are part of or intended to be part of non automated 'filing systems' in which they are accessible according to specific criteria. (For example, the traditional paper files, such as a card file with details of clients ordered according to the alphabetic order of the names).

The Data Protection Directive does not apply to data processed for purely personal reasons or household activities (e.g. an electronic personal diary or a file with details of family and friends). It also does not apply to areas such as public security, defence or criminal law enforcement, which are outside the competence of the EC and remain a national prerogative. National legislation generally provides protection for individuals in these areas.

The major requirements set by the Directive are lawfulness, consent, purpose limitation, necessity, transparency, data security and control.

The Directive distinguishes between 'data controllers' and 'data processors'.

### 4.6.1.2 Data Controllers

Data controllers are the people or body, 'which determines the purposes and the means of the processing,' both in the public and in the private sector. A medical practitioner would usually be the controller of the data processed on his clients; a company would be the controller of the data processed on its clients and employees;

a sports club would control the data processed on its members and a public library controls the data processed on its users.

The obligations contained within the Data Protection Directive are placed upon controllers of 'personal data'. It stands to reason that, if an organisation or individual is not deemed to be a data controller, or their activities do not involve the 'processing of personal data' then the Directive will not apply.

A data controller is defined at Article 2(d) of the Directive and is 'the natural or legal person, public authority, agency or any other body which alone or jointly with others determines the purposes and means of the processing of personal data'. The Data Protection Directive's obligations are contained within Articles 6, 8, 10, 11, 12-15, 17 and Article 25.

Article 11 of the Data Protection Directive is the relevant provision dealing with information not obtained directly from the data subject. It states that Member States shall provide that the data controller must provide the data subject with at least the following:

- the identity of the controller (this refers to the third party data controller)
- the purposes of the processing
- any other information such as:
  o the categories of the data concerned
  o the recipients or categories of recipients
  o the existence of the data subjects rights granted under the legislation i.e. right of access etc. except where this information has already been supplied to the data subject by the third party or where to do so would involve a 'disproportionate effort' on the data controller.

_The rules that apply to data controllers are:_
- Data must be processed fairly and lawfully.
- It must be collected for explicit and legitimate purposes and used accordingly.

- Data must be relevant and not excessive in relation to the purpose for which it is processed.

- Data must be accurate and where necessary, kept up to date.

- Data controllers are required to provide reasonable measures for data subjects to rectify, erase or block incorrect data about them.

- Data that identifies individuals must not be kept longer than necessary.

- The Directive states that each Member State must provide one or more supervisory authorities to monitor the application of the Directive. One responsibility of the supervisory authority is to maintain an updated public register so that the general public has access to the names of all data controllers and the type of processing they do.

- In principle, all data controllers must notify supervisory authorities when they process data.

- Member States may provide for simplification or exemption from notification for specific types of processing which do not entail particular risks. Exception and simplification can also be granted when, in conformity with national law, an independent officer in charge of data protection has been appointed by the controller.

- Member States may require prior checking, to be carried out by the supervisory authority, before data processing operations that involve particular risks may be undertaken. Which types of processing operations involve particular risks is for the member states to determine.

### 4.6.1.3 Data Processor

The definition of data 'processor' is set out at Article 2(e) and means 'a natural or legal person, public authority, agency or any other body which processes data on behalf of the controller.' Data is 'processed' when it is collected and further used.

Personal data can only be processed (e.g. collected and further used) if:
- The data subject has unambiguously given his or her consent, i.e. if he or she as agreed freely and specifically after being adequately informed;

- Data processing is necessary for the performance of a contract involving the data subject or in order to enter into a contract requested by the data subject, e.g. processing of data for billing purposes or processing of data relating to an applicant for a job or for a loan;

- Processing is required by a legal obligation;

- Processing of data is necessary to protect an interest that is essential for the data subjects life. An example is in the case of a car accident and the data subject is unconscious, emergency paramedics are allowed to give blood tests if it is deemed essential to save the data subject's life;

- Processing is necessary to perform tasks of public interests or tasks carried out by official authorities (such as the government, the tax authorities, the police etc.);

- Finally data can be processed whenever the controller or a third party has a legitimate interest in doing so. However, this interest cannot override the interests or fundamental rights of the data subject, particularly the right to privacy. This provision establishes the need to strike a reasonable balance, in practice, between the business interest of the data controllers and the privacy of data subjects. This balance is first evaluated by the data controllers under the supervision of the data protection authorities, although if required, the courts have the final decision.

### 4.6.1.4 What constitutes 'personal data'?

Personal data can be collected directly from the individual or from existing data base. These data may subsequently be used for other purposes and/or shared with other parties. Personal data can be any data that identifies an individual, such as a name, a telephone number, or a photo.

Advancement in computer technology along with new telecommunications networks is allowing personal data to travel across borders with greater ease. As a result, data concerning the citizens of one Member State are sometimes processed in other

Member States of the EU. Therefore, as personal data is collected and exchanged more frequently, regulation on data transfers becomes necessary.

The question of what constitutes 'personal data' is contained in Directive 95/46/EC (the data protection Directive). Article 2(a) of the Directive states: 'any information relating to an identified or identifiable natural person ('data subject'); an identifiable person is one who can be identified, directly or indirectly, in particular by reference to any identification number or to one or more factors specific to his physical, physiological, mental, economic, cultural or social identity.'

### 4.6.1.5 Sensitive Data

'Personal data' is further subcategorised. The Directive prohibits the processing of personal data of a sensitive nature unless such processing falls within one of the exemptions contained within the Directive's Article 8(2).

These special categories of data, are defined at Article 8(1) of the Directive as 'personal data revealing racial or ethnic origin, political opinions, religious beliefs or philosophical beliefs, trade union membership, and the processing of data concerning health or sex life'.

Whilst not expressly prohibited Article 8(4) provides that the 'processing of data relating to offences, criminal convictions or security measures may be carried out only under the control of official authority , or if suitable specific safeguards have been provided under national law.'

Very stringent rules apply to processing sensitive data: data relating to racial or ethnic origin, political opinions, religious or philosophical beliefs trade union membership, data concerning health or sexual preference. In principle, such data cannot be processed. Derogation is tolerated under very specific circumstances. These circumstances include the data subject's explicit consent to process sensitive data, the processing of data mandated by employment law, where it may be

impossible for the data subject to consent (e.g. blood test to the victim of a road accident), processing of data has been publicly announced by the data subject or processing of data about members by trade unions, political parties or churches. Member states may provide for additional exceptions for reasons of substantial public interest.

### 4.6.1.6 Data Protection on the Internet

The Data Protection Directive is technologically neutral: its provisions apply, irrespective of the technological means used to process personal data. For example, the Directive applies to the invisible collection of personal data on the Internet (e.g.: the "cookies" which are used to track the individual surfing habits). On the other hand, if personal data are collected in a "visible" way, it might be argued that an individual transferring his own data has given his consent to such a transfer, provided that he is properly informed about the risks involved.

Directive 2002/58/EC on privacy and electronic communications (**EPrivacy Directive**) supplements the Data Protection Directive strengthening provisions for the protection of individuals' fundamental rights, with particular focus on the processing of personal data by means of publicly available electronic communications services.

### 4.6.1.7 A User's Expectation of Privacy

Article 12 of the Data Protection Directive grants several rights to the data subject. Thus the data subject can obtain from the controller:

- Confirmation whether his personal data is processed
- The categories of data processed
- The Purpose of processing
- The recipients to whom the data are disclosed
- The rectification, erasure or blocking of data processing which does not comply with the Directive.

According to Article 10 the processor must provide the data subject with his identity, the purposes of the processing and further information such as third parties, to whom the personal data are disclosed in order to guarantee fair processing in respect of the data subject.

The data subject must be provided with a right to object according to Article 14, i.e. the data subject can, at any time, object the processing of data relating to him.

According to the Directive, each Member State must provide one or more public authorities to ensure the proper application of the data protection law. This authority, often referred to as the supervisory authority, is competent to hear complaints lodged by any person or business. The supervisory authority must investigate the claim and may temporarily ban the processing. If the supervisory authority finds that the data protection law has been violated, then the supervisory authority could, among other things, order the erasure or destruction of the data and/or ban further processing.

Each Member State has appointed a Data Protection Commissioner, assigned with the role of raising public awareness on data protection, acting as an information point, issuing licenses for data control and/ or processing, reviewing the application of national laws on data protection and conducting research on relevant issues.

According to the Data Protection Working Group, service providers have the following obligations towards users: (Padgets)

- Inform the user about the data processing purpose, such as usage for personalized
- advertisements, sharing the data with third parties and the handling of highly sensitive data.
- Provide mechanisms to mitigate the risk of third parties gaining access to the personal data. Furthermore personal data should not be indexed by search engines.

- Offer convenient means to delete data completely.

- Require the consent of the data subject to include references on this person, for example in photo tags.

- Inform the user on potential privacy risks.

- Publish sensitive personal information only if the data subject has explicitly given his consent to this disclosure.

- The European Commission has developed the **'European Safer Social Networking Principles'** (Europa), which social networking sites are encouraged to pledge to (most have done so in principle at least). The Principles are:

  - Principle 1: Raise awareness of safety education messages and acceptable use policies to users, parents, teachers and carers in a prominent, clear and age-appropriate manner.

  - Principle 2: Work towards ensuring that services are age-appropriate for the intended audience.

  - Principle 3: Empower users through tools and technology.

  - Principle 4: Provide easy-to-use mechanisms to report conduct or content that violates the Terms of Service.

  - Principle 5: Respond to notifications of Illegal content or conduct.

  - Principle 6: Enable and encourage users to employ a safe approach to personal information and privacy.

  - Principle 7: Assess the means for reviewing illegal or prohibited content/conduct.

USA users and stakeholders have developed a **Social Network Users' Bill of Rights**, which social network providers are encouraged to adopt. The bill provides for the following:

1. Honesty
2. Clarity
3. Freedom of speech
4. Empowerment

5. Self-protection

6. Data minimization

7. Control

8. Predictability

9. Data portability

10. Protection

11. Right to know

12. Right to self-define

13. Right to appeal

14. Right to withdraw

In a recent report, ENISA (European Network & Information Security Agency, 2011) has made the following recommendations on ways to uphold user privacy in life-logging scenarios:

An informed user is the first step: the right to be forgotten, right to be let alone etc., are probably best enforced if the user is in control over his/her personal data.

- although the industry and the state /government and EU institutions have the most important role to play in this, be alert for protecting their own privacy (for example by making use of available tools) and be aware of the potential impacts on others, accidentally or deliberately affected by their own use of these services, as well as the impacts on themselves by the use of such services by others.

- make use of privacy friendly tools and consider factors and variables that reflect the trade-offs they have to make between the benefits (e.g. gain of comfort, increased functionality, discounts) and risks (e.g. mistrust, disadvantages, risk of misuse or manipulation).

ENISA recommends that industry and service providers:

- design life-logging services with privacy-friendly default configurations and settings, intelligible to a wide range of customers.

- perform impact assessments and use risk management approaches with regard to privacy and information security, so as to be better prepared.

- provide direct online access to users, showing them when and with whom data is being shared, including an audit trail of accesses, and to explain decisions being made using data elements

- make individuals aware of and control the privacy risks associated with use of life-logging services

- -use of encryption for data stored on user devices (e.g. smart phones), as well as use stronger multiple factor authentication mechanisms where available, i.e. two or three-factor authentication methods.

- -should consider following a distributed model of data storage, allowing users to store and process their data on their own equipment, with strict access controls, and the provision of interoperable services by separate companies rather than integrated large-scale data processors

- -need to obtain and consider detailed information about the functionality and configuration options of the life-logging tools they provide to employees, with a view to balance the need to use life-logging applications with productivity issues.


### State / government, EU Institutions and regulators

It is recommended that:

- The European Commission utilises the consultation on revisions to the data protection directive as a mechanism to anticipate the regulatory frameworks required as a result of increasing use of life-logging devices and services. We believe that the risks identified in this report, as well as the recommendations, **can inform on-going discussions** as to what changes to the data protection directive can anticipate the technologies and services described herein.

- Governments and other statutory agencies seek to create a **regulatory environment that provides incentives for privacy-aware or privacy friendly devices** and services while supporting competition through

promotion of interoperability and interconnection between devices, services as well as providers.

- The approach of **privacy and information security impact assessment** and **risk management** should be also followed by the public sector, which should promote it and also develop generic frameworks that could assist the industry towards this direction.

- State/governments as well as EU institutions should focus on making people aware both of the benefits and of the risks of using the life-logging services; more importantly, they should also aim to **educate the individuals** of the risks and ways to protect them (e.g. the inclusion of privacy training in computer science education).

- **Competition regulators** consider privacy issues in their broader work to ensure competitive marketplaces.

- **The EU and its member states** strive for regional agreements that would apply throughout the European Union, therefore consolidating and harmonising to the best possible extent the compliant treatment of life-logging data.

- **State/ governments** consider introducing real sanctions for personal data breaches.


### 4.6.1.8 Confidentiality, Interception & Surveillance

Directive 97/66/EC deals specifically with the protection of privacy in telecommunications. This Directive states that Member States must guarantee the confidentiality of communication through national regulations. This means that any unauthorised listening, tapping, storage or other kinds of interception of surveillance of communications is illegal. Where calling-line identification is offered, users must be given the possibility to not subscribe to this service or not having their identification revealed when making a telephone call. Conversely, subscribers to this service must have the possibility to reject incoming calls from individuals who have blocked their calling-line identification. Additionally, the Directive states that where

printed or electronic telecommunication directories exist, individuals are entitled to omission from the list , in principle, at no cost.

### 4.6.1.9  Direct Marketing

The individual has the right to object to the processing of his/her data for the purposes of direct marketing. In addition, the individual could request her internet service provider to install mail filters or contact one of the associations devoted to preventing junk e-mail (CAUCE, Privacy International, etc.). Other services exist to assist individuals to prevent junk e-mail, such as www.spamfree.org. If the problem persists, the individual can write to her/his national supervisory authority.

### 4.6.1.10  Privacy in the FUPOL - Project

The main requirement in the FUPOL context is the generation of anonymous data for further analysis. Data concerning the individual person, personal and sensitive data as described above (name, religion) needs to be removed before the data are stored in the FUPOL database. Only statistical data (age, sex, location) should be kept.

The **direct dialogue** is excluded from the above mentioned rule. This means, if an e-citizens posts something, which requires a reply from the city administration the individual data of the e-citizens need to be kept.
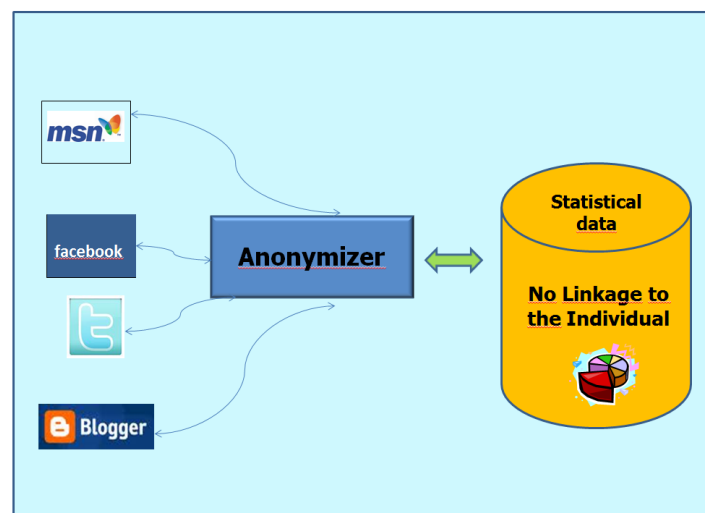
## 4.7 Security

The security of the FUPOL system is directly connected to the data protection and privacy issues and therefore discussed in further detail in the following chapter. It needs to be ensured that data from individuals (whether as data directly linked to a person or anonymous) are accessed.

### 4.7.1 Overview

Information security is the protection of information from a wide range of threats in order to ensure business continuity, minimize business risk, maximize business opportunities and be complied with all legal and contractual requirements. Information is an asset that, like other important business assets, is essential to every organization, especially in the increasingly interconnected business environment. As a result of this increasing interconnectivity, information is now exposed to a growing number and wider variety of threats and vulnerabilities. Since the FUPOL ICT tool is based on cloud computing and will be accessible as a web service, it's very important to provide security of all information asset in the process of policy modelling for which this tool will be used.

In this paragraph the main security requirements for FUPOL ICT tool are identified. As a base for their identification we used three main sources:

Risk assessment, taking into account the overall application and objectives of FUPOL ICT tool. Through a risk assessment, threats and vulnerabilities are identified, likelihood of occurrence is evaluated and potential impact is estimated.

Legal, statutory, regulatory and contractual requirements that policy makers and some stakeholders have to satisfy, and their socio-cultural environment. That includes some EC Directives (95/46/EC Data Protection Directive and 2002/58/EC31 E-Privacy Directive), but also national laws concerning privacy and data protection.

Other particular set of principles, objectives and business requirements for information processing that policy makers and some stakeholders have developed to support their operations.

Based on the identified security requirements and risks, we have identified security controls for the treatment of risks and reducing them to an acceptable level. The controls have been selected from the international standard ISO/IEC 27001:2005 Information technology -- Security techniques -- Information security management systems – Requirements and the methods defined through Technical Report ISO/IEC TR 15443-2:2005 Information technology — Security techniques — A framework for IT security assurance — Part 2: Assurance methods. These controls include the essential ones from a legislative point of view, such as data protection and privacy of personal information, protection of organizational records etc., but also controls considered as a common practice for information security, such as correct processing in application, information security awareness, allocation of information security responsibilities and access rights etc.

### 4.7.2 Specification of Methods

The main framework for defining security requirements, based on the risk assessment, can be presented by the figure 10. The first step in this process is context establishment. Understanding the organization and its processes is essential before beginning a draft risk assessment. The main objective of this first activity is to identify the overall system to be assessed and to situate it in its internal and external environment. This phase includes:

- Understanding the mission, objectives, values, strategies of the organization
- Establishing the external context
- Establishing the internal context
- Identification and analysis of stakeholders
- Identification and analysis of requirements
- Determination of the objectives
- Determination of the basic criteria

- Defining the scope and the boundaries

Also, in this process it is necessary to identify information asset that is subject of defining security requirements and protection. For example, in FUPOL the main asset components are: the raw data from citiziens and other stakeholders, the structured database, software, involved people from the policy makers' side, etc.
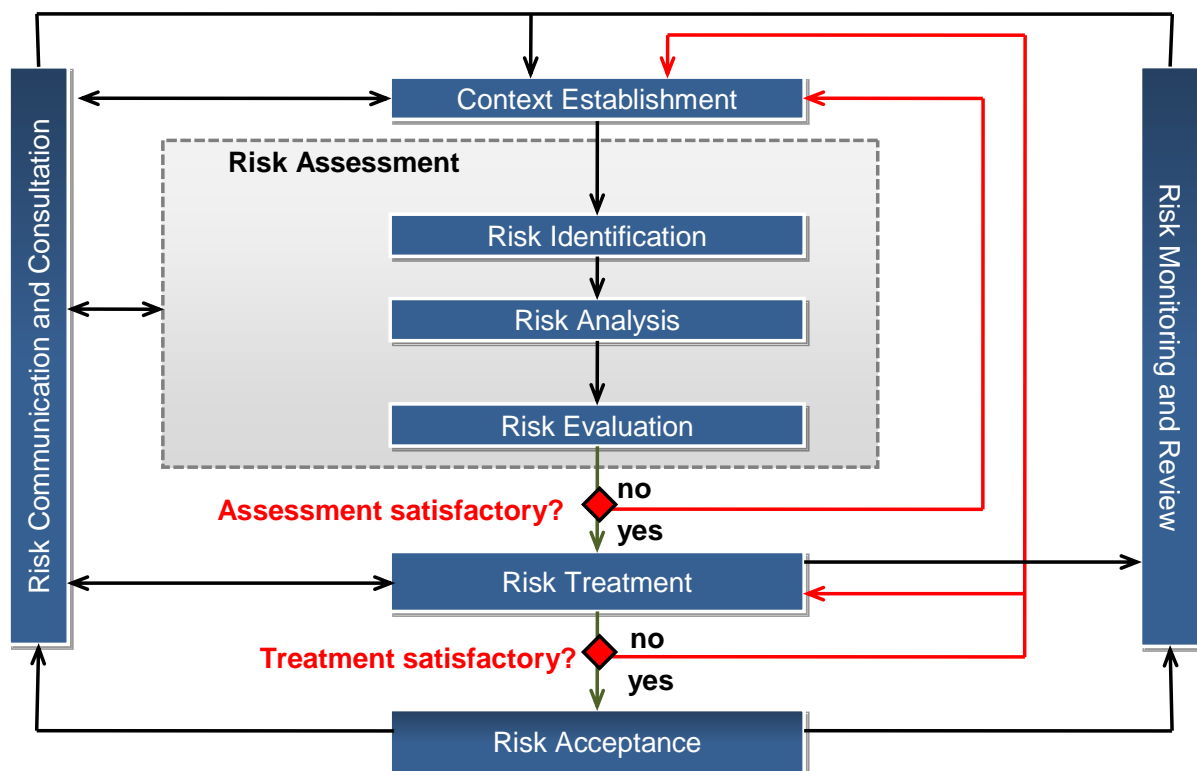


**Figure 1 Process of Information Security Risk Management**

All later phases are related to the risk management, and they could be conducted according to the standards for risk management – ISO 31000:2009 Risk Management – Principles and Guidelines and ISO/IEC 27005:2011 Information Technology – Security techniques – Information Security Risk Management.

In the phase of risk identification it is necessary to identify sources of risk, areas of impacts, events (including changes in circumstances) and their causes and their potential consequences. The aim of this step is to generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate

or delay the achievement of objectives. It is important to identify the risks associated with not pursuing an opportunity. Comprehensive identification is critical, because a risk that is not identified at this stage will not be included in further analysis.

Identification should include risks whether or not their source is under the control of the organization, even though the risk source or cause may not be evident. Risk identification should include examination of the knock-on effects of particular consequences, including cascade and cumulative effects. It should also consider a wide range of consequences even if the risk source or cause may not be evident. As well as identifying what might happen, it is necessary to consider possible causes and scenarios that show what consequences can occur. All significant causes and consequences should be considered.

Risk analysis involves developing an understanding of the risk. Risk analysis provides an input to risk evaluation and to decisions on whether risks need to be treated, and on the most appropriate risk treatment strategies and methods. Risk analysis can also provide an input into making decisions where choices must be made and the options involve different types and levels of risk.

Risk analysis involves consideration of the causes and sources of risk, their positive and negative consequences, and the likelihood that those consequences can occur. Factors that affect consequences and likelihood should be identified. Risk is analysed by determining consequences and their likelihood, and other attributes of the risk. An event can have multiple consequences and can affect multiple objectives. Existing controls and their effectiveness and efficiency should also be taken into account.

The way in which consequences and likelihood are expressed and the way in which they are combined to determine a level of risk should reflect the type of risk, the information available and the purpose for which the risk assessment output is to be used. These should all be consistent with the risk criteria.

After risk analysis it is necessary to do risk evaluation. The purpose of risk evaluation is to assist in making decisions, based on the outcomes of risk analysis, about which risks need treatment and the priority for treatment implementation. Risk evaluation involves comparing the level of risk found during the analysis process with risk criteria established when the context was considered. The criteria for risk evaluation must include, at minimum, confidentiality, integrity and availability. According to its specific needs, the organization may add other criteria such as authentication, accountability, non-repudiation and reliability. Based on this comparison, the need for treatment can be considered.

Decisions should take account of the wider context of the risk and include consideration of the tolerance of the risks borne by parties other than the organization that benefits from the risk. Decisions should be made in accordance with legal, regulatory and other requirements.

There are a lot of risk assessment methodologies that can be used in the process of assessing risks and according to that, defining security requirements. Some of them are: CRAMM, EBIOS, MEHARI, OCTAVE, Microsoft Security Risk Management, ISAMM, IT Grundschutz, ISO 27005 etc. Most of them support all phases of risk assessment, from risk identification to risk evaluation. Also, some of them have a tool that could be use for easier risk management implementation. Below is a brief description of some of these methodologies.

- CRAMM is a risk analysis method developed by the British government organization CCTA (Central Communication and Telecommunication Agency), now renamed the Office of Government Commerce (OGC). A tool having the same name supports the method: CRAMM. The CRAMM method is rather difficult to use without the CRAMM tool. The first releases of CRAMM (method and tool) were based on best practices of British government organizations. At present CRAMM is the UK government's preferred risk analysis method, but CRAMM is also used in many countries outside the UK. CRAMM is especially appropriate for large organizations, like government bodies and industry.

- EBIOS is a comprehensive set of guides (plus a free open source software tool) dedicated to Information System risk managers. Originally developed by the French government, it is now supported by a club of experts of diverse origin. This club is a forum on Risk Management, active in maintaining EBIOS guides. It produces best practices as well as application documents targeted to end-users in various contexts. EBIOS is widely used in the public as well as in the private sector, both in France and abroad. It is compliant with major IT security standards. EBIOS gives risk managers a consistent and high-level approach to risks. It helps them acquire a global and coherent vision, useful for support decision-making by top managers on global projects (business continuity plan, security master plan, security policy), as well as on more specific systems (electronic messaging, nomadic networks or web sites for instance). EBIOS clarifies the dialogue between the project owner and project manager on security issues. In this way, it contributes to relevant communication with security stakeholders and spreads security awareness.

- MEHARI is a methodology that provides a risk management model, modular components and processes, includes an asset classification, discovers vulnerabilities through audit, analyses a list of risk situations and provides seriousness levels for each. It bases its analysis on formulas and parameters, and allows an optimal selection of corrective actions. Also, it gives additional compliance measures to ISO 27002.

- The Operationally Critical Threat, Asset, and Vulnerability EvaluationSM (OCTAVE®) approach defines a risk-based strategic assessment and planning technique for security. OCTAVE is a self-directed approach, meaning that people from an organization assume responsibility for setting the organization's security strategy. OCTAVE-S is a variation of the approach tailored to the limited means and unique constraints typically found in small organizations (less than 100 people). OCTAVE-S is led by a small, interdisciplinary team (three to five people) of an organization's personnel who gather and analyse information, producing a protection strategy and mitigation plans based on the organization's unique operational security risks. To conduct OCTAVE-S effectively, the team must have broad knowledge of

the organization's business and security processes, so it will be able to conduct all activities by itself.

- ISAMM or 'Information Security Assessment & Monitoring Method' is an ISMS supporting risk management method, with supporting tools. It has been designed and continually improved based on Telindus' more than 20 years experience with thousands of information security – and risk management projects and tens of other risk management methods and tools. It is a quantitative type of risk management methodology where the assessed risks are expressed, through their Annual Loss Expectancy (ALE), in monetary units. ALE being the annual expected loss or cost should a threat or a group of threats being materialized. Annual Loss Expectancy (ALE) = [probability] x [average impact]. It is the basis for the Return on Investment (ROI) based approach and the economical justification capabilities of ISAMM with respect to the risk treatment plan. ISAMM allows showing and simulating the reducing effect on the risk ALE for each improvement control and to compare this with its cost of implementation. ISAMM's efficiency allows performing sound risk assessment within minimal time and effort. Telindus has also minimized the required steps in the assessment by using as many direct links to the ISO/IEC 27002 controls as possible. Also maximal support of the ISO/IEC 27001 ISMS standard was considered as a key requirement for ISAMM during its design and development. The latest evolution in the ISAMM methodology introduces an asset based approach which means it can be used to run risk assessments against an asset or a grouped set of assets.

- IT-Grundschutz provides a method for an organization to establish an Information Security Management System (ISMS). It comprises both generic IT security recommendations for establishing an applicable IT security process and detailed technical recommendations to achieve the necessary IT security level for a specific domain. The IT security process suggested by IT-Grundschutz consists of the following steps:
    - o Initialization of the process
    - o Definition of IT security goals and business environment
    - o Establishment of an organizational structure for IT security

- o Provision of necessary resources
- o Creation of the IT Security Concept:
- o IT-Structure Analysis
- o Assessment of protection requirements
- o Modelling
- o IT Security Check
- o Supplementary Security Analysis
- o Implementation planning and fulfilment
- o Maintenance, monitoring and improvement of the process
- o IT-Grundschutz Certification (optional)

The key approach in IT-Grundschutz is to provide a framework for IT security management, offering information for commonly used IT components (modules). IT-Grundschutz modules include lists of relevant threats and required countermeasures in a relatively technical level. These elements can be expanded, complemented or adapted to the needs of an organization.

- ISO 27005 provides guidelines for information security risk management in an organization, supporting in particular the requirements of an information security management (ISMS) according to ISO/IEC 27001. This standard presents more information security risk assessment approaches, from high-level information security risk assessment to different methods of detailed information security risk assessment:
  - o Matrix with predefined values
  - o Ranking of Threats by measures of Risk
  - o Assessing a value for the likelihood and the possible consequences of risks.

## Matrix with predefined values

In risk assessment methods of this type, for each asset, the relevant vulnerabilities and threats are considered. The appropriate rank in the matrix is identified by the value of assets, and the appropriate column is identified by the values of the threat and vulnerability.

For example, if the asset has a value of 3, the value of the threat is high and the value of vulnerability is low, the risk measure is 5. The matrix can vary in terms of number of threat levels, levels of vulnerability and number of classes of asset valuation, and can be finely adjusted to the needs of the organization.

| Asset value | Likelihood of occurrence - threat | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Low | | | Medium | | | High | | |
| | Vulnerability Level | | | | | | | | |
| | L | M | H | L | M | H | L | M | H |
| 0 | 0 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 4 |
| 1 | 1 | 2 | 3 | 2 | 3 | 4 | 3 | 4 | 5 |
| 2 | 2 | 3 | 4 | 3 | 4 | 5 | 4 | 5 | 6 |
| 3 | 3 | 4 | 5 | 4 | 5 | 6 | 5 | 6 | 7 |
| 4 | 4 | 5 | 6 | 5 | 6 | 7 | 6 | 7 | 8 |

| 0-2 Risk not significant | 3-5: Acceptable Risk | 6+ Risk not acceptable |
|---|---|---|

**Table 1 Matrix with Predefined Values (Asset, Threat, Vulnerability)**

The size of the matrix, in terms of the number of threat likelihood categories, ease of exploitation categories and the number of asset valuation categories, can be adjusted to the needs of the organization. Additional columns and rows will necessitate additional risk measures. The value of this approach is in ranking the risks to be addressed.

A similar Matrix as shown in Table 2 results from the consideration of the likelihood of an incident scenario, mapped against the estimated business impact. The likelihood of an incident scenario is given by a threat exploiting a vulnerability with a certain likelihood. The Table maps this likelihood against the business impact related to the incident scenario. The resulting risk is measured on a scale of 0 to 8 that can

be evaluated against risk acceptance criteria. This risk scale could also be mapped to a simple overall risk rating, for example as:

- Low risk: 0-2
- Medium Risk: 3-5
- High Risk: 6-8.

| | Likelihood of incident scenario | Very low (Very unlikely) | Low (Unlikely) | Medium (Possible) | High (Likely) | Very high (Frequent) |
|---|---|---|---|---|---|---|
| Business Impact | Very low | 0 | 1 | 2 | 3 | 4 |
| | Low | 1 | 2 | 3 | 4 | 5 |
| | Medium | 2 | 3 | 4 | 5 | 6 |
| | High | 3 | 4 | 5 | 6 | 7 |
| | Very high | 4 | 5 | 6 | 7 | 8 |

**Table 2 Matrix with Predefined Values (likelihood of incident, business impact)**

## Ranking of Threats by measures of Risk

This type of risk assessment methods can be used to relate the factors of consequences (asset value) and likelihood of threat occurrence (taking account of vulnerability aspects). The first step is to evaluate the consequences (asset value) on a predefined scale, e.g. 1 through 5, of each threatened asset. The second step is to evaluate the likelihood of threat occurrence on a predefined scale, e.g. 1 through 5, of each threat. The third step is to calculate the measure of risk by multiplying consequence and likelihood. Finally the threats can be ranked in order of their associated measure of risk.

| Threat | Consequence (asset) value | Likelihood of threat occurrence | Measure of risk (level of risk) | Risk priority ranking |
|---|---|---|---|---|
| Scenario A | 5 | 2 | 10 | 2 |
| Scenario B | 2 | 4 | 8 | 3 |
| Scenario C | 3 | 5 | 15 | 1 |
| Scenario D | 1 | 3 | 3 | 5 |
| Scenario E | 4 | 1 | 4 | 4 |
| Scenario F | 2 | 4 | 8 | 3 |

*Table 3 Threats by Measures of Risk*

As shown above, this is a procedure which permits different threats with differing consequences and likelihood of occurrence to be compared and ranked in order of priority, as shown here. In some instances it will be necessary to associate monetary values with the empirical scales used here.

## Assessing a value for the likelihood and the possible consequences of risks

In this type of risk assessment methods, the emphasis is placed on the consequences of information security incidents (i.e. incident scenarios) and on determining which systems should be given priority. This is done by assessing two values for each asset and risk, which in combination will determine the score for each asset. When all the asset scores for the system are summed, a measure of risk to that system is determined.

First, a value is assigned to each asset. This value relates to the potential adverse consequences that can arise if the asset is threatened. For each applicable threat to the asset, this asset value is assigned to the asset.

Next a likelihood value is assessed. This is assessed from a combination of the likelihood of the threat occurring and the ease of exploitation of the vulnerability, expressing the likelihood of an incident scenario.

| Likelihood of Threat | Low | | | Medium | | | High | | |
|---|---|---|---|---|---|---|---|---|---|
| Levels of Vulnerability | L | M | H | L | M | H | L | M | H |
| Likelihood Value of an incident scenario | 0 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 4 |

**Table 4 Assessing a Value for the Likelihood and the Possible Consequences of Risks**

Next, an asset/threat score is assigned by finding the intersection of asset value and likelihood value in Table 5. The asset/threat scores are summarized to produce an asset total score. This figure can be used to differentiate between the assets forming part of a system.

| Asset value | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Likelihood Value | | | | | |
| 0 | 0 | 1 | 2 | 3 | 4 |
| 1 | 1 | 2 | 3 | 4 | 5 |
| 2 | 2 | 3 | 4 | 5 | 6 |
| 3 | 3 | 4 | 5 | 6 | 7 |
| 4 | 4 | 5 | 6 | 7 | 8 |

**Table 5 Intersection of Asset Value and Likelihood Value**

The final step is to total all the asset total scores for the assets of the system, producing a system score. This can be used to differentiate between systems and to determine which system's protection should be given priority. After choosing an adequate risk assessment methodology and identifying the most critical risks, it's necessary to treat these risks.

Risk treatment involves selecting one or more options for modifying risks, and implementing those options. Once implemented, treatments provide or modify the controls. Risk treatment involves a cyclical process of:

- assessing a risk treatment;
- deciding whether residual risk levels are tolerable;
- if not tolerable, generating a new risk treatment; and
- assessing the effectiveness of that treatment.

Risk treatment options are not necessarily mutually exclusive or appropriate in all circumstances. The options can include the following:

- avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
- taking or increasing the risk in order to pursue an opportunity;
- removing the risk source;
- changing the likelihood;
- changing the consequences;
- sharing the risk with another party or parties (including contracts and risk financing); and
- retaining the risk by informed decision.

Selecting the most appropriate risk treatment option involves balancing the costs and efforts of implementation against the benefits derived, with regard to legal, regulatory, and other requirements such as social responsibility and the protection of the natural environment. Decisions should also take into account risks which can warrant risk treatment that is not justifiable on economic grounds, e.g. severe (high negative consequence) but rare (low likelihood) risks.

A number of treatment options can be considered and applied either individually or in combination. The organization can normally benefit from the adoption of a combination of treatment options. When selecting risk treatment options, the

organization should consider the values and perceptions of stakeholders and the most appropriate ways to communicate with them. Where risk treatment options can impact on risk elsewhere in the organization or with stakeholders, these should be involved in the decision. Though equally effective, some risk treatments can be more acceptable to some stakeholders than to others. The treatment plan should clearly identify the priority order in which individual risk treatments should be implemented. Risk treatment itself can introduce risks. A significant risk can be the failure or ineffectiveness of the risk treatment measures. Monitoring needs to be an integral part of the risk treatment plan to give assurance that the measures remain effective.

The purpose of risk treatment plans is to document how the chosen treatment options will be implemented. The information provided in treatment plans should include:

- the reasons for selection of treatment options, including expected benefits to be gained;
- those who are accountable for approving the plan and those responsible for implementing the plan;
- proposed actions;
- resource requirements including contingencies;
- performance measures and constraints;
- reporting and monitoring requirements; and
- timing and schedule.

Treatment plans should be integrated with the management processes of the organization and discussed with appropriate stakeholders. Decision makers and other stakeholders should be aware of the nature and extent of the residual risk after risk treatment. The residual risk should be documented and subjected to monitoring, review and, where appropriate, further treatment. For the FUPOL purpose, we have chosen methodology that interlinks and considers asset, threats and vulnerabilities. Combining these three variables we have recognised the most important risks and prepared a risk treatment plan for them. That has been done according the risk assessment methodology presented in the figure 1.

### 4.7.3 Definition of the Risk Categories

FUPOL is based on gathering information from the Internet, starting from the initial topic sensing and targeted searching for response of the citizens, companies and NGOs for discussion topic. Therefore, it is necessary to ensure observance of all the rules of access to personal information that individuals share on the Internet via various social networks (Facebook, Twitter, LinkedIn...) and thereby to provide the protection of their privacy. In order to implement all required security controls, it is necessary to perform a risk assessment of entire FUPOL processes and information asset that is included in it. The following Figure shows the structure of FUPOL model with all involved stakeholders and information asset that needs to be protected.
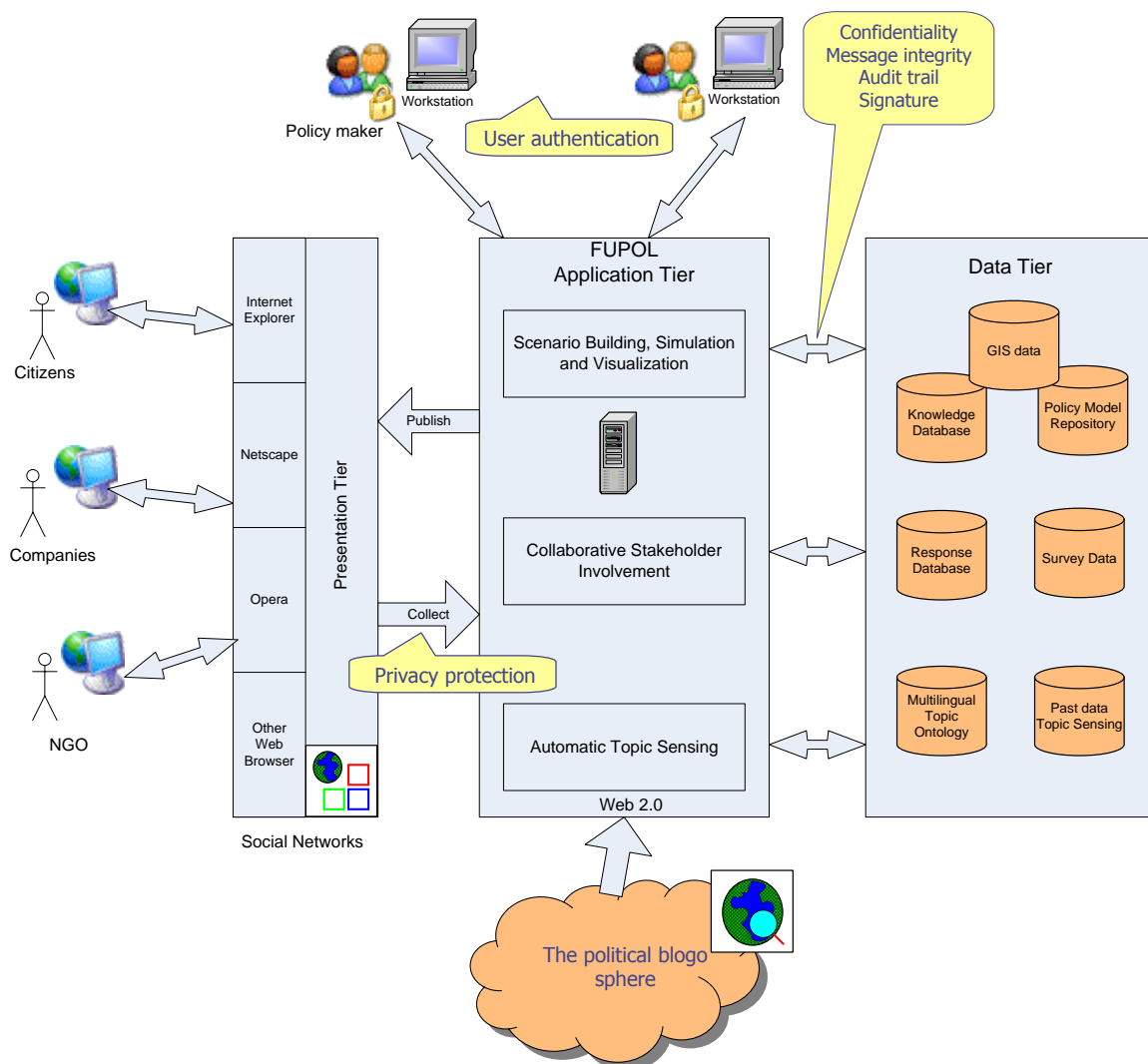


Figure 2 FUPOL Model with Stakeholders and Information Asset

As the main categories of asset we can recognize:

- the raw data from citizens and other stakeholders received from Internet,
- the structured databases (Multilingual Topic Ontology, Past Data Topic Sensing, Response Data, Survey Data, Knowledge Database, Policy Model Repository, GIS data),
- software (FUPOL application, operational system, development tool),
- hardware and other physical equipment on the policy makers' sides,
- users from the policy makers' sides,
- services (Internet connection, power supply...).

Here we are focused to the raw data, the structured databases and FUPOL application, so in the following table there are the main threats, vulnerabilities and risks connected to this asset. According to the results of this risk assessment, we recognized the most critical risks and defined the controls for their mitigation.

| Asset | Asset Value | Threat | Likelihood of occurrence | Vulnerability | Vulnerability level | Risk |
|---|---|---|---|---|---|---|
| *FUPOL application* | 3 | Identity theft | M | There are no mechanisms for secure access control | M | 5 |
| | | | | Bad password policy | L | 4 |
| | | | | There are no mechanisms for checking identification (for example personal information required) | M | 5 |
| | | Information leakage | M | HTML/Script comments containing sensitive information aren't scrub out | M | 5 |
| | | | | Improper application or server configurations | L | 4 |
| | | Application Denial of Service | L | The amount of load a particular user can put on the system isn't limited | M | 4 |

| | | | | Access to databases or other expensive resources isn't limited for unauthenticated users | L | 3 |
|---|---|---|---|---|---|---|
| | Insecure access control | M | | There are no mechanisms for secure access control | M | 5 |
| | | | | Bad password policy | L | 4 |
| | Software malfunction | L | | Inadequate configuration management | L | 3 |
| | | | | Lack of antivirus protection | L | 3 |
| | | | | There is no or failure to comply with installation or operation procedures | M | 4 |
| | Application Layer Intrusion Detection | M | | There are no mechanisms for secure access control | M | 5 |

| | | | There is no an attack detection and response system (for example web application firewall) | M | 5 |
|---|---|---|---|---|---|
| Injection of untrusted data | H | | Untrusted data are not separated from commands and queries | M | 6 |
| | | | The application doesn't use interpreters safely | M | 6 |
| Leaks or flaws in the authentication or session management | H | | There aren't strong authentication and session management controls | H | 7 |
| | | | The credentials aren't protected by hashing or encryption when stored | H | 7 |
| | | | Session IDs are exposed in the URL | M | 6 |
| | | | Session IDs don't timeout and users can't log out | M | 6 |
| Insecure Direct Object References | M | | All object references don't have appropriate defenses | H | 6 |
| | | | There isn't verification of the user for direct references to restricted resources | H | 6 |
| Cross-Site Scripting | M | | There is no mechanism for proper validating or escaping user supplied data before including it in the output page | H | 6 |
| Cross-Site Request Forgery | M | | There are no unique unpredictable tokens per user session | H | 6 |
| Security Misconfiguration | M | | There is no process for keeping application and all code libraries up to date | M | 5 |
| | | | There are more unnecessary ports, services, pages, accounts, privileges… | H | 6 |
| | | | Security settings in the development frameworks and libraries don't configured properly | M | 5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Failure to Restrict URL Access | **M** | Authentication isn't required to access every private page | **H** | **6** | |
| | | | | There are no security mechanism or it's not properly configured for authentication and authorization check for every page access. | **H** | **6** | |
| | | Insufficient Transport Layer Protection | **M** | There is no adequate transport layer protection (for example by SSL) | **M** | **5** | |
| | | | | The "secure" flag on the sensitive cookies isn't set | **H** | **6** | |
| *Row data from stakeholders* | **4** | Data theft and abuse | **H** | There are no mechanisms for secure access control | **M** | **7** | |
| | | | | Incorrect or incomplete privacy policy specification | **H** | **8** | |
| | | | | Insufficient privacy awareness | **H** | 8 | |
| | | | | Lack of understanding privacy implications | **H** | **8** | |
| | | | | Indolence – impiety of regulations | **M** | **7** | |
| | | | | Improper rejection of the backup media | **M** | **7** | |
| | | Accidental damage of system data and/or storage media | **M** | Hardware defect | **L** | **5** | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Software malfunction | L | 5 |
| | | | | Negligence of the employees/third party (because of lack of information) | L | 5 |
| | | | | Unseparated test and production base | L | 5 |
| | | | | Lack of policy/standards/procedures | H | 7 |
| | | | | Disrespect of policy/standards/procedures | M | 6 |
| | | | | The storage media's sensitivity to damage | L | 5 |
| | | Degradation of availability | M | Inadequate maintenance of the system | L | 5 |
| | | | | Inadequate capacity planning | L | 5 |
| | | | | Hardware defect | L | 5 |
| | | | | Software malfunction | L | 5 |
| | | Insecure Cryptographic Storage | H | There are no strong encryption algorithm for encrypting sensitive data | M | 7 |
| | | | | All sensitive data aren't identified | M | 7 |
| | | | | The keys and passwords aren't protected from unauthorized access | H | 8 |

| Structured databases | 4 | Data theft and abuse | H | There are no mechanisms for secure access control | M | 7 |
|---|---|---|---|---|---|---|
| | | | | Incorrect or incomplete privacy policy specification | H | 8 |
| | | | | Insufficient privacy awareness | H | 8 |
| | | | | Lack of understanding privacy implications | H | 8 |
| | | | | Indolence – impiety of regulations | M | 7 |
| | | | | Improper rejection of the backup media | M | 7 |
| | | Accidental damage of system data and/or storage media | M | Hardware defect | L | 5 |
| | | | | Software malfunction | L | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | **5** |
| | | | | Negligence of the employees/third party (because of lack of information) | **L** | **5** |
| | | | | Unseparated test and production base | **L** | **5** |
| | | | | Lack of policy/standards/procedures | **H** | **7** |
| | | | | Disrespect of policy/standards/procedures | **M** | **6** |
| | | | | The storage media's sensitivity to damage | **L** | **5** |
| | | Degradation in response time | **M** | Inadequate maintenance of the system | **L** | **5** |
| | | Degradation of availability | **M** | Inadequate maintenance of the system | **L** | **5** |
| | | | | Hardware defect | **L** | **5** |
| | | | | Software malfunction | **L** | **5** |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | Unauthorized review, coping and moving archived data | M | Inadequate access control | M | 6 |
| | | | | Lack of policy/standards/procedures | H | 7 |
| | | Insecure Cryptographic Storage | H | There are no strong encryption algorithm for encrypting sensitive data | M | 7 |
| | | | | All sensitive data aren't identified | M | 7 |
| | | | | The keys and passwords aren't protected from unauthorized access | H | 8 |

## *Risk Mitigation*

This paragraph provides risk mitigation plan for the most critical risks identified in the risk assessment process. These risks are grouped according to their similarities and the way of their mitigation in the following groups:

**- *Risk*:**
Injection of untrusted data

**- *Mitigation*:**
Preventing injection requires keeping untrusted data separate from commands and queries.

- The preferred option is to use a safe API which avoids the use of the interpreter entirely or provides a parameterized interface. It should be careful of APIs, such as stored procedures, that are parameterized, but can still introduce injection under the hood.

- If a parameterized API is not available, we should carefully escape special characters using the specific escape syntax for that interpreter. OWASP's ESAPI has some of these escaping routines.

- Positive or "white list" input validation with appropriate canonicalization is also recommended, but is not a complete defense as many applications require special characters in their input. OWASP's ESAPI has an extensible library of white list input validation routines.

**- *Risk*:**
Leaks or flaws in the authentication or session management

**- *Mitigation*:**

The primary recommendation is to make available to developers:

- A single set of strong authentication and session management controls. Such controls should strive to:
  - meet all the authentication and session management requirements defined in OWASP's Application Security Verification Standard (ASVS) areas V2 (Authentication) and V3 (Session Management).
  - have a simple interface for developers. Consider the ESAPI Authenticator and User APIs as good examples to emulate, use, or build upon.

- Strong efforts should also be made to avoid XSS flaws which can be used to steal session IDs.

**- *Risk*:**

Insecure Direct Object References

**- *Mitigation*:**

Preventing insecure direct object references requires selecting an approach for protecting each user accessible object (e.g., object number, filename):

- Use per user or session indirect object references. This prevents attackers from directly targeting unauthorized resources. For example, instead of using the resource's database key, a drop down list of six resources authorized for the current user could use the numbers 1 to 6 to indicate which value the user selected. The application has to map the per-user indirect reference back to the actual database key on the server. OWASP's ESAPI includes both sequential and random access reference maps that developers can use to eliminate direct object references.

- Check access. Each use of a direct object reference from an untrusted source must include an access control check to ensure the user is authorized for the requested object.

**- _Risk_:**

Cross-Site Scripting (XSS)

**- _Mitigation_:**

Preventing XSS requires keeping untrusted data separate from active browser content.

- The preferred option is to properly escape all untrusted data based on the HTML context (body, attribute, JavaScript, CSS, or URL) that the data will be placed into. Developers need to include this escaping in their applications unless their UI framework does this for them. More information about data escaping techniques is included in the OWASP XSS Prevention Cheat Sheet.

- Positive or "whitelist" input validation is also recommended as it helps protect against XSS, but is not a complete defense as many applications must accept special characters. Such validation should decode any encoded input, and then validate the length, characters, and format on that data before accepting the input.

- Consider employing Mozilla's new Content Security Policy that is coming out in Firefox 4 to defend against XSS.

**- _Risk_:**

Cross-Site Request Forgery (CSRF)

**- *Mitigation*:**

Preventing CSRF requires the inclusion of an unpredictable token in the body or URL of each HTTP request. Such tokens should at a minimum be unique per user session, but can also be unique per request.

- The preferred option is to include the unique token in a hidden field. This causes the value to be sent in the body of the HTTP request, avoiding its inclusion in the URL, which is subject to exposure.

- 2. The unique token can also be included in the URL itself, or a URL parameter. However, such placement runs the risk that the URL will be exposed to an attacker, thus compromising the secret token. OWASP's CSRF Guard can be used to automatically include such tokens in the Java EE, .NET, or PHP application. OWASP's ESAPI includes token generators and validators that developers can use to protect their transactions.

**- *Risk*:**

Security Misconfiguration

**- *Mitigation*:**

The primary recommendations are to establish all of the following:

- A repeatable hardening process that makes it fast and easy to deploy another environment that is properly locked down. Development, QA, and production environments should all be configured identically. This process should be automated to minimize the effort required to setup a new secure environment.

- A process for keeping abreast of and deploying all new software updates and patches in a timely manner to each deployed environment. This needs to include all code libraries as well, which are frequently overlooked.

- A strong application architecture that provides good separation and security between components.

- Consider running scans and doing audits periodically to help detect future misconfigurations or missing patches.

**- *Risk*:**

Failure to Restrict URL Access

**- *Mitigation*:**

Preventing unauthorized URL access requires selecting an approach for requiring proper authentication and proper authorization for each page. Frequently, such protection is provided by one or more components external to the application code. Regardless of the mechanism(s), all of the following are recommended:

- The authentication and authorization policies be role based, to minimize the effort required to maintain these policies.
- The policies should be highly configurable, in order to minimize any hard coded aspects of the policy.

- The enforcement mechanism(s) should deny all access by default, requiring explicit grants to specific users and roles for access to every page.

- If the page is involved in a workflow, check to make sure the conditions are in the proper state to allow access.

**- *Risk*:**

Insufficient Transport Layer Protection

**- Mitigation:**

Providing proper transport layer protection can affect the site design. It's easiest to require SSL for the entire site. For performance reasons, some sites use SSL only on private pages. Others use SSL only on 'critical' pages, but this can expose session IDs and other sensitive data. At a minimum, do all of the following:

- Require SSL for all sensitive pages. Non-SSL requests to these pages should be redirected to the SSL page.

- Set the 'secure' flag on all sensitive cookies.

- Configure your SSL provider to only support strong (e.g., FIPS 140-2 compliant) algorithms.

- Ensure the certificate is valid, not expired, not revoked, and matches all domains used by the site.

- Backend and other connections should also use SSL or other encryption technologies.

**- Risk:**

Data theft and abuse because of insecure access control

**- Mitigation:**

Access to information, information processing facilities should be controlled on the basis of business and security requirements. Access control comprises identification, authentication and authorisation. As a mitigation strategy it can be used security pattern-based access control. Security patterns are a well-established domain within the IT-security field. Security patterns describe well-proven security solutions for common IT-security problems. It can be used a combination of security patterns.

By implementing the "Single Access Point" pattern, only a one point of access needs to be secured. The "Checkpoint" pattern provides the framework for implementing the required authentication and authorization patterns and its enforcement.

Relying on a security pattern approach, the insecure access control risk can be mitigated as only authorized users have access to the FUPOL. Further a secure access control mechanism also indirectly mitigates the risk for identity theft as only the authorized user has access to his social media credentials. Also, it prevents personal data leakage, as all personal data stored in the FUPOL is only available to authorized users.

**- *Risk*:**

Personal data theft and abuse because of incorrect or incomplete privacy policy specification or insufficient privacy awareness

**- *Mitigation*:**

Data protection and privacy should be ensured as required in relevant legislation (95/46/EC Data protection directive and national laws), regulations, and, if applicable, contractual clauses. It should be developed and implemented data protection and privacy policy. This policy should be communicated to all persons involved in the processing of personal information.

Usability is one of the major challenges in the field of privacy as often privacy solutions are too complicated for the average user. Here, in creating privacy policies the focus is on usability and that shall be included in the FUPOL tool. This way, the policy maker does not need to have expertise in writing privacy policies but can focus on the FUPOL and its policy message. A design requirement for the FUPOL data collection component is an intelligent anonymisation algorithm. Depending on the sample size, the algorithm will automatically exclude specific personal data attributes from the decision support component or only provide them in an aggregated form. The average FUPOL end-user needs support to understand privacy policies and for that purpose the innovative visualization techniques can be used.

FUPOL tool should allow controlling the disclosure of personal data on the user side. For example, in a Facebook App instance of FUPOL, a privacy control can allow the end-user to explicitly select the types of personal information and the granularity of information (e.g. disclose the exact age vs. a range of age).

**- *Risk*:**

Accidental damage of system data and/or storage media

**- *Mitigation*:**

Appropriate operating procedures should be established to protect documents, computer media, input/output data and system documentation from unauthorized disclosure, modification, removal, and destruction, as well as accidental damage.

All media should be stored in a safe, secure environment, in accordance with manufacturers' specifications. Information stored on media that needs to be available longer than media lifetime should be also stored elsewhere to avoid information loss due to media deterioration. Registration of removable media should be considered to limit the opportunity for data loss. Media should be disposed of securely and safely when no longer required, using formal procedures. All employees, including in FUPOL processing, should receive appropriate awareness training in these procedures, and generally in the most important information security issues.

**- *Risk*:**

Insecure Cryptographic Storage

**- *Mitigation*:**

For all sensitive data deserving encryption, do all of the following, at a minimum:

- Considering the threats it is necessary to protect this data from (e.g., insider attack, external user), make sure that all such data is encrypted at rest in a manner that defends against these threats.
- Ensure offsite backups are encrypted, but the keys are managed and backed up separately.

- Ensure appropriate strong standard algorithms and strong keys are used, and key management is in place.

- Ensure passwords are hashed with a strong standard algorithm and an appropriate salt is used.

- Ensure all keys and passwords are protected from unauthorized access.

**- *Risk*:**

Unauthorized review, coping and moving archived data

**- *Mitigation*:**

Information should be classified to indicate the need, priorities, and expected degree of protection when handling the information. Information has varying degrees of sensitivity and criticality. Some items (e.g. personal data…) may require an additional level of protection or special handling.

An appropriate set of procedures for information labelling and handling should be developed and implemented in accordance with the classification scheme. Output from systems containing information that is classified as being sensitive or critical should carry an appropriate classification label (in the output). Items for consideration include printed reports, screen displays, recorded media, electronic messages, and file transfers. The handling procedures including the secure processing, storage, transmission, declassification, and destruction should be defined. Agreements with other organizations that include information sharing should include procedures to identify the classification of that information and to interpret the classification labels from other organizations.

## II.  PART TWO – POLICY DOMAINS AND PROCESSES

# 5 Urban Policy Domains (Overview)

To secure the on-going prosperity and wellbeing of nations the cities have to meet the needs of current and future generations. It must be ensured that economic growth can be sustained and increased without compromising the natural environment or our quality of life. This challenge has to be implemented by the city governments within the specific policy domains.

This chapter focuses on:

- The **definition** of political domains,
- Their **influence** on the city or region as a whole and
- The **correlations** between them

Due to the European city and urban planning strategies more than 20 domains have been identified. The current deliverable D2.1 covers only those having significant simulation/participation possibilities relevant to the FUPOL project, such as:

- Urban Planning
- Land Use
- Environment
- Economy
- Housing
- Community Facilities
- Transport and Movement
- Urban Segregation
- Migration
- Demography
- Social Affairs (incl. employment)
- City Treasury
- Tourism

All services provided by the city government to its citizen, either directly (through the public sector) or by financing private provision of services are called "Public Services", which are identical with the political domains (e.g. public transportation, education…)

## 5.1 Urban planning

Urban, city, and town planning aims to improve the design of economic and social environments of communities. Regional planning deals with a still larger environment, at a less detailed level. Urban planning also includes urban renewal by adapting urban planning methods to existing cities suffering from decay. (Urban planning, 2011).

Most of the cities have a Development Plan which contains the strategic policies of the city. The policies deal with city-wide issues and set them in the context of regional and national planning and set the framework for the local policies.

The strategic policies are grouped in topics such as economic activity, housing, shopping and services, environment, transport and movement. That means urban planning is an umbrella term, which encompasses many domains, which are described in detail below.

Urban planning is highly influenced by the Agenda 21, which was signed by 172 countries at the Earth Summit in 1992. It contains what have become the agreed principles of sustainable development with the following objectives:

- Maintenance of high and stable levels of economic growth and employment,
- Social progress which recognises the needs of everyone
- Effective protection of the environment; and
- Prudent use of natural resources

Therefore the city council is committed to guiding development in order to promote the city´s continuing prosperity and ensuring that change benefits all the city´s stakeholders.

The city plan for urban planning is essential to provide a consistent framework for the many planning decisions which the city council takes on development applications, infrastructure provision, environmental improvements and co-ordination with other authorities. It provides guidance to those proposing development and so reduces uncertainty.

Urban decision making requires a deep knowledge in urban dynamics and data management to   deal with the right answer to questions such as: What is the status quo? How shall the city in future look like? How can the development from the status quo into the wished direction take place? Which effects have political boundary conditions for actions in this context? Who are the key actors for the implementation of plans into practice (e.g. private investors, public authorities)?

Urban decision making must cope with complexity, uncertainty, conflicts and lack of adequate resources. Complexity and uncertainty relate for example to long-term and unpredictable dynamics of the system as changes in working conditions, demography, technological innovations or in the behaviour of actors. Further the actors bring in competing interests and values. Planning in this context is changing from big to small scales, from idealistic, intellectual to more pragmatic, from rational linear to more incremental and adaptive, from centralized to more incremental. In particular, in order to cope with the messiness and to assure an implementation of plans in practice, an integrative, incremental and collaborative approach is asked for. To reduce the risk in the urban decision making process, several decision tools has been developed.

In this deliverable an overview of these tools based on urban simulation models are reviewed, most of which lacks of an e-participation perspective in which the citizens

should be placed at the centre of the simulation activity to increase legitimacy of the model's application and results in practice.

## 5.2 Land Use

Land use is the human use of land. Land use involves the management and modification of natural environment or wilderness into built environment such as fields, pastures, and settlements. It has also been defined as "the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it". (Land use, 2011)

**Land use planning** is the term used for a branch of public policy encompassing various disciplines which seek to order and regulate land use in an efficient and ethical way, thus preventing land use conflicts. (Land use planning, 2011)

Governments use land use planning to manage the development of land within their jurisdictions. In doing so, the governmental unit can plan for the needs of the community while safeguarding natural resources. To this end, it is the systematic assessment of land and water potential, alternatives for land use, and economic and social conditions in order to select and adopt the best land-use options. Often one element of a comprehensive plan, a land use plan provides a vision for the future possibilities of development in neighbourhoods, districts, cities, or any defined planning area.

In common the goal of land use planning is to further the welfare of people and their communities by creating convenient, equitable, healthful, efficient, and attractive environments for present and future generations.

Various types of planning have emerged over the course of the 20th century (egg. Traditional or comprehensive planning, Systems planning, Democratic planning, Strategic planning, Environmental planning....)

The GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) defines Land use planning (LUP) as an iterative process based on the dialogue amongst all stakeholders aiming at the negotiation and decision for a sustainable form of land use in rural areas as well as initiating an monitoring its implementation. (Amler, 1999).

To secure a useful planning, the following conditions have to be fulfilled:

- The necessary land use change or the prevention of useless land use change has to be approved by all stakeholders.
- The land use plan has to be implemented, monitored and evaluated by the public authorities.

The goal of the land use planning should be to find the best use of land for all participants. This includes:

- Efficiency, which means that the land is economically profitable,
- Equity and acceptability which aims at reducing the inequality and
- Sustainability, which guarantees the needs of present and further generations (Soil Resources, Managment and Conservation Service, 1993)

Current processes include a combination of **strategic and environmental planning**. It is becoming more widely understood that any sector of land has a certain capacity for supporting human, animal, and vegetative life in harmony, and that upsetting this balance has dire consequences on the environment. Planners and citizens often take on an advocacy role during the planning process in an attempt to influence public policy. Due to a host of political and economic factors, governments are slow to adopt land use policies that are congruent with scientific data supporting more environmentally sensitive regulations.

**Smart Growth**: Since the 1990s, the activist/environmentalist approach to planning has grown into the Smart Growth movement, characterized by the focus on more sustainable and less environmentally damaging forms of development.

## 5.3 Environment

Generally speaking, environment could be considered as the space of life in each possible form. From a more specific "anthropocentric" perspective, environment is "The Space" (meaning a sort of meta-space involving all the others), a physical and social element for human production/reproduction (Harvey, 1989). In spite of this, attention to environmental conservation and increasing relevance of environmental politics are quite recent. They start from the awareness (ever greater and more diffused) that some human behaviours related to specific development models/forms and consumption life styles are producing effects that threaten the environmental balance and the preservation of basic resources, thus reducing the capacities of production/reproduction of future societies.

Although "environment" and "territory" are not synonymous, they are strictly tied (Tourain, 1997). The same concept of environmental sustainability reflects an existing tension between territory as nature and territory as culture, stressing the changes depending on human interaction and on the need of a correct and effective exploitation of available resources (Giddens, 1986). Since environmental matters are characterized by a spatial dislocation of cause-and-effect relations – so that localized phenomena could entail effects also in very far places – the best dimension for facing analysis, discussion and solutions is the global one (or maybe a supraregional one). Nevertheless environment, as issue, is ever more present in local discussions, both in political agendas (at each level) and in claims of also extremely localized groups.

This hyper-presence of environmental issues in different spatial levels of government is reflected also in different policy domains. It is indeed very difficult to distinguish between specific environmental policies and other policies belonging to other domains which produce relevant environmental effects. Therefore, the environment safeguard and the research of environmental sustainability have to be considered as goals "transversal to" and "interdependent with" a wide range of different policies (e.g. land use, transportation, landscape, waste recycling, energy, tourism, healthcare, housing, demography, etc.), rather than an independent domain.

Starting from the end of the '80s, several international actions have been established to manage environmental politics (or policies): the Rio Summit (1992) and Agenda 21 programs, the Kyoto protocol (1997), the first European Conference on Sustainable Cities (Aalborg 1994), the Environment Action Programmes of the European Union (currently the sixth is operating) in which the main environmental goals of EU are defined, or the Aarhus Convention (adopted in 1998) promoting citizens' involvement on environmental issues is promoted − both by recognizing the right of access to environmental information and by encouraging the participation to policies and decision processes − are only some of main steps in the general discussion on environment.

As far as the EU is concerned, environmental policies have an important role among those produced by the Community institutions: indeed, the promotion of an environment respectful culture and the struggle against climate change and pollution have been one of the main concerns of EU for many years. Action is nowadays focused on the following issues:

- struggle against climate change;
- biodiversity conservation;
- reduction of health problems created by pollution;
- development of a more responsible and effective management of natural resources

The adoption at local levels of general guidelines and goals defined by the EU and by international organizations has put environment and territory conservation as well landscape safeguard (according to European Landscape Convention) among the main institutional responsibilities of local governments. Therefore, ever more frequently such administrations have to act in a transparent way to achieve those goals and to inform citizens (or answer them).

Even though, according to the considerations expressed above, a clear picture of environmental matters can be obtained only from a global perspective, the local level is however important because it is primarily connected with people's life, action and interactions. It is at local level that perceptions concerning environmental changes and consumption of territory resources have a greater and more immediate impact, as well as benefits resulting from virtuous behaviours are more detectable. In some way, due to the sense of belonging and the awareness of interdependency, the city is the ideal place where different types of actors involved in environmental policies can share frameworks and goals and interact for achieving them, with effects on individual behaviours and life styles.

According to FUPOL purposes and regarding the main objective of the project (the improvement of urban governance models), environment conservation also means to look at the city as a real urban ecosystem, with its own demands and needs (also to be re-defined in a shared way) and resources, intended as the capacity of producing and sustaining services and activities. To assure the city sustainability it is necessary to re-think relations among residents, production activities and surrounding nature, not only by a spatial perspective – that is considering available resources, existing production models and consumption styles – but also from a time perspective that is useful to undertake the relation between present and future generations.

Although environmental themes and goals can be faced in different types of policies, there are some domains that, even at local level, are characterized by specific environmental policies. The achievement of local goals is related in a direct way to the goals defined at EU levels, especially for what concerns the reduction of health problems produced by air pollution and the conception of a more responsible and effective management of natural resources.

## 5.3.1 Air

The EU has been developing for many years specific rules for reducing and preventing damages related to the presence of polluting substances. Such rules are

imposed to Member States to control the use and production of pollutants and to intervene in case of exceeding of predefined limits.

An example of these policies in the urban context concerns the thresholds established during 2008 referring to particulate emissions (PM 10 and PM 2.5). These particles are mainly produced by private traffic and waste combustion and can cause respiratory diseases. This is why the EU regulations impose a reduction of 20% of such particles in urban areas between 2011 and 2020. To reach such goal, policy actions are mainly related with traffic limitations, the regulation of individual behaviours and production processes that could jeopardise air quality.

## 5.3.2 Challenge Air Pollution

The development of clean air policy strategies requires decision makers to face several challenges and opportunities, particularly referred to specific pollutants and the linkages between air issues, including the best strategies to address them at different spatial scales.

Experience in Europe has shown that for non-threshold pollutants, single limit values or standards may not be the most appropriate way of managing air quality and this has encouraged the European Commission to propose a new additional concept, the exposure reduction target (ERT), entered into force with the European Directive on air quality (2008/50/EC), based on the concept that for pollutants with no effect threshold, such as PM2.5, it will generally be more beneficial for public health to reduce pollutant concentrations across the whole of an urban area. The ERT would provide a better air quality management system than one relying solely on ambient air quality standards, due to a more effective contribution of source-related emission reductions, the saving of administrative resources and the improvement of public health.

The development of clean air policy strategies is particularly affected by the links with climate change. In fact, as the scientific evidence of climate change and its impact on urban air quality improves, air quality management must consider the

possible effects that a changing climate could have on regional air quality. Moreover, policy makers will also need to consider the additional positive or negative climate forcing that common air contaminant emissions could produce with existing or proposed air quality improvement measures. The linkages between air quality measures and climate change should take into account both actions that directly reduce emissions of greenhouse gases (GHGs) and other air pollutants, actions that indirectly reduce energy use and emissions and actions that include mitigation and adaptation by enhancing adaptive capacity.

Both climate change and air quality policies deal essentially with the same emission sources, so they should be faced together by policy makers. An example of such interrelations is given in the energy sector where any policy measure which reduces the use of fossil fuels in existing applications will be co-beneficial for air quality and climate change. Such measures include energy efficiency in buildings and households, which could also have co-benefits in the form of improved indoor air quality. Furthermore, community-based systems enhance local adaptive capacity, create and retain jobs in the local community, and potentially reduce a wide range of pollutants contributing to air pollution and climate change.

Another sector showing strong linkages between air quality issue and climate change in the urban context is given by transportation: any policies which lead to reduce travel and/or fuel use will improve both climate change and air quality. Such measures are usually of fiscal type and could involve specific issues like road user charging, fuel duty measures or tax/duty measures on vehicles with strong emissions.

To summarise, the following key messages can be considered as useful suggestions for the development of new urban policies regarding air quality  (Williams, 2007). The issue of air quality management is beginning to take on global dimensions, where the linkages between climate change and air pollution, how to control their sources pollutants and how they may interact to pose a cumulative risk to human health are emerging as important challenges.

- Urban areas are a major concern for air quality management, particularly as far as emissions and health effects associated with particulate matter (PM) are concerned.

- For pollutants with no (or very low) effect threshold such as PM2.5 it will generally be more beneficial for public health to reduce pollutant concentrations across the whole of an urban area as benefits would increase from reductions in pollution levels even in relatively "clean" areas.

- The interaction between climate change and air quality poses additional challenges for policy makers. Much of the focus to date has been in the area of atmospheric chemistry, with less emphasis on specific emission reduction technologies and measures that will reduce emissions of all key pollutants (air pollutants, air toxics and GHGs).

- Examples drawn from the EU (especially the UK) and North America (especially Canada) demonstrate the challenges of integrating climate change into the development of air quality policy strategies.

- The health benefits from integrating climate change and air quality management decisions can be non-linear, synergistic and in some cases counteractive. Measures must be taken that result in optimal reductions in emissions of all key pollutants, rather than at the expense of one or the other.

- Opportunities for adopting an integrated approach to air quality management include in particular energy and transportation as two sectors with a fundamental impact for the development of urban areas.

### 5.3.3 Water

As in the case of air quality, local administrations are directly responsible also for the quality of water resource and for the efficiency of services connected to its distribution. Related policies are focused on:

- the reduction of water wastage;
- the reduction/control of pollution concerning productive processes;
- the improvement of the (intrinsic) quality of water;
- the improvement of services connected to provision and distribution;
- the promotion and support of the consumption of tap water.

### 5.3.4 Challenge Water Management

The management of water resources is becoming a more and more crucial issue and a lot of debate has been developed around the so called Urban Water Conflicts (UWC). The term refers to cases in which the presence of organized water services based on physical infrastructure is decisive in framing the conflict, but regardless the kind of actors among which the conflict actually takes place (Massaruto, 2011).

The basic idea is that water is becoming scarce and that people are "struggling" for it, although some economists are criticizing the concept of water scarcity saying that it is a socially constructed issue, while the real problem is given by inefficient use and poor management. Modernization appears to be the solution but it can also generate several conflicts, due to the never definitively solved relation between water availability (natural capital) and water services (artificial capital), the former being abundant in general but neither easily nor promptly usable (thus scarce), and the latter being potentially unlimited, but costly and requiring sophisticated means for being managed, thus implying complex institutional arrangements and collective enterprises. The mutual evolution of both systems, each being constrained by its own "limits to growth", is the ultimate source of conflicts, either occurring within each system or between them.

The crisis of the traditional model of managing urban water resources leads to the need of proposing new solutions. The Water Framework Directive (WFD) represents the turning point that starts the new European water policy focused on sustainability. Among its basic principles the following clarify the new strategy:

- conservation of natural capital at a good ecological status;
- prevention of further deterioration;
- economic assessment aimed at implementing an efficient allocation;
- full-cost recovery aimed at avoiding that artificial water assets are developed beyond the social willingness and ability to pay;
- public participation in order to ensure that all social stake are duly taken into account.

The transformation of urban water services in most developed countries includes the following issues:

- from local management to regional integration;
- from public subsidies and public finance to full cost recovery and market finance;
- from direct management of local authorities to various forms of independent and professional water industry, often with the involvement of the private sector;
- from the dominance of water supply and urban network to the one of water resources management at the river basin scale and the growing emphasis on cleanup, treatment and conservation of resources;
- from simple, discretional and benevolent regulation to more sophisticated, controversial and adversarial regulatory systems;
- from sectoral water policy focused on infrastructure development to integrated management focused on sustainability and cooperation.

Sustainability of urban water systems is not only a technical, managerial and economic problem; it requires instead a thorough adaptation of the institutional,

political and social spheres. In this perspective, the transformation of urban water management can be considered as a problem of governance.

The **new challenge is to find a way back to the world of the individual access to the common property**, of course after an institutional development that makes social control of this access actually feasible. The underlying paradigm is that of an innovative understanding of "integrated water resources management".

New governance issues (e.g. new stakeholders bringing in new dimensions of demand; degradation of water quality causing the impossibility of traditional water management and regulation to carry on providing the same environmental functions as before) are responsible for pressures for change, although filtrated by the water policy network.

Several actors can be individuated in this process: water experts recognize problems and propose solutions, scientific community provides means for appreciating issues, water industry develops technologies and declares its capability to solve problems, water users make pressure in order to have more water available, environmental pressure groups ask for improved water quality etc. Of course, there might be a close interaction between these actors: for example, scientific research can be influenced by the water industry financing it; the appreciation of some problems and issues might by strongly conditioned by investment already made by the water industry and by its perception of what can or should be done.

There are also factors that constrain water policy action:
- availability of financial resources,
- readiness to pay by consumers,
- as well as geographical and institutional factors.

Altogether, these factors determine new water policies in urban water management, e.g. increasing quality standards and/or promoting new water investment.

Governance in the water sector becomes more and more complex, the meaning of the "public interest" less clear and univocal. In many countries, the trend towards privatisation also means the search for a new model of regulation, where water regulation/planning and water service operators are conceived as a counterpart rather than partners.

In a view to water policy that is dominated by engineering and economics, solutions may appear straightforward, once they are technologically feasible, economically sound and provided that the market is put in the condition to operate. This very outcome, however, is facing unexpected reactions and difficulties that cannot be simply dismissed as displays of Nimby syndromes, anti-market ideological stakes and Luddism. Dealing with this kind of conflicts is increasingly becoming the emerging issue that water institutions will have to solve in the future. Since institutional change and social learning require time and are based on trust, legitimacy and ultimately on "social capital" this arises in a further important lesson: while it might seem little important in the short term to invest on this – through public participation and direct involvement – returns of this investment will appear much more valuable in the future.

## 5.4 Economy

An **economy** consists of the economic system of a country or other area (city, region). This includes labour, capital and land resources, the manufacturing, trade, distribution and consumption of goods and services of that area.

An economy may also be described as a spatially limited and social network where goods and services are exchanged according to demand and supply between participants by barter or a medium of exchange with a credit or a debit value accepted within the network. (Economy, 2011)

A given economy is the end result of a process that involves its technological evolution, history and social organisation as well as its geography, natural resource

endowment and ecology as main factors. These factors give context, content, and set the conditions and parameters in which an economy functions.

In the FUPOL project not the whole economy should be simulated, which would exceed the scope of the project. It is advisable to select a sector, such as banking, manufacturing, or tourism, which can be linked to land use or participative budgeting etc.

## 5.5 Housing

A further key domain for cities and regions to focus on is housing. The housing policies should seek to maintain and, where appropriate, increase the residential population and housing stock, while at the same time maintaining satisfactory standards of accommodation and environment. (Rees, 2011)

The following aims should indicate the general intentions of the housing section:

- Protect and improve the existing housing stock and encourage additions to it in suitable locations, which are predominantly residential or mixed use in character. To require housing in mixed developments it is designed to minimize disturbance to both residential and commercial occupiers and should provide separate access.
- Maintain and improve the standard and quality of residential accommodation.
- Encourage appropriate types of residential accommodation to meet housing needs (e.g. for elderly and single)
- Improve the quality and accessibility of the residential environment and those services and facilities which are essential to residents (e.g. recreation, shopping and local amenities, transport, entertainment, social services) and
- Provide affordable housing for all citizens.

## 5.6 Community Facilities

One of the main responsibilities of the cities is to provide an appropriate level and range of health, welfare, educational and spiritual services for the residents, workforce and visitors. The provision of community facilities is not limited to land use planning considerations. The city planning authorities, however, will ensure that the accommodation requirements of a range of community facilities are considered. The satisfactory functioning of the cities depend on the health and welfare of those who live and work in the area. (Rees, 2011)

The cities and regions should encourage the following strategies:

- Achieve an adequate and appropriate provision of health, social and educational services and facilities for residents, workers and visitors.
- Encourage further provision of accommodation for social, health and educational services where such a need exists.
- Achieve an adequate and appropriate provision of children's day-care facilities for residents and workers and retirement homes.

## 5.7 Transport and Movement

Cities are heavily dependent on an efficient and attractive integrated transport system to move large numbers of people daily and to enable the efficient servicing of the main activities. The increasing numbers of commuters, the servicing of the business and the residential communities and the existence of through-traffic movements place a great deal of demand upon the rail and highway networks servicing the cities and regions. These demands lead to conflicts between pedestrians and vehicles and between local and through traffic. In addition road traffic contributes to noise, air pollution and use of fossil fuels. (ECO-BOS, 2011)

Consequently the policy strategies for the Transport and Movement domain should consider the following issues:

- Enhancing public transport – the existing local rail- and bus services should be improved to increase frequency, quality and reliability and new local services should be introduced. The public transport facilities need accessibility for disabled people.
- Improving existing road networks
- Encouraging alternatives to vehicle-based travel, such as cycling and walking, especially facilities have to be provided, which enhance safety and convenience
- Changing peoples behaviours
- Electric car strategy
- Less shopping trips- by communal delivery points and intelligent fridges
- Provision of communal delivery points and intelligent fridges in selected areas

## 5.8 Urban Segregation

Urban segregation is a concept used to indicate the separation between different social groups in an urban environment, which is a barrier for achieving social inclusion in cities. It occurs in various degrees in most large modern cities, including the developed and the developing world. Location is a key issue in many situations of urban segregation. For example, racial and ethnic ghettos are a persistent feature of most large cities. In some countries high-income families concentrate in areas that expand from the historical centre into a single geographical direction, whereas the poorest families mostly settle in the roughly equipped far peripheries.

Urban segregation has different meanings and effects depending on the specific form and structure of the city, as well as the cultural and historical context. Its categories include income, class, race, and ethnical spatial segregation.

Segregation causes negative impacts on the cities and lives of their inhabitants. It imposes severe restrictions to certain population groups, such as the denial of basic infrastructure and public services, fewer job opportunities, intense prejudice and

discrimination, and higher exposure to violence. Several studies point out that disadvantaged urban populations would benefit from a more non-segregated distribution of people in urban areas. These studies have increased the attention on this theme and demanded a more detailed understanding of urban segregation.

As urban segregation is significant for public policy, indices to measure the extent of urban segregation have been developed. They are useful for understanding the patterns and trends of segregation. (Feitosa)

## 5.9 Migration

Migration in this context means all long-term changes of residence or workplace and as such affects millions of people directly and most of them indirectly. Migration movements and their direction can have a large variety of push and pull factors such as economic conditions, educational infrastructure, attitude of the local population towards migrants, hospital infrastructure, climate, cost of living, social security system, language and much more.

A benefit of choosing the migration policy domain is the fact that migration is a very important political topic and appropriate policy simulation tools and models are urgently needed to improve political decisions **across Europe**.

In detail the reasons are:

- **Large Intra-Community migration flows**. Migration in this context should not be understood as people entering or leaving the EU only. It covers all changes of residence or workplace in the EU including EU-citizen moving from one EU-Member State to the other.
- **Europe is the top immigration area**. The International Organization for Migration (IOM) said there are more than 200 million migrants around the world today. Europe hosted the largest number of immigrants, with 70.6

million people. North America, with over 45.1 million immigrants, is only second.

- **Important for young people**. Migration is an important issue for young people, because they are more willing to move. Their typical drivers are education and better jobs.

## 5.10 Demography

Demography is the statistical study of human population. It can be a very general science that can be applied to any kind of dynamic human population, that is, one that changes over time or space. It encompasses the study of the size, structure and distribution of these populations, and spatial and/or temporal changes in them in response to birth, migration, aging and death.

Demographic analysis can be applied to whole societies or to groups defined by criteria such as education, nationality, religion and ethnicity. Institutionally, demography is usually considered a field of sociology, though there are a number of independent demography departments. Formal demography limits its object of study to the measurement of population processes, while the more broad field of social demography population studies also analyse the relationships between economic, social, cultural and biological processes influencing a population. (Demography, 2011)

In our FUPOL project demography is specified as a key driver in all policy domains, which will be selected for participation and simulation.

## 5.11 Social Policy (incl. employment)

Social policy primarily refers to guidelines, principles, legislation and activities that affect the living conditions. Thus, social policy is that part of public policy that has to

do with social issues (in the areas of health care, human services, criminal justice, inequality, education, and labour) Social policy often deals with wicked problems. Social policy is defined as actions that affect the well-being of members of a society through shaping the distribution of and access to goods and resources in that society

Social Policy is also distinct as an academic field which focuses on the systematic evaluation of societies' responses to social need. (Social Policy)

Social policy is also an umbrella term and comprises the domains:
- Healthcare
- Education
- Safety and security
- Housing
- Social Inclusion and

And it deals with social security, unemployment insurance, pensions and child protection.

One main field of social policy is "Employment" which should guarantee the well-beeing and the livelihood of the citizen. The cities are anxious to attract companies for job creation.

## 5.12 Participatory Budgeting

Participatory budgeting is a process of democratic deliberation and decision-making, and a type of participatory democracy, in which ordinary people decide how to allocate part of a municipal or public budget. Participatory budgeting allows citizens to identify, discuss, and prioritize public spending projects, and gives them the power to make real decisions about how money is spent.

Participatory budgeting generally involves several basic steps:
- Community members identify spending priorities and select budget delegates

- Budget delegates develop specific spending proposals, with help from experts

- Community members vote on which proposals to fund

- The city or institution implements the top proposals

Various studies have suggested that participatory budgeting results in more equitable public spending, higher quality of life, increased satisfaction of basic needs, greater government transparency and accountability, increased levels of public participation (especially by marginalized or poorer residents), and democratic and citizenship (Participatory Budgeting, 2012)

The first full participatory budgeting process was developed in the city of Porto Alegre, Brazil, starting in 1989. Participatory budgeting was part of a number of innovative reform programs started in 1989 to overcome severe inequality in living standards amongst city residents. One third of the city's residents lived in isolated slums at the city outskirts, lacking access to public amenities (water, sanitation, health care facilities, and schools). Participatory budgeting in Porto Alegre occurs annually.

Since the emergence in Porto Alegre participatory budgeting has spread to hundreds of Latim American cities and is of growing importance in Europe.

## 5.13 Tourism

In general, tourism is travel for recreational, leisure or business purposes. The World Tourism Organization defines tourists as people "traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes". (Tourism, 2012)

Tourism has become a popular global leisure activity. Over 940 million tourist were registered in the year 2010 which created an income of around US$900 billion.

As tourism is responsible for a lot of job possibilities and a high contribution to the GDP it is essential for the economic prosperity of the cities. Especially the service industry such as transportation services, accommodations, including hotels and resorts, amusement parks, casinos, shopping malls, music venues and theatres are the profiteers of tourism.

The most visited cities by international tourist arrivals are Paris and London with around 15 million visitors followed by Antalya New York with around 10 million visitors.

In addition to the initial reasons for tourism such as leisure and business the latest trends show a comprehensive variety of sectors, like:

- Sustainable tourism, which can be seen as having regard to ecological and socio-cultural carrying capacities and includes involving the community of the destination in tourism development planning. It also involves integrating tourism to match current economic and growth policies so as to mitigate some of the negative economic and social impacts of 'mass tourism.  (Tourism, 2012).
- Ecological Tourism to consider 'plants' and 'people' when implementing the sustainable tourism development process.
- Pro-poor tourism, which seeks to help the poorest people in developing countries through small-scale projects in local communities.
- Recession tourism, which defined by low-cost, high-value experiences to elongate trips.
- Medical tourism, which is forced by the increased differences between countries for a given medical procedure (e.g. Southeast Asia, India, Eastern Europe)
- Educational tourism, which is characterized by the growing popularity of teaching and learning.
- Creative tourism has recently gained popularity as a form of cultural tourism.
- Dark tourism means visiting of "dark" sites, such concentration camps etc.

- Doom tourism means traveling to places that are environmentally or otherwise threatened (The coral reefs of the Maldives…)

Most likely the European cities will support primarily sustainable tourism and education tourism.

## 5.14 Interdependencies between the Policy Domains

| Domains | Land Use | Environ-ment | Economy | Housing | Community Facilities | Transport and Movement | Urban Segregation | Migration | Demo-graphy | Social Policy (incl. Employ-ment) | Participa-tory Budgeting | Tourism |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Land use | H | H | H | H | H | H | H | H | H | H | H | H |
| Environment | H | H | H | M | M | H | L | L | H | L | L | H |
| Economy | H | H | H | H | M | H | M | H | H | H | H | H |
| Housing | H | M | H | H | N | H | H | H | H | M | H | H |
| Community Facilities | H | M | M | N | H | H | M | M | H | M | H | H |
| Transport and Movement | H | H | H | H | H | H | M | M | H | M | L | L |
| Urban Segregation | H | L | M | H | M | M | H | H | M | H | L | L |
| Migration | H | L | H | H | M | M | H | H | M | H | L | L |
| Demography | H | H | H | H | H | H | M | M | H | H | H | L |
| Social Policy (incl. Employment) | H | L | H | M | M | M | H | H | H | H | H | L |
| Participatory Budgeting | H | L | H | H | H | L | L | L | H | H | H | H |
| Tourism | H | H | H | L | L | H | L | L | L | M | M | H |

# 6 Major drivers and constraints of urban policies

## 6.1 Overall Policy Objective:  Sustainable Development

The policy objective on the highest is sustainable development comprising a number of policy domains mentioned before such as land use, environment, housing, energy, health, economy, transport etc. **All the domains have to be in an equilibrium to be called sustainable.**

In case they are not balanced it will lead to serious challenges such as slums, traffic jams, pollution, segregation and ghettos, health problems or a declining economy. The overall policy objective " sustainable development" is difficult to implement, because it means balancing a **complex system.**

Political systems in general, urban political systems, cities all share the same challenge. They are complex systems with a behaviour, which is difficult to predict with absolute certainty. Definitions are often tied to the concept of a "system"—a set of parts or elements that have relationships among them differentiated from relationships with other elements outside the relational regime. Many definitions tend to postulate or assume that complexity expresses a condition of numerous elements in a system and numerous forms of relationships among the elements. At the same time, what is complex and what is simple is relative and changes with time. (Complexity, 2011)

Warren Weaver has posited that the complexity of a particular system is the degree of difficulty in predicting the properties of the system, if the properties of the system's parts are given. Weaver has influenced the thinking about complexity. In his view, complexity comes in two forms (Weaver, Retrieved 2007):

- disorganized complexity, and
- organized complexity

In Weaver's view, disorganized complexity results from the particular system having a very large number of parts, say millions of parts, or many more. Though the

interactions of the parts in a "disorganized complexity" situation can be seen as largely random, the properties of the system as a whole can be understood by using probability and statistical methods.

Organized complexity, in Weaver's view, resides in nothing else than the non-random, or correlated, interaction between the parts. These correlated relationships create a differentiated structure that can, as a system, interact with other systems. The coordinated system manifests properties not carried or dictated by individual parts. The organized aspect of this form of complexity vis a vis to other systems than the subject system can be said to "emerge," without any "guiding hand".

Some definitions relate to the algorithmic basis for the expression of a complex phenomenon or model or mathematical expression, as is later set out herein.

By considering that urban systems can be seen as interlinked socioeconomic, technical and natural systems, in which multiple and heterogeneous actors interact, it can be easily understood that urban policies are dealing with the stochastic behaviour of complex systems.  It can also be noted that urban systems can include settlements and un-built landscapes and are on a medium spatial scale between communities or nations. Their system boundaries may be drawn according to political-institutional criteria, e.g. urban areas or functional criteria, e.g. providing support for mobility, recreation.

## 6.2 Constraint: Available Land

In urban areas the strategy of sustainable development is very much depending on the land use, simply because **the land in urban areas is very limited**. Intelligent "smart" policies depend on the proper zoning. Consequently urban development should be guided by a sustainable planning and management vision that promotes interconnected green space, a multi-modal transportation system, and mixed-use development. Diverse public and private partnerships should be used to create sustainable and liveable communities that protect historic, cultural, and

environmental resources. In addition, policymakers, regulators and developers should support sustainable site planning and construction techniques that reduce pollution and create a balance between built and natural systems. (ASLA - American Socxiety of Landscape Architects, 2011)

## 6.3 Major driver: People and Demography

The development of a city is driven by their inhabitants. They are at the beginning of each human settlement and they drive the whole development of it. The number of people determines for example housing demand, traffic volumes and infrastructure. Changes can occur because of the birthrate, immigration and emigration.

Changes in the population of a city are examined by demography, which is the statistical study of human population. It can be a very general science that can be applied to any kind of dynamic human population, that is, one that changes over time or space. It encompasses the study of the size, structure and distribution of these populations, spatial and/or temporal changes in them in response to birth, migration, aging and death.

Demographic analysis can be applied to whole societies or to groups defined by criteria such as education, nationality, religion and ethnicity. Institutionally, demography is usually considered as a field of sociology, though there are a number of independent demography departments. Formal demography limits its object of study to the measurement of populations processes, while the more broad field of social demography population studies also analyze the relationships between economic, social, cultural and biological processes influencing a population. (Demography, 2011)

A key factor for the design of the policy domains is the current human population growth.

Population growth is determined by four factors:

- births(B)
- deaths(D)
- immigrants(I), and
- emigrants(E).

Using a formula expressed as:

ΔP≡(B-D)+(I-E)

In other words, the population growth of a period can be calculated in two parts, natural growth of population (B-D) and mechanical growth of population (I-E),in which Mechanical growth of population is mainly affected by social factors, e.g. the advanced economies are growing faster while the backward economies are growing slowly even with negative growth. (Population growth, 2012)

Globally, the growth rate of the human population has been declining since peaking in 1962 and 1963 at 2.20% per annum. In 2009, the estimated annual growth rate was 1.1. The last one hundred years have seen a rapid increase in population due to medical advances and massive increase in agricultural productivity made possible by the Green Revolution.

The actual annual growth in the number of humans fell from its peak of 88.0 million in 1989, to a low of 73.9 million in 2003, after which it rose again to 75.2 million in 2006. Since then, annual growth has declined. In 2009, the human population increased by 74.6 million, which is projected to fall steadily to about 41 million per annum in 2050, at which time the population will have increased to about 9.2 billion. Each region of the globe has seen great reductions in growth rate in recent decades, though growth rates remain above 2% in some countries of the Middle East and Sub-Saharan Africa, and also in South Asia, Southeast Asia, and Latin America.

Some countries experience negative population growth, especially in Eastern Europe mainly due to low fertility rates, high death rates and emigration. In Southern Africa, growth is slowing due to the high number of HIV-related deaths. Some Western

Europe countries might also encounter negative population growth Japan's population began decreasing in 2005.

Consequently the starting point of any further deliberation on policy topics must be the modelling and simulation of the urban population and its distribution across the available land since this is the main driver of all other policy areas – from land use to housing and traffic.

The good news is that the underlying principles are known.

- The urban population in all cities is at least approximately known (in many cases down to the parcel/district level). Likewise the expected population growth of most cities worldwide is known.

- The underlying function is well defined and rather straightforward. In its simplest form it is typically an S-shaped logistic curve, which "matures", if it reaches a capacity limit. (growth constraint)

It is derived from the fact that change in urban population is proportional to the existing size.  (Banks, 1994)

$\Delta Pi(t) = L\ Pi(t)$    L=growth rate  t is a certain point in time

$\Delta Pi(t+1) = Pi(t) +\ Pi(t) = Pi(t) +\ L\ Pi(t) = (1+L)\ Pi(t)$  at  t+1

$\Delta Pi(t+T) = (1+L)\ T\ Pi(t)$  at  t+T

In reality the growth cannot be exponential without limit and gradually inhibiting factors limit the growth.

This is reflected by adding a negative feedback loop

ΔPi(t)=L Pi(t) [Ci-Pi(t)]= L Pi(t) Ci − L Pi(t) 2

It is obvious that the change Pi(t)converges towards zero, if Pi(t) -> Ci
It may "overshoot" at its peak and then returns to the capacity limit Ci
(Batty, 2007)

Urban reality seems to reflect this formula,  see a few examples below: (Vienna, 2012)
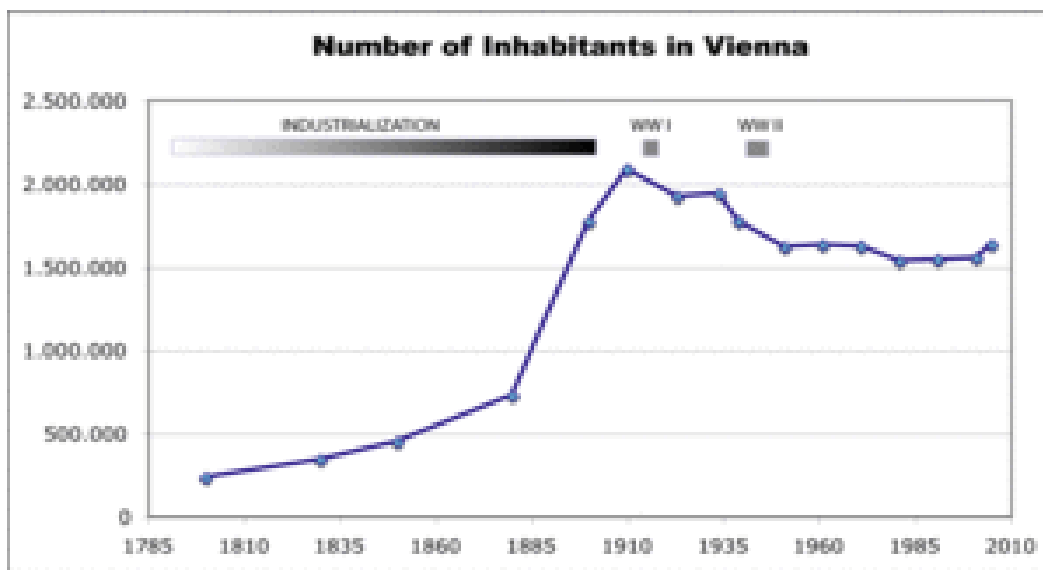


Figure 3 Urban Population Vienna
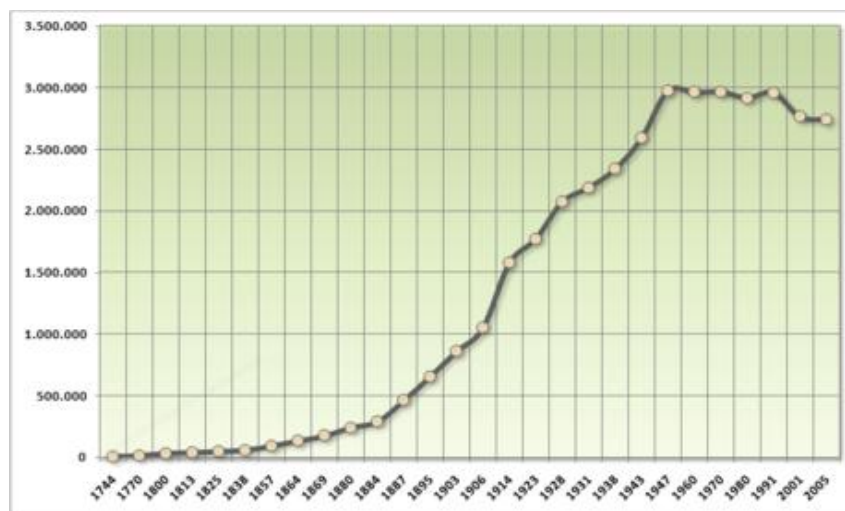


Figure 4 Urban Population Buenos Aires

(Population of Buenos Aires, 2012)
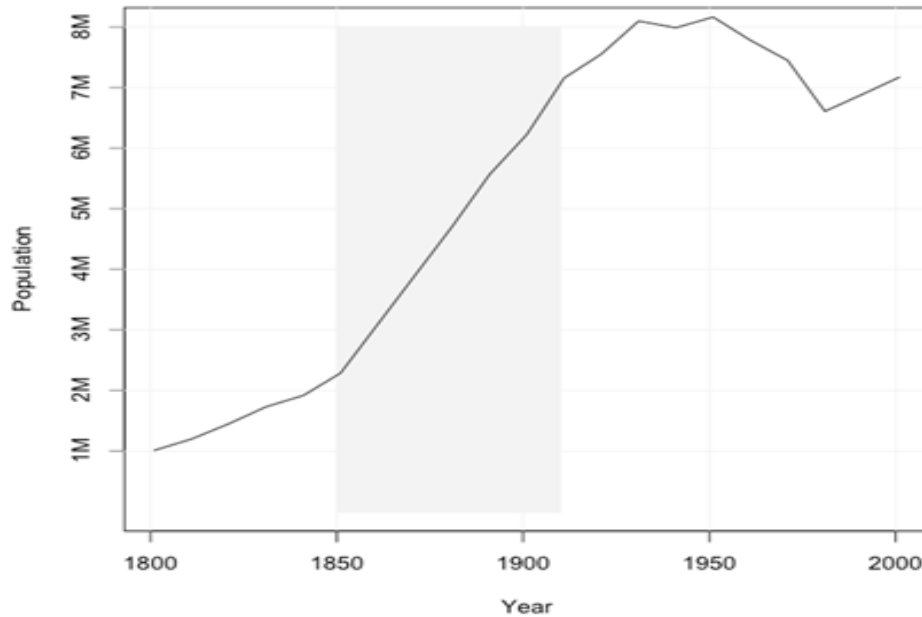
**Figure 5 Urban Population London**

(Data London, 2012)

Some more sophisticated models such as the BLV models have been proposed (see Boltzmann, Lotka and Volterra (BLV) models. (Boltzmann, 2012)


Whereby European cities seem to have levelled out somehow African and Asian cities are somewhere at the beginning or in the middle of the S-curve
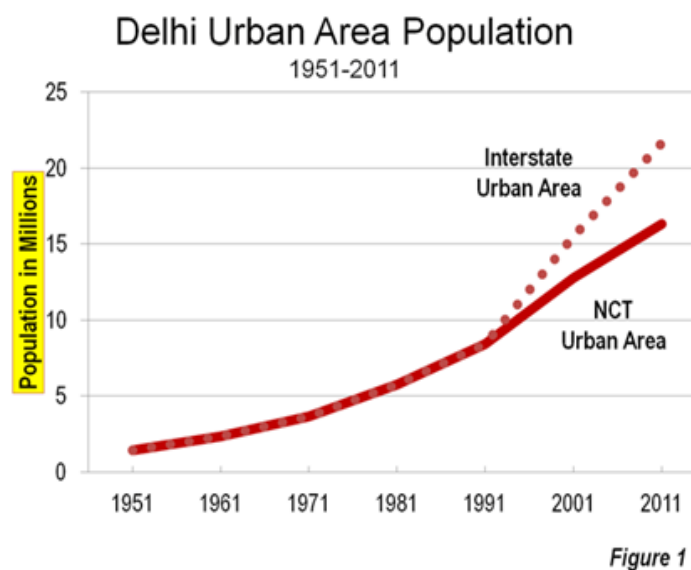


**Figure 6 Urban Population Delhi**

(The Evolving Urban Form: Delhi, 2012)

125
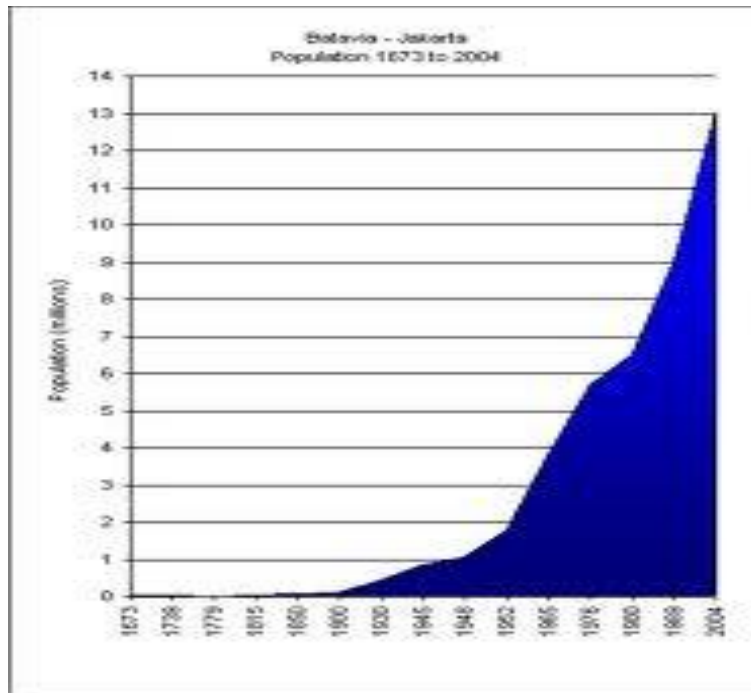
**Figure 7 Urban Population Jakarta**

(Population Growth Jakarta, 2012)
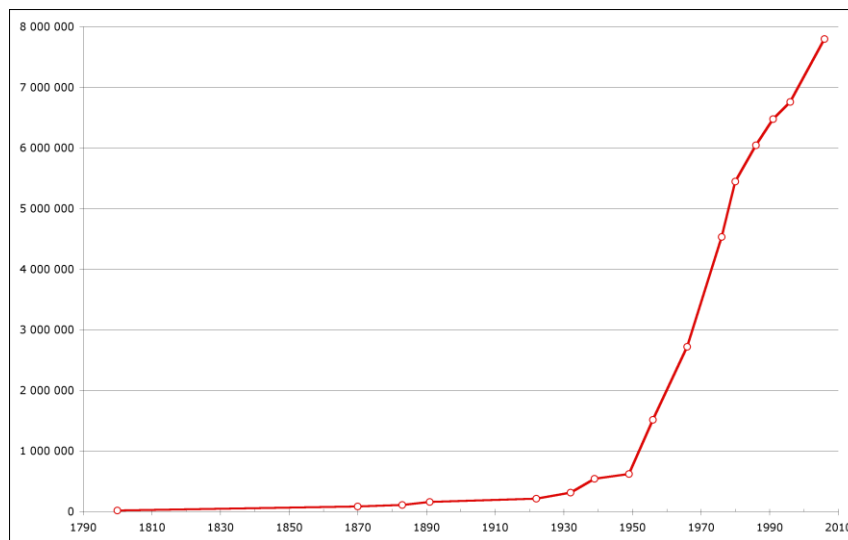


**Figure 8 Urban Population Tehran**

(Population Growth Tehran, 2012)

# 7 Assessment and Prioritization of Policy Domains

## 7.1 Assessment criteria

The assessment criteria are:

- Linkage of the domain to a major urban challenge - this refers to the linkage of the domain to a major urban challenge such as urban sprawl, slums, etc.
- Availability of statistical data - this is important, because without data simulation is very difficult.
- Pilot city priority - the priorities assigned by the pilot cities were important in the overall ranking.
- Overall priority – finally the overall priorities (European and worldwide) according to current urban development.

The summarization of the assessment criteria is shown in the following table.

|  | Urban challenge | Data availability | Pilot city priority | overall |
|---|---|---|---|---|
| Land Use | Urban Sprawl | Excellent | High | High |
| Housing | Urban sprawl, slums | Very good | High | High |
| Environment | Environment | Excellent | Medium | Medium |
| Economy |  | Excellent | Low | Medium |
| Urban Segregation | Slums | Very Good | Low | Medium |
| Participatory Budgeting |  | Excellent | Low | Medium |
| Tourism |  | Very Good | Medium | Medium |
| Transport and Movement |  | Good | Low | Low |
| Community Facilities |  | Good | Low | Low |
|  |  |  |  |  |

**Table 6 Assessment Criteria for the Domain Selection**

## 7.2 Clustering of Policy Domains

Table 6 signalises that land use, housing, environment and urban segregation are linked to major urban challenges. Both, land use and housing are forced to curb urban sprawl which requires a close cooperation of these policy domains.

Land use planning is charged with the selection of gap sites, unbuilt plots and a sustainable land use cover change to provide land for housing by avoiding sprawl. The housing policy is forced to offer affordable housing for all citizens by rebuilding and improving existing housing stock. Furthermore they are asked to provide new homes particularly in areas recommended by a "sprawl avoiding" land use planning.

In addition housing and urban segregation are confronted with the development and refurbishment of slums. Therefore they have to coordinate a strategy to improve the housing standard which should result in a better living standard and a social mix in these areas. Assistance by land use planning in this respect is required.

Land use, housing and urban segregation are closely linked to meet the major urban challenges urban sprawl and slums.

For all of them the data availability is excellent or at least very good and the pilot and the overall priority is very high. **Consequently these domains were selected to be described in detail** in the current deliverable.

The protection of the environment is a major challenge too, has very good available data and medium pilot city and overall priority. Besides it was rejected by the modellers as it is currently too comprehensive for modelling and simulation.

Participatory budgeting and tourism don't have to meet a major challenge, but they provide high level data. As discussed with the pilot cities the priority of both domains are increasing. Prato and Pegeia intend to implement participatory budgeting in the FUPOL demonstrator. Tourism supported by social media is of upcoming importance for Zagreb and Pegeia. Globally viewed participatory budgeting and tourism are of

medium relevance. **These two policy domains will be specified in the forthcoming D2.6.**

For the remaining policy areas the city priority is very low, that's why they will not be elaborated in detail.

# 8 Land Use - detailed description

## 8.1 Policy Challenge Efficient Use of Urban Land

Since available land is a major constraint in cities therefore its efficient and clever use is a key policy question. It should be used efficiently, because inefficient land use leads to the unnecessary expansion of cities (see urban sprawl below), the destruction of the natural environment and it increase infrastructure costs, transport time and pollution.

## 8.2 Policy Challenge Urban Sprawl

Urban productivity depends on spatial concentration which allows rapid exchanges of labour, information, good and services within a city. The possibility for labour and consumers to move quickly from one part of the metropolitan area to another is a key factor in the economic growth of cities. However there is phenomena, called "urban sprawl" which destroys the gains of an urban settlement.

### 8.2.1 Definition

A rapidly growing population on a limited space causes a phenomena called urban sprawl. Sprawl is a development in places where it could be damaging – in rural, undeveloped and developing suburban areas.

"Urban sprawl" means urban development in rural areas, or rural areas with low-intensity or low-density urban uses, and that have the following:

- Premature or poorly planned conversion of rural land to other uses;
- Development that is not functionally related to land uses that predominate the adjacent area; or
- Development that fails to maximize existing public facilities and services are currently provided.

(Urban Sprawl, 2005). It can be loosely defined as dispersed an inefficient urban growth.

Sprawl is identified as the combination of three characteristics

- Leapfrog or scattered development
- Commercial strip development and
- Large expanses of low-density or single-use developments—as well as by such indicators as low accessibility and lack of functional open space. (Urban Sprawl, 2005)

Though it has many definitions, urban sprawl is most simply defined as "the spreading out of a city and its suburbs over more and more rural land at the periphery". That means people leave the cities and settle in the **suburbs** or rural areas. (Hoyt, 2012).  Indeed, urban sprawl is visually perceptible. A landscape suffers from urban sprawl if it is permeated by urban development or solitary buildings.

Proponents of the sprawl argue that it provides to escape from crowed and "unsafe" cities. Opponents indicate the sprawl has many negative effects such as heavy air pollution and the reduction of green areas.

According to experts, urban sprawl is a phenomenon that began in the United States. Sprawl dates back to the late 1800s, when suburbs popped up outside major cities on the East coast of the United States. It really began to flourish during the prosperous post-World War II years in the mid-20th century. Due to a housing shortage, development began in the outer-lying areas, and people followed suit. Between 1950 and 1990, **the urban-suburban population in the United States increased by more than 200 percent, but the area occupied by these residents nearly quintupled.**

This shows, that urban sprawl doesn't only depend on the population growth itself, but to a greater extent to **poor land use,** which results in an increase in "square meters" per person. It is also called **per capita sprawl**. The degree of urban sprawl

depends on how strongly clumped or dispersed the patches of urban area and buildings are. The lowest degree of sprawl corresponds to the situation when all urban area is clumped together into the shape of a circle. The highest possible degree of sprawl is assumed in an area that is completely built over. Therefore, the more urban area present in a landscape and the more dispersed the urban patches, the higher the degree of urban sprawl. (Jaeger, 2009)

Immigrants are bypassing cities in favor of suburbs, where many jobs are now located.

Typically, sprawl is happening around most of the big cities. The southeastern United States tends to be the sprawl capital of the country, thanks in large part to its availability of affordable housing. In contrary the desert areas, like Las Vegas, are not so much concerned by the sprawl. This is why they have a much more difficult access to water supplies. Geographical barriers limit the amount of sprawling one city can do.

Another contributing factor to sprawl is **white flight**, which occurs when people abandon cities in an effort to be surrounded by others of similar race and socioeconomic background.

The key indicators, also called Land Resource Indicators, for the examination of the per capita consumption of land are: (Hasse, 2003)

- Density of new urbanization
- Loss of prime farmland
- Loss of natural wetlands
- Loss of core forest habitat
- Increase of impervious surface

## 8.2.2 Disadvantages of the sprawl

Many people believe that poor planning by municipalities and government institutions is what has led to uncontrolled sprawl in some areas. Other researchers believe sprawl to be the unavoidable result of **car-based living.**

One of the most obvious and talked-about consequences of sprawl is the loss of farmland at a rate of approximately 500.000 hectares every year (Hoyt, 2012).

Environmental devastation, including the loss of tree cover and wildlife habitats as well as polluted drinking water, is commonly attributed to urban sprawl. Increased automobile usage goes hand in hand with sprawl because people live farther away from work and because business districts in the suburbs aren't built in walking distance from homes. This has caused higher levels of smog and air pollution, resulting in more cases of asthma and other respiratory ailments.

Longer commutes have resulted in high levels of automobile crashes, despite safer vehicles and safe driving campaigns. According to the National Highway Traffic Safety Administration (NHTSA), lower driver and passenger fatality rates are seen in dense cities as opposed to sprawl-friendly counterparts. Car-based living is also credited in part with obesity.

Many experts believe that urban sprawl results in higher costs for the government agencies responsible for building streets, schools, utilities and other services required to support new residents in sprawling communities. Often, these costs result in higher taxes.

## 8.2.3 Pros of Urban Sprawl

Thanks to less expensive land in outlying areas around cities people are able to afford larger houses on larger lots.

In addition, better school systems are often available in the suburbs.

Furthermore crime rates tend to be lower in the suburbs than in urban areas, providing further incentive for families in particular to seek the white-picket fence safety of the outlying districts.

## 8.2.4  Sprawl worldwide

Although sprawl hasn't reached the proportions in Europe that it has in the United States, it's certainly on the rise. Since the 1950s, for example, European population has grown by 33 percent, while European cities have grown by 78 percent. Sprawl in Europe is becoming especially prevalent around areas featuring strong economic activity and high levels of population density, such as Paris, northern Italy, Belgium and the Netherlands. (Urban Sprawl in Europe, The ignored Challenge, 2006)

One prime example of international sprawl is in Australia, which has quickly become one of the most urbanized countries in the world -- the majority of residents living in or around the Sydney coastline. Traffic, air pollution and rising costs of living are a few of the problems blamed on sprawl in the area. As such, planners are working overtime to figure out how to handle the expected population increase of 1.1 million by 2031. One of the current plans is to build more than 600,000 new homes directly to the south and west (to ease pain on the coastline), that will be in close proximity to train and bus stations and that will also have cycling and walking trails.

One major city that many people probably assume to be the biggest offender is Los Angeles. In fact, L.A. has managed to curb sprawl despite an intense increase in population. The city has accomplished this largely through zoning requirements that kept housing lots small and close together. Not only has land consumption in the area not increased, it actually decreased by 8 percent while L.A.'s population density was on the rise between 1970 and 1990. Given the popularity of the area, sprawl would have been far worse if L.A. planners hadn't planned ahead of time by encouraging high population density through strong live, work and play incentives for residents of the city proper.

## 8.2.5 Curbing the effects of the sprawl

One popular theory of urban planning and urban design is called smart growth. Smart growth focuses on avoiding suburban sprawl and the use of private vehicles, instead designing and developing more compact urban areas where inhabitants can walk, bike, or use public transit to get to school, work, shops, and recreation.

A further way to escape sprawl (or at least to minimize sprawl) is to build centralized and self-contained communities and in finding ways that cities can use their spaces in more sustainable and efficient ways. In Austria, this idea should be realized in the Aspern Project.

Land developers have to be partners in changing the way cities are built. A favourable real estate climate helps with empty land in inner-city neighbourhoods.

One of our goals is to reduce the size of our homes by proper design. Space can be created by getting good daylight in there, good cross ventilation, the appropriate materials and colours so the spaces feel lighter and airy.

A further idea in reducing sprawl is the effective re-development of infill properties. There are a lot of opportunities that come from removing "old homes" that are sitting on large pieces of property that people don't use to their maximum extent, and replace them with high density micro-communities, with 6 to 12 homes in them."

Another solution is to create centralized communities. You need to put up several levels of parking or underground parking next to that a big box mall and put some condos or town homes on top of it so people can live right there. Then if you build an office tower on the corner of that property where people who live there can work, you can do everything close to home, and create neighbourhood and community. (Magi, 2011)

The slow home movement principle implicates that "The home needs to be simple to live in and light on the environment." Simple to live in means it works the way it should, it doesn't have rooms you don't need or awkward geometries that catch your

eye when you walk into the show home but are impossible to furnish. The slow home movement principle of living lightly also informs the viability of redeveloping the inner city. The idea of living lightly is for the home to be closer to a workplace so people don't have to drive, designed to be a modest size and situated to take advantage of passive solar heating and cooling. (Magi, 2011)

A very big challenge is to find ways for municipal governments to provide incentives for people to live in the inner city. There might be some more options such as the breaks and defraying infrastructure costs by making suburban areas bear the cost of development (infrastructure, roads, and of course of the sprawl itself).

## 8.3 Change of Paradigm

There was a change of paradigm in land-use planning. In the previous century (60ies, 70ies) city governments used to dedicate large areas for a certain purpose (e.g. industrial park) and provide the necessary infrastructure before investors have been really committed to invest. Nowadays the cities are very careful to provide any infrastructure upfront - this is driven by budget constraints. They will make the necessary land use cover changes and related infrastructure investments only after investors are really committed.

Another important policy issue is the fact that German cities are no longer growing, they are stable or shrinking (driven by a shrinking population trend). Consequently the change backwards ("Rückbau") is a policy issue of growing importance. This is much more difficult, because it means the destruction of buildings (or its reduction in size) and related other infrastructure.

E.g. in Eastern Germany apartments (owned by the state) have been partly destroyed and replaced by green areas, since the occupancy rate was too low. In other cases the number of flats has been reduced by cutting the number of floors and renovating the buildings at the same time.

## 8.4 Types of Plans

In the land use planning process three types of plans are prevailing:

- High-Level-Land Use Plan
- Detailed Land Use Plan
- Land Use Cover Change/Projects

### 8.4.1 High-Level Land-Use Plan

The initial planning document is a high-level land-use plan. Typically the outline land-use plan is elaborated **on a regional basis**, because it affects neighbouring communities in one way or another. Technically it does not have the granularity required for a development project - moreover it is not legally binding. Given the static conditions there is very little change in the high-level land-use plan.

For IT-Implementation: Vector graphic in ARCGIS
(ArcGIS is a geographic information system (GIS) for working with maps and geographic information. It is used for creating and using maps, compiling geographic data, analysing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications and managing geographic information in a database) (ArcGIS, 2012).

Note: This level is appropriate for the various land-use simulation SW packages such as Metronamica etc. (Metronamica is a unique generic forecasting tool for planners to simulate and assess the integrated effects of their planning measures on urban and regional development. As an integrated spatial decision support system, Metronamica models socio-economic and physical planning aspects. It incorporates a mature land use change model that helps to make these aspects spatially explicit. (Metronamica, 2012)

### 8.4.2 Detailed Land-Use Plan

The detailed plan contains the actual situation on the ground with all details (realized in ARCGIS)

### 8.4.3 Land Use Cover Change / Projects

#### 8.4.3.1 Preparatory Phase

In this phase the possible alternatives of a project are evaluated. This evaluation is based on a high-level process, since the objective is to get the main advantages and disadvantages. There is no legal obligation to involve the public at this stage. The decision is apparently taken in expert meeting supported by feasibility studies of external consultants. Currently it seems that in this phase (if at all) simulation programs are used by the external consultants and not by the city administration itself. This phase includes task 2-7.

#### 8.4.3.2 Detailed planning of the implementation phase

The implementation phase starts with a public review of the preferred solution ("Feststellungsverfahren"). During this phase affected citizens can propose changes or object to certain features of the proposed project.
Again during this phase the assistance of external experts is sought to cover all the planning aspects (LUCC, traffic, environment, water ...) and its implications. This phase includes task 8.

#### 8.4.3.3 Implementation

After all the input has been processed and after a certain deadline no more input or appeals from citizens are permitted and the project is implemented. This phase includes task 9.

## 8.5 Types of Land Use Plans and their Use in FUPOL

As specified above there is a clear three-fold separation which is essential for the FUPOL project between:

- Long-term land use policy, such as room planning, which is an intraregional topic beyond the city limits, which is equivalent with the High-level-land use plan, specified above.

- Area Zooning – land use of larger open spaces within the city. This offers a broad array of participation and is recommended for the FUPOL project. Well known use cases are the participation in the design of the open spaces in Berlin after the fall of the wall. The shaping of the Mariahilfer Strasse in Vienna could be designed due to the outcomes of e-participation. The simulation of traffic could be integrated too.

- "Micro" construction project based

## 8.6 Participation as a core task in Land Use Planning

The participation of all stakeholders in the planning process is mandatory for a successful land use plan, which can be implemented by the government. Consequently at the initial stage of the planning process it is important to communicate effectively with the public and invite participation in all aspects of the planning procedure and the decision-making process.

Potential participants are all people being affected by the decisions in land use, being involved in land use conflicts and being affected by the outcome.

Participation does not mean that the participants (stakeholders) are always included in the planning process as team members, but they have to be represented by delegates in the decision making process.

### 8.6.1 Participation in Germany

The extent of the participation of the citizen in the land use planning differs from country to country. In Germany especially there is no legal obligation to involve the public in the decision making process of the preparatory phase of land use cover change projects. The citizen are invited to review in the detailed planning of the implementation phase. All the feedback is formally recorded and must be taken care of (means a decision must be taken against which the citizen can formally appeal). In the implementation phase there are no more inputs from the citizen regarded.

## 8.7 Tasks of the Land Use Planning Process

This chapter is required to implement the political measures elaborated in the policy domain "Land Use" and to answer the key questions.

The Land Use Planning comprises the following tasks:
- Initiation of Land Use Changes (Task 1)
- Project Management (Task 2)
- Analysis of the Current State (Task 3)
- Formulation of the Alternatives (Task 4)
- Evaluation of the Land Suitability (Task 5)
- Assessment of the alternatives (Task 6)
- Choosing the Best Option (Task 7)
- Elaboration of the Land-Use Plan (Task 8)
- Implementation of the Plan (Task 9)
- Monitoring and Amending the Plan (Task 10)

For each task the following details are specified:
- Monitoring and Amending the Plan (Task 10)
- The objectives of the task
- The main activities included
- The required data and their sources

- The stakeholders involved (e.g. citizens, government, planners) and their responsibilities.

These tasks can be grouped into the following sequence:

- Identify the problems. (Task 1-3)

- Determine what alternative solutions exist. (Task 4-6)

- Decide which is the best alternative and prepare the plan. (Task 7-8)

- Put the plan into action, see how it works and learn from this experience. (Task 9-10)

During the elaboration of this deliverable we examined some land-use-planning guidelines (Soil Resources, Management and Conservation Service, 1993), (Amler, 1999), (United States Department of the Interior Bureau of Land Management, 2005), (City of Salem Neighbourhood Enhancement Division, 2010), (Weber, 2003), (Longtin, 2005). The FAO handbook was adapted to the FUPOL-needs. (Soil Resources, Management and Conservation Service, 1993). Furthermore interviews with politicians and administrative staff provide the attitudes and point of views of practitioners.

### 8.7.1  Initiation of Land Use Changes

Proposal concerning land use changes can be initiated by citizens or the government. A forecasted land use change provided by simulation in FUPOL could be an available input. The following step is then the discussion of those ideas between land users, government and the planners about intended land use changes.  The planners have to be briefed by the decision-makers and representatives of the people concerned in the planning area. A field visit is recommended. In this phase the following steps are useful:

- Definition of the land use cover change objective.
- Specification of the area concerned (location, size, access, number of people involved)

- Contact the people involved to demonstrate the real life to the planners. Furthermore the land users should be informed that changes are being considered. It has to be guaranteed that all people involved are integrated (including minorities, NGO´s, women´s organization… etc.)
- Collection of basic information about the area:
    - Land resources
    - Present land use (e.g. production levels and trends)
    - Present infrastructure, such as transport, communication and services to agriculture, livestock management and forestry.
    - Population in numbers, demographic trends, location of settlements
    - Land tenure (e.g. ownership)
    - Social structure and traditional practices.
    - Government and the administrative structure
    - Laws and regulations that affect land use
    - Non-governmental organizations, which may have roles in planning or implementing a land-use plan.
- Establishing of the goals and splitting them into short- and long-term ones. They might be derived from higher or lower level (top-down or bottom-up).
- Identification of the current problems and the possibilities for improvement.
- Identification of possible legal, economic, institutional, social or environmental constraints to the implementation and solution approaches.
- Definition of the scope of the plan.
- Specification of the planning period.
- Agreement on the content and the format of the plan. The format depends on the people who have to be informed and involved.
- Clarification concerning operational questions (e.g. funding, team organization…)
- Specification of the budget

### 8.7.2 Project Management of the Land Use Planning Process

In order to guarantee a successful land use planning process a project management system has to be installed to specify the methods, to coordinate the activities and the responsibilities and to be aware of the schedule and the budget.

The first steps are:

- Gathering information at an early stage as some surveys take many months to complete.
- Organisation of supporting services (e.g. training, consultancy, cartography, printing) and materials. Security clearance may be required for maps, air photographs and satellite imagery.
- Scheduling of training, travel, review meetings and consultancies at the beginning of the planning procedure.

Below a complete checklist of the activities is provided:

- Specification of the activities including:
    - Identification of the people and organizations responsible for or contributing to it
    - Setting out the resources needed
    - Estimation of the time needed.
- Decision which tasks need to be completed before others can be commenced.
- Drawing up a work plan for the project as a whole (table, bar chart or critical path analysis).
- Drawing up individual, personal work plans.
- Allocation of money and equipment.
- Arrangement of administrative matters and logistics:
    - o Checking and arranging of security clearances for staff and equipment, e.g. for the purchase and use of maps, air photographs and computers.
    - o Provision of the budget for staff, equipment and transport costs.
    - o Provision for transport (vehicles, spares, fuel, servicing), equipment and office facilities.

o Provision and coordination of technical support, like inputs from other agencies, field assistance, cartography etc.

### 8.7.3 Analysis of the current state

At the beginning the existing land-use situation has to be analysed and compared with the planning objectives. Subsequently problems with the present land use have to be identified. At the end, the cause of these problems must be analysed.

In a first step it is required to collect data in a more detailed way than in task 1 to ensure the execution of the follow-up tasks.

The information refer to the components specified below:
- Analysing the **population** according to age and sex structure, population trends and distribution. Plot these data - towns, villages and dispersed rural settlements - on the base map.
- Research for necessary **land resource** data relevant to the planning task, including landforms, climate, soils, vegetation, pasture resources, forests and wildlife.
- Summarization of the **employment and income** data by area, age, social and ethnic groups.
- Design of **up-to-date land-use** map. This is an essential basis for planning changes.
- Demonstration of **production and trend** data. This information should be as quantitative as possible.
- Specification of the existing **infrastructur**e. Plot roads, market and service centres on the base map.

In general these information will be obtained from existing sources, supplemented by field research.

To analyse the present situation it will be necessary to break the area down into **land units**, areas that are relatively homogeneous (e.g. climate, landforms, soils and vegetation). Commonly each land unit presents similar problems and opportunities. The next step is to identify the more common **land-use systems**, areas with similar land use and economy.

Unfortunately neither land units nor land-use systems will correspond to the administrative units for which economic and population data are usually available and by which many planning decisions are taken. This means that planners have to work simultaneously with land units, land-use systems and administrative units.

This stage of diagnosis of problems is of the highest importance. Without identifying problems and analysing their causes, one is in no position to plan for improving the situation. The applied methods should be interviews with land users, local leaders…. FUPOL changes of land use can be simulated which enables the prediction of future scenarios. Possible land use problems might be:

- Bad living conditions
- Slums and segregation
- Migration to towns
- Urban Sprawl
- Less job opportunities and unemployment
- Low incomes
- Insufficient rural health care
- Malnutrition
- Shortage in energy (fuel)
- Soil degradation and devastation
- Flooding

In addition to the analysis of the problems, the causes of the problems have to be identified.

The problems have to be summarized by a set of problem statements, which contain for each problem:

- its nature and severity with respect to land units and land-use systems
- its short-term and long-term effects and
- a summary of its causes: physical, economic and social.

### 8.7.4  Formulation of Alternatives

In this step the planning team has to design alternatives, which have to be discussed with the land user and decision makers and all stakeholders involved in the land use change to reach a consensus.

Planning involves seeking and appraising opportunities for closing the gap between the present situation and the goals. Opportunities are presented by:

- People in the form of labour, skills and culture
- Land resources
- New technology
- Economic measures and
- Government actions

There is usually more than one way to tackle a problem. Alternatives may be needed to give due attention to the interests of competing groups and serve as a starting point for negotiations. The plan that is finally accepted may include aspects of more than one option.

Land use options can be described as follows:

- Non-land-use planning options.
- Allocations of land use. Land-use types are allocated to specific areas of land (example: irrigated farming to bottomlands). This option is widely applied in

new settlement schemes but is more difficult to apply where land is already occupied.

- New land uses. A complete change is made by introducing new kinds of land use not previously practiced in the area, for example housing.

- Improvements to land-use types. This option follows directly from the analysis of problems.   It is one of the principal means of bringing about change in areas that have already been settled.

- Standards. Standards may consist of planning guidelines or limits. For example,   "no housing in bottomland".

There is no fixed procedure for selection of alternatives for change. What is essential is to keep all interested people informed and seek their views. Some guidelines are as follows:

- Focusing on questions regarding what action can be taken within the plan. Some decisions may have been made already at a higher level of planning. For example, it may have been decided at the national level to build a road through the planning area. The choice to be made locally is the route, based on how it will best serve the existing or planned settlements.

- Consideration of alternative land-use strategies.

- Identification of possible solutions that best meet the needs of production, conservation and sustainability and that minimize conflicts of land use.

The alternatives are presented in brief summaries to the people concerned or their representatives, the government authorities and other stakeholders.

### 8.7.5  Evaluation of land suitability

The main questions of the land suitability evaluation are:

- Which areas of land are best suited for a specified kind of land use?

- Which kind of land use is best suited for a given area of land?

### 8.7.5.1 Description of land-use types

A land-use type is a kind of land use described in terms of its products (or outputs) and management practices. At the district and local level it should be described in more detail.

### 8.7.5.2 Selection of land qualities and land characteristics

Land-use requirements are described by the land qualities needed for sustained production, which is very useful for agriculture. A land quality is a complex attribute of land that has a direct effect on land use.

### 8.7.5.3 Mapping of land units and their characteristics

In 7.2.3 land units were identified as a basis for the diagnosis of problems. It may now be necessary to map these units in more detail.

Natural resource surveys take a substantial amount of time and will delay the planning procedure. However, past experience has shown that to proceed with land development projects without adequate resource data can lead to disasters.

### 8.7.5.4 Setting limiting values for land-use requirements

Limiting values are the values of a land quality or land characteristic that determine the class limits of land suitability for a certain use.

The first and most important decision is to separate land that is suitable from that which is not. Important criteria for deciding on the suitability of land for a specific use are sustainability and ratio of benefits to costs.

### 8.7.5.5 Matching land use with land

The first stage in matching is to compare the requirements of each land-use type with the land qualities of each land unit. The simplest procedure is to:

- check measured values of each land quality or characteristic against the class limits;
- allocate each land unit to its land suitability class according to the most severe limitation

Matching, however, can become a wider process than the simple comparison of requirements with qualities. Wherever this initial comparison shows certain land units to be unsuitable for a given use, the specification of the land-use type can be examined to see if, by modifying it, the suitability of those land units can be raised.

### 8.7.5.6 Land suitability classification

The comparison of requirements of land-use types with properties of land units is brought together in a land suitability classification. Suitability is indicated separately for each land-use type, showing whether the land is suitable or not suitable, including - where appropriate - degrees of suitability. In large or complex surveys involving many mapping units land evaluation can be assisted by the use of geographic information systems. A major facility is that, if the land suitability data are entered into such system, when a change is made to one or more limiting values, new maps of land suitability can be rapidly produced.

### 8.7.5.7 Planning for research

Where new land-use types are proposed for introduction to the area, it will be necessary to conduct trials (on-station and on-farm) to validate their performance before they can be safely recommended for adoption. Gaps in knowledge of land resources may also have been revealed, thus calling for additional surveys.

It is impracticable to delay the land-use plan until all such research has been completed; but, at the same time, it is unwise to proceed if there is a serious lack of information. Action can be taken in two ways:

- Outside the land-use plan by drawing attention of national and international research agencies as well as universities.
- Within the land-use plan.

## 8.7.6 Assessment of the alternatives

In task 5 the evaluation is carried out in terms of **physical suitability**. An assessment has been made of whether different kinds of land use can be undertaken on a sustained basis. In task 6 the effects of each alternative use are appraised in environmental, economic and social terms.

### 8.7.6.1 Environmental impact assessment

In most cases the impact of a particular activity may be long term or several stages removed from the primary cause of the problem. For example, coastal erosion has been attributed to big dams, built on major rivers over 30 years ago, which have intercepted the supply of sediment to the coastal zone. Or housing in lovely scenery damages the environment.

Examples of resources which should be protected to prevent harm:
- Soil and water to avoid erosion and landslides.
- Pasture and forest resources to avoid degradation and devastation.
- Scenic and recreational resources value for tourism and leisure industries.

### 8.7.6.2 Economic analysis

Financial analysis look at profitability from the point of view of a farmer or other private investor, by comparing the producers' revenues with their costs. Farmers will not practice a land use unless, from their point of view, it pays.

Economic analysis estimates the value of a system of land use to the community as a whole. For example, they have to define the value of the proposed changes to the community, within and beyond the planning area.

Comparisons of financial with economic analysis can highlight the need for policy changes. A particular land use, establishing apartments near fantastic beaches may be damaging the environment. If financial analysis shows the use to be advantageous from the farmers' point of view, it is likely to continue, however environmentally or, in the longer term, socially damaging it is. Economic analysis should take account of damage to land resources. Policy changes will be needed, especially the amendment of the area zooning plan. Similarly, financial analysis may demonstrate that property developers do not have an incentive to build houses in a beautiful, but remote area.

### 8.7.6.3 Strategic planning

Strategic planning must take a medium- to long-term view to avoid closing options for the future. Land-use policy must take account of land suitability, the current economic situation, the production and services obtainable in relation to the expected future needs and the possibility of meeting demands from elsewhere.

Land with severe physical limitations usually offers few viable options. Land-use planning is more difficult for land that is well suited for many different uses. Besides physical and economic suitability, one needs to know the critical importance of land for specified uses. This means estimating not only whether a particular area is physically suitable but also whether it is important that this specific area of land should be used in a particular way. Examples are protected sites for the preservation of rare plant communities or the prevention of urban encroachment on to prime farmland.

8.7.6.4 <u>Social impact</u>

The most profitable land use for each parcel of land can be calculated in financial and economic terms but this does not fully represent the effects on the community. Social impact analysis studies the effects of proposed changes on different groups of people. Particular attention should be given to effects on women, ethnic minorities and the poorest sections of the community.

Examples of social factors that might be considered are:
- Population in terms of size, distribution and age structure
- Basic needs like food security
- Employment and income opportunities
- Land tenure and customary rights
- Community stability.

## 8.7.7  Choosing the best option

At the point of decision, the roles of the planner and the decision-maker and the people involved in the land change must interact. The planner has to assemble and summarize the facts needed to make an informed decision - namely the results obtained from the previous steps. The decision-maker has to choose the land-use option that best meets the goals. The option has to be agreed by the land users respectively by their representatives.

To find out the best option, the following steps are required.
- Setting out a series of options for the allocation or recommendation of land-use types to land units at the beginning. Stating the evaluation of these options in terms of land suitability and environmental, economic and social analysis.
- Setting out the consequences of these options in terms of the goals and planning activities.
- Present the options and their consequences in a way that is appropriate.

- Make arrangements for consultations with the communities affected as well as with the implementing agencies; obtain views about feasibility and acceptability.

- Assemble and review the comments received. In the light of these, make any necessary changes to the options.

- Decide if the response to comments is adequate.

- Consider the options in terms of goals and policy criteria.

- Choose the best option.

- Simulate this option for prediction.

- Authorize preparation of the plan.

## 8.7.8 Elaboration of the Land-Use Plan

The main duties in this steps are:

- Preparing maps containing base-details such as roads, tracks, settlements and further features like land-use types, soils…)

- Setting out the land-use allocations and recommendations, based on the preferred option selected in task 7. Give descriptions of land-use types, including management recommendations on each kind of land.

- Setting targets for achievement, by land-use type, area and agency. Specify how they will be reached. Check that they are within the capabilities of the agencies and infrastructure.

- Drawing up logistic preparations, specifying the capital works, recurrent inputs and responsibilities for implementation.

- Establishing mechanisms for monitoring progress and revising the plan (Task 10).

- Make arrangements for research needed to support the plan.

- Determining the finance needed for each operation and determine sources of funds.

- Writing the report - executive summary, main report, maps and appendixes.

- Establish mechanisms for communication with, and the participation of, all institutions involved.
- Prepare public relations material.

### 8.7.9 Implementation of the Plan

The implementation of the plan is included as a "task" in the planning process.

At the national level, implementation is likely to be through policy guidelines which may also serve as a framework for selection of possible projects at the district level. In this sense, the planning team remains throughout a part of implementation, supplying information to government as a basis for decisions.

At the local level, implementation is sometimes carried out almost contemporaneously with planning. The planning team may move from one locality to another and draw up detailed plans for implementation while leaving the local extension staff, village agricultural committees or other local agencies to put the plan into practice. At the district level, the plan will frequently be implemented by means of a development project.

The main activities to implement the plan are the following:
- Ensuring that the changes recommended in the plan are correctly applied in the plan; be available for technical consultations; discuss with implementing agencies any suggested modifications.
- Helping to maintain communications between all people and institutions participating in or affected by the plan, i.e. land users, sectoral agencies, government, non-governmental organizations, commercial organizations.
- Assisting in coordination of the activities of the implementing agencies.
- Assisting in institution-building by strengthening links between existing institutions, forming new bodies where necessary and strengthening cooperation.
- Focusing on the participation of the land users; ensure adequate incentives.

- Organizing research in association with the plan; ensure that results from research are communicated and, where appropriate, incorporated into the plan.
- Arranging for education and training of project staff and land users.

### 8.7.10 Monitoring and amending the plan

Information is needed on how well the plan is being implemented and whether it is succeeding, so that the implementation agencies can improve the way in which the plan is being applied and so that the planning team may learn from experience and respond to changing conditions.

The main steps are:
- Listening the goals and criteria achievement agreed in task 1. Add any that emerged later in the planning period.
- Gathering of data relevant to each criterion of attainment: physical, economic and social.
- Comparing what has been achieved with what was planned. Identify elements of success and failure.
- Seeking explanations for failures. Were they caused by:
    - o Incorrect assumptions of the plan?
    - o Changed economic or political circumstances?
    - o Logistic problems of implementation?
    - o Problems of communication and participation?
- Reviewing the goals: are they still valid?
- Initiating modification or revision of the plan:
    - o minor modifications through action by implementing agencies;
    - o larger revisions by the preparation of proposals and reference back to decision-makers.

**The land use indicators as measurement are described in chapter 13.**

| Task | Systems to foster e-participation of stakeholders such as Topic Sensing, IMS...) | Simulation |
|---|---|---|
| 1. Initiation of land use change | X | |
| 2. Project Management of the Land Use Planning Process | | |
| 3. Analysis of the current state | X | |
| 4. Formulation of alternatives | X | X |
| 5. Evaluation of land suitability | X | |
| 6. Assessment of alternatives | X | X |
| 7. Choosing the best option | X | X |
| 8. Elaboration of the Land-Use-Plan | X | |
| 9. Implementation of the Plan | X | |
| 10. Monitoring and Amending the Plan | X | X |

## 8.8 Expected Output of a Land Use Simulation Model

### 8.8.1 High-Level-Land Use Plan („large scale – long term")

The output of a simulation model should assist the politicians in assessing land use policies.

Key questions are for example:

1. Where is the industry likely to settle down?
2. How much of the agricultural land do we need to convert to support economic growth?
3. How much of the green space do we need to convert to support expected economic growth or shrinkage?
4. The population is growing; what is the most likely land use pattern in 20 years, where do we expect people do build new houses, industry and offices?

Consequently the simulation output should be a prediction of land use pattern under certain boundary conditions and policies such as:

a) Expected population growth
b) Expected economic growth
c) Green area policy ("minimum % of green space in the city)
d) Land use restriction ("conversion not allowed")

e) Maximum density of population / km2

f) Urban area development policies - means targeted development / refurbishment of an area in the city by the government

The visualization output should be a map of the city with the current land use and future land pattern to allow non-technical stakeholders a direct interpretation of the outcomes from the simulation models. It should also provide strategic policy indicators, which is mainly the % of land used for the different categories.

## 8.8.2 Detailed Land Use Plan

For the simulation output see high level land use plan.

## 8.8.3 Land Use Cover Change/Projects („small scale")

This refers to small scale projects dealing with the use of public spaces

From a policy design point of view an expected simulation output is outlined and assessed below:

a) Expected Citizen Opinion

Key question: Which type of usage would citizens prefer ?

Typically citizens are asked directly about their opinions concerning a specific project. While it may be feasible to simulate the expectations of citizens this may not have a real practical relevance.

b) Impact Simulation

Depending on the type of LUCC / project and the related high level objective the impact simulation could be quite diverse:

Example: Conversion of agricultural land into an industrial area

Depending on the focus of the public discussion and the high level policy objective the possible simulation output could include:

- Economic impact and expected creation of employment (including 2nd and 3rd tier supply chain simulation)
- Environmental impact: expected pollution
- Energy: Expected energy consumption in the area and its impact on the grid
- Expected additional traffic

- Impact on tourism (an industry could scare tourists away)
- ........ etc

As can be seen from the example it is impossible to describe the expected simulation output of LUCC / projects, because they are diverse and depend on the specific project and the related expectations of the policy makers.

Since Barnsley, one of our pilot cities intends to pilot an employment driven LUCC project a chapter is devoted to this specific subject.

## 8.9 Employment as a Special Driver for Land Use Cover Change

Employment and the promotion of the economy could be a major impact of the land use cover change. Especially in regions with declining GDP per capita and structural changes the use of land for private and business use has to be addressed specifically.

Barnsley, one of our pilot cities with an area of around 320 square kilometres had an important mining industry which resulted in small towns and villages as people lived where they were working. During the last decades the "heavy industries" became less important resulting in an increase of unemployment which might threaten the social balance. Therefore Barnsley decided to use the FUPOL tools to "improve the allocation of land for the employment purposes".

The output of the simulation model should assist all relevant stakeholders in the assessing of land to boost economy and employment.

The key questions are for example:
1. Which types of industries should be supported due to the current economic and human resources?
2. Which types of jobs should be created (high level, medium level or low level)?
3. What is the extent of the public or private investment necessary?
4. How much of the agricultural land has to be converted to strengthen economic growth?

5. What is the extent of poorly used "urban" land which can be converted into job creation land?

As a result the simulation output should also be a prediction of land use cover change and the types of investment which could best meet the needs for job creation under boundary conditions as specified under 8.8 (expected population growth, expected economic growth, green area policy, land use restriction, maximum density of population/km2w) plus human resources, budget for public investments, etc.

In case a specific industry uses the land allocated it has an impact to other sectors as well. (-> supply chain)

Consequently an impact driven output of the model should be the **future sectoral pattern** of the local economy in terms of

- o Type (sectors)
- o Peoples employed in each sector
- o Wage levels
- o Contribution to the local / regional GDP
- o Value added
- o Taxes
- o .....

# 9 Housing - detailed description

The current chapter should provide a good understanding about housing policies. It contains the following features:

- Overview of the housing situation and the change of paradigm,
- Participation in housing
- Assessment of the housing needs and demands
- Housing strategies
- Expected output of a housing simulation model
- Slum refurbishment and
- Expected outputs of a slum simulation model

## 9.1 Change of paradigm

### 9.1.1 Changes in Land Use Planning

With reference to the previous chapter Land Use Planning there was a change of paradigm in land-use planning too, which affected the housing policy as well. Compared with the last century the cities provide the necessary infrastructure after the investors have committed their investment.

### 9.1.2 Changes in Population Development

Nevertheless people need a roof above their heads which should be a house offering at least minimum qualities. This objective can be founded in every national policy statement, but the extension varies per member state. But the relation between demography and housing need is evident with housing policy makers. Furthermore housing need also depends on population size and household composition.

It has to be stated that demographic developments have varied strongly within the EU in the past decades. In some Eastern European countries the population declined. The projections for the next 30 to 40 years forecast a shrinking population development of around 20 per cent of the current figures in Bulgaria, Latvia and

Lithuania. In many Western European countries smaller growth rates are expected and population projections indicate ageing of the entire EU population. This population decline may eventually lead to an oversupply of housing in certain nations or regions and may result in the demolition and destruction of buildings (Dol, 2010). Only the predictions for Cyprus, Luxemburg and Ireland show a significant increase up to 40 per cent and more.

In addition to declining population trends the households are becoming smaller all over Europe. This is a result of older households, families with fewer children and an increase in more single person households. But the larger number of households, both young and old, will counter the population decline at least to some extent.

### 9.1.3  Changes in Housing Stock

There is no significant change in numbers and quality of the existing housing stock as the new housing construction only accounts for a few per cents of the existing stock. Indeed the quality of the new built houses differs substantially to the existing ones especially in terms of square meters.

### 9.1.4  Changes in Tenure Status

Another change in the dwelling stock in the past decades is the change in tenure form generally from renting to owning. Home ownership is now a common tenure in the EU. Tenure can be changed in a relatively short timeframe. An example of relatively rapid change can be found in Western Europe where the British Right to Buy allowed a large number of public tenants to become home owners since the 1980s (Dol, 2010).

Currently over one quarter of the EU-27 population lived in an owner occupied home for which there was an outstanding loan or mortgage, while close to half (46.5 %) of the population lived in an owner-occupied home without a loan or mortgage. As such, a total of nearly three quarters (73.6 %) of the population lived in owner-

occupied dwellings, while 13.0 % lived in dwellings with a market price rent, and 13.5 % in reduced-rent or free accommodation.

Although home ownership has increased, social/public housing still plays a role and the market share of the social housing sector has not declined very much after 1990 (Austria, Denmark, France, Finland, and Sweden). Currently the Netherlands has the largest social housing sector by market share. In the Netherlands and Sweden for instance official policy indicates that social/public housing is accessible to quite a broad layer of society.

## 9.2 The Housing Strategy

Before the assessment of the needs and demands the housing strategy has to be described. The aims of this strategy are already described in chapter 5 and are focussing primarily on:

- Balanced Housing Markets, where people can find a suitable place to stay
- Housing Quality which guarantees warm, dry and energy efficient homes
- Access, advice and support which allows people to live in the type of accommodation that best suits their needs
- Homelessness, which should be prevented for people as far as possible
- Better neighbourhoods
- Upgrading of flats (apartments)
- Change in tenure of apartments (tenants buy their apartments)

## 9.3 Participation in Housing

As well as in land use planning participation is a key issue for a satisfactory housing policy. It is advisable to integrate the relevant stakeholders in the decision making process of the city government.

Participation of the people concerned, like tenants, the local authorities (from planning, housing, economic development, etc.) in the following sectors could be envisaged:

- Design and maintenance of the existing housing stock and configuration of new residential buildings.
- Creation of quality standards in housing, e. g. upgrading apartments
- Funding for tenants to support affordable housing
- Change of ownership (tenants are allowed to buy apartments previously owned by the city)

Participation and communication between tenants and the city administration could be improved by the provision of a "tenant-help-desk".

## 9.4 Tasks of the Housing Policy – Housing Need and Demand Assessment

The tasks of the housing policy are described in the housing need and demand assessment. The housing need and demand assessment is the basis for the planning as well as for the design of the policy models. This process should assess future housing need and demand over a period of up to around 15 years in order to allow development plans to establish the housing land requirement for a period of at least 11 years beyond the predicted date of the approval of the plan. A regular five yearly review of the assessment linked to the review of the local housing strategy and the development plan will provide an opportunity to ensure the maintenance of a
n appropriate long term approach which can take account of changes.

**Housing need** refers to households lacking their own housing or living in housing which is inadequate or unsuitable, who are unlikely to be able to meet their needs in

the housing market without some assistance. **Housing demand** is the quantity and type/quality of housing which households wish to buy or rent and are able to afford.

### 9.4.1 General Workflow of the Housing Need and Demand Assessment
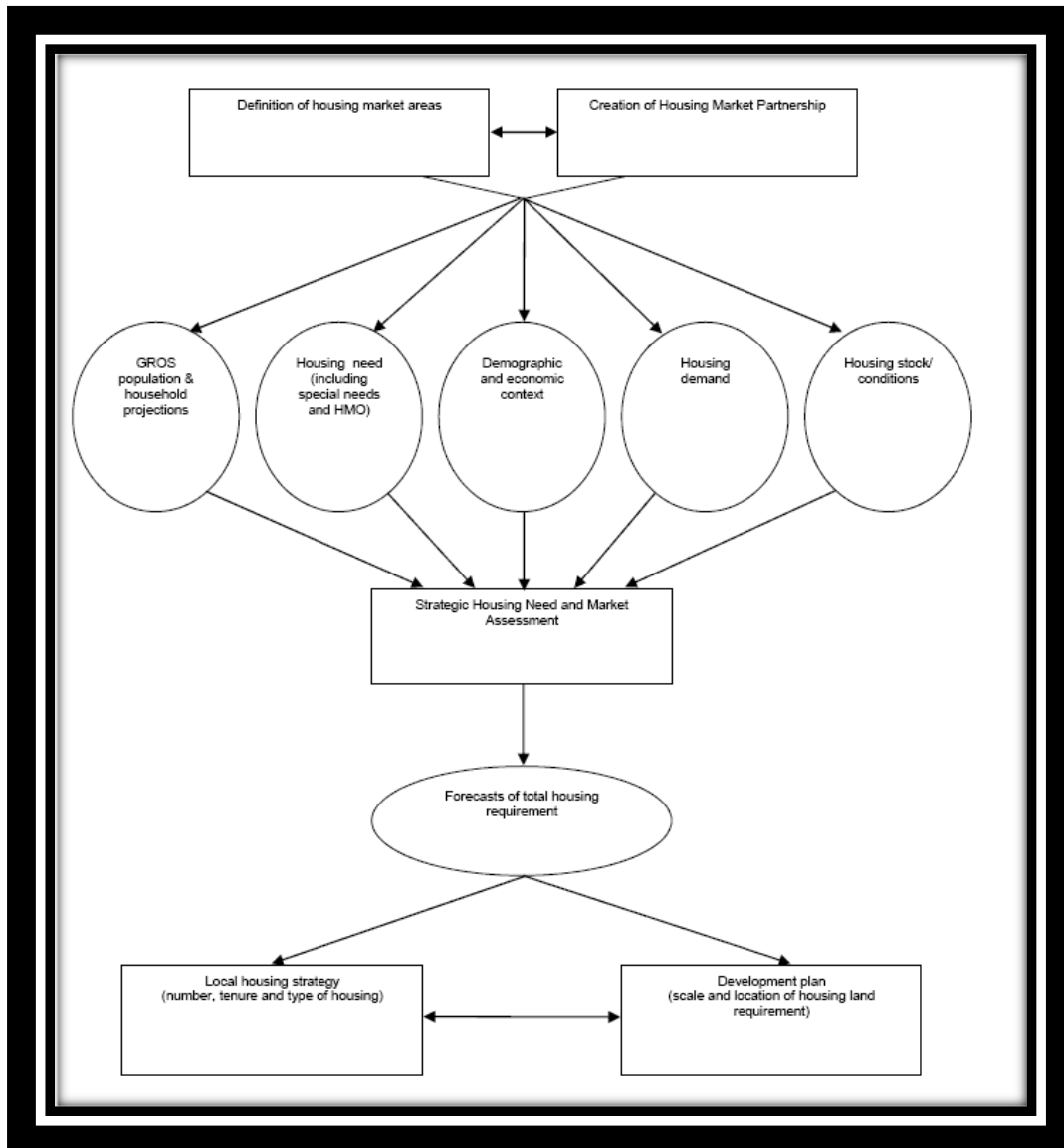


Source: Scottish Planning Policy SPP3: Planning for Housing

### 9.4.2 Initiation of the Housing Need and Demand Assessment

The initiation of the process comprises four steps:

### 9.4.2.1 Identification of the housing market areas

In a first step the housing market areas have to be defined. Housing market areas are geographical areas which are relatively self-contained in terms of housing demand, i.e. a large percentage of people moving house or settling in the area will have sought a dwelling only in that area.

### 9.4.2.2 Setting up of the housing market partnership

Based on the defined housing market areas a housing market partnership should be established, which could be a team including housing, planning and economy experts. The team might include local authorities, house builders (investors), social workers, landlords, company networks, etc.

### 9.4.2.3 Methodology

For the definition of the needs and demand assessment good practice is recommended due to past experience.

### 9.4.2.4 Data requirements

Secondary data should be used where appropriate and feasible. Secondary data is existing information that someone else has collected. Data from administrative systems and some research projects are made available for others to summarise and analyse for their own purposes. Large-scale primary data collection can therefore be avoided.

Primary data could be used especially for key indicators that are not available from secondary sources. Primary data is information that is collected from a bespoke data collection exercise (e.g. surveys, focus groups or interviews) and analysed to produce a new set of findings.

### 9.4.3 Project Management of the Housing Process

In order to guarantee a successful housing process a project management system has to be installed according that described in chapter 8 for the land use planning process.

### 9.4.4 Assessment of the housing market

For the assessment of the current housing market past trends and relationships have to be analysed to understand the current position. Therefore a wide range of data including house prices, demographic factors, labour force structure have to be interpreted. The current housing market is characterized by demography and economy, the housing stock and the market.

#### 9.4.4.1 Demography and economy

The key drivers of the housing market are demography and economy, which are influencing the demand and the supply. Economic trends such as changes in the interest rates can influence the operation of the housing market. For example higher interest rates make it more expensive for households to borrow money which reduces housing demand and house building and investment on the supply side. Therefore it has to be considered how interest rates, government funding for housing/regeneration and housing benefits have changed over the last ten to twenty years.

For the assessment the proportion of the population of different gender, age cohorts and ethnic groups has to be examined. In addition to identifying different types of households, its composition in terms of age relationships with the head of household, ethnicity, religion, gender and economic status should be examined. The number of households in Germany was increasing from around 25 million in the year 1980 to around 40 million in the year 2009 or around 60 per cent whereas the population was increasing from around 78 million to 82 million, which is around five per cent. Trends should be plotted over time to identify which household types have grown or declined in each tenure.

The demand for, and supply of housing of different types of tenure and location will be influenced by the employment opportunities in the available area. Consequently the proportion of lower and higher paid jobs has to be considered to understand the linkage between housing (especially location) and employment in the housing market area.

Incomes and earnings are key drivers of the demand. The evidence shows that households spend more on housing as incomes increases. The important factor to consider is the distribution of incomes in the housing market area and how they have changed over time relative to the national picture.

The following figure from (Hilbers, 2008) shows a significant increase of the house prices for the fast line and the average performers.

Figure 3. House Prices and Income, 1985-2006 1/
(Index, 1985=100)



Sources: Barclays; Bank for International Settlements; European Mortgage Federation; IMF, *World Economic Outlook*; OECD; and IMF staff calculations.
1/ All variables are presented as Index 1985=100, corrected for breaks in series.
2/ Real house prices.
3/ Real per capita GDP (national currency).
4/ Real gross disposable income per capita (national currency).
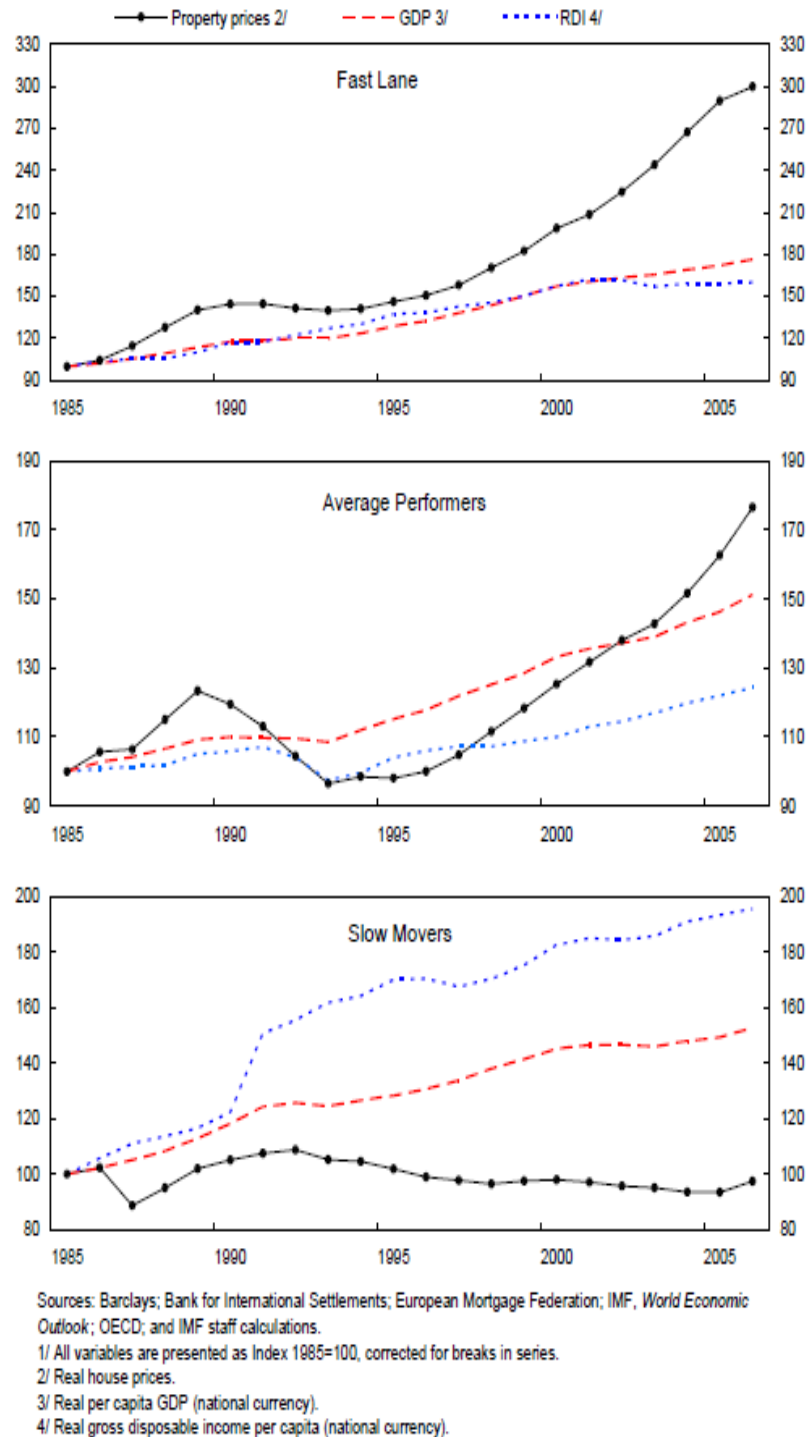
**Figure 9 House Prices and Income**

The following figure shows a significant decrease of the interest rates compared to the housing prices. This resulted in an increase of home ownership in the EU between 1980 and 2000 as specified in Figure 10.

Figure 4. House Prices and Interest Rates, 1985-2006



Sources: Bank for International Settlements; European Mortgage Federation; and Eurostat.
1/ Real house prices (index, 1985=100).
2/ In percent.
3/ Representative interest rate on new mortgage loans, in percent.
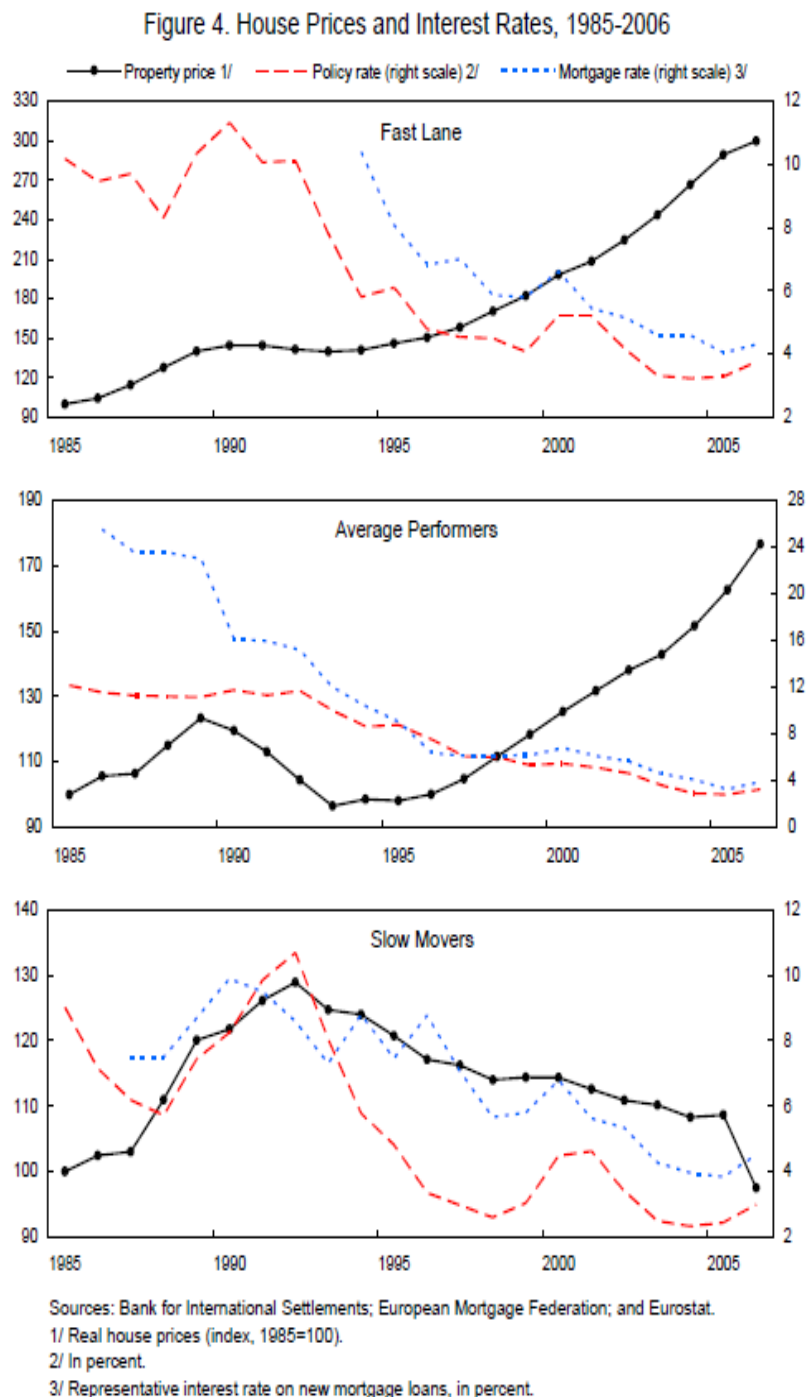
**Figure 10 House Prices and Interest Rates**

**3.5F Home ownership in the EU 1980 and 2000s**



Comment: In this graph, the cooperative sectors of Denmark, Poland and Sweden have been included as owner occupied dwellings
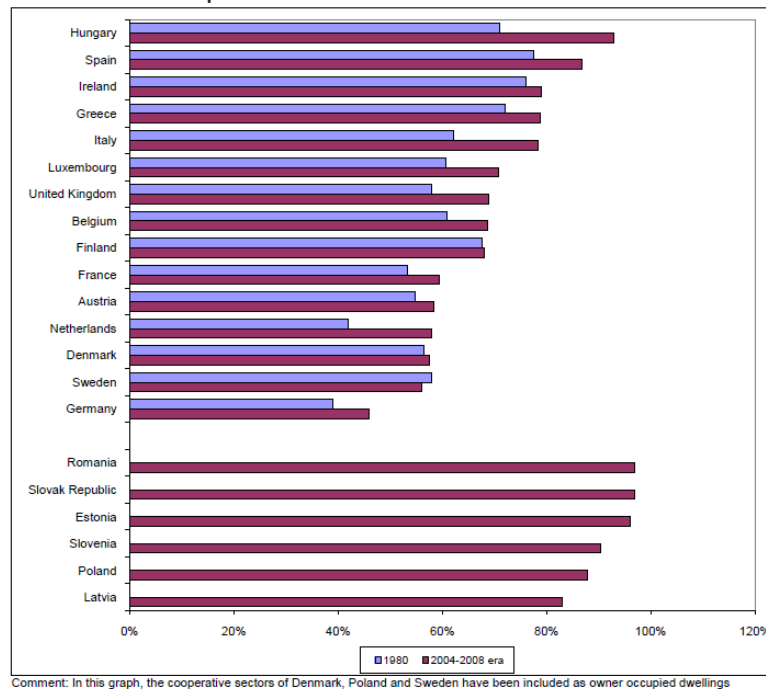
**Figure 11 Home Ownership in the EU**

Source: Housing in Europe

## 9.4.4.2 The existing housing stock

The stock of housing is the number and type of housing available within an area at a specific date and how that housing is being used. The overall adequacy of stock has to be assessed.

The following graph shows the change in the occupied dwelling stock by tenure. Par example in Germany the percentage of rental ownership degreased from 61 in the year 1980 to 54 in the year 2008. There is a significant difference in the tenure status within the European countries. Slovakia, Latvia and Romania feature a very high percentage in ownership as compared to Denmark and Sweden.

## 3.5 Occupied dwelling stock by tenure (%)

| | 1980[1] | | | | 1990[2] | | | | 2000[3] | | | | 2004[4] | | | | 2008[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R | OO | CO | O | R | OO | CO | O | R | OO | CO | O | R | OO | CO | O | R | OO | CO | O |
| Austria [6] | 43 | 52 | x | 5 | 41 | 55 | x | 4 | 41 | 52 | x | 7 | 41 | 51 | x | 9 | 40 | 56 | x | 4 |
| Belgium [6] | 38 | 59 | x | 3 | 33 | 67 | x | 0 | 32 | 68 | x | 0 | 31 | 68 | x | 2 | 31 | 68 | 0 | 0 |
| Bulgaria | | | | | | | | | | | | | | | | | | | | |
| Cyprus [7] | 16 | 61 | x | 23 | 13 | 64 | x | 23 | 14 | 68 | x | 18 | na | na | na | na | na | na | na | na |
| Czech Republic | 40 | 40 | 13 | 7 | 40 | 38 | 19 | 3 | 29 | 47 | 17 | 7 | na | na | na | na | na | na | na | na |
| Denmark | 43 | 55 | 1 | 1 | 40 | 54 | 5 | 1 | 39 | 52 | 7 | 2 | 38 | 49 | 7 | 6 | 39 | 46 | 7 | 7 |
| Estonia | na | na | na | na | na | na | na | na | na | na | na | na | 4 | 96 | 0 | 0 | 4 | 96 | x | 0 |
| Finland | 30 | 63 | 0 | 7 | 25 | 72 | 0 | 3 | 32 | 64 | 0 | 4 | 33 | 63 | 0 | 4 | 31 | 66 | 0 | 3 |
| France [8] | 41 | 47 | x | 12 | 39 | 54 | x | 7 | 39 | 55 | x | 7 | 40 | 56 | 0 | 4 | 39 | 57 | x | 4 |
| Germany [9] | 61 | 39 | x | 0 | 58 | 42 | x | 0 | na | na | na | na | 54 | 46 | x | 0 | 54 | 46 | x | 0 |
| Ex-GDR | 69 | 21 | x | 0 | 74 | 26 | x | 0 | na | na | na | na | 68 | 32 | x | 0 | 67 | 33 | x | 0 |
| Greece | 27 | 70 | x | 3 | 20 | 76 | x | 4 | 20 | 74 | x | 6 | 20 | 74 | x | 6 | na | na | na | na |
| Hungary | 29 | 71 | x | 0 | 26 | 74 | x | 0 | 7 | 92 | x | 1 | 7 | 92 | x | 1 | | | | |
| Ireland [6] | 24 | 76 | x | 0 | 18 | 79 | x | 3 | na | na | na | na | 21 | 79 | x | 0 | | | | |
| Italy | 36 | 59 | x | 5 | 25 | 68 | x | 6 | 20 | 71 | x | 9 | 19 | 73 | x | 9 | 19 | 69 | x | 13 |
| Latvia | na | na | na | na | 79 | 21 | x | 0 | 30 | 70 | 0 | 0 | 19 | 77 | 4 | 0 | 17 | 83 | x | 0 |
| Lithuania [10] | na | na | na | na | na | na | na | na | 7 | 91 | na | na | na | na | na | na | na | na | na | na |
| Luxembourg | 39 | 60 | x | 1 | 30 | 64 | x | 6 | 26 | 70 | x | 4 | 29 | 68 | x | 3 | 29 | 70 | x | 1 |
| Malta | na | na | na | na | na | na | na | na | 22 | 74 | x | 4 | 26 | 70 | x | 4 | 22 | 75 | x | 3 |
| Netherlands [8] | 58 | 42 | x | 0 | 55 | 45 | x | 0 | 47 | 53 | x | 0 | 44 | 56 | x | 0 | 42 | 58 | x | 0 |
| Poland [11] | na | na | na | na | na | na | na | na | 16 | 55 | 29 | 0 | 15 | 57 | 27 | 1 | 12 | 63 | 24 | 1 |
| Portugal | 39 | 52 | x | 5 | 28 | 67 | x | 5 | 21 | 75 | x | 4 | na | na | na | na | na | na | na | na |
| Romania [12] | na | na | na | na | na | na | na | na | na | na | na | na | 3 | 95 | - | 2 | 3 | 96 | x | 1 |
| Slovak Republic [13] | na | na | na | na | 28 | 49 | 22 | 1 | 9 | 74 | 15 | 2 | 5 | 85 | 7 | 3 | 3 | 92 | 4 | 1 |
| Slovenia [14] | na | na | na | na | na | 61 | x | 39 | na | na | na | na | 9 | 84 | x | 7 | na | na | na | na |
| Spain | 21 | 73 | x | 6 | 15 | 78 | x | 7 | 10 | 84 | x | 6 | 11 | 82 | x | 7 | 13 | 85 | x | 2 |
| Sweden [15] | 42 | 42 | 16 | 0 | 44 | 39 | 17 | 0 | 47 | 38 | 15 | 0 | 45 | 38 | 17 | 0 | 44 | 38 | 18 | 0 |
| United Kingdom | 42 | 58 | x | 0 | 35 | 65 | x | 0 | 31 | 69 | x | 0 | 31 | 69 | x | 0 | | | | |

X = No cooperative sector
R = Rent, 00 = Owner-occupied, CO = Cooperative and O = Other
Other includes BE: (rent) free dwellings; FR: tenancy of a furnished unit, sub tenancy and free housing; FI: empty dwellings; IT: free right of user; ES: vacant or unknown dwellings

**Figure 12 Occupied dwelling stock by tenure**

Source: Housing for Europe

Changes in the number of residential properties can occur due to demolition, conversion, new build, sales and transfers. Changes at the neighbourhood level can occur rapidly. The changes in the stock profile over the past 10 years should be visualized and locations with high levels of change should be identified. When assessing the changes (particularly in tenure) it is useful to consider the extent to which they are the result of construction, demolition or conversion of existing dwellings or sales to sitting tenants.

A residential property only fulfils its purpose if it addresses the requirements of those that live in it and meets minimum quality standards, e.g. free from serious disrepair, healthy, safe and secure, energy efficient, etc.). The stock condition and the trends should be assessed by tenure, size, type and location.

Furthermore information about the suitability, condition, vacancy rate and location of communal residents have to be gathered. (Communal residents are establishments such as medical and care establishments including hospitals (psychiatric and general), nursing homes, and residential care homes, children's homes; defence establishment including ships; prison and young offenders institutions; educational establishments including halls of residence; hotels, boarding houses and guest houses; youth hostels; hostels for the homeless; and civilian ships, boats and barges.)

### 9.4.4.3 The market

This section requires the analysis of housing market activity to improve their understanding about changes in demand over time and identify pressure points within the area. Imbalances in the housing market have to be identified (e.g. excess demand, lack of supply).

In order to describe the demand a range of indicators have to be examined and interpreted. Data used to understand the demand for market housing differs to that used to assess need for affordable housing, since the needs of those who cannot afford market housing are not reflected in house prices.

The understanding of the house price changes is the key to an understanding of the dynamics of housing markets. The simple theory says that the price of second hand and new built houses and the rents charged will reflect the interrelationships of demand for and supply of houses in a housing market area. But the reality is more complex and the **study of house prices** makes an essential contribution to an understanding of the dynamics of housing markets. For example the house prices can be converted into weekly housing costs through assumptions about mortgage re-payments using current interest rates. The costs of different tenures should be compared by using the median prices, which are less volatile.

House prices in Europe have risen to unprecedented levels in recent years, but there are large cross-country differences (see table below). In nominal terms, average property prices have increased sharply in practically every European country over the past decade, with the major exception of Germany, where nominal prices have come down. In real terms, property prices have remained broadly stable or declined slightly in Germany, Austria, Switzerland and Portugal, while showing moderate to strong increases elsewhere. Per capita disposable incomes have increasingly failed to keep pace with the pickup in property prices.

European countries can be classified into three broad groups on the basis of their real houseprice appreciation. The first group—the "fast lane"—consists of countries that have seen their average (real) house prices during 2005-07 more than double since 1985. This group includes Spain, Belgium, Ireland, the United Kingdom, the Netherlands, and France. The second group—the "average performers"—consists of countries with still substantial real house price increases (about 50–100 per cent) since the mid-1980s, and comprises the Nordic countries, Italy and Greece. Interestingly, real house price developments in the U.S. during this period track rather closely those in this middle category. The third group—the "slow movers"—includes Germany, Austria, Switzerland, and Portugal, where real house prices have remained largely flat or have even come down over the past two decades.

There has been some convergence in the levels among the two top groups in recent years, with average performers slightly outperforming the fast lane in terms of price increases during 2006-7. But slow movers remain in a rut, with prices on average practically flat in nominal terms over the period 2005-07. Overall, house price increases in Europe in 2007 were sharply lower than in preceding years. (Hilbers, 2008)

*Affordable housing* is housing made available at a cost below full market value, to meet an identified need. It includes social rented housing, subsidised low cost housing for sale (discounted, shared ownership or shared equity) and low cost housing without subsidy (entry level housing for sale). Private rented accommodation

available at lower cost than market rents, (mid-market rent), should also be considered within the affordable housing category. (Dol, 2010)

**Affordability** analyses provide information about which locations and types of properties are accessible to local people and which are the most difficult to afford. Poor affordability can lead to excess commuting and unsustainable travel patterns, a loss of workers in the area, high dependence on social housing or housing benefit, health problems, poverty and homelessness. Assessing affordability involves comparing house costs against the ability to pay. The ratio between the income or earnings distributions and housing costs can be used to assess the relative affordability of housing.

The degree of **overcrowding** provides an insight into a key indicator of housing need. The composition of overcrowding can provide insight into possible future household flows.

**Under-occupancy**, although not in itself an indicator of housing need, is a useful measure of how well the stock is being utilised which can, for example, inform future build patterns as well as allocation policies in the social sector. These measures should  be visualized by identifying the tenures, household types and locations most affected.

**Turnover rates** and difficult-to-let properties, and void levels can reveal potential imbalances in the housing system for different types of housing. Areas with high levels of long-term vacancies should be identified und the reasons to be explored by interviews.

It is advisable to use Geographic Information Systems (GIS) software to visualize the market characteristics. Areas where access to housing is difficult and those where there is evidence of low demand should be identified. It will be useful to look at stock characteristics, households and commuting patterns to assess why particular locations have high or low demand.

**Demand trends**, particularly housing costs, should be analysed alongside trends in key demographic and economic factors to better understand the key drivers in the housing market.

### 9.4.5 Assessment of the Future Housing Market

In this section following issues should be considered:

- Future demand
- Future economic performance
- Future affordability

In this section the total number of households should be estimated that are likely to arise in the future across the functional housing market. These projections should be based on annually household and population records over around 20 years.

Future housing demand will be affected by the ability and willingness of the households to pay for housing. The economic performance of the area can influence both the number of households (e.g. through migration) and the willingness and ability to pay for housing (e.g. through income and investment potential).

Furthermore it is required to specify the long-term stability of the local economy and its implications for future housing demand. For example, continuing over-dependence on an industrial sector that is in decline could imply incomes are unlikely to grow and present trends will continue.

Affordability is a key issue affecting overall housing markets. The aim of this step is to estimate whether the affordability of housing is likely to improve or worsen, and to understand the implications of changes in house price for affordability.

### 9.4.6 Assessment of Requirements of Specific Household Types

It is well known that different groups can have different housing needs. These needs must be understood and planned for. In case there are uncertainty or concern about the housing requirements of different groups the government should ensure that they have appropriate evidence. They have to find out how well the housing market meets the needs of specific housing groups and how these needs are likely to change over time.

These groups might be:

- Families
- Older people
- Minority and hard to reach households
- Disabled people

### 9.4.7 Assessment of Current and Future Housing Need

Housing need refers to households lacking their own housing or living in housing which is inadequate or unsuitable, who are unlikely to be able to meet their needs in the housing market without some assistance (this generally refers to assistance from the public sector). For the purposes of assessment, this means **to estimate the number of households who lack their own housing or live in unsuitable housing** and who cannot afford to meet their housing needs in the market and those whose needs cannot be met in situ.

Those households who lacking their own housing might be

- Homeless households
- Insecure tenure households with tenure under notice, real threat of notice or lease coming to an end or in rent or mortgage arrears
- Concealed households- unrelated adults sharing a kitchen, bathroom or WC with another household but not sharing meals

Types of housing that should be considered unsuitable might be:

- Overcrowding according to the 'bedroom standard' (this allocates a number of bedrooms to a household based on the age, sex and marital status of family members)
- Households containing people with mobility impairment or other specific support needs living in unsuitable dwelling (e.g. accessed via steps)
- In a poor condition (without bathroom, kitchen or WC inside)
- Threaten by harassment from others living in the vicinity or risk of domestic violence

A household is considered able to afford to buy a home if it costs up to 3.5 times the gross household income for a single earner household or 2.9 times the gross household income for dual income households. A household is considered able to afford market renting in cases where the market rent payable would constitute no more than 25% of their gross household income. 'Market Rent payable' is defined as the entire rent due, even if it is partially or entirely met by housing benefit.

**The location of suitable housing.** Since house prices vary between different locations, decisions about where a household should be able to live will affect estimates of housing costs. Issues that affect judgements about where a household should be able to live may vary between housing market areas.

**Housing need can be met in situ** which means that some of the housing need can be resolved with current accommodation. For example, an extension may solve overcrowding, equity release may allow a household to repair their property, etc.

The cities need a good understanding of the scale of the current housing need, including any backlog at the housing market area level. Data might be available from Census, local house condition surveys, housing registers, etc.

In addition to the estimate of the current need the future need has to be specified on an annual basis by including new household formation.

### 9.4.8 Monitoring

See monitoring chapter 8. Information is needed on how well the need and demand assessment paper is being implemented and whether it is succeeding, so that the implementation agencies can improve the way in which the plan is being applied and so that the planning team may learn from experience and respond to changing conditions. The planning authorities will need to regularly monitor trends and activities in housing market and local authority areas. Monitoring should be undertaken on a continuous, pro-active basis.

**The housing indicators as measurement are described in chapter 13.**

### 9.4.9 Input data for the housing need and demand assessment

The required data are:
- Population by sex and age
- Number of households by age and type (single household, two adults, two adults with kids, single parents households)
- Tenure status (renting, owning)
- Migration estimates
- Interest rate trends
- Levels of housing benefit
- Funding for regeneration
- Economic growth rates
- Individual income
- Household income
- Income distribution by age
- Number of dwellings in the area by size, type, location and tenure
- Condition of stock (unfit, in need of major/minor repairs) by tenure, size type and location
- Estimated numbers of households living in shared houses

- Estimated numbers of household living in communal establishments
- Average and lower quartile prices and rents by tenure, sizes, types and location
- Mapping of which areas and property types are most and least affordable for different types of households
- Dwelling and household size, overcrowding, under-occupancy by tenure
- Vacancy rate by tenure, size, type and location, turnover, indication of available supply by tenure, type, size and location
- Population and household projections
- Economic and employment forecasts

For the collection and projection of the required input data following data sources might be available:

- Census data,
- Register of population and net household projections,
- Local authority calculations,
- House Condition Survey,
- Household Survey
- Housing statistics
- Tax register
- Economic forecasts
- Local departments for housing, economic development, labour
- Employment and unemployment register
- Census on dwellings by size and type
- Local authority own information systems such housing management databases for councils' own stock, and private landlord registration data.
- Care home statistics
- Prison statistics
- Official government population and household projections
- Future economic and employment forecasts (e.g. by local authorities, companies, etc.)

### 9.4.10 Output of the housing need and demand assessment

These core outputs are elaborated in the housing need and demand assessment and are specified summarized below:

- Number of current ** dwellings (estimates) in terms of
  - Size
  - Type
  - Condition
  - Tenure
  - Occupation and
  - Location

  ** note that in most cases even precise current figures may not be available and therefore they must be calculated

- Analysis of past and current housing market trends, including balance between supply and demand in different housing sectors and price affordability
- Key drivers underpinning the housing market
- Estimates of future number of households
- Estimates of household groups having specific housing requirements, e.g.
  - Young people
  - Single households
  - Families
  - Elderly people
  - Disabled people
  - Minorities
- Estimates of current number of households in housing need
- Estimates of future households that will require affordable housing
- Estimates of future households that will require market housing
- Estimates of total future households requiring either affordable or market housing

(Housing Need and Demand Assessment, 2008)

## 9.5 Expected Output of a Housing Simulation Model

A housing simulation should support the major policy issue of "affordable housing". The research questions have to focus primarily on the balance between housing supply and demand or need and have to be elaborated for current and future markets and trends. Specified below there is a summarization of the key research questions:

1. Where will people likely settle down?
2. Do we provide affordable houses for citizens?
3. Do we provide sufficient housing standard for the citizen?
4. Do we need additional houses in our city?
5. Does the poverty in our city increase and people cannot afford housing?
6. Can land use change of green areas be avoided by using unbuilt plots, or by the replacement of condemned houses with new one?
7. Can we reduce the size of our homes by proper design and by slow homes?
8. Would an increased influx of immigrants mean more economic growth or more ghettos?
9. What is the impact of spending money on refurbishing less developed district areas and slums?
   a. Does it mean more jobs and less crime?
   b. Has it improved the living conditions?
10. Do we really invest in slum upgrading?

The expected output should be able to provide predictions of the future demand of housing categories and their affordability. Consequently all parameters mentioned below are potential outputs of a simulation, namely

- Forecast of future number of households
- Prediction of supply and demand in different housing sectors
- Forecast of housing prices and their affordability (taking into account the affordability = expected household net income)
- Forecast of household groups having specific housing requirements, e.g.
  - Young people

- Single households
- Families
- Elderly people
- Disabled people
- Minorities

- Forecast of households that will require affordable housing

The visualization of results should be partly map-based such as

- the forecast of the location of different housing sectors
- the forecast of housing prices
- supply and demand in different housing sectors

The simulation results could be interesting for developers and real estate agents as well.

## 9.6 Slum refurbishment as a special case of housing polices

It is estimated that more than 1 billion people around the world live in slums. By 2030, the world's slum populations could rise to 2 billion if no action is taken. Most of their inhabitants have never drunk fresh water and many suffer from starvation and diseases such as malaria and AIDS.

According to Mrs. Anna Tibaijuku the challenge of the millennium is to improve the living conditions of the poor. … we must all dedicate ourselves to the task of ensuring that, one day, we will live in a world of cities without slums (Lopez, E., 2003)

Although the % of the overall population in the EU is small it is wrong to believe that there are no slums in Europe. In Europe slum areas can be found in a number of European countries, mainly in Eastern and Southern Europe, sometimes linked to minorities (e.g. Roma).

### 9.6.1 Definition

The word "slum" appeared in the London cant at the beginning of the 19th century, designating initially "a room of low repute" or "low, unfrequented parts of the town". During the major part of the 19th century, the word appeared in the written language in quotation marks mostly as "backslum". The word underwent a series of changes.

A slum, as defined by United Nations agency UN-HABITAT, is a run-down area of a city characterized by substandard housing and squalor and lacking in tenure security. According to the United Nations, the percentage of urban dwellers living in slums decreased from 47 per cent to 37 per cent in the developing world between 1990 and 2005. However, due to rising population, and the rise especially in urban populations, the number of slum dwellers is rising. One billion people worldwide live in slums and the figure will likely grow to 2 billion by 2030. (Slum, 2012)

The term has traditionally referred to housing areas that were once relatively affluent but which deteriorated as the original dwellers moved on to newer and better parts of the city, but has come to include the vast informal settlements found in cities in the developing world. They are the most visual expression of urban poverty.

Many shack dwellers vigorously oppose the description of their communities as 'slums' arguing that this results in them being threats of evictions. Many academics have vigorously criticized UN-Habitat and the World Bank arguing that their 'Cities Without Slums' Campaign has led directly to a massive increase in forced evictions.

Although their characteristics vary between geographic regions, they are usually inhabited by the very poor or socially disadvantaged. Slum buildings vary from simple shacks to permanent and well-maintained structures. Most slums lack clean water, electricity, sanitation and other basic services.
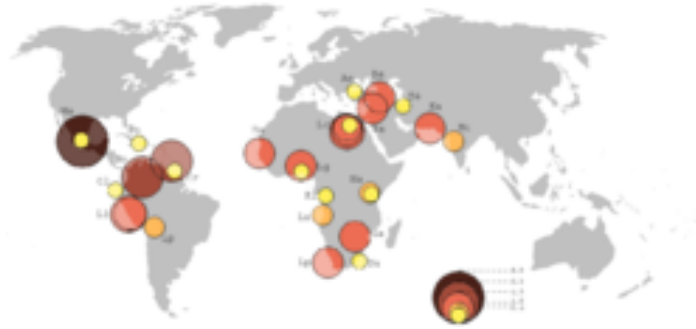
**Figure 13 Mega Slums in the World**
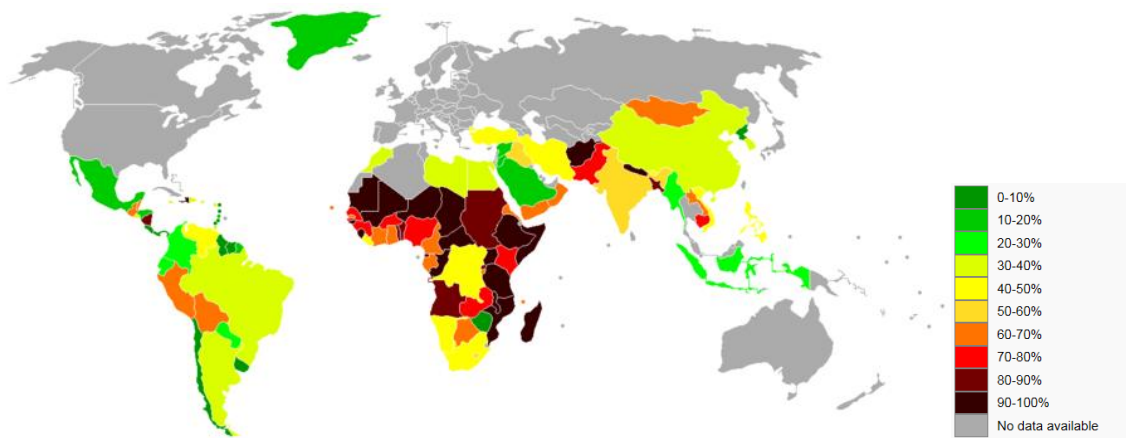


**Figure 14 Proportion of each country´s urban population living in slums**
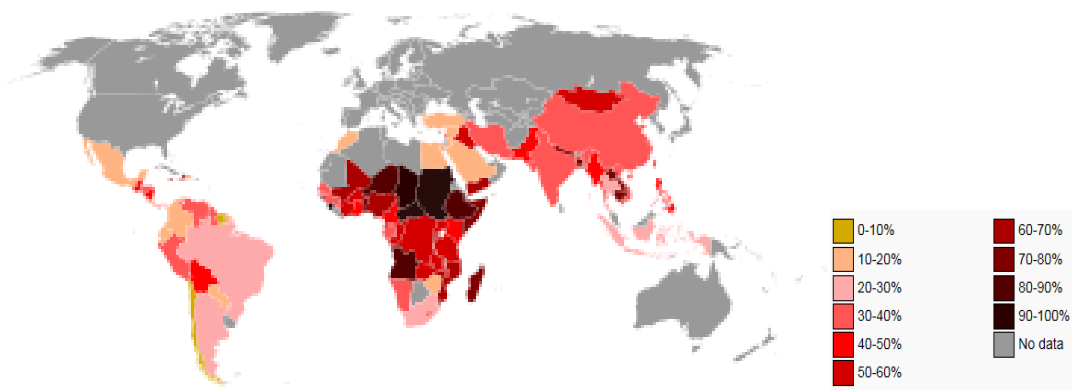
Source: UN_HABITAT



**Figure 15 Nations by percentage of urban population living in slums**

Source: UN-HABITAT

Generally said, the proportion of urban population living in slums is the proportion of urban population living in slum households. A slum household is defined as a group

of individuals living under the same roof lacking one or more of the following indicators.

Official slum indicators:

- Access to improved water - a household is considered to have access to an improved water supply if it uses improved drinking water sources or delivery points (e.g. piped water into dwelling, public tap, protected spring, rainwater collection)
- Sufficient-living area - a house is considered to provide a sufficient living area for the household members if not more than three people share the same habitable (minimum of four square meters) room
- Durability of housing - A house is considered "durable" if it is built on a non-hazardous location and has a structure permanent and adequate enough to protect its inhabitants from the extremes of climatic conditions, such as rain, heat, cold and humidity
- Security of tenure - Secure tenure is the right of all individuals and groups to effective protection by the State against arbitrary unlawful evictions. People have secure tenure when there is evidence of documentation that can be used as proof of secure tenure status or when there is either de facto or perceived protection against forced evictions. (UNHABITAT, 2011)

### 9.6.2 Major Drivers for the Development of Slums

The main drivers are:
- Population growth in urban areas in less and least developed countries
- Transition of poverty from the rural areas to the urban areas

The rapid growth and the concentration of the population in cities worldwide is a phenomenon of the 20th and 21th century. Until the second half of the 19th century almost 10 per cent of the global population could be attracted by the cities. In 1960 around one third of the total population lived in cities whereas in 2010 it reached 50

per cent. (refer figure below). The major population – round three quarters of the total growth - is expected in urban areas. Around ninety-five per cent of the population increase by 2030 will take place in the urban areas of the less and least developed countries whose population will likely rise from approximately 2,6 billion in 2011 to 3,9 billion in 2030. In comparison, for the year 2030 a total population of 8,7 billion and an urban population of 4,9 billion is expected.
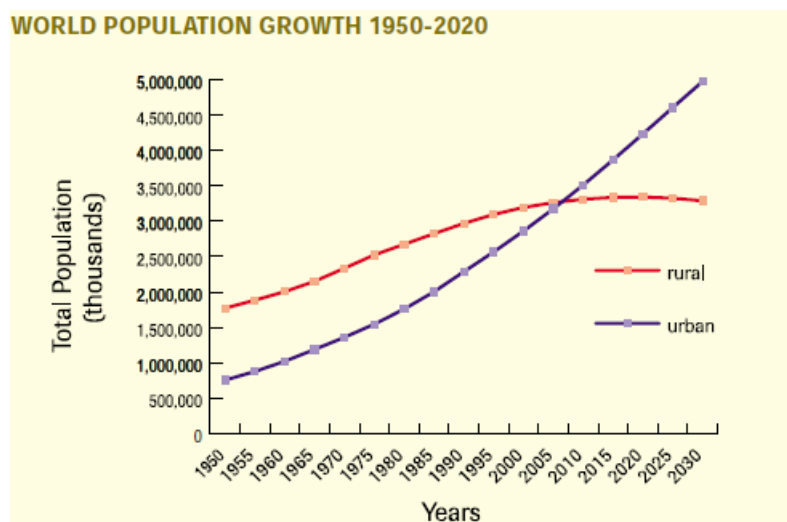


**Figure 16 World Population Growth 1959-2020**

Source: (Lopez, E., 2003)

### 9.6.2.1 Urban population by major regions in per cent of total urban population

The following chart demonstrates the shift in proportion of the global urbanization. Whilst the year 1950 Europe has with its 38% the highest proportion of urban population worldwide, it will be only around 10 per cent in the year 2050. Africa´s proportion is supposed to increase from 4,5% per cent to nearly 20%.
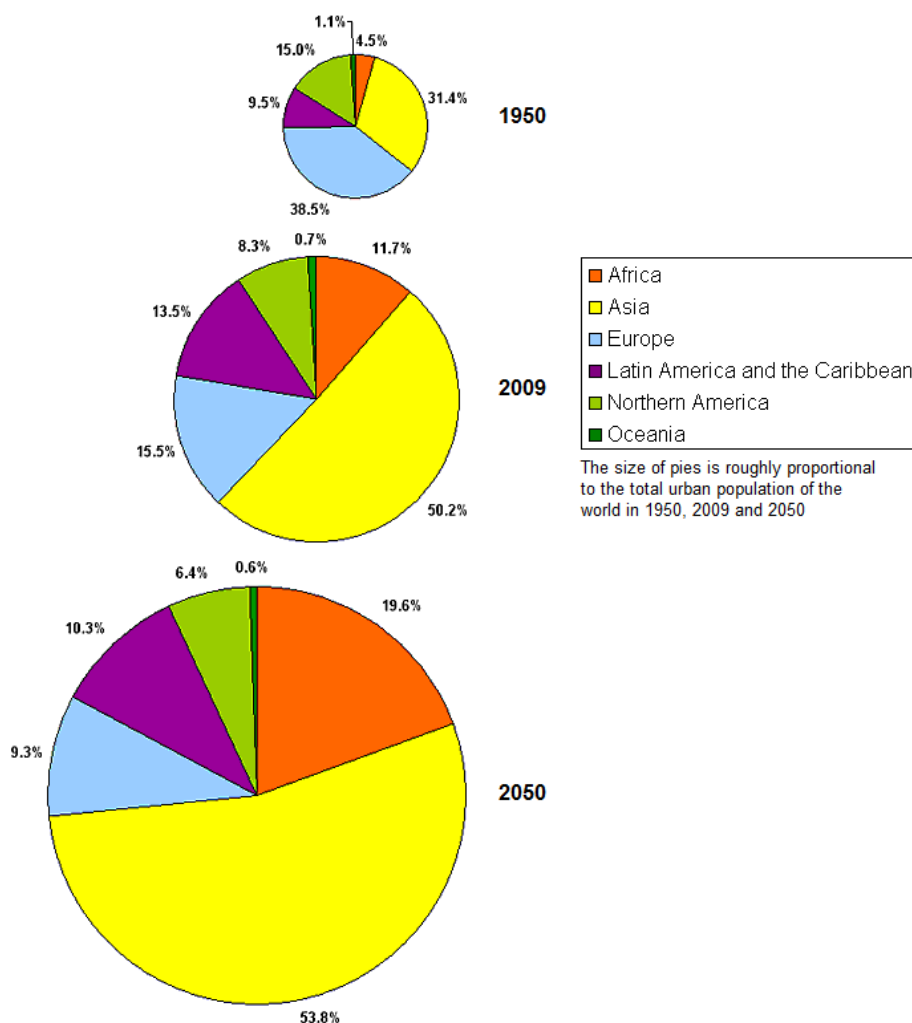
**Figure 17 Urban Population by Major Regions in Per Cent of Total Urban Population**

In addition to the extreme population growth in cities of developing countries, there is an increase in the number of mega cities in these areas. In 1975 there were five large cities in the world with a population above 10 million people, like Tokyo (19,8), New York (15,9), Shanghai (11,4),Mexico City (11,2) and Sao Paolo (10), the latter three of which were located in developing countries. (Lopez, E., 2003). Currently there are 21 megacities in existence. Tokyo (34,3), Guangzhou (25,2) Seoul (25,1), Shanghai (24,8), Delhi (23,3) Mumbai (23), Mexico City (22,9), New York City (22), São Paulo (20,9), Manila (20,3), Jakarta (18,9), Los Angeles (18,1) Karachi (17), Osaka (16,7), Kolkata (16,6), Cairo (15,3), Buenos Aires (14,8), Moscow (14,8),

Dhaka (14), Beijing (13,9), Tehran (13,1). From these 21 mega-cities 18 are from developing countries and 3 are from developed countries. (Megacity, 2012)

These figures show that the rapid trend of urban growth is primarily a phenomenon of the developing world. Urban growth of this scale and has indeed negative consequences for the living conditions of the people and the environment. A very high population density amid poverty and limited resources provokes a rapid growth of slums in mega cities of the third world.

### 9.6.2.2  Urbanization of Poverty

The poverty in developing countries which has been uniquely associated with rural areas has increasingly become urbanized. Between 40 and 80 per cent of urban dwellers in the world are living in poverty, with very little or absolutely no access to shelter, basic urban services and social amenities.

The slums are frequently situated slums in the core historic part of cities and in the peri-urban areas. Due to structural adjustment problems, mismanagement, economic mistakes it is estimated that the proportion of urban poor will increase faster than the urban population growth, which provokes in increase in the slum development.

It is further estimated that by the year 2020, the level of urban poverty in the world could reach 50 per cent of the total population (around 4 billion) living in cities, which means around 500 million households.

Poverty in cities of the developing world will be characterized by, among others, the following features:
- large and growing backlogs in delivery of basic services to urban residents as demand outstrips institutional capacity and financial resources;
- the worsening state of access to adequate shelter with security of tenure, resulting in severe overcrowding, homelessness and environmental health problems;

- increased vulnerability to environmental health problems, environmental shocks and natural disasters;

- increasing intra-city inequality, manifested in stark residential segregation, multiplying violence impacting disproportionately on women and the poor themselves;

- lack of participation of communities in decision-making processes and implementing activities;

- vulnerable sectors among women, children and youth.

9.6.2.3 Where are the slums?

An analysis in low-income economies indicates that the larger the city, the higher the proportion of slums. The observation of a selected number of African and Asian countries where the incidence of slums is between 50 and 80 per cent shows that slums can proliferate both in the primary city and/or in the intermediate ones.

In Ethiopia, for instance, slums represented 99.4 per cent of the total urban population and Addis Ababa concentrated only one fourth of this population. Three quarters of the slum population are distributed in and around other eight to ten urban centres. (Lopez, E., 2003)

In Kigali accommodates around 83% of the total urban population of Ruanda. A total slum population 88 per cent means that virtually all informal settlers were concentrated in the capital. These figures imply that the slum dwellers are living in capital cities, mid-size urban areas and small urban centres.

Slum settlements can take root anywhere - next to railway lines, under bridges, on swampy ground or next to 5-star hotels, but the slum dwellers never own the land. This means that they live in constant fear of eviction as the authorities can decide to reclaim land at any time.

### 9.6.3 Curbing the spread of slums and ghettos

#### 9.6.3.1 Policies of neglecting the existing of Slums

Slums have been portrayed as institutional failures in housing policy, housing finance, public utilities, local governance and secure tenure. Measures to address slums have therefore evolved around such thinking. Slums were tolerated because they were seen as vestiges of traditional villages that were in the process of being absorbed by the new urban planning, but they were not provided with basic services.

Then the governments pursued a programme of low-cost housing as a strategy for meeting the needs of low-income households. The programme failed to meet the housing needs of its intended beneficiaries. First, very few houses were built in relation to existing deficit. Second, the houses built were unrealistically of high standards, and thus very expensive for low-income families. Third, in many countries, the programme was "attacked" by the proliferation of fraudulent practices during various phases of implementation.

#### 9.6.3.2 Slum Clearance Programme

When it became clear that the policy of neglecting would not lead to the disappearance of slums. Mass evictions accompanied by the demolition of slums were carried out by the state. This clearance policy resulted in the destruction of fixed livelihoods, loss of social and safety networks, family disintegration, emotional trauma and in an increase of impoverishment.

#### 9.6.3.3 Slum Upgrading Action Plan

There are two priority areas of sustainable urbanization that hold good promise for reducing the prevalence of slums. The first relates to improving the provision of urban infrastructure for poor households especially in those countries where the stock of urban infrastructure is deficient. Indeed, findings from this paper clearly demonstrate that improved infrastructure reduces the prevalence of slums. Second,

city authorities need to be strengthened by providing them with the necessary powers, resources and capacity to undertake a wide range of statutory functions.

The basis of the sustainable urbanisation is the Slum Upgrading Action Plan (UNCHS) This Slum Upgrading Action Plan addresses the urban side of the world community's poverty reduction mission to ensure a better quality of life for the people. The greatest spatial concentrations of the poor are found in slums and squatter settlements within cities and on the peri-urban fringes outside administrative boundaries.

These cities-within-cities are wellsprings of entrepreneurial energy, yet their brutal physical conditions limit residents' ability to realize welfare improvements from their own efforts alone. The contribution of these individuals to the broader economy is considerable, as they constitute the core of the urban labour force and have the potential to produce a significant share of domestic capital formation through self-built housing— yet their lives are made insecure by the absence of key public interventions that would catalyze and facilitate private investment.

Slum Upgrading consists of physical, social, economic, organizational and environmental improvements undertaken cooperatively and locally among citizens, community groups, businesses and local authorities. (UNCHS)

**Actions typically include:**

- Installing or improving basic infrastructure, e.g., water reticulation, sanitation/waste collection, flood prevention, electricity, security lighting, and public telephones
- Removal or mitigation of environmental hazards
- Providing incentives for community management and maintenance
- Constructing or rehabilitating community facilities such as nurseries, health posts, community open space
- Regularizing security of tenure
- Home improvement
- Relocation/compensation for the small number of residents dislocated by the improvements

- improving access to health care and education as well as social support programs to address issues of security, violence, substance abuse, etc.

- Enhancement of income-earning opportunities through training and micro-credit

- Building social capital and the institutional framework to sustain improvements

## 9.7 Expected Output of a Slum Simulation Model

Basically there are two main areas of simulation:

a) Forecast of the appearance of slum areas

   This refers to a simulation, which predicts

   o in which areas of the city slums are likely to occur or grow

   o forecast of the people living in this slum area

b) Simulation of policies to upgrade slums to find out the most effective policies

   o in terms of acceptance by slum inhabitants

   o in terms of impact on the slum dwellers such as the improvement of living / housing standards (measured by the slum indicators)

   o in terms of investment / benefit ratio

   o in terms of positive impact on the city as a whole

      ▪ economic growth

      ▪ reduced crime

      ▪ improving the overall housing quality

      ….

The visualization of a) is clearly map-based. b) to be defined

# 10 Segregation - detailed description

As already described in chapter five urban segregation is the physical separation of two or more groups into different neighbourhoods, or a form of segregation that "sorts population groups into various neighbourhood contexts and shapes the living environment at the neighbourhood level." While it has traditionally been associated with racial segregation, it generally refers to any kind of sorting based on some criteria populations (e.g. race, ethnicity, income). (Residential Segregation, 2012)

Segregation can also be divided into **spatial** and **residential segregation**.

Spatial segregation is a feature of metropolises from San Diego to Boston, from Santiago to Cape Town, from Belfast to Bangalore. In some places the segregation is associated primarily with racial groups, in other places, ethnicity or religion, while in still other places, income status. For example, in Latin America, the public debate around urban spatial segregation typically focuses on socioeconomic issues, whereas in Europe, the U.S. and many developed countries the debate centres more on racial or ethnic disparities.

Residential segregation also has different meanings and consequences depending on the specific form and structure of the metropolis, as well as the cultural and historical context. In North America, social and ethnic minorities tend to be segregated in less desirable inner-city locales while the upper- and middle-class majority disperses into small, socially homogeneous urban neighbourhoods or suburbs across the metropolis. By contrast, in Latin American the elite minority tends to concentrate in one area of the city. (Urban Spatial Segregation: Forces, Consequences, and Policy Responses, 2012)

The major drivers for segregation are varied. The apartheid laws of South Africa were one extreme case of large-scale, government-sanctioned spatial segregation.

While government evictions and legal frameworks are explicit mechanisms for creating urban spatial segregation, more subtle mechanisms also have been used to create or enforce spatial segregation. In Colombia, the contribución de valorización (a kind of betterment charge) was imposed on inhabitants of an informal settlement in Bogotá located on the edge of a new circumferential highway. Officials knew the charge was higher than most inhabitants could afford to pay and would likely lead them to "choose" relocation. By setting land use standards that the poor could not meet, the government virtually forced them toward the informal, peripheral areas. (Urban Spatial Segregation: Forces, Consequences, and Policy Responses, 2012).

The U.S. is no stranger to such mechanisms to create segregated housing markets. For example, some real estate agents shun racial and ethnic minorities or persons from lower social classes who do not fit their target markets, and many small landlords rely on informal networks to find the kinds of tenants they prefer.

In Europe, after the Second World War the cities provided lots of council flats to their citizens at cheap rents. At that time egalitarianism was a dominating principle in modern Europe. But what once was seen as an example is now often linked with failure and is no perceived as a measure created residential segregation.

A negative consequence of segregation is exclusion. Housing segregation is arguably a real burden for the possibilities to achieve integration in society and segregation is something that threatens democracy as well as economic growth. An important argument to counteract the ethnic and socioeconomic housing segregation is that segregation make it difficult for society as a whole to be integrated (Integrationsverket 2004). A divided city – for example, a city characterized by housing segregation – results in unequal life chances that prevent people from integrating in society. The issue of exclusion and its complex nature is not merely segregation in housing but the strong social and ethnic exclusion mechanisms that are growing. It is reflected in discrimination at work or in political marginalization. (Legeby, 2010)

## 10.1 De-Segregation-Strategy

In order to promote the integration among different groups, the cities are encouraged to design their own de-segregation strategy, which has to be implemented during the de-segregation processes

Currently three de-segregation-strategies are recommended and intensely pursued:

- Disposal of poverty, which promotes the integration through the spatial dispersion of poverty focus on moving low-income households out of distressed areas into middle-class neighbourhoods. This strategy is adopted in some US housing programmes.
- Regeneration of troubled neighbourhoods, which focuses on the regeneration of problematic public housing by improving the standards and building high-quality houses and encouraging middle class households to move in these areas.
- Regulation for new developments requires mixed occupancy as a condition for approval and/or funding. (Fonseca Feitosa, 2006)

## 10.2 Participation in Segregation

Participation is a key issue too to guarantee a satisfactory policy, which aims at combatting the serious effects and impacts of spatial segregation. All relevant stakeholders for the policy decision making process as well as the people concerned should be integrated in this process.

The sectors concerned are very similar to those in the housing domain. Primarily the citizens should be involved in the

- Standard and maintenance of the existing housing stocks
- Functional requirements of the apartments
- Refurbishment of the concerned district by improvement of infrastructure and provision of workstations by attracting companies

Like in housing the participation and communication between citizens and the city administration could be supported by special "help-desks".

## 10.3 Tasks of the De-Segregation Process

The tasks of the de-segregation policy is

- Description and analyse of the current segregation of the city caused by race, income, religion, etc.
- Formulation of the alternatives
- Choosing the best options
- Monitoring
- Expected output of a segregation simulation model

### 10.3.1 Initiation of the De-Segregation Process

As segregation causes a lot of negative impacts the initiation of the segregation might come either by citizens, the government or other stakeholders. Proposals containing forecasts which will be supported by FUPOL tools based on the current structures would be an important impact.

The initiation of the process comprises the following steps:

- Identification of the area(s) concerned - at the beginning the area or the areas in the city ready for de-segregation processes have to be specified (location, size, access, number of people involved)
- Definition of the stakeholders – all relevant stakeholders, who should be included in the process have to be indicated, e.g. citizens, city government, representatives of the economy, national and international organizations, social security organisations, etc.
- Identification of the methodology which should be used (usually good practice is recommended)

- Specification of relevant data – it is recommended to use secondary data to avoid large scale primary data collection.

### 10.3.2 Project Management in the De-Segregation Process

The project management system has to be installed like in the land use planning process.

### 10.3.3 *Analysis of the Current Situation*

In a first step those areas in the city which are affected or threatened by urban segregation have to be identified.

A key element in the recognition of segregated areas is through **segregation in public spaces**. An urban landscape characterized by a prominent segregation in public space, reveals disrupted spatial relations within and between neighbourhoods. To investigate whether public space, as it is shaped and structured by built form, is segregated, a profound analysis of public space in itself is needed that reveals segregated areas within a city and how this segregation influences the accessibility to people. Furthermore, this type of investigation illustrates the consequences of a segregated urban space: e.g., how public space as a mediator defines relations between people as well as relations between people and different resources in the city, further establishing and reproducing patterns of segregation or exclusion (Legeby, 2010)

After definition of the segregated areas they have to be analysed in a more detailed way than in chapter 10.2.2. The information refer to the components specified below:
- Specification of the population in the area(s) in terms of age, sex, nationality, religion
- Specification of the housing structure (e.g. rent, private ownership, average square meter per person, social housing,  average household income

- Condition of stock (unfit, in need of major/minor repairs) by tenure, size type and location

- Unemployment rate, crime rate, population growth rate

- Analysing the economic structure (types of industries, employment, unemployment, investment per capita)

- Definition of the infrastructure

- Characterising the current land use

### 10.3.4 Formulation of Alternatives

In this step the alternatives have to be specified to bridge the gaps between the current status and the goal of the de-segregation policy and discussed with all relevant stakeholders.

Currently the idea of "mixed communities" is leading the de-segregation policies. This idea is not new and was created at the end of the 19th century. It focuses on avoiding the concentration of characteristics considered to be problematic (in terms of income, employment status and ethnicity) and on factors considered important for establishing means of interaction and support of certain public goods (Fonseca Feitosa, 2006).

However, characterized such as type of tenure or quality of housing are very often used as a proxy for these social attributes and many developments base their mixed approach on establishing quotas for home-ownership and rents, or for market rent levels and subsidised-rent levels. In the UK the term "mixed community" is commonly substituted by mixed tenure. (Fonseca Feitosa, 2006)

### 10.3.5 Choosing the best option

See chapter 8, where land use planning is described. The stakeholder have to find out the best option based on the summarization of the planners.

### 10.3.6 Monitoring

See monitoring chapter 8. Information is needed on how well the de-segregation plan is being implemented and whether it is succeeding, so that the implementation agencies can improve the way in which the plan is being applied and so that the planning team may learn from experience and respond to changing conditions.

**The de-segregation indicators as measurement are described in chapter 13.**

### 10.3.7 Input data for the de-segregation model

The required data for the selected segregation area are:
- Population by sex, age, nationality, religion
- Population forecasts
- Migration estimates
- Number of households by age and type (single household, two adults, two adults with kids, single parents households)
- Average individual income
- Average household income
- Tenure status (renting, owning)
- Levels of housing benefit
- Funding for regeneration
- Economic growth rates
- Economic forecasts
- Employment/unemployment rate
- Income distribution by age
- Number of dwellings in the area by size, type, location and tenure
- Condition of stock (unfit, in need of major/minor repairs) by tenure, size type and location
- Estimated numbers of households living in shared houses
- Estimated numbers of household living in communal establishments

- Average and lower quartile prices and rents by tenure, sizes, types and location

- Mapping of which areas and property types are most and least affordable for different types of households

- Dwelling and household size, overcrowding, under-occupancy by tenure

- Crime rate

- Current land use data

- Estimated future land use

For the collection and projection of the required input data following data sources might be available, which are very similar to housing :

- Census data,

- Estimates of migration/immigration

- Register of population and net household projections,

- Local authority calculations,

- House Condition Survey,

- Household Survey

- Housing statistics

- Tax register

- Economic forecasts

- Local departments for housing, economic development, labour

- Employment and unemployment register

- Census on dwellings by size and type

- Local authority own information systems such housing management databases for councils' own stock, and private landlord registration data.

- Care home statistics

- Prison statistics

- Official government population and household projections

- Future economic and employment forecasts (e.g. by local authorities, companies, etc.)

## 10.4 Expected Output of a De-Segregation Model

The output of a simulation model should assist the politicians in assessing the de-segregation policies.

Key questions are for example:

1.  Which areas of the city are primarily threatened by urban segregation?
2.  What can be done to stop or to reduce urban segregation?

The expected output of the de-segregation model is:

a. Forecast of the appearance of segregation areas

This refers to a simulation, which predicts

- o in which areas of the city segregation is likely to occur or grow
- o forecast of the people (by sex, age, nationality, religion, employment/unemployment, household size, individual income, household income, etc.) living in this segregation areas

b. Simulation of integration policies to curb segregation areas

- o in terms of acceptance by citizens
- o in terms of impact (de-segregation)

The visualization of a) is clearly map-based. b) to be defined

## III.  PART THREE-SOCIAL MEDIA

# 11 Social Media and its use for the Policy Modelling

The use of social media in the FUPOL project for crowd sourcing and participation is of extraordinary importance and has to be focused in detail.

The chapter is divided into the following main sections:

- We 2.0 and its user: Provides an overview of the social media
- Content in social media and its generation through crowd sourcing
- Recommendations for Social Media and Politics
- Social Knowledge through E-Participation

## 11.1 Web 2.0 and its users

### 11.1.1  Web 2.0

According to a Report by the Technology and Standards Watch (Anderson, 2007) Web 2.0 is based on six key ideas that largely account for its boom:

- Individual production and User Generated Content,
- Harness the power of the crowd,
- Data on an epic scale,
- Architecture of Participation,
- Network Effects and Openness.

Web-based services and applications that demonstrate the foundations of the Web 2.0 concept include Blogs, Wikis, Tagging and Social Bookmarking, Folksonomy versus collabulary, Multimedia sharing, Audio blogging and podcasting, RSS and syndication. For a brief description of each see below:

**Blog:** is a simple webpage consisting of brief paragraphs of opinion, information, personal diary entries, or links, called *posts*, arranged chronologically with the most recent first, in the style of an online journal.

**Wiki:** is a webpage or set of webpages that can be easily edited by anyone who is allowed access. Wikipedia's popular success has meant that the concept of the wiki, as a collaborative tool that facilitates the production of a group work, is widely understood.

**Tagging & Social bookmarking:** A tag is a keyword that is added to a digital object (e.g. a website, picture or video clip) to describe it, but not as part of a formal classification system. One of the first large-scale applications of tagging was seen with the introduction of Joshua Schacter's del.icio.us website, which launched the 'social bookmarking' phenomenon. Social bookmarking systems share a number of common features. They allow users to create lists of 'bookmarks' or 'favourites', to store these centrally on a remote service (rather than within the client browser) and to share them with other users of the system (the 'social' aspect).

**Folksonomy versus collabulary**: There is a distinction between a folksonomy (a collection of tags created by an individual for their own personal use) and a collabulary (a collective vocabulary).

**Multimedia sharing:** e.g. YouTube (video) Flickr (photographs) and Odeo (podcasts). These popular services take the idea of the 'writeable' Web (where users are not just consumers but contribute actively to the production of Web content) and enable it on a massive scale. Literally millions of people now participate in the sharing and exchange of these forms of media by producing their own podcasts, videos and photos.

**Audio blogging and podcasting:** Podcasts are audio recordings, usually in MP3 format, of talks, interviews and lectures, which can be played either on a desktop computer or on a wide range of handheld MP3 devices.

**RSS and syndication:** RSS is a family of formats which allow users to find out about updates to the content of RSS-enabled websites, blogs or podcasts without

actually having to go and visit the site. Instead, information from the website (typically, a new story's title and synopsis, along with the originating website's name) is collected within a feed (which uses the RSS format) and 'piped' to the user in a process known as syndication.

## 11.1.2 Social Media

The five core social media tools are: (Government Information Services, 2011)

1. **Social networks** – A term often used to refer to the websites used to connect and interact with other individuals. Interaction is often informal and entirely web-based. Examples include Facebook and Twitter.

2. **Media-sharing networks** – Websites that allow users to share video and images. They also allow users to comment on their own media and the media uploaded by users. Examples include YouTube and Flickr.

3. **Blogs - S**hort for weblog. A blog is a content-managed website that presents its entries in reverse chronological order and allows visitors to comment. Blogger and WordPress are examples of popular blogging tools.

4. **Wikis** – Web-based applications which allow users to add content to or edit a web page. The most popular example is Wikipedia.

5. **Forums** – Online applications for holding themed discussions between groups of participants.

Social networking sites appeared with the Web 2.0 boom. They allow their users to share content which they have produced themselves and receive content from others. 41.7 million Europeans are regular users of social networking sites. They will be 107.4 million by the end of 2012 (Europa website). Europeans are using them to share personal and professional experiences, keep in contact with family and friends, and organise their social lives.

**Advantages:**

- **More interaction for users:** members of social networks can create and share content (information, videos, pictures, advice), organise their social and political lives online, or plan vacations and business trips.
- **Continuous creation of new tools:** creating a social networking site does not require massive investments - it is relatively easy for companies to enter the market. The more competition there is, the more creative companies become to attract users through new and exciting services.
- **New ways of conducting business:** social networks allow companies to ask customers about their products. They also influence recruitment and advertising methods.
- **Forget about distance:** no need to catch a plane if you want to find a childhood friend, keep in touch with relatives, or discuss ideas and opinions with people living at the other end of the world.

**Risks:**
- **Cyber-bullying:** broad range of behaviours including harassment of minors by people who know them. Harassment can involve the circulation of photographs, rumours or gossip (true or false), "happy slapping" and other behaviour which would be distressing or hurtful to users (especially minors).
- **Violation of privacy:** problems associated with minors supplying personal information online by which they could be identified, identity theft, wrongful selling of user databases to third parties, spam, phishing.
- **Exposure to harmful content** such as pornography or sexual content, violence, or content inciting to self harm (suicide, eating disorder, etc.).
- **Grooming:** befriending a minor to prepare them to accept inappropriate behaviour (including for sexual purposes). Although the likelihood of such a risk is considered by many researchers as low, it is potentially the most severe risk and a source of high concern.

"Social networking services" refers to a wide-range of rapidly developing services tools and practices. Social networking services can be broadly defined as Internet- or mobile-device-based social spaces designed to facilitate communication, collaboration

and content sharing across networks of contacts. Social networking services allow users to manage, build and represent their social networks online. Services usually (but not always) include other individuals; they might also include the profiles of events, companies, even political parties. They may let you add anyone in the network as your friend or contact, or they might ask both parties to agree all connections.

According to a definition by the European Commission Safer Internet Initiative, Social Media Platforms offer Social Media Services which can be summed up as the following (Safer Social Networking Principles for the EU, 2009):

- A platform that promotes online  social interaction between two or more persons for the purposes of friendship, meeting other persons, or information exchange;

- Functionality that lets users create personal profile pages that contain information of their own choosing, such as the name or nickname of the user, photographs placed on the personal page by the user, other personal information about the user, and links to other personal pages on the service of friends or associates of the user that may be accessed by other users or visitors to the service;

- Mechanisms to communicate with other users, such as a message board, electronic mail, or instant messenger; and

- Tools that allow users to search for other users according to the profile information they choose to make available to other users.

### 11.1.3  Classification of Social Media Platforms

Childnet International divides social networking platforms in two main categories:

- **Sites that are primarily organised around users' profiles**: pages mainly consist of information about an individual member, including the person's picture and details of interests, likes and dislikes e.g. Bebo, Facebook and MySpace. Users can contribute to each other's spaces, typically leaving text, embedded content or links to external content through message walls,

comment or evaluation tools. Users may also include third-party content (in the form of widgets) to enhance their profiles or as a way of including information from other web services and social networking services.

- **Sites that are organised around collections of content:** the user's profile plays a secondary role to the posting of content e.g. *Flickr* where groups and comments are based around pictures; *Shelfari* where the focus is on the bookshelf of each user; and *YouTube.com* for video sharing.

Childnet also identifies the following categories of platforms:

- **White-label social networking services:** feature group building functionality, which allows users to form mini communities within sites e.g. PeopleAggregator.

- **Multi-user virtual environments:** online virtual environments that allow users to interact with each other's avatars e.g. World of Warcraft.

- **Mobile social networking services:** mobile phone versions of social networking sites e.g. MySpace and Twitter offers mobile versions, while there are some mobile exclusive sites such as MYUBO.

- **Micro-blogging/presence updates:** Micro-blogging services such as Twitter and Jaiku allow you to publish short (140 characters, including spaces) messages publicly or within contact groups. These services are designed to work as mobile services, but are popularly used on the web as well.

Nevertheless, in its report ChildNet clarifies that the users themselves can decide on the purpose of their use. «Users may also tailor the intended use of platforms to suit their own interests. For instance, sites that are primarily profile focused may be used by individuals to showcase media collections or be used as a work space for particular topics or events. Educators setting up private groups to collaborate and use tools are a great example of how social networking services can be tailored for users' own ends.»

The European Commission also offers a rough classification of social networks (Europa):

- **Generalist social networks:** MySpace, Facebook, Skyrock, Bebo, Netlog, Hyves, StudiVZ.de, Piczo, Zap.lu, MSN, Giovani.it, Arto.dk, Yahoo, One.lt, Grono, Tuenti, Aha.bg

- **Content-based platforms,** where users can watch or upload content such as videos or pictures**:** Youtube, Dailymotion, Flickr

- **Business networks:** LinkedIn, Ecademy

- **Child networks:** Club Penguin, Barbiegirls.com

- **Micro-blogging networks:** Twitter

- **Virtual environments:** Second Life, Habbo Hotel

### 11.1.3.1 Methodological Approach for Classification

With the growing importance of social networks as part of Web 2.0, the opportunities for reaching target group users, publishing information and engaging in bi-directional customer communication have expanded even more. Therefore, the technological basis provided by the Internet is becoming an inseparable part in creating an organization's (either a company, an NGO, a Municipality or even a Government) identity and represent a key medium for communicating with existing and potential users (customers, members, citizens, etc.).

With the continuously growing number of social platforms, specialized news webpages, blogs, discussion forums and messaging services, staying informed of the newest trends and, more importantly, choosing the most relevant communication channels becomes a challenging, time- and effort-consuming task. This would require the completion of periodical studies of the relevant channels as well as the development of decision mechanisms for determining the suitable ones. Currently, this is already difficult, while in future, as more and more new channels evolve, keeping an overview of all available options will hardly be possible (c.f. the following figure).

It is important to point out that the communication channels do not solely encompass Social Media channels like Facebook, Twitter, etc. but also include

traditional Web presences (homepage, email mailing list, newsletter, etc.) and future channels, such as dedicated mobile channels and Linked Open Data. In addition, with the swiftly changing underlying technologies, the context is quite dynamic so new channels become more important as old ones begin to disappear. Moreover existing channels undergo constant alterations as well.

With the growing number of channels, scalability also becomes an issue. Once a set of communication channels has been chosen, each option for publishing messages needs to be addressed individually. For example, making the same announcement over Facebook, Twitter and a mailing list would require accessing all three platforms separately and entering the message three times. This approach is not flexible because there is no support for easily adding new channels or dropping old ones. More importantly it is not scalable, since expanding the selection results directly in increased time and effort and, therefore, in higher costs.

*Application Programming Interfaces (APIs):* allow third party developer companies to create 'applications' and, in some cases, users can add such applications to their SNS profile, providing them with added utility and functionality.

## 11.1.3.2  Additional Features for Classification

Kietzmann et al (2011) described in their article, (Kietzmann, 2011) a framework that can be used to compare and contrast the functionalities and implications of different social media. This framework consists of a honeycomb of seven functional building blocks: identity, conversations, sharing, presence, relationships, reputation and groups (see figure below).



Social Media Functionality                    Implications of the Functionality
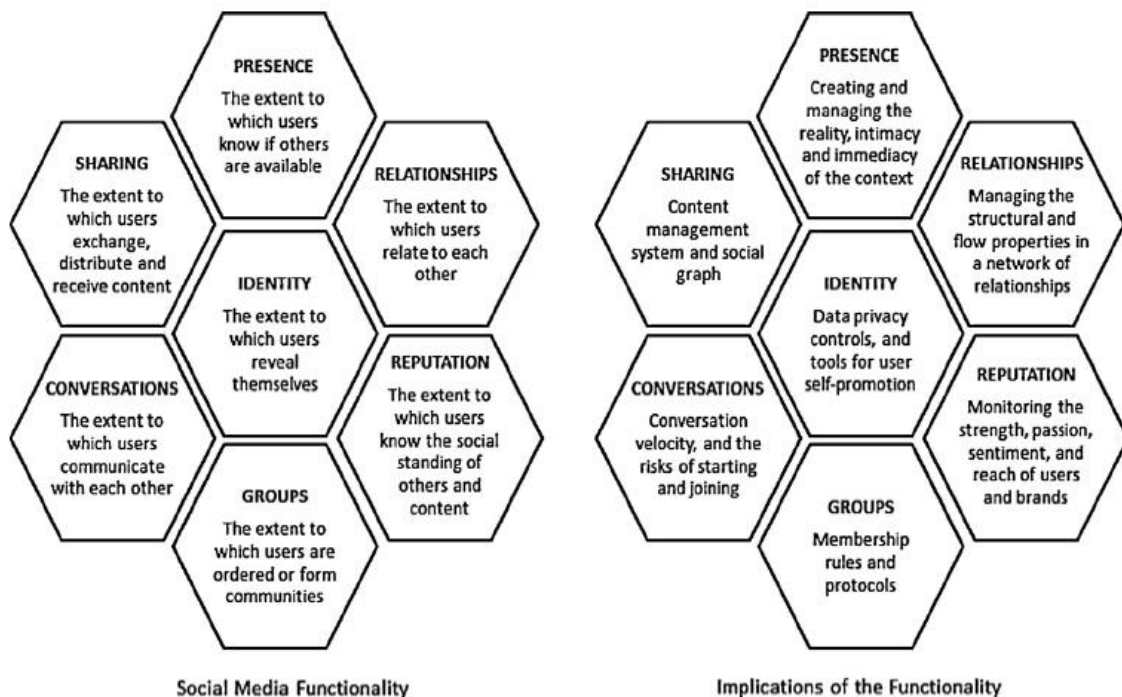
The authors state that each building block allows for an examination of: (a) a specific facet of social media user experience, and (b) its implications for organizations. These blocks are neither mutually exclusive, nor do they all have to be present in a social media activity. They are constructs that allow us to make sense of how different levels of social media functionality can be configured.

The figures below contrast the functionalities of three different social media sites based on the honeycomb framework.



YouTube



Facebook

LinkedIn
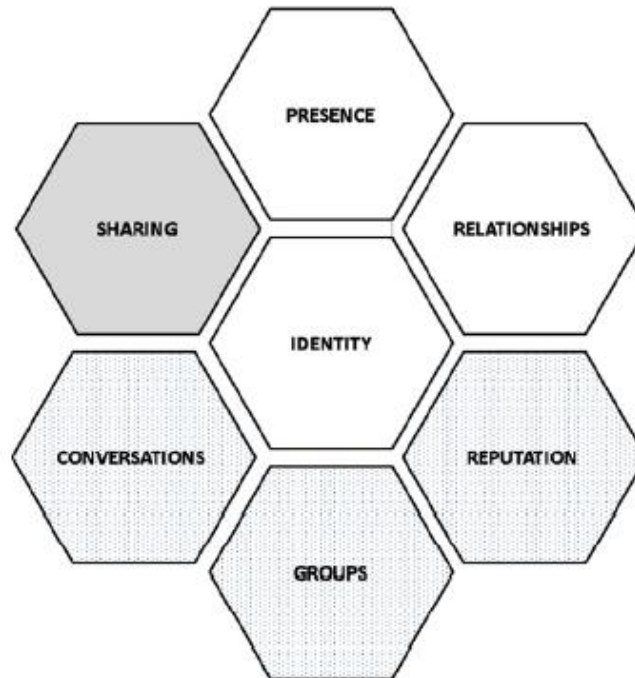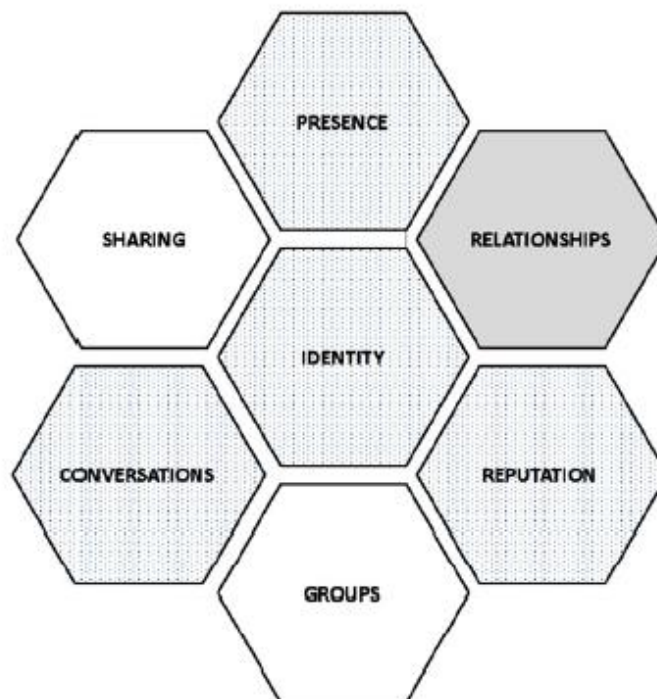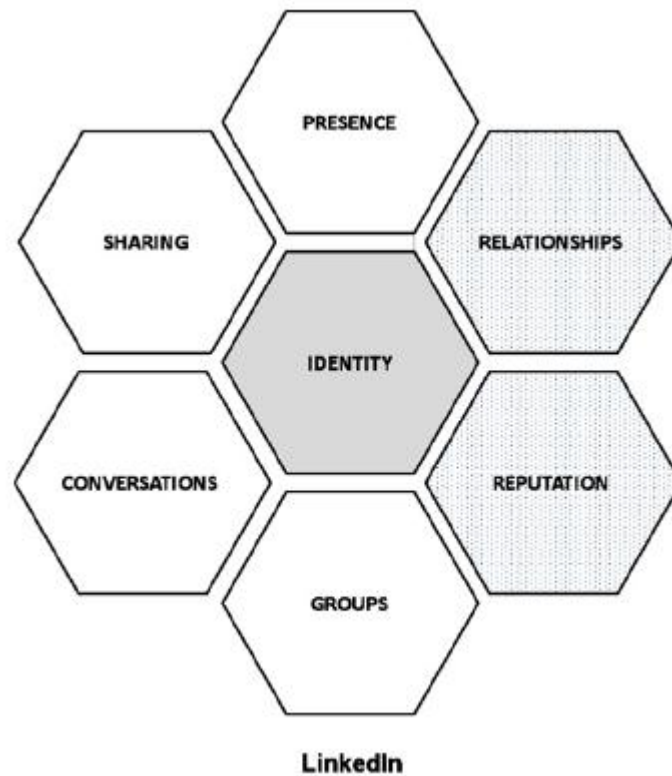
### 11.1.4 List of Platforms

The European Commission has released a list of platforms that have signed its proposed principles for security and protection (Commission). With the exception of Diaspora, these are:

**Arto.com** www.arto.com

Arto.com has, since its launch in 1998, grown to become the largest social networking site in Denmark, offering hundreds of thousands of Danish users an opportunity to kick back, relax and get in touch with old relationships and new friends. Appealing largely to teenagers, Arto is dedicated to the safety of their users, offering a safe place to communicate with others online while still being free to evolve and express themselves as they wish.

**Banzai**

Banzai is an Italian group focused on internet market and media market, e-commerce and web services. Founded in 2006 by Paul Ainio, one of the pioneers of internet Italian, and Andrea Di Camillo, Banzai controls more than 20 companies. With over 7 million unique users Banzai ranks among the top players in the Italian web, along with Telecom Italia, Wind, Gruppo L'Espresso Group and RCS (Nielsen Online data for December 2008). Banzai aims to grow in the Italian web market with an integrated project that would develop the online media in synergy with the activities of e-commerce and web services. Among the companies in the advertising, there are the dealers and Pixel Comprabanner. Media companies include: StudentiMediaGroup (Giovani.it, Studenti.it, Girlpower), Bloo, Altervista, Save the Date, SoldiOnline, Rgb, Onedegree, Gypsies, Film.tv. E-commerce companies involved in include: ePRICE, Sitonline, Efo, Saldiprivati and Joys. Web services companies include: Quadrante, Officine Network, Melazeta.

**Bebo** [www.bebo.com](www.bebo.com)

Bebo is a popular social media network. Building on the notion of traditional social networking Web sites, Bebo combines community, self-expression and entertainment to enable its users to consume, create, discover and share professional and user-generated content through the Bebo Web site. First founded in 2005 Bebo is focused on providing a more personal experience for consumers that makes it easier for them to manage their online life. By letting users pool key updates and information from multiple sites in one place, Bebo is able to build on the foundations of social networking giving them a one-stop destination from which to experience life online. Bebo has a total membership of more than 50 million registered users worldwide. Bebo's global users spend an average of 25 minutes* a day on the site.

Bebo forms part of AOL's newly created People Networks business unit which combines Bebo, the AIM (excluding AIM Mail) and ICQ personal communications networks, widget technology company Goowy Media, social search and answer service Yedda and social aggregation service Socialthing!, People Networks' collection of community platforms reaches 94 million unduplicated users worldwide (ComScore

Media Metrix, 2008). Bebo is a wholly owned subsidary of AOL LLC, a majority-owned subsidiary of Time Warner Inc. Bebo is currently present in the following European countries: UK, IE, DE, IT, ES, FR, PL and NL.

**Dailymotion** www.dailymotion.com

A top 60 website worldwide, Dailymotion attracts over 41.9 million unique monthly viewers worldwide (source: comScore, December 2008). Every day, over 15,000 new videos are uploaded into Dailymotion's global network of 18 localized video entertainment sites. In December 2008, Dailymotion delivered over 922 million videos to users including curated content from premium and Motionmaker creative contributors. Using the most advanced technology for both users and content creators, Dailymotion provides high-quality and HD video in a fast, easy-to-use website that also automatically filters infringing material notified by content owners. Dailymotion's mission is to provide the best possible entertainment experience for users and the best marketing opportunities for advertisers, while respecting content protection. Dailymotion is accessible from every European country. Dailymotion offers localized versions with local programming in France, UK, Belgium, Netherlands, Spain, Poland, Germany, Greece and Italy.

**Diaspora** http://blog.diasporafoundation.org/

is an open-source and distributed community of social networks run by users that enables you to own your own personal data, control with whom you share, and discover cool stuff throughout the Web.

**Facebook** www.facebook.com

Facebook is presently the largest social network globally, with 750 million users. Facebook users must be over 13 to register and require users to register with their real names and information. Only one personal profile may be created and users must not create an account for anyone other than themselves without permission. Facebook has developed a privacy policy and its terms of use are elaborate, yet security and data protection issues still arise.

**Google+** www.plus.google.com

**Google+** (pronounced and sometimes written as **Google Plus**, sometimes abbreviated as **G+**) is a social networking and identity service, operated by Google Inc.

The service was launched on June 28, 2011, in an invitation-only "field testing" phase. Early invites were soon suspended due to an "insane demand" for new accounts. On September 20, 2011, Google+ was opened to everyone 18 years of age or older without the need for an invitation. It was opened for a younger age group (13+ years old in US and most countries, 14+ in South Korea and Spain, 16+ in Netherlands) on January 26, 2012.

Google+ integrates social services such as Google Profiles and Google Buzz, and introduces new services identified as Circles, Hangouts and Sparks. Google+ is available as a website and on mobile devices. Sources such as *The New York Times* have declared it Google's biggest attempt to rival the social network Facebook, which has almost 800 million users. Google+ is considered the company's fourth foray into social networking, following Google Buzz (launched 2010, retired in 2011), Google Friend Connect (launched 2008, to be retired by March 2012) and orkut (launched in 2004, now operated entirely by subsidiary Google Brazil). On January 19, 2012, it was reported that Google+ had surpassed a user base of 90 million.

**Hyves** http://hyves.nl

Hyves is the leading Dutch social network and Holland's most visited website. Almost 8 million people, 50% of the Dutch population, visits Hyves monthly, generating over 5 billion page views.

**LinkedIn** www.linkedin.com

LinkedIn is a business-related social networking site. Founded in December 2002 and launched in May 2003, it is mainly used for professional networking. As of 3

November 2011, LinkedIn reports more than 135 million registered users in more than 200 countries and territories. The site is available in English, French, German, Italian, Portuguese, Spanish, Romanian, Russian, Turkish and Japanese.

### MySpace www.myspace.com

MySpace, a unit of Fox Interactive Media Inc. (FIM), is a premier lifestyle portal for connecting with friends, discovering popular culture, and making a positive impact on the world. By integrating web profiles, blogs, instant messaging, email, music streaming, music videos, photo galleries, classified listings, events, groups, college communities, and member forums, MySpace has created a connected  community.

MySpace has localized sites in the following EU member states Austria, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden and the United Kingdom. Other European localized sites include Norway and Switzerland.

### Nasza Klasa www.nasza-klasa.pl

Nasza-klasa.pl is a social networking site gathering Internet users who want to find classmates. Thanks to nasza-klasa.pl it is possible to rebuild relations with colleagues from kindergarden, primary school, high school or college. Nasza-klasa.pl was created by four students: Maciej Popowicz, Pawel Olchawa, Michal Bartoszkiewicz and Lukasz Adzinski and is being in use since 11th of November 2006. These days there are over 20 million profiles on this website. Every month nasza-klasa.pl users generate 14 billion pageviews (22.62 page/visit; 00:11:20 avg. time on site/visit).

A controlling stake in Nasza Klasa Sp. z o.o. was sold to an Estonian company AS Forticom last January. The group also fully or partially owns stakes in the following social networking portals: Latvia's One.lv, Lithuania's One.lt and Russia's Odnoklassniki.ru.

### Ning www.ning.com

**Ning** is an online platform for people and organizations to create custom social networks, launched in October 2005. Ning offers customers the ability to create a community website with a customized appearance and feel, feature sets such as

photos, videos, forums and blogs, and the service layers in support for "Like", integration with Facebook, Twitter, Google and Yahoo!. Ning, Inc. is owned by Glam Media and, the operating company, has its headquarters in Palo Alto, California.

The service allows customers to charge for membership directly within their Ning Network. Customers can also monetize by using services provided through partnerships established by Ning, and adding display advertisements, such as Google AdSense, to their Ning Network.

There are over 90,000 (as of June 2011) social websites, known as Ning Networks, running on the Ning Platform. Ning offers 3 plans to its customers: Mini, Plus and Pro. The plans are offered with varying feature offerings and range in price so that customers can choose a plan that best fits the goal for their community. Once a plan is chosen, a customer can change it to another plan at any time. As of June 2011, Ning has 65 million monthly unique visitors globally on its platform.

**Netlog** www.netlog.com

Netlog is the leading social networking destination for young Europeans and provides a fun environment where people communicate with friends, like-minded people and local communities. Netlog is currently available in 25 languages and has over 40 million users.

**ONE.LT** www.one.lt

ONE.LT is the most popular online social networking site in Lithuania, used by close to one million unique users and serving around 1 billion page views every month. ONE.LT is operated by Forticom UAB, part of the Forticom Group, which also operates leading social networking sites in Latvia, Poland, Russian Federation and the Ukraine.

**Piczo, Inc.** www.piczo.com

Piczo empowers teens worldwide to creatively express themselves, build personal communities, and share experiences with their friends in a safe environment. Piczo's

customizable content, colourful graphics, glitter text, video, and photo tools spotlight member creativity without requiring technical skills.

4 of the top 10 countries where Piczo has their strongest visitor base are in the EU: German, Norway, Romania, and Bulgaria, with Germany being number 1. Piczo has 35million registered users worldwide, with 55% of those members being in the EU and 88% of those being under 18 years of age.

**Rate.ee** www.rate.ee

Rate.ee is the largest social networking site in Estonia. Launched in 2002 offering a simple picture rating service it has since grown to a fully fledged online community featuring friends lists, blogs, albums, and many other services. It has now over 300,000 active users comprising a one fifth of the population. EMT, the largest telecom company in the country, acquired a majority stake in Rate.ee in 2006.

**Skyrock.com** www.skyrock.com

Skyrock.com is global social network dedicated to the New Generation, offering its members a free, personal web space where they can create a blog, add a profile, and exchange messages with other registered members. The site also offers a specific space for members who create blogs showcasing their original musical compositions. Available in 14 international versions, the platform registers 33.143 million accounts, and is frequented by over 15.923 million of Unique Visitors in Europe (reach: 5.7%). Skyrock is present in the following European countries: France ; England ; Deutschland ; Spain ; Nederland ; Belgium ; Switzerland ; Italy ; Portugal ; Finland ; Sweden ; Denmark ; Norway. There are 33.143 million of Skyrock accounts worldwide at the end of January 2009; 18.235 million of those accounts belong to people under 18 (55.0%).

**studiVZ Ltd** www.studiVZ.net, www.meinVZ.net, www.schuelerVZ.net

StudiVZ Ltd provides three social networking communities:

1. studiVZ is only for university students from about 18 to 26 years.

2. meinVZ is only for alumni and for people who do not study at a university

3. schuelerVZ is only for pupils in the age between 12 and 21 years.

StudiVZ Ltd is in Germany, Austria, Switzerland; it has approximately 5 million registered users under 18 and 8 million registered users older than 18.

## Tagged www.tagged.com

Tagged is a social networking site based in San Francisco, California, United States, founded in 2004. The website, is a large social network focused on helping others meet new people. It also allows members to browse people, play games, Tagged Inc. was co-founded in mid 2004 by entrepreneurs Greg Tseng and Johann Schleier-Smith, who wanted to build a "Teen Yahoo or the next MTV". Each month Tagged is visited by 6.2 million US users and 20.4 million users worldwide: In May 2010 Tagged moved towards social discovery by opening up its own in-house gaming division.

## Tuenti www.tuenti.com

TUENTI is a Spain-based, invitation only private social networking website. The site is targeted at the Spanish audience, and is currently accessible only to those who have been invited. TUENTI features many tools common to social-networking sites. It allows users to set up a profile, upload photos, link videos and connect with friends. Many other utilities, such as the ability to create events, are also offered. Unlike similar social networking sites which feature banner advertising, Tuenti has opted out of these traditional forms of "noisy" and obstructive advertising. TUENTI has created a private social platform where you can keep updated with your friends by sharing photos, commenting on videos, creating events or recommending activities. Comparing to models growing with no control, Tuenti invests in consolidating itself as the safest platform for its users.

## Twitter www.twitter.com

Twitter is an online social networking service and microblogging service that enables its users to send and read text-based posts of up to 140 characters, known as "tweets". It was created in March 2006 by Jack Dorsey and launched that July. The service rapidly gained worldwide popularity, with over 300 million users as of

2011, generating over 300 million tweets and handling over 1.6 billion search queries per day. It has been described as "the SMS of the Internet."

**Viadeo** www.viadeo.com

Viadeo is a Web 2.0 professional social network with over 35 million members worldwide. Headquartered in Paris, the company has offices in the United Kingdom (London), Spain (Madrid and Barcelona) and Italy (Milan). Viadeo also has a presence in America, with offices in the USA (San Francisco) and through its Mexican and Canadian subsidiaries. Furthermore, the group is very active in the Asian market through Tianji.com in China and ApnaCircle.com in India. Members include business owners, entrepreneurs and managers from a diverse range of enterprises. The site is available in English, French, German, Italian, Portuguese and Spanish.

**Windows Live** www.live.com

More than 460 million customers around the world rely on Windows Live for sharing e-mail, messaging, photos and files within their networks of friends, family members, business associations and more.

**XING** www.xing.com

XING is a social network focusing on professionals and business. It was founded back in 2003 has its roots on German speaking countries, where 4.2 million of its now 10 million users hail from. XING's core international markets, Turkey and Spain, are experiencing accelerating member growth with the former reaching nearly 1 million users and Spain recently passing the 1.5 million users mark. XING has set up key strategic offices in Barcelona and Istanbul to support its growth in those regions.

**ZAP S.A.** www.zap.lu

ZAP S.A provides the following services: Social Networking, Personalized Web Presence, Event- and Nightlifereports, Chat, Agenda Country coverage: Luxembourg, in a few months Luxembourg, Lorraine, the Saarland, Wallonia and Rhineland-Palatinate.

### 11.1.5 Groups of Users in Social Media

The rapid progress in social media technologies has changed the role of individuals from passive content consumers to active content creator/producers. It is clear in a few years everyone will fall under one of the following three categories:

(1) «**content producer or content creator**» by publishing digital pictures, video recordings, post blog entries, write reviews and post comments to articles online, etc.),

(2) «**content mediator**» by storing/forwarding the digital content of various forms), and

(3) «**content consumer**» by reading articles, viewing photos and videos, etc.

Hybrid categories (that combine on or more of the abovementioned ones) also do exist. Like the «**content prosumer**», that is both a producer and a consumer of content.

A 2010 study from Forrester Research (Jackie Rousseau-Anderson´s Blog, 2010) has found a decline in the number of content producers across social networking sites, even while general use and participation on these sites has risen. The group of users classified as «Producers» or «Creators»  are less active this year than they were in 2009, with shrinking percentages of users in the majority of markets studied. In the U.S., for example, the Creators category dropped from 24% to 23%.

A more detailed breakdown of user groups is provided in the same study provided by Forrester Research:

## The Social Technographics® Ladder

**Creators**
**23%**
- Publish a blog
- Publish your own Web pages
- Upload video you created
- Upload audio/music you created
- Write articles or stories and post them

**Conversationalists**
**31%**
- Updata status on a social networking site*
- Post updates on Twitter*

**Critics**
**33%**
- Post ratings/reviews of products or services
- Comment on someone else's blog
- Contribute to online forums
- Contribute to/edit articles in a wiki

**Collectors**
**19%**
- Use RSS feeds
- "Vote" for Web sites online
- Add "tags" to Web pages or photos

**Joiners**
**59%**
- Maintain profile on a social networking site
- Visit social networking sites

**Spectators**
**68%**
- Read blogs
- Listen to podcasts
- Watch video from other users
- Read online forums
- Read customer ratings/reviews

**Inactives**
**19%**
- None of the above

Groups include people participating in at least one of the activities monthly except Conversationalists who participate in at least one of the included activities at least weekly.

Base: US online adults

Source: North American Technographics® Online Benchmark Survey, Q2 2010 (US)

Source: Forrester Research, Inc.

## 11.2 Content in Social Media through Crowd Sourcing

*Judgment Aggregation:* When a group or collective organization is given an epistemic task, its performance may depend on its 'aggregation procedure', i.e. its mechanism for aggregating the group members' individual beliefs or judgments into corresponding collective beliefs or judgments endorsed by the group as a whole. (List).

An *aggregation procedure* is a mechanism by which a group can generate collectively endorsed beliefs or judgments on the basis of the group members' individual beliefs or judgments (List).

Social network service providers provide online communication platforms which enable individuals to publish and exchange information with other users. These service providers are data controllers, since they determine both the purposes and the means of the processing of such information.

### 11.2.1 Types of Content in Social Media

Social networking services are all about content – pictures, music, video, as well as event, organization and topic information. Content can be roughly categorized as follows:

**User Profile Information**

There are many different kinds of profiles, although they typically consist of a web page supported by a range of tools. Profile pages are not just lists of information – they allow members to develop and present an image of themselves to the world, and to establish and project their online identities. Displays of preferences (favourite music, books and films, for example) allow members to share information about themselves.

**User Generated Content (UGC),** also known as consumer-generated media (CGM), refers to any material created and uploaded to the Internet by non-media professionals, whether it's a comment left on Amazon.com, a professional-quality video uploaded to YouTube, or a student's profile on Facebook (Interactive Advertising Bureau, 2008).

**Third Party Content**

Third-party content might be in the form of links or embedded content hosted somewhere else e.g. a video hosted at YouTube or another videohosting service, but playable on a member's profile page. Content may be added in widget form – widgets can be simple badges (pictures with links back to other sites) or dynamic content, for example, a slide show or the last songs catalogued by a last.fm account.

This type of dynamic content makes it easy to move information, content and links from one social networking service to another.

Quizzes and polls are also very popular. Some services allow you to create quizzes or compare yourself with other people on your contacts list who have also answered questions or added a particular application.

**Collaborative Content**

By using service tools to create groups, users can, for example, collectively create profiles, hold discussions, and store, share and comment on objects. In-service messaging can be a rich source of informal collaboration.

Personal data types generally available to social media providers:

- First name
- Last name
- City
- Zip code
- Birth date
- Sex
- Email-Address
- Phone number
- User-ID
- Hobbies
- Job
- Personal Pictures and Videos
- Time zone
- Religion
- Sexual orientation
- Citizenship
- Relations to other users
- Political View
- Education

- Bank account Information
- Credit Card Number
- Family status

## 11.2.2  Purpose of Content in Social Media

Recent years have seen a transformation in the type of content available on the web. During the first decade of the web's prominence from the early 1990s onwards almost online content resembled traditional published material: the majority of web users were consumers of content, created by a relatively small amount of publishers. From the early 2000s, user-generated content has become increasingly popular on the web: more and more users participate in content creation, rather than just consumption. Popular user-generated content (or social media) domains include blogs and web forums, social bookmarking sites, photo and video sharing communities, as well as social networking platforms such as Facebook and MySpace, which uses a combination of all of these with an emphasis on the relationships among the users of the community.

The quality though, of user-generated content varies drastically from excellent to abuse and spam (Agichtein, 2008). As the availability of such content increases, the task of identifying high-quality content sites based on user contributions --social media sites -- becomes increasingly important. Social media in general exhibit a rich variety of information sources: in addition to the content itself, there is a wide array of non-content information available, such as links between items and explicit quality ratings from members of the community.

## 11.3 Recommendations for Social Media and Politics

### 11.3.1 How to integrate Social Media into urban politics

The following picture shows the ecosystem of social media in urban politics as well as where the FUPOL tools can assist to formulate a better policy.
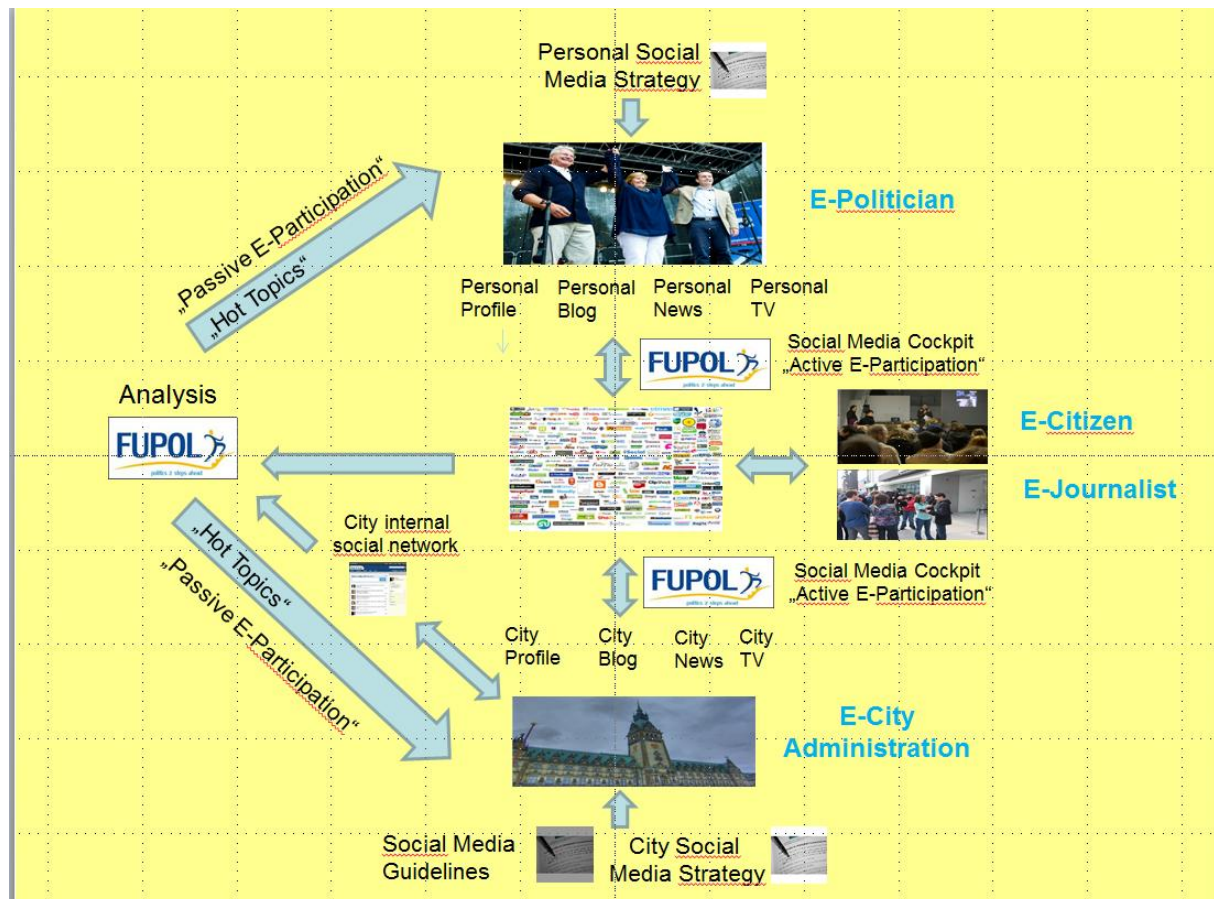


#### 11.3.1.1 E-Politician

Recommendation #1: The E-Politician needs a personal social media strategy which should contain:

- personal objectives
- how to communicate over the new channels
- which channels to use
- how to integrate into political campaigns
- .. etc.

The effort to really engage in social media should not be underestimated and carefully weighted against the potential benefits.

**Personal Profile**

Recommendation #2:   The following networks should be used to present the politician and what he stands for:

- Facebook – biggest social network therefore suitable to address all voters and allows two-way communication (facebook wall), which can be used <u>optionally</u> for short messages (3-4 lines + one link)
- LinkedIn – important to address the professional / business community and allows two-way communication , which can be used optionally for short messages (3-4 lines + one link)

**Personal Blog**

Recommendation #3:   A personal blog should be opened as part of the personal website. It should be used to present topics in greater details with multiple links to pictures and videos. An advantage is the two-way communication: Citizens can comment on the views presented, citizen posts can be screened before final publishing

**Personal News**

Recommendation #4: The short messaging services Twitter should be used to transmit "hot news", sentiments and / or links to blog entries etc.

The main target group are voters <u>and</u> journalists.

**Personal TV**

Recommendation #5:   The video service "You-Tube" should be used to transmit short videos with a personal touch, campaign messages etc.

11.3.1.2  <u>E-Citizen</u>

Recommendation #6:

Facebook entries, policy blogs, forums, twitter streams etc. of e-citizens should be analysed by both cities and politicians to get an insight view of the current sentiment, "hot topics" and challenges.

This is addressed by the FUPOL social media crawler and the hot topic sensing modules.

### 11.3.1.3 E-City Administration

**Social Media Strategy and Social Media Guidelines**

Recommendation #10: The city needs a social media strategy and social media guidelines for employees.

The strategy should contain:

- objectives
- which channels to use
- responsibilities with the city administration
- Integration of the social medias into the overall media and communication efforts.
- …etc.

The social media guidelines should contain rules of conduct for employees.

**City Profile**

Recommendation #11: Facebook to be used to present a profile of the city with information and a facebook wall with short city news. Optionally it could also be opened to citizens for postings, however current Facebook does not allow to publish only moderated comments, consequently the function could be misused.

**City Blog(s)**

Recommendation #12: One or several blogs attached to the city homepage should be implemented to present city topics in greater details with multiple links to pictures and videos. Recommended as a support of active e-participation processes, because it allows two-way communication.

**City News**

Recommendation #13:

The short messaging services Twitter should be used to transmit "hot news". It should be used to make meetings of the city council more transparent as well as to promote the city ("event twitters").

**City TV**

Recommendation #14: Use You-Tube as part of the city marketing (short videos about the city, events and people)

**City internal social network**

Recommendation #15: Use social media also to improve communication and collaboration between employees of the city. The internal network should also be analysed by politicians and city decision makers, because it may contain valuable hints what could be improved.

11.3.1.4 FUPOL Social Media Cockpit: Communicate "Single Window"

The FUPOL Social media cockpit integrates the social media communications and provides advanced analysis and visualization of multiple channels. It also allows a "single window" two- way communication with several channels.

### 11.3.2 How to evaluate the Impacts

Public managers face real challenges in evaluating the impacts of their online participatory activities. The most prominent challenge is that currently, there are no officially allowed or approved tools available that go beyond mere quantitative counts of website traffic.

At present, most agencies have no formal metrics in place, and measurement tools provided by vendors are not used. Most agencies using social media count their friends and number of likes on Facebook, and their number of Twitter followers. Some are using rudimentary measurement techniques offered by third-party service provides (e.g., Google Analytics or Facebook Insights). While such data do offer

indicators of interest in the online activities used by agencies to engage the public, they do not provide information about the impacts and outcomes of such activities.

### 11.3.3  How to engage citizens

Social Media can be a valuable asset to the policy maker who is interested in public opinion, particularly in accessing segments of the population such as youth, who are displaying declining levels of trust in government and largely account for declining election turnouts. Youth, however, display high participation levels in social media; Policy makers can therefore gain access to this segment of the population through social networking sites and involve citizens in the design phase of the policy making cycle.

It is important to actively engage citizens. Recent research provides a valuable insight into the engagement strategy. Although the figures are taken from a study covering user engagement of the top 100 retailers during a six-month period in 2011, they are equally valid for citizen engagement. (BuddyMedia, 2011)

a) The best time to post is between 8 p.m. and 7.a.m.
   The analysis showed it was best to post when fans were not at work; between the hours 8 p.m. and 7 a.m. Post during these «non-busy» hours to increase likes and comments.



b) 1-2 times a day is the best frequency.

Posting once or twice a day and one to four times a week, results in a 40% higher / 71% engagement rate compared with posting more than three times a day / more than five posts a week. Apparently this creates an information overflow and users are getting less interested.
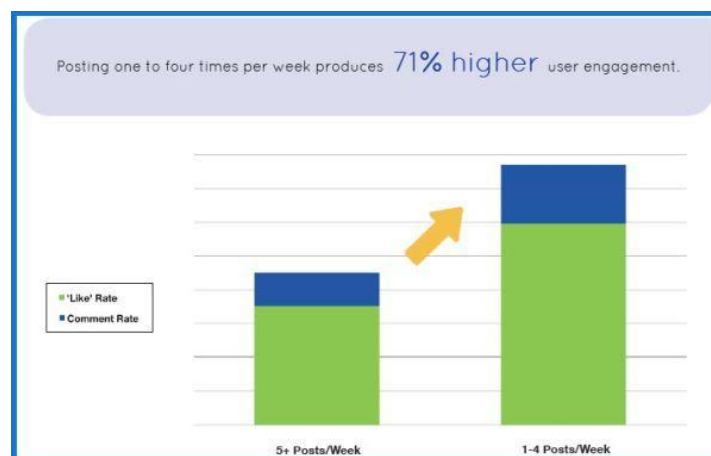




c) Short posts are better.

Posts less than 80 characters in length receive 66% higher engagement than longer posts. More concise posts – those between one and 40 characters – generate the most engagement.

Posts with 80 characters or less receive 66% higher engagement.

d) Questions tend to spark a dialogue - Posts with questions generate more than double the amount of comments that non-question posts.


Ask questions to spark dialogue –
"question" Posts generate Comment rates double that of "non-question" Posts.
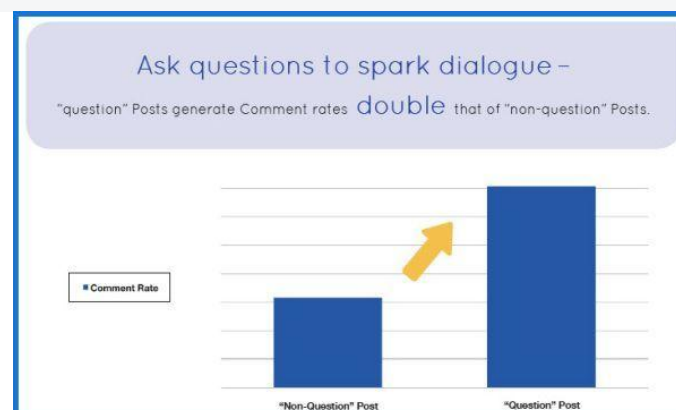
**General citizens** might be interested in knowing how a public participation program impacted policy decisions.

## 11.3.4  Social Media and Policy Modelling

Social Media are a powerful tool for participatory democracy as they have been used extensively by groups for grassroots mobilization, exchange of ideas and information, and campaigning. Participatory democracy and citizen empowerment can be further enriched by using Social Media (with techniques such as opinion mining) to bridge the gap between citizen and elected leaders in two main ways:

- Exchange of information through social media channels e.g. citizens can contact their elected representative and get answers online.

- Leaders 'listening in' to the opinions of the people, as expressed on the Internet, with the assistance of experts.

# IV. PART FOUR – DATA AND INDICATORS

# 12 Data, Datasets Classifications and Definitions

The following chapter provides some definitions concerning specific data and overview of existing classification, which can be used for the domain information database.

## 12.1 Definitions

In the FUPOL project specific data are required, which are defined below:

### 12.1.1 Open government data

Government data shall be considered open if the data are made public in a way that complies with the principles below:

1. Data Must Be Complete - All public data are made available. Data are electronically stored information or recordings, including but not limited to documents, databases, transcripts, and audio/visual recordings. Public data are data that are not subject to valid privacy, security or privilege limitations, as governed by other statutes.

2. Data Must Be Primary- Data are published as collected at the source, with the finest possible level of granularity, not in aggregate or modified forms.

3. Data Must Be Timely - Data are made available as quickly as necessary to preserve the value of the data.

4. Data Must Be Accessible - Data are available to the widest range of users for the widest range of purposes.

5. Data Must Be Machine processable -Data are reasonably structured to allow automated processing of it.

6. Access Must Be Non-Discriminatory - Data are available to anyone, with no requirement of registration.

7. Data Formats Must Be Non-Proprietary - Data are available in a format over which no entity has exclusive control.

8. 8. Data Must Be License-free - Data are not subject to any copyright, patent, trademark or trade secret regulation. Reasonable privacy, security and privilege restrictions may be allowed as governed by other statutes.

9. Finally, compliance must be reviewable-  A contact person must be designated to respond to people trying to use the data. A contact person must be designated to respond to complaints about violations of the principles. An administrative or judicial court must have the jurisdiction to review whether the agency has applied these principles appropriately. (Open Government Data, 2012)

### 12.1.2  Big data

These data comes from everywhere: from sensors used to gather climate information, posts to social media sites, digital pictures and videos posted online, transaction records of online purchases, and from cell phone GPS signals to name a few.  They have three main criteria:

- Volume – Enterprises are awash with data, easily amassing terabytes and even petabytes of information.
- Velocity – Often time-sensitive, big data must be used as it is streaming in to the enterprise in order to maximize its value to the business.
- Variety – Big data extends beyond structured data, including unstructured data of all varieties: text, audio, video, click streams, log files and more.

Big data is more than a challenge; it is an opportunity to find insight in new and emerging types of data, to make your business more agile, and to answer questions that, in the past, were beyond reach.
(IBM, 2012)

### 12.1.3 Legacy data

are those which are normally in use. Most often, this takes the form of records in an existing database on a system in current use. At mindwrap, the questions we are most frequently asked concern how to use these legacy records, how to "image enable" an existing database, or how Optix can interact with an existing system. Often, the existing database forms an important part of daily work and will remain in place after Optix is installed. (Legacy Data)

## 12.2 Classification

To receive comparable and harmonized data, codes for classification are required, such as

- NACE Rev. 2 - Statistical classification of economic activities
- CPA – Statistical classification of products by activity
- NUTS – The statistical classification of regions in the EU
- ISCED – International Standard Classification of Education
- ISCO – International Standard Classification of Occupations

### 12.2.1 NUTS – Nomenclature of Territorial Units for Statistics

The NUTS classification is a hierarchical system for dividing up the economic territory of the EU for the purpose of:
- The collection, development and harmonisation of EU regional statistics.
- Socio-economic analyses of the regions.
  - NUTS 1: major socio-economic regions
  - NUTS 2: basic regions for the application of regional policies
  - NUTS 3: as small regions for specific diagnoses
- Framing of EU regional policies.
  - Regions eligible for aid from the Structural Funds (Objective 1) have been classified at the NUTS 2 level.
  - Areas eligible under the other priority objectives have mainly been classified at the NUTS 3 level.

- o The Cohesion report has so far mainly been prepared at the NUTS 2 level.

(NUTS, introduction, 2011)


**Principles and Characteristics of NUTS:**

Principle 1: The NUTS regulation defines minimum and maximum population thresholds for the size of the NUTS regions:

| LEVEL | MINIMUM | MAXIMUM |
|---|---|---|
| NUTS 1 | 3 million | 7 million |
| NUTS 2 | 800 000 | 3 million |
| NUTS 3 | 150 000 | 800 000 |

Principle 2: NUTS favours administrative divisions (normative criterion)

For practical reasons the NUTS classification is based on the administrative divisions applied in the Member States that generally comprise two main regional levels


Principle 3: NUTS favours general geographical units

General geographical units are normally more suitable for any given indicator than geographical units specific to certain fields of activity.

(NUTS, Principles and Characteristics)

### 12.2.2 Local Administrative Units – LAU

To meet the demand for statistics at local level, Eurostat has set up a system of Local Administrative Units (LAUs) compatible with NUTS.


At the local level, two levels of Local Administrative Units (LAU) have been defined:

- The upper LAU level (LAU level 1, formerly NUTS level 4) is defined for most, but not all of the countries.
- The lower LAU level (LAU level 2, formerly NUTS level 5) consists of municipalities or equivalent units in the 27 EU Member States.

Since there are frequent changes to the LAUs, Eurostat follows-up its development from year to year. (Local Administrative Units (LAU))

### 12.2.3 International Standard Classification of Education – ISCED

The International Standard Classification of Education (ISCED) is a classification structure for organizing information on education and training maintained by the United Nations Educational, Scientific and Cultural Organization (UNESCO). It is part of the international family of economic and social classifications of the United Nations (International Standard Classification of Education)

| Level | Description | Principal characteristics |
|---|---|---|
| 0 | Pre-primary education | initial stage of organized instruction, designed primarily to introduce very young children to a school-type environment |
| 1 | Primary education or first stage of basic education | normally starting between the ages of 5 and 7, designed to give a sound basic education in reading, writing and mathematics along with an elementary understanding of other subjects |
| 2 | Lower secondary or second stage of basic education | designed to complete basic education, usually on a more subject-oriented pattern |
| 3 | (Upper) secondary education | more specialized education typically beginning at age 15 or 16 years and/or the end of compulsory education |
| 4 | Post-secondary non-tertiary education | captures programmes that straddle the boundary between upper- and post-secondary education from an international point of view, e.g. pre-university courses or short vocational programmes |
| 5 | First stage of tertiary education | tertiary programmes having an advanced educational content, cross-classified by field (see below) |
| 6 | Second stage of tertiary education | tertiary programmes leading to the award of an advanced research qualification, e.g. Ph.D., cross-classified by field (see below) |

### 12.2.4 International Standard Classification of Occupations - ISCO

The International Standard Classification of Occupations (ISCO) is one of the main international classifications for which ILO is responsible. It belongs to the international family of economic and social classifications. (International Standard

Classification of Education)

ISCO is a tool for organizing jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job. Its main aims are to provide:

- a basis for the international reporting, comparison and exchange of statistical and administrative data about occupations,
- a model for the development of national and regional classifications of occupations and
- a system that can be used directly in countries that have not developed their own national classifications.

It is intended for use in statistical applications and in a variety of client oriented applications. Client oriented applications include the matching of job seekers with job vacancies, the management of short or long term migration of workers between countries and the development of vocational training programmes and guidance.

## 12.3 Available data sources

The most important data sources for FUPOL are:

- European Statistical Office - EUROSTAT
- HM Revenue & Customs (HMRC) Trade Statistics unit - UK trade info
- International Labour Organisation  - ILO
- International Monetary Fund - Statistical Topics - IMF
- International Statistical Institute - ISI
- Interstate Statistical Committee of the Commonwealth of the Independent States - CIS STAT
- Organisation for Economic Co-operation and Development - OECD
- United Nations Development Programme - UNDP
- United Nations Statistics Division - UN
- United Nations Economic Commission for Europe - UN/ECE
- United Nation Industrial Development Organization   -UNIDO

- United Nations Economic Commission for Latin America and the Caribbean - UN/ECLAC

- United Nations Educational, Scientific and Cultural Organization - UNESCO

- United Nations Food and Agriculture Organization -FAO

- United Nations Population Information Network - POPIN

- The World Bank Group - WB

- World Health Organization - WHO

- World Trade Organization - WTO

## 12.4 Composition of the dataset

The complete dataset in the FUPOL project consists of:

- Available data (from Eurostat, United Nations…)

- Real data from Pilot Cities

- Data to be collected by Pilot Cities (not yet available data for Pilot Cities)

## 12.5 Eurostat

AS FUPOL is an FP7-project the most important data source is Eurostat which has close co-operations with the above mentioned organizations.

Eurostat is the statistical office of the European Union situated in Luxembourg. Its main task is to provide the European Union with statistics at European level that enable comparisons between countries and regions.

Democratic societies do not function properly without a solid basis of reliable and objective statistics. On one hand, decision-makers at EU level, in Member States, in local government and in business need statistics to make those decisions. On the other hand, the public and media need statistics for an accurate picture of contemporary society and to evaluate the performance of politicians and others. Of course, national statistics are still important for national purposes in Member States whereas EU statistics are essential for decisions and evaluation at European level. (EUROSTAT)

Eurostat's main role is **to process and publish comparable statistical information** at European level. Data collection is done in the Member States by their statistical authorities (not by Eurostat). They verify and analyse national data and send them to Eurostat. Eurostat's role is to consolidate the data and ensure they are comparable, using harmonized methodology. Eurostat is actually the only provider of statistics at European level and the data we issue are harmonized as far as possible, because apples have to be prepared with apples - not with pears…

### 12.5.1  Regional Statistics

Eurostat provides statistics for many domains, such as economy, demography, migration, employment, education, health, agriculture, industry, tourism, transport, research and development.

Regional statistics provide more detailed statistical patterns and trends than national data. The territory is subdivided by NUTS (Nomenclature of Territorial Units for Statistics).

### 12.5.2  City Statistics – Urban Audit

The "Urban Audit" data collection provides information and comparable measurements on the different aspects of the quality of urban life in European cities. It is a respond to the demand of the Lisbon Strategy which aims to improve the attractiveness of regions and cities. Quality of life is crucial in attracting and retaining a skilled labour force, businesses, students, tourists and, most of all, residents in a city.

Data collection currently takes place every three years, but an annual data collection is being planned for a smaller number of targeted variables. Currently 322 cities in 27 Member States, plus 47 cities from Switzerland, Norway, Croatia und Turkey, are represented in the urban data collection

12.5.2.1 Spatial units

Data are collected for four different levels of city spatial units:

- the "**core city**" is the administrative unit, for which a rich dataset is generally available.

- **the larger urban zone** (LUZ) is an approximation of the functional urban zone centred around the city.

- **sub-city districts** (SCD) is a sub-divison of the city according to population criteria.

- the "**kernel**" was created for some capital cities where the concept of the "Administrative City" does not yield comparable spatial units.

(Spacial Units)


12.5.2.2 Description of Urban Audit Indicators and Urban Audit Variables

The Urban Audit Indicators and the Urban Audit Variables are described in a generic way in the attached tables. (EUROSTAT, 2010).


**Indicators**

The indicators have been calculated by Eurostat based on the variable data set. The exact calculation algorithms are listed below with the detailed table description. For indicators, only the reference periods in the TIME dimension are indicated. There are no reference years in the INFO dimension, as the indicators are not necessarily calculated from variables of the same year; this depended on their availability.


Beginning of 2010 Eurostat introduced variables and indicators relating to the **city hinterland**, i.e. larger urban zone minus core city.


In **2004** the survey was carried out in **31** cities of the 15 EU Member States with a representative sample of **300** citizens. In **2006** the survey was carried out in **75** cities of the 27 EU Member States, Turkey and Croatia with a representative sample of **500** citizens. End of **2009** the survey was again carried out in the same cities as

2006, with the same sample size. This time some questions were dropped and some other questions added (not listed yet under "C. Perception data").

**Codes used in the tables (Audit Urban Indicators and Urban Audit Variables):**

Spatial unit:

- C – variable collected at the core city level
- L – variable collected at the larger urban zone level
- S – variable collected at the sub-city district level

LCA

- LCA – variables collected in the Large City Audit

Key

- Key – variables used in calculating key indicators

Numerator and Denominator

Codes of the variable used to calculate the indicator. The detailed list of variables is available in the attachment as specified below.

Time-line

- Time-line – variables collected for four periods

12.5.2.3 Variables

Nine different areas of variables have been defined. The coding enables the content to be pinpointed. The first two letters of the variables plus the following digit make for easy content identification.

**DE Demography**

- DE1 Population
- DE2 Nationality
- DE3 Household structure

**SA Social aspects**

- SA1 Housing
- SA2 Health

- SA3 Crime

**EC Economic Aspects**

- EC1 Labour market
- EC2 Economic activity
- EC3 Income disparities and poverty

**CI Civic involvement**

- CI1 Civic involvement

**TE Training and education**

- TE1 Education and training provision
- TE2 Educational qualifications

**EN Environment**

- EN1 Climate/Geography
- EN2 Air quality and noise
- EN3 Water
- EN4 Waste management
- EN5 Land use

**TT Travel and transport**

- TT1 Travel patterns

**IT Information society**

- IT1 Users and infrastructure
- IT2 Local e-Government
- IT3 ICT sector

**CR Culture and recreation**

- CR1 Culture and recreation
- CR2 Tourism

**Generic structure how to represent geographical statistical data**



Geo Classifications

(NUTS, Lau-2….)

e.g.

NUTS AT112 Nordburgenland

LAU2: 7071   Rust (in Nuts AT112)

Variables (+ definition)

e.g. DE 1041 Total resident population …

Actual Data (or forecast)

| Geo_classification | Variables | Month | Quarter | Year | Value |
|---|---|---|---|---|---|
| AT112 7071 | DE1041 | | | 2001 | 1000 |
| AT112 7071 | DE1041 | | | 2020 | 1010 |
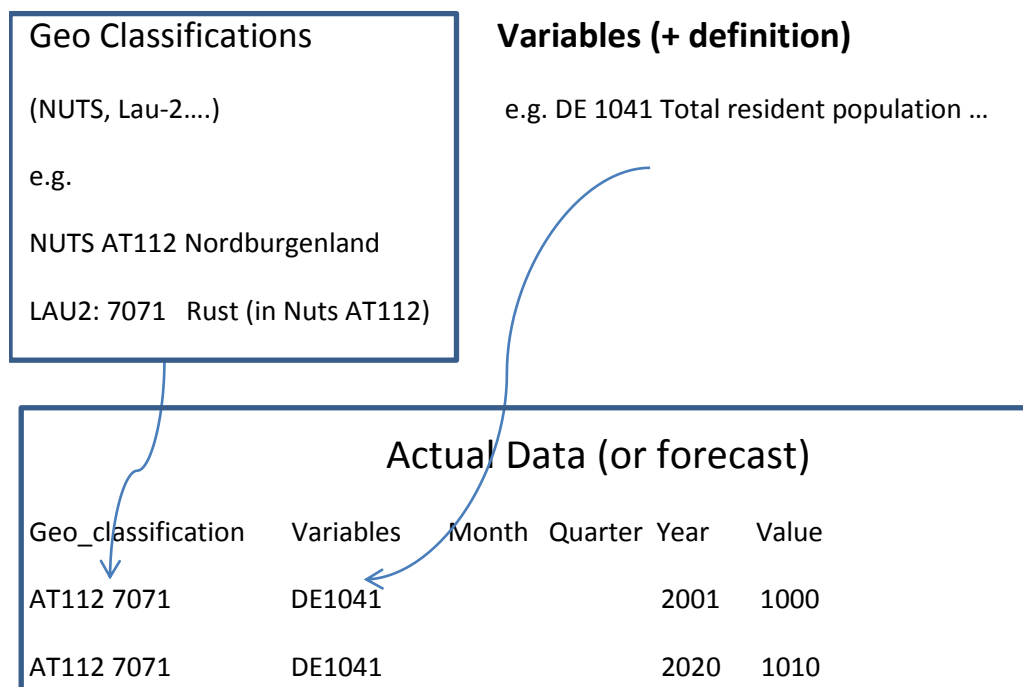
### 12.5.3 LUCAS Land cover/use statistics

Agriculture, forestry, industries, transport, housing and other services all use land as a natural and/or an economic resource. Land is also an integral part of ecosystems and indispensable for biodiversity and carbon cycle. Therefore land cover/use data forms the basis for spatial and territorial analyses which are crucial for policy planning in many respects.

LUCAS (Land Use and Cover Area frame Survey) aims to gather harmonized data on land use/cover and their changes over time. (LUCAS)

Land cover refers to the bio-physical coverage of land (e.g. crops, grass, broad-leaved forest, or build-up area).

- Land use indicates the socio-economic use of land (e.g. agriculture, forestry, recreation or residential use).

**Examples of data use**

Data and information on land cover/use status and changes is widely used for:
- nature protection,
- forest and water management,
- urban and transport planning,
- agricultural policy,
- natural hazards prevention and mitigation,
- soil protection and mapping,
- monitoring climate change,
- biodiversity, etc.

Land cover/use data also forms the basis for spatial and territorial analyses which are increasingly crucial for policy planning in many respects.

## 12.6 CORINE

The European Environmental Agency (EEA) provides the CORINE (COoRdinate INformation on the Environment ) land data base, a pan-European land cover/ land use map for non-commercial use. The Minimum Mapping Unit (MMU) is set to 25 hectares.

Corine Land Cover (CLC) is a map of the European environmental landscape based on interpretation of satellite images. It provides comparable digital maps of land cover for each country for much of Europe. This is useful for environmental analysis and for policy makers. (Corine, 2010)



**Figure 18 Corine Land Use Map**

# 13 Urban indicators as measurement of policy analysis methods

A POLICY ANALYSIS defines the problem and the goals, examines the arguments, and analyses the implementation of the policy. Urban indicators are used as measurements either the policy goal of the domain could be reached or not.

## 13.1 Definition - What are urban indicators?

Indicators are signposts that allow to measure whether a place is becoming more (or less!) liveable. They allow monitoring whether, over time, the methods you're using to manage urban amenity are working. An indicator will often be a goal, a target, a threshold, or a benchmark against which you can assess change. If you are measuring changes in pedestrian safety for example, your chosen indicator might be "a 30% reduction in vehicle-related injuries to pedestrians in the previous summer".

In other words each indicator is a kind of small model in its own right, implying elements of cause and effect, of social norms that constitute progress. The main difference between indicators and other kinds of data is that the connection with policy is, or should be, explicit. Indicators are about the interface between policy and data.

The indicators are used by a wide range of users such as:
• City and National Policy Makers
• Citizens
• Researchers
• Private Sector
• International Organizations

## 13.2 Aims of indicators

A key aim of the indicators approach is to ensure the integration of indicators with policy. No policies without indicators, and no indicators without policies. This means indicators should be integrated in policy action plans.

## 13.3 The Data Triangle
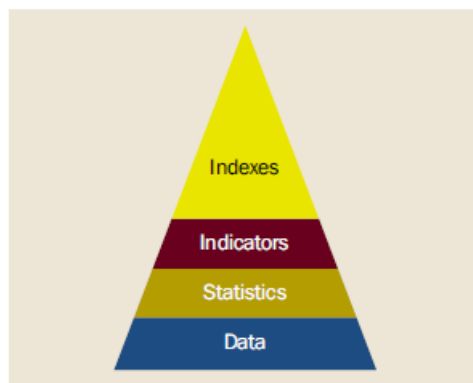


**Figure 19 Data Triangle**

At the bottom are raw data or information. These data are usually transferred into statistics, which are often outlined in tables, which are often difficult to interpret.

At the next step the indicators are located, which are usually single numbers, mostly ratios, e.g. such as the unemployment rate or the economic growth rate, which permit comparisons over time and space and have normative and policy implications.

Finally at the top level of data organization are indexes, which are combinations of indicators, such as the consumer price index (CPI), the gross domestic product (GDP) and the Human Development Index (HDI).

## 13.4  Types of indicators

There are three main types of indicators in the policy area:

- **Performance Indicators**, which measure aspects of the performance of organizations, sectors, or cities, and are intended to meet desirable aims.

- **Issue-based Indicators**, which are intended to draw attention to particular issues, such as unemployment rate, crime, air quality, sprawl.

- **Needs indicators**, which measure need or deprivation.

The indicators can be distinguished in:

- **Physical indicators**, which measure the changes in tangible urban amenity and

- **Perceptual indicators**, which measure the changes in intangible urban amenity.

Sometimes the change has to be measured by using both a physical and a perceptual indicator. Noise is a good example. Noise could be measured by the physical indicator of decibels on a noise meter, and by the perceptual indicator of people's satisfaction with noise levels.

## 13.5  Indicator Frameworks

The following table shows for whom, by whom, the purpose, the scope and the context of the indicators:

| Framework | For whom | Purpose | Scope | Context | By whom | Example |
|---|---|---|---|---|---|---|
| Policy-driven | City planners, Policymakers | Dialog between policymakers and stakeholders | City or sector | Political, pluralist | Stakeholders, experts. Ideally, both directions | UNCHS |
| Theme- or index-driven | Development professionals | Comparative | Theme or metaphor | Develop-ment | Experts Top down | UNDP |
| Systems | Experts advising policy | Sustainability | City or theme | Physical | Usually top down by experts | State of the Environment |
| Performance | Policymakers | Accountability | Sector | Managerial | Bureaucracy Top down | Program budgeting |
| Needs-based allocation | Central policy-makers | Resources for target groups | Target groups | Budget setting | Bureaucracy Top down, may be negotiated | Asian Crisis Thailand |
| Bench-marking | Middle management | Efficiency | Organization | Units | Employees Bottom up | Best practice |

**Table 7 Indicator Frameworks**

Source: **(Cities Data Book - Urban Indicators for Managing Cities, 2001)**

## 13.6 Example

The following table shows how a policy goal is implemented by a strategy and measured either the performance target is reached or not.

| Goal | Strategy | Performance Measure | Performance Target |
|------|----------|---------------------|--------------------|
| Create job opportunities through neighbourhood investment | Cut unemployment rate | Number of new jobs created through investment in infrastructure, marketing and promotion | 100.000 jobs created |
| Strengthen the local retail economy | Increase local retail space available | Additional square feet of retail space | 1 million square feed added |
| Strengthen Downtown as a mixes use neighbourhood | Increase available housing units near and within Downtown. | Number of new mixed income housing units built | 30.000 units built in Downtown, 10.000 built in the outskirts |

## 13.7 Application of Urban Indicators

On the following tables the main policy questions per domain and the appropriate indicators are described

## 13.7.1  Land Use

<table>
<tr><td colspan="5" align="center">**Policy Issue Land use / Land use cover change**</td></tr>
<tr>
<th>Policy Question</th>
<th>Policy Objectives /limitiation</th>
<th>Policy Indicator/Measurement</th>
<th>Variable / Indicator to be used</th>
<th>Visualization</th>
</tr>
<tr>
<td>Where is the industry likely to settle down?</td>
<td></td>
<td></td>
<td></td>
<td>The landuse should be represented on a map by different colours for each category. (see Corine 2006). Eventually a slider should be used to move between different periods / years.</td>
</tr>
<tr>
<td>How much of the agricultural land do we need to convert due to economic growth?</td>
<td>Keep a certain minimum of Agricultural land</td>
<td>Percentage of total agricultural land as a % of total land by spatial unit (actual and forecast)</td>
<td>EN5003I, EN5016I</td>
<td>The % should be visualized as a line graph (timeseries)</td>
</tr>
<tr>
<td>How much of the green space do we need to convert to support economic growth?</td>
<td>Keep a certain minimum of green spaces</td>
<td>Percentage of total green space as a % of total land to be converted over time by spatial unit (actual and forecast),  Proportion of the area used for commercial activities (industry, trade, offices) over time by spatial unit (actual and forecast)</td>
<td>EN5003I, EN5012I, EN5024I</td>
<td>The % should be visualized as a line graph (timeseries)</td>
</tr>
<tr>
<td>How much of the green space do we need to convert to support expected population growth or shrinkage?</td>
<td>Keep a certain minimum of green spaces, enlarge green spaces, if no longer needed to improve living quality</td>
<td>Percentage of total green space as a % of total land to be converted over time by spatial unit (actual and forecast),  Proportion of the area used for commercial activities (industry, trade, offices) over time by spatial unit (actual and forecast), Total population</td>
<td>EN5003I,  EN5012I, DE1001I</td>
<td>The % should be visualized as a line graph (timeseries)</td>
</tr>
<tr>
<td></td>
<td>Enlarge green spaces, if no longer needed to improve living quality</td>
<td>Percentage of total green space as a % of total land to be converted over time by spatial unit (actual and forecast),  Proportion of the area used for commercial activities (industry, trade, offices) over time by spatial unit (actual and forecast), Total population</td>
<td>EN5003I,  EN5012I, DE1001I</td>
<td>The % should be visualized as a line graph (timeseries)</td>
</tr>
<tr>
<td>The population is growing, what is the most likely land use pattern in 20 years, where do we expect people do build news houses, industry and offices?</td>
<td>Early planning of urban infrastructure (roads, energy, housing,....)</td>
<td></td>
<td></td>
<td>The landuse should be represented on a map by different colours for each category.  (see Corine 2006). Eventually a slider should be used to move between different periods / years.</td>
</tr>
<tr>
<td>Do we have excessive urban sprawl ?</td>
<td>Monitor and limit urban sprawl, because of its undesirable consequences on the environment and people.</td>
<td>Population density by spatial unit (at least district level desired )</td>
<td>EN5101I</td>
<td>The indicator should be represneted as a cityscape on the real map of the city, eventually a slider should be used to move between different periods / years.</td>
</tr>
<tr>
<td></td>
<td>Monitor and limit urban sprawl, because of its undesirable consequences on the environment and people.</td>
<td>Average time of journey to work, Average length of journey to work by private car (km), Prop.of inbound commuters of persons employed in the city</td>
<td>TT1019I,TT1020I, TT1090I</td>
<td>The % should be visualized as a line graph (timeseries)</td>
</tr>
</table>

## 13.7.2 Housing

| Policy Issue Housing | | | | |
|---|---|---|---|---|
| **Policy Question** | **Policy Objectives /Limitiation** | **Policy Indicator/Measurement** | **Variable / Indicator to be used** | **Visualization** |
| Where will people likely to settle down? | Provide sufficient living accommodation | | | The housing should be represented on a map by different colours for each category. (see Corine 2006). Eventually a slider should be used to move between different periods / years. |
| Do we provide affordable houses for citizens? | Affordable accommodation for all citizen | Average disposable annual household income (for city or NUTS 3 region), Average annual rent for housing, average price per house per m2, Average price per apartment per m2, average price per m2 for apartm. / median annual househ income | EC3040I, SA1016I, SA1023I, SA1036I, SA1049I, | The value should be visualized as a line graph (timeseries) |
| | Reduce the proportion of citizen requiring "Tenant reduced price or fees" | Tenant-reduced price or fee, Tenant-market price, Owner occupied with mortgage or loan, Owner occupied without mortgage or loan | FUP86-89 | The value should be visualized as a bar graph (timeseries) |
| Do we provide sufficient housing quality for citizens? | Improve the housing standard | Apartments per category (A, B, C, D) | FUP93 | The value should be visualized as a line graph (timeseries) |
| Does the poverty in our city increase and people cannot afford housing? | Avoid homeless on the street | Number of people in accommodation for the homeless per 1000 pop, Number of roofless persons per 1000 | SA1028I, SA1027I | The value should be visualized as a line graph (timeseries) |
| Can land us change of green areas be avoided by using unbuilt plots, or by the replacement of condemned houses with new one? | Prevention of land use change from agricultural land to residential areas | Empty conventional dwellings per total No. of dwellings, Proportion of mobility among social tenants | SA1025I, FUP92 | The value should be visualized as a line graph (timeseries) |
| Can we reduce the size of our homes by proper design and by slow homes? | Implementation of slow home policy | Average living area in m2 per person | SA1022I | The value should be visualized as a line graph (timeseries) |
| Would an increased influx of immigrants mean more economic growth or more ghettos? | Immigration as a driver for economic growth | Average disposable annual household income (for city or NUTS 3 region), Proportion of residents who are not EU nationals and citizens of a country with a medium or low HDI. | EC3040I, DE2006I | The value should be visualized as a line graph (timeseries) |
| Do we provide sufficient publich infrastructure? | Increase the proportion of community facilities (e.g. hospitals, schools..) | | | The value should be visualized as a line graph (timeseries) |
| What is the impact of spending money on refurbishing less developed district areas and slums? | | | | |
| Does it mean more jobs and less crime? | Upgrading of less developed district areas and slums to create more jobs. | Proportion of employees in total employment (jobs), total number of recorded crimes per 1000 population, Public investment in slum upgrading. | EC2018I, SA3001I, FUP30 | The value should be visualized as a line graph (timeseries) |
| Has it improved the living conditions? | Upgrading of the living conditions of the population | Overcrowding rate, Severe housing deprivation rate, Population with access to improved sanitation (% of urban population), Population with access to improved water (% of urban population), Population with durable structures (% of urban population), Population with sufficient living area (% of urban population), Population with secure tenure (% of urban population), Public | SA1050I, FUP90, UNH5-UNH9, FUP30 | The value should be visualized as a line graph (timeseries) |
| Has it improved the living conditions? | Upgrading of the living conditions of the population | Population in slums by spatial unit | UNH3 | The percentage of the population living in slums should be illustrated on a map by different colours. Eventually a slider should be used to move between different periods / years. |
| Do we really invest in slum upgrading? | Reduction of inequalities through increased per capita spending of public investment in less developed/slum areas | Public investment per capita by spatial unit | FUP31 | Public investment per capita should be illustrated on a map by different colours. Eventually a slider should be used to move between different periods / years. |

## Policy Issue Housing

| Policy Question | Policy Objectives /Limitiation | Policy Indicator/Measurement | Variable / Indicator to be used | Visualization |
|---|---|---|---|---|
| Which areas of the city are primarily affected by urban segregation (slums)? | Reduce segregated ares | Population in slums by spatial unit | UNH3 | The percentage of the population living in slums should be illustrated on a map by different colours. Eventually a slider should be used to move between different periods / |
| What can be done to stop or to reduce segregation? | Upgrading of the living conditions of the population | Overcrowding rate, Severe housing deprivation rate, Population with access to improved sanitation (% of urban population), Population with access to improved water (% of urban population), Population with durable structures (% of urban population), Population with sufficient living area (% of urban population), Population with secure tenure (% of urban population), Public investment | SA1050I, FUP90, UNH5-UNH9, FUP30 | The values should be visualized as a line graph (timeseries) |

# V.  PART FIVE – MISCELLANEOUS

# 14 Ongoing projects and Assessment of Relevance for the FUPOL Project

## 14.1 Introduction

The objective of this chapter is to assess the results achieved by other projects and the reusability in the FUPOL project by taking into account IPR-issues. The following projects have been identified:

- Cockpit
- WeGov
- +Spaces
- padgets
- IMPACT
- OCOPOMO
- UrbanSim
- APPSIM

## 14.2 Cockpit

### 14.2.1 Project Summary

Governments are striving to deliver more efficient and effective public services in order to achieve better public service quality, with reduced waiting times, improved cost effectiveness, higher productivity and more transparency. The basis idea of the Cockpit Project is to use Web 2.0 social media as a platform between citizens themselves and between citizens and public administrations to create, share and track knowledge.

Cockpit aims to define a new Governance model which actively engages and empowers citizens in Public Service delivery decision making process. Cockpit will

combine the research areas of citizens' opinion mining in the context of Web 2.0, enhance Service Science Management Engineering in the context of the public sector and encourage deliberative engagement of citizens for forming informed judgements on public services delivery. (Cockpit, 2011)

### 14.2.2 Policy Domains

The concerned policy domains are:

- All Public Services (Land use, …..)

### 14.2.3 Relevance to FUPOL

#### 14.2.3.1 Criteria 1: Use Case

Improvement of the Public Services (e.g., certificates of various civil acts, financial contribution for the purchase of one´s first residence…) through participation of the citizen via Web 2.0 social media.

Citizens express their opinions. As they are not based on causal or policy models, they are not relevant to FUPOL – WP2.

#### 14.2.3.2 Criteria 2: Technical approach and / or components

Component for identification of citizens' sentiments about public services as expressed in Web2.0 applications (crawler, cleaner, database, repository..).
Relevant to FUPOL WP3: Deliverable D2.2.0 Opinion-mining demonstration in Web 2.0 approach. It contains the following:

- Identification and collection of relevant content by utilizing a Web crawler fed with terminology provided by an appropriate content identification schema.
- Sentiment analysis by using a mining tool.

Component for deliberative engagement platform
Relevant to FUPOL WP3: Deliverable D2.4.0 Deliberative engagement platform demonstration. It contains a

- tool that enables citizens to engage in a two-way dialogue and to make informed judgments on simulated delivery of public services in a citizen-friendly way.

### 14.2.3.3 Criteria-3: Other deliverables/concepts

Evaluation of governance model / pilots
Relevant to FUPOL WP7: Deliverable COCKPIT D5.1 Governance Model and Toolkit
Evaluation: It contains

- methods for the evaluation of both the proposed model and the software used in pilots.

## 14.3 WeGov

### 14.3.1 Project Summary

Wegov aims to develop a toolset by using the wide range of existing and well established social networking sites (Facebook, Twitter, Bebo, WordPress etc.) to engage citizens in two-way dialogs and discussions as part of governance and policymaking processes. The tools will make it possible to detect, track and mine opinions and discussions on policy oriented topics.

The tools will allow discussions to be seeded and stimulated through injection of policy discussion points into relevant communities in a secure and managed way. The tools will allow the origins, bias and evolution of opinions to be tracked to provide auditable records of provenance, guard against misuse, and ensure trust and privacy for all involved. (WeGov, 2011)

### 14.3.2 Policy Domains:

The concerned policy domains are:

- Healthcare

- Consumer Protection

### 14.3.3  Relevance to FUPOL

14.3.3.1  Criteria 1: Use Case

**Use Case 1 - Healthcare**

An existing comment website in the northwest of England provides information and comments concerning the quality of the services provided. WeGov aims to provide better discussion and knowledge generation by the use of Web 2.0 media. Health service staff will be able to explore citizens´opinions about the quality of their services by monitoring the debates on the platform and respond. Furthermore, health service providers who are interested in citizens´opinions on specific issues will be able to launch new topics, extract their opinions and prepare public responses (D5.1 Scenario definition, advisory board and legal/ethical review)

**Use Case 2 - Consumer Protection**

In the field of consumer protection the citizens will be able to share their opinions with political decision-makers which are in the legislative pipeline by using Web 2.0 social media. The platform will be used by the policy makers to enable them to gather the most topical, relevant and popular information concerning consumer protection issues for their region.

In this project two sets of end users will be engaged, one involving the Regional Government of Valencia in Spain and the other involving Regional Authorities in Germany.  (D5.1 Scenario definition, advisory board and legal/ethical review)

Citizens express their opinions. As they are not based on causal or policy models, they are not relevant to FUPOL – WP2.

### 14.3.3.2 Criteria 2: Technical approach and / or components

<u>Tools to detect, track and mine opinions</u> as well as to enable discussions on policy-oriented topics.

<u>Relevant to FUPOL WP3</u>: Deliverable WeGov D4.2 Initial WeGov toolbox. All interactions between the WeGov toolbox and SNS are via the generic API and single sign on for social media.

<u>Relevant for FUPOL WP6:</u> Deliverable WeGov D4.2 Initial WeGov toolbox. It contains

- A description of an ontology model

### 14.3.3.3 Criteria-3: Other deliverables/concepts

<u>Design of use case scenarios</u>

<u>Relevant to FUPOL WP7:</u> Deliverable WeGov 5.1Scenario definition, advisory board and legal/ethical review. It contains

- The Scenario description, thus including end-user engagement with the dashboard.

<u>Definition of the Security Requirements</u> as well as <u>Legal Ethical Issues</u> and <u>Privacy</u>

<u>Relevant to FUPOL WP2:</u> Deliverable WeGov 5.1Scenario definition, advisory board and legal/ethical review and Legal and Ethical Issues for WeGov. It contains

- The Methods, approaches and descriptions for every single
- use case.

## 14.4 Positive Spaces

### 14.4.1 Project Summary

+Spaces-Project aims

- To provide tools that will allow the exploitation of virtual spaces (3D Online VWs and Online Social Networking platforms) in order to assess public reaction and

- To build a service-oriented platform that will support these tools by exploiting virtual worlds as knowledge containers.

A principal goal of +Spaces is to support policy makers in their decision-making process enabling them to set up policies by using virtual spaces and measuring public-in world reaction.
(Positivespaces, 2011)

Meaning of "Virtual Spaces"
"Environments that allow users to socialize under a technological frame that implements a specific context". (Project Presentation)

## 14.4.2 Policy Domains:

The concerned policy domains are:
- Land Use Planning (Green Taxes)
- Health(care) (Smoking Ban)

## 14.4.3 Relevance to FUPOL

### 14.4.3.1 Criteria 1: Use Case

**Use Case 1: Land Use Planning**
The Ministry of Environment has decided to draft a law to charge green-taxes. According to the new law, owners of old cars (10+ years) and owners of bigger cars (2,000+ cc) are to pay more than twice the tax they have paid before. Subsequently, the government expects a 30% increase in income through the new tax. They will apply that change and monitor the reaction.

**Use Case 2: Healthcare**
Based on a new law, smoking is banned in public places. Will smokers protest? Will non-smokers leave the premises more often? The reactions should be simulated.

Citizen express their opinions. As they are not based on causal or policy models, they are not relevant to FUPOL – WP2.

### 14.4.3.2 Criteria 2: Technical approach and / or components

Design of the platform

Relevant for FUPOL WP3: Deliverable D3.1 +Spaces Platform Overall Architecture. It contains the overall architecture of the +Spaces platform including API, describes the process of mapping requirements to platform capabilities and outlines the platform architecture, thus including a detailed description of the Component Layout.

Description of the Middleware and Front-end Design

Relevant for FUPOL WP3: Deliverable D3.2.3 Middleware and Front-end Component Report. It contains the components (e.g. ExperimentManager, ServicesManager, NotificationManager, ConfigurationManager and DataManager)

Data Protection of the Platform

Relevant to FUPOL WP3: Deliverable 3.2.4 Data Protection and Safeguard against Misuse of the Platform Report. It describes the communication channels of the +Spaces platform and the different ways to protect data passing through these channels.

### 14.4.3.3 Criteria 3: Other deliverables/concepts

Pilot Planning and Evaluation

Relevant to FUPOL WP7: Deliverable D6.1 Pilot Scenarios. It contains a pilot planning for the validation of the prototype based on the evaluation framework.

## 14.5 Padgets

### 14.5.1 Project Summary

"The Padgets project aims at bringing together two well established domains, the mashup architectural approach of web 2.0 for creating web applications (gadgets) and the methodology of system dynamics in analysing complex system behaviour. The objective is to design, develop and deploy a prototype toolset that will allow policy makers to graphically create web applications that will be deployed in the environment of underlying knowledge in Web 2.0 media".

"Through the PADGETS platform any policy can become a reusable and communicable web application to be used in relation to underlying content and social activities over the web. Policy makers will be able to set up such applications on their own and use them to communicate their policies to the public. People can use these applications as they use everyday services and policy makers can track the results of this interaction back to their policy making process to assist them in reaching solid decisions that represent society's input and aspirations". (padgets, 2011)

### 14.5.2 Policy Domains:

The concerned policy domains are:
- Public Services (Introduction of an electronic ID-card)
- Healthcare (Telemedicine)
- Migration (Immigration)

### 14.5.3 Relevance to FUPOL

14.5.3.1 Criteria 1: Use Case

**Use Case 1: Introduction of an electronic ID-card**

In order to modernize government and enhance on-line services use, an electronic identity card should be introduced. Consequently citizen's opinions and concerns, particularly about personal data privacy and security have to be collected by in newly

designed tools. This padget is linked to information concerning the introduction of this id-card in other European countries and enables communication across the social media. As a result the attitude towards the introduction of this electronic card is expected.

As they are not based on causal or policy models, they are <u>not relevant to FUPOL – WP2.</u>

## Use Case 2: Telemedicine

The policy topic concerns the implementation of a telemedicine initiative in a scenario different from the native one, transferring the experience of a limited area (VCO, Verbano-Cusio-Ossola) to the entire Piedmont Region. (D2.1 Padget Design and Decision Model for Policy Making). This project is expected to become one of the most challenging telemedicine experiences in Italy.

It is not based on causal or policy models, they are <u>not relevant to FUPOL – WP2.</u>

## Use Case 3: Immigration/Migration

A member of the European Parliament wants to discuss with citizen and NGOs either Immigration in the European Union is a problem or a solution.

<u>No policy model could be identified.</u>

14.5.3.2  <u>Criteria 2: Technical components</u>

<u>Component to connect all social media platforms via one unified API</u>, single sign-on for social media, social media metrics and analytics (integrated across social media) .......

<u>PADGET Container for the Distribution and</u> Propagation of Policy Messages with Social Media

<u>Relevant to FUPOL WP3: Deliverable D2.1 Padget Design and Decision Model</u>

## 14.6 IMPACT

### 14.6.1 Project Summary

The IMPACT project will conduct original research to develop and integrate formal, computational models of policy and arguments about policy, to facilitate deliberations about policy at a conceptual, language-independent level. These models will be used to develop and evaluate innovative prototype tools for supporting open, inclusive and transparent deliberations about public policy.

The research goals of the project aim

- to further the state-of-the-art of computational models of argumentation about policy issues
- to contribute to computational linguistics by developing methods for mining arguments in natural language texts
- to discover ways to increase the inclusiveness and quality of public participation in consultation processes and
- to provide and Open Source prototype.

(IMPACT, 2011)

### 14.6.2 Policy Domains:

The concerned policy domains are:

- Legislation (Green Paper-Copyright in the Knowledge Economy)

"The purpose of the Green Paper is to foster a debate on how knowledge for research, science and education can best be disseminated in the online environment. The Green Paper aims to set out a number of issues connected with the role of

copyright in the "knowledge economy" and intends to launch a consultation on these issues". (Green Paper)

### 14.6.3 Relevance to FUPOL

#### 14.6.3.1 Criteria 1: Use Cases

The use cases are focused on the discussion of the Green Papers by the use of argumentation tools, like (maybe above)

- An **argument reconstruction** tool, which uses a library of argumentation schemes to support the manual reconstruction of arguments from natural language texts.
- A policy modelling and analysis tool. This tool will enable citizens and other actors in the policy development process to compare the effects of different policy proposals.
- A structured consultation tool. The tool also enables arguments to be more easily tracked, mapped and visualized, since it obviates the need to manually reconstruct arguments from natural language texts.
- An argument analysis, tracking and visualization tool. This will enable citizens to appreciate the complexity of the policy issues in their entirety, to zoom in on the issues which are of interest to them and then be in a position to articulate a reasoned contribution to the consultation.

#### 14.6.3.2 Criteria 2: Criteria-2: Other Technical approach and / or components

Policy Modelling Tool Design and Specification
Relevant to FUPOL WP3: Deliverable D4.1 Policy Modelling Tool Requirement Analysis and Specification. It contains explanations regarding how policies are modelled when using OWL and LKIF.

Argument Analysis, Tracking and Visualisation Tool (AVT)

Relevant to FUPOL WP3+WP5: Deliverable D6.1 Argument Analysis, Tracking and Visualisation Tool, Requirements Analysis, Tool specification and Construction Plan Report. It also contains overview of AVT API

## 14.7 OCOPOMO

### 14.7.1 Project Summary

OCOPOMO aims at defining and demonstrating a new approach to policy formation that resolves crucial issues involved with prevailing approaches. The issues and means of resolving them have been identified over recent years by scholars and practitioners.

This project provides an innovative "off the mainstream" bottom-up approach to social policy modelling, combined with e-governance tools and techniques, and advanced ICT technologies.

The OCOPOMO project will create an ICT-based environment integrating lessons and practical techniques from complexity science, agent based social simulation, foresight scenario analysis and stakeholder participation in order to formulate and monitor social policies to be adopted at several levels of government.

Policy issues which are high on the European political agenda will serve as a testbed for the applied approach to policy modelling. (OCOPOMO, 2011)

### 14.7.2 Policy Domains:

The concerned policy domains are:
- Economy (Allocation of EU Structural funds)
- Infrastructure (Renewable Energy Resources)
- Research and Innovation

### 14.7.3  Relevance to FUPOL

#### 14.7.3.1  Criteria 1: Use Case

**Use Case 1: Campagnia Region**

The main goal of the pilot is to develop a tool to support policy decisions regarding to an optimal allocation of EU Structural funds in Campania Region to improve economic growth and socio-economic balance in the region. Furthermore the intention is to grant environmental sustainability as well as competitiveness and cultural and tourism attraction.

**Use Case 2: Kosice**

The key topic is the development of a sustainable long-term strategy for the exploitation of renewable energy resources. In addition the impact of this new strategy on employment and environment should be defined.

#### 14.7.3.2  Criteria-2: Other Technical approach and / or components

Description of the Architecture

Relevant to FUPOL WP3: D2.1 Platform Architecture and Functional Description of Components. It contains the state of the art analyses and technology identification, description of e-participation tools and the architecture development.

Agent-based policy models

Relevant to FUPOL WP2 and WP4: Deliverable D5.1 Scenario, Policy Model and Rule-Based Agent Design. It also contains declarative rule-based agent modelling software.

#### 14.7.3.3  Criteria-3: Other Deliverables/Concepts

Description of Pilot Cases, Stakeholder Analyses and Policy Processes

Relevant to FUPOL WP7: Deliverable OCOPOMO D1.1 Stakeholder Identification and Requirements for Toolbos, Scenario Process and Policy Modelling

## 14.8 UrbanSim

### 14.8.1 Project Summary

UrbanSim is a software-based simulation system for supporting planning and analysis of urban development, incorporating the interactions between land use, transportation, the economy, and the environment. It is intended for use by Metropolitan Planning Organizations (MPOs), cities, counties, non-governmental organizations, researchers and students interested in exploring the effects of infrastructure and policy choices on community outcomes such as motorized and non-motorized accessibility, housing, greenhouse gas emissions, and the protection of open space and environmentally sensitive habitats. (UrbanSim, 2011)

### 14.8.2 Policy Domains

The policy domains are, as described above:

- Urban development
- Land Use
- Transportation
- Environment
- Housing

## 14.9 APPSIM

### 14.9.1 Project Summary

The aim of this Australian Research Council (ARC) Linkage project is link academic microsimulation modellers with government organizations to develop a sophisticated model with the capacity to assess the future distributional and revenue consequences of changes in tax and outlay programs. Hence it will enhance the planning and policy simulation capacity of the Commonwealth. (Appsim)

This project will develop APPSIM, a dynamic population microsimulation model.

### 14.9.2  Policy Domains

- Immigration and Emigration;
- Economy (employment, taxes)
- Education
- Health
- Social Affairs (Social Security)
- Housing

### 14.9.3  Relevance to FUPOL

14.9.3.1  Criteria 1: Use Case

Simulation of the APPSIM simulation cycle
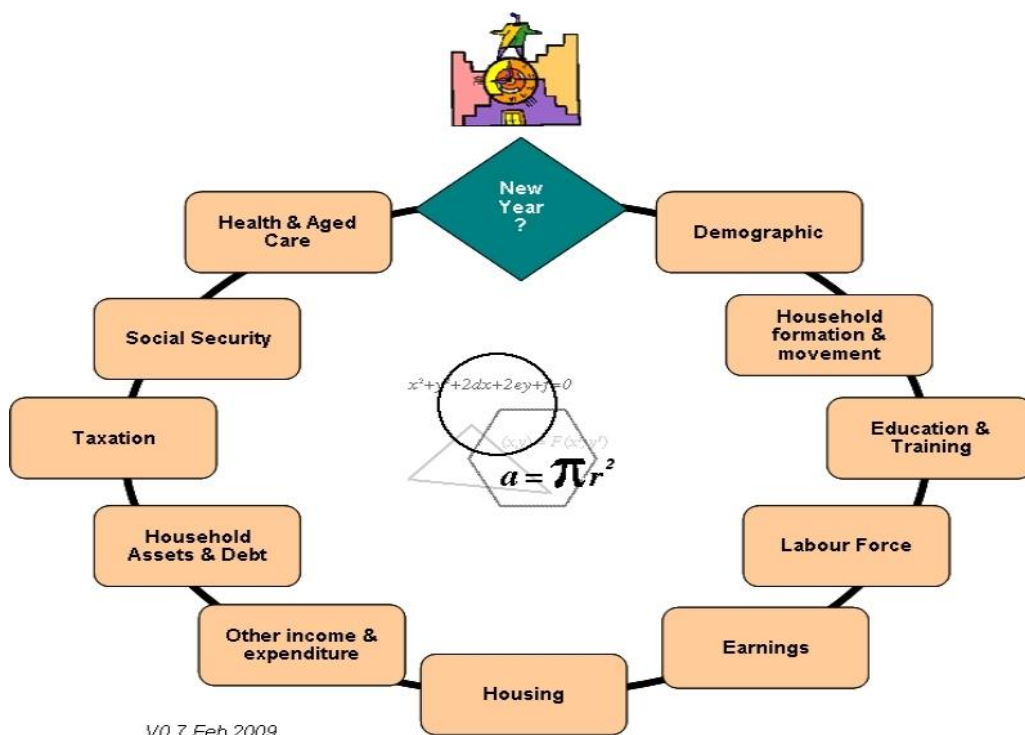


(Research, 2011)

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# 16 Figures

# 17 Tables

# 18 Annex

## 18.1 Lists of Indicators

### 18.1.1 Urban Audit Indicators

The list of Urban Audit Indicators includes all quantitative indicators of the Urban Audit and their relevance for the policy domains.

Key:

| | | | | | |
|---|---|---|---|---|---|
| L= | Land Use | EN= | Environment | CF= | Community Facilities |
| EC= | Economy | US= | Urban Segregation | PB= | Participatory Budgeting |
| H= | Housing | T= | Tourism | | |

Fuzzification means the quantitative indicator could be „fuzzificated" in a qualitative indicator with a „fuzzy" value (e.g. high, medium, low)

Example:

Quantitative indicator:     Total population change over 5 years: 10%

Qualitative indicator:     Total population change over 5 years: high

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| DE1001I | Total resident population | DE1001V | - | C,L,S | LCA | key | | X | | | X | | | | |
| DE1011I | Total population at working age | DE1046V + DE1049V + DE1052V + DE1025V | - | C,L | LCA | key | | | | | | | | | |
| DE1067I | Proportion of total resident population aged 0-2 | DE1067V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1068I | Proportion of male resident population aged 0-2 | DE1068V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1069I | Proportion of female resident population aged 0-2 | DE1069V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1070I | Proportion of total resident population aged 3-4 | DE1070V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1071I | Proportion of male resident population aged 3-4 | DE1071V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1072I | Proportion of female resident population aged 3-4 | DE1072V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1040I | Proportion of total population aged 0-4 | DE1040V | DE1001V | C,L,S | LCA | | | X | | | X | | | | |
| DE1043I | Proportion of total population aged 5-14 | DE1043V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1046I | Proportion of total population aged 15-19 | DE1046V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1049I | Proportion of total population aged 20-24 | DE1049V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1073I | Proportion of total resident population aged 25-34 | DE1058V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1074I | Proportion of male resident population aged 25-34 | DE1059V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1075I | Proportion of female resident population aged 25-34 | DE1060V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1076I | Proportion of total resident population aged 35-44 | DE1061V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1077I | Proportion of male resident population aged 35-44 | DE1062V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1078I | Proportion of female resident population aged 35-44 | DE1063V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1064I | Proportion of total resident population aged 45-54 | DE1064V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1065I | Proportion of male resident population aged 45-54 | DE1065V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1066I | Proportion of female resident population aged 45-54 | DE1066V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1052I | Proportion of total population aged 25-54 | DE1052V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1025I | Proportion of total population aged 55-64 | DE1025V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1082I | Proportion of male population aged 55-64 | DE1026V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1083I | Proportion of female population aged 55-64 | DE1027V | DE1001V | C,L | | | | X | | | | | | | |
| DE1079I | Proportion of total population aged 15-64 | DE1046V + DE1049 + DE1052V + DE1025V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1080I | Proportion of male population aged 15-64 | DE1047V + DE1050V + DE1053V + DE1026V | DE1001V | C,L | | | | X | | | X | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DE1081I | Proportion of female population aged 15-64 | DE1048V + DE1051V + DE1054V + DE1027V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1028I | Proportion of total population aged 65-74 | DE1028V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1029I | Proportion of male population aged 65-74 | DE1029V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1030I | Proportion of female population aged 65-74 | DE1030V | DE1001V | C,L | | | | X | | | X | | | | |
| DE1055I | Proportion of total population aged 75 and over | DE1055V | DE1001V | C,L | LCA | | | X | | | X | | | | |
| DE1003I | Proportion of females to males in total population | DE1003V | DE1002V | C,L,S | | | | | | | | | | | |
| DE1057I | Proportion of females to males - aged 75 and over | DE1057V | DE1056V | C,L | | | | | | | | | | | |
| DE1061I | Total population change over 1 year | DE1001V (t) | DE1001V (t-1) | C,L,S | LCA | key | X | X | | | X | | | | |
| DE1062I | Total annual population change over 5 approx.years | DE1001V (t) | nSQR(DE1001V) (t-n) | C,L,S | LCA | key | X | X | | | X | | | | |
| DE1058I | Demographic dependency: (<20 + >65) / 20-64 years | DE1040V + DE1043V + DE1046V + DE1028V + DE1055V | DE1049V + DE1052V + DE1025V | C,L | LCA | | X | | | | | | | | |
| DE1059I | Demographic young age dependency Index: (lt 20 years) / 20-64 years | DE1040V + DE1043V + DE1046V | DE1049V + DE1052V + DE1025V | C,L | LCA | | X | | | | | | | | |
| DE1060I | Demographic old age dependency: > 65 / 20-64 years | DE1028V + DE1055V | DE1049V + DE1052V + DE1025V | C,L | LCA | | X | | | | | | | | |
| DE2001I | Nationals as a proportion of total population | DE2001V | DE1001V | C,L, | LCA | key | | | | | | | | X | |
| DE2002I | EU nationals as a proportion of total population | DE2002V | DE1001V | C,L, | LCA | key | | | | | | | | | |
| DE2003I | Non-EU nationals as a proportion of total pop. | DE2003V | DE1001V | C,L, | LCA | key | | | | | | | | X | |
| DE2004I | Nationals born abroad as a prop. of total pop. | DE2004V | DE1001V | C,L | | key | X | | | | | | | X | |
| DE2005I | Proportion of Residents who are not EU Nationals and citizens of a country with high HDI | DE2005V | DE1001V | C,L,S | | | X | | | | | | | X | |
| DE2006I | Proportion of Residents who are not EU Nationals and citizens of a country with a medium or low HDI | DE2006V | DE1001V | C,L,S | | | X | | | | | | | X | |
| DE3003I | Total number of households | DE3001V | - | C,L,S | LCA | | | | | | X | | | | |
| DE3004I | Average size of households | DE3017V | DE3001V | C,L,S | | key | X | | | | X | | | | |
| DE3002I | Proportion of households that are 1-person households | DE3002V | DE3001V | C,L,S | | key | X | | | | X | | | | |
| DE3005I | Prop. of households that are lone-parent households | DE3005V | DE3001V | C,L,S | | | X | | | | X | | | | |

| | | | | | | | | Policy Domains | | | | | | | |
| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DE3008I | Prop. households that are lone-pensioner households | DE3008V | DE3001V | C,L,S | | | X | | | | X | | | | |
| DE3009I | Lone-pensioner households: male / female | DE3009V | DE3010V | C,L | | | X | | | | X | | | | |
| DE3011I | Proportion of households with children aged 0-17 | DE3011V | DE3001V | C,L | LCA | key | X | | | | X | | | | |
| DE3016I | Lone parent households per 100 households with children aged 0-17 | DE3005V*100 | DE3011V | C,L | | | X | | | | X | | | | |
| DE3015I | Moves to city during the last 2 years/moves out of the city during the last 2 years | DE3015V | DE3016V | C | | | X | X | | | X | | | | |
| DE3012I | Proportion of nationals that have moved to the city during the last two years | DE3012V | DE1001V | C | | | X | X | | | X | | | | |
| DE3013I | Proportion of EU nationals that have moved to the city during the last two years | DE3013V | DE1001V | C | | | X | X | | | X | | | | |
| DE3014I | Proportion of non-EU nationals that have moved to the city during the last two years | DE3014V | DE1001V | C | | | X | X | | | X | | | | |
| SA1001I | Number of dwellings | SA1001V | - | C,L,S | LCA | | | | | | X | | | | |
| SA1005I | Number of apartments | SA1005V | | C,L | | | | | | | X | | | | |
| SA1004I | Number of houses | SA1004V | | C,L | | | | | | | X | | | | |
| SA1051I | Number of houses per 100 apartments | SA1004V*100 | SA1005V | C,L | | | X | | | | X | | | | |
| SA1028I | Number of people in accommodation for the homeless per 1000 pop | SA1029V*1000 | DE1001V | C | | | X | | | | X | | | | |
| SA1027I | Number of roofless persons per 1000 pop | SA1027V*1000 | DE1001V | C | | | X | | | | X | | | | |
| SA1030I | Number of people in accommodation for immigrants per 1000 pop | SA1030V*1000 | DE1001V | C | | | | | | | X | | | | |
| SA1031I | Number of people in Women's Shelter per 1000 pop | SA1031V*1000 | DE1001V | C | | | X | | | | X | | | | |
| SA1016I | Average price per m2 for an apartment | SA1016V | - | C,L | | | X | | | | X | | | | |
| SA1023I | Average price per m2 for a house | SA1023V | - | C,L | | | X | | | | X | | | X | |
| SA1036I | Average price per m2 for apartm. / median annual house income | SA1016V | EC3039V | C,L | | | X | | | | X | | | X | |
| SA1049I | Average annual rent for housing per m2 | SA1049V | - | C,L | | | X | | | | X | | | X | |
| SA1018I | Proportion of dwellings lacking basic amenities | SA1018V | SA1001V | C,L,S | | | X | | | | X | | | X | |
| SA1026I | Proportion of Non-conventional dwellings | SA1026V*10 | SA1001V | C,L | | | X | | | | X | | | X | |
| SA1019I | Average occupancy per occupied dwelling | SA1019V | - | C,L | | | X | | | | X | | | | |
| SA1022I | Average living area in m2 per person | SA1022V | - | C,L | | key | X | | | | X | | | | |
| SA1050I | Percentage of overcrowded households (>1 persons in 1 room) | SA1046V | DE3001V | C,L | | | X | | | | X | | | X | |
| SA1025I | Empty conventional dwellings per total No. of dwellings | SA1025V | SA1001V | C,L | | | X | | | | X | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
| SA1011I | Proportion of households living in owned dwellings | SA1011V | DE3001V | C,L | LCA | key | | | | | X | | | X | |
| SA1012I | Proportion of households living in social housing | SA1012V | DE3001V | C,L,S | | | | | | | X | | | X | |
| SA1013I | Prop. of households living in priv. rented housing | SA1013V | DE3001V | C,L | | | | | | | X | | | X | |
| SA1007I | Proportion of households living in houses | SA1007V | DE3001V | C,L | | | | | | | X | | | X | |
| SA1008I | Proportion of households living in apartments | SA1008V | DE3001V | C,L | | | | | | | X | | | | |
| SA2029I | Crude death rate per 1000 residents | SA2019V*1000 | DE1001V | C,L,S | | | | | | | | | | | |
| SA2030I | Crude death rate of male residents per 1000 male residents | SA2020V*1000 | DE1002V | C,L,S | | | | | | | | | | | |
| SA2031I | Crude death rate of female residents per 1000 female residents | SA2021V*1000 | DE1003V | C,L,S | | | | | | | | | | | |
| SA2019I | Total deaths per year | SA2019V | | C,L,S | | | | | | | | | | | |
| SA2020I | Total deaths per year (Male) | SA2020V | | C,L | | | | | | | | | | | |
| SA2021I | Total deaths per year (Female) | SA2021V | | C,L | | | | | | | | | | | |
| SA2016I | Mortality rate for <65 per year | SA2016V | DE1040V + DE1043V + DE1046V + DE1049V + DE1052V + DE1025V | C,L,S | | | | | | | | | | | |
| SA2017I | Mortality rate for <65 per year (Male) | SA2017V | DE1041V + DE1044V + DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | | | | | | | | | |
| SA2018I | Mortality rate for <65 per year (Female) | SA2018V | DE1042V + DE1045V + DE1048V + DE1051V + DE1054V + DE1027V | C,L | | | | | | | | | | | |
| SA2013I | Mortality rate for individuals under 65 from heart diseases and respiratory illness | SA2013V | DE1040V + DE1043V + DE1046V + DE1049V + DE1052V + DE1025V | C,L | | | | | | | | | | | |

| | | | | | | | | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
| SA2014I | Mortality rate for males under 65 from heart diseases and respiratory illness | SA2014V | DE1041V + DE1044V + DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | | | | | | | | | |
| SA2015I | Mortality rate for females under 65 from heart diseases and respiratory illness | SA2015V | DE1042V + DE1045V + DE1048V + DE1051V + DE1054V + DE1027V | C,L | | | | | | | | | | | |
| SA2007I | Live births per 1000 residents | SA2007V*1000 | DE1001V | C,L | | | | | | | | | | | |
| SA2004I | Infant Mortality rate per year (per 1000 live births) | SA2004V*1000 | SA2007V | C,L | | | | | | | | | | | |
| SA2005I | Male Infant Mortality rate per year (per 1000 live births) | SA2005V*1000 | SA2008V | C,L | | | | | | | | | | | |
| SA2006I | Female Infant Mortality rate per year (per 1000 live births) | SA2006V*1000 | SA2009V | C,L | | | | | | | | | | | |
| SA2022I | Number of hospital beds per 1000 residents | SA2022V*1000 | DE1001V | C,L | | key | | | | | | | | | |
| SA2032I | Number of hospital discharges of in-patients per hospital bed | SA2026V | SA2022V | C,L | | | | | | | | | | | |
| SA2026I | Number of hospital discharges of in-patients per 1000 residents | SA2026V*1000 | DE1001V | C,L | | | | | | | | | | | |
| SA2027I | Number of practising physicians per 1000 residents | SA2027V*1000 | DE1001V | C,L | LCA | | | | | | | | | | |
| SA2028I | Number of practising dentists per 1000 residents | SA2028V*1000 | DE1001V | C,L | | | | | | | | | | | |
| SA3001I | Total Number of recorded crimes per 1000 population | SA3001V*1000 | DE1001V | C,L,S | | | X | | | | X | | | | |
| SA3005I | Number of murders and violent deaths per 1000 pop. | SA3005V*1000 | DE1001V | C,L | | | X | | | | | | | | |
| SA3006I | Number of car thefts per 1000 population | SA3006V*1000 | DE1001V | C,L | | key | X | | | | | | | | |
| SA3007I | Number of domestic burglary per 1000 population | SA3007V*1000 | DE1001V | C,L | | key | X | | | | | | | | |
| EC1201I | Annual average change in employment over approx. 5 years | EC1001V(t)-EC1001V(t-n) | nSQR(EC1001V - EC1001V)(t-n) | C,L,S | LCA | | x | | | | | | | | |
| EC1010I | Number of unemployed | EC1010V | - | C,L,S | LCA | | | | | | X | | | X | |

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| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EC1020I | Unemployment rate | EC1010V | EC1001V | C,L,S | LCA | key | | | | | X | | | X | |
| EC1011I | Unemployment rate - male | EC1011V | EC1002V | C,L | | | | | | | X | | | X | |
| EC1012I | Unemployment rate - female | EC1012V | EC1003V | C,L | | | | | | | X | | | X | |
| EC1148I | Proportion of residents unemployed 15-24 | EC1148V | EC1142V | C,L,S | LCA | | | | | | X | | | X | |
| EC1149I | Proportion of male residents unemployed 15-24 | EC1149V | EC1143V | C,L | | | | | | | X | | | X | |
| EC1150I | Proportion of female residents unemployed 15-24 | EC1150V | EC1144V | C,L | | | | | | | X | | | X | |
| EC1151I | Proportion of residents unemployed 55-64 | EC1151V | EC1145V | C,L | | | | | | | X | | | X | |
| EC1152I | Proportion of male residents unemployed 55-64 | EC1152V | EC1146V | C,L | | | | | | | X | | | X | |
| EC1153I | Proportion of female residents unemployed 55-64 | EC1153V | EC1147V | C,L | | | | | | | X | | | X | |
| EC1154I | Proportion of unemployed aged 15-24 unemployed for more than 6 months | EC1154V | EC1148V | C,L | | | | | | | X | | | X | |
| EC1155I | Proportion of long term young unemployed - male | EC1155V | EC1149V | C,L | | | | | | | X | | | X | |
| EC1156I | Proportion of long term young unemployed - female | EC1156V | EC1150V | C,L | | | | | | | X | | | X | |
| EC1157I | Proportion of unemployed aged 55-64 unemployed for more than one year | EC1157V | EC1151V | C,L | | | | | | | X | | | X | |
| EC1158I | Proportion of long term old unemployed - male | EC1158V | EC1152V | C,L | | | | | | | X | | | X | |
| EC1159I | Proportion of long term old unemployed - female | EC1159V | EC1153V | C,L | | | | | | | X | | | X | |
| EC1202I | Proportion of unemployed who are under 25 | EC1148V | EC1010V | C,L,S | LCA | | | | | | X | | | X | |
| EC1034I | Ratio of employed persons to population of working age | EC1034V + EC1088V | DE1046V + DE1049V + DE1052V + DE1025V | C | LCA | key | X | | | | | | | | |
| EC1035I | Ratio of employed to population of working age - male | EC1035V + EC1089V | DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | X | | | | | | | | |
| EC1036I | Ratio of employed to popul. of working age - female | EC1036V + EC1090V | DE1048V + DE1051V + DE1054V + DE1027V | C,L | | | X | | | | | | | | |
| EC1028I | Ratio of employees to economically active population | EC1028V | EC1001V | C | | | X | | | | | | | | |
| EC1029I | Ratio of male employees to male economically active population | EC1029V | EC1002V | C | | | X | | | | | | | | |
| EC1030I | Ratio of female employees to female economically active population | EC1030V | EC1003V | C | | | X | | | | | | | | |
| EC1031I | Self-employment rate | EC1025V | EC1025V + EC1028V | C | | key | | | | | X | | | X | |
| EC1032I | Self-employment rate - male | EC1026V | EC1026V + EC1029V | C | | | | | | | X | | | X | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|------|-----------|-----------|-------------|--------------|-----|-----|----------------|---|----|----|---|----|---|----|----|
| | | | | | | | | | | | **Policy Domains** | | | | |
| EC1033I | Self-employment rate - female | EC1027V | EC1027V + EC1030V | C | | | | | | | X | | | X | |
| EC1001I | Activity rate | EC1001V | DE1046V + DE1049V + DE1052V + DE1025V | C,L | LCA | | | | | | X | | | X | |
| EC1002I | Activity rate - male | EC1002V | DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | | | | | X | | | X | |
| EC1003I | Activity rate - female | EC1003V | DE1048V + DE1051V + DE1054V + DE1027V | C,L | | | | | | | X | | | X | |
| EC1005I | Net activity rate residents aged 15-64 | EC1001V-EC1010V | DE1046V + DE1049V + DE1052V + DE1025V | C,L,S | LCA | | | | | | X | | | X | |
| EC1142I | Activity rate 15-24 | EC1142V | DE1046V + DE1049V | C,L, | LCA | | | | | | X | | | X | |
| EC1143I | Activity rate 15-24 - male | EC1143V | DE1047V + DE1050V | C,L | | | | | | | X | | | X | |
| EC1144I | Activity rate 15-24 - female | EC1144V | DE1048V + DE1051V | C,L | | | | | | | X | | | X | |
| EC1006I | Net activity rate residents aged 15-24 | EC1142V-EC1148V | DE1046V + DE1049V | C,L,S | | | | | | | X | | | X | |
| EC1145I | Activity rate 55-64 | EC1145V | DE1025V | C,L | LCA | | | | | | X | | | X | |
| EC1146I | Activity rate 55-64 - male | EC1146V | DE1026V | C,L | | | | | | | X | | | X | |
| EC1147I | Activity rate 55-64 - female | EC1147V | DE1027V | C,L | | | | | | | X | | | X | |
| EC1007I | Net activity rate residents aged 55-64 | EC1145V-EC1151V | DE1025V | C,L,S | | | | | | | X | | | X | |
| EC1088I | Proportion of employed residents in part-time employment | EC1088V | EC1088V + EC1034V | C | LCA | key | X | | | | | | | | |
| EC1089I | Proportion of employed residents in part-time employment - male | EC1089V | EC1089V + EC1035V | C | LCA | | X | | | | | | | | |
| EC1004I | Proportion of employed residents in part-time employment - female | EC1090V | EC1090V + EC1036V | C | | | X | | | | | | | | |
| EC1166I | Proportion of employed residents in part-time employment, 15-24 | EC1166V | EC1166V + EC1160V | C | | | X | | | | | | | | |
| EC1167I | Proportion of employed residents in part-time employment, 15-24 - male | EC1167V | EC1167V + EC1161V | C | | | X | | | | | | | | |
| EC1168I | Proportion of employed residents in part-time employment, 15-24 - female | EC1168V | EC1168V + EC1162V | C | | | X | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
| EC1169I | Proportion of employed residents in part-time employment, 55-64 | EC1169V | EC1169V + EC1163V | C | | | X | | | | | | | | |
| EC1170I | Proportion of employed residents in part-time employment, 55-64 - male | EC1170V | EC1170V + EC1164V | C | | | X | | | | | | | | |
| EC1171I | Proportion of employed residents in part-time employment, 55-64 - female | EC1171V | EC1171V + EC1165V | C | | | X | | | | | | | | |
| EC2003I | No. of companies with HQs in city quoted on the national stock market | EC2003V | - | C | | | X | | | | | | | | |
| EC2008I | Proportion of employment in agriculture fishery | EC2008V | EC2020V | C | | | | | | | | | | | |
| EC2016I | Prop. of employment in mining, manuf, energy, | EC2016V | EC2020V | C | | | | | | | | | | | |
| EC2024I | Prop. of employment in commercial services (NACE Rev 1.1: G-K) | EC2010V + EC2023V + EC2011V | EC2020V | C | | | | | | | | | | | |
| EC2017I | Prop. of employment in services (NACE Rev.1.1 G-P) | EC2017V | EC2020V | C | | | | | | | | | | | |
| EC2009I | Prop. of employment in industries (NACE Rev.1.1 C-E) | EC2009V | EC2020V | C | | | | | | | | | | | |
| EC2022I | Proportion of employment in construction (NACE Rev.1.1 F) | EC2022V | EC2020V | C | | | | | | | | | | | |
| EC2010I | Prop. of employment in trade, hotels and restaurants (NACE Rev.1.1 G-H) | EC2010V | EC2020V | C | | | | | | | | | | | |
| EC2023I | Prop. of employment in transport and communication (NACE Rev.1.1 I) | EC2023V | EC2020V | C | | | | | | | | | | | |
| EC2011I | Prop. of employment in financial and business services (NACE Rev.1.1 J-K) | EC2011V | EC2020V | C | | | | | | | | | | | |
| EC2012I | Prop. of employment public admin., health and educ. (NACE Rev.1.1 L-P) | EC2012V | EC2020V | C | | | | | | | | | | | |
| EC2018I | Proportion of employees in total employment (jobs) | EC2018V | EC2020V | C | | | | | | | | | | | |
| EC2019I | Proportion of self- employees in total employment (jobs) | EC2019V | EC2020V | C | | | | | | | | | | | |
| EC2020I | Average employment per company | EC2020V | EC2021V | C | | | | | | | | | | | |
| EC2021I | Employment per 100 of residents aged 15-64 | EC2020V*100 | DE1046V + DE1049V + DE1052V + DE1025V | C | | | | | | | | | | | |
| EC2014I | Proportion of companies gone bankrupt | EC2014V | EC2021V | C | | | X | | | | | | | | |
| EC2004I | New businesses registered as a prop. of exist. Companies | EC2004V | EC2021V | C | | | X | | | | | | | | |
| EC3039I | Median disposable annual household income (for city or NUTS 3 region) | EC3039V | - | C,L,S | LCA | | X | | | | X | | | X | |
| EC3040I | Average disposable annual household income (for city or NUTS 3 region) | EC3040V | - | C | | | | | | | X | | | X | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains |||||||| 
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EC3054I | Ratio of first to fourth quintile disposable annual household income | EC3054V | EC3045V | C,L | | | X | | | | X | | | X | |
| EC3051I | Household Income: Quintile 2 (income with 60% households above, 40% below) | EC3051V | | C,L | | | X | | | | X | | | X | |
| EC3048I | Household Income: Quintile 3 (income with 40% households above, 60% below) | EC3048V | | C,L | | | X | | | | X | | | X | |
| EC3057I | Percent. households with less than half nat.aver.income | EC3057V | EC3056V | C,L,S | | key | X | | | | X | | | X | |
| EC3055I | Percent. households with less than 60% of the national median annual disposable income | EC3055V | EC3056V | C,L,S | | | X | | | | X | | | X | |
| EC3060I | Proportion of households reliant upon social security | EC3060V | EC3056V | C,L,S | | | X | | | | X | | | X | |
| EC3063I | Proportion of individuals reliant on social security | EC3063V | DE1001V | C,L,S | | | X | | | | X | | | X | |
| CI1016I | Number of elected city representatives | CI1016V | - | C | | | | | | | | | | | |
| CI1026I | No of elected city representatives per 1000 residents | CI1016V*1000 | DE1001V | C | | | | | | | | | | | |
| CI1017I | Percentage of elected city representat. who are men | CI1017V | CI1016V | C | | key | | | | | | | | | |
| CI1018I | Percentage of elected city representat. who are women | CI1018V | CI1016V | C | | | | | | | | | | | |
| TE1006I | Children 0-2 in day care (publ.&priv) per 1000 children | TE1006V*1000 | DE1067V | C,L | | key | X | | | | | | | | |
| TE1007I | Children 3-4 in day care (publ.&priv) per 1000 children | TE1007V*1000 | DE1070V | C,L | | | X | | | | | | | | |
| TE1001I | Number of Children 0-4 in day care (publ.&priv) per 1000 children 0-4 | TE1001V*1000 | DE1040V | C,L | LCA | | X | | | | | | | | |
| TE1030I | Proportion of students not completing compulsory educ. | TE1030V | TE1005V | C,L | | | X | | | | | | | | |
| TE1031I | Students in upper and further education (ISCED level 3-4) per 1000 resident pop. | TE1031V*1000 | DE1001V | C | | | X | | | | | | | | |
| TE1035I | Students in upper and further education (ISCED level 3-4) per 100 resident population aged 15-24 | TE1031V*100 | DE1046V + DE1049 | C | | | X | | | | | | | | |
| TE1032I | Proportion of male students in upper and further education (ISCED level 3-4) | TE1032V | TE1031V | C | | | X | | | | | | | | |
| TE1033I | Proportion of female students in upper and further education (ISCED level 3-4) | TE1033V | TE1031V | C | | | X | | | | | | | | |
| TE1026I | Number of Students in universities and further education establishments per 1000 resident pop. | TE1026V*1000 | DE1001V | C | | | | | | | | | | | |
| TE1034I | Students in higher education (ISCED level 5-6) per 100 resident population aged 20-34 | TE1026V*100 | DE1049V + DE1058V | C | | | X | | | | | | | | |
| TE1027I | Proportion of male students in higher education (ISCED level 5-6) | TE1027V | TE1026V | C | | | X | | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
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| | | | | | | | | **Policy Domains** | | | | | | | |
| TE1028I | Proportion of female students in higher education (ISCED level 5-6) | TE1028V | TE1026V | C | | key | X | | | | | | | | |
| TE2025I | Prop. of working age population qualified at level 1 or 2 ISCED | TE2025V | DE1046V + DE1049V + DE1052V + DE1025V | C,L,S | LCA | key | X | | | | | | | | |
| TE2026I | Prop. of working age population qualified at level 1 or 2 ISCED - male | TE2026V | DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | X | | | | X | | | X | |
| TE2027I | Prop. of working age population at level 1 or 2 ISCED - female | TE2027V | DE1048V + DE1051V + DE1054V + DE1027V | C,L | | key | X | | | | X | | | X | |
| TE2028I | Prop. of working age population qualified at level 3 or 4 ISCED | TE2028V | DE1046V + DE1049V + DE1052V + DE1025V | C,L,S | LCA | | X | | | | X | | | X | |
| TE2029I | Prop. of working age population qualified at level 3 or 4 ISCED - male | TE2029V | DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | X | | | | X | | | X | |
| TE2030I | Prop. of working age population qualif. at level 3 or 4 ISCED - female | TE2030V | DE1048V + DE1051V + DE1054V + DE1027V | C,L | | | X | | | | X | | | X | |
| TE2031I | Prop. of working age population qualified at level 5 or 6 ISCED | TE2031V | DE1046V + DE1049V + DE1052V + DE1025V | C,L,S | LCA | key | X | | | | X | | | X | |
| TE2032I | Prop. of working age population qualified at level 5 or 6 ISCED - male | TE2032V | DE1047V + DE1050V + DE1053V + DE1026V | C,L | | | X | | | | X | | | X | |
| TE2033I | Prop. of working age population qualif. at level 5 or 6 ISCED - female | TE2033V | DE1048V + DE1051V + DE1054V + DE1027V | C,L | | key | X | | | | X | | | X | |
| EN1001I | Number of days of rain per year | EN1001V | - | C | | | | | | | | | | | |
| EN1002I | Average number of hours of sunshine per day | EN1002V | - | C | | | | | | | | | | | |
| EN1003I | Average temperature of warmest month | EN1003V | - | C | | | | | | | | | | | |
| EN1004I | Average temperature of coldest month | EN1004V | - | C | | | | | | | | | | | |
| EN1005I | Rainfall (litre/m2) in the reference year | EN1005V | - | C | | | | | | | | | | | |
| EN2002I | Summer smog: Number of days ozone (O3) concentrations exceed 120 µg/m3 | EN2002V | - | C | | key | | | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EN2003I | Number of days per year NO2 concentrations exceed 200mg/m3 | EN2003V | - | C | | | X | | | | | | | | |
| EN2005I | Number of days per year PM10 concentrations exceed 50 µg/m3 | EN2005V | - | C | | key | X | | | | | | | | |
| EN2025I | Accumulated ozone concentration in excess 70 µg/m3 | EN2025V | | C | | | X | | | | | | | | |
| EN2026I | Annual average concentration of NO2 | EN2026V | | C | | | X | | | | | | | | |
| EN2027I | Annual average concentration of PM10 | EN2027V | | C | | | X | | | | | | | | |
| EN2028I | Prop. of residents exposed to air traffic noise >65 dB(A) at day time | EN2028V | DE1001V | C | | | X | | | | | | | | |
| EN2029I | Prop. of residents exposed to air traffic noise >55 dB(A) at night time | EN2029V | DE1001V | C | | | X | | | | | | | | |
| EN2032I | Prop. of residents exposed to rail traffic noise >65 dB(A) at day time | EN2032V | DE1001V | C | | | X | | | | | | | | |
| EN2036I | Prop. of residents exposed to rail traffic noise >55 dB(A) at night time | EN2036V | DE1001V | C | | | X | | | | | | | | |
| EN2033I | Prop. of residents exposed to road traffic noise >65 dB(A) at day time | EN2033V | DE1001V | C | | | X | | | | | | | | |
| EN2035I | Prop. of residents exposed to road traffic noise >55 dB(A) at night time | EN2035V | DE1001V | C | | | X | | | | | | | | |
| EN3003I | Consumption of water (m3 per annum) per inhabitant | EN3003V | DE1001V | C | | key | | | | | | | | | |
| EN3010I | Price of a m 3 of domestic water | EN3010V | | C | | key | X | | | | | | | | |
| EN3004I | % dwellings connected to potable drinking water supply infrastructure | EN3004V | SA1001V | C | | | X | | | | | | | | X | |
| EN3006I | % dwellings connected to sewerage treatment system | EN3006V | SA1001V | C | | | X | | | | | | | | X | |
| EN3011I | Percentage of the urban waste water load (in population equivalents) treated according to the applicable standard | EN3011V | | C | | | X | | | | | | | | | |
| EN3008I | Number of water rationing cases, days per year | EN3008V | - | C | | | X | | | | | | | | |
| EN3009I | Number of scheduled water stoppages, days per year | EN3009V | - | C | | | X | | | | | | | | |
| EN4001I | Amount of Collected solid waste per capita per annum | EN4001V | DE1001V | C | | key | X | | | | | | | | |
| EN4002I | Proportion of solid waste arising within the boundary processed by landfill | EN4002V | EN4001V | C | | key | X | | | | | | | | |
| EN4003I | Proportion of solid waste arising within the boundary processed by incinerator | EN4003V | EN4001V | C | | | X | | | | | | | | |
| EN4004I | Proportion of solid waste arising within the boundary processed by recycling | EN4004V | EN4001V | C | | | X | | | | | | | | |

Policy Domains

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Policy Domains | | | | | | | |
| EN4006I | Proportion of solid waste arising within the boundary processed by other methods | EN4006V | EN4001V | C | | | X | | | | | | | | |
| EN5003I | Total land area (km2) - according to cadastral register | EN5003V | - | C,L,S | LCA | key | X | X | | | | | | | |
| EN5001I | Green space (in m2) to which the public has access per capita | EN5001V*10000 | DE1001V | C,L,S | | | | X | | | | | | | |
| EN5012I | Proportion of the area in green space | EN5012V | EN5003V | C,L,S | | | | X | | | | | | | |
| EN5016I | Proportion of the area used for agricultural purposes | EN5016V | EN5003V | C,L | | | | X | | | | | | | |
| EN5024I | Proportion of the area used for commercial activities (industry, trade, offices) | EN5024V | EN5003V | C,L | | | | X | | | | | | | |
| EN5025I | Proportion of the area used for transport (road, rail, air, ports) | EN5025V | EN5003V | C,L | | | | X | | | | | | | |
| EN5015I | Water and wetland | EN5015V | | C,L | | | | X | | | | | | | |
| EN5011I | Proportion of the area in recreational sports and leisure use | EN5011V | EN5003V | C,L | | | | X | | | | | | | |
| EN5027I | Land area (in m2) in recreational, sports and leisure use per capita | EN5011V*1000000 | DE1001V | C,L | | | | X | | | | | | | |
| EN5004I | Proportion of the area in housing/residential use | EN5004V | EN5003V | C,L | | | X | X | | | X | | | | |
| EN5026I | Proportion of the area use for other purposes | EN5026V | EN5003V | C,L | | | X | | | | | | | | |
| EN5101I | Population density: total resident pop. per square km | DE1001V | EN5003V | C,L,S | LCA | key | | X | | | X | | | | |
| EN5102I | Net residential density - pop. per land area in housing | DE1001V | EN5004V | C,L | | | | | | | | | | | |
| TT1003I | Proportion of journeys to work by car | TT1003V | - | C,L | | key | X | | | | | | | | |
| TT1012I | Proportion of journeys to work by car or motor cycle | TT1012V | | C,L | | | X | | | | | | | | |
| TT1006I | Proportion of journeys to work by motor cycle | TT1006V | - | C,L | | | X | | | | | | | | |
| TT1007I | Proportion of journeys to work by bicycle | TT1007V | - | C,L | | | X | | | | | | | | |
| TT1008I | Proportion of journeys to work by foot | TT1008V | - | C,L | | | X | | | | | | | | |
| TT1010I | Proportion of journeys to work by public transport (rail, metro, bus, tram) | TT1010V | | C,L | | | X | | | | | | | | |
| TT1057I | Number of registered cars per 1000 population | TT1057V*1000 | DE1001V | C,L | LCA | key | | | | | | | | | |
| TT1013I | Number of registered motor cycles per 1000 population | TT1013V*1000 | DE1001V | C,L | | | | | | | | | | | |
| TT1060I | Road accidents that lead to death per 10000 pop. | TT1060V*10000 | DE1001V | C,L | | key | | | | | | | | | |
| TT1061I | Road accidents that lead to serious injuries per 10000 pop. | TT1061V*10000 | DE1001V | C,L | | | | | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| TT1064I | Prop. of incommuters of persons employed in the city | TT1064V | EC2020V | C | | | X | | | | | | | | |
| TT1065I | Prop. of out-commuters of employed persons living in the city | TT1065V | EC1034V + EC1088V | C | | | X | | | | | | | | |
| TT1090I | Inbound commuters per 100 outbound commuters | TT1064V*100 | TT1065V | C | | | X | X | | | | | | | |
| TT1019I | Average time of journey to work | TT1019V | - | C,L | | key | X | X | | | | | | | |
| TT1020I | Average length of journey to work by private car (km) | TT1020V | - | C,L | | | X | X | | | | | | | |
| TT1066I | Length of public transp.network as a prop. of land area | TT1066V | EN5003V | C, L | | | X | | | | | | | | |
| TT1076I | Length of public transport network per inhabitant | TT1066V*1000 | DE1001V | C,L | | | | | | | | | | | |
| TT1093I | Proportion of public transport network on fixed infrastructure | TT1077V | TT1066V | C | | | X | | | | | | | | |
| TT1077I | Length of public transport network on fixed infrastructure per 1000 pop | TT1077V*1000 | DE1001V | C | | | X | | | | | | | | |
| TT1092I | Proportion of public transport network on flexible routes | TT1078V | TT1066V | C | | | X | | | | | | | | |
| TT1078I | Length of public transport network on flexible routes per 1000 pop | TT1078V*1000 | DE1001V | C | | | | | | | | | | | |
| TT1085I | Length of restricted bus lanes per 1000 pop | TT1082V | | C | | | X | | | | | | | | |
| TT1086I | Share of restricted bus lanes from public transport network | TT1082V | TT1066V | C | | | X | | | | | | | | |
| TT1087I | Number of buses (or bus equivalents) operating in the public transport per 1000 pop | TT1083V*1000 | DE1001V | C,L | | | | | | | | | | | |
| TT1088I | Average age of the bus (only buses) fleet | TT1084V | | C | | | | | | | | | | | |
| TT1089I | Proportion of buses running on alternative fuels | TT1085V | | C | | | X | | | | | | | | |
| TT1082I | Number of stops of public transport per 1000 pop. | TT1069V*1000 | DE1001V | C, L | LCA | | X | | | | | | | | |
| TT1069I | Number of stops of public transport per km2 | TT1069V | EN5003V | C, L | | key | X | | | | | | | | |
| TT1091I | Number of stops per 1 km of public transport network | TT1069V | TT1066V | C, L | | | X | | | | | | | | |
| TT1080I | Cost of a monthly ticket for public transport (for 5-10 km) | TT1080V | | C | | key | | | | | | | | | |
| TT1070I | Number of park and ride parking spaces per 1000 pop. | TT1070V*1000 | DE1001V | C, L | | | X | | | | | | | | |
| TT1083I | Number of park and ride parking spaces per 1000 cars | TT1070V*1000 | TT1057V | C, L | LCA | | | | | | | | | | |
| TT1084I | Maximum charge of on-street parking in the city centre per hour | TT1075V | | C | | | X | | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| TT1081I | Cost of a taxi ride of 5 km to the centre at day time | TT1081V | | C | | | | | | | | | | | |
| TT1079I | Length of bicycle network (dedicated cycle paths and lanes) per 1000 pop | TT1079V*10001 | DE1001V | C | | | X | | | | | | | | |
| TT1071I | Accessibility by air (EU27=100) | TT1071V | - | C,L | | | X | | | | | | | | |
| TT1072I | Accessibility by rail (EU27=100) | TT1072V | - | C,L | | | X | | | | | | | | |
| TT1073I | Accessibility by road (EU27=100) | TT1073V | - | C,L | | | X | | | | | | | | |
| TT1074I | Multimodal accessibility (EU27=100) | TT1074V | - | C,L | | | X | | | | | | | | |
| IT1005I | Percentage of households with Internet access at home | IT1005V | - | C | | | X | | | | | | | | |
| IT3007I | Local units manufacturing ICT products per 1000 companies | IT3001V*1000 | EC2021V | C | | | X | | | | | | | | |
| IT3001I | Proportion of local companies that produce ICT products | IT3001V | EC2021V | C | | | X | | | | | | | | |
| IT3002I | Percentage of employed in manufacturing ICT products | IT3002V | EC2020V | C | | | X | | | | | | | | |
| IT3008I | Local units providing ICT services per 1000 companies | IT3003V*1000 | EC2021V | C | | | X | | | | | | | | |
| IT3003I | Number of local units providing ICT services per resident | IT3003V | DE1001V | C | | | X | | | | | | | | |
| IT3004I | Percentage of employed in providing ICT services | IT3004V | EC2020V | C | | | X | | | | | | | | |
| IT3009I | Local units producing content for the Information Society per 1000 companies | IT3005V*1000 | EC2021V | C | | | X | | | | | | | | |
| IT3005I | Number of local units producing content for the Information Society | IT3005V | | C | | | X | | | | | | | | |
| IT3006I | Percentage of employed in producing ICT content | IT3006V | EC2020V | C | | | X | | | | | | | | |
| CR1005I | Annual cinema attendance per resident | CR1005V | DE1001V | C | | | X | | | | | | X | | |
| CR1003I | Number of cinema seats per 1000 residents | CR1003V*1000 | DE1001V | C | LCA | key | X | | | | | | X | | |
| CR1008I | The number of theatres | CR1008V | - | C | | | | | | | | | X | | |
| CR1016I | Number of theatres per 1000 residents | CR1008V*1000 | DE1001V | C | | | | | | | | | X | | |
| CR1009I | Annual attendance at theatres per resident | CR1009V | DE1001V | C | | | X | | | | | | X | | |
| CR1006I | Number of museums | CR1006V | - | C | | | | | | | | | X | | |
| CR1017I | Number of museums per 1000 residents | CR1006V*1000 | DE1001V | C | | | | | | | | | X | | |
| CR1007I | Annual visitors to museums per resident | CR1007V | DE1001V | C | | key | X | | | | | | X | | |
| CR1010I | The number of public libraries | CR1010V | - | C | | | | | | | | | | | |
| CR1015I | Number of libraries per 1000 residents | CR1010V*1000 | DE1001V | C | | | | | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|------|-----------|-----------|-------------|--------------|-----|-----|----------------|---|----|----|---|----|---|----|----|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| CR1011I | Total loans of books and other media per resident | CR1011V | DE1001V | C | | | X | | | | | | | | |
| CR1014I | Proportion of employment in culture and entertainment industry | CR1014V | EC2020V | C | | | X | | | | | | | | |
| CR1013I | Number of theatre seats per 1000 residents | CR1013V*1000 | DE1001V | C | | | | | | | | | | | |
| CR2001I | Number of Tourist overnight stays in reg. accommodation per year | CR2001V | - | C | LCA | key | | | | | | | X | | |
| CR2011I | Number of Tourist overnight stays in reg. accommodation per year per resident population | CR2001V | DE1001V | C | LCA | key | | | | | | | X | | |
| CR2017I | Tourist overnight stays per 1000 population at low season | CR2105V*1000 | DE1001V | C | | | X | | | | | | X | | |
| CR2016I | Tourist overnight stays per 1000 population at high season | CR2104V*1000 | DE1001V | C | | | X | | | | | | X | | |
| CR2101I | Average occupancy rate of accommodation | CR2001V | CR2009V | C | | | X | | | | | | X | | |
| CR2103I | Average occupancy rate of accommodation at low season | CR2105V | CR2103V | C | | | X | | | | | | X | | |
| CR2102I | Average occupancy rate of accommodation at high season | CR2104V | CR2102V | C | | | X | | | | | | X | | |
| CR2009I | Number of available beds | CR2009V | - | C | | | | | | | | | X | | |
| CR2010I | Number of available beds per 1000 residents | CR2009V*1000 | DE1001V | C | | | | | | | | | X | | |
| CR2019I | Number of available beds per 1000 residents at low season | CR2103V*1000 | DE1001V | C | | | | | | | | | X | | |
| CR2018I | Number of available beds per 1000 residents at high season | CR2102V*1000 | DE1001V | C | | | | | | | | | X | | |
| CR2004I | Number of air passengers using nearest airport | CR2004V | - | C | | | | | | | | | X | | |
| CR2014I | Number of air passengers per resident | CR2004V | DE1001V | C | | | | | | | | | X | | |
| CR2015I | Share of non-domestic arrivals using nearest airport | CR2005V-CR2006V | CR2005V | C | | | X | | | | | | X | | |
| CR2005I | Share of non-domestic departures from nearest airport | CR2007V-CR2008V | CR2007V | C | | | X | | | | | | X | | |
| CR2006I | Number of air passengers using nearest airport: Domestic arrivals | CR2006V | | C | | | X | | | | | | X | | |
| CR2007I | Number of air passengers using nearest airport: Total arrivals | CR2005V | | C | | | X | | | | | | X | | |

## 18.1.2 „Other" Indicators

| | | | | | | | | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
| FUP1 | Ratio of change in dwelling unit development | | | | | | X | X | | | X | | | | |
| FUP2 | Average population densities in urban agglomeration rings (pyramid concept) | | | | | | | X | | | X | | | | |
| FUP3 | Total potential population capacity within development boundaries | | | | | | | X | | | X | | | | |
| FUP4 | Actual population within development boundaries as a percentage of total potential population capacity | | | | | | | X | | | X | | | | |
| FUP5 | Ratio of the potential population capacity of developed residential areas to their actual population | | | | | | X | X | | | X | | | | |
| FUP6 | Percentage of undeveloped land in designated residential zones | | | | | | X | X | | | X | | | | |
| FUP7 | Percentage of undeveloped residential land at urban agglomeration ring level | | | | | | X | X | | | X | | | | |
| FUP8 | Ratio of remaining dwelling capacity to number of actual building permits issued | | | | | | X | X | | | X | | | | |
| FUP9 | Number of dwelling units outside development boundaries | | | | | | X | X | | | X | | | | |
| FUP10 | Retail and office land use as a percentage of total development within designated commercial areas | | | | | | X | X | | | | | | | |
| FUP11 | Residential land use as a percentage of total development within designated tourist zones | | | | | | X | X | | | | | | | |
| FUP12 | Percentage of total population living outside catchment areas of bus stops | | | | | | X | X | | | | | | | |
| FUP13 | Percentage of designated industrial areas and zones developed | | | | | | X | X | | | | | | | |
| FUP14 | Percentage of designated workshop areas and zones developed | | | | | | X | X | | | | | | | |
| FUP15 | Number of incompatible industrial and workshop units outside designated areas and zones | | | | | | X | X | | | | | | | |
| FUP16 | Crime rates by category | | | | | | X | X | | | | | | X | |
| FUP17 | Percentage of total area designated as public green space | | | | | | | X | | | | | | | |
| FUP18 | Ratio of public green space area by category per capita | | | | | | | X | | | | | | | |
| FUP19 | Percentage of total area designated as open space | | | | | | | X | | | | | | | |
| FUP20 | Percentage of total area designated for nature protection | | | | | | | X | | | | | | | |
| FUP21 | Intrusion of development into areas of high environmental value | | | | | | | X | | | | | | | |
| FUP22 | Intrusion of development into good agricultural land | | | | | | | X | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | L | EN | EC | H | CF | T | US | PB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Policy Domains | | | | |
| FUP23 | Percentage of protected natural areas in need of rehabilitation | | | | | | X | X | | | | | | | |
| FUP24 | Percentage of total area contaminated/derelict (brown field) | | | | | | | X | | | | | | | |
| FUP25 | Percentage of contaminated/derelict land resorted per annum | | | | | | X | X | | | | | | | |
| FUP26 | Number of protected landscapes with management plan at Development Plan Level | | | | | | X | X | | | | | | | |
| FUP27 | Wage level for different income groups (Income Trends) | | | | | | | | | | X | | | X | |
| FUP28 | Disparity per capita income between urban areas and their suburbs | | | | | | X | | | | X | | | X | |
| FUP29 | Savings rate per capita | | | | | | X | | | | X | | | X | |
| FUP30 | Public Investment per district | | | | | | | | | | X | | | X | |
| FUP31 | Public investment per capita | | | | | | | | | | X | | | X | |
| FUP32 | Private investment per district | | | | | | | | | | X | | | X | |
| FUP33 | Private investment per capita | | | | | | | | | | X | | | X | |
| FUP34 | Average level of experience, capability, knowledge and social skills of individuals in the workforce | | | | | | X | | | | X | | | X | |
| FUP35 | Local per capita income and employment | | | | | | X | | | | X | | | X | |
| FUP36 | Decreased number of people living below the poverty line | | | | | | X | | | | X | | | X | |
| FUP37 | Distribution of income per capita arranged to show the percentage of the population | | | | | | X | X | | | | | | X | |
| FUP38 | Number of families living below the poverty line | | | | | | X | | | | X | | | X | |
| FUP39 | Population living in absolute poverty and income Gini coefficient | | | | | | X | | | | X | | | X | |
| FUP40 | Number of cities experiencing a sharp decline in population and income within the last 30 years | | | | | | X | X | | | X | | | X | |
| FUP41 | Number of people receiving financial aid from Federal state or local governments. This excludes recipients of Medicare and related programs. | | | | | | X | | | | X | | | X | |
| FUP42 | Money spent by Federal state and local governments on welfare, except Medicate and related programs.i. This excludes recipients of Medicare and related programs. | | | | | | X | | | | X | | | X | |
| FUP43 | Area of land ecosystems organized by type | | | | | | | X | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| FUP44 | Fragmentation of forest types | | | | | | X | X | | | | | | | |
| FUP45 | Protected area as % of total land area | | | | | | | X | | | | | | | |
| FUP46 | Area and percent of forest land managed in relation to the total area of forest land to protect the range of cultural, social and spiritual needs and values | | | | | | X | X | | | | | | | |
| FUP47 | Protected areas of forest land used for subsistence purposes. | | | | | | X | X | | | | | | | |
| FUP48 | Extent of areas by forest type in protected areas defined by age class or successive stage | | | | | | X | X | | | | | | | |
| FUP49 | Extent of areas by forest type in protected area categories as defined by IUCN or other classification systems. | | | | | | X | X | | | | | | | |
| FUP50 | Millions of acres of public and private forest land reforested | | | | | | | X | | | | | | | |
| FUP51 | Percentage of forested area | | | | | | | X | | | | | | | |
| FUP52 | Increased number of acres of healthy native grasslands | | | | | | X | X | | | | | | | |
| FUP53 | Area wetlands lost per year | | | | | | | X | | | | | | | |
| FUP54 | Conversion rate of one land ecosystem type to another | | | | | | X | X | | | | | | | |
| FUP55 | Major land use, urban and agricultural land | | | | | | | X | | | | | | | |
| FUP56 | Area of reclaimed land | | | | | | | X | | | | | | | |
| FUP57 | Budget devoted to research aimed at improving forest management and reducing impacts of human intervention on forests | | | | | | | X | | | | | | | |
| FUP58 | Modified forest land - area and percent of forests affected by processes or agents beyond the range of historic variation (e.g. by insects, disease, fire, storm..) | | | | | | | X | | | | | | | |
| FUP59 | Number or urban areas experiencing a growth rate of greater than 50% per year | | | | | | | X | | | | | | | |
| FUP60 | Urban green space, park space and recreational areas | | | | | | | X | | | | | | | |
| FUP61 | Irrigation percent of arable land | | | | | | X | X | | | | | | | |
| FUP62 | Number of mega-cities (10 million or more) per area | | | | | | | X | | | | | | | |
| FUP63 | Total population organized by geographic area | | | | | | | X | | | | | | | |
| FUP64 | land reform policy (yes/no) | | | | | | | X | | | | | | | |
| FUP65 | Area of land ecosystems organized by use | | | | | | X | X | | | | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| FUP66 | Forest planning policy - extent to which the legal framework (laws, regulations) supports the conservation and sustainable management of forest. | | | | | | X | X | | | | | | | |
| FUP67 | Number of plans released each year to sustainable forest management | | | | | | X | X | | | | | | | |
| FUP68 | Area and population of informal settlements | | | | | | X | X | | | | | | | |
| FUP69 | Population increases in coastal areas | | | | | | X | X | | X | | | | | |
| FUP70 | Population growth in coastal areas (%) | | | | | | X | X | | X | | | | | |
| FUP71 | Housing trends in coastal areas | | | | | | X | | | X | | | | | |
| FUP72 | Land area converted to urban use per year | | | | | | X | X | | | | | | | |
| FUP73 | Prime agricultural land area converted to urban use per year | | | | | | X | X | | | | | | | |
| FUP74 | Number of people moving into cities greater than 100.000 | | | | | | X | | | X | | | | | |
| FUP75 | Population living below poverty line (in dry soil areas (%) | | | | | | X | | | X | | | X | |
| FUP76 | House price to income ratio | | | | | | X | | | X | | | X | |
| FUP77 | Migration and dispersal patterns of the population | | | | | | X | | | | | | X | |
| FUP78 | Percentage of population in urban areas | | | | | | | X | | X | | | | |
| FUP79 | Growth rate of urban population | | | | | | X | X | | X | | | | |
| FUP80 | Number of recreational facilities within walking distance of people | | | | | | X | X | | X | | | | |
| FUP81 | Density of new urbanization | | | | | | X | X | | | | | | | |
| FUP82 | Loss of prime farmland in % | | | | | | X | X | | | | | | | |
| FUP83 | Loss of natural wetlands in% | | | | | | X | X | | | | | | | |
| FUP84 | Loss of core forest habitat in % | | | | | | X | X | | | | | | | |
| FUP85 | Increase of impervious surface in % | | | | | | X | X | | | | | | | |
| FUP86 | Tenant-reduced price or fee | | | | | | X | | | X | | | | |
| FUP87 | Tenant market price | | | | | | X | | | X | | | | |
| FUP88 | Owner occupied with mortgage or loan | | | | | | X | | | X | | | | |
| FUP89 | Owner occupied without mortgage or loan | | | | | | X | | | X | | | | |
| FUP90 | Severe housing deprivation rate -Proportion of persons living in a dwelling which is considered overcrowded and having aspects of housing deprivation - such as lack of a bath or a toilet, a leaking roof etc.. | | | | | | X | | | X | | | | |

| Code | Indicator | Numerator | Denominator | Spatial unit | LCA | key | Fuzzy-fication | Policy Domains | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | L | EN | EC | H | CF | T | US | PB |
| FUP91 | Proportion of mobility among social tenants - Social housing lettings to existing social tenants (% of the whole whole social housing lettings) | | | | | | X | X | | | X | | | | |
| FUP92 | Apartments per m2 less than 35m2, 35-60 m2. 60-90m2, 90-130m2, more than 130m2 | | | | | | X | | | | X | | | | |
| FUP93 | Apartments per category (A, B, C, D) | | | | | | X | | | | X | | | | |
| FUP94 | Estimates of current dwellings in terms of size, Type, condition, tenure, occupancy and location | | | | | | X | | | | X | | | | |
| FUP95 | Analysis of past and current housing market trends, including balance between supply and demand in different housing sectors and price/affordability. Description of key drivers underpinning the housing market. | | | | | | X | | | | X | | | | |
| FUP96 | Estimate of total future number of households. | | | | | | X | | | | X | | | | |
| FUP97 | Estimate of household groups who have specific housing requirements e.g. families, older people, minority ethnic groups, disabled people, young people, etc. | | | | | | X | | | | X | | | | |
| FUP98 | Estimate of current number of households in housing need. | | | | | | X | | | | X | | | | |
| FUP99 | Estimate of future households that will require affordable housing. | | | | | | X | | | | X | | | | |
| FUP100 | Estimate of future households requiring market housing. | | | | | | X | | | | X | | | | |
| FUP101 | Estimate of total future households requiring either affordable or market housing. | | | | | | X | | | | X | | | | |
| UNH1 | Annual slum population growth rate (%) | | | | | | | X | | | X | | | X | |
| UNH2 | Annual urban population growth rate | | | | | | | X | | | X | | | | |
| UNH3 | Population in slums (in % of urban population) | | | | | | | X | | | X | | | X | |
| UNH4 | Population in slums | | | | | | | X | | | X | | | X | |
| UNH5 | Population with access to improved sanitation (% or urban population) | | | | | | X | X | | | X | | | X | |
| UNH6 | Population with access to improved water (% or urban population) | | | | | | X | X | | | X | | | X | |
| UNH7 | Population with durable structures (% of urban population) | | | | | | X | X | | | X | | | X | |
| UNH8 | Population with sufficient living area (% or urban population) | | | | | | X | X | | | X | | | X | |
| UNH9 | Population with secure tenure (% of urban population) | | | | | | X | X | | | X | | | X | |

## 18.2 List of Urban Audit Variables

| Code | Label | Unit | Spatial | LCA | Key | annual |
|---|---|---|---|---|---|---|
| DE1001V | Total Resident Population | number | CLSN | LCA | key | annual |
| DE1002V | Male Resident Population | number | CLSN | | | annual |
| DE1003V | Female Resident Population | number | CLSN | | | annual |
| DE1067V | Total Resident Population 0-2 | number | CLN | | | |
| DE1068V | Male Resident Population 0-2 | number | CLN | | | |
| DE1069V | Female Resident Population 0-2 | number | CLN | | | |
| DE1070V | Total Resident Population 3-4 | number | CLN | | | |
| DE1071V | Male Resident Population 3-4 | number | CLN | | | |
| DE1072V | Female Resident Population 3-4 | number | CLN | | | |
| DE1040V | Total Resident Population 0-4 | number | CLSN | LCA | key | annual |
| DE1041V | Male Resident Population 0-4 | number | CLN | | | |
| DE1042V | Female Resident Population 0-4 | number | CLN | | | |
| DE1043V | Total Resident Population 5-14 | number | CLSN | LCA | key | annual |
| DE1044V | Male Resident Population 5-14 | number | CLN | | | |
| DE1045V | Female Resident Population 5-14 | number | CLN | | | |
| DE1046V | Total Resident Population 15-19 | number | CLSN | LCA | key | annual |
| DE1047V | Male Resident Population 15-19 | number | CLN | | | |
| DE1048V | Female Resident Population 15-19 | number | CLN | | | |
| DE1049V | Total Resident Population 20-24 | number | CLSN | LCA | key | annual |
| DE1050V | Male Resident Population 20-24 | number | CLN | | | |
| DE1051V | Female Resident Population 20-24 | number | CLN | | | |
| DE1052V | Total Resident Population 25-54 | number | CLSN | LCA | key | annual |
| DE1053V | Male Resident Population 25-54 | number | CLN | | | |
| DE1054V | Female Resident Population 25-54 | number | CLN | | | |
| DE1058V | Total Resident Population 25-34 | number | CLN | LCA | | |
| DE1059V | Male Resident Population 25-34 | number | CLN | | | |
| DE1060V | Female Resident Population 25-34 | number | CLN | | | |
| DE1061V | Total Resident Population 35-44 | number | CLN | LCA | | |
| DE1062V | Male Resident Population 35-44 | number | CLN | | | |
| DE1063V | Female Resident Population 35-44 | number | CLN | | | |
| DE1064V | Total Resident Population 45-54 | number | CLN | LCA | | |
| DE1065V | Male Resident Population 45-54 | number | CLN | | | |
| DE1066V | Female Resident Population 45-54 | number | CLN | | | |
| DE1025V | Total Resident Population 55-64 | number | CLSN | LCA | key | annual |
| DE1026V | Male Resident Population 55-64 | number | CLN | | | |
| DE1027V | Female Resident Population 55-64 | number | CLN | | | |
| DE1028V | Total Resident Population 65-74 | number | CLSN | LCA | key | annual |
| DE1029V | Male Resident Population 65-74 | number | CLN | | | |
| DE1030V | Female Resident Population 65-74 | number | CLN | | | |
| DE1055V | Total Resident Population 75 and over | number | CLSN | LCA | key | annual |
| DE1056V | Male Resident Population 75 and over | number | CLN | | | |
| DE1057V | Female Resident Population 75 and over | number | CLN | | | |
| DE1073V | Median population age | number | CLN | | | |
| DE2001V | Residents who are Nationals | number | CLSN | LCA | key | annual |
| DE2002V | Residents who are Nationals of other EU Member State | number | CLSN | LCA | key | |
| DE2003V | Residents who are not EU Nationals | number | CLSN | LCA | key | |
| DE2005V | Residents who are not EU Nationals and citizens of a country with high HDI | number | CLSN | | | |
| DE2006V | Residents who are not EU Nationals and citizens of a country with a medium or low HDI | number | CLSN | | | |
| DE2004V | Nationals born abroad | number | CLSN | | key | |

| DE1001V | Total Resident Population | number | CLSN | LCA | key | annual |
|---|---|---|---|---|---|---|
| DE1002V | Male Resident Population | number | CLSN | | | annual |
| DE1003V | Female Resident Population | number | CLSN | | | annual |
| DE1067V | Total Resident Population 0-2 | number | CLN | | | |
| DE1068V | Male Resident Population 0-2 | number | CLN | | | |
| DE1069V | Female Resident Population 0-2 | number | CLN | | | |
| DE1070V | Total Resident Population 3-4 | number | CLN | | | |
| DE1071V | Male Resident Population 3-4 | number | CLN | | | |
| DE1072V | Female Resident Population 3-4 | number | CLN | | | |
| DE1040V | Total Resident Population 0-4 | number | CLSN | LCA | key | annual |
| DE1041V | Male Resident Population 0-4 | number | CLN | | | |
| DE1042V | Female Resident Population 0-4 | number | CLN | | | |
| DE1043V | Total Resident Population 5-14 | number | CLSN | LCA | key | annual |
| DE1044V | Male Resident Population 5-14 | number | CLN | | | |
| DE1045V | Female Resident Population 5-14 | number | CLN | | | |
| DE1046V | Total Resident Population 15-19 | number | CLSN | LCA | key | annual |
| DE1047V | Male Resident Population 15-19 | number | CLN | | | |
| DE1048V | Female Resident Population 15-19 | number | CLN | | | |
| DE1049V | Total Resident Population 20-24 | number | CLSN | LCA | key | annual |
| DE1050V | Male Resident Population 20-24 | number | CLN | | | |
| DE1051V | Female Resident Population 20-24 | number | CLN | | | |
| DE1052V | Total Resident Population 25-54 | number | CLSN | LCA | key | annual |
| DE1053V | Male Resident Population 25-54 | number | CLN | | | |
| DE1054V | Female Resident Population 25-54 | number | CLN | | | |
| DE1058V | Total Resident Population 25-34 | number | CLN | LCA | | |
| DE1059V | Male Resident Population 25-34 | number | CLN | | | |
| DE1060V | Female Resident Population 25-34 | number | CLN | | | |
| DE1061V | Total Resident Population 35-44 | number | CLN | LCA | | |
| DE1062V | Male Resident Population 35-44 | number | CLN | | | |
| DE1063V | Female Resident Population 35-44 | number | CLN | | | |
| DE1064V | Total Resident Population 45-54 | number | CLN | LCA | | |
| DE1065V | Male Resident Population 45-54 | number | CLN | | | |
| DE1066V | Female Resident Population 45-54 | number | CLN | | | |
| DE1025V | Total Resident Population 55-64 | number | CLSN | LCA | key | annual |
| DE1026V | Male Resident Population 55-64 | number | CLN | | | |
| DE1027V | Female Resident Population 55-64 | number | CLN | | | |
| DE1028V | Total Resident Population 65-74 | number | CLSN | LCA | key | annual |
| DE1029V | Male Resident Population 65-74 | number | CLN | | | |
| DE1030V | Female Resident Population 65-74 | number | CLN | | | |
| DE1055V | Total Resident Population 75 and over | number | CLSN | LCA | key | annual |
| DE1056V | Male Resident Population 75 and over | number | CLN | | | |
| DE1057V | Female Resident Population 75 and over | number | CLN | | | |
| DE1073V | Median population age | number | CLN | | | |
| DE2001V | Residents who are Nationals | number | CLSN | LCA | key | annual |
| DE2002V | Residents who are Nationals of other EU Member State | number | CLSN | LCA | key | |
| DE2003V | Residents who are not EU Nationals | number | CLSN | LCA | key | |
| DE2005V | Residents who are not EU Nationals and citizens of a country with high HDI | number | CLSN | | | |
| DE2006V | Residents who are not EU Nationals and citizens of a country with a medium or low HDI | number | CLSN | | | |
| DE2004V | Nationals born abroad | number | CLSN | | key | |
| DE2007V | Number of residents born abroad (not only nationals) | number | CLN | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| SA2018V | Total deaths under 65 per year (Female) | number | CLN | | | |
| SA2019V | Total deaths per year | number | CLSN | | | annual |
| SA2020V | Total deaths per year (Male) | number | CLN | | | |
| SA2021V | Total deaths per year (Female) | number | CLN | | | |
| SA2022V | Number of hospital beds | number | CLN | | | |
| SA2026V | Number of hospital discharges of in-patients | number | CLN | | | |
| SA2027V | Number of practising physicians | number | CLN | LCA | key | |
| SA2030V | Number of general practitioners | number | CL | | | |
| SA2031V | Number of specialist doctors | number | CL | | | |
| SA2028V | Number of practising dentists | number | CLN | | | |
| SA3001V | Total number of recorded crimes within city [country for national data] | number | CLSN | | | |
| SA3005V | Number of murders and violent deaths | number | CLN | | | |
| SA3006V | Number of car thefts | number | CLN | | key | annual |
| SA3007V | Number of domestic burglary | number | CLSN | | key | annual |
| EC1001V | Total Economically Active Population | number | CLSN | LCA | key | annual |
| EC1002V | Male Economically Active Population | number | CLSN | | | annual |
| EC1003V | Female Economically Active Population | number | CLSN | | | annual |
| EC1142V | Total Economically Active Population 15-24 | number | CLSN | LCA | key | |
| EC1143V | Male Economically Active Population 15-24 | number | CLN | | | |
| EC1144V | Female Economically Active Population 15-24 | number | CLN | | | |
| EC1145V | Total Economically Active Population 55-64 | number | CLN | LCA | key | |
| EC1146V | Male Economically Active Population 55-64 | number | CLN | | | |
| EC1147V | Female Economically Active Population 55-64 | number | CLN | | | |
| EC1010V | Residents Unemployed | number | CLSN | LCA | key | annual |
| EC1011V | Male Residents Unemployed | number | CLN | | | annual |
| EC1012V | Female Residents Unemployed | number | CLN | | | annual |
| EC1148V | Residents Unemployed 15-24 | number | CLSN | LCA | key | |
| EC1149V | Male Residents Unemployed 15-24 | number | CLN | | | |
| EC1150V | Female Residents Unemployed 15-24 | number | CLN | | | |
| EC1151V | Residents Unemployed 55-64 | number | CLSN | | | |
| EC1152V | Male Residents Unemployed 55-64 | number | CLN | | | |
| EC1153V | Female Residents Unemployed 55-64 | number | CLN | | | |
| EC1154V | "Unemployed continuously for more than six months, 15-24" | number | CLN | | | |
| EC1155V | "Male unemployed continuously for more than six months, 15-24" | number | CLN | | | |
| EC1156V | "Female unemployed continuously for more than six months, 15-24" | number | CLN | | | |
| EC1157V | "Unemployed continuously for more than one year, 55-64" | number | CLN | | | |
| EC1158V | "Male unemployed continuously for more than one year, 55-64" | number | CLN | | | |
| EC1159V | "Female unemployed continuously for more than one year, 55-64" | number | CLN | | | |
| EC1025V | Residents in Self Employment | number | CN | | key | |
| EC1026V | Male residents in Self Employment | number | CN | | | |
| EC1027V | Female residents in Self Employment | number | CN | | | |
| EC1028V | Residents in Paid Employment | number | CN | | key | |
| EC1029V | Male residents in Paid Employment | number | CN | | | |
| EC1030V | Female residents in Paid Employment | number | CN | | | |
| EC1034V | Total Full-Time Employment | number | CLN | LCA | key | |
| EC1035V | Male Full-Time Employment | number | CLN | LCA | | |
| EC1036V | Female Full-Time Employment | number | CLN | LCA | | |
| EC1088V | Total Part-Time Employment | number | CLN | LCA | key | |
| EC1089V | Male Part-Time Employment | number | CLN | LCA | | |
| EC1090V | Female Part-Time Employment | number | CLN | LCA | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| EC1160V | Total Full-Time Employment 15-24 | number | CN | | | |
| EC1161V | Full-Time Employment 15-24 Male | number | CN | | | |
| EC1162V | Full-Time Employment 15-24 Female | number | CN | | | |
| EC1163V | Total Full-Time Employment 55-64 | number | CN | | | |
| EC1164V | Full-Time Employment 55-64 Male | number | CN | | | |
| EC1165V | Full-Time Employment 55-64 Female | number | CN | | | |
| EC1166V | Total Part-Time Employment 15-24 | number | CN | | | |
| EC1167V | Part-Time Employment 15-24 Male | number | CN | | | |
| EC1168V | Part-Time Employment 15-24 Female | number | CN | | | |
| EC1169V | Total Part-Time Employment 55-64 | number | CN | | | |
| EC1170V | Part-Time Employment 55-64 Male | number | CN | | | |
| EC1171V | Part-Time Employment 55-64 Female | number | CN | | | |
| EC1172V | Number of jobless households with children | number | CLN | | | |
| EC1173V | Number of jobless households without children | number | CLN | | | |
| EC2001V | Gross Domestic Product of city | euro | CL | LCA | key | annual |
| EC2030V | Gross Domestic Product of NUTS-3 region in Euros | euro | CLN | | | |
| EC2031V | Gross Domestic Product per inhabitant in PPS of NUTS-3 region | PPS/head | CLN | | | |
| EC2021V | All companies | number | CN | | | |
| EC2024V | Enterprises with 1 to 250 employees | number | CN | | | |
| EC2025V | Enterprises with more than 250 employees | number | CN | | | |
| EC2026V | Enterprises that had a turnover increase last year (size class 1-250 employees) | number | CN | | | |
| EC2027V | Enterprises that had a turnover increase last year (size class >250 employees) | number | CN | | | |
| EC2028V | Average employment growth (or decline) of enterprises with 1 to 250 employees last year | Percentag | CN | | | |
| EC2029V | Average employment growth (or decline) of enterprises with more than 250 employees last year | Percentag | CN | | | |
| EC2003V | Companies with headquarter within the city quoted on national stock exchange | number | CN | | | |
| EC2004V | New business registered in reference year | number | CN | | | |
| EC2005V | Purchasing power parities for the ESA95 GDP aggregates (EU27=1) | number | N | | | |
| EC2014V | Companies gone bankrupt in reference year | number | CN | | | |
| EC2020V | Total employment / jobs (work place based) | number | CN | | | annual |
| EC2008V | "Employment (jobs) in agriculture, fishery (NACE Rev. 1.1: A-B) " | number | CN | | | |
| EC2009V | "Employment (jobs) in mining, manufacturing, energy (NACE Rev. 1.1: C-E)" | number | CN | | | |
| EC2022V | Employment (jobs) in construction (NACE Rev. 1.1: F) | number | CN | | | |
| EC2010V | "Employment (jobs) in trade, hotels, restaurants (NACE Rev. 1.1: G-H)" | number | CN | | | |
| EC2023V | "Employment (jobs) in transport, communication (NACE Rev. 1.1: I)" | number | CN | | | |
| EC2011V | "Employment (jobs) financial intermediation, business activities (NACE Rev. 1.1: J-K)" | number | CN | | | |
| EC2012V | "Employment (jobs) in public admin., health, education, other (NACE Rev. 1.1: L-P)" | number | CN | | | |
| EC2016V | Employment (jobs) in NACE Rev. 1.1 C-F | number | CN | | | |
| EC2017V | Employment (jobs) in NACE Rev. 1.1 G-P | number | CN | | | |
| EC2018V | Employment (jobs) - employees | number | CN | | | |
| EC2019V | Employment (jobs) - self employed | number | CN | | | |
| EC3039V | Median disposable annual household income | euro | CLSN | LCA | | |
| EC3040V | Average disposable annual household income | euro | CN | | | |
| EC3045V | "Disposable annual household Income: Quintile 4 (income with 20% households above, 80% below)" | euro | CLN | | | |
| EC3048V | "Disposable annual Household Income: Quintile 3 (income with 40% households above, 60% below)" | euro | CLN | | | |
| EC3051V | "Disposable annual Household Income: Quintile 2 (income with 60% households above, 40% below)" | euro | CLN | | | |
| EC3054V | "Disposable annual Household Income: Quintile 1 (income with 80% households above, 20% below)" | euro | CLN | | | |
| EC3056V | Total Number of Households (relating to the reported household income) | number | CLSN | | | |
| EC3055V | Total Number of Households with less than 60% of the national median disposable annual household | number | CLN | | | |
| EC3057V | Total Number of Households with less than half of the national average disposable annual household | number | CLSN | | key | annual |
| EC3060V | Total Number of Households reliant on social security benefits (>50%) | number | CLSN | | | |

| Code | Description | Unit | | | | |
|------|-------------|------|---|---|---|---|
| EC3063V | Individuals reliant on social security benefits (>50%) | number | CLSN | | | |
| CI1009V | City Elections: Number of voters turned out | number | CS | LCA | | |
| CI1019V | Participation rate at European elections | ratio | C | | | |
| CI1020V | Participation rate at national elections | ratio | CS | LCA | | |
| CI1021V | Participation rate at city elections | ratio | CS | LCA | | |
| CI1016V | Total number of elected city representatives | number | C | | key | |
| CI1017V | Number of male elected city representatives | number | C | | | |
| CI1018V | Number of female elected city representatives | number | C | | | |
| TE1001V | Number of children 0-4 in day care | number | CLN | LCA | key | annual |
| TE1006V | Number of children 0-2 in day care | number | CLN | | | |
| TE1007V | Number of children 3-4 in day care | number | CLN | | | |
| TE1005V | Total students registered for final year of compulsory education | number | CLN | | | |
| TE1030V | Students leaving compulsory education without having a diploma | number | CLN | | | |
| TE1036V | Students in education of ISCED level 1-2 | number | CN | | | |
| TE1037V | Male students in education of ISCED level 1-2 | number | CN | | | |
| TE1038V | Female students in education of ISCED level 1-2 | number | CN | | | |
| TE1031V | Students in upper and further education (ISCED level 3-4) | number | CN | | | |
| TE1032V | Male students in upper and further education (ISCED level 3-4) | number | CN | | | |
| TE1033V | Female students in upper and further education (ISCED level 3-4) | number | CN | | | |
| TE1026V | Students in higher education (ISCED level 5-6) | number | CN | | key | annual |
| TE1027V | Male students in higher education (ISCED level 5-6) | number | CN | | | |
| TE1028V | Female students in higher education (ISCED level 5-6) | number | CN | | | |
| TE1034V | Average number of pupils in a class (primary schools) | number | CLN | | | |
| TE1035V | Average number of pupils in a class (secondary schools) | number | CLN | | | |
| TE2025V | "Number of residents (aged 15-64) with ISCED level 0, 1or 2 as the highest level of education" | number | CLSN | LCA | key | |
| TE2026V | "Number of residents (aged 15-64) with ISCED level 0, 1or 2 as the highest level of education - male" | number | CLN | | | |
| TE2027V | "Number of residents (aged 15-64) with ISCED level 0, 1or 2 as the highest level of education - female" | number | CLN | | | |
| TE2028V | Number of residents (aged 15-64) with ISCED level 3or 4 as the highest level of education | number | CLSN | LCA | key | |
| TE2029V | Number of residents (aged 15-64) with ISCED level 3 or 4 as the highest level of education - male | number | CLN | | | |
| TE2030V | Number of residents (aged 15-64) with ISCED level 3 or 4 as the highest level of education - female | number | CLN | | | |
| TE2031V | Number of residents (aged 15-64) with ISCED level 5 or 6 as the highest level of education | number | CLSN | LCA | key | |
| TE2032V | Number of residents (aged 15-64) with ISCED level 5 or 6 as the highest level of education - male | number | CLN | | | |
| TE2033V | Number of residents (aged 15-64) with ISCED level 5 or 6 as the highest level of education - female | number | CLN | | | |
| EN1003V | Average temperature of warmest month | degrees | C | | | |
| EN1004V | Average temperature of coldest month | degrees | C | | | |
| EN1005V | Rainfall (litre/m2) | litre/m2 | C | | | |
| EN1001V | Number of days of rain per annum | number | C | | | |
| EN1002V | Total number of hours of sunshine per day | number | C | | | |
| EN1006V | Median city centre altitude above sea level | metre | C | | | |
| EN2002V | Number of days ozone O3 concentrations exceed 120 µg/m3 | number | C | | key | annual |
| EN2003V | Number of days nitrogen dioxide NO2 concentrations exceed 200 µg/m3 | number | C | | | |
| EN2005V | Number of days particulate matter PM10 concentrations exceed 50 µg/m3 | number | C | | key | annual |
| EN2030V | Number of days particulate matter PM2.5 concentrations exceed 50 µg/m3 | number | C | | | |
| EN2025V | Accumulated ozone concentration in excess 70 µg/m3 | µg/m3 | C | | | |
| EN2026V | Annual average concentration of NO2 (µg/m3) | µg/m3 | C | | | |
| EN2027V | Annual average concentration of PM10 (µg/m3) | µg/m3 | C | | | |
| EN2033V | Number of residents exposed to road traffic noise >65 dB(A) at day time | number | C | | | |
| EN2035V | Number of residents exposed to road traffic noise >55 dB(A) at night time | number | C | | | |
| EN2032V | Number of residents exposed to rail traffic (incl. tram) noise >65dB(A) at daytime | number | C | | | |
| EN2036V | Number of residents exposed to rail traffic (incl. tram) noise >55dB(A) at night-time | number | C | | | |

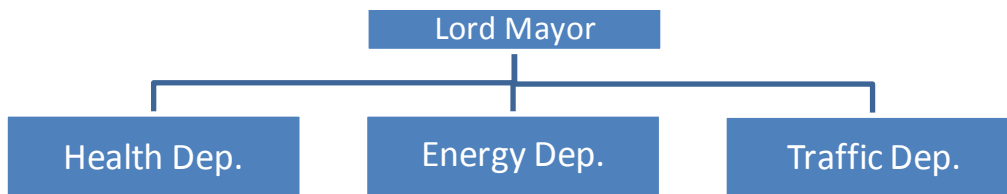| | | | | | |
|---|---|---|---|---|---|
| EN2028V | Number of residents exposed to air traffic noise >65 dB(A) at day time | number | CL | | |
| EN2029V | Number of residents exposed to air traffic noise >55 dB(A) at night time | number | CL | | |
| EN3003V | Total consumption of water | m3 | CN | | key | |
| EN3004V | Number of dwellings connected to potable drinking water system | number | CN | | |
| EN3006V | Number of dwellings connected to sewerage treatment system | number | CN | | |
| EN3008V | "Number of water rationing cases, days per year" | number | C | | |
| EN3009V | "Number of water cuts, days per year" | number | C | | |
| EN3010V | Price of a m3 of domestic water (Euro) | euro | C | | key | |
| EN3011V | Percentage of the urban waste water load (in population equivalents) treated according to the | Percenta | C | | |
| EN4001V | Annual amount of solid waste (domestic and commercial) | tonnes | CN | | key | |
| EN4002V | Annual amount of solid waste (domestic and commercial) processed by landfill. | tonnes | CN | | key | |
| EN4003V | Annual amount of solid waste (domestic and commercial) processed by incinerator | tonnes | CN | | |
| EN4004V | Annual amount of solid waste (domestic and commercial) that is recycled | tonnes | CN | | |
| EN4007V | Annual amount of solid waste (domestic and commercial) that is composted | tonnes | CN | | |
| EN4006V | Annual amount of solid waste (domestic and commercial) given to other disposal | tonnes | CN | | |
| EN5003V | Total land area (km2) according to cadastral register | km2 | CLSN | LCA | key | |
| EN5015V | Water and wetland | km2 | CL | | |
| EN5012V | Green space area (km2) | km2 | CLS | | |
| EN5016V | Land used for agricultural purposes | km2 | CL | | |
| EN5024V | "Land used for commercial activities (industry, trade, offices)" | km2 | CL | | |
| EN5004V | Land area in housing/residential use | km2 | CL | | |
| EN5025V | "Land used for transport (road, rail, air, ports)" | km2 | CL | | |
| EN5011V | "Land area in recreational, sports and leisure use" | km2 | CL | | |
| EN5026V | other land use | km2 | CL | | |
| EN5001V | Green space (in hectares) to which the public has access | hectares | CLS | | |
| EN5109V | overbound - underbound based on population (qualitative indicator) | qualitativ | C | | |
| EN5110V | overbound - underbound based on area (qualitative indicator) | qualitativ | C | | |
| TT1003V | Percentage of journeys to work by car | Percenta | CLN | | key | |
| TT1010V | "Percentage of journeys to work by public transport (rail, metro, bus, tram)" | percenta | CLN | | |
| TT1006V | Percentage of journeys to work by motor cycle | Percenta | CLN | | |
| TT1007V | Percentage of journeys to work by bicycle | Percenta | CLN | | |
| TT1008V | Percentage of journeys to work by foot | Percenta | CLN | | |
| TT1012V | Percentage of journeys to work by car or motor cycle | percenta | CLN | | |
| TT1019V | Average time of journey to work (minutes) | minutes | CLN | | key | |
| TT1020V | Average length of journey to work by private car (km) | km | CL | | |
| TT1064V | People commuting into the city | number | C | | |
| TT1065V | People commuting out of the city | number | C | | |
| TT1069V | Number of stops of public transport | number | C | | key | |
| TT1083V | Number of buses (or bus equivalents) operating in the public transport | number | C | | |
| TT1084V | Average age of the bus (only buses) fleet | years | C | | |
| TT1085V | Proportion of buses running on alternative fuels | percenta | C | | |
| TT1066V | Length of public transport network (km) | km | C | | |
| TT1077V | Length of public transport network on fixed infrastructure | km | C | | |
| TT1078V | Length of public transport network on flexible routes | km | C | | |
| TT1082V | Length of restricted bus lanes | km | C | | |
| TT1079V | Length of bicycle network (dedicated cycle paths and lanes) | km | C | | |
| TT1080V | Cost of a combined monthly ticket (all modes of public transport) for 5-10 km in the central zone | euro | C | | key | annual |
| TT1081V | Cost of a taxi ride of 5 km to the centre at day time | euro | C | | |
| TT1057V | Number of private cars registered | number | CLN | LCA | key | annual |
| TT1013V | Number of motor cycles registered | number | CN | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| TT1070V | Number of park and ride parking spaces | number | C | | | |
| TT1075V | Maximum charge of on-street parking in the city centre per hour | euro | C | | | |
| TT1060V | Number of deaths in road accidents | number | CLN | | key | annual |
| TT1061V | Number of persons seriously injured in road accidents | number | CLN | | | |
| TT1071V | Accessibility by air (EU27=100) | index | CL | | | |
| TT1072V | Accessibility by rail (EU27=100) | index | CL | | | |
| TT1073V | Accessibility by road (EU27=100) | index | CL | | | |
| TT1074V | Multimodal accessibility (EU27=100) | index | CL | | | |
| IT1005V | Percentage of households with Internet access at home | Percentag | CN | | | |
| IT3001V | Number of local units manufacturing ICT products | number | CN | | | |
| IT3002V | Number of persons employed in manufacture of ICT products | number | CN | | | |
| IT3003V | Number of local units providing ICT services | number | CN | | | |
| IT3004V | Number of persons employed in provision of ICT services | number | CN | | | |
| IT3005V | Number of local units producing content for the Information Society | number | CN | | | |
| IT3006V | Number of persons employed in production of content for the Information Society | number | CN | | | |
| CR1003V | Number of cinema seats ( total capacity) | number | C | LCA | key | |
| CR1005V | Cinema attendance (per year) | number | C | | | |
| CR1006V | Number of museums | number | C | | | |
| CR1007V | Number of museum visitors (per year) | number | C | | key | |
| CR1008V | Number of theatres | number | C | | | |
| CR1013V | Number of theatre seats | number | C | | | |
| CR1009V | Theatre attendance (per year) | number | C | | | |
| CR1010V | Number of public libraries (all distribution points) | number | C | | | |
| CR1011V | Number of books and other media loaned from public libraries (per year) | number | C | | | |
| CR1014V | Number of persons employed in the culture and entertainment industry | number | C | | | |
| CR1015V | "Number of public swimming pools (indoor and outdoor, excluding beaches)" | number | CL | | | |
| CR2001V | Total annual tourist overnight stays in registered accommodation | number | CN | LCA | key | annual |
| CR2009V | Number of available beds | number | CN | | | |
| CR2102V | Number of available beds at high season | number | CN | | | |
| CR2103V | Number of available beds at low season | number | CN | | | |
| CR2104V | Total tourist overnight stays in registered accommodation at high season | number | CN | | | |
| CR2105V | Total tourist overnight stays in registered accommodation at low season | number | CN | | | |
| CR2004V | Number of air passengers using nearest airport | number | C | | | |
| CR2005V | Number of air passengers using nearest airport: Total arrivals | number | C | | | |
| CR2006V | Number of air passengers using nearest airport: Domestic arrivals | number | C | | | |
| CR2007V | Number of air passengers using nearest airport: Total departures | number | C | | | |
| CR2008V | Number of air passengers using nearest airport: Domestic departures | number | C | | | |

## 18.3 City Questionnaire

**Organizational structure**

As a first step an organizational chart of the city administration has to be provided.

Example:

```
                    ┌─────────────┐
                    │ Lord Mayor  │
                    └──────┬──────┘
        ┌──────────────────┼──────────────────┐
┌───────────────┐  ┌───────────────┐  ┌───────────────┐
│  Health Dep.  │  │  Energy Dep.  │  │  Traffic Dep. │
└───────────────┘  └───────────────┘  └───────────────┘
```

Furthermore the specification of all departments and the approximate number of employees by department is needed.

Example:

| Department | approximate number of employees |
|---|---|
| Example: Health Department | 100 |
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**IT- Department**

An organizational chart should provide an overview.

**Overview of IT-systems**

The IT-systems have to be outlined as specified below.

Example:
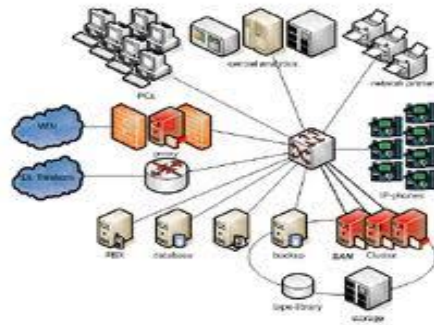


- Hardware
- Network

**Softwarepackages supported**

A list of the softwarepackages has to be provided.

Example:

| Software | Domain |
|----------|--------|
| SAP | Accounting |
| | |
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**Systems to be linked to the FUPOL-system**

The systems to be linked to the FUPOL-system have to be clarified.

- Example: GIS, which has maps of the city region

**Web and social networks**

The Web resources, which are linked to the city and/ or to its politicians have to be specified.

Resources are for example:

- Website(s)
- Facebook
- LinkedIn groups
- Twitter
- Blogs
- Forums etc.

| Web 2.0 resources | Link |
| --- | --- |
| Example: Gerasdorf connection (group of citizen) | http://www.facebook.com/group.php?gid=59919833833&ref=ts |
| Example: Bremerhaven page | http://www.facebook.com/MeinBremerhaven?ref=ts |
| Example: Guardian (Newspaper) | http://www.guardian.co.uk/politics/blog |
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**Political priorities**

In general the political priorities are reflected by the organizational structure of the city management.  The cities have to specify the domains and the priories (high, medium, low).

| Domain | Priority |
| --- | --- |
| Example: Land Use | H |
| Housing | |
| Shopping (Local amenities) | |
| Infrastructure | |
| IT, Telecommunication | |
| Waste Management | |
| Energy and Water | |
| Transport and Movement | |
| Spatial environmental planning | |
| Urban segregation | |
| Migration | |
| Inclusion | |
| Demography | |
| Safety and Security | |
| Healthcare | |
| Social Affairs | |
| Education | |
| Research and Innovation | |
| Others (below) | ███ |
| | |
| | |
| | |

**Expectations**

The expected outcome of the FUPOL project and the expected benefits from the cities point of view have to be described.

Examples:

**What are the current political hot topics?**

The topics and the priorities (high, medium, low) have to be specified by the cities:

| Hot topics | Priority |
|---|---|
| Example: Construction of a new highway | H |
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**Who will be the potential users of the FUPOL system in the city?**

The potential users have to be specified by the cities.

| Description of user | Number of users |
|---|---|
| Example: Department for construction | 100 |
| City Mayor | 1 |
| | |
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**Related data available**

The cities have to provide a list of public data of the city relevant for the FUPOL-project.

| Indicator | available year from/to | data collection*) |
|---|---|---|
| Example: Population by gender, nationality and citizenship | 2000/2007 | annual |
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|  |  |  |

*) Data collection could be:
- Annually
- Daily
- Monthly
- Weekly
- Real time

# 19 List of Abbreviations

| | |
|---|---|
| EEA | European Environmental Agency |
| C | Core City |
| CA | Cellular Automata |
| CPA | Statistical Classification of Products by Activity |
| CORINE | COoRdinate INformation on the Environment |
| EEA | European Environmental Agency |
| EHG | Emissions of Greenhouse Gases |
| ERT | Exposure Reduction Target |
| GIS | Geographic Information System |
| GISCO | Geographical Information System at the Commission |
| GTZ | Gesellschaft für Technische Zusammenarbeit |
| ISCED | ISCED is UNESCOS Standard Classification of Education |
| ISCO | International Standard Classification of Occupations |
| LUP | Land Use Planning |
| LUZ | Larger Urban Zone |
| K | Kernel |
| LAU | Local Administrative Units |
| LUCAS | Land Use and Cover Area Frame Survey |
| NACE | Statistical Classification of Occupations |
| NHTSA | National Highway Traffic Safety Administration |
| NUTS | Nomenclature of Territorial Units for Statistics |
| SCD | Sub-City District |
| SLEUTH | Slope, Land Use, Exclusion, Urban Extent, Transportation, and Hillshade |
| UNCHS | United Nations Centre for Human Settlements |
| UGM | Urban growth model |
| UNCHS | United Nations Centre for Human Settlements |
| UN-HABITAT | United Nations Human Settlements Programme |
| UNIDO | United Nations Industrial Development Organization |
| UWC | Urban Water Conflicts |
| WFD | Water Framework Directive |

# 20 Glossar

| | |
|---|---|
| Active Inclusion | Active Inclusion is intended to support the labour market integration of those who are excluded from or experience disadvantage in entering the labour market (odder people, women, young people, migrants and ethnic minorities, lone parents, people with disabilities, people with no skills or qualifications. |
| Affordable housing | is housing made available at a cost below full market value, to meet an identified need (e.g. social rented housing, subsidised low cost housing for sale, low cost housing without subsidy. |
| Agenda 21 | was signed by 172 countries at the Earth Summit in 1992 in Rio and contains what have become the agreed principles of sustainable development (Maintenance of high and stable levels of economic growth and employment, social progress, effective protection of the environment and prudent use of natural resources) |
| Agent based modelling | Agent-based modelling is a type of simulation, which allows a researcher to create, analyse, and experiment with agents that interact within an environment. |
| Agents | Agents are typically components of the software representing social actors such as people of a certain group, political parties, companies or governments. |
| City | A city is a relatively large and permanent settlement. |
| City Treasury | Collects and records all taxes an monies received by the city. |
| Communal Establishment | residents living in medical and care establishments including hospitals (psychiatric and general), nursing homes, and residential care homes, children's homes; defence establishment including ships; prison and young offenders institutions; educational establishments including halls of residence; hotels, boarding houses and guest houses; youth hostels; hostels for the homeless; and civilian ships, boats and barges. |
| Community Facilities | To support as a planning authority the welfare of residents , workers and visitors by seeking to ensure that adequate accommodation for health, social and educational services is available. |
| Complexity | Many definitions tend to postulate or assume that complexity expresses a condition of numerous elements in a system and numerous forms of relationships among the elements. At the same time, what is complex and what is simple is relative and changes with time. |
| Concealed household | refers to a household of unrelated adults sharing a kitchen, bathroom or WC with another household but not sharing meals |
| Construction the public/private divide | concerns on institutions or other entities trying to influence what personal data are regarded public and what is private |
| Conurbation | A conurbation is a region comprising a number of cities, large towns, and other urban areas that, through population growth and physical expansion, have merged to form one continuous urban and industrially developed area. |
| Core City | Core City is the administrative unit, for which a rich dataset is generally available. |
| CORINE | The European Environmental Agency (EEA) provides the CORINE ( COoRdinate Information on the Environment ) land data base, a pan-European land cover/ land use map for non-commercial use. |
| CPA - statistical classification of products by activity | for specification of the products |
| Cramm | is a risk analysis method |
| Demography | Demography is the statistical study of human population |
| EBIOS | is a comprehensive set of guides (plus a free open source software tool) dedicated to Information System risk managers. |

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|---|---|
| Economy | An economy consists of the economic system of a country or other area (city, region) ; labour, capital and land resources; and the manufacturing, trade, distribution and consumption of goods and services of that area |
| Education | Active Inclusion is intended to support the labour market integration of those who are excluded from or experience disadvantage in entering the labour market (odder people, women, young people, migrants and ethnic minorities, lone parents, people with disabilities, people with no skills or qualifications. |
| Energy and Water | It deals with efficient use of energy and water resources (e.g. sustainable production, supply and use of energy by improved building design, increased efficiency and conservation and the greater use of renewable energy sources, development of water conservation and technologies which help to rise groundwater levels) |
| Environment | environment could be considered as the space of life in each possible form. |
| E-Participation | is the the practice of consulting and involving members of the public in the agenda-setting, decision-making and policy forming activities of organizations or institutions responsible for the policy development. |
| ESMS - Euro SDMX Metadata Structure (ESMS) | ESMS Metadata files are used for describing the statistics released by Eurostat. |
| Eurostat | is the statistical offce of the European Union situated in Luxembourg. |
| Exurb | Exurbs are settled regions beyond the boundaries of the suburbs of a city or major metropolitan area. |
| Freedom from Intrusion | constitutes the classical notion of privacy and is closely linked to the original definition of privacy by Warren and Brandeis (Warren and Brandeis, 1890) who defined privacy as "the right to be left alone". |
| GIS - Geographic Information System | A geographic Information System (GIS) integrates hardware, software and data for capturing, managing, analysing and displaying all forms of geographically referenced information. |
| GISCO (Geographical Information System at the Commission) | GISCO, a Eurostat service which promotes and stimulates the use of GIS within the European Statistical System and the Commission. |
| Healthcare | Healthcare is the diagnosis, treatment, and prevention of disease, illness, injury, and other physical and mental impairments in humans. In some countries and jurisdictions, health care planning is distributed among market participants, whereas in others planning is made more centrally among governments or other coordinating bodies. |
| Household | is one person living alone, or two or more people living together at the same address as their only or main residence who share at least one meal a day together or who share a living room. |
| Housing | Housing should seek to maintain and, where appropriate, increase the residential population and housing stock, while at the same time maintaining satisfactory standards of accommodation and environment. |
| Housing demand | is the quantity and type/quality of housing which households wish to buy or rent and are able to afford. |
| Housing need | refers to households lacking their own housing or living in housing which is inadequate or unsuitable, who are unlikely to be able to meet their needs in the housing market without some assistance. |
| Housing requirements | is the total amount and type of housing necessary to accommodate a given (or projected) population at appropriate minimum standards. This includes both housing needs and housing likely to be demanded in the market. |
| Housing size | can be measured in terms of the number of bedrooms, habitable rooms or floor space. |
| Housing type | Housing type refers to the type of dwelling, for example, flat, house, specialist accommodation. |
| Identity Management | Identity management is a about constructing different social identities. This refers to the definition of privacy by Westin (1967) who regards privacy as an individual's right "to control, edit, manage, and delete information about them [selves] and decide when, how, and to what extend that information is communicated to others". |
| Infrastructure | Infrastructure is basic physical and organizational structures needed for the operation of a society or enterprise  or the services and facilities necessary for an economy to function |

| ISAMM | ISAMM or 'Information Security Assessment & Monitoring Method' is an ISMS supporting risk management method, with supporting tools. |
|---|---|
| ISCED | ISCED is UNESCOS Standard Classification of Education |
| ISCO - International Standard Classification of Occupations | ISCO (ILO is responsible) is a tool for organizing jobs into a clearly defined set of groups according to tasks and duties undertaken in the job. |
| ISO27005 | provides guidelines for information security risk management in an organization, supporting in particular the requirements of an information security management (ISMS) according to ISO/IEC 27001. |
| IT, Telecommunication | Telecommunication is an essential and beneficial domain as a reliable and cost effective communication is important for business. But it is important too, that external telecommunications apparatus is designed in that way to provide high quality environment (to meet the environmental demands). |
| Kernel | Kernel. -was created for some capital cities where the concept of the "Administrative City" does not yield comparable spatial units |
| Land use | Land use is the human use of land. Land use involves the management and modification of natural environment or wilderness into built environment such as fields, pastures, and settlements. It has also been defined as "the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it |
| Land use planning | Land use planning is the term used for a branch of public policy encompassing various disciplines which seek to order and regulate land use in an efficient and ethical way, thus preventing land use conflicts |
| LAU - Local Administrative Units | To meet the demand for statistics at local level, Eurostat has set up a system of Local Administrative Units (LAUs) compatible with NUTS. |
| LUCAS - Land cover/use statistics | LUCAS aims to gather harmonized date on land use/cover and their changes over time. |
| LUZ - larger Urban Zone (LUZ) | LUZ is an approximation of the functional urban zone centred around the city. |
| Market housing | is private housing for rent or for sale, where the price is set in the open market. |
| Megalopolis | in a megalopolis the urban areas are close but not physically contiguous and the merging of labour markets has not yet developed. |
| MEHARI | is a methodology that provides a risk management model, modular components and processes, includes an asset classification, discovers vulnerabilities through audit, analyses a list of risk situations and provides seriousness levels for each |
| Metropolis | A metropolis is a very large city or urban area (at least one million inhabitants) which is a significant economic, political and cultural centre for a country or region, and an important hub for regional or international connections and communications. |
| Migration | Migration means all long-term changes of residence or workplace. |
| NACE - Statistical classification of products by activity | for statistics referring to economic activities |
| NUTS – Nomenclature of territorial units for statistics | The NUTS classification is a hierarchical system for dividing up the economic territory. |

| | |
|---|---|
| OCTAVE® | Operationally Critical Threat, Asset, and Vulnerability EvaluationSM approach defines a risk-based strategic assessment and planning technique for security. |
| Overcrowding rate | Proportion of people living in an overcrowded dwelling as defined by the number of rooms available to the household, the household's size, as well as its member´s ages and family situation. |
| Per capita sprawl | Increase in square meters per person. |
| Policy | A policy is typically described as a principle or rule to guide decisions and achieve outcomes. |
| Population Growth | Population growth is the change in a population over time, and can be quantified as the change in the number of individuals in a population using "per unit time" for measurement. |
| Primary data | is information that is collected from a bespoke data collection exercise (e.g. surveys, focus groups or interviews) and analysed to produce a new set of findings. |
| Private sector housing | is housing for or rent provided by private developers or other commercial organisations. The term 'owner occupied sector' excludes the private rented element. |
| Research & Innovation | Research and development (R&D) contributes to economic growth and job creation. New technology also helps address social challenges, such as poverty, health problems and environmental degradation |
| ROC curve | The ROC curve is a fundamental tool for diagnostic test evaluation |
| Safety and Security | **Safety** is the state of being "safe", the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage, error, accidents, harm or any other event which could be considered non-desirable. **Security** is the degree of protection against danger, damage, loss, and crime. |
| Severe housing deprivation rate | Proportion of persons living in a dwelling which is considered overcrowded and having aspects of housing deprivation - such as lack of a bath or a toilet, a leaking roof, or a dwelling considered as being too dark etc..(Severe housing deprivation rate) |
| Shopping and Services | Retails services are very important for cities and regions. They provide a wide range of support services for city workers and residents (e.g. shops, financial and professional services including branch banks, food and drink including restaurants, bars... |
| SLEUTH | Is a complete CA Model of Urban Growth |
| SLUM | Is an area characterized by social and economic isolation, irregular land ownership and low standard sanitary and environmental conditions |
| Slum Upgrading | Means improving the provision of urban infrastructure for poor households. |
| Smart Growth | Smart growth focuses on avoiding suburban sprawl and the use of private vehicles, instead designing and developing more compact urban areas where inhabitants can walk, bike, or use public transit to get to school, work, shops, and recreation |
| Social affairs | Social policy primarily refers to guidelines, principles, legislation and activities that affect the living conditions conducive to human welfare (Social Security, Healthcare, Education, Safety and Security, Housing, Social Inclusion). |
| Spatial environmental planning | Spatial Environmental Planning aims at ensuring protection of environmental resources while meeting development targets. |
| Sub-City-Districts (SCD) | SCD is a subdivision of the city according to population criteria. |

| | |
|---|---|
| Surveillance | Focuses less on harms to specific individuals and more on the practices of creating and managing social knowledge, especially the knowledge of population groups.. |
| Transport and Movement | An efficient and attractive integrated transport system is necessary to move large numbers of people daily and to enable the efficient servicing of the main activities. However there are significant conflicts between pedestrians and vehicles and between local and through traffic. In addition road traffic contributes to noise, air pollution and use of fossil fuels. |
| Urban agglomeration | has a similar meaning to conurbation. |
| Urban Audit | The "Urban Audit" data collection provides information and comparable measurements on the different aspects of the quality of urban life in European cities. |
| Urban Indicator | Indicators are signposts that allow to measure whether a place is becoming more (or less!) liveable |
| Urban planning | Urban, city, and town planning aims to improve the built, economic and social environments of communities by integration many domains (e.g. land use, housing, transport..). Regional planning deals with a still larger environment, at a less detailed level. Urban planning can include urban renewal, by adapting urban planning methods to existing cities suffering from decay and lack of investment. |
| Urban segregation | Urban segregation is a concept used to indicate the separation between different social groups in an urban environment. It occurs in various degrees in most large modern cities, including the developed and the developing world. |
| Urban Sprawl | It can be loosely defined as dispersed an inefficient urban growth. |
| Waste Management | Waste Management is focussed on more sustainable waste management practices which are based on the best practicable environmental option for the local circumstances of the city or the region. It also includes waste collection and storage. |
| White Flight | People abandon cities in an effort to be surrounded by others of similar race and socioeconomic background. |