PeBBu Domain 4 Final Report
BUILT ENVIRONMENT
PeBBu Domain 4

FINAL DOMAIN REPORT

author
Professor Colin Gray
CMandE University of Reading
UK

Report layout / cover design, editing
Ms. Mansi Jasuja
CIBdf, The Netherlands

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UK
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PeBBu Coordinator:
Wim BAKENS
wim.bakens@cibworld.nl

PeBBu Programme Manager:
Mansi JASUJA

CIB (PeBBu) General Secretariat
Postal Address: Postbox 1837, 3000 BV
Visitors Address: Kruisplein 25-G, 3014 DB
Rotterdam
The Netherlands
Email: secretariat@cibworld.nl
Tel: +31.10.4110240
Fax: +31.10.4334372

www.pebbu.nl

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From the outset, this topic within the PeBBu programme was very challenging. The Built Environment as a whole is an enormous subject that in many ways defies definition. There are so many variables that have to be considered. Eventually the scope was reduced and refined into two aspects. The first was the effect of the building on the built environment and the second was the effect of the built environment on the building. Buildings sit within a context and there must be empathy with the context such that the building contributes to the improved performance of its local environment. Equally the building itself must respond to and respect its surroundings and the impact that it will have. In some cases the impact needs to be strident, an icon celebrating change whilst in other locations it needs to fit and not be obtrusive. Other environmental pressures need to be considered which are applicable in any circumstance such as, energy usage and sustainability. The task was therefore defined as one of enabling clients and specifiers to be able to access all of the relevant subjects, inform themselves and then to decide which were relevant and prioritise choices when setting performance criteria.

What also became apparent very early in the task was that the built environment literature describes the issues but there was no literature that discussed it in performance terms. There are only a few guides in some of the areas. There are many lists of the subjects that must be included, but these are not in performance terms. The questionnaire that was developed sought to define the areas in performance terms but met with little response. It was at this point that the Domain was terminated and resource transferred to other areas. However the work in developing the decision making tool in this area was completed as a demonstrator and is available for further development.

I would like to thank those people who attended the first workshop and dealing with the challenge of definition in this complex area. Also, those who responded with detailed suggestions and clarifications on the definitions and who contributed links to relevant web sites and research in the sub topics. I would also like to thank Dr Salam Al-Bizri, my research officer who undertook the majority of the data collection and developed the decision framework and tool. The contribution from the Reading Production Engineering Group was also invaluable in providing the base work in QFD to enable the development of the decision framework tool.

Colin Gray  
CMandE University of Reading, UK  
Task Leader of PeBBu Domain 4  
c.gray@reading.ac.uk
EXECUTIVE SUMMARY

Attempting to set a performance specification for the built environment is an impossible task so this Domain chose to consider the built environment in the context of individual buildings. Whilst there is a very strong overlap with town and country planning and building regulations, particularly in the UK and Netherlands, this Domain chose to look at the wider issues of the building’s impact.

The assumption was made that the potential user of the information generated by this domain was the client or specifier of the building. They would want to know which areas they had to consider in the initial briefing stage, what was the state of the art in each area and if possible guidance to relevant experience.

Following an initial review it was concluded that the majority of new construction would be urban and in cities. The literature on cities is merging into three categories and these were used to provide the context within which the broader information could be accessed. There was a discussion as to the place of development in villages and rural situations, but this could be dealt with by selecting suitable instances from the total data base of information.

By using the World Wide Web searches were made of experience within and beyond the EU to determine relevant experience. In practice this is very limited and there were no instances of performance specifications that could be used directly.

The literature on cities and the Web search was used to structure a data base of relevant information and links to sites that could be explored if the user required a deeper explanation of the subject. Because each topic is so large it was practical to only link to key texts and instances to indicate the starting points for a user to explore the subject. The anticipation is that they could then start to formulate their own performance specification given this structured approach to the topic and subjects within it.

Even with the website it was realised that the user still had little guidance as to how to structure the information nor how to make decisions or how to generate a performance based specification in this area. This is not an uncommon problem in construction so a modified and developed form of a briefing tool developed by the Reading Production Engineering Group was created to help users set a Built Environment Performance Specification.

The briefing tool enables a user to set a performance specification, a level of priority to each requirement and be able to assess whether their objectives are in conflict with each other.
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CHAPTER 1

Background to Domain 4 Work
1 Background to Domain 4 Work

The UK, for example has set a policy of building an extra 3.8 million households by 2021 a real increase of 19% over planned targets. 60% of these new homes are to be built on previously developed land. More than 90% of the buildings and infrastructure needed in 30 years time has already been built. The implication of this is that society will increasingly require new buildings but to serve a very different set of purposes. The majority will be in areas which are already built, thus meaning a move towards high density urban environments (Towards an Urban Renaissance, DETR, 1999). This may well be a similar issue in all existing urban environments particularly those in the EU over the next 20 years. The practical issues are that the environmental and social issues of high-density living are still unresolved. Car traffic and commuting is growing, unemployment in inner cities is more than double that elsewhere, 40% of inner city housing stock is in the ‘public sector’ with their intrinsic management and social problems. However urban neighbourhoods should be attractive places in which to live. By improving the design of the ‘whole’ in creating compact developments, with a mix of uses, with better-integrated transport and an approach, which provides safe communities a new performance standard for urban environments is being formulated. That it will be different for each circumstance needs to be recognised.

1.1 Performance And The Built Environment

Buildings are normally treated as individual artefacts and hardly ever in the urban context. The relationship between this individual approach and the needs of the urban context needs to be understood if a holistic community approach is to be established. This introduces the needs of the community and how they can be addressed. However where is the balance drawn between addressing the needs of the community and the alternate which is central planning? The UK and other European countries have very strong planning systems. Do these provide a solution? How effective are they in comparison with other systems in the world? Would a performance-based approach to stating the requirements for a built environment conflict with the normal planning approaches and can a community articulate the performance that is required in a way that is useful to developers, designers and financiers?

These initial questions provide the context for the Domain 4 activity. Is it possible to set a performance agenda for individual projects given the current knowledge and if so what are the elements of the performance criteria.

1.2 Definitions

Before the state of the art can be stated a definition of the scope of the built environment must be established. This was the first task for the Domain. As can be seen above the scope was focussed onto the developing urban society and the continuing growth of urban areas in Europe. This is mirrored in other parts of the world particularly in the major cities of the world such as Mexico City, Delhi and Beijing. In Europe the demographic trends both within member states and across the Community are changing such that population growth is levelling off, although there is still a trend towards inward migration from other countries, so the trend is still towards an increase in urban living rather than agriculture based rural life. However the growth in city living is somewhat clouded by the growth of second homes and the gentrification of rural villages for commuter based living. Consequently the focus was urban in the context of city based living and the study of particular characteristics of cities.

In a review of the literature on the emerging developments in the concept of the city three dominant approaches seem to be emerging: compact cities, high density cities and learning cities. It is at the neighborhood level at which these ways of living are being developed. A city may well contain many areas
which together could encompass any or all of the above descriptions, so performance needs to be stated at the neighborhood level within the context of the city. In discussion an argument was put forward that a village in some countries is also the equivalent of a city neighborhood, which may be true and demonstrates the difficulty of precise definition in the subject. What was clear was that the PeBBu study was not to cover issues of urban and regional planning as the literature was huge and also beyond the competence of the participants.

The weaknesses at the moment are that considerations of performance based construction focus on individual projects and not the fit within urban society. For example, how is the functioning of a building affected by the infrastructure to which it is connected? Equally what is the effect on the performance of the services and infrastructure of a new building or the wider impact upon the local community and society? The effect of the new art gallery in Bilbao is an example of a building used to change the performance of a whole urban area. Successful urban generation is design led. The future need is in promoting a sustainable lifestyle across the urban environments of Europe. But design alone is not sufficient. A performance specification that considers all of the issues of modern living both within and without buildings must be developed against which a new development can be measured or its brief set. The concept of Performance Based Building can provide the interface between the conflicting requirements of sociological, technical, ecological, economic and physical restraints on development.

What became clear within this task was the complexity of the interaction and integration of a wide range of subjects and topics. There was no single technological solution but a large number of issues that had to be balanced against each other which called for sophisticated mechanisms for decision-making to allow the consideration of a wide range of variables.

### 1.3 Objectives

#### 1.3.1 To define the concept of performance based building in the context of the urban environment

It is commonly acknowledged that new facilities are required to cater for the increasing population. The practical issues are that the environmental and social issues of high-density living are still unresolved. Car traffic and commuting is growing, unemployment in inner cities is more than double that elsewhere. By improving the design of the 'whole' in creating compact developments, with a mix of uses, with better-integrated transport and an approach that provides safe communities a new performance standard for urban environments can be created.

The object of the Domain 4 is to define those issues that a building project must embrace to enhance the many aspects of the built environment in which it is located in order to add benefits, value, space and life to achieve urban sustainability. The importance of this task is that it sets the project into its context and ensures that it reflects the growing need to contribute to the sustainability of the urban built environment.

The majority of the PeBBu project deals with the project or building’s performance. The scope of domain 4 was purposely set as considering the building in the context of the environment in which it sits. Domain 4 started from the wider picture in trying to establish what the built environment of the future needed to consider and then how buildings need to react to the requirement. Much of the debate in the planning and environmental journals and in Government circles centre on achieving a sustainable built environment. Every new building project is therefore not isolated from these issues and the client and design team must consider the impact of these requirements on the project and conversely how the project impacts or not on the need for a sustainable environment. It is within these parameters that the performance requirements must be set and can be considered in a number of ways:
• The immediate environs of the building. This could be interpreted as within say 2 meters of the building envelope. The performance requirements are therefore related very closely to the way that the external environment operates on the building, or that the envelope impacts with the local environment.

• The local environment of the building. This could be considered as the local context in which the building sits and its relationship with the street or adjacent spaces.

1.3.2 To identify possible areas of contribution to society’s value of the urban environment from this approach

Domain 4 started from the wider picture and its scope goes beyond the immediate building environs therefore it considers the impact on the surroundings of a building. The economic, physical, environmental and social issues are discussed. Questions are raised such as; how will the building affect the local situation? Is the building so large as to affect a neighbourhood? If when that neighbourhood is affected will it itself affect the wider city? These are issues of testing the contribution that the building or development is intending to make. Domain 4 views these issues from two directions. The first is that the building will make an impact and the full extent of that impact must be specified in order that the desirable performance change to the new state is achievable. The second is that the local environment may impact the building and the performance requirements of the local situation and its causes must be stated in order that the building adds to rather than detracts from the performance requirements.
The State Of The Art

CHAPTER 2
2 THE STATE OF THE ART – PERFORMANCE STUDIES IN THE BUILT ENVIRONMENT

Domain 4 started by asking one significant and initial question; ‘in what type of urban situation is the performance based built environment going to be designed to perform? This question was addressed because it sets the framework for the whole of the subsequent specification. So far three concepts have been identified: the compact city (Jenks et al, 2000), the creative city (Landry, 2000) and the high-density city (DETR, 1999). The compact city debate questions the cost of urban sprawl versus the social and psychological issues of high-density living. The argument is one of conservation, reduced transportation and a general increase in well being through a reduction in the dependency on cars. The creative city case is one of releasing the potential within the citizen by providing the right leadership and facilities within the various ‘rings’ (hub, inner urban ring and suburbs) or areas of a city. These concepts have been used to provide an initial sort of the desirable features that a specifier may need to consider.

The three city concepts have been used to structure the review of the literature and surveys of the World Wide Web. A dedicated PeBBu website has been developed and is maintained at http://www.rdg.ac.uk/PeBBu/. This contains the current state of the collection and analysis of the relevant published literature and website surveys. The difficulty with the available information is that the desirable urban features and regeneration actions are implicit within the description of the urban problem. The continuing task is to review the literature and to determine action-oriented statements that can be construed as performance requirements.

In order to establish the state of the art as required in the overall PeBBu project a questionnaire was developed based on the findings of the extensive literature search described above. The development of the questionnaire was done on schedule. The questionnaire required that for each area the definition was confirmed or that suggestions were made as to amendments so that an agreed definition of the topic could be achieved. The respondents were also asked to give information on their local activity in each of the topic areas so that the draft state of the art could be obtained. By necessity the questionnaire was complex and few returns were made because the built environment had not been described in performance terms before so respondents had great difficulty in replying to the specific questions that were asked. The primary goal of the questionnaire was to establish the scope of the domain and to obtain an agreed definition of each sub-topic. Whilst input to the PeBBu website was a goal of the project this has been developed in this Domain to be the primary method to access the knowledge that is available about the built environment. An extensive website has been created that is in excess of the original intended scope. Domain 4 website has been established at http://www.rdg.ac.uk/PeBBu/. Because little in the built environment has been configured in performance terms the response to the questionnaire has been limited. Much of the content of the website so far has been developed by the domain leader and research team.

Switching to a format based on the World Wide Web enables a potential user to access not only current practice, but also future practice if the respective web sites are maintained. The request to the contributors therefore switched to include relevant web sites.

The website describes the project, the domain objectives and for each sub-topic the definition that has been used and a brief description of the scope of the topic. Twenty-one sub areas have been developed so far. Some are further developed with long lists of actions and areas that have to be considered. Few are developed as performance specifications, although all have an implicit expectation that by adopting new practices in each area then the overall performance objective will be achieved. Work has commenced to
review the information in each area and to produce a performance oriented text that links the many websites and information sources. To review every site and every piece of information and to evaluate it as state of the art or not is an impossible task. This realization has led to the development of the domain as a support system to users who themselves would have to develop an intimate knowledge of those topics and areas that are relevant to their particular project. Therefore a user or client needs assistance to identify the relevant topics and also a means of accessing and stating the basis of the performance requirement once they have understood the issues. That understanding can be supported by the international research that is now accessible via the domain website. The subject areas and scope of each is set out below.

2.1 Smart Growth

Smart Growth is an attempt to make urban development a positive force for the long-term health of the economy, society and the environment. It aims at controlling urban sprawl and creating healthy, sustainable communities and to continue to provide the jobs, tax revenues and amenities that growth and development provide without degrading the environment, raising local taxes, increasing traffic congestion or breaking local government budgets. Smart growth means smart management of resources in both growing and declining communities.

http://www.greenontario.org/smartgrowth/index.html
http://www.plc.org/bridges/smartgrowth/
http://www.mnplan.state.mn.us/SDI/smart.html
http://www.sierraclub.org/sprawl/whitepaper.asp

2.1.1 Related Web Sites

MNPLANNING - Minnesota Planning
http://www.mnplan.state.mn.us/SDI/smart.html

The administration of Governor Jesse Ventura has placed great emphasis on smart growth. Its framework for action on smart growth, a work in progress, is laid out in Growing Smart in Minnesota.

Smart Growth Online
http://www.smartgrowth.org

Getting to Smart Growth
100 Policies for Implementation is the newest primer in the ongoing series from the Smart Growth Network and International City/County Management Association (ICMA). The publication serves as a roadmap for states and communities that have recognized the need for smart growth, but are unclear on how to achieve it.


Dutch urban management policy aims at this issue. Red lines will be drawn on urban plans and within these boundaries urban development is allowed. Everything outside the boundaries is reserved for green fields.

2.2 Sprawl

Sprawl is the result of a process that began largely after WW II whereby technological advances and business and marketing strategies spurred demographic shifts and altered consumption patterns in favour of privacy, local control, and flexible personal transportation. Sprawl can be defined as extensive low-density development on greenfields. Sprawl typically has the following characteristics:

- Unnecessary land consumption
- Low average densities in comparison with older centres
- Widespread strip commercial development along roads
- Auto dependence. Physically and economically segregated subdivisions
2.2.1 Causes of Sprawl

- Public investments in roads, public buildings, water, sewer and other infrastructure in peripheral areas; decrease in investment in existing centres.
- Land regulations that promote suburban style development
- Other public policies, including tax policies and utility rate policies based on low cost fuel
- Lower land prices in peripheral areas
- Higher costs of development associated with existing centres
- Consumer desire for rural lifestyle with large homes and large yards, safe environment and less traffic congestion
- Preference of business and industry for easy highway access, plenty of free parking and corporate identity
- Demands of commercial tenants for particular locations and designs for buildings and sites
- Telecommunications advances
- Commercial lending practices that favour suburban development

http://www.vtsprawl.org/index3.htm

2.2.2 Sprawl Issues

- Relationship Between Population Growth and Sprawl
  Analysing suburban sprawl shows that population growth variable explains about 31% of the growth in land area and even those areas that experienced no population growth increased in urbanized land area by an average of 18% and urban areas are expanding at about twice the rate that the population is growing.
  It is important to remember that if there are multiple causes of sprawl, then their impact is multiplied together, so that if population increases by 50%, and density decreases by 50%, land consumed will increase not by 100%, but by 300%. So poor land use makes the impact of population growth worse, and vice-versa.

- Subsidies and Population Growth
  A growing body of research shows that many communities are subsidizing new development in the form of new roads, water and sewer lines, schools, and emergency services. Communities are also subsidizing growth by offering incentives to new businesses or industries that locate there, often sacrificing tax revenues needed to serve existing residents and businesses.

- Reducing Density
Attempt to discourage population growth by reducing density can lead to more sprawl and more growth. Tools aimed at simply capping growth by reducing density can be racially and economically exclusionary. Low-density-only leads to exclusion of racial minorities either directly or by spurring a shift to lower housing production and single-family unit housing, leading to a lower percentage of renters and lower rental affordability.

http://www.sierraclub.org/sprawl/whitepaper.asp

### 2.2.3 Effects of Sprawl

**Increased public costs**
- Unnecessary public costs for redundant infrastructure outside existing centres
- Excessive public costs for roads and utility line extensions and service delivery to dispersed development
- Unutilised and under utilized infrastructure in existing centres
- Reduced opportunity for public transportation services

**Loss of sense of place and community decline**
- Fragmented and dispersed communities and a decline in social interaction
- Isolation of some populations, such as poor and elderly, in urban areas
- Decline in vitality and economic and fiscal viability of existing urban and village centres

**Decline in environmental quality and natural resource production**
- Fragmented open space and wildlife habitat
- Loss of productive farmland and forestland
- Increase in auto dependency and increased fuel consumption
- Decline in water quality from increased urban runoff, shoreline development and loss of wetlands

**Decline in economic opportunity**
- Premature disinvestments in existing buildings, facilities and services in urban and village centres
- Relocation of jobs to peripheral areas at some distance from population centres
- Increased commuting times and costs
- Decline in number of jobs in some sectors, such as retail
- Isolation of employees from activity centres, homes, day care and schools
- Reduced ability to finance public services in urban centres
- Inability to capitalize on unique cultural, historic and public space resources (such as waterways) in urban and village centres

http://www.vtsprawl.org/index3.htm

### 2.2.4 Related Web Sites

**GREAT LAKES SUSTAINABLE LAND USE**
http://www.glc.org/bridges/sprawl/

**GREAT LAKES SUSTAINABLE NET**
http://www.great-lakes.net/teach/pollution/sprawl/sprawl_1.html

The Great Lakes region is losing its rich farmland and other greenfields to urban sprawl at an alarming rate, and the environment and the residents are paying the price. Many cities of the Great Lakes region, such as Chicago, Detroit, Cleveland, are seeing their businesses and residents move to the suburbs, forever destroying open spaces and leaving behind cities of abandoned buildings with fewer tax payers.

**VERMONT FORUM ON SPRAWL**
http://www.vtsprawl.org/index3.htm

### 2.3 New Urbanism
New Urbanism is an urban design movement that burst onto the scene in the late 1980s and early 1990s. It shares many similar goals with Smart Growth. However, their differences lie mainly in approach. Where Smart Growth addresses these issues through strategically directing financial resources to support programs and policies that support these goals New Urbanism takes a predominately design approach. New Urbanism aims to reform all aspects of real estate development and support regional planning for open space, appropriate architecture, and planning, and the balanced development of jobs and housing. Many other issues, such as historic restoration, safe streets, and green building are also covered in the Charter of the New Urbanism.

http://www.cnu.org/

2.3.1 Related Web Sites

Congress for the New Urbanism (CNU)
Advocates for the restructuring of public policy and development practices to support the restoration of existing urban centres and towns within coherent metropolitan regions.
http://www.cnu.org/

Whose Urbanism?
Article exploring the negative side of the New Urbanism movement.
By Alex Krieger - Chairman of the Department of Urban Planning and Design at Harvard University's Graduate School of Design, and Principal of Chan Krieger & Associates.

The New Urbanism Articles
By Alex Marshall - Journalist and writer focusing on the environment and issues of urban sprawl, new urbanism, and comparative studies of European and American culture.
http://www.alexmarshall.org/am_categoryPagesFolder/newUrbanism.htm
http://www.alexmarshall.org/

Governmental funding of urban renewal in the Netherlands is using these principles.

2.4 Gentrification

Gentrification is the unit-by-unit acquisition of poor quality housing or industrial or commercial property by incoming residents attracted by the low costs and used for, art, cultural, fashion or other high-status use. Housing is renovated because of its initial low cost by people who have the capital to invest. The movement is led by professional and managerial occupations and the rise of young university graduates with a strong cultural orientation towards the facilities of the inner city (Hall and Pfeiffer, 2000).

The phases of gentrification have not been categorised by systematic research, but it seems that art and culture are prominent in the first phase. The first art gallery in a working-class neighbourhood is a classic sign of imminent gentrification. Later these activities, and the associated population, may themselves be displaced by an older high-income population and by office uses.

http://web.inter.nl.net/users/Paul.Treanor/gasfab.html

2.4.1 The Ethics of Gentrification

Gentrification is not a normal market phenomenon and it is not normal in a historical perspective. Displacement means force. It means harassment, and violence, especially of tenants. By initiating gentrification, gentrifiers create the potential for landlords to displace tenants. The ethics of gentrification are primarily about displacement, but not entirely. There are also non-displacement issues:

- Gentrification creates right-wing upper-middle-class concentrations - electorally and socially.
- In recent gentrifications, there is a conscious attempt to "upgrade" the population.
- The arrival of the rich destroys much of the infrastructure, which the poor rely on, to live cheaply.
• The social mix argument is especially fraudulent, because there is no attempt to re-house the poor in the rich suburbs.
• Gentrification reduces the cheaper housing stock, which ultimately forces the poor into more expensive housing - reducing their real income.
• In older stock, gentrification involves the combination of small rental units, into larger units for sale thus reducing housing stock and pushing up prices.
• The constant pressure to move into more expensive housing is a form of forced consumption.

http://web.inter.nl.net/users/Paul.Treanor/gasfab.html

2.4.2 Examples of gentrification

Docklands Projects
Docklands projects imply a coordinated plan for former port areas with many brown-field sites. Usually there are separate developers, the project may last a generation, and the city government is essential to plan and co-ordinate it. http://web.inter.nl.net/users/Paul.Treanor/gasfab.html

Urban Regeneration
Urban regeneration is the name usually applied by planners and politicians to brown-field redevelopment, from single sites to docklands. It also covers a wide range of social policies, and may be used as a euphemism for gentrification.

http://web.inter.nl.net/users/Paul.Treanor/gasfab.html

Social Cleansing
Social cleansing is deliberate policies aimed at removing a section of the population - a criminal underclass, or simply those with low incomes. It is ultimately driven by the belief that an area and its administration have failed, if such people live there. A quasi-moral moral character, attributed to residents, is also attributed to the geographical area itself. Unlike gentrification, social cleansing is always government-initiated.

http://web.inter.nl.net/users/Paul.Treanor/gasfab.html

Brown-field Gentrification In Europe
http://web.inter.nl.net/users/Paul.Treanor/gasfab.html

2.5 Urban Planning

The explosive growth of urban areas has brought with it a host of negative effects. Population concentration in increasingly smaller land-masses has caused a drastic decline in the quality of living both in the residential and work fronts. While the causes for these problems are many, focus has been maintained on the role and contribution of urban planning processes to this situation. The processes involved in urban planning and development vary considerably, and depend on a number of objective and subjective aspects in the physical, social, economic, and political spheres. In general, planning involves the cyclical processes of plan and policy-making, public debates and feedback, its implementation and evaluation. A plurality of actors are involved in these processes, such as local governments, citizens groups, industry, governmental ministries, departments and other agencies, and the planners themselves. The interaction and intersections between these affect the overall development of the urban environment and the quality and attributes of the urban environment. http://www.glc.org/bridges/planning/

Urban Planning should be more than the preparation of master plans or blueprints for the future. Even when such master plans have involved substantial time and effort to prepare, they are not relevant to real developments on the ground if stakeholders do not adhere to them. In other words, the authority of a master plan can vary a great deal. Effective planning also depends upon the ability of planning authorities to enforce whatever has been agreed upon. The co-ordination and facilitation of all the individual decisions affecting urban land uses is as important as a master plan that is respected. A city plan can be narrow or broad. It can be focused only on urban land uses and infrastructure, or it can incorporate environmental concerns and use of natural resources, such as water systems. The most
ambitious urban plans reflect the interactions among all sectors in the urban area, including urban food systems and agricultural demands. A comprehensive plan also links with land use planning in periurban areas and the surrounding countryside.

http://www.fao.org/urbanag/Paper3-e.htm

In the Netherlands this is a municipal responsibility, often incorporated in a zoning plan. The owner of the land particularly if it is a property developer has a lot of influence on the final plan. In the UK development plans are the responsibility of the Regional Assembly with input at County and city level.

The issue for PeBBu is allowing the relevant authorities their voice in the setting of the performance for the project in a proactive way rather than the negative planning control approach.

2.6 Capacity Building

"Specifically, capacity building encompasses the local human, scientific, technological, organizational, institutional and resource capabilities. A fundamental goal of capacity building is to enhance the ability to address the crucial questions related to policy choices and modes of implementation among development options, based on an understanding of environment potentials and limits and of needs perceived by the people in the broader community".

Derived from Capacity Building - Agenda 21’s definition (Chapter 37, UNCED, 1992.)

Capacity Building includes:
- Human resource development, the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively.
- Organizational development, the elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors (public, private and community).
- Institutional and legal framework development, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities.

2.7 Environmental Impact Assessment

Environmental Impact Assessment (EIA) may be defined as a formal process used to predict the environmental consequences of any development project. EIA thus ensures that the potential problems are foreseen and addressed at an early stage in the projects planning and design.

Manu and Anshu, UEMRI-India

The purpose of the environmental assessment process is:
1. to support the goals of environmental protection and sustainable development.
2. to integrate environmental protection and economic decisions at the earliest stages of planning an activity.
3. to predict environmental, social, economic, and cultural consequences of a proposed activity and to assess plans to mitigate any adverse impacts resulting from the proposed activity.
4. to provide for the involvement of the public, department of the Government and Government agencies in the review of the proposed activities.

Alberta Environmental Assessment and Enhancement Act (38)

By EU directive environmental impact reporting is mandatory for large-scale developments in the member states.
2.8 Life Cycle Assessment

Life cycle assessment determines the environmental impacts of products, processes or services, through production, usage, and disposal.

- Life Cycle Assessment:
  A systematic set of procedures for compiling and examining the inputs and outputs of materials and energy and the associated environmental impacts directly attributable to the functioning of a product or service system throughout its life cycle.

- Life Cycle:
  Consecutive and interlinked stages of a product or service system, from the extraction of natural resources to the final disposal.

ISO 14040.2 Draft: Life Cycle Assessment - Principles and Guidelines

A TNO developed tool “Sustainability profile of a location” partly uses LCA data to assess the environmental performance at district level.

2.9 Brown-Field And Contaminated Lands

Brown-field redevelopment means new building on former industrial and transport sites, or complete renovation of existing plant for non-industrial use. Until recently, this was usually for the service sector: many offices, some shops, hotels and conference centres. Subdivision of old industrial plant, for new industrial users, is not brown-field redevelopment. Brown-field residential redevelopment is a new pattern, in regions with relative land shortage. Usually, it implies a suburban style of development on a cleared site, but with higher density than true suburban housing.

Brown-field cleanup projects can play a central role in urban and rural revitalization and offer alternatives to new green-field developments. For many years, brown-field programs focused on cleanup of older industrial sites without consideration of the broader growth goals of the community or region. Today, however, brown-fields are being seen as key components of state growth management initiatives. There is a compelling economic case for state spending on brown-fields. A dollar of state spending produces about 10 times to 100 times more dollars in economic benefits. Expanding the mission of brown-fields justifies greater state spending.

http://web.inter.nl.net/users/Paul.Treanor/gasfab.html
http://www.dnr.state.wi.us/org/aw/rr/rbrown-field/index.htm
http://bri.gsa.gov/brown-field/home
http://www.nga.org/center/divisions/1,1188,C_ISSUE_BRIEF%5ED_306,00.html

Amsterdam: “Westergasfabriek” conversion of a gas works into a residential estate. Rotterdam: complete new residential development of former dock yards.

2.9.1 Revitalization of Communities

The revitalization of communities involves more than the reuse of old buildings. Redevelopment encompasses a wide array of socio-economic and a land use issue, all of which must be addressed if a community is to be revitalized.

Brown-field properties tend to be concentrated in older urban areas inhabited by peoples of colour or low-income people of all ethnic backgrounds. Concerns raised by people from urban brown-field communities should be addressed. Territorial, tribal, and rural representatives should be engaged in this process and add their concerns to the list. Brown-field revitalization is an environmental justice issue, and all stakeholders should work to overcome the barriers to public involvement as well as to address the concentration of environmental problems typically present in such communities. All brown-field
stakeholders should aggressively pursue strategies that deliver equity to those who are most affected by brown-field properties.

http://bri.gsa.gov/brown-field/home
http://www.cpeo.org/index.html
http://www.cpeo.org/pubs/reccom.html

2.9.2 Brown-field Projects Effect on Communities

Brown-field projects can influence nearby communities in many ways. They can remove health hazards and visible blight, or they can simply provide window dressing under the guise of institutional controls. They can bring in new polluting industries to the sites of old ones; they can trigger gentrification that looks good but drives the old neighbours out; or they can provide new business and housing opportunities to long-time residents. They can generate traffic, or they can bring new transportation options. They can provide new jobs, or they can aggravate economic disparities.

Today, at most brown-field sites, the people who are most affected have little influence over which of these outcomes prevail. Environmental decisions - or at least sign-off - are the responsibility of state regulators, with local health agencies playing a supporting role. Land use planning is generally a prerogative of local governments, which usually answer to an electorate much larger than the affected neighbourhood. Financing may be controlled by redevelopment agencies, the private sector, or a mix of public and private entities. Given the concentration of brown-field in poor communities, the neighbours rarely have the resources to influence investment decisions.

To the affected public, the combined process of environmental cleanup and economic revitalization is at best bewildering. Agencies and companies, often with conflicting or at least disparate goals and objectives, often take actions without considering the views or interests of the people who live next door, downstream, downwind, or up-traffic. To achieve the lofty goals inherent in the brown-field concept, it's essential to bring public stakeholders into the decision-making process early in the project development process, and to keep them involved until completion. Though many developers are suspicious of community activists, a constructive program of public involvement actually promotes more successful projects.

http://www.cpeo.org/pubs/comadv.html

2.9.3 Brown-field Stakeholders

For successful brown-field redevelopment, the interested parties or "stakeholders" need to come together to identify interests, conflicts and problems. At the very minimum, interested parties will include:

- Property owner and, if it exists, operator;
- Brown-field redeveloper;
- The lender or financial backer;
- The regulators (state, and in some cases, federal);
- Local government planning and redevelopment agencies; and
- Representatives from the affected community.

Together the stakeholders can develop a strategy to productively use contaminated property. They can work together to clean up and redevelop contaminated properties, revitalize communities, create jobs, prevent urban sprawl and make a significant contribution to their country, region or city.

http://www.brown-field.org

2.9.4 Clean Up Process

The cleanup is performed, in part, to accommodate the future use of the site (i.e., a parking lot has different cleanup standards than a school). In general, three options are evaluated: leave contamination in
place and monitor, treat the contamination in place and monitor the cleanup, or completely remove the contamination. Especially on larger sites, a combination of these techniques is generally employed. In general, the entity that causes the pollution has to pay for the cleanup. Often, however, sites are abandoned and it is difficult or impossible to track down past owners or users, or the contamination is so old that the source of it is unknown. In these cases, there should be new funding sources and programs to assist new owners working to resolve environmental issues and redevelop.

http://www.uvm.edu/~empact/land/brown-field.php3

2.9.5 Evaluating the Risk

All risk assessments must consider existing and reasonably likely future human exposure and significant adverse effects to ecological receptors in the locality of the facility. Risk assessment issues could be:

- Existing and reasonably likely future human exposures and significant adverse effects to ecological receptors;
- Estimates of plausible upper-bound exposures that neither grossly underestimate nor grossly overestimate risks;
- The range of probabilities of risks actually occurring, the range of populations likely to be exposed, current and reasonably likely future land uses, and quantitative and qualitative descriptions of uncertainties;
- Criteria for the selection and application of fate and transport models
- High-end and central-tendency exposure cases and assumptions;
- Individual risk estimates and population risk estimates
- Approaches for addressing cumulative risks posed by multiple contaminants or multiple pathways

http://www.brown-field.org

2.9.6 Brown-field Redevelopment Principles

- Brown-field redevelopment should foster healthy communities throughout the city and region. This can best be achieved by devising and following effective participatory planning processes that identify redevelopment priorities, build local capacity, and stipulate leadership in all sectors.
- Public incentives for greenfield development should not outweigh incentives for recycling brownfield. Redevelopment of brownfield areas will reduce the need for new infrastructure in outlying areas, conserve environmentally sensitive areas, and otherwise save the costs of sprawl.
- Engaging the private sector and expanding market resources are critical to brownfield redevelopment.
- Effective strategies require strong partnerships among government, communities, and the private sector. Cooperation is the only way serious progress will be made.
- Public brownfield expenditures should:
  - Address sites that would not be redeveloped without government participation;
  - Re develop disadvantaged areas, especially where environmental justice is a concern;
  - Focus on areas where brownfield reuse will likely catalyse additional development;
  - Create and retain jobs;
  - Maximize public benefit.
- To prevent the spread of brownfield and to foster sustainable communities, redevelopment efforts should seek to attract environmentally sound industries;
- Brownfield redevelopment cannot solve the city’s environmental, economic development, and social problems. Brownfield initiatives should be viewed as one important component of a comprehensive strategy for revitalizing urban communities and coordinated with other local, state, and federal planning and policy development efforts.
• In areas where contamination is widespread, brown-field redevelopment should seek to leverage broader, integrated strategies for promoting viable, long-term, area-wide development.
• Environmental cleanup standards must be clarified to accommodate a full range of land use options. Cleanup and land use decisions must consider community-wide issues.
• A large-scale brown-field redevelopment program should be based on knowledge and experience gained through pilot efforts and tests of innovative approaches and tools.
• While industrial redevelopment should be the top priority of the city’s brown-field redevelopment pilot program, the city and other interests should explore other reuse options that meet community development goals.

http://www.brown-field.org

2.9.7 Financing And Funding

The complicated process and legal hurdles of acquiring, cleaning and reusing brown-field sites can be expensive in terms of site preparation expenses and fees, and costly in terms of time delays. Site evaluation processes, testing, possible legal liabilities, and other factors serve to deter private participation in activities to bring old industrial sites back to productive use. In many situations, the private development and financial sectors are not able or willing to act on their own to ensure that the full economic potential of site reuse will be achieved. This is because of the following factors:

• Uncertain Costs and Timelines: Cleanup costs can range from next to nothing up into the millions, depending on the extent and nature of the problem and the cleanup standards established. Buyers, lenders and investors need to quantify their risks and costs and pin down project timelines in order to evaluate proposals and to make projects succeed. The environmental variables associated with brown-field complicate this task.
• Access to Capital: Financial institutions are reluctant to make loans associated with potentially contaminated properties for three reasons. First, lenders fear that unexpected cleanup liability could bankrupt borrowers and thus jeopardize the loan. Second, these properties make undesirable collateral. In the event of a borrower’s failure to pay back a loan, the bank could end up taking title to contaminated property. Third, the law is unclear as to the circumstances under which lenders who engage in workouts with borrowers to help them avoid default can themselves be sued as operators of a hazardous waste site. All this can have a chilling effect on the availability of capital for redevelopment.

Private Sector Financing
• Responsible parties. Prior to redevelopment, many sites are cleaned up by the party responsible for the environmental contamination.
• Purchasers. Often times a property can be cleaned up by the new property owner when a responsible party could not be identified or held accountable, or where the party was financially insolvent.
• Commercial Banks. Many banks are reluctant to loan money on brown-field projects until remedial work at the site has been certified as complete. However, banks are increasingly exploring the role of lending on contaminated property, and many will do so.
• Foundations. Private foundations may be sources of money for cleanup and redevelopment.

Public Sector Incentives
The public sector can do much to help level the economic playing field between greenfield and brown-field sites. Creatively crafted and carefully targeted incentives and assistance can help advance cleanup and reuse activities.

http://www.brown-field.org

Funding to Cleaning Up Contamination
• The companies or agencies responsible for causing the contamination if they are economically viable, particularly if the state has a strong program which assigns them strict liability for their contamination;
• Special cleanup funds created by state or local governments;
- Public funds established to finance the redevelopment of depressed economic areas;
- Tax incentives established under special federal, state, or local programs; and
- The future developer (depending upon the value of the site and the cost of cleaning up the contamination).

http://www.brown-fieldnet.org/bfinancing.htm

**Funding The New Development**

- The future developer;
- Banks or other investors, particularly if they have some corporate commitment to invest in urban redevelopment;
- Public funds established to finance the redevelopment of depressed economic areas, to create public areas such as parks, or for other special purposes; and
- Tax incentives established under special federal, state, or local programs.

http://www.brown-fieldnet.org/bfinancing.htm

### 2.9.8 Related Web Sites

**Brown-field Non Profit Network**

http://www.brown-fieldnet.org/

Financing Brown-field Cleanup and Redevelopment

By Charles Bartsch

http://www.brown-fieldnet.org/bbartsch.htm

Coming Clean for Economic Development

http://www.nemw.org/cmclean.htm


By:

- Charles Bartsch, *Senior Policy Analyst*, Economic Development
- Elizabeth Collaton, *Senior Policy Analyst*, Pollution Prevention and Waste Reduction
- Edith Pepper, *Policy Analyst*, Brown-field Research

**National Governors Association Online**

http://www.nga.org/center/divisions/1,1188,C_ISSUE_BRIEF%5ED_306,00.html

NGA Centre for Best Practices. This report discusses the success of brown-field programs that attack sprawl in five states: Maryland, Massachusetts, Michigan, New Jersey, and Pennsylvania.

**New Mission for Brown-field**

http://www.nga.org/cda/files/REPORT200010BROWN-FIELD.pdf

**Wisconsin Department of Natural Resources**

http://www.dnr.state.wi.us/org/aw/rr/rbrown-field/index.htm

**USA General Services Administration (GSA)**

Landlord and real estate agent for the federal government. GSA launched the Brown-field Redevelopment Initiative to identify and redeploy under-utilised federal properties

http://bri.gsa.gov/brown-field/home

**The Centre for Public Environmental Oversight (CPEO)**

CPEO promotes and facilitates public participation in the oversight of environmental activities at federal facilities, private "Superfund" sites, and Brown-field

http://www.cpeo.org/index.html

**Clean up to Build up**

The Winston-Salem Brown-field Program

http://www.brown-fieldw-snc.org/index.html

**Brown-field Economic Redevelopment Initiative**

http://www.epa.gov/swerosps/bf/topics.htm

The North Carolina Brown-field
The North Carolina Brown-field Program encourages the safe reuse of abandoned properties that have some measure of environmental impairment. [http://www.ncbrown-field.org/]

The Brown-field 2002 Conference: Investing in the Future

National Brown-field Association
The National Brown-field Association, established in June, 1999, is a nonprofit organisation dedicated to stimulating brown-field redevelopment by providing information resources and educational programs. [http://www.brown-fieldassociation.org/default.htm]

Nine Mile Run Greenway Project
Conversations in the Brown-field into GreenwaysPittsburgh, PA [http://slaggarden.cfa.cmu.edu]

ROBIN - The Great Lakes Regional Online Brown-field Information Network
"Recycling Land For A Sustainable Future" [http://www.glc.org/robin/index.html]

The Brown-field Centre
Carnegie Mellon University and The University of Pittsburgh
The Brown-field Centre (TBC) was founded on the recognized need to integrate multiple disciplines to realize potential benefits from revitalizing idle industrial sites. [http://www.ce.cmu.edu/Brown-field/home.htm]


2.10 Sustainable transportation

Sustainable transportation concerns systems, policies, and technologies that aim for the efficient transportation of people, transit of goods and services, and sustainable freight and delivery systems. The design of vehicle-free city planning, along with pedestrian and bicycle friendly design of neighbourhoods is a critical aspect for grassroots activities, as are telework and teleconferencing.

2.10.1 Aesthetic Highway Design

The growing social and technical complexity of both urban and rural transportation problems demands new tools, insights, connections, and organizing principles that spring from deeper wells of imagination than generally accessible through computer-generated design or formal engineering techniques alone. Although a significant body of literature exists in regard to bridge aesthetics, formal transportation research does not yet provide a working definition of “successful” highway design in terms of aesthetic, social, and environmental characteristics. [http://www.fhwa.dot.gov/terp/prog.htm]

The Dutch tool Transportation Performance on Location (VPL) for optimising infrastructure at new urban developments
2.10.2 Air Quality Issues

Air Quality Conformity: Aims to ensure that transportation planning is consistent with clean air objectives for one or more of the following pollutants: ozone, carbon monoxide, particulate matter, and nitrogen dioxide.

Air Quality Models: There are four generic classes of air quality modelling procedures: Gaussian; numerical; statistical or empirical; and physical. Gaussian models are most widely used for modelling non-reactive pollutants. Numerical models are most appropriate for urban applications involving reactive pollutants (such as ozone formation and dispersion), but require extensive input data and resources. Statistical or empirical models are “second-best” techniques that are frequently employed when incomplete scientific understanding or lack of data make the use of a Gaussian or numerical model impossible. Physical modelling is technically detailed and resource intensive, involving the use of wind tunnel or other fluid modelling facilities, but may be applicable for complex flow situations such as complex building or terrain conditions.

In addition to the various classes of models, there are two basic levels of model sophistication: screening models; and refined models. Screening models consist of relatively simple estimation techniques to identify sources, which will clearly not cause or contribute to ambient concentrations, which exceed the allowable increment, thus eliminating the need for more detailed modelling. Refined models provide more detailed treatment of physical and chemical atmospheric processes, require more detailed and precise input data, and provide more specific estimates.

Emission Reductions: Emissions reduction efforts range from producing lower-emitting new vehicles to reducing vehicle use. Efforts to reduce emissions focused on producing vehicles, which emitted less pollution. Despite the progress in reducing the emission rates from new vehicles, emission system component failure, lack of proper maintenance, tampering, and the normal deterioration of emission control system performance all act to offset these emission benefits.

Increased attention has been focused on control measures intended to reduce emissions from in-use vehicles. These reductions can come from technology improvements. Technology improvements offer a number of innovative approaches to reducing emissions. In fact, I/M programmes (Vehicle Inspection & Maintenance) represent one of the first and perhaps most widespread of the technology-based control measures targeted at in-use vehicles.

Ambient Air Quality Standards: An ambient air quality standard sets legal limits on the level of an air pollutant in the outdoor (ambient) air necessary to protect public health.

2.10.3 Social and Economic Issues

Public Involvement: Today, transportation project work demands an increasingly sophisticated and thorough approach to public involvement. Public involvement has been achieved with varying degrees of success.

Social and Economic Impact: This task aims to identify and document techniques for assessing social and economic impacts of a transportation action (project or potential project), including techniques that respond to their current legal environment.

Community Impact Assessment: is a process to evaluate the effects of a transportation action (project or potential project) on a community and its quality of life. The assessment process is an integral part of project planning and development that shapes the outcome of a project. Its information is used continuously to shape the project and provide documentation of the current and anticipated social environment of an area with and without the continuation of an action. The assessment should include all items of importance to people, such as mobility, safety, employment effects, relocation, isolation, and other community issues.

Housing Issues, Environmental Justice and Transportation Equity: Discriminatory distributive transportation outcomes can be subsumed under three broad categories: procedural inequity, geographic inequity, and social inequity. No systematic database exists to show how far states and metropolitan systems have identified, and taken steps to mitigate, discriminatory effects of their of a transportation action (project or
potential project, programs, and policies) on low-income and minority populations. Environmental justice and transportation equity concerns extend to discriminatory outcomes in planning, operation and maintenance, and infrastructure development by state and metropolitan systems.

2.10.4 Environmental Issues

Environmental Impact Assessment: Researches are required to distil proper methods of environmental impact assessment of a transportation action (project or potential project). This is because although a significant amount of guidance exists, the approach to environmental impact assessment of a transportation action is often reinvented. Institutional and geographic impediments have hindered the definition of a standard, or an accepted set of approaches to evaluating an issue, and the unique aspects of each project tend to confuse the common elements.

Environmental Planning and Management: Aims is to put transportation decisions against a backdrop of social, economic, and environmental factors (such as global climate change) early in the planning process, coordinate planning efforts among affected agencies, and involve the public earlier in the decision-making process.

Hazardous Materials Control: This area is concerned with approaches to control highway-related hazardous substances:
- Right-of-way hazardous substances, materials, and waste.
- Hazardous materials generated during development and completion of projects.

Stormwater Constituents: Storm-water discharges from roads and highways represent an environmental issue requiring an understanding of not only the technical aspects of highway design and operations, site environmental impacts assessment, and regulatory requirements, but also the relative contribution and magnitude of the environmental impacts on the ecological system. Although available data and research shows highway stormwater discharges are most likely to have significant impact on localized areas, the holistic approach which integrates highway stormwater runoff into the overall watershed-based ecological framework allows for the evaluation of long-term water and water quality trends.

Transportation Noise: While noise emanates from many different sources, transportation noise is perhaps the most pervasive and difficult source to avoid in society today. If noise impacts are identified, various noise abatement measures are considered to mitigate the adverse impacts, for example, noise barriers. Other possible noise abatement measures include: traffic management measures, creating buffer zones, planting vegetation, installing noise insulation in buildings, and relocating the highway.

2.10.5 Wetlands

The proper application of functional evaluations is critical to mitigating adverse impacts of transportation projects on wetlands. Functional evaluations of newly created wetlands can be extremely useful in measuring the success of efforts to replace lost wetland functions. Such assessments require careful definition of objectives and a comparison of results to certain baseline conditions. Depending on the objectives of the wetlands project, the baseline may be defined as the same wetland prior to alteration or as a nearby unaltered wetland of similar hydrogeomorphic type. Comparisons may also be made with other stated mitigation objectives, based on a reference wetland representing a desired target condition.

2.10.6 Transportation Planning

Transportation policies need to be aimed directly at supporting national and community goals. National goals that can be substantially aided by transportation include increasing industrial productivity, promoting energy efficiency, facilitating trade, upgrading the cities, protecting the environment, guiding urban growth, and exploiting the opportunities conferred by the global economy. These goals must also consider
environmental and social impacts and techniques used to decrease those impacts, such as, transportation control measures.

2.10.7 Related Web Sites

Transportation Environmental Research Program (TERP)
Is a programme aiming to fund research in transportation and environmental issues at universities and colleges in the USA.
http://www.fhwa.dot.gov/terp/prog.htm

Transportation Choices Coalition
Wants a better quality of life for the people of Washington State, including clean air and clean water, more parks, and vibrant and healthy communities.
http://www.transportationchoices.org/

2.11 Communications

During the last years, the growth of electronic communication and the New Economy have noticeably accelerated the globalisation, changing its perspectives and meanings. Those cities that succeed in computerising their structures will become the so-called Digital Cities, Smart Cities and, more recently, Internet Cities. These new cities will be able to benefit from relevant opportunities provided by the New Economy, provided they deeply revalue their role and organisational structures. As an example, the Internet’s growth of last five years has already changed in some way the models of several installations: buildings, neighbourhoods, cities, metropolitan areas, regional system, etc.

2.11.1 Communication Issues

- The use of communication technologies to: improve the quality of life in urban areas; simplify the access to the public administration and its services; contribute to a greater use of the Internet by citizens specially students in schools; develop the local economy and create new jobs; improve the quality of life of handicapped or less favoured citizens; and the use of tele-medicine to improve the quality of health services in remote areas, where there is a lack of medical staff and/or where access to specialised health services is difficult
- Modernisation of the services of the local administration by using the Internet as a means to: make public information widely and easily available; implementation of interactive services reducing the need of a direct contact with the administration and reducing the amount of wasted time needed in the physical presence in the administration premises
- Electronic commerce and Internet technology for new markets and business partners. Digitalisation of cultural contents. Traffic management in the urban area. Operation of portals for specific economic and social groups.
- The need to educate citizens and business people in the use of communications technologies and the Internet; the shortage of the technical staff necessary to implement the services; the necessity to improve management capabilities of parties to projects that involve several partners and new technologies; and the high costs of telecommunication services and the difficulties in the implementation of the organizational changes necessary to fully automate administration and business services.


2.11.2 Related Web Sites

Community Networks for reinventing citizenship and democracy
2.12 Energy systems

Three key issues will define the shape and future of energy in cities:

- Sustainability: how much and at what rate is energy consumed, and its effect on long term sustainability; the quality and quantity of available alternative/renewable forms of energy; and the effect of existing energy use on the global environment as a whole.
- Efficiency: the technology, planning and management of energy systems that will facilitate efficient use of energy for human activity.
- Equity: the appropriate financial mechanism for research, development and use of finite and alternative energy forms, and their equitable distribution for all humankind.

2.13 Waste management

Arising quality of life, and high rates of resource consumption patterns have had an unintended and negative impact on the urban environment - generation of wastes far beyond the handling capacities of urban governments and agencies. Cities are now grappling with the problems of high volumes of waste, the costs involved, the disposal technologies and methodologies, and the impact of wastes on the local and global environment.

But these problems have also provided a window of opportunity for cities to find solutions - involving the community and the private sector; involving innovative technologies and disposal methods; and involving behaviour changes and awareness raising. These issues have been amply demonstrated by good practices from many cities around the world. There is a clear need for the current approach of waste disposal that is focussed on municipalities and uses high energy/high technology, to move more towards waste processing and waste recycling.

2.14 Water resources

The message of the developing world - grappling with poverty, growing population, increasing urbanisation and industrialisation - is clear. Supply of freshwater will be a critical issue in the years to come. Information, assessment and monitoring of global water resources will be crucial.

Klaus Toepfer, Executive Director
Water, food and environmental security are three dimensions of human security that closely linked to water. Water security in terms of safe household water is fundamental for human health. Food security is in poor countries, especially in rural areas, closely linked to local production. Environmental security, finally, depends on ability to minimise environmental threats in terms of ecosystem degradation.

### 2.14.1 Urban Water Security

Urban water security involves supply of bulk water to the urban area from the surrounding landscape and the internal distribution in the urban area. While urban water security is closely linked to urban stability, particular problems originate from the fact that regulation of inter-urban water provision is generally limited only to the formal supply system while the informal supply of shanty-towns etc tends to remain unregulated. Similarly, small-scale industry often offers the backbone to employment and generation of income among uneducated sections of society. This means that efforts to reduce their massive pollution flows by for instance closing down such industry, while waiting for wastewater treatment facilities to be introduced, tend to meet enormous social problems.

### 2.14.2 Water Quality

Water quality monitoring provides information that helps set policies and programs to protect and improve the quality of streams, rivers, and lakes. It provides a basis for prioritising needs so that limited funds can be effectively allocated to improve conditions. Monitoring also provides the basis both for determining whether those policies and programs actually result in measurable environmental improvements, and to increase policies and programs effectiveness.

### 2.14.3 Ecosystem/Watershed Planning

To protect water resources, it is increasingly important to address the condition of land areas within the watershed because water carries the effects of human activities throughout the watershed as it drains off the land into surface waters or leaches into the ground water.

Ecosystem/watershed planning aims for achieving clean water and healthy, sustainable ecosystems. This requires taking a comprehensive look at ecosystem issues and tailor corrective actions to local concerns within the coordinated framework of a national water program.

### 2.14.4 Water Management

Water management efforts to reach hydro-solidarity while securing both water, food and environmental security should encompass both sequential reuse of blue water along the river system and proper attention to green/blue water interactions as well as pollution loads, degrading the usability of the accessible water.

Intra-basin hydro-solidarity: Adapting to the hydro-climatic constraints of catchments involves compromise building and depends on the existence of adequate institutions able to take cross-sectional approaches. Societal ability to cope is a fundamental precondition, involving human ingenuity both in terms of communal approaches and technical solutions.

Sharing principles will evidently have to be found for the unavoidable compromise building process in a specific river basin. Starting point will have to include attention to both international conventions, to different modes of "human livelihood rights", to long-term productivity of the basin soils, and to ecosystem resilience through biodiversity to surprising catastrophes.

Downstream water security: Rivers depletion is a real problem that has to be given adequate attention and for which mitigation efforts are urgent. It follows from the water balance equation that, with an increasing
consumptive use of water linked to an intensification of agricultural production, river flow may decrease in response. A further consequence of such a phenomenon is that the dilution-flow for introduced pollution load will also diminish and that, as a result, pollution levels will increase even more.

Conceptual obstacles: The most evident conceptual obstacle is the compartmentalised approach taken by most water professionals, representing typical differences in their sectoral focus. Second, there are a set of scientifically based paradigm locks which originate from a deep-going sectarianism within science incompatible with water's large complexity in both roles and functions.

Human momentum: The older form of national scale hydro-solidarity took the form of the water-rich regions feeling obliged to supply "thirsty" water-poor regions with the water that they were considered to need. This transfer has been seen as a public duty, and in line with this view irrigation water has often been provided at no or minimal cost. According to the modern view - "perverse subsidies" are quite difficult to abolish. Both vote-capturing interests, strong lobbying groups, attention to society's safety and stability, and potential threats in terms of riots etc have to be taken into account.

http://www.siwi.org/Articles_Summaries/exsum_SIWI_Sem_2001.htm

2.14.5 Related Web Sites

Water Related Human Security and Catchment Hydrosolidarity
By: Malin Falkenmark, SIWI
Analytical Summary of:
Water Security for Cities, Food and Environment - Towards Catchment Hydrosolidarity
The result of the 2001 SIWI Seminar, this document includes presentations and analysis about how hydrosolidarity can be approached in a realistic way for mutually dependent water stakeholders.
http://www.siwi.org/Articles_Summaries/exsum_SIWI_Sem_2001.htm

2.15 Urban Information Systems

Urban information systems are powerful means for governments in meeting long-term strategic planning and management challenges. For example the information from a geographic information database helps in planning, zoning, transportation, utilities, flood management, urbanisation and its impact on the environment and the use of demographics in making public policy. It provides a heightened awareness of the interdependency among environmental, social and economic health and the impact of decisions made by neighbouring jurisdictions, state and federal agencies and private business.

Urban information system provides various information on urban (facilities, urban planning, environment, disaster prevention, water supply, transportation, etc.) for municipalities to perform effective administration and decision-making. In order to establish security system for municipalities, effective management of infrastructure should be preceded and the maintenance of the facilities by urban information system is very effective. Maps, statistics, and all the data that can be components of urban information system are produced and managed by each department (transportation, urban planning, water supply and drainage, environmental protection, etc.) Introduction of urban information system can integrate all the information related to each other and make the use of information easier and more efficient.

TNO has done some studies in assessing the external costs and benefits of line infrastructure

2.15.1 Freedom of Information

Freedom of information is concerned about the measures that ensure individual citizens rights to privacy and protection against disclosure and other related abuses in government collection and re-use of data and also public access to agencies records and information.
2.15.2 Disclosure

The argument about privacy is two-dimensional:

- Informing the public: How is the public told about when, what and which data about individuals and property data is collected, stored, sold and/or given away? Does the average citizen even understand that information they give to the government in everyday interactions may be disclosed publicly in return for their access to public services? When a citizen accesses a public website leaving behind a trail of data, then be collected through the use of web site technology eventually distributed or sold by the agency?

- Privacy issues: Is it necessary to disclose private details about individuals and/or specific geographic locations to make data useful to outsiders? How can agencies discern end use of its data? And what recourse should the agency have on behalf of its citizenry in the wrongful or harmful disclosure of detailed data? Should citizens have some form of recourse, some punitive action, some financial claim? Or simply the legal means by which the record must be publicly set straight if wronged?

2.15.3 Municipal Liability

There is a constant tug between privacy concerns and information needed for community decisions and community protection. The following are problems that can only be decided issue by issue, mainly by a legislature at the appropriate level: Should agencies that collect and distribute data be held legally responsible for data content? If so, by whom? Should they also be held accountable for actual content when further disclosure beyond an initial and agreed upon data distribution occurs? Can an agency or a collective acting on behalf of many agencies perform public data distribution after its initial collection and not be held responsible? What rights does the agency have to protect itself from possible data abuse? How can an agency protect itself from possible litigation by the citizenry as a result of data disclosure and/or sale? And when is the agency released from harm should data be wrongfully used or misrepresented with regards to data accuracy?

2.15.4 Urban Information System Economics

The "enterprising government" style has been embraced by public agencies wishing to make a profit from data. The question is whether the sale of data by government agencies is appropriate or not and, how does one determine the price of the products? However, there often is a large gap between funding data collection, maintenance and production costs and what is recovered in costs through pricing the sale of the assimilated data using a market competitive situation.

Collecting the data from citizens via applications to government, through the use of surveys, tax forms, even questions become a very expensive means to ensure some degree of accuracy and data maintenance. There is an overwhelming need to increase public funding of public data collection and maintenance. Prices charged for data could vary widely from covering just data reproduction costs, to including all marginal costs, to including a share of the basic costs, to all the market can bear.

http://www.theipa.org/regional-research/nyadcmain.htm

2.15.5 Related Web Sites

Municipal Information Systems
Making the Best Use of Government Data
http://www.theipa.org/regional-research/nyadcmain.htm
Citizen Participation and New Perspective in the Multimedia Era
Reducing Apathy Toward Government Through Citizen Participation
By Prof. Dr. Hermann Hill, Speyer
http://www.hfv-speyer.de/hill/Publikationen/Citizen.pdf
Public Participation GIS for re-development support in European Historic City Centres
By: M. Compagna and G. Deplano
Monitoring Urban Development and Web GISby: N. Maiellro
Workshop on Urban Information Systems
http://www.forumhabitat.polito.it/maison_habitat/workshops/UNCHS-UNITAR/report.html
Additional Discussion Areas

CHAPTER 3
3 ADDITIONAL DISCUSSION AREAS

A number of relevant subjects are emerging that are relevant although not developed sufficiently. Some are informing, particularly of the wider environmental debate. Some are critical of current debates and some are new topics that may become relevant in the future.

3.1 Complex systems debate

In a time of unprecedented pressure on our planet’s resources, when the planetary atmosphere has been uniquely altered by man, and increasing populations are rearranging land use patterns, Complex Systems concerned with investigating the effects of human disturbance on the Earth’s biogeochemical processes. Emphasis is placed on the ocean’s role in the global carbon cycle, forest decline and land use change, nutrient cycling in terrestrial ecosystems, and processes contributing to changes in atmospheric chemistry and climate. Complex Systems is about defining and solving problems of global and regional environmental change such as:

- Global water resources
- Atmosphere/biosphere exchange and trace gas dynamics
- Hydrothermal vents and ocean chemistry
- The global carbon cycle
- Forest, recovery decline and land-use change
- Nitrogen in terrestrial ecosystems
- Biogenic processes and changes in atmospheric chemistry and climate

3.2 Environment versus economics debate

"Almost all economists are intellectually committed to the idea that the things people want can be valued in dollars and cents. If this is true, and things such as clean air, stable sea levels, tropical forests and species diversity can be valued that way, then environmental issues submit - or so it is argued - quite readily to the disciplines of economic analysis. Trade-offs can be struck between competing ends, in principle at least, and one can begin to think about how the world’s consumption of environmental goods can be optimised, as economists say, subject to the constraints that people cannot have everything they want. Most environmentalists object to the very first step in the argument - the idea that environmental goods can be reduced, as they would put it, to a cash equivalent. In fact, most environmentalists not only disagree with this idea, they find it morally deplorable."

_The Economist, February 2nd 2002_

This page is dedicated for debating the issues of environment versus economics, the debate that has ascended to its climax after the publishing of "The skeptical Environmentalist" by Bjorn Lomborg.

3.2.1 Related Web Sites

"The Skeptical Environmentalist" critics and Dr Lomborg’s replies
Summary of Dr Lomborg’s views published in _The Economist_
Valuing Public Goods, a paper by Philip E. Graves, Department of Economics, University of Colorado
3.3 Public facility planning

Successful public facility planning historically has met both the practical, functional needs of society and, at the same time, has expressed cultural and civic aspirations. The objective of public facility planning is to make realistic, buildable plans that create new and beautiful places. This includes:

- Reviewing proposed site selections and site plans for public facilities such as parks, trails, schools and libraries. Reviewing plans for consistency with the goals, policies and land use designations of municipal plans adopted. Investigating the effects of a proposal on the surrounding area.
- Landscaping review regarding cost, feasibility and design criteria. Other factors include off site impacts of the facility, safety, efficient public use, visual attractiveness and architectural considerations.
- Reviewing planning and design criteria include an assessment of how the landscaping complements adjacent areas, enhances on-site use of the facility, and contributes to the visual attractiveness of the project.

3.4 Health issues

Urban cultures around the world are growing, and with this growth come a unique set of health issues. Traditional public health and medical practices and methods must be adapted to respond to the urban population. Important changes in patterns of disease and disability have been noted in urban populations, encouraging health professionals to expand their vision to include social and economic determinants of health. For example, the parallel epidemics of substance abuse, teenage pregnancy, HIV, tuberculosis, and violence underscore the significance of such key factors as poverty, family disintegration, racial bias, and urban crowding in shaping the profile of urban morbidities. These health issues should be addressed from both clinical and policy perspectives.

From: The Journal of Urban Health

3.5 Security and crime prevention in cities

Insecurity has become a major concern of urban societies. In the face of the growth in both petty and serious crime, violence and anti-social behaviour, what is expected of political authorities is rapid action and practical solutions. This phenomenon is mainly a result of persistent unemployment, changes in the family unit, the pressures of the consumer society, social exclusion, the often-difficult integration of immigrant population groups and inadequacies in urban policy. Unfortunately, growing concern among the public enables extremist movements to expound their xenophobic and racist theories, to lay the blame on scapegoats such as young people or immigrants, and consequently to place in jeopardy the principles of democracy, social cohesion and tolerance in which our societies must have their basis. New strategies to combat insecurity based on improved co-ordination of preventive, repressive and solidarity-oriented measures should be endorsed. These strategies should not rely only on the commitment of the authorities concerned, but also on active partnerships between economic and social operators and restoration of the traditional roles of the family, schools, businesses and civil society.

From: Security and crime prevention in cities: setting up a European observatory
Council of Europe - Parliamentary Assembly Recommendation 1531 (2001)
3.6 Eco-tourism issues

Tourism is changing rapidly as nature, heritage, and recreational destinations become more important, and as conventional tourism is forced to meet tougher environmental requirements. This presents a challenge to government and private enterprise to develop new approaches to the tourism market. Successful tourism must benefit local populations economically and culturally to give them incentives to protect the natural resources which create the attraction. Strategies must be economically feasible if private investors are to support the projects.

Eco-Tourism International

3.7 Emergency management issues

Each of the mega-cities on our planet has a unique set of problems related to security, energy, water, nutrition, economics, and the environment. An understanding of these problems allows us to better evaluate vulnerabilities related to the hazards of natural events such as a hurricane or the unnatural event of a terrorist attack. The sheer size of mega-cities inherently increases the scope of any potential crisis and necessary tools must be developed for urban survival.

For cities to be safe and sustainable, we must implement long-range urban planning and risk assessment tools and not rely on reactive decision-making. The tools should be based on an accurate assessment of the inter-relationships of the many complex processes that occur in the urban environment.

3.8 Compact city debate

The Compact City: A High Density Urban Environment

The contemporary debate is: Urban compaction or decentralisation? What kind of cities we should have?
Should our cities spread out across the landscape or be limited to compact urban areas?
The following are list of issues for the above debate:

3.8.1 Cities

Decentralisation
Compact City
  High-density development
  Mixed-use development
  Services and facilities: hospitals, parks, schools, leisure and fun
Development in rural areas
  Incremental expansion of housing in villages and small towns
  Sporadic housing development in the open countryside
  Small new settlements
Compact City: what next when it achieves its highest possible density?
Environmental capacity of a city
Modelling urban spaces
Expected and desired development at the urban scale

3.8.2 Land

Reducing, reusing and recycling of land
Disused industrial areas, brown fields, contaminated land, problems of land acquisition
3.8.3 Urban densities

The effect of urban densities on travel ➔ fuel consumption
The effect of urban densities on car parking
The effect of urban densities on urban size ➔ wild / rural size
The effect of urban densities on urban size ➔ infrastructure
The effect of urban densities on consumption rates
The effect of urban densities on quality of life
Other effects of urban intensification
The quality of urban environment, public spaces and green areas
The image and vitality of the city, cultural and community activities on streets etc.
Urban intensification social impact and effect on service provision

3.8.4 Urban Size and Form

The effect of urban size on travel ➔ fuel consumption
The effect of urban size ➔ infrastructure
The effect of urban size on consumption rates
The location of different types of development relative to transport provision and vice versa
Forms of development that encourage walking, cycling and public transport

3.8.5 Transport

Public transport V private cars issues (environmental, health, social, accidents, market, political, media, educational, psychological etc.)
Residential densities, city size and travel behaviour
Travel behaviour and local accessibility to services and facilities, mode of travel, distance of travel etc.
Transport and urban forms: locations of residences, industries, public services, recreational areas, etc. and transport needs ➔ land use and planning
Transport and economic and institutional factors
Transport and socio-psychological factors
Expected and desired transport policy measures
Expected and desired use of conventional modes of transport
Expected and desired use of new modes and technologies of transport

3.8.6 Market

Planning policies and property market

3.8.7 Lifestyle and Society

Compact City implications for individual lifestyles
Equity and community issues: The urban periphery, doughnuts of deprivation, social inclusion / exclusion, crime and security issues
Urban management and safety
Industry structure and the redistribution of population
Family size, lifestyle, culture etc. effect on dwelling / building size, type and design, housing needs, relocation and transaction costs, health, education infrastructure, facilities and services etc.
3.8.8 Consumption and Pollution

Energy production, supply and consumption
Water consumption and drainage
Food production and supply
Waste management
Noise pollution
Air pollution
Conservation issues
Using the State of the Art to Inform the Development of Performance Specifications in the Built Environment
It became clear that there was no obvious source for performance information in this area. When a project brief is developed the client and team start from a blank sheet of paper and are informed by the various sources of information about the current issues. They decide which are relevant and how to respond. Given the 21 areas listed above the task of understanding all of them to a depth from which it is possible to specify a performance standard is only available to a few and yet it is the goal that all projects not only understand the issues but conform to them where necessary and enhance them in other cases. This is immensely complex so a decision framework has been built to manage the interpretation of the website information. This work is in excess of the original project objectives. The data collection of the state of the art is also in excess of the project objectives as it has extended worldwide and not been limited to the PeBBu members.

4.1 The Development of the Decision Framework

This decision framework is a database system that contains a large amount of preset values in the form of structured tables of desirable urban features, urban regeneration actions, state of art examples and links to relevant websites helping the user to better understand the context of the selected feature, action or state of art example. QFD methodology has been used as the structure and mathematical system to assess the importance of the actions in delivering the required desirable urban features. It provides the decision framework to arrive at the performance specification. At every stage in the decision making process the user can access further information via the embedded hyperlinks to the PeBBu website and other websites.

QFD is normally a ‘blank sheet of paper approach however the number of functional requirements in even a small product is considerable and examples of QFD matrices for product design are very large. The built environment is of another scale altogether as the potential number of issues makes QFD approach very difficult so the tool that has been developed is designed to help build up an understanding of the range of issues as well as provide an opportunity for the user to develop additional needs. This tool provides a structure and content to create mutual understanding and acceptance of values between experts as it uses a QFD framework in order to structure the discussion and its database facilitate an extended conversation, a shared language and values. This is not a substitute for expertise however it provides added value to the expert in that it enables the distinguishing of the most critical issues and linking defined values to the built environment and the processes used to achieve this value. The allocated value is used to prioritise and focus efforts on actions, which will deliver the state of art built environment. This tool has adapted the QFD methodology as a means for capturing the most important urban features and focusing attention upon them. This approach offers a model for identifying a value relationship between requirements and actions. This provides the starting point for each stage described below in working through the system. The decision support tool is based on an Access database with a Visual Basic GUI linked to a website. Three city concepts have been used to formulate the review of the literature and surveys of the World Wide Web. The difficulty with the available information is that the desirable urban features and regeneration actions are implicit within the description of the urban problem.

4.2 QFD - Background
The basis for the development of the decision framework is Quality Function Deployment (QFD) developed in Japan in the late 1960s for setting specifications in manufacturing industry for product design (Guinta and Praizler, 1993). QFD is a structured approach that a product team can use to represent performance objectives and priorities in order evaluate how and whether these objectives can be met (Rawabdeh, et al., 2001). This approach requires rigorous requirement analysis, systematic management of the requirements during design and collaborative iterations for improvement thereby reducing the value loss from the point of view of the customer (Koskela and Huovila, 1997, Koskela and Huovila, 1999 and Kamara, et al., 1999). Recent experimentation in building briefing showed that using this approach it was more valuable to consider the facility life cycle early in the process; by making transparent the decision process thus adding value to the customer (Huovila, 1999 and Sarja, 2000). Lean function deployment (Tyagi and Chua, 2000) and lean design management (Koskela, et al, 1997) are attempts to use the same approach to analyse waste in design and construction then rationalise and re-engineer the process using a QFD system framework.

The QFD methodology is designed to ensure that the client’s expectations are met in a profitable way, that management techniques are employed for maintaining the client’s requirements and solutions are aimed at the optimisation of the end product (Huovila, et al., 1997, Kamara, et al., 1999, Leinonen and Huovila, 2000, Nieminen, et al., 2000 and Rawabdeh, et al., 2001). The approach employs mathematical analysis using a series of matrices, which depend on functional relationships, to arrive at the client’s statement of the acceptable level of quality in the resulting product (Maharon, 1999).

4.3 Using the tool

The following example describes the stages through which the decision process works. The first step in this case is to produce a relevant subset of the total database so that it is more manageable. An initial question is; in what type of urban situation is the performance based built environment going to be designed to perform? This question sets the framework for the whole of the subsequent specification. So far three concepts have been used to produce sub-sets from the total decision space: the compact city (Jenks et al, 2000), the creative city (Landry, 2000) and the high-density city (DETR, 1999). The compact city debate questions the cost of urban sprawl versus the social and psychological issues of high-density living. The argument is one of conservation, reduced transportation and a general increase in well being through a reduction in the dependency on cars. The creative city case is one of releasing the potential within the citizen by providing the right leadership and facilities within the various ‘rings’ (hub, inner urban ring and suburbs) or areas of a city.

Because this subject area is so extensive pre-selected lists of desirable urban features, urban regeneration actions and state of art examples with relevant hyperlinks to websites have been provided. At every stage in the decision making process the user can access relevant information via the embedded hyperlinks to the PeBBu website and then on to other websites.

4.3.1 Entry to the decision-making framework

The opening form (see figure 1) shows the structure of the steps to take. Users start by selecting an urban approach from: High Density Urban Development, Compact City or Creative City, and the sub section of City Centre, Inner City, Suburb or as a whole. This loads a relevant pre-selection from the total data base for the urban approach. The user has the possibility to view, discuss and change the suggested module parameters. Clicking on the different areas of the House of Quality triggers the required function and opens its form. The screen shots throughout the example shown here are taken from the High-Density City approach.
4.3.2 Choosing the required features

The form (see figure 2) allows the user to select from or to add the desirable features of the selected urban approach. The desirable urban features are grouped into five categories: Economic, Physical, Environmental, Social, and Training and Education. Users can select, deselect or add new features to the default list of features. When the user clicks on a feature a relevant list appears, on the right hand side of the form, of links to pages that provide information from relevant literature and websites. Through the links the user can surf these websites to build their knowledge base. They will be in a better position, when their knowledge is enhanced, to make informed judgements and selections. The normal practice of setting requirements is that all relevant people meet together and develop the list of requirements. The decision support tool in this case not only facilitates the process but can set an order and also becomes the record of the discussion and agreements. Agreement is reached by consensus and the advantage of this tool is that all can be informed of the current state of knowledge via the website access, whatever their background, so ensuring a fully informed decision process.

4.3.3 Ranking the desired features (Rating)

Once the desirable features of the high-density city are identified, the form (see figure 3) requires that an importance rating is set for each feature. This sets a level of importance of each element in the defined need. The importance rate is set on a five-point scale from very low to very high. The ranking is subjective and will vary according to the users perceptions and criteria. Again when a feature is selected, the relevant list of links appears at the bottom of the form so that the user can always access more information or refresh their previous thinking. This step also requires consensus from those taking part and it is not a ranking of order but a reflection of the importance of each aspect in the final solution.

4.3.4 Benchmarking the quality of the desired features

With a system that is based on the user’s perceptions of quality or specification it is useful to have a reference point that is either ranked by the user or one that is set by an independent person. Thus by benchmarking the desirable features (see figure 4) against other examples that have been ranked enables the communication of values from one group to another. The quality rate is set on a five-point scale from very low to very high. The ranking is subjective and will vary according to the users perceptions and criteria. Again when a feature is selected, the relevant list of links appears at the bottom of the form so that the user can always access more information or refresh their previous thinking. This feature is very powerful with this technology as pictures, video and film clips can be used to provide a much more realistic view of say, aesthetics.

4.3.5 Selecting actions to meet the desired features

For each of the desired features selected above in the window shown in figure 3 there will be number of ways of providing a solution in terms of actions. These actions form the basis of the performance specification. The user chooses the actions by clicking on the selection box (see figure 5). Again when an action is selected, the relevant list of links appears at the bottom of the form so that the user can always access more information or refresh their previous thinking. In this example the urban regeneration actions are grouped into five features’ oriented categories: Economic Development, Physical Improvement, Environmental Actions, Neighbourhood Strategy, and Training and Education strategy.

4.3.6 Correlation between actions (Correlation Matrix)

The Correlation Matrix (see figure 6) indicates where there is either support from the actions working in concert with each other (the positive relationship) and where they are in conflict with each other (the
Performance Based Building Thematic Network
Domain 4 Final Report

4.3.7 Satisfying rules between desirable features and actions
(relationship matrix)

The final stage is to determine how well each of the actions that have been selected meets the criteria of each desirable feature (see figure 7). For each feature selected in the left of this form the list of selected urban actions appears to the right of the form so that a row in the relationships matrix is established. The strength of the usefulness of the action is expressed by (scale 0 is weak through, 1, 3 to 9 as very strong). The strength of the relationship between the features and the actions is subjective and according to the user’s understanding of the issues. By double-clicking on a feature or an action, a pop up window appears to show the relevant list of links to literature and websites. When a relationship between a feature and an action is selected, a relevant list appears at the bottom-right of the form, of links to pages that shows literature and websites of examples of the selected relationship. Users can surf these websites or add more links to the list.

4.3.8 Results reports (Assessment)

The selected actions are scored in order to assess their feasibility and their importance in delivering the features to the required quality. The Assessment form (see figure 8) displays the actions in the order of their scores. The actions with highest importance scores and lowest feasibility rate are displayed first as these are the most problematic situations, which need more attention so that trade offs could be made and the conflict could be solved.

Three detailed reports can be viewed or printed:

Importance assessment report (see figure 9): Actions are scored taking into account the strength of their relationship to the desirable urban features and the features' importance rates (see relationship matrix above). Actions are listed in descending order of their importance scores and grouped with features that produce 45 importance points, i.e. very important feature with very strong relationship to the action in consideration.

Quality assessment report (see figure 10): Actions are scored taking into account the strength of their relationship to the desirable urban features and the features' quality rates (see relationship matrix above). Actions are listed in descending order of their quality scores and grouped with features that produce 45 quality points, i.e. very high quality feature with very strong relationship to the action in consideration.

Technical feasibility report (see figure 11): Actions are scored according to their feasibility taking into account their correlation strengths (see correlation matrix above). Actions are listed in ascending order of their technical feasibility and grouped with actions that have -9 very negative correlation.
Conclusions

CHAPTER 5
5 CONCLUSIONS

The work in this Domain has shown that even when the information that is available is not set out in a readily accessible performance based form a specification can be produced. Techniques for developing specifications used in other industries can be used in the field of construction.

The development of decision making techniques appropriate to the construction industry are essential as the context within which projects are built increase in complexity. The number of issues that have to be considered, weighted and then traded off against each other are considerable. The range of issues within each subject is growing. Building projects have to consider them all. Clients have to be aware of the issues and their decision making transparent.

The work in this Domain has shown that by using the WWW the state of the art, as it is emerging and changing, can be made available to clients in any situation. Connecting this to decision making tools enable them to respond effectively to the changing environment. The decision making can become transparent and there is an audit trail of the process.

The work in the Domain has developed a pilot demonstrator of this approach. The lack of readily available performance based specification material in this subject area hindered the development of a complete and fully functioning specification system. Consequently the work was terminated at an earlier point than originally scheduled. However the tool that was developed demonstrates the potential and it is recommended that it is further enhanced and developed.
Recommendations For Future Research

CHAPTER 6
6 RECOMMENDATIONS FOR FUTURE RESEARCH

The following recommendations are not meant to be specific research projects but to be areas where fruitful research but more importantly development could take place. The Domain produced a pilot data base driven briefing support tool linked to a web site which itself was linked to many other web sites dealing with specific topics and sub topics.

1 Definitions
More precise definitions need to be developed for each topic area. Attempts were made based on the approach used in the UK in the Common Arrangement of Work. This approach not only states what is included in the definition but also states what is excluded.

2 The built environment affected by the project
The project will have an impact on its surroundings. These are commonly the subjects of planning disputes. These impacts need to be clarified so that a more articulate debate can be undertaken.

The project will also have an impact on the wider world in terms of its contribution to: global warming, carbon emissions, sustainability as well as the local infrastructure. These need to be described in a way that the buildings affect on the ‘performance’ of its wider environmental impact can be measured and assessed.

3 The effect of the environment on the project
A building cannot be isolated from its surroundings. The debate over context, planning and style preferences must be had for every project. Because there is no formal basis for the decisions that are made in this area the debate over every project is often heated because of miss-information, prejudice or wilfulness. The discussion is very arbitrary and needs to be better informed. Enhancing the WWW sites with examples, photographs and video images is becoming a possibility and needs to be considered.

4 Development of the briefing tool
The setting of standards, and priorities within the tool is done in an informed but somewhat arbitrary manner. Much of the discussion is better conducted with visual examples which themselves have been benchmarked. The development of benchmarking of current practice so that the performance expectations can be assessed is required.
References
REFERENCES


The Economist, 2001, The Truth about the Environment, August 2
The Economist, 2001, This Side Up, October 27
## Annex 1: Contacts in Domain 4

### Contacts Domain 4: Built Environment

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<td><a href="mailto:salam.albizri@btinternet.com">salam.albizri@btinternet.com</a></td>
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<tr>
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<td>Jasuja</td>
<td>Mansi</td>
<td>Network Secretariat</td>
<td>CIBdf - CIB Development Foundation</td>
<td><a href="mailto:mansi.jasuja@cibworld.nl">mansi.jasuja@cibworld.nl</a></td>
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<td>Donchev</td>
<td>Vesselin</td>
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<td>Bech-Danielsen</td>
<td>Claus</td>
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<td>Danish Building and Urban Research</td>
<td><a href="mailto:cbd@by-og-byg.dk">cbd@by-og-byg.dk</a></td>
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<td>Task Member</td>
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<td><a href="mailto:konieczny_architekten@t-online.de">konieczny_architekten@t-online.de</a></td>
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<td>TECHNION</td>
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<td>Natalija</td>
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<td>Vilnius Gediminas Technical University</td>
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<td>Hulten</td>
<td>Peter</td>
<td>Ex Task Member</td>
<td>Ministry of Housing, Spatial Planning and the Environment</td>
<td><a href="mailto:peter.vanhulten@minvrom.nl">peter.vanhulten@minvrom.nl</a></td>
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<td>SBR</td>
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<td>Maria</td>
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<td>ASM</td>
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<td>The Polish National Energy Conservation Agency</td>
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<td>Role</td>
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<td>Darula</td>
<td>Stanislav</td>
<td>Replacement for a Task Member</td>
<td>Institute of Construction and Architecture</td>
<td><a href="mailto:usarsdar@savba.sk">usarsdar@savba.sk</a></td>
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<td>Slovakia</td>
<td>Durica</td>
<td>Pavol</td>
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<td>Technical University</td>
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<td>Bramslav</td>
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<td>United Kingdom</td>
<td>Hudson</td>
<td>John</td>
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<td>University of Salford</td>
<td><a href="mailto:j.hudson@salford.ac.uk">j.hudson@salford.ac.uk</a></td>
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<tr>
<td>United Kingdom</td>
<td>Curwell</td>
<td>Steve</td>
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<td>University of Salford</td>
<td><a href="mailto:s.r.curwell@salford.ac.uk">s.r.curwell@salford.ac.uk</a></td>
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<td>Haig</td>
<td>Task Member</td>
<td>BRE</td>
<td><a href="mailto:gulvanessian@bre.co.uk">gulvanessian@bre.co.uk</a></td>
</tr>
</tbody>
</table>
Annex 2: Outputs from the Briefing Tool developed for Domain 4

Figure 1: PeBBu main menu to the left with a pop-up window for selecting an urban approach for the session to the right.
Figure 2: Selecting/adding desirable features and viewing/adding links to relevant information for each of the selected feature
### Importance Rating (IR): High-Density City

<table>
<thead>
<tr>
<th>High-Density City Desirable Features</th>
<th>Importance Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessible Noise Level</td>
<td>High</td>
</tr>
<tr>
<td>Air Quality</td>
<td>High</td>
</tr>
<tr>
<td>Being strategically principled and tactically flexible</td>
<td>Medium</td>
</tr>
<tr>
<td>Brownfield Developments to Revitalize the Community</td>
<td>Medium</td>
</tr>
<tr>
<td>City grees around centres of social and commercial activity located at public transport nodes</td>
<td>Very High</td>
</tr>
<tr>
<td>Concentration of urban development at public transport nodes</td>
<td>Very High</td>
</tr>
<tr>
<td>Cultural industries that play a role as a platform to provide content for the IT driven knowledge based economy</td>
<td>Low</td>
</tr>
<tr>
<td>Demand for buildings grows from the determination of wider social and economic needs, rather than development and infrastructure-led</td>
<td>Low</td>
</tr>
<tr>
<td>Digital and Internet City</td>
<td>Very Low</td>
</tr>
<tr>
<td>Economically Successful Towns and Cities</td>
<td>Very High</td>
</tr>
<tr>
<td>Eco-tourism</td>
<td>Medium</td>
</tr>
<tr>
<td>Freedom of Information</td>
<td>Very Low</td>
</tr>
<tr>
<td>Good Quality Urban Design</td>
<td>Very Low</td>
</tr>
<tr>
<td>Good Quality Urban Environment</td>
<td>Very Low</td>
</tr>
<tr>
<td>High-density development</td>
<td>Very High</td>
</tr>
<tr>
<td>Historic Bridges</td>
<td>Very Low</td>
</tr>
<tr>
<td>Mass transit systems that provide high-speed cross-town travel by linking one neighbourhood centre with another, leaving local distribution</td>
<td>High</td>
</tr>
<tr>
<td>Minimum Impact of Development Upon the Surrounding Countryside</td>
<td>Very Low</td>
</tr>
<tr>
<td>New Developments on Brownfields and No Empty Properties</td>
<td>Medium</td>
</tr>
<tr>
<td>Open-minded and willing to take risks</td>
<td>Low</td>
</tr>
<tr>
<td>Positive cultural image that attracts international companies and their mobile workforce who seek a vibrant cultural life for their employees</td>
<td>Low</td>
</tr>
<tr>
<td>Quality, Culture, Leisure and Sport Facilities for All</td>
<td>Low</td>
</tr>
</tbody>
</table>

Click the following links to know more about selected feature alternatively, add more websites.

**Eco-tourism**

1. [EcoTourism EXPLORER - Home Page](#)
2. [Sustainable Tourism](#)
3. [International Year of Ecotourism 2012](#)

---

**Figure 3: Importance Rating (IR) of the selected desirable features**
### Benchmarking - Quality Rating (QR): High-Density City

<table>
<thead>
<tr>
<th>High-Density City Desirable Features</th>
<th>Quality Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Medium</td>
</tr>
<tr>
<td>Resiliently principled aesthetically flexible</td>
<td>Very Low</td>
</tr>
<tr>
<td>Brownfield Developments to Revitalize the Community</td>
<td>High</td>
</tr>
<tr>
<td>City grows around centres of social and commercial activity located at public transport nodes</td>
<td>Medium</td>
</tr>
<tr>
<td>Concentration of urban development at public transport nodes</td>
<td>Medium</td>
</tr>
<tr>
<td>Cultural industries that play a role as a platform to provide content for the IT driven knowledge based economy</td>
<td>Medium</td>
</tr>
<tr>
<td>Demand for buildings grows from the determination of wider social and economic needs, rather than development and infrastructure-led</td>
<td>Medium</td>
</tr>
<tr>
<td>Digital and Internet City</td>
<td>Very High</td>
</tr>
<tr>
<td>Economically Successful Towns and Cities</td>
<td>Low</td>
</tr>
<tr>
<td>Eco-tourism</td>
<td>Medium</td>
</tr>
<tr>
<td>Freedoms of Information</td>
<td>High</td>
</tr>
<tr>
<td>Good Quality Urban Design</td>
<td>Very High</td>
</tr>
<tr>
<td>Good Quality Urban Environment</td>
<td>Low</td>
</tr>
<tr>
<td>High-density development</td>
<td>Low</td>
</tr>
<tr>
<td>Historic Bridges</td>
<td>Low</td>
</tr>
<tr>
<td>Mass transit systems that provide high-speed urban travel by linking one neighborhood centre with another, leaving local districts</td>
<td>High</td>
</tr>
<tr>
<td>Minimum Impact of Development Uses the Surrounding Countryside</td>
<td>Very High</td>
</tr>
<tr>
<td>New Developments on Brownfields and No Empty Properties</td>
<td>Very Low</td>
</tr>
<tr>
<td>Open-minded and willing to take risks</td>
<td>Low</td>
</tr>
<tr>
<td>Positive cultural image that attracts international companies and their mobile workforce who seek a vibrant cultural life for their employees</td>
<td>Low</td>
</tr>
</tbody>
</table>

**The following links are state of art examples of City grows around centres of social and commercial activity located at public transport nodes:**

- [www.stateofartdev1.com](http://www.stateofartdev1.com) | Quality Rating: Medium
- [www.stateofartdev2.com](http://www.stateofartdev2.com) | Quality Rating: Very High
- [www.stateofartdev3.com](http://www.stateofartdev3.com) | Quality Rating: High
- [www.othereexamples.com](http://www.othereexamples.com) | Quality Rating: Very Low
- [www.yetanotherexample.com](http://www.yetanotherexample.com) | Quality Rating: Low

**Figure 4: Benchmarking – Quality Rating (QR) of the selected features against state of art examples**
Figure 5: Selecting/adding regeneration actions and viewing/adding links to relevant information for each of the selected action
Figure 6 Correlation Matrix

Correlation Matrix: High-Density City

You are now working on the correlation between:

Accelerate the Change << correlation to >> Allow community groups and voluntary organisations to access the resources needed to tackle derelict buildings and other eyesores that are spoiling their neighbourhood.
### Relationship Matrix: High-Density City

<table>
<thead>
<tr>
<th>High-Density City desirable features</th>
<th>Rating</th>
<th>Actions required to achieve City grows around centres of social and commercial activity located at public transport nodes</th>
<th>Relationship Strength</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable Noise Level</td>
<td>4</td>
<td>Adopt an integrated approach to design-led regeneration of different urban areas.</td>
<td>Strong</td>
<td>45 36</td>
</tr>
<tr>
<td>Air Quality</td>
<td>4</td>
<td>Allocate an above-inflation funds for managing and maintaining the environment.</td>
<td>Strong</td>
<td>45 36</td>
</tr>
<tr>
<td>Being strategically principled and tactically flexible</td>
<td>3</td>
<td>Allocate social housing not only to accommodate the poor.</td>
<td>Medium</td>
<td>15 12</td>
</tr>
<tr>
<td>Brownfield Developments to Revitalise the Community</td>
<td>3</td>
<td>Allow social housing not only to accommodate the poor.</td>
<td>Medium</td>
<td>15 12</td>
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<td>City grows around centres of social and commercial activity located at public transport nodes</td>
<td>5</td>
<td>Allow community groups and voluntary organisations to access the resources needed to tackle derelict buildings and other eyesores that are spoiling their neighbourhood.</td>
<td>Weak</td>
<td>5 4</td>
</tr>
<tr>
<td>Concentration of urban development at public transport nodes</td>
<td>5</td>
<td>Allow public bodies flexibility to pay disturbance payments over and above costs.</td>
<td>Weak</td>
<td>5 4</td>
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<tr>
<td>Cultural industries that plays a role as a platform to provide context</td>
<td>2</td>
<td>Attract institutional investment into the residential private rented market.</td>
<td>Weak</td>
<td>5 4</td>
</tr>
<tr>
<td>Demand for buildings grows from the determination of wider social/economic conditions</td>
<td>2</td>
<td>Attract new visitors.</td>
<td>Weak</td>
<td>5 4</td>
</tr>
</tbody>
</table>

Digital and Internet City
Economically Successful Towns and Cities
Eco-tourism

Record: [ ] [ ] [ ] [ ] [ ] of 350

You are now filling the relationship matrix.

City grows around centres of social and commercial activity located at public transport nodes <in relation to> Allow community groups and voluntary organisations to access the resources needed to tackle derelict buildings and other eyesores that are spoiling their neighbourhood.

The list box to the left is for websites that discuss the above issues. Click these links to know more about the above relationship alternatively you can add more websites:

- [www.connectibilitycommunitygroups.com](http://www.connectibilitycommunitygroups.com)
- [www.communitygroupsanddutiesenvironment.com](http://www.communitygroupsanddutiesenvironment.com)
- [www.netzevente.com](http://www.netzevente.com)

Figure 7 Relationship matrix
### Assessment of High-Density City Actions

<table>
<thead>
<tr>
<th>High-Density City actions assessment</th>
<th>Score</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td><strong>Control urban sprawl</strong></td>
<td>151</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>178</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>✔ ✔</td>
</tr>
<tr>
<td><strong>Allocate adequate funds for managing and maintaining the urban environment</strong></td>
<td>153</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>154</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td><strong>Urban planning</strong></td>
<td>161</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>164</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td><strong>Designate urban green spaces in development plans</strong></td>
<td>148</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>148</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>-12</td>
<td>×</td>
</tr>
<tr>
<td><strong>Develop projects that prioritize walking, cycling and public transport</strong></td>
<td>148</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>148</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>×</td>
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<tr>
<td><strong>Encourage patterns of developments which reduce the need to travel by car</strong></td>
<td>148</td>
<td>1</td>
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<tr>
<td></td>
<td>148</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>×</td>
</tr>
<tr>
<td><strong>Explicitly plan transport to reduce car journeys, and continuously increasing the proportion of trips made on foot, bicycle and public transport</strong></td>
<td>148</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>148</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>×</td>
</tr>
<tr>
<td><strong>Remove allocations of greenfield land for housing from development plans where the allocations are not consistent with sustainability objectives</strong></td>
<td>148</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>148</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>×</td>
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<td><strong>Adopt an integrated approach to design-led regeneration of different types of urban neighbourhood</strong></td>
<td>148</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>148</td>
<td>✔ ✔</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>✔ ✔ ✔</td>
</tr>
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</table>

**Total Of: 150 Actions**

*Importance Report: 191*

*Competitive Report: 176*

*Feasibility Report: 136*

Figure 8: Actions assessment form
**High Density Development**

**Actions Importance Assessment**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>Scores: Importance</th>
<th>Quality</th>
<th>Feasibility</th>
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</thead>
<tbody>
<tr>
<td>Adopt an integrated approach to design-led regeneration of different types of urban neighbourhood.</td>
<td>145</td>
<td>148</td>
<td>21</td>
</tr>
<tr>
<td>The list of the desirable features that have Very High importance rating and Strong relationship with the action above.</td>
<td>153</td>
<td>154</td>
<td>35</td>
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<tr>
<td>City grows around centres of social and commercial activity located at public transport nodes</td>
<td>191</td>
<td>178</td>
<td>15</td>
</tr>
</tbody>
</table>

Allocate an above-inflation funds for managing and maintaining the urban environment.

Control urban sprawl

**Figure 9: Actions Importance Assessment Report**
<table>
<thead>
<tr>
<th>ACTION</th>
<th>Actions Competitive Assessment</th>
<th>High-Density City</th>
<th>Scores</th>
<th>Importance</th>
<th>Quality</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocate an above-inflation funds for managing and maintaining the urban environment.</td>
<td>The list of desirable features that have Very High quality rating and Strong relationship with the action above: Acceptable Noise Level</td>
<td></td>
<td>143</td>
<td>147</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Campaign for and promote public transports</td>
<td>The list of desirable features that have Very High quality rating and Strong relationship with the action above: Air Quality Acceptable Noise Level</td>
<td></td>
<td>121</td>
<td>139</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Charge an environmental impact fees on new development to reflect its full environmental costs.</td>
<td>The list of desirable features that have Very High quality rating and Strong relationship with the action above: Air Quality Acceptable Noise Level</td>
<td></td>
<td>121</td>
<td>139</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 10: Actions Competitive Assessment