

**SEVENTH FRAMEWORK PROGRAMME**  
**THEME 6: Environment (including climate change)**

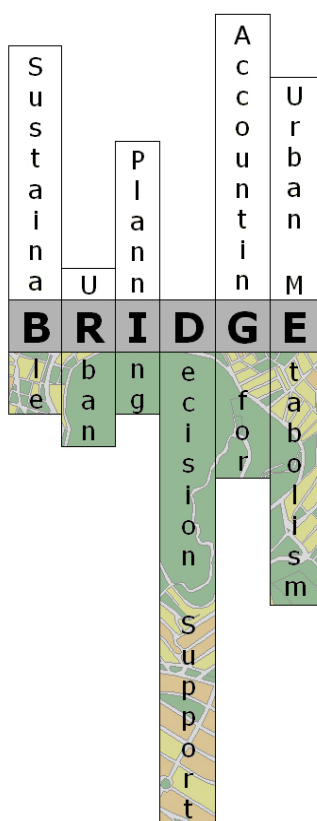


**Contract for:**

**Collaborative Project**

***D.2.2***

***Protocol to assess differences between  
knowledge supply and knowledge needs in the  
field***



Project acronym:

**BRIDGE**

Project full title:

sustainaBle uRban planning Decision  
support accountinG for urban  
mEtabolism

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## 1. Introduction

### 1.1 Purpose of the document

This document is the D.2.2 - *Protocol to assess differences between knowledge supply and knowledge needs in the field*. It is a report produced from Task 2.2 - *Documentation of the needs of users and demands of the planning community in the context of sustainable design*. The **aim of this document** is to identify the theoretical needs that the planning professionals are called to meet and to propose the way (in form of a protocol) to face the practical needs, based on a model participative approach (where the whole society is represented). This report provides the theoretical framework for the next protocol of Task 2.3, which will be based on the implementation of a participatory approach in practice (called Community of Practices, concerning the planning community) at the BRIDGE project.

### 1.2 Definitions and Acronyms

#### Acronyms

|           |   |
|-----------|---|
| CoP       | Community of Practice   |
| DSS       | Decision Support System   |
| BRIDGE    | SustainaBle uRban plannIng Decision support accountinG for urban mEtabolism)  |
| UNDP      | United Nations Development Program  |
| WCED      | World Commission on Environment and Development                               |
| BEQUEST   | Building Environmental Quality and Evaluation of Sustainability               |
| MUCS      | Montreal Urban Community Sustainment  |
| WMRC      | Waste Management and Research Center  |
| UNCHS     | United Nations Centre for Human Settlements                                   |
| NGO       | Non-governmental organization   |
| GIS       | Geographic information system   |
| POS       | Plan d'Occupation du Sol  |
| SDAU      | Schema Directeur d'Aménagement et d'Urbanisme                                 |
| ZAC       | Zone d'Aménagement Concertée  |
| DSS       | Decision Support Systems  |
| MCA       | Multi Criteria Analysis   |
| CA        | Cellular Automata   |
| PETUS     | Practical Evaluation Tools for Urban Sustainability                           |
| BREEAM    | Building Research Establishment Environmental Assessment Method               |
| BEES      | Building for environmental and economic sustainability                        |
| ASTM      | American Society for Testing and Materials                                    |
| HQI       | Housing Quality Indicator   |
| SPARTACUS | System for Planning and Research in Towns and Cities for Urban Sustainability |



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## 1.4 Setting the context

More than half the world's population lives in cities today. Each week, an average of three million people in the developing world move to a city and by 2050, global urbanisation levels are expected to reach 70% (UN-HABITAT, 2008). It is therefore evident that improving social, economic and environmental conditions for urban population is an increasing challenge. Especially, as cities grow these improvements become even more crucial but complex as well, since the needs for space and resources constantly augment.

Sustainable urban planning is designed to regulate the use of land and other physical resources in the public interest and can make a tremendous difference in the quality of life and wellbeing of people living in cities. Therefore, the widespread inclusion of sustainability objectives in urban planning at all scales (from regional to site level) is necessary, providing the opportunity for the incorporation of bio-physical sciences knowledge into the planning process on a routine basis. To this end, the project BRIDGE (sustainaBle uRban plannIng Decision support accountinG for urban mEtabolism) aims at bridging the gap between bio-physical sciences and urban planners and to illustrate the advantages of accounting for environmental issues on a routine basis in design decisions.



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### 1.5 Structure of Deliverable 2.2

The work to be carried in BRIDGE is divided into 9 Work Packages (WPs) following the logical phases of the implementation of the project. The present WP2 is dedicated to Methodology Specification. It ensures that new research and policy tools developed as part of the BRIDGE project, builds on current knowledge and makes best use of the available resources from a scientific and policy perspective. The main objective of WP2 is to document current understanding and the status of policy in the realm of urban metabolism in order to specify the methodology to be used.

D.2.2. report consists of five chapters:

*Chapter 1* gives a brief description of the purpose of the document, the broader context of the project and presents the main parts of Deliverable 2.2., in regard to methodology specification, which is the main objective of the present WP2.

*Chapter 2* refers to the planning dimension and the sustainable planning strategies. Firstly it analyses the complex dynamics of cities and the role of urban planning and then it moves from the historical context of city planning approaches towards the modern drivers leading to a sustainable city. Furthermore, best practices of cities that have made remarkable efforts towards sustainability are highlighted and at the time barriers to implementation are analysed to justify the gap between theory and practice and the difficulty of the path towards sustainability.

*Chapter 3* tries to provide a current understanding of the process. This is achieved through analysing the Processes that are well understood and the processes where insight is lacking. Chapter 3 approaches urban metabolism from the scope of planning and gives a review in terms of empirical data and modelling capability.

*Chapter 4* analyses the inputs, use and transformations, and outputs of resources from the urban area. Systems, Services and Functions through a) Identification of needs, b) Set up goals and objectives and c) identification of inputs and outputs

Finally *Chapter 5* provides the way to connect theoretical needs with actual needs and perceptions in the field for each case study participatory approach through a protocol which attempt to bridge the gap between knowledge supply and knowledge demand.

### 1.6 Project Overview

Urban metabolism considers a city as a system and distinguishes between energy and material flows. “Metabolic” studies are usually top-down approaches that assess the inputs and outputs of food, water, energy, etc. from a city, or that compare the metabolic process of several cities. In contrast, bottom-up approaches are based on quantitative estimates of urban metabolism components at local scale, considering the urban metabolism as the 3D exchange and transformation of energy and matter between a city and its environment. Recent advances in bio-physical sciences have led to new methods to estimate energy, water, carbon and pollutants fluxes. However, there is poor communication of new knowledge to end-users, such as planners, architects and engineers.



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BRIDGE aims at illustrating the advantages of considering environmental issues in urban planning. BRIDGE will not perform a complete life cycle analysis or whole system urban metabolism, but rather focuses on specific metabolism components (energy, water, carbon, pollutants). BRIDGE's main goal is to develop a Decision Support System (DSS) which has the potential to propose modifications on the metabolism of urban systems towards sustainability.

BRIDGE is a joint effort of 14 Organizations from 11 EU countries. Helsinki, Athens, London, Firenze and Gliwice have been selected as case study cities. The project uses a "Community of Practice" approach, which means that local stakeholders and scientists of the BRIDGE meet on a regular basis to learn from each other. The end-users are therefore involved in the project from the beginning. The energy and water fluxes are measured and modelled at local scale. The fluxes of carbon and pollutants are modelled and their spatio-temporal distributions are estimated. These fluxes are simulated in a 3D context and also dynamically by using state-of-the-art numerical models, which normally simulate the complexity of the urban dynamical process exploiting the power and capabilities of modern computer platforms. The output of the above models lead to indicators which define the state of the urban environment. The end-users decide on the objectives that correspond to their needs and determine objectives' relative importance. Once the objectives have been determined, a set of associated criteria are developed to link the objectives with the indicators. BRIDGE integrate key environmental and socio-economic considerations into urban planning through Strategic Environmental Assessment. The BRIDGE DSS evaluates how planning alternatives can modify the physical flows of the above urban metabolism components. A Multi-criteria Decision Making approach has been adopted in BRIDGE DSS. To cope with the complexity of urban metabolism issues, the objectives measure the intensity of the interactions among the different elements in the system and its environment. The objectives are related to the fluxes of energy, water, carbon and pollutants in the case studies. The evaluation of the performance of each alternative is done in accordance with the developed scales for each criterion to measure the performance of individual alternatives.

Several studies have addressed urban metabolism issues, but few have integrated the development of numerical tools and methodologies for the analysis of fluxes between a city and its environment with its validation and application in terms of future development alternatives, based on environmental and socio-economic indicators for baseline and extreme situations. The innovation of BRIDGE lies in the development of a DSS integrating the bio-physical observations with socio-economic issues. It allows end-users to evaluate several urban planning alternatives based on their initial identification of planning objectives. In this way, sustainable planning strategies will be proposed based on quantitative assessments of energy, water, carbon and pollutants fluxes.



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## 2. Sustainable planning strategies

### 2.1 Understanding the complex dynamics of cities and the role of urban planning

The complexity that characterises the function of cities stems from the fact that current cities are not only the place of dwelling and working for some thousands of people, but they constitute living organisms with various flows of energy and materials. It is more and more realised that cities are no longer only economic stimulators, but also social, cultural and ecological motors for sustainable development. The population growth is merely one factor that causes dramatic alterations in the sizes, structures, functions and roles of the cities. Globalisation, rapid technological development, economic and social evolutions are responsible for unemployment, social segregation, declining quality of life and several other aspects that cities have to struggle with (Rotmans and Van Asselt, 2000). So, urban transformations are multi-dimensional affecting the economic, social, environmental, cultural and institutional every-day life of their citizens.

Moreover, city planning has also changed. A few decades ago, the focus was on housing, transportation and water and waste systems. Nowadays, modern planners' focal point is the integration of the physical, social and cultural infrastructure, the economy and the environment of the city. Furthermore, new tools like for example Strategic Environmental Assessment (SEA), have been introduced to assist planners in assessing the impact of the planning interventions. According to Alshuwaikhat and Nkwenti (2001), three key issues should be taking in mind when considering the future development of an urban centre. The first is the provision of flexible means of commuting or transiting between residences, work, recreation, and other related locations. The second is the supply of power, water, and similar basic needs for the sustenance of the activities of an urban centre. And the third is the frequency of removing waste generated as a result of human interaction. The ability to synchronise these three aspects and incorporate them into an integrated approach is synonymous with the modern urban planning. The key-elements that compose the complex interactions and determine the future development of urban systems are presented below:

#### *Urban transportation*

Current transport systems, for a variety of reasons, cannot satisfy the numerous requirements of urban mobility. Urban productivity is highly dependent on the efficiency of its transport system to move labor, consumers and freight between multiple origins and destinations. Additionally, important transport terminals such as ports, airports, and railroads are located within urban areas, contributing to a specific array of problems, such as traffic congestion, public transport inadequacy, loss of public space, environmental impacts, excessive energy consumption etc. The challenge that arises is a new, more integrated consideration of urban transportation's aspects and the redesign of transport systems in a sustainable way. This means that urban transportation should not only be seen from its economic point of view, but also from multiple dimensions such as social, cultural and environmental aspects. So, the role of planners is to present structural solutions for sustainable transport systems, since efficient transportation is an inextricable part of successful urban planning.

#### *Water systems*

Urban sprawl expands water problems. The weakness to treat water as an economic, as well as a public good, results in insufficient water use practices from households, industry and agriculture. Moreover, the current management water is fragmented among sectors and institutions, which do not have a holistic consideration of economic, social and environmental objectives that relate to water systems. Another issue is the qualitative and quantitative degradation of water resources due to pollution from urban and land-based activities or even from physical scarcity. It seems evident that a redesign of new sustainable urban water systems is indispensable, approaching equally the multiple perspectives of this issue: economic (setting



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pricing policies), environmental (safeguarding the water supply and avoiding pollution), and social (keeping in mind that water is a limited resource and needs to be treated as such).

### *Waste*

Waste flows are becoming more and more complex, as waste is closely linked to the increasingly changing patterns of lifestyle and consumption. The increasing quantity of waste, the increasing distance between centres, the legal framework modifications and the call for adequate and technology-intensive solutions are some of the issues that need to be addressed in planning. In the long run the capacity of ecosystems to produce goods for cities and accept back their waste might be at stake. Future urban planning must take into account the limitations from the usage of ecosystems by cities for a long-term period of time.

### *Information and communication*

The rapid evolutions in information and communication technology will radically alter the structures of cities. Electronic commerce, decrease of distances, change of demand and supply mechanisms, advanced telecommunications are all techniques that can affect urban infrastructure (e.g. telecommunications as substitute for transportation). And institutionally, the information revolution may change urban governance, and can stimulate and facilitate civic participation by citizens. The way in which the modern information and communication technology will influence future urban infrastructure and its urban population is still poorly understood. There is, however, an urgent need for integrated approaches in order to increase our understanding of the nature and magnitude of these impacts on our cities of tomorrow (Rotmans and Van Asselt, 2000).

Obviously, urban planning needs to be effective combining all the aforementioned dynamics. Apart from that, the following components need to be incorporated:

- Community participation and empowerment during the whole decision-making and planning process
- Active involvement of all stakeholders, whose interests may be affected by the procedures of planning
- Coordination between national policies and local needs
- Provision of approaches with long-term concerns for sustainable urban development
- Awareness of financial, social and environmental implications of urban plans on the communities (WHO, 1999).

Of particular importance are the ways of drawing the communities into planning debates, raising awareness about the causes of existing problems. The following table illustrates a range of participatory tools for planners.



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**Table 1.** Participatory tools and techniques for urban planners (WHO, 1999)

|  |
|--|
| • Participatory mapping of the settlements by the inhabitants  |
| • Community members undertaken surveys of the settlement to collect socioeconomic data   |
| • Collective modelling of new housing designs that will better meet the needs of residents   |
| • Collective planning of new settlements   |
| • Collective identification of resources including access, management and control  |
| • Walks through neighbourhoods to identify the different informal activities or housing conditions   |
| • Wealth ranking of all households in the settlement   |
| • Analysis of trends of life histories   |
| • Identification of priorities through collective ranking  |
| • Acting out of the life stories of individuals in the community to provoke discussions about the opportunities and constraints facing residents |
| • Establishment of formal and informal groupings that can provide a focus and maintain the momentum of community-driven development              |

Institutional innovations and specific indicators are needed to provide fertile ground for socio-economic improvements and creativity. All actors have a major role to play in this process because cities need paradigm shifts towards a new economic, political and socio-environmental equilibrium (Mega and Pedersen, 1998).

## 2.2 Historical context of city planning approaches

In developed countries planning has gone through various stages of general consensus in the last 200 years. Firstly, there was the industrialised city of the 19th century, where control of building was largely held by businesses and the wealthy elite. Around 1900, there began to appear a movement for providing citizens, especially factory workers, with healthier environments. The concept of garden cities arose and several model towns were built. It wasn't until the 1920s that modernism began to emerge. Based on the ideas of Le Corbusier, the modernist city stood for the elimination of disorder, congestion and the small scale, replacing them instead with pre-planned and widely spaced freeways and tower blocks set within gardens. No large-scale plans were implemented until after World War II however. Throughout the late 1940s and 1950s, housing shortages caused by war destruction led many cities around the world to build substantial amounts of government-subsidized housing blocks. By the late 1960s and early 1970s, many planners were coming to realize that the lack of human scale tended to sap vitality from the community. This was expressed in high crime and social problems within many of these planned neighbourhoods. Rather than attempting to eliminate all disorder, planning now concentrates on individualism and diversity in society and the economy. This is the post-modernist era.

The critical role of urban planning is to improve people's wellbeing and quality of life. It is responsible for the regulation of land use for the interest of public. Governments throughout Europe have established systems intended to achieve this goal. Therefore the evolution of these systems based on different institutional and cultural frameworks has led to variations of the planning process. For example, in France the terminology includes urbanisme and aménagement du territoire, in United Kingdom town planning, in Germany Raumordnung and in Italy urbanistica (WHO, 1999). No matter what the language is, urban planning in all countries has the mission to address the implications of land-use strategies, and the policies and programmes for the social, economic and physical environment.



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The type of planning system of each European country depends on the country's legal system, its institutions and the role of the different actors involved in the planning process. Nevertheless, the tendency of the last years is the partnership of central and local governments and the transfer of powers and responsibilities to local authorities. Generally, three types of planning systems can be identified today: the first is clearly centralised, although there are different levels of planning. The second has a balanced distribution of responsibilities among the different levels and the third is fully decentralised with highly autonomous levels of planning (WHO, 1999). The types of plans vary as well. They range from structure and master plans to local land use plans. According to Healey and Williams (1993) urban planning systems are categorised into:

*Development plans*, which vary in their legal status. Legally-binding plans are the basis of planning systems in Germany and Netherlands (Healey and Williams, 1993). In Germany, plans govern the processes of property development and land use change and co-ordinate public investment in infrastructure, based on a framework of principles and rules. Plans are also legally binding once translated into a zoning ordinance and in principle central to the system in Italy. Here however, the presence of informal political networks is intense and there might be a considerable divergence between the plan and its implementation. In Southern Italy, as in Greece, development may evade formal planning regulation altogether (Getimis, 1992). In Britain, plans have only an advisory character, giving more flexibility in adjustment of strategies.

*Development promotion*. European planning systems vary in the relation between planning strategies and regulatory power and development activity. In the Netherlands, the public sector plays a major role in supplying land for development. In other European countries, development involves public and private sectors, while most of the differences focus on coordinating the activities of these sectors according to the plan priorities: in France complex negotiations are required, while in Italy, it is very difficult to be achieved (Healey and Williams, 1993).

*Development control*. A major dimension of difference in European planning systems is the approach to regulation. In France, property owners are permitted to develop according to building norms. In Britain, development regulation is an administrative, not a legal act. This means that decisions are taken by local politicians based on the development plan (Healey and Williams, 1993).

Generally, the planning system in England is infused with the dominant and distinctive liberal social model, the pragmatic approach to governance, the common law legal system and the long history of stable national state boundaries. National government has a dominant position in decision-making, although the system is operated by local authorities. Although formally described as plan-led, there is much negotiation around decisions of any significance and the system offers considerable discretion: decisions on development are made on their merits with no binding zoning instruments. There are extensive opportunities for consultation and objections to policies and development projects (Nadin and Stead, 2008).

Planning is one of the central cultural institutions in Dutch society. In the Netherlands, stakeholders are consulted at an early stage of the planning procedure. The country's planning system is plan-led: nothing can be developed that is not in accordance with the local land use plan, since this is legally binding (Nadin and Stead, 2008).

The characteristics of the German planning system are the federal state and the strong local self government, while the mode of governance is hierarchical. Strategic, development planning is absent from the national planning policy, but there are some approaches to urban development on the local level. Moreover, there are national and Lander programmes on urban development since 1994 without systematic connection to other policies or general planning policy (Reiter, 2006).

In France, the planning system state is characterised by a decentralising unitary state, a weak local government and a semi hierarchical mode of governance. There is a long, highly institutionalised tradition of economic development planning and specific rules on urban planning and systematic institutionalisation of urban development policy since 1990, which is integrated in economic planning (Reiter, 2006).





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in mind the aforementioned elements, and trying to take small steps towards sustainable development, “sustainable cities” are attainable.

According to BEQUEST Protocol (2000) a network trying to establish a common knowledge for sustainable urban developments, urban sustainability must assure four fundamental complementary functions: the preservation, protection and improvement of the quality of the built environment, the improvement of the quality of urban life with specific attention to the protection of human health, the development of the economy and the prudent and rational utilisation of natural resources.

Although it seems complicated, urban sustainability is not inevitable. A plethora of good practices prove that systematic and integrated actions and programmes can lead to reduction of resource consumption, to alterations in land uses in favour of disadvantaged groups who don't have easy access to services, to structural changes that limit institutional barriers etc. Some of these actions are presented below:

- a) Prioritisation of issues. Taking small steps towards sustainability and solving the community problems one by one, is usually more effective than setting grandiose and audacious goals and seeking theoretically sustainable development.
- b) Delegation of power to the community level. The empowerment of citizens, the establishment of networks and co-operations among different kinds of stakeholders and the active involvement of public are crucial for the whole process of planning, in order to assure consent and success to the final outcome.
- c) Development of government structures that accommodate long-term decision-making.
- d) Expansion of communication links with other cities, with successful application of sustainable projects (Moore, 1994).

## 2.4 Current best practice –integrated policy making and sustainable development

There is a large number of cities that have made remarkable efforts towards sustainability. They managed to define a specific development objective for the urban area and accomplished their goal through the active involvement of citizens and the use of public and private sector funds. The outcomes concern different sectors of the urban environment such as, energy or food distribution and consumption, emergence of green neighbourhoods, integration of local communities, public transport, recycling of waste, water issues and others. Some best practices of sustainable cities are presented below:

### *Munich-Germany*

The wager for the city of Munich was to transform Theresienhöhe, a former fair site of the city, into a dense and green neighbourhood. The strategy for this region was to implement the city's guidelines on 'compact urban-green' development. In addition, Theresienhöhe sought an economically sustainable realisation generating revenue to build the city's new fair site. A large amount of lots were divested through sale of real estate and the project has been an economic success for Munich. The area's master plan included facilities like schools, centres for children and youth and better public open spaces. But most importantly, the regeneration of Theresienhöhe was based on an open planning process with numerous meetings, workshops and public events with the participation of many stakeholders. This approach resulted to a high degree of acceptance and consent from the public, even though not all wishes were fulfilled and has become today a permanent part of planning procedures in Munich. Theresienhöhe has today mixed residents and ownership.



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The district has 4-5.000 workplaces and 1.400 apartments of which 50% are publicly subsidised rentals. Approximately 11,2 hectares of Theresienhöhe's 47.1 hectares are green and public spaces<sup>1</sup>.

### *London-United Kingdom*

The Olympic Park of 2012 Games will be built in one of London's most underdeveloped areas, Lower Lea Valley. It will hopefully trigger a positive development in the area providing new transport facilities, employment, housing, a new big green park and cultural and sport facilities of international standard.

Much of the land of Lower Lea Valley is taken up with derelict industrial land and poor housing, often divided by underused waterways, pylons, roads, the London Underground and heavy rail lines. The Olympic Park is using the local building materials coming from the demolishment and cleaning of this area. Pre-demolition surveys take place, identifying the types and volumes of materials. From these surveys, detailed Site Waste Management Plans are developed. This includes specific targets for the reuse and recycling of materials, as well as plans for the effective management of any contaminated waste. An example of the reuse of materials in the Olympic Park development is the reuse of timber. Timber arising from any trees which need to be removed is reused.

By using the materials present already at the site, the need for transport of building materials is reduced drastically. At least 90 per cent, by weight, of the material from demolition works will be reused or recycled. 50% of materials, by weight, will be transported to and from the Olympic Park by water or rail during construction. The Olympic Park and venues are designed wherever possible for post-Games use. To minimise any waste during the conversion from Games to the legacy phase, all temporary venues and structures will be designed with reuse and recycling in mind<sup>2</sup>.

### *Montreal-Canada*

In 2003, students from the McGill University of Montreal Canada, began the Montreal Urban Community Sustainment collective (MUCS). A non-profit student organization, the MUCS was founded on the principles of green design, cooperative living, and education on sustainable livelihoods. The organisation's mission is to create and promote sustainable urban communities.

A group of McGill students wanted to create a new residence, less wasteful, expensive and individualistic. The initial plans began in November 2002, when a group of McGill students with shared environmental concerns conceived the idea of creating an ecologically and socially sustainable residence and community centre; one with the objective of housing approximately 200 people. Today, the MUCS groups are actively involved in redesigning urban areas, creating dining co-ops with weekly meals, as well as the Montreal free school, offering free learning for all members of society.

In October, 2006, the MUCS project moved into one of Montreal's urban areas (Notre-Dame-de-Grâce) and established a multi-tenant office and organising space called the Northcliffe Square. With the day-to-day sharing with four other community groups, the Northcliffe Square and the MUCS Project has quickly transformed into a hub of social activities<sup>3</sup>.

### *Chicago-USA*

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<sup>1</sup> (<http://sustainablecities.dk/en/city-projects/cases/theresienhohe-a-new-dense-and-green-neighbourhood-in-munich>)

<sup>2</sup> (<http://sustainablecities.dk/en/city-projects/cases/london-olympic-park-is-recycling-building-materials>)

<sup>3</sup> (<http://sustainablecities.dk/en/city-projects/cases/montreal-creating-sustainable-urban-communities>)



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Mayor Daley's vision for the city of Chicago was to transform it into the most environmentally friendly city in America. In 2005, Chicago released an Environmental Action Agenda: Building the Sustainable City. The comprehensive and detailed plan is divided into 17 functional areas (from airports to waste and recycling). The three primary strategies of the agenda were:

- Conserving, protecting and restoring natural resources
- Encouraging healthy environmental practices
- Leading by example

Some of the application fields of the aforementioned agenda deal with:

- Reduced energy costs for saving energy and reducing pollution in public buildings with efficient equipment for heating, cooling, lighting and ventilation.
- Training, where emphasis is given on teaching kids about solar energy.
- The Industrial Rebuild Program is a partnership of the City of Chicago Department of Environment, the ComEd electricity provider, the University of Illinois, and the Illinois Waste Management and Research Center (WMRC). The program helps the most energy- and waste-intensive industries in Chicago become more energy efficient.
- Renewable programs, installing solar electric systems for heating and hot water in public buildings and houses.
- Green building for extremely energy efficient buildings, using less toxic materials and providing nicer work environments than traditional structures.
- New businesses and new jobs through the attraction of companies to the area as a direct result of its sustainable environment.
- Green roofs, reducing heat and affecting the efficiency of air conditioning equipment directly (Regelson, 2005).

The above city examples are some of the best practices in the application of sustainable development principles. They have accomplished to involve their citizens in the planning process, render them more responsible and active and improve their quality of life in an urban environment of competitive economy, social equity and environmental conscience.

## 2.5 Connecting research and practice: barriers to implementation

Today, a growing body of research suggests that the goals of sustainable development are failing to be integrated into practice. The path towards sustainable cities requires changes in the current traditional practices and actions. It requires different social attitudes, long-term thinking and a different decision-making process. Taking into consideration these relatively new elements of planning, there is a number of certain obstacles that hinder the development of sustainable cities - even though it is getting more and more widely accepted that this is the only way to go in the long run. The Regional Environmental Centre categorises these obstacles into perceptual, institutional / structural, economic and national / sub-national barriers:

### Perceptual barriers:

The term refers to obstacles that deal with different interpretations of definitions, lack of information and deeper socio-cultural issues (Donovan et al., 2005). Several times the definition of sustainability may be misinterpreted not only by the public, but by the decision-makers as well. Additionally, the lack of



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information on important matters creates indifference about the severity of environmental problems. People tend to believe that if their actions do not affect them, they are not hurtful to a larger scale either. Therefore, a disconnection is observed between people's behaviours and wider or global problems. The systematic information can lead to positive alterations in personal and organisational behaviour. Below, some of the perceptual barriers of implementing sustainability are set out:

- Lack of information or knowledge which creates convenient excuses for inaction
- Media's presentation of information (media shape public perception and issues that are omitted have less chances of becoming part of public consciousness)
- Acceptance of the status quo
- Strong resistance from people to change their lifestyles (e.g. drive less, purchase environmentally conscious goods, collect waste separately, become more active members of civil society, Not In My Back Yard Syndrome etc.)
- Lack of empowerment and equity (Moore, 1994)

### Institutional / structural barriers:

A key barrier to achieving sustainability is the requirement to integrate objectives and activities between and within institutions. The majority of public and private sector institutions have been established to undertake a discrete function rather than to support inter-linkages between functions (Donovan et al., 2005). It is not rare for different departments within an organisation or a council to have diverging agendas. Therefore, the ability of institutions to cooperate and learn from each other emerges as a problem. Moore (1994) underlined that the range of competing issues faced within organisations along with the limitations of their jurisdiction, often serves to limit the extent to which innovation and change can occur, in order to allow more sustainable solutions and policies to emerge. More importantly, the increasing alienation of the public from political institutions and processes serves as a major barrier to achieving sustainability, because public participation is difficult to be achieved, when there are weak linkages between governments and their constituents (Donovan et al., 2005). Some of the most important institutional obstacles are:

- Weak linkages between government and its constituents
- Weak diversity among these in the decision-making arena (homogeneous decision-makers may not expose the full range of problems that other communities experience, causing barriers to the adoption of actions that support sustainability)
- Unequal balance of power and resources among community organisations
- Fear of losing control or power
- Inappropriate structural framework of government (vertical)
- Prevailing notion of environment vs. economy. Even though lots of examples show that eco-efficiency can bring real savings through more efficient production practices (Moore, 1994)

### Financial barriers:

The growing disparity between rich and poor, in both global and local contexts, is highlighted as a key barrier to achieving sustainability. Studies have shown that the economic growth potential of a particular place can affect how sustainability is actually defined (Donovan et al., 2005). A greater concentration on economic growth is usually at the expense of other aspects, such as redistribution of wealth, or protection of the natural environment. Nevertheless, the emphasis on the economy's health as a policy issue prevails over other aspects of sustainability. Significant financial barriers to implementing sustainability also arise, in the small amounts of public funds that are provided to implement innovative solutions (Moore, 1994). In the



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private sector especially, perceptions about the higher cost of sustainable solutions lead to preferences of conventional types of construction. Further financial barriers to sustainability are:

- Financial gain motive
- Inadequate funds
- Externalities: market conditions that permit a producer or consumer to shift the costs for their economic activities to other parties
- Existing funds already pre-allocated to other initiatives
- Benefits of sustainable real estate development are diffuse, while the costs (to specific groups) are concentrated
- Lack of scientific data on the economic benefits of sustainability (Arbor, 1999)
- Fragmentary approvals process, which adds time and cost to innovative development, thereby increasing risk
- Emphasis is on initial cost instead of life cycle (Arbor, 1999)
- Business lobbies of energy/material intensive or environmentally controversial industries are still very strong (e.g. oil industry, car manufacturers, power generators, tobacco industry etc.)
- A lack of widely available and understood cost-comparison data (including from a full-cost accounting perspective) with respect to sustainable development design features and alternative development standards<sup>4</sup>.

### National and sub-national barriers:

This type of barriers to implementing sustainability refers to certain perceptions and mentalities that can be detected during the planning process in a national or even lower level. Some of the most important are:

- Decision makers tend to look at the costs of urban sustainability, and place less emphasis on the benefits
- No attention to regionalism and each bio-region's particular health and safety needs like cold, heat, sun, etc. (Arbor, 1999)
- Information barriers: consumers are not provided with access to information about the environmental impacts of the product
- Investment criteria: national infrastructure investment programmes do not include sustainable development in the assessment criteria
- Laws and regulations: (ie. regulations to control the price of food which benefit urban population but hurt rural farmers)
- Standards: building code is connected to traditional urban serviced infrastructure, while discourages self-sufficient buildings
- Professional and civil service standards: strict application of traditional professional standards that may not be responsive to technological or policy developments

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• <sup>4</sup> (Regional Environmental Centre, <http://www.rec.org/>)



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- Institutional arrangements: donor agencies may overlook existing participatory planning processes in the project design and assessment stages and establish its own rapid consultation and assessment processes to suit the agency's work schedule. In the above list one more category of barriers towards sustainability can be added. It is the obstacles coming from the side of planners, designers and constructors:
- Reluctance of adopting energy-efficient technologies (Pinkse and Dommisse, 2008)
- Lack of information and technical capacity in order to be able to apply new sustainable technologies
- Perceived conflicts between aesthetics and sustainable design

It is imperative to underline, that in the assessment of a planning process is not always easy to apart one type of barriers from another. Depending on the nature of the case, they are usually interrelated, making it difficult to distinguish the perceptual from the institutional, the financial or the national ones.



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## 3. Current understanding of the process - both empirical data and modelling capability

### 3.1 The urban problem - Processes that are well understood

The increasing urban populations, the globalisation, the current economic conditions, the social and cultural trends and the unprecedented rapid technological advancement are the main factors that create the contemporary faces of European cities. Cities of complex dynamics and multi-dimensional that combine different roles and functions and at the same time bearers of the most crucial problems that their citizens have to face. According to a UNDP report (1997), the most important urban problems that modern cities have to deal with are:

1. Unemployment
2. Insufficient solid waste disposal
3. Urban poverty
4. Inadequate housing stock
5. Insufficient solid waste collection
6. Inadequate water/sanitation facilities
7. Inadequate public transportation
8. Traffic congestion
9. Poor health services
10. Insufficient civil society participation
11. Inadequate education services
12. Air pollution
13. Urban violence/crime/personal safety
14. Discrimination (women, ethnic, poor)

The above problems continuously grow, as more and more of the European citizens move towards urban areas. As a result the alteration in land uses is immense, since the demand for land in and around cities is becoming acute. The impacts on the environment are not negligible. The inadequacy of public transportation and the domination of private cars lead to traffic congestion and air pollution. The increasing demand for space and the simultaneous lack of it cause augmentation in the land prices and lack of open spaces. The vast energy and material consumption from the urban population inevitably guide to proportionate waste that central and local governments fail to manage. The high rates of unemployment, urban poverty and inadequate education services lead to social problems, such as violence and discrimination of certain groups of people (based on sex, origin, religion etc.).

In this context, the majority of European cities can be considered unsustainable, concentrating environmental threats and social and economic distress with the consequence that:

- Urban production and consumption extracts resources from the environment and deposits massive volumes of waste, creating a bloated urban footprint.



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- Cities have massive and inefficient energy consumption, thus they waste resources and generate greenhouse gases.
- Urban planning usually stops at the city's border, failing to integrate with planning for the larger region that it impacts so deeply.

### 3.2 Identifying the gaps - processes where insight is lacking

#### *Environmental problems*

- An area in which evidence is inconclusive or misleading is the valuation of external costs of pollution. Results can be different depending on the local circumstances and the methodologies applied, which effects are included or not. Standard methodologies to be developed at the European level should help in this respect.
- The long term present cost of climate change is similarly difficult to be established, due to the fact that economic techniques of discounting are not made for estimations that extend over at least a century. Hence, it is difficult and quite ambitious to establish a unique value for this effect.
- One of the most strong debates in the literature is the preference between the models of urban sprawl or compact cities. What feeds the debate is the absence of solid empirical evidence to support the arguments made either for or against sprawl. Pivotal issues, such as the effect of urban density on the environment, remain to a great extent questionable.
- The understanding of the generation and the impacts of some pollutants to human health generated by transport such as fine particulates (below 2.5  $\mu\text{m}$  of diameter), ozone as well as some unregulated pollutants, like PAHs demands further research.
- As with regard to the effects of pollution on monuments, as stone quality, climate and the present pollutants, there is a lot of variation and impacts are highly variable from one locality to the other. Thus, these evaluations are difficult to be made and they only give reason for proportional damages, such as fractures or the loss of engravings, and not for discontinuous events.
- With respect to the noise, the only existing evidence of effects are those based on sleep disturbance and annoyance. Little is known in respect of estimating if excessive noise might contribute to long term adverse effects on health.
- Finally, more research needs to be done aiming at quantifying the impact on severance of land and visual impacts (Blackledge 2009).

#### *Economic problems*

- There is an absence of consistency when different economic factors are treated in different policy and modelling approaches.
- Also, information is lacking as with regard to urban freight. Hence, efforts should focus on how to ensure that the availability and compatibility of such information across European cities is guaranteed (Blackledge 2009).

#### *Land use solutions*

- The understanding of the underlying behavioural and structural mechanisms that cut across land use/transport interactions still remains inadequate. In order to improve this understanding, research is required that will take into account wider urban contextual factors that stand outside the dualistic land use/transport relationship (Blackledge 2009).



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### *Strategy Development*

- Research is necessary on how the traditional techniques used in plan-led strategy development processes, such as modelling, appraisal, mathematical optimisation etc., can be incorporated within an overall framework aiming at encouraging participatory democracy by stakeholders.
- More research is also needed on how to specify which are the appropriate sustainable performance indicators and differentiate between them, when these are applied in different spatial contexts.
- Moreover, lack of research can be identified on how to develop mechanisms for incorporating socially excluded groups into active public participation processes, as well as for stimulating the participation in long term strategic planning of those who are mostly concerned in participating in discussions over short term plans.
- The relationship between “solutions” and “problems” in overcoming barriers is not self-evident but greatly complex, and more research needs to be conducted in this field.
- Finally, case studies are necessary to be investigated in which goals were set in the past and involved meeting a specific requirement for the present. Questions that demand to be addressed are “were these goals met?” and “if not, what are the policy implications?”(Blackledge 2009).

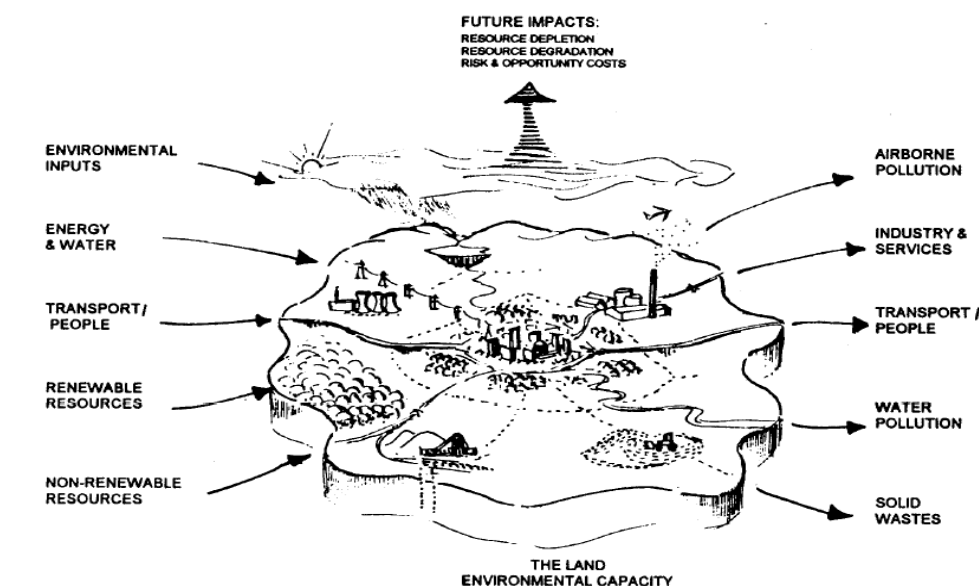
### **3.3 Urban metabolism from the scope of planning**

One of the best approaches to evaluate the environmental dimension of a city’s sustainability consists in analysing the city as an organism, characterizing its metabolism: the city is a complex system that, in order to maintain its vital functions, consumes materials and energy and, after digesting them, accumulates materials and releases different forms of waste, which, in turn, are transformed in environmental problems. The utilization and flow of material resources (solid, liquid and gaseous) underpins economic and social development, but the ways in which they are used can create waste, emissions, effluents and resource shortages. One of the biggest challenges to sustainable development in Europe is a more responsible management of natural resources. Breaking the link between the economic growth, and the use of resources has been determined as a headline objective.

All over the world, urban planners and decision-makers on the local level, are required to meet the needs of the residents of their jurisdiction. However, in view of the growing complexity of managing all and more rapidly evolving cities, and with fewer and fewer resources granted by the central governments, the end-users of the BRIDGE Project should abstain from old tactics that focus solely on the economic and physical infrastructure of cities, namely on spatial planning, housing, transport and urban water systems, but rather on engaging on more integrated city planning instruments where the theory of systems is applied.

## Sustainable city-region (4) ENVIRONMENTAL METABOLISM

General picture of inputs, outputs and transformations



**Figure 1.** Sustainable city-region; Environmental Metabolism (Ravetz J. 2000)

According to Coelho and Ruth (2006), urban metabolism provides a way of quantitatively measuring resource inputs and waste outputs - production, consumption, recycling and waste - relative to a city or urban area. It can be thought of as a city's circulatory system, which processes matter and energy. The importance of incorporating energy (or embodied energy) is also pointed out into the analysis. A broader concept of urban metabolism is the social as well as biophysical means by which cities acquire or lose the capacity for sustainability in the face of diverse and competing problems (Coelho and Ruth 2006).

Similarly, Gandy (2004) points out that when we think of what a city is, we cannot avoid contemplating the complex mass of structures that bind different elements of urban space into a coherent functional entity. Urban infrastructure has often been conceived as a functional lattice of different elements, which correspond to the different organs of the human body. Therefore, the metabolism of the modern city is frequently presented as an interconnected space of flows dependent on the external input of energy, materials and information (Gandy, 2004).

According to Idrus et al. (2008), the concept of urban metabolism can be widely used to determine the liveability or the vulnerability of an area. It has a great potential to help planners understand the problems occurred in a specific city. Analogically to the human biological metabolism, urban metabolism concerns a process that takes place in a city and can produce two expected outcomes; first, a positive outcome when components of the system function well to produce good outcomes for the urbanites-hence the liveability parts; second, a negative outcome when the components of the city system produce stress and problems-

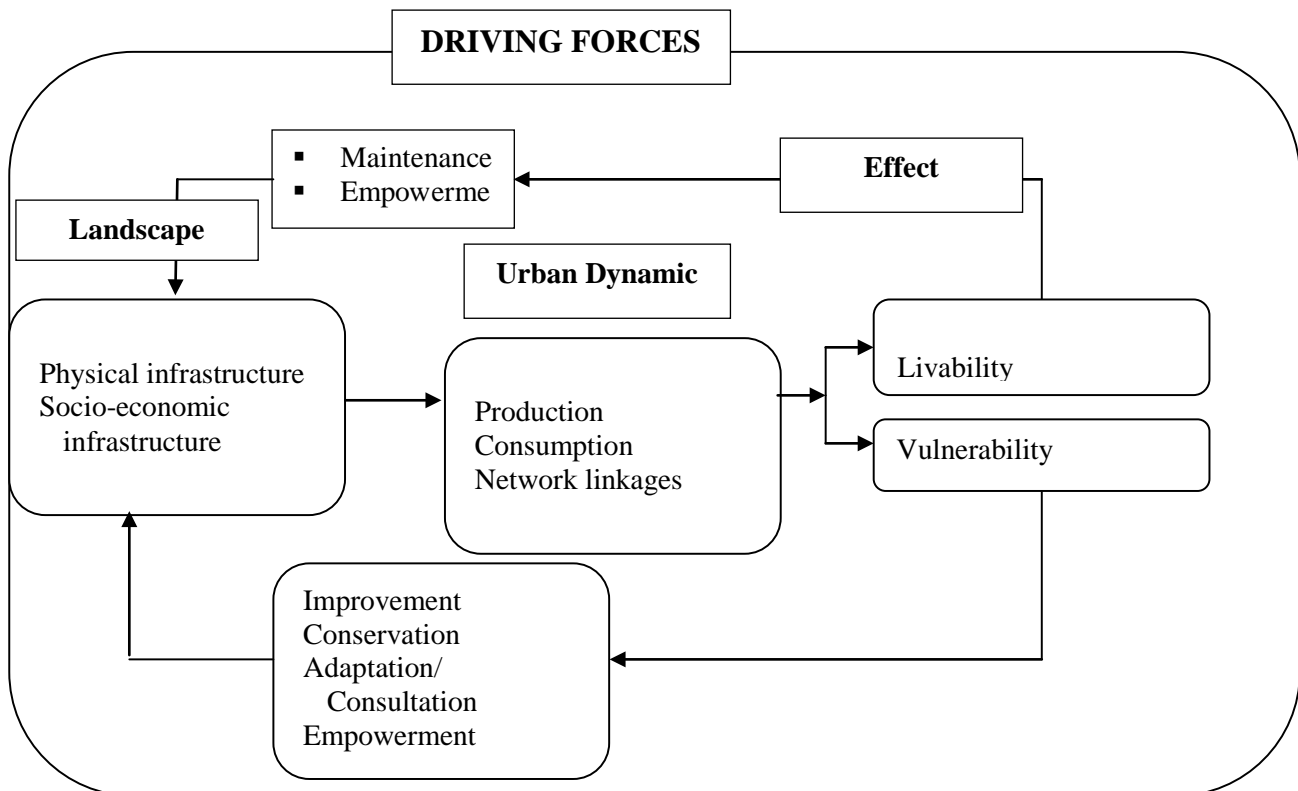


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hence the idea of ‘vulnerability’. The whole idea is adapted and represented in a diagram below. The diagram allows the expression of the spatial aspect of urban metabolism. It also allows the observation of distribution patterns of both events of the liveable and vulnerable aspects of the city area.



**Figure 2.** Simplified model for spatial urban metabolism (Idrus et al., 2008)

Using the landscape to represent the city space, the city is well endowed on the whole with both physical infrastructures such as roads and the infrastructures for power and water supply, and social infrastructures such as educational, health and recreational ones. Governing infrastructures should also be provided to ensure a smooth, transparent and efficient running of the city. These infrastructures facilitate socio-economic activities as shown in the city’s production, consumption and links with the hinterland and with other cities. Sub- areas with not only good infrastructures but also with good local participation and support in a working local and public partnership will render the place liveable. On the other hand those city sub-areas that have poorly maintained and degraded infrastructures may show-case many localized problems. Such sub-areas are said to be vulnerable local areas. The back-loop for the liveable sub-areas goes to the need for continuous maintenance, while the vulnerable sub-areas require specific attentions. Socio-economic drivers, global and local, move the whole urban system (Idrus et al., 2008).

The present day form and structure of most major European cities is not the result of continuous planning efforts but rather of incremental and often unchecked development processes. The design of more environmentally efficient urban agglomerations is a prime challenge for planners. A comprehensive knowledge of the urban system is needed to move from general goals of the development of sustainable cities to the necessary clear guidance and targets. In particular, the links between socio-economic driving



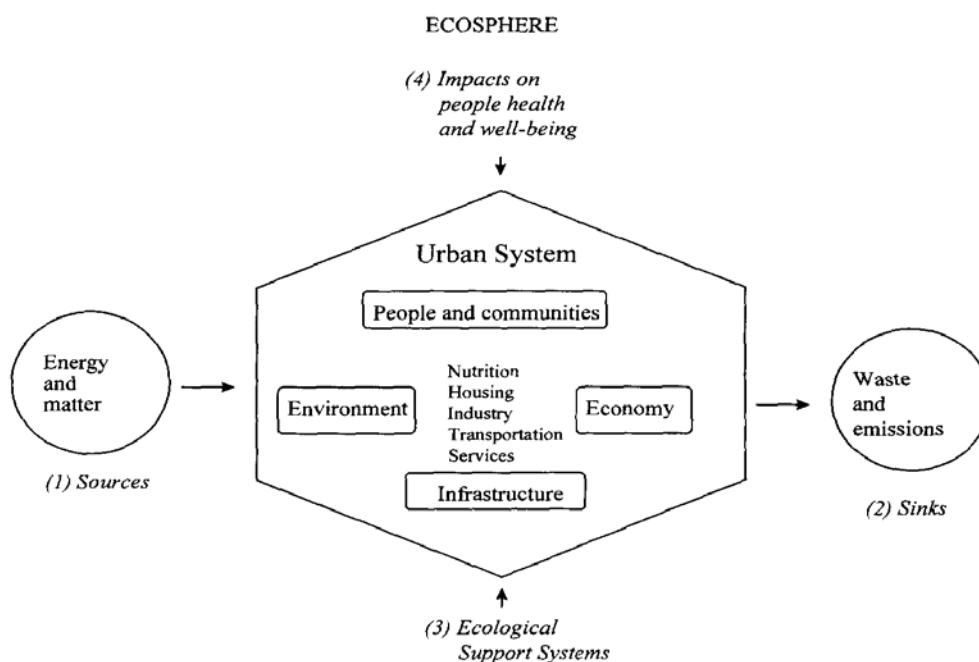
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forces, the functioning of the urban system and its environmental performance have to be understood. What is needed is the optimisation of the urban planning in order to:

- Accommodate increasing demand for space and resources.
- Reduce material and energy consumption.
- Include sustainability objectives at all scales (from regional to site level).
- Incorporate bio-physical scientific knowledge into the planning process on a routine basis.
- Include environmental indicators (related to consumption of energy and materials alongside conventional economic, institutional and social measures) in the evaluation of settlement performance.



**Figure 3.** Ecosphere (Alberti, 1996)

The ultimate goal of planning should be the attainment of a “healthy city,” one constantly learning from past experience in order to improve the quality of life. The search for quality is not a search for static longevity or short-lived functionality, but long term development. However, measurement, especially over the long term, is complicated by a general lack of data (both quantitative and qualitative) describing the interaction of system components. The development, through more integrative research and large-scale experimentation, of a unified urban systems theory will serve to create common ground on which to collect and analyze such information and implement more effective policies (Coehlo and Ruth, 2006).

Urban policy makers should be encouraged to understand the urban metabolism of their cities. It is practical for them to know if they are using water, energy, materials, and nutrients efficiently, and how this efficiency compares to that of other cities. They must consider to what extent their nearest resources are close to exhaustion and, if necessary, appropriate strategies to slow exploitation. It is apparent from this review that



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metabolism data have been established for only a few cities worldwide and there are interpretation issues due to lack of common conventions; there is much more work to be done. Resource accounting and management are typically undertaken at national levels, but such practices may arguably be too broad and miss understanding of the urban driving processes (Kennedy et al., 2007).

What planners and other relevant actors need is to approximate how changes in urban structure will affect future material and energy flows, both qualitatively and quantitatively. Based on the knowledge of environmental impacts, future planning and restructuring of elements within a city can be more precisely targeted at increasing sustainability (Bory and Schremmer, 2009). More precisely, sustainable urban plans should combine high levels of understanding about the interrelationship between the spatial forms of urban built structures and the level of resources used in urban systems. The desirable result is cities with social integration, combining residential, commercial, and tertiary types and uses, along with communal facilities and green zones. In addition, they will be supported by systems that promote energy efficiency, the control of water use, recycling and incorporation of information and knowledge technology.

Towards this direction, a few preconditions are vital to be taken into consideration. The success of an urban policy, a scheme, or an action is dependent on some features. One of these is the engagement of many parties, including those directly involved - for example the socially excluded and/or those living in renewal or restructuring areas. Urban governance and empowerment seem to be important conditions of success. This implies that the population of an area in focus should be transferred from passive citizenship to active participation. Citizens must be actively involved in all stages of policy process. The philosophy is that by providing such competence, the residents are supposed to be capable of managing their own lives and the necessary actions for improvements. Community empowerment has become a key concept in discussions of urban regeneration in many European countries. The motives differ, but in general the idea is that empowerment of the community would create long standing, better and cheaper results than “traditional” programmes (Andersen and Kempen, 2003).

In January 2006 the EU launched a Thematic Strategy on the Urban Environment ‘to help Member States and regional and local authorities improve the environmental performance of Europe’s cities. Its goal was to facilitate better implementation of EU environmental policies and legislation at the local level through exchange of experience and good practice between Europe’s local authorities. This strategy stated the necessity that ‘creating high quality urban areas requires close co-ordination between different policies and initiatives, and better co-operation between different levels of administration’. Support mechanisms are required to provide reliable guidance on how to incorporate sustainability into practice that include ways to involve all levels of stakeholders including policy makers, technicians and the general public (Jones and Patterson, 2007). Its overall objectives for seven priority challenges are:

- climate change and clean energy
- sustainable transport
- sustainable production and consumption
- public health threats
- better management of natural resources
- social inclusion, demography and migration
- fighting global poverty

These illustrate the holistic nature of sustainable development reaching across environmental, social and economic issues at local and global scales (Jones and Patterson, 2007). All are deeply rooted in the built environment and need to be taken into serious consideration in the processes of urban planning.



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### 3.4 Review in terms of empirical data

Urban planning is a complicated task. Due to its complexity and its multi-dimensional character, the approach of empirical method is vital. The aspects of land uses, urban economic development, transportation usage, resource consumption, environmental protection and continuity of cultural heritage can only be addressed by empirical data.

The achievement of sustainable urban planning presupposes the access to detailed urban data, in order to monitor and evaluate progress towards the sustainability targets that have been set. The most common tool that gives empirical meaning to complex concepts is the indicators that manage to translate abstract concepts into operational terms. The use of quantitative indicators began with a view to measuring economic questions in the 1940's and continued in the mid 1960's to measure social changes. In the 1990's, when several environmental questions emerged, the indicators transformed in order to measure sustainability and the different aspects of quality of life (Lira, 2007).

Nowadays the use of indicators accurately measures and monitors conflicting policy trends. The most common dimensions that empirical data deal with are the following:

- Planning, design, land uses
- Vibrant, sustainable local economy
- Social equity, justice and cohesion
- Transportation, better mobility, less traffic
- Responsible consumption and lifestyle choices
- Energy and climate change, environmental protection
- Local management and governance towards sustainability
- Local action for health - Natural common goods (Berrini and Bono, 2008)

According to the UN Commission on Sustainable Development (1996), indicators are developed around certain key issues. Indicators selected exemplify a set of norms for seven policy sectors from the point of view of key stakeholders or players in the arena. From these norms UNCHS and the World Bank derived a number of objectives and then selected indicators to help evaluate the policies designed to meet these objectives. The background document refers to a "well-functioning city" as the result of "well-functioning" sectors, and classifies indicators into seven categories: (1) socio-economic development, (2) infrastructure, (3) transport, (4) environmental management, (5) local government, (6) affordable and adequate housing, and (7) housing provision. In addition, the UNCHS Indicator Program includes a background-data module, which provides selected demographic indicators (Alberti, 1996).

A mere example of urban indicators can be tracked in the Urban Ecosystem Europe Report which provides an integrated assessment of 25 indicators applied in 32 main or bigger cities in Europe and focuses on their local responses capacity and needs (Berrini and Bono, 2008). These are:

1. Air quality: PM10 concentrations
2. Air quality: NO2 concentrations
3. Noise map and noise reduction plan
4. Domestic water consumption
5. Inhabitants served by water treatment plants



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6. Electric consumption variation
7. Amount of municipal waste produced
8. Municipal waste, differentiated collection
9. Green public procurement, procedures and purchasing
10. Passengers travelling on public transport
11. Underground and tram lines in the urban area
12. Number of registered cars
13. Cycle paths and lanes availability
14. Public green areas availability
15. Energy Balance and CO2 reduction target
16. Solar power generation in public buildings
17. Inhabitants connected to district heating system
18. Climate and Energy saving policies
19. Demographic and old age dependency
20. Female employment
21. Population qualified at highest level of education
22. Environmental certification of public authorities
23. Level of implementation of Agenda 21 processes
24. Electorate voting in city elections
25. City representatives who are women

The above list of indicators covers in a great degree the complexity of urban planning and provides the final report with empirical data, bringing out the strengths and weaknesses of cities.

Urban indicators are crucial to help local and national policymakers improve their action towards sustainability. They serve several purposes: (1) systematic monitoring of urban environmental changes, (2) early warning of urban environmental problems, (3) target setting, (4) performance reviews, and (5) public information and communication. Indicators provide information in a form that facilitates communication among experts, policymakers, and the public. By simplifying a vast amount of information into a simple form, they make it much easier to read and understand (Alberti, 1996).

One should also keep in mind that the planning of cities involves a number of agencies, such as different levels of government, local authorities, NGOs and many others. In this case, indicators can be a tool around which co-ordinated planning and resource targeting between the various agencies involved in urban management can take place. They are vital for reporting and communicating with the public and other stakeholders and therefore they can assist towards transparency and accountability in urban governance<sup>5</sup>.

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<sup>5</sup> (<http://www.sacities.net/downloads/StrategicPlanforUrbanIndicatorsProgramme.doc>).



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Currently, the great challenge in drawing up indicators is how to collect, efficiently, valid and good quality data which are suitable for analyzing a given reality, in a satisfactory way (Lira, 2007). Moreover, the use of indicators in urban management is limited by the following factors:

- the sharing of methodologies and projects between cities is weak
- the information analysis and indicator work that is undertaken in local authorities is not effectively tied to the strategic planning of local authorities
- the absence of a core set of urban indicators which would allow the comparison of levels of development between the major urban areas
- the data collected by local authorities are not being used effectively and the data collected by national departments are not always suited for use by local authorities

In order to overcome these obstacles Alberti (1996) proposes several practical steps that should be considered:

1. Create a public forum involving all groups in the community and facilitate their participation to help identify key issues and select indicators.
2. Create expert panels and opportunities for policymakers to interact with them in setting targets and criteria for evaluating indicators.
3. Identify data needs and specific mechanisms for their systematic collection.
4. Explore opportunities for linkages among urban policy areas and between urban-monitoring activities and policymaking.
5. Establish mechanisms to evaluate indicators and recalibrate them towards new policy goals (Alberti, 1996).

Effective monitoring of urban environmental quality and performance should provide planners with the information they require to design sustainable plans. This information should improve the way urban dwellers live in and use cities. Indicators work as feedback mechanisms. They succeed when the users modify their behaviour in light of the new information available. In this context, most urban indicator programs refer to four key characteristics of successful indicators: a) policy relevance b) scientifically founded c) readily implemented and d) usable for decision-making (Alberti, 1996).

### 3.5 Review in terms of modelling capability

The need to understand the dynamics of a particular urban region, the interrelationships between population, land use, transportation, economics, environment, and other factors is crucial to effectively develop urban policies. The gathering, organizing, analysis, and dissemination of this information remain vital to the goal of creating more sustainable cities. The main question lies in what tools and methodologies are best to use for this type of assessment.

Geographic information systems (GIS) consist one of the fundamental tools that planners and policy-makers utilize to ensure the sustainability of cities. The use of GIS in this endeavour provides solid, spatially referenced data that serves as a fact-based foundation for the decisions that need to be made. However, the data show that the tools and methodologies currently being developed through academic and private research are often not making it into the hands of the decision-makers that deal with these issues everyday (James, 2008).

Moreover, the authorities apply urban management tools for planning purposes. In France, for example, these tools are the plan d'occupation du sol (POS) or the schema directeur d'aménagement et d'urbanisme (SDAU) or more applied tools like the zone d'aménagement concertée (ZAC) (Weber, 2003), which are



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associated with cities strategic planning decisions. Remotely sensed data are often used to get a general view of urban areas but are seldom integrated in a landscape modelling approach. Nevertheless, satellite imagery can be a valuable help in designing decision support products allowing city development visions.

Additionally, Decision Support Systems (DSS) have been developed to introduce multiple inter-disciplinary aspects to the planning process. In this context, GIS capabilities are exploited to develop a DSS capable of integrating the data, the model results and the models and the impact assessment methodologies and providing scenarios for resource optimisation in urban fabric. These scenarios are then evaluated by end users contributing to the development of new strategies for a more sustainable use of energy and materials in urban planning. The concept of DSS lies in the combination of computer technology and design methodology that is intended to significantly restructure the relationship between the user and the analyst (Henderson, 1985).

According to Alshuwaikhat and Nkwenti (2002), the complexity of socioeconomic, environmental, and socio-cultural dynamics was the reason of developing decision support systems, with a majority of them anchored to a dedicated GIS environment. Decision-support systems have been studied for applications in many areas related to planning schemes. The essential character of DSS is to couple a set of processes or tools strategically such that they can be logically and chronologically employed in the solution of a problem. A flow chart is required at the outset, to establish the hierarchy of the processes involved and the devices to be employed at each stage. In addition, there are logical decisions to be made in cases of unexpected outcomes, and in terms of what the final outcome should represent. Usually a number of models are coupled together, with either strong or weak links, each with an internal flow chart. These processes have been greatly simplified with the introduction of model builders within GIS applications (Alshuwaikhat and Nkwenti, 2002). Within a DSS multiple other techniques and methodologies can be used such as:

- techniques of multivariate analysis, principal component analysis and cluster analysis
- econometric Multi Criteria Analysis (MCA), which combines measurable information with intangible or more subjective information, providing ways of comparing and ranking different outcomes across several dimensions
- Cellular Automata (CA) that is recognised by the scientific community as a valuable tool for linking models that operate at different spatial and temporal scales
- Network Analysis - Creative System Modelling - Decision Support (NetSyMoD) methodology in the framework of which, the integration and implementation of state-of-the-art approaches in the field of modelling will be carried out. It allows different visions of the problem to be shared among different actors arriving at a consensus over the main components of the urban systems

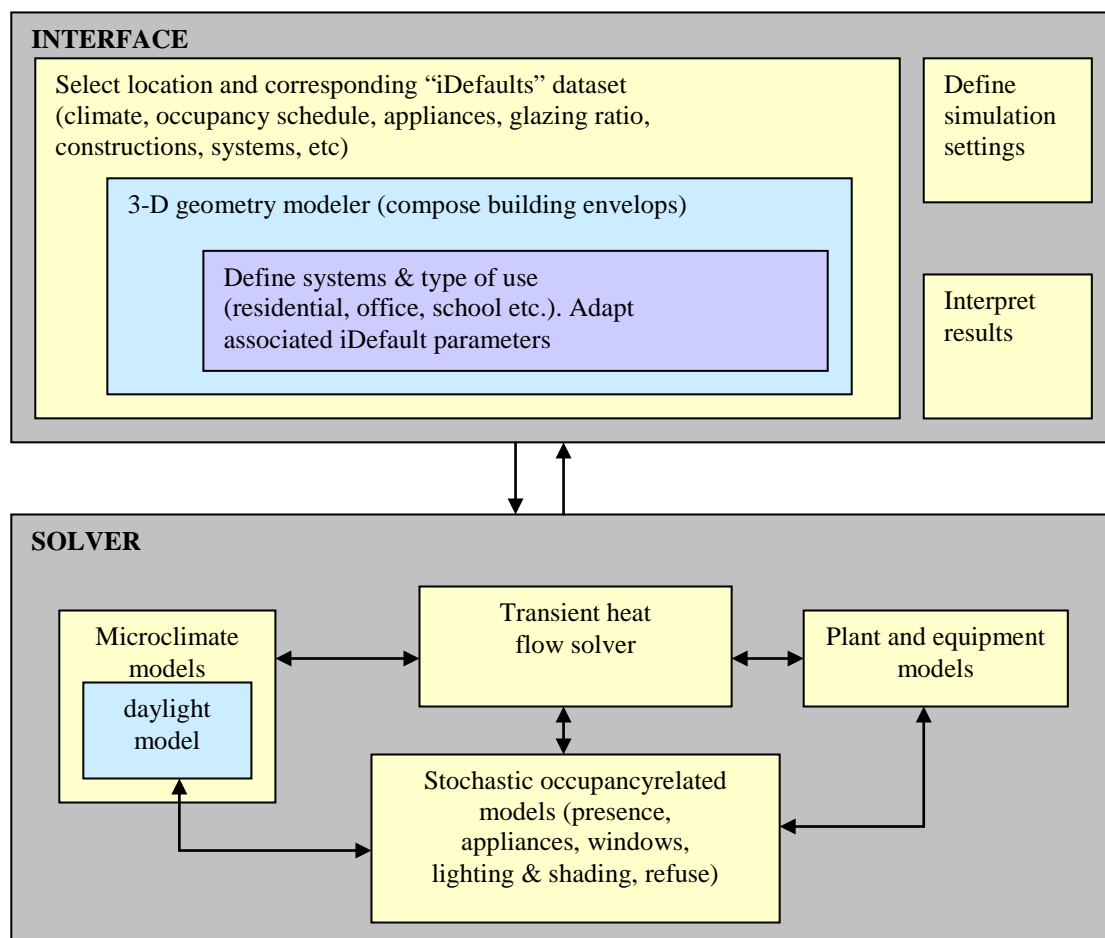
The European Community has already funded numerous projects on urban sustainability based on modelling tools. One of them was SUNtool (sustainable urban neighbourhood modelling tool) for the design of more sustainable urban neighbourhoods based on accurate simulations of resource (energy, water and waste) flows. In this, the software enables the designer to optimise the layout, form and fabric design of buildings to minimise energy demands as well as to choose the optimum combination of technologies to supply and control energy and to process water and waste – all accounting for sensitivities to microclimate and human behaviour (Robinson et al., 2007). SUNtool is the first of a new genre of simulation tools, developed to support urban designers to optimise the environmental sustainability of their master planning proposals. From the outset of its development, the aims were to develop a quick and easy to use interface to describe the factors which influence the dynamic demand (mainly for buildings) and supply of energy, water and waste. An integrated solver should simulate the flows of these resources (energy and matter) in a way that is sensitive to the urban microclimate, to human behaviour, to synergies between buildings and resources and finally to the presence of district resource management centres (Robinson et al., 2007).



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**Figure 4.** Conceptual design of the SUNtool software (Robinson et al., 2007)

SUNtool is uniquely capable of producing urban energy planning guidelines taking into account the set of energy implications of the urban context on building's energy consumption. It is also uniquely placed to support the (environmentally) sustainable planning process – from defining building layouts, their forms and facades, through to the energy systems supplying them (Robinson et al., 2007).

Decision support systems are developed around some basic principles:

- To provide information on the different aspects of sustainability (economic, social and environmental), which is easy to use
- To clarify the sustainable objectives of a specific project
- To ensure that all stakeholders' views are represented and the choices that are made are conscious and informed (Jones and Patterson, 2007)

Another good example of DSS has been produced by the pan-European BEQUEST network, in order to make informed decisions on urban development. According to Hamilton et al. (2002), its overall aim is to enhance urban sustainability, by developing a built environment that meets peoples' needs whilst avoiding unacceptable social or environmental impacts. The system, called the BEQUEST toolkit, consists of modules that present advice on how to make urban development projects more sustainable, how to assess their sustainability and whom to contact for further advice. A glossary of terms related to sustainable urban development, as well as links to best practice examples and other additional information are also included in



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the toolkit. The system addresses the issues in a holistic manner and aims to bridge the various scales of urban development from whole urban regions down to buildings and their components and materials.

Another computer based interactive guidance system is PETUS (Practical Evaluation Tools for Urban Sustainability). It started from a practice based approach using experience gained through case studies and end user involvement. Several end users were regularly consulted during the development of the system and many had the opportunity to present their experiences directly to the project (Jones and Patterson, 2007). Moreover PETUS provides the stakeholders with an interactive guidance system and well defined objectives to be shared among them, keeping sustainability goals alive during the duration of programmes or policies. More specifically, the PETUS system was developed in order to:

- provide information on environmental, social and economic aspects of sustainability that is practical and easy to use,
- assist with clarification what the sustainable objectives are for a specific project,
- ensure that all aspects of sustainability are considered and informed choices made,
- ensure design intent feeds through the programme and any changes are made as a conscious decision and
- ensure that all stakeholders views are represented (Jones and Patterson, 2007).

PETUS system has a collection of tools (142) that can be used to assist in incorporating sustainability into urban infrastructure projects. The tools have either been used within the case studies or are tools that have been reviewed as part of wider literature review and are practical for use. The tools can be accessed in three ways:

1. From the sector approach, tools related to the six different sectors of PETUS (energy, waste, water and sewage, transport, green/blue structures and buildings and land use)
2. From the cases studies – for each case study the tools used are listed and can be accessed.
3. From the tools library – this includes a list of all the tools used.

It is often difficult to identify the most appropriate tool for use in practice and for this reason many tools are not used as often as they could be. Tools are often rejected for fear that they will take too long to complete or may not be the ‘right tool for the use’. Many tools have been identified during PETUS that are being used in practice to assist with sustainable urban development. The use of tools varies in their role within the decision making process of a project including:

- stages used within a project – from inception of the idea of a project through design, design assessment, construction, operation and demolition,
- length of time a tool takes to use in practice can range from one stage to the whole lifetime,
- required output – this can range from a simple checklist to a detailed report.

It is these characteristics that determine the type of tool that is likely to be used within a project. The use of many different tools reflects the complex problems to be tackled in implementing sustainability in urban infrastructure projects and policies. Moreover, the combination of different kinds of tools enables stakeholders to develop a holistic approach to sustainable development. PETUS case study investigations have found that tools are adapted to fit the context. This means that tools are not necessarily used in their original format with tools being developed through practical use. Sustainability in decision making is an iterative process, as every time a tool is used at any stage within the decision making process, knowledge is developed further. This results in more informed decisions being made at the same stage in future projects (Jones and Patterson, 2007). A few of these tools are further presented below:



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One of them is the Building Research Establishment Environmental Assessment Method (BREEAM), which was originally launched in 1990. It sought to provide authoritative guidance in ways of measuring and minimising the adverse effects of buildings on the global and local environments, while promoting a healthy and comfortable indoor environment. The scheme has become an internationally recognised standard and forms a significant component of the environmental policy of many organisations and businesses. The BREEAM certificate provides a label for the building that enables owners and occupants to gain recognition for the building and their environmental performance. An overall rating of the building's performance is given using the terms pass, good, very good or excellent. BREEAM's principal aims are:

- To mitigate the impacts of buildings on the environment
- To enable buildings to be recognised according to their environmental benefits
- To provide a credible, environmental label for buildings and
- To stimulate demand for sustainable buildings (<http://www.breeam.org/>)

Another tool is BEES software. It is based on a technique for balancing the environmental and economic performance of building products. The tool is based on consensus standards and it is designed to be practical, flexible, consistent, and transparent. The Windows-based decision support software, aimed at designers, builders, and product manufacturers, includes actual environmental and economic performance data for a number of building products. The approach is based on the belief that all stages in the life of a product generate environmental impacts and must be analyzed. The stages include raw material acquisition, manufacture, transportation, installation, use, and waste management. Economic performance is measured using the American Society for Testing and Materials (ASTM) standard life-cycle cost method. The technique includes the costs over a given study period of initial investment, replacement, operation, maintenance and repair, and disposal. Environmental and economic performance are combined into an overall performance measure using the ASTM standard for Multiattribute Decision Analysis (Lippiat and Boyles, 2001).

Another tool is the Housing Quality Indicator (HQI) system, which is a measurement and assessment tool designed to allow potential or existing housing schemes to be evaluated on the basis of quality rather than simply of cost. The quality rating derived by using the system does not provide a direct correlation with financial value, nor does it not set out minimum standards. Developers can use the HQI system to improve the quality of their housing schemes. One of its key applications is to allow the evaluation of different schemes against a fixed brief. In addition, as part of the process of completing the HQI assessment, potential developers and their architects should also be able to make design decisions that result in higher quality housing with minimal cost implications. Developers should be able to monitor their success in achieving good HQI quality scores, and learn from their successes and mistakes. The structure and application of the HQI system has been formulated with these uses in mind. The HQI allows an assessment of quality of key features of a housing project in three main categories: a) location, b) design and c) performance. These three categories produce the ten "Quality Indicators" that make up the Housing Quality Indicator system (Harrison, 1999).

Finally, SPARTACUS (System for Planning and Research in Towns and Cities for Urban Sustainability) is an indicator system and decision support tool for assessing sustainability implications of urban land use and transport policies. The objectives of the project were:

- to design and specify a system for analysing the interactions between transport, land use, economy, the environment and social factors and forecasting these into the future,
- to build strategies for urban sustainability using combinations of land-use, transport and environmental policy instruments (regulation, pricing and investment),



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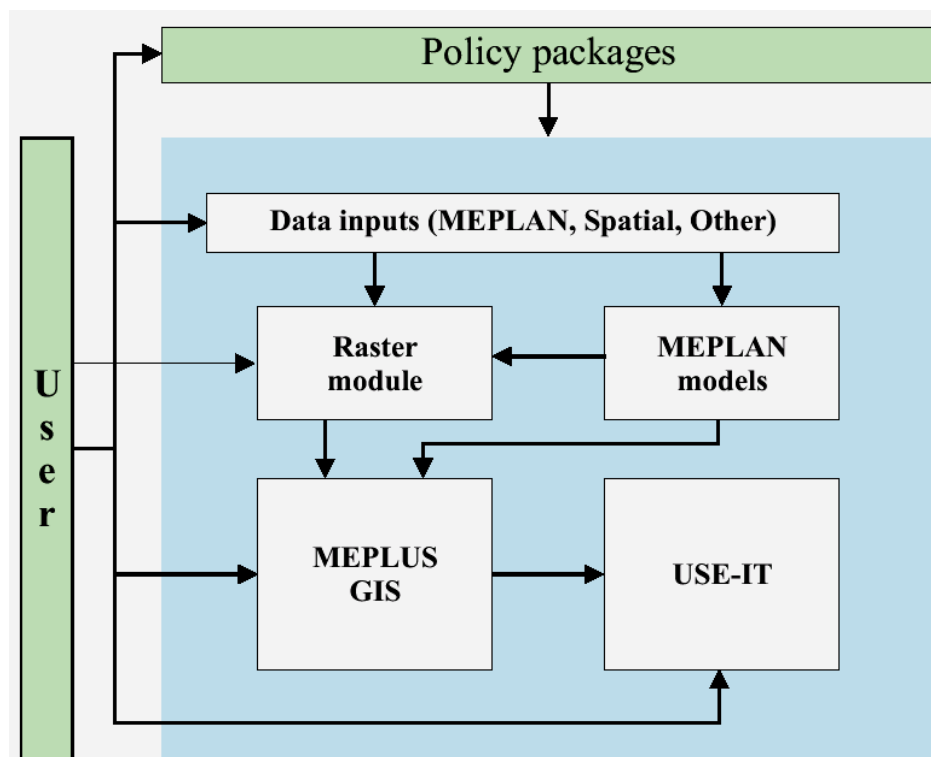
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- to simulate and assess the long-term effects of introducing these policies in each of the pilot cities and to compare and explain any differences in results,
- to specify common sets of policies that are economically, environmentally and socially sound and viable and that could be successfully used in different types of cities within the European Union
- to give policy recommendations and to disseminate the results.

The model system developed for SPARTACUS combines newly developed modules with an existing land-use transport model:

- MEPLAN is an integrated land-use transport model forecasting land uses and traffic flows subject to regulation, pricing and investment policies in land use and transport.
- The Raster module uses GIS techniques to calculate spatially disaggregate indicators of emissions, air quality and noise intrusion.
- MEPLUS-GIS is an analysis, report and presentation module.
- USE-IT is a decision-support tool for the evaluation of policy alternatives based on multi-criteria utility theory (Wegener, 2000).



**Figure 5.** The SPARTACUS model system (Wegener, 2000)

Sustainability is measured in SPARTACUS by a set of indicators. These indicators were chosen so that they are sensitive to urban policies, independent from each other, follow the impact chain, and can be forecast. They are categorised into economic, social and environmental ones (Wegener, 2000).



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## 4. Inputs, use and transformations, and outputs of resources from the urban area

### 4.1. Systems, Services and Functions

The urban metabolism concept has already represented a holistic approach to urban planning by exploring the interaction among resource flows (water and energy), waste streams and assimilation capacity urban transformation processes, and quality of life. Nevertheless, over the last decades, the strategic urban planning systems adopted and developed with a focus on the urban metabolism concept, were largely oriented to energy use, transport and land use, usually translated in terms of ecological footprint analysis, environmental space and carrying capacity. These tools of urban planning often consist a modelling framework associated with a set of indicators, by which the environmental and economic implications of city policies can be evaluated (Rotmans, Van Asselt, 2000).

Most often, municipal officials resort to short-term problem solving, band-aid solutions and crisis management, when in most cases, progress is being made in one area at the expense of another crucial issue (Hallsmith, 2007). So far, what has been missing as a core axiom for the development of these urban planning tools is, sustainability. Existing knowledge of city dynamics suggested that alterations in the economic and physical infrastructure are heavily related to changing social-cultural, institutional and ecological dynamics, which urgently emphasizes the need for real integrated systems approaches, taking into consideration the whole spectrum of both physical and less tangible changes in city dynamics (Rotmans, Van Asselt, 2000).

#### 4.1.1 The evolution of community systems

One useful embarking point for the end users to attempt to meet people's needs and create real sustainable cities, is to think that the entire communities work in circles. As Hallsmith appositely quotes, “all of our interactions – the purchase and consumption of goods and services, the ways we exercise political power, our social institutions and relationships – have cyclical characteristics. The ways in which the cycles of community life either strengthen or weaken themselves through time all impact the health and sustainability of the whole community system” (Hallsmith, 2007, p.3).

Community's effort to meet human needs can be divided in four sectors, the environmental system, the economic system, the governance system and the social system, each of which serves us by meeting our needs respectively for care, power, economic resources and material well-being, and all have their own own resources, cyclical dynamics and reproductive functions. These community systems have evolved from our very nature of being social being and depending on a community for survival (Hallsmith, 2007). Over time, these community systems have been created by human beings to meet their own needs. As needs become more cumulative, unsustainable practices are more common, which in turn results in driving people at an accelerate rate towards global destruction. Moreover, a typical feature of communities is that they possess all of the systems characteristics (cyclical dynamics, stocks, flows, equilibrium, etc.). If the insights offered by systems dynamics are applied, not only persistent community problems can be better understood and addressed, but also more productive strategies for meeting our needs in new sustainable ways can be materialized (Hallsmith, 2007).

Another characteristic of community systems often overlooked and underestimated, is that they exist not only for the satisfaction of our economic and material needs, but also for our inherent need for power, care, spirituality, education, and other social development, which are not always fulfilled within community



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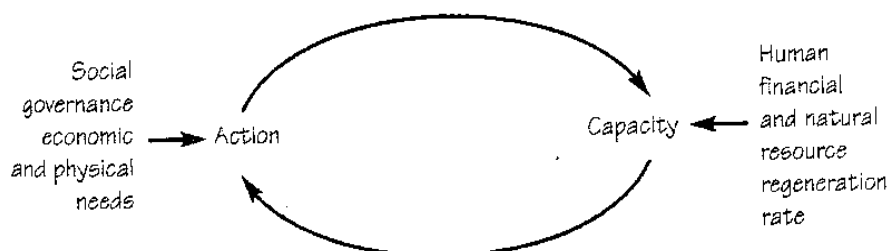
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systems. Moreover, if community is viewed holistically, where all the different interactions take place are examined, that either enhance or erode the capacity of the community to satisfy its future needs, then this will clearly correspond to the main issue for sustainable development. A final point to be highlighted with regards to the community systems characteristics is that a) by their very nature are alive; over time they maintain themselves through the interaction of their different component parts, and b) they are dynamic; they grow or shrink, they move and change. Realizing how these dynamics operate within the community systems, gives valuable information to decision makers and urban planners when they work with communities to help them meet their needs in a more sustainable manner (Hallsmith, 2007).

### 4.1.2 Supply and demand – Sustainability equation

Nowadays, cities face many challenges in meeting community's needs, which essentially stem from lack of both physical and community capacity to meeting these needs. These are basically represented as supply and demand; the resources that satisfy the needs and the needs themselves. On the demand side, cities are challenged with abrupt and serious increases in population that stresses their ability to meet the needs of the citizen. In addition, another significant factor that tends to influence the demand side of the equation is our changing perception of our needs, due to increased consumerism (Hallsmith, 2007). On the supply side, political, economic and environmental conditions may change. An important insight offered by Hallsmith is that as “in economics, the circular flow of money through the economic cycle has led to theories of the multiplier effect and a more sophisticated understanding of how the economy works, a similar understanding of the flows of other resources through the community system can help us understand the sustainability as a whole – on the social, political, economic, and environmental levels” (Hallsmith, 2007, p.24). On one hand, the demands of a community come in the form of actions taken to satisfy needs, and on the other hand, the supply resources a community owns to meet needs, namely its capacity in a specific area, is influenced by the regeneration rate.

How this supply and demand affect each other is illustrated in figure 1. Here, the idea of sustainability is manifested in its simplest form, hence, we need to be cautious of how we enhance or erode our capacities to meet our needs, in order not to deny future generations the ability to meet theirs. A final crucial point to be mentioned it that all the different capacities communities possess to meet their needs, are interrelated. For example, if the education system of a community tries hard to offer the best education available, then the citizens of that community have more chances to be successful in other areas as well, enhancing the political, economic and social capacity of the whole community. Conversely, if the education system is not of good quality, this will impact the overall capacity of the community (Hallsmith, 2007).



**Figure 6.** The sustainability Cycle (Hallsmith, 2007, p.25)



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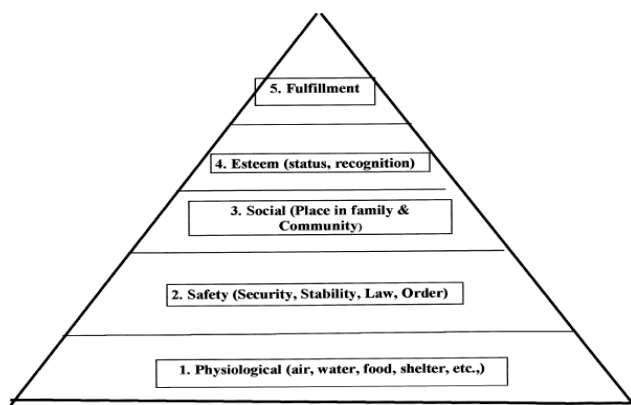
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### 4.1.3 Community actors

As was previously referred, the whole community is an aggregate of systems people have established over the years to meet our needs. It is all of its elements and actors, all of its parts that function together to provide life-giving and life-sustaining support. As part of this system, three main community actors can be distinguished; 1) the government bodies, 2) organizations, including businesses and non-profit organizations, and 3) individuals/households. Each one of these community actors responds to community needs and can be seen playing its part in the recreational system of the community (Hallsmith, 2007). Most commonly, these different stakeholders have conflicting agendas and different access to power, which can probably result in decisions made that are inconsistent with a community's vision for its quality of life. Requesting stakeholder input is more than a means of performing a statutory obligation on behalf of the government bodies, in our case the end users of the BRIDGE project. Meaningful public input is fundamental in good decision making. With meaningful public input, it is likely that a lasting contribution to a community's quality of life will be made and projects that the public truly wants will be delivered (ICF International, 2008). In order for the "politics of inclusion" to be effective, there needs to be provided a formal recognition at some levels of government through legislation legitimizing public participation initiatives. Moreover, in order for the end-users to foster a truly meaningful participation, then all concerned and affected stakeholders should be provided all the information and resources they feel necessary for to genuinely influence and sufficiently contribute to the decision-making process (Roseland, 2005).

### 4. 2. Identification of needs

The unique power of needs to captivate or demand satisfaction justifies a deeper look. How can one define need? Need is a lack of something required for each of us to live whole human lives. For our lives and our community to be whole, how do we perceive what needs improvement? How do we collect the appropriate and right data for making decision? When do we go beyond making complaints about problems as our primary source of direction? When a need assessment is completed for the system that is our community, the prime subjects are the people in the community. When both their stories and their viewpoints are collected, four broad categories of community needs surface: social well-being, governance, economic security, and physical well-being. These additionally correspond to the needs that have been suggested by Maslow" (Hallsmith, 2007). Maslow conceived a hierarchy of five levels of human needs, which were classified into the form of pyramid, as demonstrated in Figure 2. His hypothesis specified that until the lowest levels of needs had been fulfilled, one could not begin to be occupied and concerned with higher levels of needs (Melloul, Collin, 2001).



**Figure 7.** Maslow's pyramid of needs (After Maslow, 1943, in Melloul and Collin, 2001, p.48)



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If we apply systems thinking to each community need in more detail, we would discover that they all are closely and dynamically interconnected; each one can be either mutually beneficial or mutually detrimental for the rest. Precisely, if one community system is enhanced and more able to satisfy needs in a more effective way, the rest of the actors benefit. Similarly, when a system is not operating well, other areas will suffer some impacts too. Nonetheless, a sole identification and listing of human needs is not adequate for achieving sustainable cities, and sadly, no systemic approach has yet been developed to identify, connect, and compare the needs to the gaps in need satisfaction on different levels.

Additionally, the core assumption of the Bruntland Commission that the principal goal for sustainable development is the satisfaction of material needs cannot actually be accomplished in isolation from the other levels of need satisfaction. Arguably, material needs place demands on the environment, therefore it comes as no surprise that they are central points of sustainable planning. However, if one examines the hidden mechanisms through which material needs are met, it will become apparent to him/her that these needs are interdependent on other needs such as those for social well-being, equity, self-determination and economic security. In the community system, all of these different aspects work together.

The following discussion touches upon some of the needs encountered within each different category -social life, governance, economic development and the natural and built environment-, a list of which is included in table 1., as well as upon the dynamic interaction among them (Hallsmith, 2007).

### 4.2.1 Needs for social well-being

Social well-being includes our needs for a sense of community, health care, lifelong education, valued relationships, recreation, peace, safety, security, spiritual development and aesthetic life. What community systems that have emerged to meet these needs have in common, is that primarily all are associated with the way we cultivate and express our values and care for one another. To elaborate more, first of all, we need to have a **sense of community**, a sense of belonging. This is in agreement with Maslow's need for self-esteem and belonging. People seek to satisfy these needs in various ways and the fact that the already established social systems are not fulfilling our need for a sense of community possibly gives the explanation why participation in intentional communities around the world (eg. co-housing communities, ecovillages etc) has increased so greatly the last 30 to 40 years. Another core need is for people **being healthy**, that is living in such a way to advance well-being. This is a proactive, holistic approach to health care that demands to harmonize the way we live with the world. It is a significant challenge to recapture that element of the health care system, and to view health care not solely as medicine but mostly as care for our bodies, our families and our communities. Further more, one of the most valuable functions of our social system is possibly, **lifelong learning**. To live in today's world, more complex and conceptual skills are necessitated, resulting in an increase in our need for education. A vast amount of complex information should be learned by people in order for them to function effectively in this modern world. The share of this information is not only a part of education, but also manifests a mark of caring, rather than power. Another fundamental element of our social system is our need for **meaningful relationships** with others. Maslow refers to this need as a need for love and connectedness with others. Maslow also describes a need for **safety**, a key need without which we can't meet the rest of our needs. On the community or national level, it is a need for **peace**, for national security, law and order. The need for **recreation** is another prime need that satisfies our psyche and provides us time of relaxation and enjoyment. Finally, a critical element of our social system is the **spiritual development** of a community. Our need for spirituality embraces the need to develop a philosophy of life where each one of us seeks to find his/her own ways to get along in a senseless world, withstand tragedies and loss, forgive others and belong to a community that shares values and common moral codes (Hallsmith, 2007).



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### 4.2.2 Needs for empowerment

The needs we have for governance incorporates those for equity, access and conflict resolution. Maslow refers to it as a need for self-actualization, implying the need for having the personal power needed so we can choose between alternatives that help determine and improve the path of one's life. First of all, **equity** is an interesting concept to characterize as a need, particularly as a need that is linked to the way we exercise power. Through time, all the rights movement, such as women's right and voting rights, are strong manifestation of our deep need for equity. Moreover, **access**, an aspect of how we use power, is hard to classify entirely on its own. Standing close to self-determination, it may signify that we have access to all the necessary systems, institutions, facilities etc., in order to succeed in meeting our needs. Finally, both as individuals and as communities, we all need **conflict resolution** systems. Currently, court systems, the legislative process and mediation services are a few ways that our communities satisfy meet this need (Hallsmith, 2007).

### 4.2.3 Economic needs

Economic needs include our need for employment and income. The need **for meaningful work** is linked to the need for **money**, and this is why it is included here. Additionally, work fill a great spectrum of social needs, from meaningful production activity to self-expression and self-esteem. Maslow also determines it as a need for self-esteem that derives from our work. As our global systems change, what essentially is needed, is economic security; this can only be achieved if an economy produces wealth and distributes it equitably, in order for all the people in the word to be able to exercise their natural productivity and creativity in manners that can be sustained by the natural world (Hallsmith, 2007).

### 4.2.4 Material needs

Our material needs start with a clean and safe environment. If the air and water are clean, the plants and trees are green and healthy, the houses and buildings are safe and the transportation system is quite and efficient, and the waste is frequently collected and efficiently managed, then all these systems can significantly improve our physical well-being and the overall health of the community and the individuals within it. We also need **energy** in order to have food to eat, the lights in the dark, warmth against the cold, the productive energy for manufacturing processes and our creativity (Hallsmith, 2007). We need parks and **natural spaces** in order to maintain and cultivate our relationship with nature and we need good **soil quality** so we can be able to grow food.



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**Table 2.** Human needs (largely based on Figure 5.1, Hallsmith, 2007, p.90)

| COMMUNITY SYSTEM  | NEEDS BEING SATISFIED  |
|---|--|
| SOCIAL DEVELOPMENT<br>Provides social well-being                        | NEEDS FOR SOCIAL WELL-BEING<br>Sense of community<br>Health care<br>Lifelong education<br>Relationships<br>Recreation<br>Peace, Safety and Security<br>Spiritual development – Culture   |
| GOVERNANCE<br>Provides empowerment and information                      | EMPOWERMENT NEEDS<br>Equity<br>Access – Public Participation<br>Conflict Resolution  |
| ECONOMIC SYSTEM<br>Provides income, jobs,<br>and economic opportunities | ECONOMIC NEEDS<br>Meaningful work<br>Money<br>Accessibility<br>Technology<br>Labour market development   |
| INFRASTRUCTURE AND ENVIRONMENT<br>Provides material well-being          | MATERIAL NEEDS<br>Sustainable urban form – land use<br>Clean and safe environment<br>Urban green<br>Housing<br>Transportation<br>Atmosphere<br>Water and Sewage<br>Energy<br>Waste processing<br>Soil quality<br>Biodiversity<br>Climate |



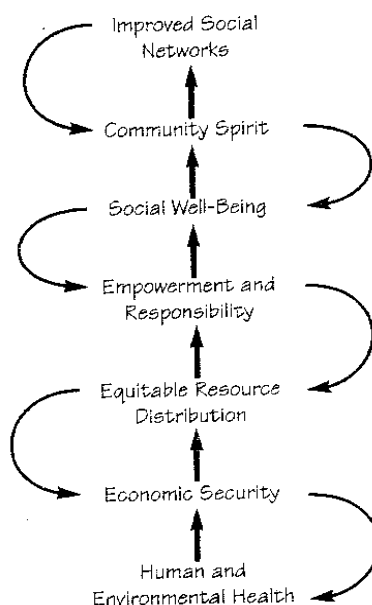
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### 4.2.5 Community systems dynamics

It is true that the needs are the most important drivers of the system, the flows of transactions between the various actors. It is also true that the systems themselves can drive the transaction when there are already established patterns. What is regularly observed is that an unsustainable behaviour is well-established and tends to perpetuate itself. This happens because of an unhealthy systemic tendency to maintain the specific pattern. Nevertheless, comprehending the needs per se, it can be a strong tool for the end users to diagnose problems and gaps and seek strategies that satisfy the needs of communities in new ways. Figure 3. describes an integrated system, which basically illustrates an interrelated dynamic where social well-being has a strong effect on other community systems and environmental health is both the result and the stimulus for even higher levels of community health (Hallsmith, 2007).



**Figure 8.** Community Systems Dynamics (Hallsmith, 2007, p.43)

It all works together to produce a sustainable outcome, but if the higher levels of need are ignored, and we continue with the inequitable and socially fragmented system we have in place today, we will not be able to achieve economic and environmental sustainability” (2007, p.43-44).

To sum up, communities possess the capacities for satisfying needs, and the continuous cyclical process, which were analysed before, can either enhance or erode these capacities over time. In case the community capacity is being enhanced, then it will become easier to meet the same needs for future generations. In case it is being eroded, then this will become more difficult to be accomplished. It is essential to understand that for communities to actualize their goals of being socially cohesive, democratic, economically viable and environmentally healthy, all systems analysed before need to be addressed holistically. Since they are all interconnected, if one set of needs is being met without pre-thinking of its effects on the rest of the systems, then the outcome could erode the rest of the community’s capacities over the long run (Hallsmith, 2007).



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### 4. 3. Set up goals and objectives

So far, we have explained how important is to try and understand the system as a whole, rather than to focus on particular problems and suggest isolated solutions. To learn from the lessons of system dynamics, it is crucial to create an environment where spontaneous change can be possible, where the whole system undergoes a phase change, a metamorphosis, and operates at a higher level, a new kind of normal (Hallsmith, 2007).

So where the decision makers and urban planners can start from? At the level of municipal action planning, a starting point in attempting to develop a framework for effective sustainable development is to try to understand how all the different needs in the community are satisfied. This approach, in contrast to the common types of community planning that is centred to solving problems, begins the process of community development with an evaluation of its assets rather than embarking on its problems. Hence, when communities focus on their assets, new creative possibilities surface for meeting human needs (Hallsmith, 2007).

After needs and assets are mapped, several pieces of information are required, such as the stock of the needs satisfier (how much there is of water, for example), the inflow and/or outflow of the needs satisfier from the system, and the regeneration rate of producing more of whatever meets the need (see figure 1.). When a comprehensive list of assets, needs, and need satisfiers has been made and evaluated according to their sustainability and impact, it is then beneficial to identify gaps where needs are not being met satisfactorily, or at all. These gaps will be significant elements in forming a vision for the community and set goals and objectives (Hallsmith, 2007).

Once the end users acquire the big picture and are able to observe all the different ways that needs are met, coupled with the assessment of the system's sustainability and gaps, it is plausible to see it as a whole system and to seek for ways in which the different sectors either reinforce the activity of the rest of the sectors or operate at cross-purposes. Along these lines, it will be possible for the community to encounter areas of synergy, where more than one need can be fulfilled using a single strategy.

Whether a vision is complex or simple, it is critical to have one to create constancy of purpose and to show the way of how the actions and strategies should be developed. A vision works similarly to a road trip; if you don't know where you are going, it is hard to finally get there. This part of the paper is dedicated in setting goals and objectives in order for community to meet its needs, according to the different four systems previously defined; the social system, the political system, the economic system, and the material world (Hallsmith, 2007). At the end of the sub-chapter, the goals and objectives analysed within the different community systems, are summed up in table 2.

#### 4.3.1 The Social System

The social system, as was described before, is the ways in which we meet our needs for care, for relationships with each other, and for fulfilling our values. A vision (goals and objectives) that describes conditions for satisfying these needs in an equitable way across society is as follows. Starting our discussion from our need for peace, safety and security, our goal should be the statement that that we need to treat all living beings with consideration and respect. We should serve those who suffer, recognize those who are ignored, protect the vulnerable, and enable all to develop their capacities and seek their aspirations. Additionally, we need to protect the rights of all the people, and affirm that with increased power, freedom and knowledge arrives increased responsibility to foster common good (Hallsmith, 2007).



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With the regard to our need for relationships, our goal should be to create relationships that first, are non-exploitative, but rather mutually supportive, based on mutual respect, with oneself, other people, other cultures and ethnicities, other life (animals) and Earth (the natural world). To accomplish that, we need primarily to strengthen families and safeguard the loving nurture and safety of all family members. Without healthy families, healthy communities are not possible, and only communities that are based on right relationships are more likely to create a strong sense of community cohesiveness (Hallsmith, 2007).

The sense of community has been identified before, as another need we have. If people are treated with consideration and respect, they have a sense of being cared for as members of a community. Hence, our goal is to build communities.

Healthcare is another part of the practice of caring for the community. Our goal should be to defend the right of all to a social and natural environment which support bodily health, spiritual well-being, and human dignity, without discrimination and with specific attention to the rights of minorities and indigenous people (Hallsmith, 2007).

Another key way we care for each other, and especially for young people, is through the course of education. We need to support the young people of our communities to fulfil their leading role in forming sustainable societies. Only through this course, we can convey traditions, values and institutions to future generations and make the long-term flourishing of human communities possible. It is therefore crucial to target our goal towards integrating formal education and lifelong learning with knowledge, values and skills and providing educational opportunities equally to all (Hallsmith, 2007).

Finally, the needs for recreation and spiritual development come from a place deep within our collective psyche, this is why we should aim at providing opportunities for self-creation, self-expression and recreation and preserving the diversity of faiths, beliefs and culture shapes.

### 4.3.2 The Political System

The political system has been described before as the ways in which we satisfy our needs for power. We use power to resolve disputes and conflicts, control our environment and the events in our lives, and to win access to needed resources. Justice is strongly related to the way power is used for all of these reasons, which is why the need for equity is located within this system. When power is distributed in an equitable way, then people will feel that the world is just and this will result in an even more equitable access to resources, to economic goods and services. Hence, our goal should be to bring about social, political and economic equity; namely to eliminate discrimination in all its forms, based on colour, religion, sex, language, race, sexual orientation, and social, national and ethnic, to guarantee equal rights to healthcare, education and economic opportunity, as well as, to foster active participation of all in all aspects of social, civic, political, economic, political and cultural life as equal partners, decision makers and beneficiaries (Hallsmith, 2007).

Closely to issues of equity, stand issues of access. The objective in this case should be to make sure that people have access to governments, facilities, resources and information and, thus, be able to have a say in all development plans and activities that are likely to have an impact on them or in which they have an interest.

Finally, a central target is the need of promotion of a culture of tolerance, non-violence, and peace and the encouragement and support of mutual understanding, solidarity and cooperation in order to gain win-win solutions and have a peaceful co-existence (Hallsmith, 2007).



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### 4.3.3 The Economic System

Our care and concern for all other people needs to extend now to concern also about their economic well-being. A central objective is to ensure that the economic activities and institutions at all levels promote human development in an equitable and sustainable manner. This means empowering every human being with the resources and the education to secure a sustainable livelihood (Hallsmith, 2007). To do this successfully, we will also need to promote the equitable distribution of wealth within and among nations, to ensure access to work opportunities, to support labour market with resources and infrastructures and to invest in enhancing the technological level.

### 4.3.4 The Material World

A healthy environment stands centrally in our needs satisfaction. The way to achieve it prerequisites a set of different and multiple goals. One first goal is to find ways to promote sustainable urban form and mixed land use. This encompasses the physical form and functions of a city; how the layout of buildings, open spaces, roads and social and physical infrastructure can be best devised in order to maximize social well-being, economic opportunity, cultural diversity and environmental health (Urban Form Design and Development work-strand of the Auckland Sustainable Cities Programme, 2006). Precisely, our objectives can be identified as the promotion of a) walkability (the creation of walkable neighbourhoods that are well-connected and fully accessible to major destinations and surrounding neighbourhoods), b) placemaking (the creation of streetscape quality, and the contribution to neighbourhood character and sense of place), c) balance (the promotion of neighbourhood design quality by means of a balanced approach with economic considerations), d) liveability (the promotion of design solutions that contributes to sustainable practices, healthy and complete communities and the celebration of arts and culture), e) conservation (the conservation, protection and integration of cultural and natural heritage resource), and, finally, f) safety, (the promotion of design practices that advance neighbourhood safety) (City of Kitchener, 2007).

Another goal is the satisfaction of our need for shelter and this can be achieved by building neighbourhoods that provide a range of housing types, open spaces and parks as well as neighbourhood focal points. In addition, a focus should be on promoting attractive architecture and the conservation of important built heritage resources (City of Kitchener, 2007).

Moreover, energy can be considered as an environmental need that underpins many others. The production of energy is a key leverage point for the global environment and atmosphere, and recognizing this, we need to set as our primary goals to a) manage the extraction and use of non-renewable resources, such as fossil fuels and minerals, in such way that minimizes depletion and causes no serious environmental change and degradation, b) act with caution and efficiency when consuming energy and rely incrementally on renewable energy resources such as wind and solar power (Hallsmith, 2007), c) optimise energy efficiency of the urban structures, d) minimize energy demand of settlements, e) maximize efficient use of energy through building services and energy supply, f) maximize the share of renewable energy resources and, g) maximise the use of eco-friendly and healthy building materials.

Except for energy, transportation is another need do indispensable is contemporary societies. People need to move from home to work, to visit family and friends and have access to goods and services. Without fundamental changes to our transportation systems, we will not be able to achieve the goals mentioned before (the reduction and elimination of non-renewable energy consumption), since a great amount of the fuel we produce is consumed to power the different means of transportation. Our goal is, hence, to design and build neighbourhoods that give greater opportunity for transit usage and promote various route options to all modes of travel (Hallsmith, 2007, City of Kitchener, 2007).



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Next to air, water is the most fundamental human need. Still, billions of people do not have access to water that is adequate, clean and potable. Managing water in ways that do not exceed rates of regeneration should be our aim. Water can be a renewable resource if it is treated well. Therefore, we need to target in minimizing primary water consumption and impairment of the natural water cycle.

Finally, another issue needing management, is waste processing. The more we decrease our need for waste disposal facilities, the more sustainable our community systems will be. Therefore, we need to set our target towards reducing, reusing, and recycling the materials used in production and consumption, and ensuring that residual waste can be assimilated by ecological systems (Hallsmith, 2007).

**Table 3.** Goals and Objectives

| COMMUNITY SYSTEM   | GOALS - OBJECTIVES  |
|--------------------|---|
| SOCIAL DEVELOPMENT | <ul style="list-style-type: none"> <li>○ to build communities</li> <li>○ to ensure access to health care</li> <li>○ to integrate formal education and lifelong learning with knowledge, values and skill</li> <li>○ to provide educational opportunities</li> <li>○ to build right relationships with family, community and animals</li> <li>○ to provide opportunities for self-creation and recreation</li> <li>○ to protect the rights of the people, promote the common good and treat all with respect and consideration</li> <li>○ to preserve diversity of faiths, beliefs and culture shapes</li> </ul> |
| GOVERNANCE         | <ul style="list-style-type: none"> <li>○ to bring about more equity in political, social and environmental issues</li> <li>○ to make sure that people have access to government, facilities, information</li> <li>○ to promote a culture of tolerance and non-violence</li> </ul>   |
| ECONOMIC SYSTEM    | <ul style="list-style-type: none"> <li>○ to ensure that economic activities and institutions at all levels promote human development in an equitable and sustainable manner</li> <li>○ to promote the equitable distribution of wealth</li> <li>○ to ensure access to work opportunities</li> <li>○ to enhance the technological level</li> <li>○ to support labour market with resources and infrastructure</li> </ul>   |



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| COMMUNITY SYSTEM               | GOALS - OBJECTIVES   |
|--------------------------------|--|
| INFRASTRUCTURE AND ENVIRONMENT | <ul style="list-style-type: none"> <li>○ to create walkable neighbourhoods that are well-connected and fully accessible to major destinations and surrounding neighbourhoods</li> <li>○ to create streetscape quality and contribute to neighbourhood character and sense of place</li> <li>○ to promote neighbourhood design quality through a balanced approach with economic considerations</li> <li>○ to promote design practices that contribute to neighbourhood safety</li> <li>○ to conserve, protect and integrate existing natural and cultural heritage resources</li> <li>○ to build neighbourhoods that provide a range of housing types, park and open spaces and neighbourhood focal points</li> <li>○ to invest in attractive architecture</li> <li>○ to provide multiple route options for all modes of travel</li> <li>○ to design and build neighbourhoods that provide greater opportunity for transit usage</li> <li>○ to minimize the emissions to the atmosphere</li> <li>○ to maximize pollutant sinks</li> <li>○ to minimize primary water consumption</li> <li>○ to minimize impairment of the natural water cycle</li> <li>○ to manage the extraction and use of non-renewable resources in ways that minimize depletion and cause no serious environmental damage</li> <li>○ to act with restraint and efficiency when using energy and rely increasingly on renewable energy resources, such as solar and wind power</li> <li>○ to optimize energy efficiency of the urban structure</li> <li>○ to minimize energy demand of settlements</li> <li>○ to maximize efficient use of energy through building services and energy supply</li> <li>○ to maximize share of renewable energy resources</li> <li>○ to maximize the use of eco-friendly and healthy building materials</li> </ul> |



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### 4. 4. Identification of inputs and outputs

After we identified the goals and the objectives of the different community subsystems, it is now the time to highlight what are the appropriate inputs to be introduced to the respective subsystems in order to accommodate the desired outputs. A set of indicators will be introduced in order to quantify and estimate the level of needs satisfaction within each community system (see tables 3., 4. and 5.). Our discussion will initiate, again, with the social system and continue with the rest subsystems.

#### 4.4.1 The Social System

One of the foremost needs to be satisfied in order to make sustainable cities is the need for a sense of community. This can be advanced when the decision makers of a city invest in building social and cultural facilities and organize regular public festivals where people have the chance to meet each other and practice their social skills. Community associations need to be provided with more power in order to give the motive to the residents to become potential members and actively participate for the common local good. Furthermore, social and environmental events that require a level of volunteerism should be promoted in order to enable the community to get together and share their values for a good common purpose. All these, can lead to an increase in the level of participation in community life of diverse group of people, such as visible minorities, women and children-adolescents.

Health care is another crucial social need and access to it should be guaranteed to all. This can be possible if, for example, the number of clinics, hospitals and health care services increase and campaigns are initiated with the aim to inform the residents for possible health risks such as obesity, asthma etc. This attempt will probably result in an increased number of healthy people.

Lifelong education can be achieved if money are invested in libraries, teacher salaries, school infrastructure and the quality of learning in classes, which can be seen from example, from the ratio of pupil/per teacher. The outcome could be estimated as an increase in the number of people with skills and values, increased opportunities of finding meaningful jobs and in decreased levels of crime.

Right relationships among people and animals is an essential need to be satisfied. Families need to be strengthened and basic social support like social security and welfare need to be developed, especially in the cases of lone parent and low income families as well as in the cases where families face indoor violence. Further to that, urban planning can focus on making the locality more walkable through parks, squares and meeting points on a 5 minute walking distance from homes in order to foster the development of relationships between the neighbours. These inputs may result in improved social cohesiveness and social networks in the neighbourhood, in increased safety and in more healthy families which are the cornerstone of healthy communities.

Recreation is a vital need for human existence and decision makers should take it in serious consideration when they take their decisions about their cities. The investment in availability of recreation services and cultural facilities, such as youth centres, libraries etc. is an important input, which can end in building community's creativeness, in lower levels of crime, and in making people to communicate values through the means of art.

Finally, closely to recreation stands our need for spirituality. This can be advanced if there are enough places where faithful people can pray and exercise their spirituality, and if equal rights for spirituality are recognized and communicated, through, for example campaigns or in schools, in cases where people of



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different faiths co-exist in the same community. This attempt will possibly lead to a preservation of spiritual wisdom and to lower levels of racist incidents (Josza, Brown, 2005).

Following the discussion, a set of social indicators is presented in table 3., against which the level of fulfilment of community's needs for social well-being can be estimated.

**Table 4.** Indicators for the Social System

| Needs for social well-being | Indicators  |
|-----------------------------|---|
| Sense of Community          | % Population participation in public events   |
| Health Care                 | <p>Life expectancy at birth for males and females</p> <p>Infant mortality rate: 0-1 year per 1000 birth</p> <p>Low birth weight: Number of children born weighting less than 2,5 kg (or national definition of low birth weight) per 1000 births</p> <p>Mortality rate for individuals under 65 from heart diseases and respiratory illness</p>   |
| Lifelong Education          | <p>Percentage of students not completing their compulsory education</p> <p>Percentage of students completing compulsory education and achieving the national minimum standard</p> <p>Number of places in universities and further education establishments located within the above specified boundary per 1000 resident population</p> <p>Percentage of resident population – male/female who have completed lower secondary education (ISCED level 2)<br/>(International Standard Classification for Education)</p> <p>Percentage of the resident population – male/female who have completed upper secondary education (ISCED 3)</p> <p>Percentage of the resident population – male/female – who have completed tertiary education (first stage) not leading to first university degree (ISCED level 5)</p> <p>Percentage of the resident population – male/female – who have completed tertiary education (second stage) leading to a post-graduate university degree or equivalent (ISCED level7)</p> |



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| Needs for social well-being    | Indicators  |
|--------------------------------|---|
| Relationships                  | <p>The number of households</p> <p>Average size of households</p> <p>Percentage of households that are one person households</p> <p>Percentage of households that are lone parent households</p> <p>Percentage of households that are lone pensioner households</p>   |
| Recreation                     | <p>The number of sport facilities and annual users per resident</p> <p>Number of cinemas, showings, and annual attendance per resident</p> <p>Number of cinema seats</p>  |
| Peace, Safety and Security     | <p>Total number of recorded crimes per 1000 population per year</p> <p>Recorded crimes against people per 1000 population per year</p> <p>Recorded crime against commercial and residential properties per 1000 population per year</p> <p>Recorded crimes against cars (including thefts from and of vehicles) per 1000 population</p> |
| Spiritual Development, Culture | <p>The number of theatres and annual attendance per resident</p> <p>Number of museums and annual visitors per resident</p> <p>Number of concerts and annual attendance per residential</p> <p>Number of public libraries and total book loans per resident</p>  |



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### 4.4.2 The Political System

Equity and access to government as core needs in the political system can only be achieved if fundamental changes occur, such as the institutionalisation of the firm application of equal right to all (women, migrants, youth) in every aspects of community life (culture, economics, politics etc.), the promotion of decentralization of decision-making, the strategies for more income equity across communities and finally, the independence of judicial procedures. It only then, that true socially and politically just communities will be built, where discrimination and corruption will be eliminated and a greater trust in justice will be established. Moreover, conflict resolution can be satisfied only if solidarity and cooperation are seen as strategies that can be supported and implemented on the local community level. Interesting inputs can be sister cities, or student exchange programs, or other similar activities that help build inter-cultural relationships. Another strategy to prevent violent conflicts is the engagement of young people from an early age in pro-social activities (such as volunteering, participation in team games, theatrical plays etc.), so that they will be able to resist the pressure to get involved in drugs and illegal activity that is often associated with criminal behaviour (Hallsmith, 2007).

### 4.4.3 The Economic System

In recent years, the inadequacies of conventional economic development have been expressed in under-employment, disparity in distribution of economic benefits,, and “downsizing” as companies demand more work from less employees. If the same pattern of economic development is to be followed, community's needs for money and accessibility to job opportunities and meaningful work will continue to be downplayed. How this can be reversed? A first possible input can be the reinforcement of local self-reliance and community control through financing new business development projects. Building on local strength, creativity, and resources to decrease dependency on economic interests outside the community will enhance local wealth, support local needs, encourage cohesiveness, reduce waste and let money circulate within a community opening new job positions. A synergetic effect will also be an increase in people's self-esteem, lower levels of crime and fear, the elimination of ghetoisation phenomena and the battle of informal economy (Roseland, 2005).

However, economic development is not just about business and job creation; it's about creating self-sustaining communities. Citizens who care and protect their natural resource base and preserve their environment from degradation contribute to more sustainable economies. Green business and sustainable production can be promoted if city decision makers adopt policies, zoning by-laws and guidelines to attract and retain green businesses, finance and award innovative businesses that use environmentally sound technologies and provide the appropriate technical assistance and support through training and delivering environmental business directories. Simultaneously, sustainable consumption should be supported through effective demand management, which includes accurate valuations of natural resources and increasing public awareness (Roseland, 2005).

Finally, a sustainable planning strategy can be that of mixed-land use. If land-use planning aims at creating neighbourhoods that are both residential and commercial, this will not only lower the unemployment rate in the locality but also will end in less street congestion and more air quality, since the need for transport to work will decrease.

In order to estimate to which extent community needs for economic welfare are satisfied, a list of economic indicators is presented in table 4.



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**Table 5.** Indicators for the Economic System

| Economic Needs            | Indicators   |
|---------------------------|--|
| Meaningful Work           | <p>Employment by sector – male/female, part time/full time, by sector (NACE Rev.1)</p> <p>Percentage change in employment</p> <p>Number of companies with headquarters in the city quoted on the national stock market</p> <p>Net level of business registrations (new registrations minus deregistrations per year)</p>   |
| Money                     | <p>Household income, median and average income for each quintile</p> <p>Male/Female earnings, Full time/Part time earnings, median and average earnings for each quintile</p> <p>Ration of first to fifth quintile earnings</p> <p>Percentage of the households receiving less than half of the national average household income</p> <p>Percentage of households without cars</p> <p>GDP per capita at city level (if available) or at the regional level</p> |
| Accessibility             | <p>Number of households reliant upon a social security- national definition</p>  |
| Technology                |  |
| Labour market development | <p>Number of unemployed (ILO Labour Force Survey)</p> <p>Unemployment rate (by sex)</p> <p>Percentage of unemployed who are male/female</p> <p>Percentage of unemployed who have been unemployed continuously for more than one year</p> <p>Percentage of unemployed who are under 25</p> <p>Employment / Population Ratios (Male-Female-Total)</p> <p>Activity Rate (Male-Female_Total)</p>   |



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### 4.4.4 The Physical System

Previously, in the section of our analysis of community's physical needs, a lot of the goals discussed depend largely upon the ways we organize our use of land and the form this use takes. Conventional and well-established land-use practices spread our destinations, increase our need for space and travel, and consequently, bring a large amount of related problems. On the other hand, sustainable land use can help revitalize communities, and provide substantial social, economic, environmental, and cultural benefits and the creation of walkable, liveable, peaceful and safe neighbourhoods. Cities with low automobile dependence are more centralized, have more intense land use, place more restraints on high-speed traffic and are more oriented to alternative transit modes and, hence, they are more liveable because they tend to have cleaner air and water and more protected open space.

An important input at the municipal level can be the adoption of policy measures that increase residential density, improve transit access and promote bicycle and pedestrian friendliness. Some useful examples are the promotion of a) pedestrianization by improving cross walks, parks, squares, focal points and tree-lined streets in the neighbourhood, b) high density, so that everything within the locality is within cycling and walking distance, c) considerable landscaping, including gardens on balconies and on top of the buildings, d) a mixture of private and public housing with a priority to families and, thus quite large internal home spaces, e) community facilities such as libraries, senior centres, child care, and in some cases, small urban farms, f) public spaces with strong design features (playgrounds, water etc), and g) close proximity by all of the residents to metro stops, mixed-use neighbourhoods with shops and commercial offices on main spines, surrounded by residential (Roseland, 2005).

This new approach in sustainable urban form and land use will possibly lead, first, to the reduction of traffic congestion and to lower vehicles miles travelled, which in turn will lead to fewer per capita air pollutants and greenhouse gases. Another synergetic effect, is the improvement of public health. When driving is non convenient, obesity rates and hypertension will be better addressed. All in all, residents life will be improved with regard to exercise, travel, recreation and the neighbourhoods will start to acquire an identity and a sense of community (ICF International, 2008).

The sustainable creation, preservation and restoration of urban green is another need to be satisfied. Urban ecology uses climate- and region- appropriate plants, xeriscaping to decrease the need for water and fertilizer, and uses land for various functions such as food production, recreation, wildlife habitat and beautification. The benefits it provides are the reduction of the urban heat island effect, the conservation of energy, the minimization of the use of pesticides, the absorption of carbon dioxide from the atmosphere and clean urban air. Apart from the environmental benefits, it provides the opportunity to foster a greater understanding of and connection with nature, in contrast to the conventional urban design that causes alienation between people and the natural world. Moreover, when people are getting involved, for example, in community gardens, planting trees, or taking part in stream stewardship projects, all these can improve our health, build community, foster local-self reliance, protect our ecosystem, and even fulfil some of our food needs (Roseland, 2005). Some of the inputs needed to arrive to the beneficial outputs just outlined, can be, for example, the design of multifunctional naturalized park, offering a wide spectrum of opportunities for recreation, education, naturalist activities, indigenous species planting, community gardens and wildlife habitat. Other types of efforts on behalf of municipal governments can take the form of government policy, by-laws or regulations (and/or driven by NGO's, citizens, or private sector) for the protection and reclamation of watercourses and green spaces. Additionally, local decision makers need to direct their attention to the valuable strategy of promoting and supporting urban agriculture, through the creation of community gardens and the training to learn gardening skills to those who want to cultivate in their backyards and balconies (Roseland, 2005). The benefits can be an increased food system security, the



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empowerment of communities through self-reliance, the enhancement of community well-being through decreased illnesses and increased health, increased sense of community and increased environmental health due to reduced transportation of food. Furthermore, gardens and local farms can use the organic wastes produced by the city for compost, contributing to the reduction of burden on local landfills (organic wastes account for about one third of household waste), and home-grown food contributes to the reduction of energy consumption and packaging waste. Finally, a great benefit of urban agriculture is also the provision of affordable food supplies for lower-income people (Roseland, 2005).

Housing is a another key factor that influences both social and environmental aspects of community development, since there are many people that live without adequate housing or lack any form of permanent and secure tenure and shelter. Even the more fortunate that have a secure home, they may live in neighbourhoods that lack a 'sense of place'. Municipalities can do the appropriate planning and promote affordable housing in various ways, including the following: “a) development approval process; to accelerate the approval process and fast-track applications for rentals, special needs housing, and non-market housing, b) financing for new developments; to generate new funds for affordable housing projects through municipal initiatives, c) intensification of existing areas; to re-zone to allow higher density housing in existing areas, e.g., secondary suites, d) intensification in new areas; to regulate zones to encourage compact forms of residential land use, e) land use; to lease or provide municipal land for affordable housing at lower than market rates, f) partnerships; to collaborate with non-profit organizations, churches, developers etc., g) protect existing housing stock; to regulate existing housing stock to ensure it remains as affordable housing, h) technical support and housing information; to collect, maintain, and disseminate information regarding affordable housing in the community, and i) zoning regulations; to develop creative zoning to promote affordable housing programs, e.g., mixed-land use or density houses” (BCMCAWS, 2004, in Roseland, 2005, p.156). The promotion of the above-mentioned strategies, along with a thoughtful building design, places to gather, clean streets and gardens, could create a 'village-like' atmosphere even in inner-city neighbourhoods, namely create a sense of place, foster connection among people and develop an atmosphere of peace, security and pride among residents (Roseland, 2005).

Unsustainable transport systems are the next to be addressed not only because they are a major contributor to atmosphere change (environmental degradation), but also because they cause increasing street congestion and longer commuting times (social disruption), as well as increasing demands for shorter work hours to compensate for longer travel hours and higher prices due to reduced worker productivity (economic cost) (Roseland, 2005). So far, the conventional, common approach towards transport planning has focused mainly to the improvement of mobility standards, accompanied by efforts to decrease the environmental impact of transport systems. Mobility policies have been channelled towards the supply side of the urban transport system, putting a great emphasis on the environmental improvements achieved through more attractive, diversified and energy efficient public transport, combined with better and safer cycling and walking facilities, priority to zero emission cars and innovative traffic management strategies. Nonetheless, wise land use planning is beneficial at reducing the demand side of transport, hence, it should also be considered. Through more compact and mixed use planning policies, an overall reduction of travelling distances and needs can be achieved (Jones, Patterson, 2007). Urban density significantly determines auto and transit use, as well as the relative role of transit, since decreasing density causes increases in auto use and decreases in transit. Road and parking provision, as well as non-motorized mode use are all strongly linked to the pattern of auto-dependence across cities. Some of the directions pursued that target auto-mobile reductions, can be the following: “a) more transit-oriented, higher density, mixed land uses, which help to halt the growth in auto-based development, b) stabilization or decreased level of car use and less emphasis on infrastructure for cars, c) higher quality transit systems, especially rail, which are more competitive with cars, d) greater amenity and safety for walking and cycling and increased use of these modes, e) road pricing that reduces total vehicle travel can reduce road and parking costs, increase road safety, protect the environment and



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encourage more efficient land use and finally, f) traffic calming, which includes measures such as installation of stop signs, speed bumps, and/or traffic circles to slow or calm traffic, allowing roads to better accommodate a range of different road users and activities” (Roseland, 2005, p.119, 122). The overall benefits can be, except for reductions in carbon emissions and improved air quality, a better quality of life and a greater social integration within local communities while sustaining local economic situations (Jones, Patterson, 2007).

Air quality is another key need to be satisfied. If measures to decrease the release of atmospheric pollutants are not taken with seriousness, then human and environmental health are in serious risk of deterioration. Municipal governments can play a key role in developing strategies to reduce emissions of greenhouse gases through promoting renewable energy resources, diversification of the local transportation sector, expanded urban reforestation efforts, energy efficiency measures, 'precycling and recycling', tree planting, lobbying for stronger federal actions with respect to vehicle fuel efficiency standards and tax incentives, retro-fitting city owned buildings for energy efficiency and conservation, expansion of the existing district energy systems for heating and cooling, energy and water-efficiency retrofits of all commercial and residential buildings, energy efficiency and conservation standards for new and existing buildings and balancing employment and residential growth in the central areas as part of an integrated land-use and transportation policy (Roseland, 2005). The results of such inputs will have a great impact on health improvement. Health problems associated with atmospheric pollutants such as bronchitis, emphysema, asthma, eye irritation and many more, will be greatly addressed. A number of economic benefits will also arise, deriving from policies that reduce air emissions, some of which include “a) lower energy costs that come from conservation and energy efficiency, b) growth of businesses that sell energy-efficient technologies, c) growth of renewable energy businesses, d) more disposable income from increasing taxes on the inefficient use of energy and using that money to reduce taxes on income and capital and, e) reduced repair costs for damage to the environment and human health caused by pollutants” (Roseland, 2005, p.108).

Water and sewage are another indispensable community needs. Increasing demand due to urban sprawl has led to the expansion of infrastructure for reservoir and dam construction and chlorination plants. This has caused not only economic costs because of the operation, maintenance and expansion of sewage treatment facilities, but also major environmental degradation due to water pollution and the rapid rate of water extraction which brings damage to fish stocks. Energy demand is also influenced by increased water consumption and treatment, as energy is necessary to pump and process water supplies and waste water (Roseland, 2005). To be more sustainable, both the water and sewerage sector must reduce the flows of water into and out of the city. If the reduction of the demand in the amount of water used is achieved, consequently, the amount of water that requires treatment will be decreased (Jones, Patterson, 2007), resulting in both financial savings and environmental benefits. Local governments need to initiate policies or incentives for water conservation and restrictions or penalties encouraging water conservation initiatives. This can only be possible if an integrated resource planning is previously established. Staff, boards, budgets, billing, and goals of the different departments should be coordinated in order for shared goals to be reached while saving costs and decreasing impact on the ecosystem. Integrated resource planning requires inter-governmental coordination and targets multiple-means and multiple-purpose projects including: use of zoning and other land-use management strategies, taxation, regulations, incentive programs, and whatever else contributes to the achievement of multiple goals for provision of water and sewage, as well as other objectives, like energy-efficiency, flood control, wildlife preservation, recreation, irrigation, and finally, economic development, through creation of jobs and stimulation of market for water conserving products and technologies (Roseland, 2005).

Now, in the field of our need satisfaction for energy, two should be the main aims and are associated with supply and demand. The first aim is to decrease demand, both total annual energy use and peak demand



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which is associated with the capacity of local systems (cooling, heating or power generation needed). This applies to both existing and new buildings and also relates to energy used by infrastructures such as water and sewage systems, transport, and waste. For example, the EU Directive on the energy performance on buildings can be a useful tool for decision makers in their attempt to address energy efficiency through building design and operation, including building energy labelling and more standardised calculation procedures of energy use (Jones, Patterson, 2007). In addition, citizens and local governments can play a strong role by organizing education and information campaigns for energy building designs and operations (such as passive solar design, light shelves, light-tubes, and high-performance windows) in order to spread the knowledge of the reduction of energy consumption and money savings (Roseland, 2005). Energy supply systems are primarily premised on the use of fossil fuels. Losses are mainly related to distribution as well as emissions from the combustion processes. Distribution losses can be limited through insulation, better transformers in electricity distribution, leak detection and repair, and overall improved maintenance. Most importantly, there is a need to shift to more secure resources become less dependent on fossil fuels (Jones, Patterson, 2007), invest in co-generation and district heating and, as mentioned several times in our analysis, be oriented towards integrating planning where interdepartmental cooperation is guaranteed and all different strategies that influence energy (such as land use, transportation planning, building sizes, etc.) are being considered in a comprehensive urban plan (Roseland, 2005).

Effective waste management is another key element of sustainable urban development. Waste generation is a result of human activities and waste has first to be reused or recycled, otherwise to be disposed of. Currently, waste management is practised through a 'supply' perspective', meaning that most activities are centred to the supply of systems for managing waste arisings (Jones, Patterson, 2007). However, the four Rs in an hierarchy of preferred options: reduce, reuse, recycle and recover, are usually neglected. The disposal of waste is a source of environmental pollution and deterioration, whether through landfill or incineration, and alternative means of waste disposal and management need to be promoted and practised by the local governments. Some of them include: a) reuse and recycling of waste through the provision of financial incentives, special zoning, and information, on behalf of municipalities, to encourage reuse, lease and rental businesses, b) the promotion of buying recycled products through municipalities own procurement processes and guidelines, and c) composting, as a recycling technology that can be a useful tool for municipalities to significantly limit waste management volumes and costs. The benefits are numerous both environmental and socio-economic. Less landfills mean more free land to be used for sustainable urban plans, less methane emissions, which is a strong green-house gas, municipal economic changes, generation of jobs, and many more.(Roseland, 2005)

Finally, a list of physical indicators is displayed in table 5, against which the level of satisfaction of community's needs for social well-being can be determined.



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**Table 6.** Indicators for the Physical System

| Material Needs                    | Indicators  |
|-----------------------------------|---|
| Sustainable urban form – land use | <p>Percentage of the population within 15 minutes walking distance of urban green areas</p> <p>Percentage of the urban area unused and in main land uses</p> <p>Percentage of the urban areas subject to special physical planning/conservation measures</p> <p>Population density – total resident population per square km</p> <p>Proportion of net office space that is vacant</p>   |
| Urban green                       | <p>Green space to which the public has access (sq metres per capita)</p>  |
| Housing                           | <p>Number of homeless people</p> <p>Number of homeless people as a percentage of total resident population</p> <p>Average house prices to average annual household income ratio</p> <p>Average weekly social housing rents as a percentage of average weekly household income</p> <p>Percentage of dwellings lacking basic amenities</p> <p>Useful living area per person (m2)</p> <p>Percentage of households buying or owning their own dwellings</p> <p>Percentage of households that are social housing tenants</p> <p>Percentage of households that are private rented tenants</p> <p>Number of conventional dwellings</p> <p>Percentage of households living in houses</p> <p>Percentage of households living in apartments</p> <p>Percentage of households living in “other” dwellings</p> |
| Transportation                    | <p>Mode of journey to work: rail/metro, tram, bus, car, cycle, walking</p> <p>Characteristics of all travel by residents (purpose, distance and mode of travel)</p>   |



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|                  |  |
|------------------|--|
|                  | <p>Numbers of cars registered within the specified boundary per 1000 population</p> <p>Road accidents resulting death or serious injury per 1000 population</p> <p>Average number of occupants of motor cars</p>   |
| Atmosphere       | <p>Winter smog: Number of days SO<sub>2</sub> exceeds 125µg/m<sup>3</sup> (24hr average time)</p> <p>summer smog: Number of days Ozone O<sub>3</sub> exceeds 120MG/m<sup>3</sup> (8hr average time)</p> <p>Number of days per year that NO<sub>2</sub> concentrations exceed 200µg/m<sup>3</sup> (1hr average time)</p> <p>Proportion of the population exposed to outdoor noise levels above 65dB (24hr average time)</p>   |
| Water and sewage | <p>Number of determinations (total number of annual tests on all parameters on drinking water quality) which exceed the prescribed values, as specified in the Directive/EEc - 'Directive relating to the quality of water intended for human consumption'</p> <p>Consumption of water (cubic meters per annum) per inhabitant</p> <p>Percentage of dwellings connected to potable drinking water supply infrastructure</p> <p>Percentage of dwellings connected to sewerage treatment systems</p> |
| Energy           | <p>Total energy use per fuel type (coal, petrol, electricity, natural gas, fuel, oil) and by sector (transport, industry, domestic, commercial [service])</p> <p>Percentage of final energy consumption by different sectors (transport, industry, domestic, commercial)</p> <p>Electricity consumption per capita (toe)</p> <p>Gas consumption per capita (toe)</p> <p>CO<sub>2</sub> emissions per capita</p>  |
| Waste Processing | <p>Amount of solid waste collected within the boundary (domestic and commercial) tonnes per capita per annum</p> <p>Proportion of solid waste (domestic and commercial)</p>  |



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|              |   |
|--------------|---|
|              | arising within the boundary processed by landfill, incinerator, recycled  |
| Soil quality | Total carbon<br>Olsen P (phosphorus)<br>Mineralizable nitrogen<br>Bulk density<br>Macro and total porosity  |
| Biodiversity | Percentage of protected area to total area<br>Number of endemic/threatened/endangered/vulnerable species by group<br>Species threatened with extinction (number or percents)<br>Change in area of agricultural land (conversion to or from agriculture) |
| Climate      | Average land surface temperature<br>Number of days of rain per month (averaged over a year)<br>Average number of hours of sunshine per day (averaged over a year)   |

To sum up, it must be noted here that despite the relevance of certain issues (e.g. health related impacts) the scope of BRIDGE limits the extent to which certain issues can be addressed in this project.



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## 5. Protocol to connect theoretical needs with actual needs and perceptions in the field for each case study participatory approach

The aim and challenge of the last chapter is to summarize the previous analysis in a theoretical framework in form of a protocol that connects theoretical needs described earlier in section 4.2 with actual needs and perceptions in the field for each case study. This process is initially benefited from existing local platforms such as Agenda 21 fora, and can be implemented by initiating a model participatory approach, based on the society as whole.

### 5.1. Methodological Framework

Any methodological process that is introduced as a response to local sustainable issues is meaningless if it is not owned, agreed and implemented by both council and the broader community. Thus, the primary step is to gain support from across the local community. Possible local partners may include interest groups, business, industry, clubs, church groups, ethnic groups, community organisations, education organisations, media, elected officials, other levels of government, staff and interested families and individuals (Cotter, Hannan, 1999). In BRIDGE project, this process will be applied in practice in the Task 2.3 and described in D.2.3, concerning the formulation of CoPs in participant case study cities regarding the local planning communities.

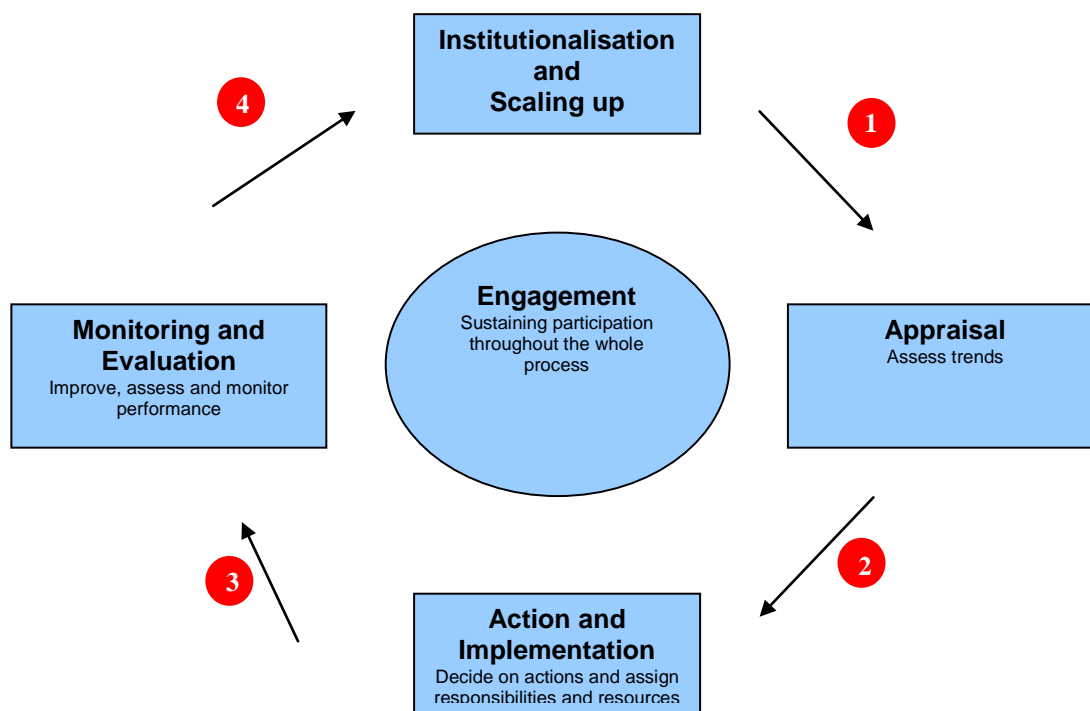
In our proposed theoretical framework, discussions can be informal, or representatives may be gathered for an information session. But most crucially, engagement should be established and sustained throughout the whole process, from the appraisal of the local trends and conditions and the formulation of strategies to the monitor and evaluation of the so far performance and commitment to scale up (See Figure 9). (Allen, 2002, Cotter, Hannan, 1999).



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**Figure 9.** Methodological Framework (Allen, 2002)

This methodological framework constitutes the protocol to assess knowledge supply and knowledge demand in the field and it is analysed below in form of series of practical steps.

## 5.2. Step 1 - Engagement

Given the emphasis of sustainable development mandate on participation, engagement is more than a separate step. Rather it is an activity that drives through the whole process, embracing diagnosis, facilitation of negotiation and conflict resolution and leading towards action planning. Bringing people's knowledge, view and experience of their own reality into the process is a fundamental element that links appraisal and engagement (Allen, 2002, p.44). It is only when all participants have been actively engaged, that priorities are established and consensus building is achieved. The participatory prioritisation of problems and the identification of actions provide the strategic fundament of the process, by detecting which practices to be adopted will have maximum effect and significance for different groups in the local community. It is of utter importance that groups in the community that previously and traditionally have had little role in planning processes, such as youth, migrant and minority groups, women, indigenous people etc., are included. Business and intergovernmental partnerships are also necessary to be established in order to pursue and accomplish a common goal (Cotter, Hannan, 1999). Hence, it is important to devise a systematic approach for identifying the stakeholders in the context of a particular project early, so that the appropriate means for their engagement can be planned. Four key distinct techniques for the identification of stakeholders have been identified from the literature. These are: the use of a generic list, asking a set of questions, using snowballing technique and stakeholder mapping (Mathur et al, 2007; INVOLVE, 2005; Mitchell et al, 1997).



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**Table 7.** Guides on community engagement (Dankó et al., 2008, Cotter, Hannan, 1999)

| What to take into consideration?  | How to go about it?   |
|---|---|
| <ul style="list-style-type: none"> <li>➤ The role of partnerships within the process should be acknowledged</li> <li>➤ Potential participants are all the people who are affected by the plans and at the same time can make contributions to their development</li> <li>➤ Beyond the community borders, there are people and institutions that can have a significant impact on the development plans. The challenge is to find ways to involve them too.</li> <li>➤ One needs to be aware of power relations and social networks and try to prevent the co-option of groups with less power</li> <li>➤ Everyone's perspective is significant; individuals can make a contribution and a difference and this needs to be manifested</li> <li>➤ Communication between the council and the community should be progressive, reciprocal and responsive; the conventional one way stream of information and/or consultation at a particular point in time should be relinquished</li> <li>➤ The involvement and commitment of all council staff is absolutely necessary for the efficiency of the development process. This may demand alteration of the thinking that comes with entrenched perceptions and professional bias.</li> </ul> | <ul style="list-style-type: none"> <li>➤ Formulate a comprehensive participatory strategy; Which and how many people to engage and how representative will they be (community assessment process), what level of contribution they will have to decision making and to what extent they will be involved in implementation, monitoring and evaluation stages, what mechanisms of involvement and communication to apply</li> <li>➤ Develop an effectual information and awareness strategy in order to stimulate engagement and maintain interest</li> <li>➤ Decide upon who will drive the process</li> <li>➤ Formulate a Local Action Group (a steering committee) with members from different community groups. This will be responsible for developing vision, setting directions, building partnerships, fund raising, educating, integrating, scaling up</li> <li>➤ Arrange a festival to inaugurate the process of partnership building</li> </ul> |



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### 5.3. Step 2 - Appraisal

Appraisal involves taking a closer look at the context of intervention to comprehend the problems, opportunities and hidden trends or processes of urban change, as well as the actors involved. This step is vital for the clarification of priorities and targets that will later form the prospective initiatives. Community input (see section 4.4) will delineate where local imbalances exist within the dimensions of urban sustainability, placing emphasis on the areas that action is required the most (Allen, 2002).

#### 5.3.1. Identification of community values

It is crucial for the future of each community to know what common values the members of each community have and what common identity they share (see section 4.3). This will help to preserve the community's identity and to realise the basis and motivation for coalition with others. This step is significant because if people are enthusiastic from the beginning, good results will be achieved faster (Dankó et al., 2008).

**Table 8.** Guides on identification of community values (Dankó et al., 2008)

| What to take into consideration?  | How to go about it?   |
|---|---|
| <ul style="list-style-type: none"> <li>➤ The values and significant characteristics of the community</li> <li>➤ The local identity; history, culture, landscape, skills and technologies used by local people etc., anything that make one community unique</li> <li>➤ The main reasons why local people decide to stay in the community</li> <li>➤ The development process should leave room for participation to people coming from different generations, genders and social status, including cultural minorities</li> <li>➤ The participatory process should provide a platform where everybody can express their opinion freely and nobody monopolises the discussions</li> <li>➤ Collective goals for the whole initiative should established</li> </ul> | <ul style="list-style-type: none"> <li>➤ Make a survey of public opinion using tools such as questionnaires, interviews, focus groups etc.</li> <li>➤ Sponsor community films and show them to the public. Allow for discussion after the projection</li> <li>➤ Organize fairs and exhibitions during which local artists and their products can be promoted</li> <li>➤ Give room of expression to the local children through a contest of drawings, photos and essays, to show in a creative way what they like and what they dislike about their area</li> <li>➤ Use local media as a platform through which citizens can have the possibility to present their opinion</li> <li>➤ Record all meetings aiming at mapping community identity and values</li> </ul> |

#### 5.3.2. Identification of community needs

Possibly the most pivotal preparatory step in a process towards a sustainable urban centre (see section 2.3), is the identification of what the actual needs of people are (see section 4.2). When the community leaders and decision-makers acquire a good knowledge of the needs of people under their jurisdiction, they are ready to



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develop and launch the strategic planning process with the full engagement of different community members (Dankó et al., 2008).

| What to take into consideration?   | How to go about it?   |
|--|---|
| <ul style="list-style-type: none"> <li>➤ It is important that the community will become knowledgeable about what “quality of life” and sustainable development” mean and how they are related</li> <li>➤ One of the first steps of the process is the formulation of sustainable criteria. One needs to make sure that the community understands why their needs should be consistent with the chosen criteria of sustainability</li> <li>➤ The opinions of people about their problems and the possible solutions should be collected and assimilated</li> <li>➤ The following questions should be addressed: Why is the community not pleased with the present conditions? What do they want to change? What alterations should be made by people together?</li> </ul> | <ul style="list-style-type: none"> <li>➤ Authorise an ad-hoc and experienced NGO to undertake a series of trainings on sustainable development for the community</li> <li>➤ Work with the local media in order to help you raise awareness among the community about sustainable development</li> <li>➤ Make a survey with questionnaires in order to identify which are the needs of people in the community. Learn more about what satisfies them in their daily life, and try to find out what would make their grand-grand-children happy there. Allow also for a question about the possible solutions they can introduce to the present problems. Publicise results of the survey in a popular manner so they can be widely delivered.</li> </ul> |

### 5.3.3. Identification of community resources

The purpose of this step is to get a holistic view about both the existing situation of the community and the external factors that affect or may affect local sustainable development. Once this information is registered in a methodical way, then it will become a tool for measuring the success of the actions determined in a forthcoming step (Dankó et al., 2008). Pursuing a baseline understanding of local contexts and problems will enable community awareness, facilitating community members to realise and assess the role that their locality plays within sub-national, national and global affairs (Allen, 2002, p.43). Realising also the progress made at a later stage, this will motivate the community to continue the implementation of the plan.

**Table 10.** Guides on identification of community resources  
 (Dankó et al., 2008, Cotter, Hannan, 1999, Sustainable Measures, Ditor et.al, 2001, Eurostat, 2007)

| What to take into consideration?  | How to go about it?   |
|---|---|
| <ul style="list-style-type: none"> <li>➤ The economic, social and geographic characteristics of the community</li> <li>➤ The links of the community with the adjacent localities in the wider region</li> </ul> | <ul style="list-style-type: none"> <li>➤ Organize a meeting with all the participants to brainstorm in different groups about the strengths, weaknesses, opportunities and threats in order to make a SWOT analysis of the community (external and community auditing). Ask the participants the following</li> </ul> |



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- Which regional, national and international policies and strategies may affect the community
  - What local resources (natural, financial and human) does the community possess in order to formulate and implement the local sustainable development strategy
  - Which institutions and organisations are active in the community and if any community engagement and joint ownership is already established in the area
  - What are the local issues with regard to the land ownership
  - The evaluation of council's management system: Is it targeted on providing solutions for the long term, rather than solely addressing immediate issues? Does it take into consideration the long term impact of new proposals? Do decision making processes seek to balance social, economic and environmental factors? Does the current system support the development of innovative solutions that would contribute in fulfilling the sustainable development goals?
  - Information should be classified by “strengths”, and “weaknesses” (internal factors), and “opportunities” and “threats” (external factors) (SWOT Analysis)
  - The impact of community's consumption patterns beyond city limits (e.g. using ecological footprint analysis)
  - What processes are particularly unsustainable within the local environment (e.g. using rapid urban environmental assessment)
- questions: What local sources, factors and agents reinforce sustainable development of the community? What has already been achieved? What is the community proud of? (What are the strengths?) - What local sources, factors and agents inhibit sustainable development of the community? What does the community dislike and condemn? (What are the weaknesses?) - What opportunities exist beyond the limits of the community? Which one of them and to what extent could one use in order to encourage local sustainable development? (What are the opportunities?) - What factors derived from outside the community may threaten the local sustainable development? (What are the threats?)
- Present the answers on a flip-chart paper so they can be visible for everyone and then reflect on them together
  - Prior to and after the meeting, collect and add to the SWOT analysis statistical information.
  - Information data about the physical, social and economic environment of the area in question can potentially be collected from: state of the environment reports, national land and water audit reports, planning strategies, corporate plans or cultural programs, studies by local universities or schools, libraries, maps and data sets of the region, inventories and databases available through state agencies, the Bureau of Statistics, public opinion polls, local NGO's, department of public works (generation of solid waste, waste water, water use, recycling rates), local school boards (graduation rates etc.), public health departments (illness and disease rates), town finance department (tax rates, tax revenues, government expenditure), building permits, number of low-income housing residences, traffic volumes on major roads etc.
  - Information about global trends that might affect the local community can potentially ne
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obtained from: Eurostat, National Reform Programmes of EU Member States, National Sustainable Development Strategies of EU Member States, European Environmental Agency, United Nations Commission on Sustainable Development etc.

### 5.4. Step 3 -What to avoid / Possible Pitfalls

- Community engagement and consultation that does not result in appropriate action can eventuate in a deterioration in community relations (Dankó et al., 2008)
- Frequently, community engagement within destitute communities has been fruitless because language and policy goals do not succeed in resonating with the concerns of ordinary people for their local area (Lucas et al. 2008)
- Tensions in the community can be generated in cases where some stakeholder groups are not considered in the process, such as minorities. Nevertheless, even when they are included, tensions may also arise, because some of the majority do not always accept that some of these minorities do belong to the community. In such a case, a strategy should be formulated that will aim at how to raise the acceptance of cultural minorities inside the community (Dankó et al., 2008)
- There are not few the examples when an interesting group intends to dominate the decision-making processes in order to negotiate benefits for just a few people, co-opting other stakeholders and putting into threat the interests of the wider community (Dankó et al., 2008)
- Sometimes, there are people within the community who stand out of the rest because of their good understanding of others, their enthusiasm, their abilities in community work etc. but they are not being identified and enabled to become strong partners in finalising and implementing the plans. In such a case, community mapping proves to be a valuable instrument to identify them. Then, these people can prove to be very useful in leading action groups and stimulating people to keep on going until the goals are reached (Dankó et al., 2008)
- Often, outsiders manipulate the local community processes. Whether this is good or not for the quality of the strategy is difficult to say, since it is up to local people to decide upon who belongs to the local community and who does not. A strong community that is very aware of where it is heading, will be less affected by external interventions (Dankó et al., 2008).