

# Intelligent City Balanced Scorecards for the City of Rijeka

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**Abstract** - Democratic and constituent focused developments in the strategic planning and management of local government requires performance and process management infrastructure. Composition of applied balanced scorecard (BSC) performance management system used to translate strategy into tangible objectives and measures for the Local Government is presented. New BSC requirements for the Intelligent City concept enriched by sustainable development based on knowledge system domains are derived. Enlarged set of performance indicators and new statistical sources are presented. The political and social interaction benefits of open, interactive balanced scorecard for the City of Rijeka are given.

**Key words:** local government, balanced scorecard, performance management, intelligent city, city sustainable development

## 1. INTRODUCTION

Sustainable city makes an important contribution to social and economic development at local, regional, national and global level<sup>1</sup>. Cities are important engines of economic growth. Cities absorb two-thirds of the population growth in developing countries. Cities offer significant economies of scale in the provision of jobs, housing and services. Cities are important centers of productivity and social advancement.

Urban area/city can be seen as a type of system, with inputs, throughputs and outputs – just as in the human system (Figure 1.).



Figure 1: City as an open system

Dynamics of the city is goal focused by its strategy. A strategy is a set of hypotheses about cause and effect. The measurement system should make the relationships (hypotheses) among

objectives (and measures) in the various perspectives explicit so that they can be managed and validated. Strategic Map with the strategic objectives of the organization as a hierarchy stating how the attainment of an objective contributes to the attainment of others (Figure 2).



Figure 2: Strategic Map

## 2. POLITICAL REQUIREMENTS FOR BSC

EU Ministerial eGovernment Conference 2005 „Transforming Public Services“<sup>2</sup> [1] has resulted in a strong impetus to bring forward the European eGovernment agenda towards 2010. It is the revision of Lisbon Strategy, which “...emphasizes community relationships over individual autonomy, cultural diversity over assimilation, quality of life over accumulation of wealth, sustainable development over unlimited material growth, deep play over unrelenting toil, universal human rights and the rights of nature over property rights, and global cooperation over the unilateral exercise of power”.

Technology lowers barriers to information, and makes it easier to use information to achieve one’s ends. Previously politics suffered from massive information asymmetries: the establishment had access to information and rationed and controlled access by others<sup>3</sup>. New technology, particularly networked Internet technologies, means that anyone can find almost anything. There are fewer secrets, and fewer places to hide.

Political pressure and challenge factors<sup>4</sup> are installing political requirements for BSC, as:

**Pressure from citizens:** Local authorities are facing increasing demands for better environmental quality from their citizens. Cities (and their officials and representatives) are being held accountable for

their environmental performance, much like in the private sector.

**International and national political pressure:** Local authorities are directly or indirectly in charge of the implementation of national and international agreements and laws on sustainable development.

**Complexity of environmental challenges:** End-of-pipe solutions in different sectors of a city's management are no longer enough. Sustainable development requires the holistic integration of economic, social and environmental considerations in all aspects of urban management.

**Rapid population and urban growth:** Urban growth has created an increasing demand for houses, offices, shops, factories, roads and other services, leading to an improved urban quality of life.

**Challenges in Local Government<sup>5</sup>:** The management of local government organizations is encountering tough external pressures and internal challenges such as:

- Decreasing tax income and government funding,
- Increasing demands for service delivery (quality and quantity),
- Regional cooperation in service delivery,
- Moving from bureaucracy to constituent/customer orientation,
- Organizational changes due to privatization and outsourcing.

e-Democracy<sup>6</sup> (Digitally conveyed information (transparency) and the political influence (participation) exerted by citizens and business on the opinion-forming processes of public – state and non-state –institutions), as well as e-Administration (Transaction of user-oriented services offered by public institutions that are based on information and communication technologies), are bringing acceleration of aforementioned challenges.

The balanced e-government scorecard served in the recording and evaluation of the various dimensions of e-democracy and e-government services. Scorecards permit the uniform checking of different objectives within the framework of a higher order strategy.

Performance and process management can be used as a solution in responding to these ever-increasing challenges. These management methods can be easily adapted to public sector organizations providing the following benefits:

**Improved service delivery efficiency:**

- Process orientation ensures customer focus in all operations,
- Process improvement removes bottlenecks in service delivery processes,
- Process and performance management helps to privatize and outsource efficiently without endangering the quality of service delivery,
- Performance management helps in optimizing resource usage in service delivery.

**Increased effectiveness:**

- Process improvement allows removing bureaucracy and streamlining support processes leading in improved effectiveness,
- Performance management helps improving effectiveness by connecting enabling indicators to measured outcomes (cause-and-effect analysis and strategy mapping),
- Performance management enables analyzing and helps in prioritizing and focusing service delivery for better effectiveness.

**Increased transparency and accountability:**

- Process and performance ownership supports in creating organization-wide transparency and accountability,
- Performance management creates an easy-to-understand overview of current and targeted performance levels with drill-down to root causes,
- Performance and process based initiative management enables prioritization and follow-up of improvement actions.

**Better value for tax-payers' money:**

- All benefits provided by the Collaborative management<sup>7</sup> lead to enabling local government organizations to provide better value for tax-payers' money.

"We, cities and towns, pledge to use the political and technical instruments and tools available for an ecosystem approach to urban management. We shall take advantage of a wide range of instruments..." ([Aalborg Convention](#))<sup>8</sup>.

E-government, democracy and e-participation are the foundation of e-democracy. Governments will play a critical role in the development of the online world. They need to incorporate and adapt strategies and technologies that will expand participatory democracy. Enhancing the participation of citizens is vital to ensuring that the views and inputs of the people are taken into account and have an effect on the policies of governments<sup>9</sup>. E-government can transform governments by making them more accessible to its citizens. In addition, through e-government, governments can become more accountable, effective and transparent.

A properly implemented e-government strategy will enhance and cement the bond between government and citizens. The bond will enable government to have confidence that their policies have the best interest of its citizens in mind and citizens that these policies had been influenced by their input.

Economic, employment, social and environmental policies are mutually reinforcing. Economic growth is sustainable when it goes hand in hand with efforts to reduce poverty, fight social exclusion and tackle environmental problems. Sustainability is particularly pertinent in cities, which are on the frontline of the battle against social exclusion, environmental degradation, dereliction and urban sprawl. These issues, along

with others such as inadequate governance and leadership, are among the main challenges to the economic performance, attractiveness and competitiveness of cities<sup>10</sup>.

### 3. STANDARD COMPONENTS OF BSC FOR LOCAL GOVERNMENT

Originally developed in 1990s, the Balanced Scorecard (BSC) is a multidimensional framework for describing, implementing, and managing strategy at all levels of an organization by linking objectives, initiatives, and measures to an organization's strategy. The basic principle of this management model is "it is only possible to manage what can be measured"<sup>12</sup>. The scorecard provides a comprehensive view of an organization's overall performance by integrating financial measures with other key performance indicators around customer perspectives, internal business processes, and organizational growth and learning.

Balanced Scorecard Performance Management System<sup>11</sup> is a Performance Management system that can be used in any size organization to align vision and mission with customer requirements and day-to-day work, manage and evaluate business strategy, monitor operation efficiency improvements, build organizational capacity, and communicate progress to all employees (Figure 3).

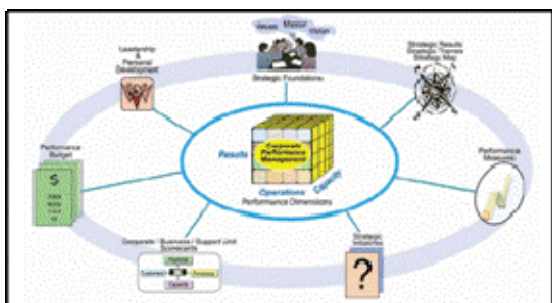


Figure 3: Balanced Scorecard Performance Management System

Standard components of Balanced Scorecard (Figure 4) are: Financial perspective, Customer perspective, Internal business process perspective, and Learning and growth perspective. The origins of standard components of the Balanced Scorecard are given by the books of Kaplan and Norton<sup>12,13</sup>. Each perspective is defined by cause and effect linkage, objectives, measures, targets, and initiatives<sup>14</sup>.

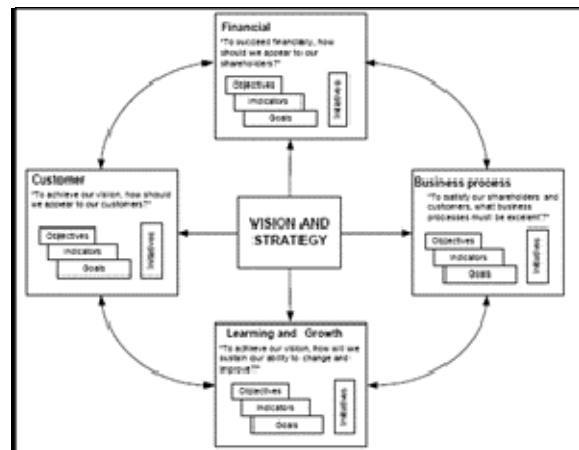


Figure 4: Strategic elements of BSC model

Given that achieving financial success is not the primary objective in nonprofits, government and healthcare organizations, the architecture has been rearranged to place constituents/customers and correspondent missions at the top of the hierarchy (Figure 5). Extension for strategy scorecards in nonprofits, government and healthcare organizations during 90's is given in the book of Kaplan and Norton<sup>15</sup>.



Figure 5: Balanced scorecard for nonprofit sector

Many local governments have turned toward performance management methodologies to help quantify performance, improve services, and to communicate more effectively with the community and stakeholders<sup>15</sup>.

Customer focused strategic themes for local government as Planning and community development, Collaboration, Sustainability, Resource Management, Community Enrichment, Community Safety, are "scorecarded" in the following perspectives:

**Customer perspective:** facilitate economic opportunity, pursue beneficial alliances, strengthen sense of community, provide sufficient infrastructure, provide well maintained community, provide a safe community, enhance service and program delivery.



**Financial perspective:** balanced development yields positive net tax growths, maintain/improve bond rating, diversification of revenue sources, maximize external funding sources, administer fiscal plan, and maximize benefit/cost.

**Internal process perspective:** promote positive customer/constituent relationships, optimize resources, simplify customer/constituent processes, and facilitate community-based problem-solving involvement.

**Learning and growth perspective:** analyze and enhance the management of information/technology/processes, foster employee skills and development, promote a positive and motivated work environment.

Illustrative example of strategic themes, perspectives and goals for the Charlotte City<sup>16</sup> is given in the following figure (Figure 6).

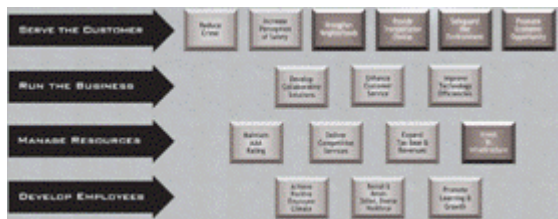


Figure 6: Charlotte Smart Growth Corporate objectives

Illustrative references of strategic themes for local government are given in<sup>16,17</sup> as well as the Framework for building Local Government Balanced Scorecard below (Figure 7):

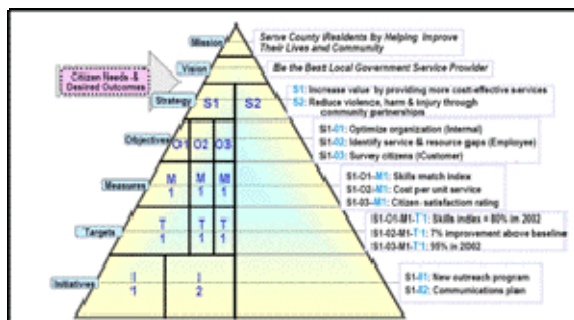


Figure 7: Framework for Building a Local Government Balanced Scorecard performance system<sup>11</sup>

#### 4. LOCAL AGENDA 21 ENHANCED

##### BALANCED SCORECARD COMPONENTS

At the onset of the 21st century, the interplay of environmental, economic, and social aspirations – commonly called sustainability – is beginning to inform planning, design, and business decisions around the globe. Groups as diverse as the World Economic Forum, the United Nations, and the International Chamber of Commerce are now using sustainability as a strategic compass. These groups see sustainability as offering an exciting new value proposition – an opportunity to differentiate their product and service offerings, increase the value they provide to customers, and potentially

command premium prices in the marketplace. In recent years, the research project “A Management Cockpit for Corporate Sustainability” has developed the BSC further to a SBSC as a concept for sustainability management<sup>18</sup>.

A company which follows the corporate sustainability strategy of market development will focus on environmental and social objectives and measures to develop existing markets or new markets in order to be more sustainable than today<sup>19,20,21</sup>. Environmental and social objectives are illustrated in Figure 8.

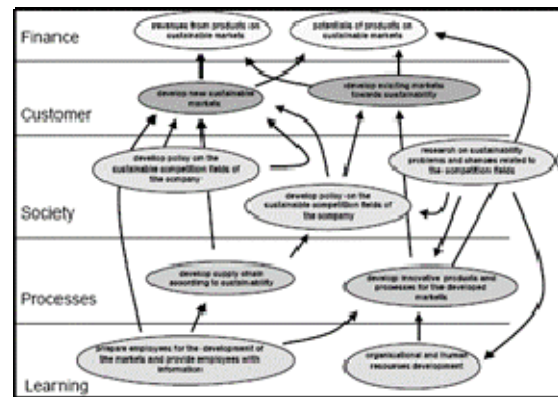


Figure 8: Environmental perspective of BSC

For municipalities, the motivations to become sustainable are somewhat different. Sustainability is not a new concept for a city; the provision of a good, “sustainable” lifestyle – safe, secure neighborhoods, clean air and water, and affordable housing is at the core of any city’s mission and strategy<sup>22</sup>. Europe’s cities should be sustainable and offer a high quality of life so that people want to live and work in them and businesses want to invest there<sup>23</sup>.

The UN definition of a sustainable city is as follows<sup>24</sup>: A sustainable city [...] is a city where achievements in social, economic, and physical development are made to last. A sustainable city has a lasting supply of the natural resources on which its development depends (using them only at a level of sustainable yield). A sustainable city maintains a lasting security from environmental hazards which may threaten development achievements (allowing only for acceptable risk).

Frequently referenced example, as noted in the UN World Public Sector Report 2003<sup>25</sup>, is the objective of the e-Tampere programme, aimed to develop a sustainable knowledge society that supports active citizenship and innovative business. Their visions, goals and measures of the environmental programmes are grouped as: Diversity and sustainable use of natural and cultural environments; a healthy, pleasant and ecologically sustainable housing environment; environmentally responsible business operations; recreational use of nature; environmental awareness and research<sup>26</sup>.

## 5. LOCAL GOVERNMENT PERFORMANCE INDICATORS

Local government statistics follows Urban Audit Statistics<sup>27</sup> structure and statistical variables for the correspondent local level: **Demography** (Population, Nationality, Household structure), **Social aspects** (Housing, Health, Crime), **Economic aspects** (Labor market, Economic Activity, Income disparities and poverty), **Civic involvement** (Civic involvement, Local administration), **Training and education** (Education and training provision, Educational qualifications), **Environment** (Climate/geography, Air quality and noise, Water, Waste management, Land use, Energy use), **Travel & Transport** (Travel patterns), **Information society** (Users and infrastructure, Local e-government, ICT sector), **Culture and recreation** (Culture and recreation, Tourism).

Experimental set of SD indicators<sup>28</sup> consists of:

- Indicators for *Environmental Aspects* of Sustainable Development - **Atmosphere**: Protection of the atmosphere (Emissions of greenhouse gasses, Emissions of sulphur oxides, Emissions of nitrogen oxides, Consumption of ozone depleting substances, Ambient concentrations of pollutants in urban areas, Expenditure on air pollution abatement).
- Indicators for Environmental Aspects of Sustainable Development - **Water**: Protection of the quality and supply of freshwater resources (Annual withdrawals of ground and surface water, Domestic consumption of water per capita, Groundwater reserves, Concentration of fecal coliform in freshwater, Biochemical oxygen demand in water bodies, Waste-water treatment, Density of hydrological networks); Protection of the oceans, all kinds of seas and coastal areas (Population growth in coastal areas, Discharges of oil into coastal waters, Releases of nitrogen and phosphorus to coastal waters, Maximum sustained yield for fisheries, Algae index).
- Indicators for Environmental Aspects of Sustainable Development - **Land**: Integrated approach to the planning and management of land resources (Land use change, Changes in land condition, Decentralized local-level natural resource management); Managing fragile ecosystems: combating desertification and drought (Population living below poverty line in dryland areas, National monthly rainfall index, Satellite derived vegetation index, Land affected by desertification); Managing fragile ecosystems: sustainable mountain development (Population change in mountain areas, Sustainable use of natural resources in mountain areas, Welfare of mountain populations); Promoting sustainable agriculture and rural development (Use of agricultural pesticides, Use of fertilizers, Irrigation percent of arable land, Energy use in agriculture, Arable land per capita, Area affected by salinization and waterlogging, Agricultural education).
- Indicators for Environmental Aspects of Sustainable Development - **Waste**: Environmentally sound management of solid wastes and sewage-related issues (Generation of industrial and municipal solid waste, Household waste disposed per capita, Expenditure on waste management, Waste recycling and reuse, Municipal waste disposal); Environmentally sound management of toxic chemicals (Chemically induced acute poisonings, Number of chemicals banned or severely restricted); Environmentally sound management of hazardous wastes (Generation of hazardous wastes, Imports and exports of hazardous wastes, Area of land contaminated by hazardous wastes, Expenditure on hazardous waste treatment); Safe and environmentally sound management of radioactive wastes (Generation of radioactive wastes).
- Indicators for Environmental Aspects of Sustainable Development - **Other Natural Resources**: Combating deforestation ( Wood harvesting intensity, Forest area change, Managed forest area ratio, Protected forest area as a percent of total forest area); Conservation of biological diversity ( Threatened species as a percent of total native species, Protected area as a percent of total area); Environmentally sound management of biotechnology (R & D expenditure for biotechnology, Existence of national biosafety regulations or guidelines).
- Indicators for *Social Aspects* of Sustainable Development: **Combating poverty** (Unemployment rate, Head count index of poverty, Poverty gap index, Squared poverty gap index, Gini index of income inequality, Ratio of average female wage to male wage); Demographic dynamics and sustainability (Population growth rate, Net migration rate, Total fertility rate, Population density); Promoting education, public awareness and training (Rate of change of school-age population, Primary school enrolment ratio—gross, Primary school enrolment ratio—net, Secondary school enrolment ratio—gross, Secondary school enrolment ratio—net, Adult literacy rate, Children reaching grade 5 of primary education, School life expectancy, Difference between male and female school enrolment ratios, Women per hundred men in the labor force, GDP spent on education); Protecting and promoting human health (Basic sanitation: percent of population with adequate excreta disposal facilities, Access to safe drinking water, Life expectancy at birth, Adequate birth weight, Infant mortality rate, Maternal mortality rate, Nutritional status of children, Immunization against infectious childhood diseases, Contraceptive prevalence, Proportion of potentially hazardous chemicals monitored in food, National health expenditure

devoted to local health care, Total national health expenditure related to GNP); Promoting sustainable human settlement development (Rate of growth of urban population, Per capita consumption of fossil fuel by motor vehicle transport, Human and economic loss due to natural disasters, Percent of population in urban areas, Area and population of urban formal and informal settlements, Floor area per person, House price to income ratio, Infrastructure expenditure per capita).

- Indicators for *Economic Aspects of Sustainable Development*: International cooperation to accelerate sustainable development in countries and related domestic policies (GDP per capita, Net investment share in GDP, Sum of exports and imports as a percent of GDP, Environmentally adjusted Net Domestic Product, Share of manufactured goods in total merchandise exports); Changing consumption patterns (Annual energy consumption, Share of natural-resource intensive industries in manufacturing value-added, Proven mineral reserves, Proven fossil fuel energy reserves, Lifetime of proven energy reserves, Intensity of material use, Share of manufacturing value-added in GDP, Share of consumption of renewable energy resources); Financial resources and mechanisms (Net resources transfer / GNP, Total ODA given or received as a percentage of GNP, Debt / GNP, Debt service / export, Environmental protection expenditures as a percent of GDP, Amount of new or additional funding for sustainable development); Transfer of environmentally sound technology, cooperation and capacity-building (Capital goods imports, Foreign direct investments, Share of environmentally sound capital goods imports, Technical cooperation grants).
- Indicators for *Institutional Aspects of Sustainable Development*: **Integrating environment and development in decision-making** (Sustainable development strategies, Programme for integrated environmental and economic accounting, Mandated Environmental Impact Assessment, National councils for sustainable development); Science for sustainable development (Potential scientists and engineers per million population, Scientists and engineers engaged in R & D per million population, Expenditure on research and development as a percent of GDP); International legal instruments and mechanisms (Ratification of global agreements, Implementation of ratified global agreements); Information for decision-making (Main telephone lines per 100 inhabitants, Access to information, Programmes for national environmental statistics); Strengthening the role of major groups (Representation of major groups in national councils for sustainable development, Representatives of ethnic minorities and

indigenous people in national councils for sustainable development, Contribution of NGOs to sustainable development).

Local government performance indicators (PIs) play a critical role in building an overall framework of performance management. The main benefits of them are<sup>29</sup>: Measuring progress towards achieving stated local objectives, Making sure that local priorities are highlighted, Community accountability, Service management and improvement, Internal accountability, Policy decisions and allocating resources, Partnership working.

## 6. INTELLIGENT CITY BSC (SUSTAINABLE DEVELOPMENT BASED ON KNOWLEDGE SYSTEMS)

Intelligent City based on Knowledge and Sustainable Development is bringing new perspectives to BSC<sup>30</sup>: e-Administration, e-Inclusion, Mobility and Transport Information Services, e-Land use information management, Regeneration, Virtual urban planning, e-Learning, Visioning and capacity building of citizens, e-Governance, and e-Organization.

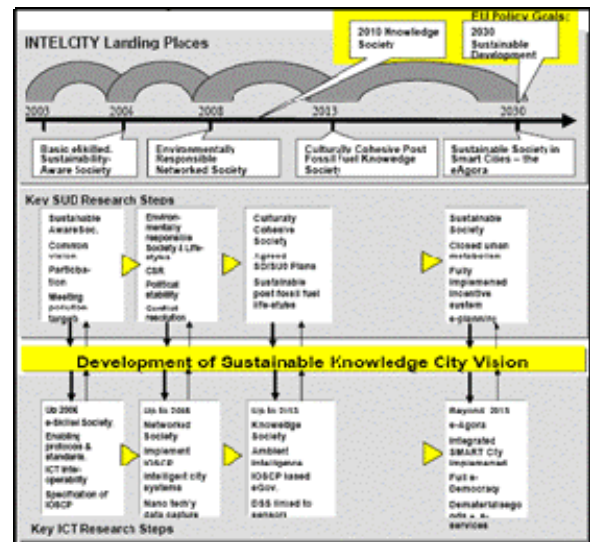
Perspectives, goals and performances of Intelligent City for 2006/7:

- **Knowledge Society (KS)**: Basic e-Skilled Society; Protocols and specifications set for e-activities, e.g. e-democracy, e-voting; Access to all, ICT knowledge for all citizens and disincentives to communicate eliminated; Effective knowledge capture (and reuse) through job or activity mining giving improved job prospects, quality and enjoyment; Basic, open system city information platform(s) and interfaces (IOSCP).
- **Sustainable Urban Development (SUD)**: Sustainability Aware Society - common understanding, awareness, vision, targets; Confidence building, e.g., effective participation, full(er) employment, for more effective personal and community action; Effective waste reduction/recycling systems; Meeting pollution abatement targets (Kyoto).
- **Integrating KS and SUD**: Demonstration projects, best practice case studies that link both KS and SUD (Phase 1); Public/private partnerships for bridging the digital divide; Changing employment structures, flexible working; Social shaping of technology, transfer and e-learning plus institutional changes; e-Security, safety and confidence; ICTs for planning process efficiency and effectiveness; Risk analysis modeling.
- **Bridge**: Local and regional action plans to consider ICTs; Demo projects linking e-Government, e-Administration, sustainable transport, recycling, etc.

Perspectives, goals and performances of Intelligent City for 2008:

- **Knowledge Society (KS):** Networked Society; Technology nearly everywhere, advanced e-skills and IOSCP; Increased flexibility of working; Real time intelligent systems, monitoring and interfaces; Use and waste monitoring using advanced (nano) sensor technology; e-Administration in all cities; e-Government pilot implementation; City models based on four SUD pillars.
- **Sustainable Urban Development (SUD):** Environmentally Responsible Society of shared values and accepted targets; Effective urban and corporate governance (CSR) with appropriate incentives/legislation; Political stability (in enlarged EU); Healthy, more environmental friendly lifestyles and habits; Conflict resolution structures and mechanisms in place.
- **Integrating KS and SUD:** Integrated data models and knowledge management; e-Spaces/workspaces; Group decision support, e.g. integrated planning support tools; Cause and effect of public/private partnerships (in a broader sense than current interpretation); New fiscal policy of/in the knowledge economy.
- **Bridge:** ICT/KS integrated in planning (e-planning and development control); Demo projects linking e-Government, e-Administration, sustainable transport, recycling, etc. in all cities.

- **Knowledge Society (KS):** Smart City (e-Agora); Integrated SMARTcity infrastructure fully implemented and full e-democracy; Fully dematerialized goods and services.
- **Sustainable Urban Development (SUD):** Sustainable Society with fully closed urban metabolism.
- Fully implemented strategy, plans and incentive systems.
- **Bridge:** e-Skills fully embedded in society and culture.



Picture 9: Landing places of sustainable city vision<sup>31</sup>

Perspectives, goals and performances of Intelligent City for 2013:

- **Knowledge Society (KS):** Knowledge Society Technology everywhere, high bandwidth access for all, full city knowledge system - no digital divide; Work anywhere fully flexible working and learning leading to high level job quality and opportunities for most citizens; Effective e-Governance implemented, e-voting, devolution, etc.; Flexible resources use/infrastructure.
- **Sustainable Urban Development (SUD):** Culturally Cohesive society providing safe, clean environment with no unemployment; Strategies and plans agreed for rapid transition to SD/SUD; Largely sustainable life-styles / mobility through citizen awareness; Post fossil fuel and clean technology; Circular urban metabolism; Decoupled growth.
- **Integrating KS and SUD:** Theories and tools for bridging KS and SUD and integrating research outcomes; e-Identity linking virtual and real worlds; Demonstration projects for dissemination and implementation in "follower" cities (Phase 2).
- **Bridge:** Virtual products and services; Full implementation of e-planning; e-Democracy development & demo, towards e-Agora.

## 7. ICT AS INFRASTRUCTURE FOR BSC

ICT architecture requirements for balanced scorecard are highlighted as:

- implementation of BSC methodology
- open (city) network architecture
- Web based enterprise wide deployment
- sophisticated visual development environment
- automated synchronization of the complete system (Figure 10.)
- distributed scalable architecture for analytical processing
- reach text/document handling
- intelligent middleware for data warehouse and ERP integration
- intelligent collaborative, standard based communication and knowledge based technology.

Perspectives, goals and performances of Intelligent City for 2030:





Figure 10: Performance Information Software Solution Space<sup>11</sup>

Collaborative user requirements:

- The core balanced scorecard measurement system to report on actuals versus targets across multiple dimensions
- Explanations and assessments communicate strategy and focus on qualitative information
- Initiative tracking to translate objectives into actions and to track strategic impact of actions
- Targets, forecasts and analysis to crystallize commitment to strategy and provide ad-hoc analytic capability
- Dialogs to allow shared problem solving with dynamic communication.

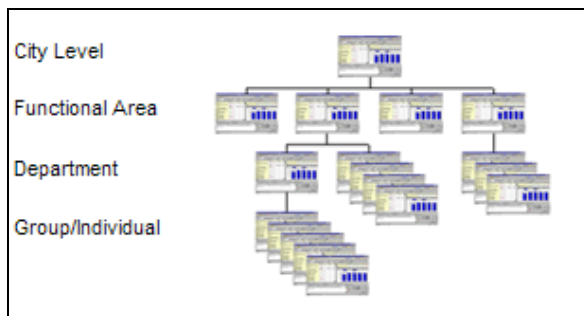


Figure 10: Creating and linking scorecards across the City

Integration of role based BSC portal is embedded in overall open collaborative individual portal.

## 8. CONCLUSION

Overall social, political as well as ICT developments for Ambient Intelligence are accelerating the transition from Information Society to Knowledge Society.

Transition from Digital to Intelligent City requires open networked infrastructure to provide City strategy developments and implementations for all stakeholders. Intelligent City Balanced Scorecard, based on IOCS, integrates and focuses developments to Intelligent, Sustainable City based on Knowledge.

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