CoP in Sustainable Urban Planning

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Sub-title: ***Using a Community of Practice (CoP) approach to develop sustainability objectives and indicators in urban planning.***

Abstract

Sustainable urban planning entails consideration of a number of aspects including: socio-economic characteristics; planning approaches to development patterns and infrastructure; and, most importantly, existing and future environmental challenges. A robust methodology is required to ensure both integration of the above considerations and monitoring of sustainability achievements. This can be done through the participative development of sustainability objectives and associated indicators, which can activate local stakeholders and improve the integration of environmental and socio-economic considerations into planning decisions.

The FP7 project BRIDGE (SustainaBle uRban plannIng Decision support accountinG for urban mEtabolism) uses a Community of Practice approach, whereby scientists and local stakeholders of five European cities meet on a regular basis to share knowledge. This paper presents the methodology and outcomes of these meetings, illustrating that a common understanding of planning priorities and environmental challenges contributes to a better decision-making process, facilitates impact assessment techniques, and promotes greener policies and actions.

1. Introduction and Context

The transition to a greener economy requires the incorporation of sustainable development principles, including the responsible management of natural resources and the promotion of social well-being. This is of particular significance in the urban context, where the design of more environmentally efficient urban settlements is a key challenge for planners. Constant interaction between environmental scientists, planners, stakeholders and decision-makers can improve understanding of environmental considerations and encourage sustainable planning decisions. In light of this, the FP7 project BRIDGE, launched in 2008, aims at providing a tool which links bio-physical sciences and urban planning and, through its application, to demonstrate the benefits of considering environmental issues in plan-making. Therefore, BRIDGE will develop and apply a Decision Support System (DSS) to assess the sustainability of planning alternatives within 5 European case study cities (Athens, Gliwice, Helsinki, Firenze, and London). The DSS will integrate modeling tools for the multi-criteria analysis of energy, water and pollutant fluxes between the city and its environment in the evaluation of development alternatives. This evaluation is based on Strategic Environmental Assessment (SEA) principles, assessing proposed planning interventions against previously defined sustainability objectives and associated environmental and socio-economic indicators – developed using the Driver-Pressure-State-Impact-Response (DPSIR) framework. BRIDGE adopts a novel participative bottom-up approach by integrating the concept of Communities of Practice (CoP), whereby stakeholders are involved from an early stage to establish key sustainability issues, and define objectives and indicators.

1.1. SEA in BRIDGE

SEA – a mandatory requirement in land use planning (CEC, 2001), provides a structured and participative approach to evaluate the likely environmental effects of implementing a proposed

plan, in order to ensure that these effects are appropriately addressed at the earliest stage of plan-making on a par with economic and social considerations (Sadler and Verheem, 1996; Fischer, 2004; González, 2008). The SEA process requires the consultation and involvement of stakeholders (CEC, 2003) to gather information, enhance understanding and improve the transparency of decision-making (Runhaar and Driessen, 2007). From a sustainability perspective, SEA must ensure that environmental, social and economic issues are well integrated and considered in the planning process (Partidário, 2000 and 2003). In this way, SEA promotes sustainable development, contributes to raising awareness of significant environmental issues, and ensures that such issues are appropriately addressed within the capacity of the planning system. These are key considerations within the BRIDGE project.

BRIDGE aims to assess how a planned urban structure may affect the exchange and transformation of energy, water and pollutants (including carbon) within the city. Correspondingly, it examines how such energy and material flows affect socio-economic activities and how socio-economic activities affect such flows. Therefore, in line with the environmental receptors suggested in Annex 1 of the SEA Directive (CEC, 2001), BRIDGE will use models to address:

- Water (i.e. water balance, including evapotranspiration and run-off);
- Air & climate (i.e. air quality in terms of pollutant concentration and dispersion; as well as CO_2 emissions, carbon sinks and climate change); and
- Material assets (i.e. energy consumption and associated heat fluxes – heat islands).

1.2. Communities of Practice (CoP)

There is no single definition for sustainability applicable to all urban areas (Alberti, 1996). As a result, sustainability objectives are specific to the urban environment in question. A CoP bottom-up approach has being adopted to define objectives and indicators that determine urban sustainability in the BRIDGE case study cities. CoP represent individuals sharing a common interest. Thus, CoP facilitate the interaction between scientists (e.g. BRIDGE researchers), plan-makers (e.g. architects, urban planners) and other stakeholders to work together in a joint learning mode (Bouma *et al*., 2001; Groot *et al*., 2009). It must be noted that CoP are different from other organizational groups, such as formal working groups; they are voluntary and develop organically without a set agenda (Groot *et al*., 2009). However, there are a number of stages that commonly occur when establishing a CoP, including: a) orientation – individuals meet creating a loose and voluntary network; b) coalescing – they create connections and recognize potentials; c) maturing – where knowledge is deepened and communication strengthened; and d) stewardship – conscious development of knowledge and practices. In the case of BRIDGE, both the orientation and coalescing phases are promoted. This is achieved by identifying potential participants and setting an agenda: to establish key planning priorities and sustainability issues in the relevant cities and to jointly develop sustainability objectives and indicators to be used in assessing the planning alternatives.

CoP meetings ensure participation and early involvement of stakeholders. In the context of BRIDGE, communication and interaction with stakeholders/planners through the CoP meetings help fulfil the public participation requirements of the SEA Directive, as well as encouraging participants to adopt sustainability practices. In BRIDGE two official CoP meetings take place within each case study city, as well as two umbrella CoP meetings where representatives of each city come together to discuss relevant issues. Additional CoP meetings may occur voluntarily.

2. Methodological Framework

The methodology applied during the various CoP meetings is composed of a number of components that have been merged to facilitate a systematic and analytical problem solving logic. These are as follows:

1) Principles of the enhanced DPSIR framework proposed by Niemeijer and de Groot (2008) were applied to define core objectives based on a domain of interest, and to frame them within the boundaries of the system. In the case of BRIDGE, the domain of interest is sustainable urban development, and the boundaries are determined by the aspects being analysed (i.e. water and energy fluxes, and pollutants including carbon). The identification of the drivers and pressures for each case study during the kick-off CoP meetings helped determine the core aspects that needed further evaluation. This was achieved by answering the following questions: 'what are the planning priorities in the city?', 'how do the associated socio-economic drivers affect the environment?'; 'what are the consequent pressures on natural resources?'; and 'what do we need to do to protect/improve the state of natural resources?'. The answers obtained from participants provided context to the study and formed the basis of the sustainability objectives specific to each city.

2) Elements of the decision-support framework proposed by Donnelly *et al.* (2006) were used to define targets and indicators. Once the core sustainability objectives were established, the potential impacts associated with the drivers and pressures were addressed for each of the four environmental considerations in BRIDGE. In order to address sustainability issues, indicators were discussed and defined by answering the questions: 'what do we need to look at/measure/monitor/assess to know that resources are protected or improved?'; 'what indicators are needed to measure progress towards established objectives?'. The first round of CoP outcomes resulted in a preliminary set of indicators.

3) Criteria based on the Specific-Measureable-Achievable-Relevant-Time-bound – SMART approach (Schomaker, 1997) were used to finally select individual indicators. In order to meet the requirements of BRIDGE, an additional criterion was necessary to ensure the indicators were spatially specific as the DSS is based on Geographic Information Systems (GIS). The preliminary indicators were evaluated against all criteria to determine their suitability to the case study. The first step during the second round of CoP meetings was to determine whether the suggested indicators were relevant and specific enough to evaluate the sustainability of the planning alternatives under consideration. Taking into account the project time-frame and the models available, together with the spatial datasets accessible from the relevant city authorities, the measurability and achievability of the preliminary indicators were verified. Specific criteria were then determined, mostly based on thresholds set in European and national guidance and/or legislation.

3. Results & Discussion

Despite the different urban settings and the differences between the identified planning issues, the results of the CoP meetings illustrate, as expected, a clear correlation among the cities in relation to some a number of sustainability objectives (Table 1). Improvement in air quality was considered to be one of the key objectives (in particular, a reduction in emissions of particulate matter), followed by the need for the improvement of energy efficiency (mostly related to ineffective insulation and poor energy performance of aging buildings), and the mitigation of climate change effects (in relation to both temperature increases and flooding events). It is worth noting that water was not always considered an issue. The scope of the BRIDGE project limits the assessment to carbon and pollutants, energy and water. These boundaries constrain the detailed assessment of additional sustainability issues (such as

mobility and human well-being identified by the CoP). Moreover, the CoP were largely dominated by scientists and researchers, with a limited number of planners and other stakeholders, and no decision-makers. As a result, the planning priorities and sustainability issues were largely influenced by the background and expertise of those involved.

Table 1. Sustainability objectives established by participants at the CoP meetings.

	Sustainability Objectives			
City	***Carbon & Pollutants***	***Energy***	***Water***	***Others***
Athens	• Improve air quality • Reduce CO_2 emissions	• Improve energy efficiency • Reduce thermal discomfort		• Improve the built fabric • Increase green areas • Increase mobility
Firenze	• Improve air quality	• Improve energy efficiency		• Improve mobility • Increase & improve green spaces
Gliwice	• Improve air quality	• Optimise energy efficiency	• Improve water management	• Promote controlled urban expansion • Improve mobility
Helsinki	• Improve air quality	• Optimise energy efficiency	• Protect the water balance	• Enhance human well-being in the city
London	• Improve air quality • Reduce CO_2 emissions	• Decrease heat island effect	• Reduce flooding	• Promote integrated decision-making • Increase canopy cover

Due to the existing correlation between objectives, there was also a significant overlap in the indicators proposed in the first round of CoP meetings. In terms of air quality, key pollutant emissions and concentrations, together with their relative sectoral share, were proposed as indicators. Energy consumption and percentage of supply coming from renewable sources were the most common indicators suggested to monitor energy performance. Flooding events was the most widely suggested indicator to monitor water balance; water consumption was rarely considered an issue by the CoPs. These indicators largely correlate with those established by the European Environment Agency (EEA, 2005). The preliminary sets are currently being reviewed during the second round of CoP meetings to determine the suitability and measurability of the individual indicators in each case study.

4. Conclusion

The number and background of participants largely defined the outcomes of the meetings and the sustainability criteria. Additional efforts are needed to engage stakeholders in plan-making. Moreover, the open approach of CoP limits the extent to which key aspects can be addressed in a systematic and structured manner. In all cases, it was considered that the application of a coherent and methodical CoP approach to the development of sustainability objectives and indicators focused the debate and facilitated communication between participants.

The differences in the urban planning issues require that objectives and indicators are tailored to each case study. However, a number of sustainability objectives were common across the cities examined. In all cases, the final set of indicators needs to satisfy the selection criteria and ensure that they are: a) critical for decision-making (i.e. address core issues); b) linked to sustainable planning (i.e. the domain of interest); and c) easily monitored (i.e. DSS compatible and measured on a regular basis).

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