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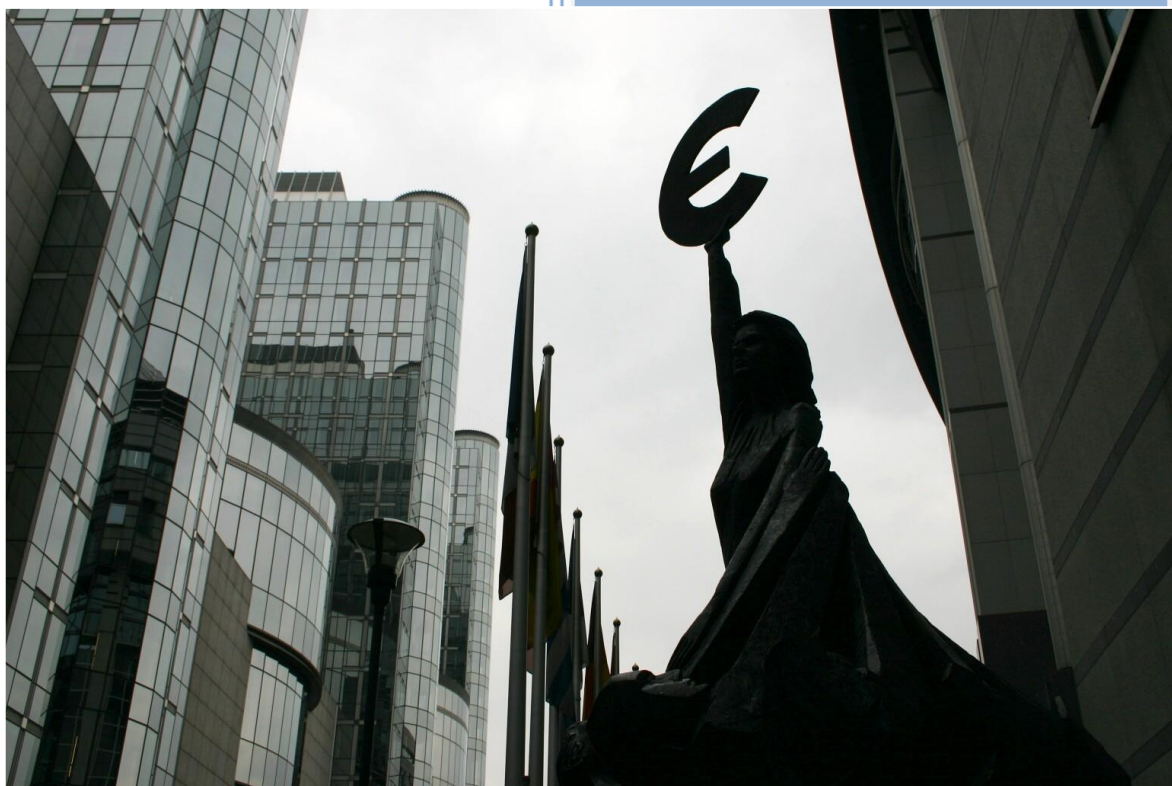
SMARTER CITIES AS AN EUROPEAN AGENDA

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SMO ČR

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SMARTER CITIES
AS AN EUROPEAN AGENDA

HOW COULD EUROPEAN UNION LEVERAGE
AN INTEGRATED AND INTELLIGENT GROWTH OF URBAN AREAS

This orientation paper was prepared by Union of Towns and Municipalities Czech Republic with a support of IBM ČR, spol.s r.o. Its aim is to highlight the potential of ICT for the urban development, identify the key problems and challenges cities face, show possibilities how to address these issues using smart solutions (on several case studies) and introduce resources available at the European level. An integral part of this paper is also a set of recommendations targeted to European Commission, European Parliament and Member States how to promote an integrated and intelligent growth of urban areas.

RECOMMENDATIONS

1. Nearly 80 % of the 492 million EU inhabitants live in cities and urban areas are responsible for generating 70 to 80 % of the EU's GDP. Hence cities as poles of growth perform the main job for local, regional, national and also European development. On the other hand cities also pay the price as regards unprecedented urbanization, traffic congestions, environmental pollution and social polarization. Only a balanced and smart development of European urban areas based on technological advancements can ensure that the growth is sustainable.

2. Information and communication technologies (ICT) sector is the most important driver of growth and jobs in the EU economy, contributing 50 % to productivity growth. Development of the digital economy together with communications and information revolution has major implications for the organization and functioning of European cities. Implementation of ICT represents a great potential for urban regeneration that can lead to enhanced efficiency and savings and better quality of local services.

3. So far European interest has been very much targeted to ICT infrastructure and supply side structures (such as measures promoting coverage by broadband). It needs to be underlined that ICT infrastructure is conditio sine qua non for smarter urban development. However it is particularly important to ensure that urban regeneration programmes include not only measures designed to develop technical information and communications infrastructure but also applications that improve people's lives and the functioning of public services, enhance public sector service provision and encourage use of ITS infrastructure.

4. Also current understanding of "Smart Cities" on the European level is rather limited to strategic planning and innovations in the field of energy efficiency and savings. However European cities need to become smarter in all areas of urban life. Smarter cities needs to be understood as a parallel urban world of ICT incorporating city economy, mobility, environment, people, living and governance to which the regeneration agenda should give consideration.

5. In the field of Cohesion Policy European Union involvement in urban areas is still week. Mainstreaming of Urban Community initiative in current programming period (2007-2013) has led to a stronger sectoral focus. Possibilities of delegation of operations to urban authorities have not been utilized. Potential of Jessica instrument is not commonly understood and embraced by cities. Integrated approach to urban development has often been hindered by over-bureaucracy and lack of partnership. This needs to be changed.

6. Future Cohesion Policy must pay more significant respect to cities and adjusting agglomerations in order to enable them to be more instrumented, interconnected and intelligent in all areas of public life such as city governance, energy, water management, transport, tourism, housing, education, health and social care, public safety etc. The solution is a strengthened legal framework for the urban dimension in Cohesion Policy in the next programming period, a stronger emphasis on integrated planning and a simplified delivery system, better and more utilization of global grants and sub-delegations and stronger local involvement and contributions in the design and delivery of all Operational Programmes.

7. It is also crucial to see the urban dimension within the wider context of European governance. European cities are instrumental in achieving Union objectives. Therefore smarter development of urban areas should be an integral part of all development policies and funding mechanisms. Especially urban dimension needs to be strengthened, elaborated and specifically included within the Research Framework Programmes (FP) and Competitiveness and Innovation Framework Programme (CIP).

8. Meanwhile it is important to disseminate knowledge and exchange information on best practice of urban regeneration, provide case studies on successful city projects, continue to drive research, comparative studies and statistics on urban topics in order to better understand what the main problems and challenges European cities face are and how can they react and become smarter.

Dear readers,

At the beginning of new millennium cities are continuously facing new, ever more complicated and interconnected problems and challenges.

Communal services are under pressure. To name only a few.

Urban populations are rapidly ageing and their demands on social and health care are increasing. As society is disintegrating and people are ever more living on their own it is the cities not family they address when they need support and solution to their adverse social situation.

Possibilities of cities to promote start ups and business culture are limited by excessive central administrative bureaucracy. Cities have to cope not only with consequences of entrepreneurs and businesses closures and relocations such as higher unemployment and social exclusion of individuals but also with absent services for wider communities.

Inner cities are overcrowded with transport vehicles with prices of cars drastically falling and making them widely accessible for mass populations, they need to confront with traffic jams, ecological damages, raising level of noise and health impacts. This again leads to increasing demands on urban mass transportation systems.

Affected by climate change, some urban areas are overcoming the issue of water scarcity; others prepare and fight against more frequent floods. Moreover citizens demand high quality drinking water; state and European authorities dictate constraints concerning the waste and sewage. Cities are sometimes left alone to solve this puzzle.

Urban possibilities to face and solve all these problems are limited by finite resources that have been recently shrinking as a result of financial and economic crisis. Cities need to holistically address the pressing challenges that they face. How can they do that?

Economy has taught us that the more or improved output can be obtained from the same bundle of inputs by a change in the process of production – a technological change. Cities thus can use technology to transform their core systems and maximize quality and scope of urban services within finite resources. As they strive for sustainability and prosperity, cities can grasp the opportunities that now exist in smarter systems.

The possibilities of information and communication technologies deployment in urban areas are truly numerous. Not only in Europe but around the whole world cities of all sizes have been introducing new policies, better regulation and market tools using the ICT, in areas like administration, business environment, energy, water, transport, safety, tourism or health and social care.

Improvements in urban administration and services can have dramatic impact on the daily activities of citizens and businesses. People can feel safer with public safety systems and better urban policing. People can feel more secured at home even at the old age with telecare. People can live in healthier environment with ecologic urban transport. People can spend less time in traffic jams. People can save money on energy, water and other

utility bills with energy grids. People can explore historical heritage with navigation systems and virtual monument applications.

In European Union we need to recognize that cities are integral part of the solution and core where the economic, social and territorial cohesion lies. We need to enable cities to invest in modernization of infrastructure and urban services. We need to target strategic investments at smart cities agenda as its provide an opportunity for development and revitalization of local communities where live nearly 80% of EU population and a chance to apply intelligent systems and technologies that would spur economic growth and enable sustainable way of life

In our cities at the beginning of new millennium it is the time to start doing the old things in a new way. In a smarter way.

Oldřich Vlasák

Brussels, May, 2010

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Vice chairman of Intergroup Urban
Executive president of European Municipalities and Regions (CEMR)
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INTRODUCTION

For centuries the world has witnessed futuristic visions of smart cities. These vision have often been associated with safe, secure, environmentally friendly, and efficient urban areas where all structures such as transportation, water, sewage and power networks are designed, constructed, and maintained making use of advanced, integrated materials, sensors, electronics, and networks which are interfaced with computerized systems comprised of databases, tracking, and decision-making algorithms. (Bowerman et all, 2000)

Amongst others projections and expectations, the ones of a famous French pioneer of the science-fiction genre Jules Verne are the most well known. In his books Verne has highlighted his appreciation for technologically advanced and sophisticated places for urban life. This is also the case of the city of wellbeing, a kind of phalanstery, called Franceville in his novel The Begum's Fortune that is based upon environmental protection and strict ecologic and health standards. Is his work Jules Verne has not only showed an ability to see things that have later became reality, an important part of his heritage is also the strong message that even the greatest wonders of technology are useless if people cannot agree on their use.

UNDERSTANDING OF SMART CITIES

Only a couple of decades after Jules Verne death we can see the emergence of the smart city concept, an urban area governed and driven by the ICT sector. Urban performance currently depends not only on the city's endowment in physical infrastructure, but also, and increasingly so, on the availability and quality of information and communication infrastructure. In our cities virtual communication and electronic connection is increasingly forming the guiding architecture, next to physical and face-to-face interactions.

A "Smart City" is understood to mean a city that makes a conscious effort to innovatively employ information and communication technologies (ICT) to support a more inclusive, diverse and sustainable urban environment. A city can be defined as "smart" when investments in human and social capital and traditional (transport) and modern information and communication infrastructure (ICT) fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance. (Wikipedia, 2010)

The European Union (EU), in particular, has devoted constant efforts to devising a strategy for achieving urban growth in a smart sense for its city-regions. However sometimes understanding of "Smart Cities" on the European level is rather limited to metropolis cities and to strategic planning and innovations in the field of energy efficiency and savings. Nevertheless European cities need to become smarter in all areas of urban life. Smarter cities needs to be understood as a parallel urban world of ICT incorporating city economy, mobility, environment, people, living and governance to which the regeneration agenda should give consideration.

VARIETY OF URBAN SETTLEMENTS IN EUROPE

Europe is one of the most urbanised continents with middle size cities dominating the landscape. **Today around 70 % of its population is urban, while urban areas account for around 25 % of the EU's territory.** In Europe there are about 5.000 towns with populations between 5.000 and 50.000 inhabitants and almost 1.000

cities counting populations above 50.000. It is estimated that by 2020, around 80% of Europeans will be living in urban areas, while in seven Member State countries the proportion of urban population will be 90 % or more. (EEA, 2006)

Although municipalities are usually the principal unit of government in the EU, the diversity of local government units and structures in the EU means that not all cities are equal. Europe can be characterized by territorial diversity and polycentric development, the relatively dense urban network contains few very large cities. In the European Union, only 7% of people live in cities of over 5 million as against 25% in the United States of America. (European Commission, 2008) Thus Europe needs to utilize its polycentric potential.

Box – Cities and Urban Population in the Czech Republic

In the Czech republic over 70 percent of the population is urban and 63,6 percent of the inhabitants live in towns and cities with a population over 5.000. Local authority is regarded as a city municipality, when it is granted city status. In 2008 in the Czech Republic there was a total of 592 cities, including 23 towns that have the status of a statutory city.

There are four major cities in the Czech Republic with a population of more than 150.000 inhabitants: Prague (1.285 million inhabitants as in 2008), Brno (405 thousand), Ostrava (314 thousand), and Plzeň (173 thousand). Two more cities have reached population over 100.000 inhabitants: Liberec (105 thousand inhabitants) and Olomouc (102 thousand). Relatively close to that margin level were also the following cities: Ústí nad Labem (99 thousand inhabitants), Hradec Králové (96 thousand), České Budějovice (96 thousand) and Pardubice (91 thousand inhabitants).

The country's urban population has declined since 1991 at a faster rate than in the country as a whole. The cities lose population through both natural demographics and migration. The demographic change is characterized by the process of ageing caused by very low fertility not only in the cities but in the whole country.
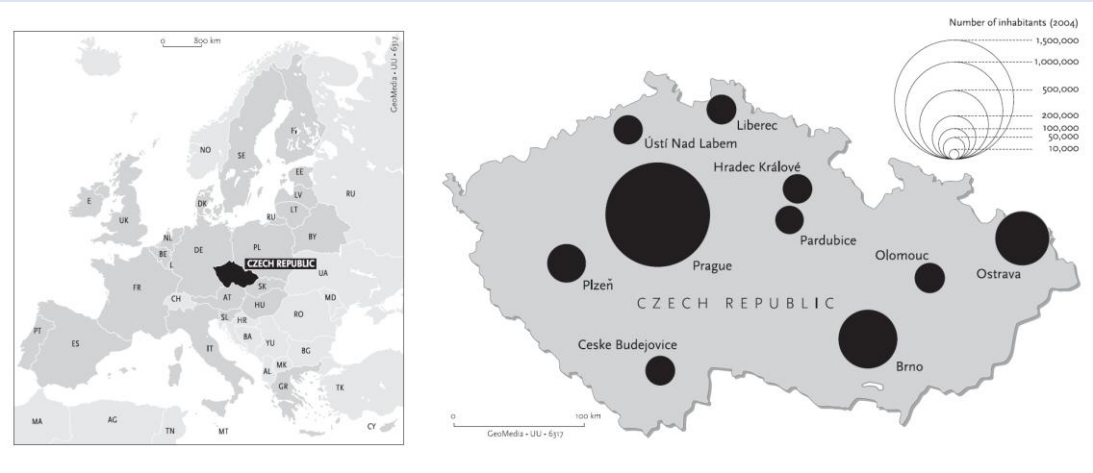
Source: Van Kempen, R., Vermeulen, M. and Baan, A. (2004), Eurostat (2008)

Cities are crucial actors in the shaping of Europe's economy and territory. Cities are the indisputable engines of economic growth across Europe. In virtually all European countries, urban areas are the foremost producers of knowledge and innovation – the hubs of a globalising world economy. Cities and urban areas are home to an overwhelming majority of jobs, businesses and higher education institutions in the European Union. Cities

have been, and always will be, powerful vehicles for agglomeration benefits that far exceed the opportunities of any other geographic constellation. On the other hand, many cities are confronted with severe problems and challenges of economic, environmental and social nature.

POTENTIAL OF NEW TECHNOLOGIES

To solve these issues and react on the existing challenges cities can rely on new technologies. **Europe's digital economy has tremendous potential to generate huge benefits not only in cities but across all tiers of governments and all sectors.** Nearly 56% of Europeans now regularly use the internet, 80% of them via a high-speed connection, making Europe the world leader in broadband internet. Europe is the world's first truly mobile continent with more mobile subscribers than citizens (a take up rate of 119%). (European Commission, 2009) Europe can advance even further as a generation of "digitally savvy" Europeans becomes a strong market driver for growth and innovation.

The avalanche of information supply however, has not kept pace with the use of information. The potential of ICT infrastructure is not materializing in the ICT services. Europe is still behind the US and Japan in R&D investments in information and communication technologies (ICT) and developing innovative services like online advertising. Especially in the public domain we observe an insurmountable gap. The use of opportunities offered by the ICT sector to the public domain is disappointingly low.

As argued by Cohen at all (2001) **development of ICT policies on the ground in our cities depends on decision makers' perceptions and perceived costs and benefits**. On one hand technological innovation and new technology policies are increasingly advocated as effective tools in urban and regional strategies for a balanced and sustainable development, on the other hand as urban design and technological solutions are becoming more complex their deployment very often depends on the individual attitudes, positions of popular media and perceived role of private sector.

Chart – Factors and actors that affect utilization of ICT policy
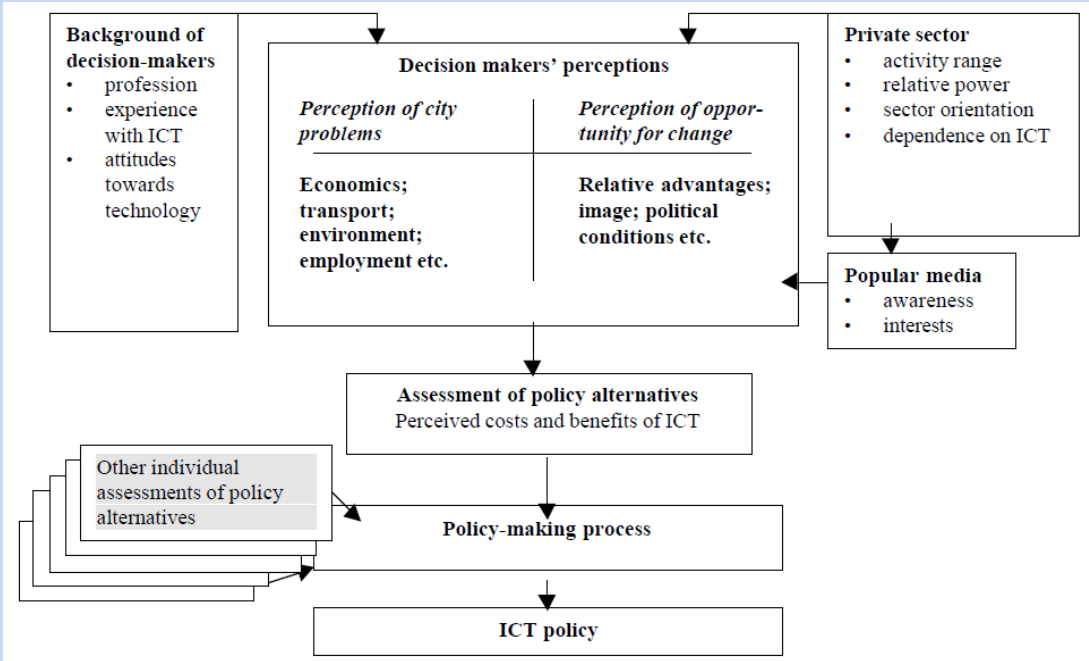
Source: Cohen, G., van Geenhuizen, M. and Nijkamp, P. (2001).

PURPOSE AND CONTENT OF THE ORIENTATION PAPER

This orientation paper aims to highlight the potential of ICT for the urban development. It identifies the key problems and challenges European cities face, shows possibilities how to address these issues using smart solutions and introduces resources available at the European level.

Annexed to the orientation paper is a **collection of smarter city case studies** that present example city situation, describe addressed issue and used solution, bring more detailed technical information and outline achieved results and benefits. Although it is clear that is not possible to copy solutions automatically as the specific realities of individual cities are always crucial, the set of case studies can serve as a source of potential inspiration for urban planners and politicians.

An integral part of this paper is also a set of recommendations targeted to European Commission, European Parliament and Member States how to promote an integrated and intelligent growth of urban areas.

WHAT ARE THE PROBLEMS AND CHALLENGES EUROPEAN CITIES FACE?

In today's Europe, cities are the main sources of prosperity and engines of economic development. However they are also the places where problems and challenges of all sorts are located.

INCREASED UBRANIZATION

Urban sprawl is regarded as one of the major common challenges facing urban Europe today. It threatens the very culture of Europe, as it creates environmental, social and economic impacts for both the cities and countryside of Europe. Land use patterns across Europe show that tensions are arising almost everywhere between society need for resources and space and the capacity of the land to support and absorb this need.

Throughout Europe urban areas have expanded considerably more rapidly than the growth of population during the post-war decades. There is no apparent slowing down in these trends. Particularly at risk are the urban areas of the southern, eastern and central parts of Europe where the urban structure has historically been very compact but which in the past few decades have started to grow rapidly outwards.

AGEING POPULATION

Cities are also affected by population changes. According to the State of European Cities Report (2007) the strongest urban population growth rates were recorded in Spain, where some urban areas saw average annual increases of 2 percent or more. Cities in Ireland, Finland, and Greece also experienced some of the highest population growth rates in the EU. In contrast, many urban areas in Central and Eastern Europe witnessed an overall population decline in the same time frame. In virtually all cities, suburbs grow and if they decline they still tend to decline less than the core city.

In a broader demographic context we can observe a considerable fall in the proportion of the population of productive age and younger (those below the age of 45) and an **increase in the elderly population is evident in many cities which has an impact on the demand for social infrastructure**. Age structure and demographic growth rates in cities are also related. While an ageing population is an overarching trend across Europe, evidence shows that cities with the fastest population growth are those with the lowest share of elderly people. (State of European Cities Report, 2007)

HIGH UNEMPLOYMENT

In virtually all European countries, urban areas are the foremost producers of growth, knowledge and innovation. The concentration of jobs in cities is even stronger than that of residents, many of Europe's main employment centres are within cities and its largest cities are truly economic powerhouses. Yet, as in other parts of the world, the generated wealth does not necessarily translate into corresponding rates of employment among urban citizens **An employment paradox can be observed in European cities - unemployment rates tend to be higher in cities.** Within cities, very large differences in unemployment rates can be also observed between neighbourhoods.

SOCIAL EXCLUSION

Cities are the engines of economic growth and social innovation, however many of them are faced with persistent social problems and challenges, often concentrated in specific neighbourhoods. **Certain urban areas in Europe are suffering from recurring high levels poverty, low academic achievement, long-term welfare dependency and low quality public facilities.** Inhabitants of these deprived urban areas are usually less likely

to have access to and use the Internet and other Information and Communication Technologies (ICT) compared to people living in well-off areas which poses extra challenge on the development of smart cities. Apart from that the role of local public administrations in tackling social exclusion and inequalities differs between countries, according to the degree of decentralisation of state powers. However, overall cities are having increasing responsibilities for addressing social problems, and making local economic development less exclusionary. (Eurocities, 2010)

URBAN VIOLENCE/CRIME/PERSONAL SAFETY

Over the last few years security has become of greater political and social relevance than ever before. **Crime is concentrated in the cities with considerably higher rates of registered crimes per capita in European cities than in the individual countries** as a whole. As a worldwide phenomenon, urban violence, crime and insecurity amongst residents of cities is believed to have grown by between three to five percent a year over the last twenty years. (Kulach Whiskin and Marks, 2006) Crime in deprived urban areas is usually even higher and reflects poor living conditions, as these neighbourhoods experience great levels of poverty, racial heterogeneity, transience, and family disruption. The high rate of social exclusion and unemployment especially of young people in deprived neighbourhoods in European cities is reason for concern; the lack of decent, sustainable jobs promotes a sense of displacement in the general population and often leads to rising levels of crime, suicide and violence, which impact all city residents. Cities also face new threats as being also targets for terrorist attacks, as demonstrated by the bombings of Madrid or London. City citizens and local politicians are thus equally concerned by the high level of crime, violence and instability in Europe's cities. Cities will probably be also the locus of much of the future conflict and violence, particularly in the context of economic recession and readjustment. Hence **they will urgently need to introduce community based crime preventive measures and appropriate policies** not only in strategies, but also in practice.

INADEQUATE HOUSING STOCK

European urban housing systems are expected to address affordability and production problems. As rising house prices in central areas encourage people to move to the suburbs where property is cheaper, cities are sprawling and becoming less dense. Cities also need to face challenges posed by the large-scale housing estates built in the three or four decades after the Second World War that are often seen as problem areas in many cities all over Europe. An associated problem of an inadequate urban housing stock is the energy loss from badly isolated panel houses. Thus although most European countries have a crude surplus of houses over households, large numbers of properties are unfit to live in. (Murie, Knorr-Siedow and Van Kempen, 2003) Overall demand for adequate housing is thus rising and Europe's city governments are being compelled to take a more and more active interest in this area.

CLIMATE CHANGE, POLLUTION AND UNHEALTHY ENVIRONMENT

Undoubtedly, quality of life has improved in many urban areas over the past 50 years. (EEA, 2009) **However cities are not always the healthiest places to live.** Most of the European inner cities are either old cities with narrow streets, often situated in valleys, or industrial cities with substantial traffic flows. Consequently air pollution is still one of the most pressing problems in urban areas which have a direct impact on health of urban populations. In our cities there have been marked increases in allergic reactions and lifestyle related diseases, such as cardiovascular disorders caused by obesity, physical inactivity or stress. The average life expectancy for those born in European cities was thus only 79 years for women and 73 years for men living in 2001. (European Commission, 2007) This is approximately two years less than the European Union average. **It is more and more recognized that metropolitan areas, cities and towns are key actors for global sustainability and more specifically to combat climate change**, since they are the places where most of the

resources consumption (both materials and energy) and the production of waste and emissions (including, most significantly, greenhouse gases) are concentrated.

TRAFFIC CONGESTION AND INADEQUATE PUBLIC TRANSPORTATION

Industrialized cities are also witnessing an increasing demand on key infrastructures. Among the most strained are transportation networks. **Living in cities increasingly means that inhabitants spend significant part of their time in urban transport.** Especially in larger cities, travelling to work has become a major challenge in everyday life. Single occupancy cars are the prominent mode of passenger transport, and the majority of good are carried by road and these are tending to increase over time. **Issues related to traffic (congestion, parking) are particularly problematic in many European cities.** The challenge is that transport modes often develop independently and transferring between modes is complicated. Also transport systems in cities tend to be radial in nature; they are efficient at moving people between the suburbs and the centre, but less good at moving people from suburb to suburb. While journey time between cities is reducing, journey times and average speeds within cities are falling. Public transportation, although fairly efficient in the city centers, is often poor when connecting the outskirts and inner cities. Public transport infrastructure also tends to be fixed and inflexible. Transportation also affects environment we are living in. Pollution from transport emissions – noise, particulates, benzene and nitrous oxides, they all affect health. (Edwards, T. and Smith, 2008)

INSUFFICIENT SOLID WASTE DISPOSAL AND WASTE WATER MANAGEMENT

Cities development is resulting in, among other things, increasing quantities of waste being generated. Worldwide figures for municipal wastes vary considerably due to inconsistent statistics and definitions; it is estimated that municipal solid wastes in general constitute about 14-20 percent of all wastes generated worldwide. (WSSD, 2003) Due to varied lifestyles and consumption patterns, the quality and composition of waste has been more varied and changing. Industrialization and economic growth has produced more amounts of waste, including hazardous and toxic wastes. Complexity, costs and coordination of waste management has necessitated multi-stakeholder involvement. Cities and local governments that often have a significant competences in this area are aiming at safely process and dispose wastes with a minimum impact on the environment. **Cities are hence 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 environment.**

LOW AUTHONOMY AND DEPENDENCE ON STATE STRUCTURES

Specific challenge for many European cities is a low autonomy and dependence on state. **In many cities, economic policies and investments are mostly the result of central government decisions and budget allocations (often in a form of grants which is also the case of European funds).** The states, in their various institutional forms, exert a critical influence on determining which cities and regions will benefit most from public resources. Governments also promote and/or regulate private or public investments for the construction of infrastructure and other investments that contribute to urban development. At the same time we are witnessing increasing flows of persons, goods, information, transactions, etc., that are deepening the interdependence between cities, regions and states also in areas to which cities alone were previously solely competent. Thus cities need to tackle the demand for improved coordination within the system of multilevel governance.

Box – Urban problems in the Czech Republic

Czech cities are facing many specific problems. Their causes are often interconnected and even 20 years after the fall of communism linked with the transformation of the former socialist economy and subsequent changes in lifestyle.

Rapid commercial and residential suburbanization

One of the most visible challenges is the one associated with spatial growth of Czech cities which can be characterized by building commercial shopping centers, warehouses, and other logistic facilities in suburban areas. Specific problems are also created by the mass construction of family houses in the so called satellite districts without adequate facilities and public transport services. This rapid commercial and residential suburbanization takes the form of unregulated urban sprawl.

Derelict brownfields in inner cities

Since the beginning of the 1990s, the central parts of the cities have been under strong pressure from new investments. An integral part of city governance is logically support of business development. While these efforts contributed to the physical upgrading in many Czech cities there are still large derelict sites (brownfields) – the result of massive deindustrialization. These previously developed parts of the cities (such as a former factory site or railroad siding) are now abandoned or underused as a results of the decline of numerous manufacturing and heavy industry activities, which were located in cities. Some of these brownfield properties are also gridlocked in an underused state because being contaminated or feared contaminated, which is an issue hardy to be addressed by local government with its constrained resources.

Inadequate infrastructure and traffic issues

Further urban development in the Czech Republic is affected by a low quality and capacity of transport infrastructure, especially road networks. Uncompleted motorway regional road networks, need for reconstruction and optimization of regional railways, unbearable state of the urban infrastructure for safe cycling and walking are amongst the most pressing issues. With an eminent need of transport infrastructure development is closely connected rising pressure on urban public transportation systems, rapid growth in car traffic and the consequent congestions. The situation in Prague is particularly critical, but problems occur in most of the regional capitals.

Increased demands on environmental protection

Czech cities also address the complex problems of environmental protection. Complicated issues are connected with the negative trend of car traffic accretion and consequent deterioration of the urban environment (noise, dust, emissions, etc.). Cities also have to deal with rising costs of energy, need to rationalize waste management or requirements to modernize sewage treatment facilities. Finally, urban governments must also respond to the lack of green areas, which affect quality of life in the city and reduce its attractiveness.

Dilapidated panel housing stock

Specific urban problems, common to most of the former socialist countries, are related to the dilapidated housing infrastructure. An important part of the housing stock in the Czech Republic is namely formed by the housing estates constructed with the use of prefabricated panel technology during the 1960s-1980s. These housing estates are now threatened by serious physical and social decline. Especially challenging is the extremely high energy consumption.

HOW CAN CITIES REACT AND BECOME SMARTER?

Urban performance and ability to react on the main challenges and issues more often depends not only on the city's modernisation of hard infrastructure but increasingly also on the availability to utilize communication and information technologies. **Cities are being empowered technologically. Technological advances enable cities to better understand and control their operation and development.** (Dirks and Keeling, 2009)

Urban design and planning issues are becoming more complex. **Information technology has become the basic tool of urbanism and city planning.** New technologies have the ability to create, edit and analyze data on nearly all major components of urban life. Information technologies make it possible to display information in thematic layers, so it is possible to monitor land use, traffic load, geographical distribution of unemployment and other variables in different parts of cities. Various types of extra information can be combined, so interdependences and links can be followed. City planning can use an incredible amount of available data. In the world today there are more than 33 billion RFID sensors (radio frequency identifiers) deployed that are themselves capable of transmitting information from a variety sources such as cars movements, water flows into sewage systems or emergencies, in which seniors find themselves when they fall at home and cannot get up. City planning with a support of technologies can also look at future of urban areas. Micro-agent simulations based on predictive software enable forecasts of pedestrian and drivers' behaviour, demographic simulation scenarios and other modelling. In practice these simulations allow city decision makers to prepare beforehand and for example optimize traffic and parking or forecast the needs of schools, nurseries and facilities for the elderly in future.

Possibilities of new technologies exist not in our own urban governance, but in all individual areas such as utilities management, transport, public safety, education, social services or tourism. In general, new technologies fulfil the requirements of user friendly public management, high service quality and environmental friendliness. At the time of the lingering economic and financial crises technology also helps cities to streamline spending respectively.

CITY GOVERNANCE

Greater demands for individualized and tailored service delivery mean that city authorities are under increasing pressure to transform their approach to managing service delivery to citizens. Similar to private enterprises, who are applying business models and returning their focus on customers, city governments are finding success in reorienting their structures, information technology and policies around the citizens. Leading **urban governments are integrating their service delivery, establishing offices that support multiple services and placing the most needed transactions on the Web. The solutions can range from "one-stop shopping" for previously discrete sets of services to information sharing and collaboration across various departmental units**.

Implemented smart solutions are visible all around Europe. In the City of Helsinki the municipal government has put user-driven innovation environments and public procurement at the heart of their new competitiveness strategy. The Forum Virium Helsinki cluster brings together corporations, R&D institutions and the municipality to create future digital services. It is a platform for open, market-driven innovation, located in the metropolitan area, and acts as a matchmaker between partners. Other example can be found in the United Kingdom, where the Southwest One, a joint venture, is providing shared services by integrating many functions of the Somerset County Council, the Taunton Deane Borough Council, and the Avon and Somerset Police. In Italian Parma he city's management is planning citizen-focused innovations that will provide new "intelligence" for existing infrastructure to optimize resources, improve services to citizens and businesses and make the city smarter and more efficient. Solutions are visible also on other continents. For example in

Japanese town of Kyoto a Web site was created that allows all people, regardless of their abilities or native language, to access city information.

These examples show that smarter systems can increase the cities' ability to keep citizens informed and enable more user friendly contacts. It supports improved service delivery, greater efficiencies and lower costs. Improvements include less bureaucracy, more electronic workflows with decreasing paperwork, and greater ability to share information with other organizations. **Smarter government means collaborating across departments and with communities—to become more transparent and accountable, to manage resources more effectively, and to give citizens access to information about decisions that affect their lives**.

UTILITIES MANAGEMENT (WATER, WASTE, ENERGY, BUILDINGS…)

City governments are often responsible for vast amount of infrastructure and various utility networks (such as waste, water and energy ones). **Running infrastructure is expensive — both in terms of real estate and operating costs. New technologies enable cities to manage energy, waste and water inefficiencies and reduce utilities usage, and associated costs.** Deployment of smart technologies in infrastructure and utilities is a powerful tool. Thousands of sensors can monitor everything from motion and temperature to humidity, precipitation, occupancy and light. Technology can monitor, measure and analyze entire water ecosystems, from rivers and reservoirs to the pumps and pipes in our homes. Use of advanced analytical techniques also promotes establishment of carbon management and enable raise profits through activities such as carbon trading.

Already, cities are using sophisticated technology. In the Netherlands cities like Rotterdam or Eindhoven are working with partners to build smarter levees that can monitor changing flood conditions and respond accordingly. in Galway, Ireland, through an advanced sensor network and realtime data up-to-date information (on water temperature, currents, wave strength, salinity and marine life) is given to all stakeholders – from scientists to commercial fishing businesses. Galway Bay is also applying algorithms that can forecast everything from wave patterns over 24 hours to the right time to harvest mussels. With regards to buildings today most attention is focused on smart homes; however some of the most dramatic progress can be achieved in public buildings and infrastructure. Examples can be followed also from a private sector. The St. Regis hotel in Shanghai has integrated 12 subsystems to create one intelligent building, with a ratio of energy costs to revenue below 5% (compared to 8% for other five-star hotels). In Switzerland company is using excess heat from its datacenter to heat a local public swimming pool. A mining company in Canada is using its excess datacenter heat to warm its warehouses during the cold Canadian winters.

Smarter infrastructure and utilities management can foremost optimize resources. Smart infrastructure can reduce energy consumption and CO2 emissions by 50% to 70% and save 30% to 50% in water usage. **Smart metering can give individuals and businesses timely insight into their own utility use, raising awareness, locating inefficiencies and decreasing demand.**

TRANSPORTATION

Cities around the world face common transport problems – from increasing congestion, overcrowding on public transport, safety concerns and aging infrastructure to a lack of funding and increasing environmental impacts. (Rodrigue, 2006) **Many cities are starting to tackle urban problems by implementing new intelligent transport systems.** Intelligent transport is about more than implementing discrete technologies. Leading cities are using these technologies to evolve their transport systems from single modes to integrated ones, improve transport services and provide an improved value proposition to customers.

It is becoming clear that without changes city transportation infrastructure and management approaches will not be able to handle the traffic in future. The key solution originates from the systemic nature of urban

transportation. It is not enough to focus only on pieces of the problem: adding a new bridge, widening a road, putting up signs, establishing commuter lanes, encouraging carpooling or deploying traffic copters. Instead, cities need to look at relationships across the entire system—and all the other systems that are touched by it – the way people and cities live and work. City traffic isn't just a line of vehicles; it's a web of connections.

As part of their transport strategies, many cities have deployed ITS, and many others have plans to do so. Intelligent transport systems have been around for many years, but more recently, global cities have been implementing a new generation of ITS. Some examples include **integrated fare management, enhanced transit/customer relationship management, traffic prediction, improved transport and traffic management, road user charging or variable parking pricing.** These smart solutions are possible because cities can infuse intelligence into their entire transportation system—streets, bridges, intersections, signs, signals and tolls, which can all be interconnected and made smarter. However the majority of cities are at an early stage in understanding and realizing the full potential of ITS. (Houghton et all, 2009)

Examples of implemented smart solutions include mostly cities in the developed world. For instance in Europe the City of London has taken the pioneering role in introducing a congestion management system that has significantly lowered traffic volume, Swedish City of Stockholm has introduced a dynamic toll system based on the flow of vehicles into and out of the city and managed to reduce traffic, decrease wait time and cut emissions or the Dutch municipal government in Eindhoven piloted a strategy to reduce traffic congestion using a fee-based traffic management solution originating from time, length and type of road travelled. Good practice examples include also urban areas outside Europe. In the United States a single monitoring software system that tracks, monitors and manages transportation assets (including vehicles, stations, equipment and personnel) is used in order to improve the safety and reliability of the metropolitan rail and bus mass transportation systems in Washington and in California. Such a system can perform continuous evaluations of the infrastructure to monitor the status of equipment in use and even identify potential problem areas, allowing repair staff to address the issue before the part or system fails. Examples also include Asian countries. In Singapore, controllers receive real-time data through sensors to model and predict traffic scenarios with 90% accuracy and thus are able to anticipate and better manage the flow of traffic to prevent the build-up of congestion; in Kyoto, city planners simulate large-scale traffic situations involving millions of vehicles to analyze urban impact.

These examples show that **smarter traffic systems can reduce the length and frequency of traffic jams, improve drivers' commutes, give better information to city planners, increase the productivity of businesses and raise citizens' quality of life. They can also reduce congestion, shrink fuel use and cut carbon dioxide emissions.**

PUBLIC SAFETY

The first duty of a public authority is to protect its citizens. Public safety involves the prevention of and protection from events that could endanger the safety of the general public from significant danger, injury/harm, or damage, such as crimes or disasters (natural or man-made). The question is how to achieve that in an urbanizing world that is becoming more interconnected, fast-paced and unpredictable every day. **Cities around the world are no longer just responding to crimes and emergencies after they happen; they're analyzing, anticipating and working to mitigate or prevent them. They use smart systems that capture data from myriad processes, devices and objects, and then apply intelligence to this welter of information to detect patterns and take action in real time.**

Especially active are United States cities. In New York police commanders are using analytics and visualization tools to see crime patterns as they are forming. The city's Real Time Crime Center system can quickly query millions of pieces of information to uncover previously unknown data relationships and points of connection. Integrated crime information analysis, delivered in real time, has helped improve public safety, with a 27% drop

in crime since 2001. In Chicago previously manual analysis of video from surveillance cameras was mostly used as evidence after an incident had occurred. Today, 911 dispatchers have access to video from a multitude of cameras citywide, with advanced analytics built into the infrastructure, that are connected to a fiber/wireless network to assist the operator with potential "eyes-on-the-scene" in the vicinity of an incident. The video image they receive helps them dispatch exactly the right services immediately. Another example can be witnessed in reaction to natural disasters. During the recent wildfires in California, government agencies turned to Twitter to provide real-time updates on the status of the fires—directing people without power, but with mobile devices, to Google Maps for evacuation information. There are also examples of public safety solutions in Europe. For example the City of in Madrid in Spain, following the terrorist attacks of March 2004, has developed a new Emergency Response Center so today, when a citizen witnesses an accident and places an emergency call, the system simultaneously alerts the police, the ambulance service and, if needed, the fire brigade. The smart system can recognize if alerts from several different sources relate to a single or multiple incidents, and assign the right resources based on the requirements coming from the ground. Security is also an addressed issue in Polish cities, where personal and vehicle IDs can be instantly checked in an database. The new system has improved police operations, helping to shorten the time for queries, reduce errors and allow police to verify information and uncover potential threats to local and national security, through use at Poland's borders. Overall, the system contributed to a 66% increase in arrest rates for Polish police in 2008.

These examples show that smarter systems can respond to public safety threats quickly and effectively. They empower first responders to sense, respond to and manage emergencies. At the same time these systems integrate and analyze information with speed and accuracy that may influence life or death of citizens.

EDUCATION

Many local governments in Europe are also responsible for education. In the time of crisis, schools and education systems are straining under budget cuts. The education industry has grown increasingly complex and difficult to quantify, as students pursue a variety of alternative learning paths. One of the challenges is that our education technologies need to be more, well, systemic. There have been advances in education technology—cloud computing, open source systems, virtualization, analytics—that can help educational systems refresh outdated infrastructures with new functionality. **Apart from upgrading aging infrastructure smarter education systems are reshaping learning not around administrative processes, but around the two key components of** any education system – the student and the teacher.

Many of existing examples of smarter education systems occur in United States. For example in the town of Illinois educators are mining student data electronically—from academic records to information on student mobility and attendance. In Florida County Teacher Workbench provides teachers with instructional resources linked to timely student data. This information helps teachers to identify what each student needs and thus individualize instruction to improve student achievement, while protecting confidentiality. In Broward County parents can access a "virtual counselor" to track their children's attendance, assignments and progress. In Ohio, student data is feeding performance dashboards for teachers, helping them to share courseware and lesson plans. On the horizon is the opportunity to create education "clouds"—like the one North Carolina State University uses to provide computing power and IT tools to students and faculty for research, student learning and administration. In Ohio, student data is feeding performance dashboards for teachers, helping them to share courseware and lesson plans. On the horizon is the opportunity to create education "clouds"—like the one North Carolina State University uses to provide computing power and IT tools to students and faculty for research, student learning and administration.

Using smarter education systems ensures more focus targeted on students individual needs. It also enables more user friendly communication with parents. Apart from that it supports special joint education initiatives

that enable the inclusion of supporting organizations and communities—from social workers, service agencies to families, church organisations —transforming schools into a student-centered educational ecosystem.

SOCIAL AND HEALTH CARE SERVICE

Ageing populations are posing extra demands on social and health care services. Rising costs, limited access, high error rates, lack of coverage, poor response to chronic disease and the lengthy development cycle for new instruments —most of these could be improved if cities could link diagnosis to health and social care providers to insurers to employers to patients/clients and communities. **A smarter social and health care system starts with better connections, better data, and faster and more detailed analysis. It means integrating data and centering it on the patient/client, so each person has his or her information and has access to a networked team of collaborative care. It means moving away from paper records, in order to reduce errors and improve efficiencies. It means applying advanced analytics to vast amounts of data, to improve outcomes. It also means utilizing full potential of tele-care.**

Examples of utilization of technology in this area is numerous. For example social and health care providers in Denmark are using predictive health systems with advanced telemetry to monitor elderly patients in their homes, sharing data instantly. Sainte-Justine, a research hospital in Quebec, is automating the gathering, managing and updating of critical research data, which is often spread across different departments. Then they're applying analytics to speed childhood cancer research and improve patient care—while drastically lowering the cost of data acquisition and enhancing data quality. Servicio Extremeño de Salud, a public healthcare service in Spain, has built a regionally integrated system that lets patients go to many health centers within the region, knowing a doctor there can have the patients' complete, up-to-date records for faster and more accurate treatment. French orthopedics manufacturer, is using RFID technology to track surgical implants from manufacture until they're inside patients. Hannover Medical School in Germany uses mobile and wireless technology to gather and record trauma patients' data in real time throughout their hospital stay, enabling its system to communicate, "Patient X is waiting for doctor Y in room Z." In the United States Continua Health Alliance enables individuals and families to store and track their health information and stream data from medical devices.

Smarter healthcare systems hold promise beyond their particular cities, communities, patients and diseases. They are integrating clinical, financial, operational, claims, genomic and other information into an integrated environment of care intelligence that helps doctors and other care workers deliver more personalized care. This enables them to make smarter decisions and deliver higher quality care, all because they can easily turn information into actionable knowledge. Results are lower costs, better-quality care and healthier people.

TOURISM

Tourism is one of the world's fastest growing industries and is a major source of income for many cities. Being a people-oriented industry, tourism also provides many jobs which have helped revitalize local economies. Cities all over the world make special efforts to attract foreign tourists. For many cities urban tourism is their number one industry, generating not only rising income but also underpinning many regeneration projects. Doing so cities face a double challenge. Firstly, they have to be able to respond to the expectations and needs of the growing numbers of tourists who are attracted to their rich and varied array of cultural, business, entertainment, shopping, sports and other attractions; furthermore, they need to continuously renovate and improve such facilities in order to maintain their share in the competitive tourism market and the benefits resulting from it. Secondly, cities have to ensure that tourism is developed and managed in such a way that it benefits the resident population, does not contribute to the deterioration of the urban environment but rather to its enhancement, and does not become a financial burden to the local authority.

Smarter tourism activities are supporting the high demand by tourists of all sorts as well as problems associated with the handling of these tourists. **Smart solutions include navigation and information systems (combined with booking facilities), virtual information on key attractions, interaction portals enabling exchange of visitors' views and joining common programmes.**

An interesting example of smarter approach to tourism can be witnessed in Italian Venice. The City of Venice launched a mobile phone-based pilot initiative to guide tourists to discover lesser known parts of the city, provide instant information on historical sites and prevent "walking jams". Using a new free Wi-Fi network provided by Venice throughout the city, visitors with a wi-fi enabled mobile device can download an application called TagMyLagoon and use its opportunities. Another example is the Chinese Capitol City Beijing. With a support of private partners its authorities have built a virtual recreation of the architecture and artefacts of the former palace grounds, enabling online visitors to get a first-hand view into imperial China as embodied in the intricate design, history and storied culture of this newly accessible Forbidden City. This virtual city is a first-of-a-kind, fully immersive, three-dimensional virtual world that recreates a visceral sense of space and time of this Chinese cultural treasure -- as it was centuries ago during the height of the Ming and Qing dynasties -- for most anyone with access to the Internet. In Luxor city is transforming the tourist hotspot town to the world's first open air museum. The partner team has worked on assessing and identifying areas of growth of Luxor's core operational systems (people, business, transportation, communication, markets) which are then analyzed to benchmark the city's overall capabilities to better understand. Result is the Luxor Supreme Council's Master Plan 2030, which has driven infrastructural development to make Luxor the World's First Open Air, leveraging its thriving tourism industry.

Such projects can react on the issue of overcrowding and destruction of monuments thus emphasising the importance of sustainable urban tourism. They also help visitors to prepare in advance and hence approaching the seemingly straightforward problem which tourists face in an unfamiliar place – that is what to do and how to do all sorts of activities (sightseeing, relaxing, shopping, visiting friends etc.)

WHAT EUROPEAN RESOURCES ARE AVAILABLE?

EU membership generates important advantages for cities and their metropolitan areas. EU resources are available for urban development and for combating urban problems. The European Union contributes to the sustainable development of urban areas through a range of policies, initiatives and financing mechanisms which cover various areas of activity. In particular, the EU's Cohesion Policy, through the Structural Funds, plays a key role in underpinning the development and revitalisation of Europe's towns and cities. Several other EU programmes, including the Framework Programme for Research and Technological Development and the Competitiveness and Innovation programme also finance measures promoting the sustainable development of our towns and cities. EU policies equally impact upon urban transport and energy efficiency, urban safety, tourism, health, the environment and services to citizens.

COHESION POLICY AND STRUCTURAL FUNDS

Historically the urban dimension was standing alongside the main volume of structural operations. Since the 1990 there have been Urban Pilot Projects. Since 1994, there was the URBAN Community initiative programme that allowed the promotion of integrated local development models.

Whereas during the previous programming period the various Urban initiatives were allocated specific funding, this is not the case during the 2007-2013 period. Following the adoption of the new regulations governing the structural funds, urban development policy has been integrated (mainstreamed) into the cohesion and regional competitiveness and employment objectives thus underlining the importance the Union attaches to this aspect of cohesion policy. Whilst drawing up the National Strategic Reference Frameworks (NSRFs) and Operational Programmes (OPs), **Member States were encouraged but not obliged, to integrate sustainable urban development as a strategic priority.** Member states also have the possibility of delegation of operations to urban authorities; however this possibility has not been utilized. Mainstreaming of Urban Community initiative in current programming period (2007-2013) has also often led to a stronger sectoral focus.

In urban areas the **European Regional Development Funds** (ERDF) provides financial support for:

- investment in infrastructure;
- productive investment which contributes to creating and safeguarding sustainable jobs, mainly through direct aid to investment primarily in small and medium-sized enterprises (SMEs);
- measures which support regional and local development - support for and services to enterprises, in particular SMEs, creation and development of financing instruments such as venture capital, loan and guarantee funds, local development funds, interest subsidies etc.;
- substantial resources are available to support urban development actions, such as networking, cooperation and exchange of experience, also for information measures targeting beneficiaries and the general public.

The **European Social Fund** (ESF) enables:

- Strengthening the role of cities as growth centres to achieve the objectives of the Lisbon strategy;
- Improving employability and governance at the level of urban measures by promoting the role which the municipalities can play;
- Actions aiming to reduce the disparities between towns and neighbourhoods and between the various social groups (youth, women, migrants, ethnic minorities), especially through the promotion of entrepreneurship and the introduction of training programmes;

- Actions aimed at improving capacity building to support the design of efficient and well targeted housing allowances within the social protection system;
- Actions supporting job creation, such as training, in the construction sector for rehabilitation of the social housing stock in urban areas with high concentration of high-rise buildings increasingly seen as stigmatic of poverty and social exclusion.

Chart – Cohesion policy in the EU regions
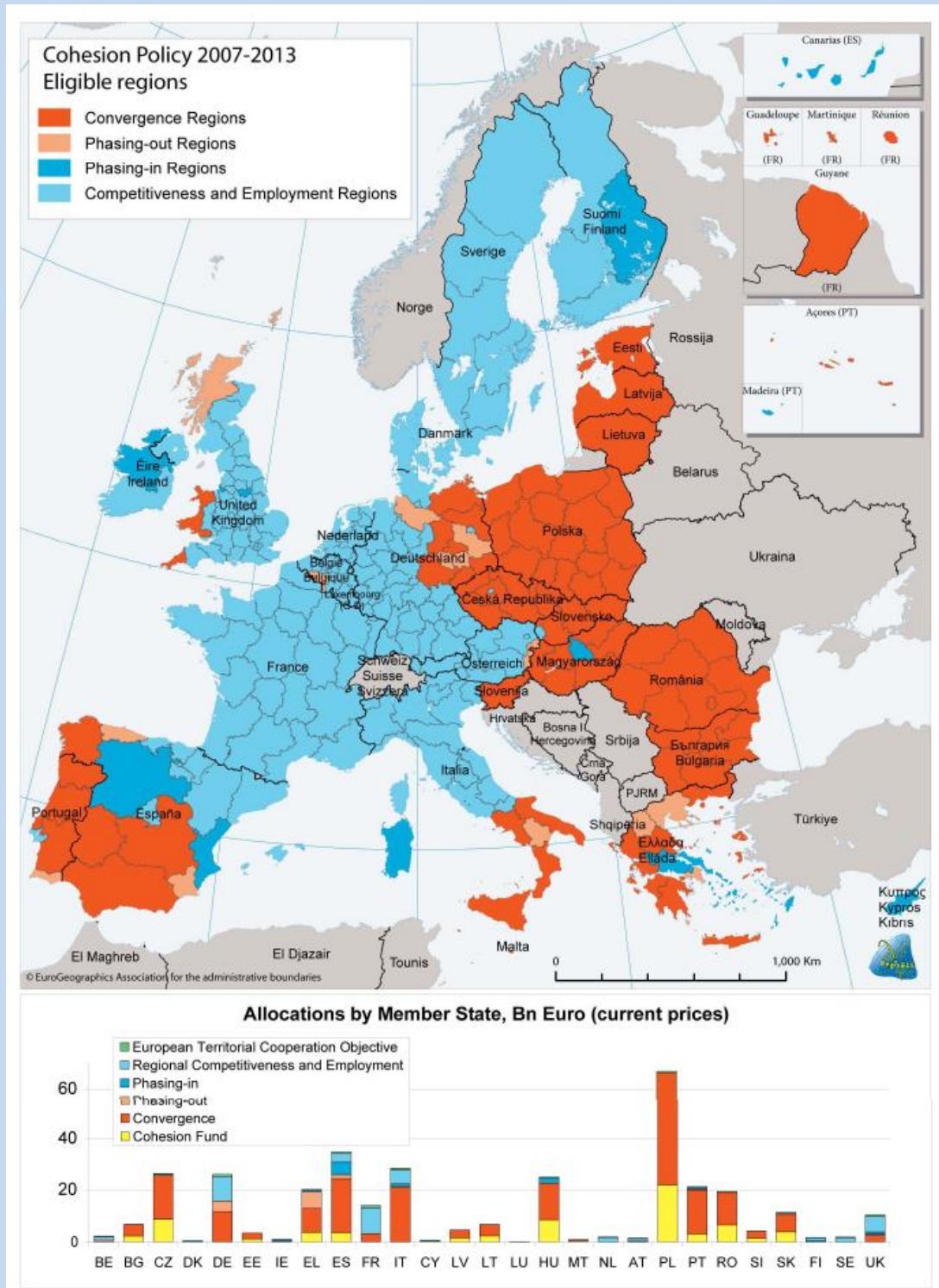
Cities can also rely upon **Cohesion Fund** (CF) that provides support to:

- Infrastructures contributing to the trans-European transport networks (including access to these networks); these investments play a key role in the attractiveness of an urban area by promoting its accessibility and inter-urban mobility.
- Environmental projects fitting within the priorities of EU environmental protection policy (especially in the management and treatment of waste and waste water produced by urban areas), as well as fields relating to sustainable development, such as energy efficiency, renewable energies and transport, including clean urban transport and public transport, traffic management, intermodal transport systems and their interoperability

The current revised regulations permit managing authorities to have recourse to a wide range of public/private partnerships in the management of funds earmarked for urban development. Thus the structural funds may finance an operation of financial engineering such as venture capital funds, guarantee funds or loan funds. The European Commission and the EIB have developed three financial instruments namely, JEREMIE, JASPERS, JESSICA and JASMINE. JESSICA - The Joint European Support for Sustainable Investment in City Areas - represents the greatest interest for urban development. It is aimed at achieving a leverage effect with the financial resources available. The recovered funds must be reinvested in urban development or reallocated to the managing authority for other urban projects. In fact these instruments are at still in the early stages.

EU INNITITIVES AND PILOT PROJECTS

The European Union has a long history of support through various EU initiatives and pilot projects for activities that could broadly be termed smart cities.

One of the EU initiatives that enable cities finance technological investments is the **Framework Programmes for Research and Technological Development** (FPs). Its Information and communication technologies research theme aims to improve the competitiveness of European industry and enable Europe to master and shape the future developments of Information and Communication Technologies (ICT) so that the demands of its society and economy are met. Urban actions may be financed under Integration of technologies (home environments such as buildings and public spaces) and Applications Research (ICT meeting societal challenges, including e-government, e-health and e-inclusion) activities. For example in the mid-1990s, the Telematics for Urban and Rural Areas programme invested around €80m in research activities to develop ICT solutions for cities and other local administrations, as well as a further €55m in a series of larger-scale projects under the Integrated Applications for Digital Sites programme. These produced many successful projects which helped advance new digital solutions for cities.

An integrated approach in the field of urban transport is supported within the **CIVITAS Initiative**. Under the CIVITAS Initiative, the Commission co-funds projects which address energy and transport issues in a coherent manner. The initiative helps cities to achieve more sustainable, clean and energy efficient urban transport systems by implementing, demonstrating and evaluating an ambitious integrated mix of technology and policy-based measures. CIVITAS supports demonstration projects of integrated packages of technology and policy measures in the field of clean and energy efficient urban transport. Each city-led project should combine, in an integrated way, tools and measures from as many as possible of the following categories: increased use of (short/medium term) alternative fuels and clean, energy-efficient vehicles and their integration into the transport system; stimulation of high quality and innovative, energy-efficient collective transport and its integration with other modes; demand management strategies; mobility management; marketing, information and education; safe and secure road infrastructure and means of travel for all users; new mobility services for more energy efficient vehicle use or ownership; less car-dependent lifestyles; energy-efficient urban freight

logistics; new concepts for goods distribution; innovative telematics systems for traffic management and traveller services (Galileo applications).

In recent years European Commission has also supported the promotion and piloting of user-driven open innovation methodologies under the **ICT Policy Support Programme**, part of the **Competitiveness and Innovation Programme** (CIP). Two of the resulting projects are directly relevant to the focus on Smart Cities. Project of thematic Network CO-LLABS promotes the Europe-wide adoption of ICT-based Living Labs services and practices allowing SMEs to improve their innovation capabilities and processes and to become part of open innovation environments. E-health, energy, media, e-business and e-inclusion are among the covered domains. Another project is the Pilot B Project APOLLON that plans to explore further the European dimension of Living Labs through four complementary cross-border Living Lab experiments (in homecare, energy efficiency, manufacturing, and e-participation). The ICT-PSP Work Programme 2010 foresees five Smart Cities pilots.

City administrations themselves, too, have been keen supporters of the digital agenda on the European level. **Telecities**, a forum promoting the use of ICT within cities, was set up in 1993 and has since been instrumental in leading or facilitating several major EU-funded projects. More recently, **EUROCITIES** has set up the Knowledge Society Forum to focus on research, knowledge and innovation issues within city contexts. There are also other platforms such as **MAJORCITIES** that enables a voluntary exchange of ideas, visions and experience between participating cities for the purpose of improving the performance of local government by using information technology and also serves as a lobby group for discussions with public authorities, suppliers of information technology and other relevant organizations at an European level.

CONCLUSION

For centuries, towns, cities and metropolitan areas have shaped European society and civilisation. In the past urban areas were the places where not only economic but also political power was concentrated. At present times high politics is often concentrated on national, state level. However the real power of cities stemming from the fact that economic power is concentrated is still prevails. Hence it comes no surprise that many economists, political scientists and sociologists argue for **stronger role of cities in domestic, European and international politics.** This is also the case of Ward (1976) who in her book "The Home of Man" makes a convincing and passionate plea for a necessary repeated reorientation of our views on the city – place that is the cradle of civilisation, place that must be protected, supported and recognised as the major carrier of socio-economic and cultural progress.

Not only in Europe but worldwide, cities will play an ever-more important role in progressive development. On one hand urban areas are the engines of economic development, on the other they are feeling the strain in terms of congestion, pollution, exclusion and land use. Also unemployment and ageing population are among the most pressing issues European cities need to face. This high density of these challenges makes cities the ideal platform for new digital applications and services. The internet with its services and social networks has become a critical part of our daily life. **Utilization of information and communication technology is essential for cities in meeting the challenges of sustainable economic, social and environmental development**. New technology can also help meet the growing demand for better quality of life within urban settings.

Many cities in Europe and across the world already invest significantly in smart solutions and platforms for internet-based services cutting across application domains. They deploy technologies nearly in all individual areas such as utilities management, transport, public safety, education, social services or tourism as well as in own urban governance. However real massive awareness of possible solutions is still missing. Mayors, local councillors and city officials have many competing demands on their time. **Smart solutions are often complicated but they have to be routed in political reality.** Their utilization in the cities depends on decision makers' perceptions and perceived costs and benefits. Thus it is crucially important to disseminate knowledge and exchange information on best practice of urban regeneration, provide case studies on successful city projects, so that cities can make informed decisions.

Smart cities is also not just an issue for city authorities, multi-level partnerships are needed. Smart cities approach implies integrated urban development based on multi-actor, multi-sector, and multi-level perspectives. Very wide range of organisations need to be involved from IT organizations, telecommunications companies, power utilities, transport operators, health services, to SMEs, universities and research centres, voluntary and third sector organisations, etc. to enable smart services and applications. Strengthened partnership is also necessary with regions and central governments.

Smart city solutions also need to be supported from the EU level. There are all sorts of funds available both administered on the national or regional level and also from Brussels. However EU involvement in urban areas is still week. Support is fragmented, various possibilities such as possibilities of subdelegation or financial ingeneering instruments are not fully utilized. This needs to be changed. **Future European Cohesion Policy must pay more significant respect to cities and adjusting agglomerations in order to enable them to be more instrumented, interconnected and intelligent in all areas of public life. It is also crucial to see the urban dimension within the wider context of European governance.** European cities are instrumental in achieving Union objectives. Therefore smarter development of urban areas should be an integral part of all development policies and funding mechanisms.

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ALBUQUERQUE

BETTER AND FASTER REACTION TO CITIZEN'S REQUESTS

CITY SITUATION:

Albuquerque is the largest city in the state of New Mexico, United States. It is the county seat of Bernalillo County and is situated in the central part of the state, straddling the Rio Grande. The city is the sixth fastest-growing in America. The city population was 521,999 as of 2008, 34th-largest city in the United States.

City leaders and citizens in the city have actively pursued urban projects taken on by cities many times larger which has resulted in the successful revitalization of downtown. With an annual budget of more than US$1 billion, the city provides a wide cross-section of critical municipal services to its residents.
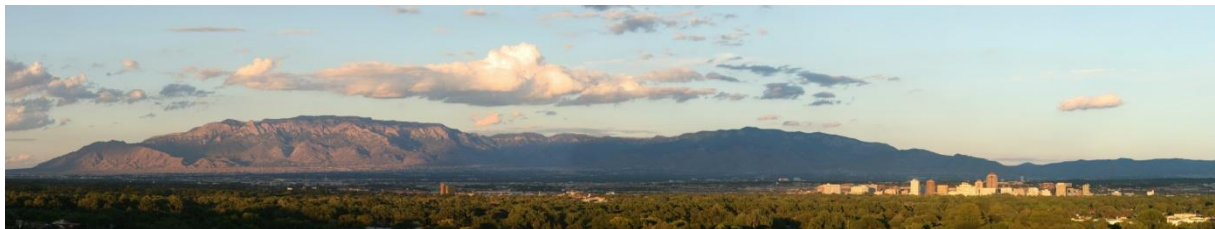
ADDRESSED ISSUE:

Historically, different departments in the City of Albuquerque have maintained a variety of home-grown and off-the-shelf systems to manage data. For example, public safety services, water services, and residential and commercial development planning each captured high volumes of data relating to financial and operational performance. With a mix of enterprise resource planning (ERP), legacy, mainframe and distributed relational database systems, data was spread across various systems and in multiple formats. Officials could not generate their own reports, nor could they consolidate information or share it with other departments without substantial manual effort.

Also although City of Albuquerque officials wanted to convey key data to city residents over the Internet - especially public safety data - they had no solution in place to accomplish this critical task. They realized that a public extranet could be a tall order to fulfil, as the solution would need to be easy to use with minimal training and minimal software maintenance. It would also need to be scalable enough to serve many people simultaneously and quickly.

SOLUTION:

In 1997, the city began overhauling its business intelligence (BI) infrastructure solution so that it could provide effective, efficient reporting, analysis and score carding from a collection of heterogeneous information sources.

For example one of the mayor's goals was to respond to citizen's request concerning graffiti removal in shorter time. Using specific software, responsible city officials were able to create reports that allowed them to see that it previously took two to four days for graffiti to be removed. If a person called the system between midnight and 7 AM, it took on average one day less than if the call came in between 7 AM and midnight

because of where the call landed in the queue. It was subsequently found that the vast majority of graffiti reports came in between 7 AM and 7 PM and they were being delayed 24 hours due to the dispatch time. This new information allowed redeploying the work hours and dispatching times to circulate throughout the day.

TECHNICAL INFORMATION:

The city began overhauling its BI infrastructure, deploying IBM Cognos® Series 7, IBM Cognos ReportNet™ and, most recently, IBM Cognos 8 Business Intelligence software. IBM Cognos Education provided training and implementation services, and ongoing technical support is provided by IBM Cognos Professional Services. The city has standardized on IBM Cognos software to automate data collection and information sharing among its 7,000 employees in more than 20 departments. To provide the right data at the right time, IBM Cognos software accesses information from the city's key applications. The city had all of the requests routed through the PeopleSoft CRM/311 system. In addition, the city has a very large external Web presence that allows vendors to check the payment status for their services, and citizens to look up the contributors of any given campaign. IBM has also helped the city optimize its investment in IBM technologies such as IBM DB2, IBM AS/400, IBM Lotus Domino database and IBM FileNet software.

RESULTS AND BENEFITS:

The new system allowed streamlined data collection, reporting and analysis across all data sources. It has facilitated information sharing, empowering employees to make better decisions and enhancing citizen outreach.

According to Nucleus Research, an independent Wellesley, Massachusetts-based firm that evaluates financial return on IT assets, the City of Albuquerque achieved nearly 2,000 percent return on investment in 2003 from its overall Cognos deployment by reducing administrative overhead and identifying cost-saving opportunities.

FURTHER INFORMATION:

http://www-01.ibm.com/software/success/cssdb.nsf/cs/SANS-7SULT7

http://www.cabq.gov/

"With Cognos, it is now possible for us to use relatively few resources to provide information to a large and diverse audience."

Brian Osterloh

Applications development manager CRM & BI City of Albuquerque

VIRTUAL FORBIDDEN CITY PROMOTING CULTURAL HERITAGE

CITY SITUATION:

Beijing, also known as Peking, is a metropolis in northern China and the capital of the People's Republic of China. Governed as a municipality under direct administration of the central government Beijing is China's second largest city after Shanghai, with more than 17 million people in Beijing's area of jurisdiction.

At the heart of Beijing's historical centre lies the Forbidden City. The Forbidden City was the Chinese imperial palace from the Ming Dynasty to the end of the Qing Dynasty. It now houses the Palace Museum and is the world's largest surviving palace complex and covers 72 ha. The Forbidden City was declared a World Heritage Site in 1987, and is listed by UNESCO as the largest collection of preserved ancient wooden structures in the world.

ADDRESSED ISSUE:

Originally, the Forbidden City was constructed to embody the idea of the emperor as the centre of the universe with a series of dramatic courtyards and gates, buildings and landings underscoring a design built to reinforce security and power. This huge palace complex was completed in 1420, about twelve years after construction began, and contained hundreds of exquisite buildings and historic artefacts. In 2008 it celebrated its 83rd anniversary as a museum and one of China's major cultural attractions. The municipality wanted to promote the museum and thus welcomed the possibility to provide means for a worldwide audience to explore Chinese culture and history.

SOLUTION:

As a Corporate Citizenship project IBM has meticulously built a virtual recreation of the Forbidden City architecture and artefacts of the former palace grounds, enabling online visitors to get a first-hand view into imperial China as embodied in the intricate design, history and storied culture of this newly accessible Forbidden City. The Forbidden City: Beyond Space & Time" is a first-of-a-kind, fully immersive, three-dimensional virtual world that recreates a visceral sense of space and time of this Chinese cultural treasure -- as it was centuries ago during the height of the Ming and Qing dynasties -- for anyone with access to the Internet. Now, using virtual world technology, visitors can experience the awe inspired by this vast and amazing space. Rather than experiencing its wonders in isolation, the virtual Forbidden City allows visitor to see and interact with other users and a range of helpful automated characters. As visitor explores the virtual Forbidden City, s/he can choose to simply observe the buzz of activity, or can take tours and participate in activities that provide insights into important aspects of Qing culture. At the Forbidden City in Beijing, local visitors can also use a kiosk to interact with the virtual world.

TECHNICAL INFORMATION:

This project is the first virtual world to be built using SOA architecture and includes open source components such as Linux. IBM's BladeCenters with Linux Blade Servers are at the heart of this virtual world – supporting robustness with the capability to enable thousands of concurrent users and the scalability comparable to that of massive multiplayer online games. IBM built the application using WebSphere Application Server, Tivoli, ESB (Message Broker), DB2 Viper, and IBM BladeCenters. The virtual world runs on Linux, Windows and Mac operating environments

RESULTS AND BENEFITS:

The recreation of the Forbidden City represents how 3D technology can be used to promote tourism, educate and provide cultural experiences on a large scale. While it provides an immersive and compelling experience in its own right, the Virtual Forbidden City also provides an unequalled way to plan a visit to the Palace Museum in Beijing thus making the tourism in Beijing smarter.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/25379.wss

http://www.beyondspaceandtime.org

"The Forbidden City: Beyond Space & Time' is a program that combines China's world-class cultural heritage with state-of-the-art information technology. Three years in the making, the Palace Museum worked closely with IBM in jointly engineering the program. Both parties have been deeply touched by the profound and dazzling ancient Chinese culture. Meanwhile, we would like to express our sincere gratitude to IBM for its full investment and devotion and its strategy of applying innovative technology to social and cultural promotion. This program is only a start, which, as we believe, will have an unlimited future to explore China's traditional culture."

Zheng Xinmiao

Director-General of The Palace Museum

CHESHIRE

AGENCY DELIVERING PERSON-CENTRIC SOCIAL AND MEDICAL CARE

COUNTY SITUATION:

Cheshire used to be a ceremonial county and former principality in North West England. Cheshire County Council ceased to exist on April 1st 2009 and was split between Cheshire East Council and Cheshire West and Chester Council. The traditional town in this area is the city of Chester, although Cheshire's largest town is Warrington. Apart from the large towns along the River Mersey and the historic city of Chester, it is mostly rural, with a number of small towns and villages that support an agricultural industry. Cheshire's area is 2,343 square kilometers (905 sq mi).

Based on the Census of 2001, the overall population of Cheshire is 673,781. Of those aged over 75 years, 62.9% were female and 37.1% were male.

ADDRESSED ISSUE:

Driven by growing resource constraints and a government mandate, Cheshire County Council sought to coordinate the way its various agencies served its growing senior population. One of the most basic drivers was resource availability, with demand for social services growing as a result of demographic changes and government funding struggling to keep up. In the realm of health and human services, an equally important factor was a growing awareness of the need for continuity to maximize the quality of care that aged, infirm or vulnerable citizens receive. Cheshire County Council's "before" state typified the shortcomings of disconnected social service delivery channels. Each time an agency worker visited a senior citizen at his or her home, the worker was required to fill out his agency's paper-based assessment form in full—from demographic information to that citizen's specific health or mobility needs. That paper form was then stored in a file folder within the agency. If, for any reason, another agency working in Cheshire visited the home—say the fire brigade or emergency medical services—the same process would unfold. Manual, unconnected processes within its agencies stood in the way.

SOLUTION:

Cheshire County Council built a new needs assessment solution that enabled its agencies to function as a single, "virtual" community of providers—and served as the nucleus of a process automation effort. Cheshire County Council worked closely with partners to design a whole new set of standardized assessment processes that are employed by all agencies using the system. When agency employees make their initial visit, they populate a standardized electronic form, which (if the citizen gives approval to share the data) becomes the core of that citizen's profile. On each subsequent visit, from any agency, employees can retrieve and modify that profile as necessary, instead of having to rebuild it from scratch. The automation comes in on the backend.

Based on changes in the profile—such as a recent medical procedure or change in mobility status—the solution automatically flags a citizen as potentially needing one or more additional social services and sends a notification to the appropriate agency for follow-up. Built-in confirmation tools ensure that all agencies and providers fulfill their respective roles.

Among the biggest barriers to small government projects even getting off the ground are the issues of funding and accountability; Cheshire County Council's single assessment process initiative was no exception. IBM was instrumental in resolving this issue by proposing that the solution be deployed as a shared service, hosted and managed by IBM e-business Hosting Services and paid for based on usage levels.

TECHNICAL INFORMATION:

Working with IBM and IBM Business Partner Esprit Ltd., Cheshire County Council developed and implemented a collaborative case management platform and an accompanying set of process improvements. The solution is based on Esprit's ShareCare for e-Enabled Single Assessment Process platform, which combines tight security, flexible device access and advanced forms technology to enable agency workers to create, access and change assessments remotely. The solution runs on IBM WebSphere Application Server and employs IBM Tivoli Access Manager for end user authentication. The solution uses servers IBM System x™ and deploys IBM Global Technology Services e-business Hosting™ Services.

RESULTS AND BENEFITS:

Cheshire County Council, in the UK, was one of the first local authorities to address the government's requirement of a uniform, standardized way to assess the healthcare and social services needs of its senior citizens, known as the Single Assessment Process. The solution resulted in 20 percent reduction in time and cost required to perform in-home senior visits, improved quality and continuity of care by gaining a single seamless view of a citizen's case history, improved ability to proactively manage the course of health and social care for senior citizens, lessened burden for senior citizens to fill gaps in provider or agency records , improved utilisation of health and social care resources and finally reduced administrative costs through improved coordination between healthcare providers and social agencies.

FURTHER INFORMATION:

http://www-01.ibm.com/software/success/cssdb.nsf/CS/JSTS-7HUNPT?OpenDocument&Site=gicss67gov&cty=en_us

http://www.cheshire.gov.uk/

"We needed a provider that could offer us access to broad and deep resources and expertise. IBM's edge was that it had this while at the same time giving us the focus, flexibility and attention you would normally only get from a smaller provider. … We're not only helping Cheshire to be at the leading edge in the way it provides services to its older citizens. With IBM's help and insight, we've also developed a whole new model of how local government can provide services to citizens in an innovative and joined-up way."

Alan Allman

Senior Manager for Business Strategy, Planning and Performance Cheshire County Council

CHICAGO

REDUCING CRIME WITH DIGITAL VIDEO SURVEILLANCE

CITY SITUATION:

Chicago is the third largest city in the United States in terms of population, and with more than 2.8 million people, the largest city in the state of Illinois and the Midwestern United States.

Besides its gangland problems, Chicago saw a major rise in violent crime starting in the late 1960s. Murders in the city peaked first in 1974, with 970 murders when the city's population was over three million and again in 1992, with 943 murders when the city had fewer than three million people. Following 1992, the murder count slowly decreased to 641 in 1999. In 2002, Chicago had fewer number of murders but a significantly higher murder rate than New York or Los Angeles. Chicago was among the first U.S. cities to build an integrated emergency response centre to coordinate the city's response to natural disasters, gang violence, and terrorist attacks.

ADDRESSED ISSUE:

The City of Chicago Office of Emergency Management and Communications (OEMC) manages and operates the city's public safety communications systems that coordinate police, fire and emergency medical services (EMS) responses to 911 calls. The OEMC operates a world-class voice and data radio system, giving police and fire personnel access to valuable information from any location to help them respond quickly to emergency situations. The OEMC wanted to scale its digital video surveillance infrastructure from an initial installation of 250 cameras to more than 3,500 cameras. To support this growth, the organization also needed a storage system that could support a growing amount of high-resolution data and allow OEMC employees to view it from any workstation in the organization's data centre. Further, the OEMC needed a system that could support its long-term goals, which included integrating its surveillance infrastructure with the existing surveillance systems of other city agencies, such as the airport authority and the police department.

SOLUTION:

The city implemented a cost-effective high-resolution video archiving solution that is highly scalable and able to integrate with other city agencies' surveillance systems. The solution enables the client to store high-resolution video surveillance data from cameras installed throughout the city. Installed anti-crime cameras are capable of pinpointing gunshot sounds, calculating where the shots were fired, and pointing and zooming the cameras in the direction of the shots within a two-block radius. City departments use this surveillance data to record and efficiently review potential criminal and/or emergency situations, allowing emergency workers to respond proactively, without waiting for witness emergency phone calls. OEMC staff can quickly and easily access archived material without having to perform time-consuming restoration from backup media, thereby greatly improving staff efficiency. With the new infrastructure in place, the OEMC is able to review recordings and live

video from street cameras on demand, from any location, with archive-review capabilities spanning back 30 days. The organization's recording software provides automated analytics on all previously recorded video for more immediate research results without staff interaction; this includes such granularity as following a car's license plate across covered zones of the city to pinpoint a suspect's route and/or location.

TECHNICAL INFORMATION:

The City of Chicago Office of Emergency Management and Communications engaged IBM Business Partner 411 Solutions International to implement a storage solution from IBM. The organization implemented four IBM System Storage DS4800 devices, each equipped with nine IBM System Storage DS4000 EXP710 expansion drawers. It deployed two of the System Storage devices at its primary production site, using Cisco MDS Director devices to connect them to five IBM System x servers that host video software. An additional System x server runs IBM Director software to manage the client's server and storage environment. A redundant site (located at the OEMC's non-emergency call center) hosts the other two System Storage machines. The OEMC uses the DS4800 device's Enhanced Remote Mirror option to synchronize data between the two sites to improve application availability and to facilitate data recovery. The DS4800 devices have given the client the scalability required to handle both its immediate and projected future storage needs, as well as the throughput needed to support its high-resolution video recording software. The IBM Director software enabled centralized management that allowed the OEMC to consolidate its previously disparate management systems, and it provides alerts when issues occur in any part of the infrastructure.

RESULTS AND BENEFITS:

The solution provides advanced video security with high-resolution cameras, which have far- and wide-ranging viewing capabilities to add situational awareness. It integrates cameras, alarms, sensors, audio and analytics to protect residents and visitors enabling Chicago to significantly improve security

FURTHER INFORMATION:

http://www.cityofchicago.org

http://www.navypier.com

"We consider this to be one of the finest security command centres of its kind in the country. IBM's video monitoring system allows us to better serve and protect a facility that is both a vital economic engine for the City of Chicago and a beloved family destination."

Juan Ochoa

Chief executive Office
MPEA Chicago

CITY SITUATION:

Corpus Christi is a coastal city in the South Texas region of the United States state of Texas. The city population was 277,454 at the 2000 census making it the eighth-largest city in the state.

The City of Corpus Christi provides a variety of facilities and services to its community, including police, fire and emergency, medical services, park, recreation, health services, a natural history museum, libraries, an airport and a marina. It also operates water utility, storm-water utility, wastewater treatment plant, gas utility, recycling, street maintenance, etc.

ADDRESSED ISSUE:

Like most municipal governments, the City of Corpus Christi, Texas strives to improve the quality of life for citizens while keeping operating costs low. When the city staff reviewed its management of water, wastewater, utility and storm water services, it found a system in need of change. Previously, citizen calls were routed to the appropriate department and recorded on index cards before being entered into a spreadsheet. Given the manual nature of this process, the staff could not accurately track how long it took to respond to and fix problems. Additionally, the staff had no way to view the work history for each site, making it difficult to identify recurring problems. There was also no means to spatially analyze work requests. As a result, departments could not easily identify if a customer request represented a site-specific problem or an area-wide issue that would require more extensive support. Greater insight into operations was also needed to help the city identify trends to improve service and optimize efficiency. The city wanted to develop and implement a repair plan to help resolve these ongoing issues and ultimately reduce costs. It needed a cost-effective service management, governance and risk management solution and implementation services.

SOLUTION:

The City implemented a work and asset management system that integrates asset information, work orders, accounting information and geographical data to help staff easily identify recurring problems and actively institute preventative measures. The City regarded the project as a tool that could be used to accomplish the organizational changes needed to better plan and manage work. This includes providing timely response to citizen calls, delivering continuous service and ensuring job completion. Citizen calls are now routed to a citywide call centre where service staff can immediately record and track work orders and view work histories. Standardized location and priority codes help staff deploy resources based on urgency and service level requirements (e.g., maintenance crews must respond to gas leaks within 30 minutes, wastewater backup calls

within four hours and water main breaks within one hour). Leveraging the process automation software capabilities, the City can efficiently manage each job to completion. If the Water Department tears up a street to fix a water main, a "child" work order is automatically created for the Streets Department to patch the street. Additionally, staff can accurately measure the elapsed time for each job and associated work order and track it against the City's service level agreements (SLAs). Automated notifications are sent to City managers via their BlackBerrys so they can keep an eye on critical issues such as wastewater manhole overflows or water main breaks. Because software is integrated with the City's geographic information system from ESRI, City staff can spatially view problem areas and planned work. This has helped service staff to avoid creating duplicate requests and better inform citizens of work in their area. It has also enabled departmental staff to proactively identify areas with serious infrastructure problems. For example the Wastewater Department found that many wastewater backups were not caused by rain, signalling an issue with the pipes themselves. Staff members then used the spatial analysis capabilities to pinpoint which areas experienced problems in dry weather and implement a repair strategy.

TECHNICAL INFORMATION:

Working with IBM Business Partner EMA, the City of Corpus Christi implemented IBM Maximo Asset Management to gain the visibility, control and automation it needed to link work to City strategy and SLAs. The solution is integrated with the organization's global information system and financial accounting system to provide the 360-degree view required to improve resource utilization, enhance response times and accurately track costs. As part of the solution implementation, IBM integrated IBM Maximo Asset Management software with the city's financial accounting system from PeopleSoft. This integration helped the staff accurately track departmental costs as well as staffing needs. With the IBM Maximo software, the staff can track costs separately and use the information to apply for federal funding when available. The Maximo software provided a significant portion of the data required to rate services against the city's Balanced Scorecard (BSC) initiative. This program measures the city's operations in four areas: customer service, financial management, process efficiency and sustainability.

RESULTS AND BENEFITS:

The system manages approximately 1,250 miles of wastewater gravity mains, 6 wastewater treatment plants, a water treatment plant with 170 million gallons a day capacity, 1,500 miles of water mains, 1,100 miles of streets, 80,000 utility customers and a gas distribution system. Improved customer service and satisfaction has been one of the biggest benefits. The system enabled increased percentage of customers experiencing continuous service. It also enabled ability to share information on work performed and work needed across the entire organization using a single database. New insight into operations increased the ratio of planned work to reactive work and enabled staff to proactively adjust work frequencies to prevent service interruptions. The ability to spatially analyze work improved resource utilization and helped maintenance crews more quickly respond to citizen calls.

FURTHER INFORMATION:

http://www.cctexas.com/

"Improved customer service is the biggest benefit of Maximo. Maximo software has been vital in helping us meet our SLAs, plan work and determine labor requirements to provide a timely response."

Stephen Klepper

Administrative Superintendent
City of Corpus Christi, Texas

DUBUQUE

REDUCING WASTE WITH SYSTEM OF SENSITIVE WATER METERS

CITY SITUATION:

Dubuque is a city in and the county seat of Dubuque County, Iowa, United States, located along the Mississippi River. In 2008 its population was estimated at 57,250, making it the eighth-largest city in the state.

The city is committed to using technology to reduce its impact on the environment while still delivering the services residents need. In recent years, Dubuque's economy has grown very rapidly. In fact, in 2005, the city had the 22nd-highest job growth rate in the nation, far outpacing the rest of Iowa. Dubuque has received a number of special designations. In April 2007, the city was voted 15th in the "Best Small Places For Business and Careers" ranking by Forbes Magazine. In June 2007, Dubuque won the All-America City Award, one of 10 cities nationally to do so. It was named the "most liveable small city" in the country by the United States Conference of Mayors in 2008.

ADDRESSED ISSUE:

Dubuque was looking for ways to reduce its impact on the environment and fulfil a commitment to sustainability—while still delivering the services residents need. To satisfy both goals, Dubuque needed accurate information on resource distribution and consumption, and a way to enlist the help of citizens by notifying them quickly of instances where resources are being wasted so that corrective action can be taken. City officials wanted to build a pilot platform for Integrated Sustainability Management that could be replicated and used by other small cities.

SOLUTION:

The city implemented a water meter replacement project to precisely measure water flow and built a platform for real-time integrated sustainability monitoring to provide an integrated view of its energy management, including energy consumed by the electric grid, water system and general city services. The first phase of the initiative included a project to enhance the city's and its citizens' understanding of their water consumption and management in order to reduce costs and the overall consumption footprint. Then the city implemented a US$850,000 citywide water meter replacement project and has worked with a local manufacturer A.Y. McDonald to integrate a device called an unmeasured flow reducer (UFR). This device is designed to augment every water meter in providing the most accurate measurement possible during low-flow use. According to surveys, 30 percent of households have water leaks (leaky faucet, toilet, etc.). The new system will allow consumers and the city water department to identify waste and promote changed behavior, which will translate into better water utilization and energy savings. The monitoring and alerting system is connected to

city management and consumers via the Internet to facilitate rapid, accurate, low-cost communication. New, smarter systems will analyze data collected from more-sensitive water meters and other devices to alert consumers via the Internet about such resource issues as water waste and enable them to take corrective measures. As part of the water meter replacement project, the city is creating a rebate program for costs associated with repairing leaks identified by the new metering system. The goal of the project is to develop and pilot a systematic mechanism to give consumers and businesses the information they need to make informed decisions about how they consume resources like electricity, water, natural gas and oil. A planned energy component will follow a similar process of using meters to track usage.

TECHNICAL INFORMATION:

Dubuque city implements IBM Cognos 8 BI, DB2 9.5 for Linux UNIX and Windows and InfoSphere Information Server software and IBM WebSphere Application Server software. IBM Research is building a prototype to help it create a new, smarter system.

RESULTS AND BENEFITS:

The project provided an integrated view of water management. It enables city to notify residents of sources of energy waste so they can take corrective action, it reduces energy costs and the city's overall carbon footprint and finally promotes sustainability by enabling cities to build energy monitoring systems that help citizens use energy more efficiently. The overall project results led to lower costs and resource savings.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/28420.wss

http://www.cityofdubuque.org/

"I'm extremely confident this will help people save money. A lot of this is changing peoples' behavior, giving them the information to make smarter decisions about electricity and water use."

Roy D. Buol

City Mayor
Dubuque

EINDHOVEN

STRATEGY TO REDUCE TRAFFIC CONGESTION USING A FEE-BASED TRAFFIC MANAGEMENT SYSTEM

CITY SITUATION:

The City of Eindhoven is located in the North Brabant province in the southern region of the Netherlands. As of 2009, the population of Eindhoven consisted of 212,269 persons; the metropolitan area had nearly 750,000 inhabitants.

Eindhoven is easily accessible by road, rail and air. Being at the intersection of highways, it is situated in a very central position in relation to other large cities like Amsterdam, Rotterdam, Antwerp, Brussels or Düsseldorf. There were more than 86,000 private cars in Eindhoven at the end of the year 2004. Similar to the rest of the Netherlands private transportation in Eindhoven is often congested with traffic jams. On contrary public transportation in Eindhoven is well organized. It consists of almost 25 city bus lines and is linked to regional buses. The bus companies transported a total of 14,300,000 passengers a year. Eindhoven is also a rail transport hub. On an standard working day, an average of 44,500 passengers boarded or left trains at one of the two Eindhoven stations.

ADDRESSED ISSUE:

Taking steps to address its own traffic concerns, the City of Eindhoven had begun to evaluate potential congestion management plans. The City of Eindhoven wanted to launch a fee-based traffic system that could influence traffic patterns and encourage citizens to adjust their travel plans to avoid congested areas.

SOLUTION:

Launching a pilot program the city put in place a vehicle tracking system that monitors the length, distance, pollution generated and route of any travel and automatically assesses appropriate taxes and fees. The new system assigns a fee based on road type, time of day, and the environmental characteristics of the routes driven. The solution uses onboard units to track vehicle locations. Drivers can easily view these dashboard-mounted devices to monitor their trip costs. In addition, drivers can visit a public Web site to view past trip summaries and effectively monitor their driving habits. The site also helps users identify alternate routes or driving strategies that will help reduce costs. This information is displayed to motorists in a clear and easy to understand way.

TECHNICAL INFORMATION:

The solution is based on an On Board Unit, developed by NXP in collaboration with CPS Europe, contains the NXP ATOP chip. This chip contains a GPS receiver that determines the vehicle's location through wireless communication, with optimal privacy. Using the mobile GPRS network, it continually feeds the car's location to an IBM back-office system running in an IBM cloud computing platform. The IBM back-office system calculates the exact route driven including distances travelled on each road type and within predefined zones. The system then calculates the cost of the journey using a rules engine borrowed from the Telecommunications industry. All information is subsequently published to a public Web site.

RESULTS AND BENEFITS:

In the pilot project 70 percent of drivers have changed their behaviour to avoid rush-hour travel when presented with the right incentives. Hence the project shows that road pricing systems can have a positive effect on driving habits and help alleviate traffic. Pilot project is supposed to be expanded to the larger nation; as a result of that more than 12 million vehicles will be equipped with the onboard monitoring units, and the solution will monitor roughly 135,000 kilometres of road. In the Netherlands, once fully implemented, the Price per Kilometer (De kilometerprijs) system is expected to achieve 58 percent reduction in delays caused by traffic jams, 15 percent reduction in the total number of kilometres driven annually, 10 percent reduction in CO_2 emissions and 6 percent increase in total passenger kilometres via public transportation. As a result of the nationwide scheme it is estimated that more than 50 percent of Dutch households will pay less than they do currently for the motor vehicle tax and vehicle purchase tax.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/29507.wss

http://www-03.ibm.com/press/us/en/pressrelease/27842.wss

http://www.verkeerenwaterstaat.nl/onderwerpen/mobiliteit_en_bereikbaarheid/kilometerprijs/index.aspx

http://www.eindhoven.eu/

"The results of our GPS based solution in Eindhoven show that nationwide implementation of road user charging is feasible. …Smart traffic and transportation systems have tremendous potential to reduce traffic congestion, contribute to a cleaner environment with reduced carbon dioxide and small particles emissions."

*Eric-Mark Huitema*
Mobility executive
IBM

COUNTY SITUATION:

Mobile County is a county of the United States state of Alabama. As of 2009, its population was 411,721. Its county seat is Mobile, Alabama. Mobile County is governed by a three-member county commission. Each commissioner represents a district and is elected by the voters of that district to serve a four-year term.

In the county the population under the age of 18 formed 27.5 %. All of the public schools in Mobile County, with the exception of Saraland city schools, are operated by the Mobile County Public School System (MCPSS). MCPSS is the largest school district in Alabama and the 56th largest school system in the United States, with an enrollment of over 63,000 students in 95 schools covering 10 incorporated cities. All MCPSS schools are required to adopt school uniform policies.
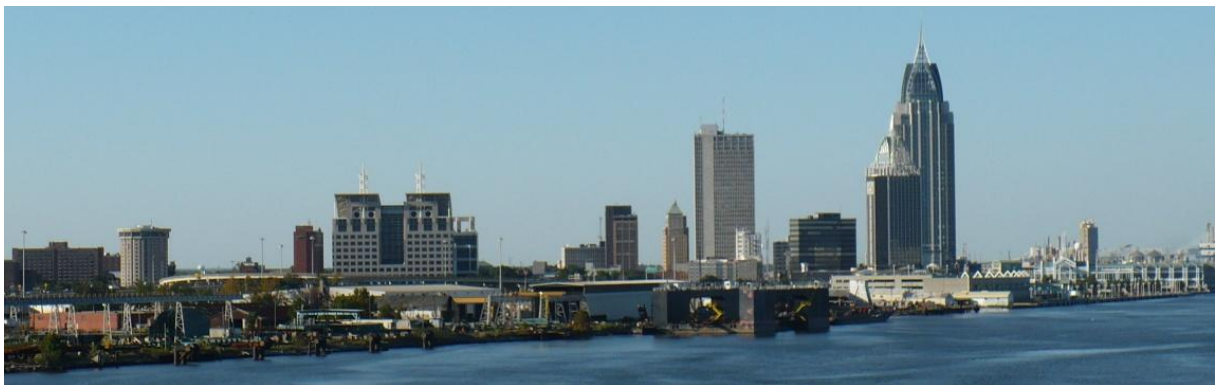
ADDRESSED ISSUE:

Committed to fulfilling national education standards, MCPSS officials found it difficult to tap into their vast student information stores using their previous reporting system. Information for each academic year was in three separate physical databases. Rendering reports was a time-consuming, complex process that provided limited insight into student performance that was often out-of-date or inaccurate. School administrators had to wait for quarterly reports, which arrived too late in some cases to flag at-risk students before they got into trouble or dropped out of school.

SOLUTION:

Mobile County Public Schools has opted for analytics technology to improve its student performance management practices. In collaboration with IBM business partner DecisionEd Group, MCPSS introduced a system that delivers accurate analytics for up to 5,000 users across the school district, including central office administrators, principals, guidance counselors and teachers.

Customizable dashboards are giving the users access to up-to-date reports and measures, offering them the transparency they need to quickly and effectively gauge how well their schools are delivering education programs, and monitor the entire academic lifecycle of each student, including class attendance, grades, interventions and any special educational requirements. With information in hand, teachers can then tap into

the school district's Teacher Resource for Instructional Planning (TRIP) website, access special lesson plans and individualize instruction according to each student's needs, while still protecting confidentiality.

School district executives are particularly focused on tracking students who are at risk of dropping out of school. A set of notifiers built into the system proactively alert the proper personnel once a student has crossed specific "At Risk" thresholds, such as absenteeism and grade levels. With this advanced warning system, school officials are be able to focus on preventing or resolving issues before they escalate, helping steer students on the right path and monitoring their progress moving forward.

Top Five Discipline Infractions

Incident Type	2007	2008
Failure to Comply (Type = R)	15,121	7,866
Insubordination(Failure to comply) (Type = G)	11,175	5,481
Disturbing class (Type = R)	8,105	2,869
Tardy (Type = R)	5,525	2,399
Skip class/truancy (Type = G)	4,557	1,508

Top Five Discipline Actions

Action Taken	2007	2008
Warning/Reprimand (Severity = 1)	3,592	1,447
Expectation Restated (Severity = 1)	2,414	742
Phone Call to Parent (Severity = 1)	2,013	791
Time Out in Classroom (Severity = 1)	1,598	711
Suspension	1,485	637

Percent of Student Meeting AYP for Student Performance

*Data item has been suppressed for privacy		ELL/LEP/ESE Met AYP	FRE Met AYP	ESE Met AYP	African American Met AYP	Asian/Pacific Islander Met AYP	Caucasian Met AYP	Hispanic Met AYP	Multiracial Met AYP	Native American Met AYP
West	ELA	36.2%	53.5%	17.8%	46.8%	75.3%	63.2%	52.4%	68.2%	73.3%
	MATH	51.3%	54.8%	27.2%	49.3%	73.6%	56.1%	61.0%	64.4%	76.9%
	SCIENCE	21.4%	28.6%	15.2%	21.6%	52.2%	49.8%	35.8%	44.5%	100.0%
Northeast	ELA	26.2%	51.5%	18.8%	46.0%	71.4%	58.8%	45.8%	62.4%	69.6%
	MATH	40.6%	49.8%	23.8%	42.2%	80.0%	58.8%	50.3%	60.6%	60.0%
	SCIENCE	12.5%	29.5%	17.0%	24.4%	60.0%	46.6%	23.1%	45.9%	57.1%
South	ELA	25.8%	50.5%	16.0%	38.9%	56.8%	55.0%	47.0%	61.2%	56.5%
	MATH	44.5%	53.5%	26.2%	39.9%	61.7%	59.7%	53.0%	65.5%	63.6%

TECHNICAL INFORMATION:

The solution is based on IBM Cognos Business Intelligence software, deployed in a relational database environment. Cognos BI produces customizable dashboards that give administrators and teachers up-to-date reports and measures.

RESULTS AND BENEFITS:

Used analytics and business intelligence also expected to help MCPSS comply with transparency and reporting mandates. This smarter system also ensures that schools do not bear the education burden alone. MCPSS partners with the Mobile County District Attorney's Office on a number of special joint education initiatives, including the Early Warning Truancy Program, and the Multiple Education Pathways Blueprint Initiative, which is designed to help connect high school dropouts to alternative learning opportunities.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/27984.wss

http://www.mcpss.com/

http://www.mcpss.com/Download.asp?L=2&LMID=181390&PN=DocumentUploads&DivisionID=2140&DepartmentID=4439&SubDepartmentID=&SubP=&Act=Download&T=1&I=61002

"Mobile County Public Schools has an important mandate to fulfill - one that plays a critical role in the development of every student in our school system. To ensure that each student learns to high standards, we needed a smart system in place where we could easily access and share real-time student information and identify where we are successful, and where we are not meeting the needs of our students. Through invaluable information insights delivered by IBM technology, we move closer to fulfilling our mission of graduating citizens who are prepared with the skills they need for the 21st century."

David K. Akridge

Executive manager of IT services
Mobile County Public Schools

CITY SITUATION:

New York is the most populous city in the United States, and the centre of the New York metropolitan area, which is one of the most populous urban areas in the world. Located on a large natural harbour on the Atlantic coast of the North-eastern United States, the city population estimates exceed 8.3 million people. The New York metropolitan area's population is also the nation's largest, estimated at 19.1 million people.

At the beginning of this century New York City had one of the worst crime rates in the United States and was ranked 197th in crime among the 216 United States cities with populations greater than 100,000. However since 2005 the city has had the lowest crime rate among the 25 largest United States cities, having become significantly safer after a spike in crime in the 1980s and early 1990s from the crack epidemic that affected many neighbourhoods. Violent crime in New York City decreased more than 75% from 1993 to 2005 and continued decreasing during periods when the nation as a whole saw increases. Some sociologists and criminologists attribute this phenomenon to new tactics used by the New York City Police Department, including its use of CompStat and the broken windows theory.

ADDRESSED ISSUE:

The New York City Police Department (NYPD), the largest police department in the United States, has primary responsibility for law enforcement and investigation within the five boroughs of New York City. The NYPD, that has approximately 37,000 sworn officers, recognized that to more effectively solve and prevent crimes, it needed to provide information to key users—from precinct detectives to crime analysts to department leadership—more holistically, thus strengthening their ability to synthesize various bits of information into actionable intelligence. The NYPD was determined to reduce time of exchange of information by fundamentally transforming the way crime information is managed and exploited.

SOLUTION:

To frame and execute its transformation strategy, NYPD engaged IBM Business Consulting Services. IBM's first move was to conduct a thorough user study designed to identify the information elements needed at every level of the department and from it establish the solution's high-level business requirements. From them, the team produced a conceptual design of the solution as well as a new underlying data model to facilitate the

integration of information from the department's many systems. The solution that came out of this process, known as the Crime Information Warehouse (CIW), provides a single, easy-to-use point of

access to data on virtually all crimes committed in NY's five boroughs. Using the real time information officers and analysts in the Real Time Crime Center can detect crime patterns as they are forming, enabling precinct commanders to take proactive measures to keep ahead of these trends—and head off spikes in criminal activity.

TECHNICAL INFORMATION:

The CIW solution provides the information foundation for the NYPD's state-of-the-art Real Time Crime Center. Using business intelligence software from IBM Business Partner Cognos, along with GIS mapping and visualization tools, in the backend, the solution pulls data from various standalone systems, transforms it to the new data model format and integrates it on the Crime Information Warehouse (CIW). The solution's core technology, IBM DB2 Universal Database Data Warehouse Edition, runs on an IBM System p5 575. The CIW is backed up in realtime on an IBM TotalStorage DSS800 storage server running IBM DB2 Personal Edition software, IBM WebSphere Portal Enable, IBM Tivoli Storage Manager and IBM WebSphere Application Server V6 software.

RESULTS AND BENEFITS:

Having replaced its siloed systems with a common crime data repository, the NYPD is now able to do far more with the information, systems and processes that it already had in place. The city's Real Time Crime Center system can quickly query millions of pieces of information to uncover previously unknown data relationships and points of connection. It is supporting the more proactive policing tactics by virtue of an ability to see crime trends as they are happening and allows faster and higher rate of case-closing through more efficient gathering and analysis of crime-related data. Integrated crime information analysis, delivered in real time (reports that could take weeks or months are now available instantly), has helped improve public safety, with a 27% drop in crime since 2001.

FURTHER INFORMATION:

http://www.nyc.gov/html/nypd/home.html

"The NYPD's innovative policing strategies depend on our ability to gather, share and act on information. IBM—its people, partners and technology—have helped us redefine how information can be used to fight crime. …There's no substitute for interacting with people to solve cases. Our goal is to make the process more efficient: instead of having to talk with 10 different investigators in different parts of the city, they'll have to talk with two. That's a lot more time available to solve cases."

James Onalfo

Chief Architect and CIO
NYPD

PARMA

NEW GOVERNANCE SYSTEM INCLUDING A VIRTUAL CITY OFFICIAL

CITY SITUATION:

Parma is a city in the Italian region of Emilia-Romagna famous for its architecture and the fine countryside around it. It is the home of the University of Parma, one of the oldest universities in the world. In 2007, there were 177,069 people residing in Parma located in the province of Parma.

It has been historically marked by the enlightened government of Maria Luigia, the wife of Napoleon, when it was the capital of the Duchy of Parma, Piacenza and Guastalla.

ADDRESSED ISSUE:

This city's management was planning citizen-focused innovations that would provide new "intelligence" for existing infrastructure to optimize resources and improve services to citizens and businesses.

SOLUTION:

The city has entered into a strategic initiative with IBM with the aim of creating a Smart City. IBM consultants served on an Innovation Board to identify and design a new model for a sustainable city through a range of digital solutions. Initial projects in this city include a virtual teller in several locations around the city. Citizens will be able to interact with the municipality as if there is a municipal official in front of them, delivering and receiving documents and checks, filling in and signing forms, and requesting support.

Such a system is known in Italy from the banking sector where live teller interacts with consumers at the kiosk via a video monitor. A webcam set up at a live teller's workspace connects that teller with a customer at the kiosk. The virtual bank teller appears on a screen and can help customers to fill out and sign forms and provide support and provide specialized advice. This enables more efficient utilization of staff, because tellers at remote locations can be called into service.

TECHNICAL INFORMATION:

This project uses following solutions: IBM Global Business Services (GBS Strategy and Change: Business Strategy, Operations Strategy, Organization Change Strategy) and IBM Global Technology Services (Integrated Technology Services: Unified Communications & Collaboration & the Mobile Enterprise; Integrated Communications: Mobility & Wireless, Network Integration).

The solution in the banking sector is based on the following applications. On the operator's desktop, a J2EE application is installed to remotely control the virtual teller, the audio/video stream and the remote devices," Di Pace explains. "This application runs on the operator's desktop as a toolbar, so the operator will work on his actual teller window. Working in this way, no integration is needed with the core banking application.

RESULTS AND BENEFITS:

Parma is one of six Italian Cities which have agreed on a common protocol on IT innovation, and is the first to initiate the project. The benefits of teller-assisted kiosks for cities range from improved staffing efficiencies to stronger security. Such a technology can make the local service delivery systems and infrastructure more intelligent and efficient.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/27145.wss

http://www.comune.parma.it/portal/page?_pageid=205,1&_dad=portal&_schema=PORTAL

"This strategic initiative, signed with IBM, allows us to create an Innovation Board. This Board has the mission of finding innovative citizen services solutions leveraging new technologies: from info-mobility to security, to social services. We are the first town in Italy to engage in this innitiative with IBM and this puts Parma in the network of Europe's most innovative capitals, like Stockholm and London."

Pietro Vignali

Mayor
Parma

PILSEN

SMARTER GOVERNANCE OF MUNICIPAL RESOURCES

CITY SITUATION:

Plzeň is a city in western Bohemia in the Czech Republic. It is the capital of the Plzeň Region and the fourth most populous city in the Czech Republic. It has 173 932 inhabitants, together with suburban areas over 200 thousands.

Pilsen is known as an industrial town (in large factory halls of Škoda company vehicles and industrial machinery are manufactured) and the centre of brewery (Pilsner Urquell and Gambrinus). Plzeň is also important center of Czech railway transport, crossing of 5 main railway lines. The Plzeň metropolitan area is largely served by a network of trams, trolleybuses and buses operated by the Pilsen Urban Transport Company.

ADDRESSED ISSUE:

Optimization and efficiency of spending of the city are among the fundamental principles applied in the management of each entity. Striking the right balance of revenue efficiency and budget expenditures of the city, moreover, supported by sufficiently transparent information about the activities of the city, are important targets on which city of Plzen wanted to focus.

SOLUTION:

In November 2008 Administration Office of the City of Pilsen (SITMP) implemented new functionalities within the SAP system for the City's internal processes such as the planning, monitoring and assessment of the city's budget. In Jul 2009 IBM and the ICT Administration Office of the City of Pilsen (SITMP) have concluded a four-year contract, based on which IBM will participate in the strategic development of the information system for the City of Pilsen. The new system will bring benefits to the city, its subsidiary companies, other municipality-funded organizations and the citizens of Pilsen. The first stage of the new project is the implementation of the city's Human Resource management system, which supports the city, its districts and the municipal police. The project will help to increase the efficiency of HR and payroll processes, improve management of education and training programs and increase the security of HR data. Another goal of the collaboration is to leverage the information system to boost the business activities of Pilsen Urban Transport Company Inc., a subsidiary company of the city of Pilsen, which provides urban transportation services for the citizens of the city.

TECHNICAL INFORMATION:

The new information system is based on software from SAP. Within the budgeting part of the project new components of SAP FM-BCS (Funds Management – Budget Control System) were implemented. An adjustment of the SAP modules (FI, CO, PS, MM, PM) was conducted, data were migrated from the original components in the structures of the new components of FM-BCS.

Within the HR management part SAP HCM module for the municipality of Pilsen, offices of its boroughs and city police in the areas of human resources development and training activities was implemented. It enables processing and calculation of salaries, negative time recording and use of selected scenarios of managerial and employee portal.

In the part dedicated to SAP development in Pilsen Urban Transport Company SAP HCM module for the personnel administration, organizational management, training, processing fees, and employee benefits will be implemented. Apart from that SAP modules FI / SD, including for example the approval of incoming invoices to the SAP Portal, SAP MM module, including functionality such as bar codes in warehouses for inventory tracking and inventory records or clothing and protective equipment, SAP HCM module for the planning and maintenance management modules CO / PS for controlling and managing investment projects, SAP MM module, and a portal for entry requirements for order processing, management of budgets and selection procedures will be introduced.

RESULTS AND BENEFITS:

New IT infrastructure will bring increased efficiency to Pilsen municipality and support introduction of e-Government services. It is supposed to lead to more user-friendly and simpler system administration, increased system security and easier maintenance of information system. Activities in the field of Human Resource management will enable streamlining staffing and training processes and data entry processes for calculating salaries (attendance, illness, vacation, working. travel, etc.). The part applied at Pilsen Urban Transport Company Inc should enable effective planning and maintenance of various means of transport (trams, trolleys, buses), easier planning, monitoring and evaluating the cost of their repair process more efficient support of central purchasing and tendering including extensive support of managerial decision. Overall information technologies should improve the efficiency of the city's internal processes and provide better access to information and public services for the 170,000 citizens of Pilsen.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/27900.wss

http://www.sitmp.cz/

"We need to ensure standard public services, we need to address the consequences of the crisis and we must ensure that strategic investments in future development. How can we do that? Here we have tested the way that works - trying to streamline our services through so-called smart technology. We can thus address old problems with new ways. However, to achieve efficiency, quality and economy we must first invest."

Pavel Rödl

Mayor
City of Pilsen

ROTTERDAM

RESPONDING TO CHANGES IN WATER CONDITIONS, FLOOD AND DROUGHT THREATS

CITY SITUATION:

Rotterdam is a city and municipality in the Dutch province of South Holland, situated in the west of the Netherlands. The municipality is the second largest in the country, with a population of 589,615 as of 2009.

Rotterdam is on the banks of the river Nieuwe Maas, one of the channels in the delta formed by the Rhine and Meuse rivers. Built mostly behind dikes, large parts of the Rotterdam are below sea level. For instance, the Prins Alexander Polder in the northeast of Rotterdam extends 6 meters below sea level, or rather below Normaal Amsterdams Peil (NAP). The port of Rotterdam is the largest in Europe.

ADDRESSED ISSUE:

As climate change makes rising waters increasingly inevitable, water management is among the crucial challenges of the City of Rotterdam. The city has built a strong history of water management. Rotterdam has taken considerable measures to be able to work toward water management and climate proofing, yet most of its water management solutions are point solutions that have been developed over time. The city was seeking to become Climate Proof in order to be able to withstand shifts or changes in climate. Together with other initiators, Port of Rotterdam, Deltalinqs, and DCMR Environmental Protection Agency, the city wanted to improve the climate by a fifty per cent reduction of CO_2 emissions for the benefit of local people, the environment, and the economy. There are over 60 projects planned or already in execution that will have some effect on the climate adaptation of Rotterdam. Yet, the city did not have a holistic view of the aggregate effect of the projects or the goals that are being pursued.
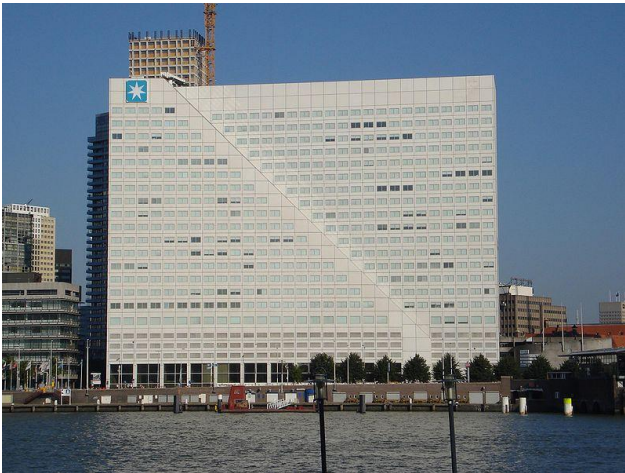
SOLUTION:

The city of Rotterdam is collaborating with IBM on the design and testing of a monitoring and forecasting system for smarter water and energy management. The system, managed through an intuitive dashboard, will collect and analyze real-time data on the rivers, ocean, weather, and more, creating the world's first Smart Delta City. Rotterdam aims to transform into the first Smart Delta City – a city that utilizes real-world, real-time operational information to manage infrastructure and operations related to the effects of climate change in a dynamic, complex natural water system. The Smart Delta system's information portal will enable officials and professionals to more quickly and effectively respond to concerns such as flood and drought threats, safety or accessibility issues, and changes in water conditions that could harm fish and other aquatic life. The platform allows easy cross silo data exchange. Measurement data that one party has can easily be shared so others can make use of the existing data. An ecosystem will form of parties supplying data, parties using data, parties

doing smart things with that data to create other useful information which they can feed into the system (for a fee, or for free). When implemented, a sensor data integration platform will allow the different parties who measure parameters. These parties would then be able to plug-in their data into a data integration platform, making it very easy for other parties to access that data and use it in their decision making and business rules.

TECHNICAL INFORMATION:

IBM Global Business Services (GBS) has delivered two studies which pave the way to the implementation of the data integration platform. The first analyzed the efficacy and the feasibility of implementing a sensor network. The second study focused on the creation of a dashboard that will provide information about climate situations and help the City of Rotterdam measure and evaluate its level of climate proofing. The City of Rotterdam is building a floating Pavilion which will be finished before May 2010. IBM is in negotiation to make this Pavilion a smart Pavilion. To accomplish this IBM will implement several Maximo and Tivoli software packages (Maximo Enterprise Asset Management, Maximo Zaset Navigator, Tivoli Monitoring), which we hope to run on System x for Windows OS.

RESULTS AND BENEFITS:

Rotterdam can use its Smart Delta capabilities to evaluate flood and drought threats, safety issues, and changes in water conditions. The solution is beneficial not only for the purposes of public safety but it is also business supportive (it can for example monitor water conditions that could hurt fish and inform local fisherman). Using more relevant context and compatible data Rotterdam will be able to base decisions on (strategic and operational) means. This will mean that resources are deployed in a more efficient and effective way and as a result fewer resources will be used. Branding itself as a Smart Delta City can help Rotterdam communicate its expertise in the water management.

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/27790.wss

"We are committed to reducing carbon dioxide by 50 percent and reaching a climate adaptive situation while also strengthening our region's economic condition by 2025 …To reach these goals, we have defined a holistic approach to climate change and water management, considering economic and spatial planning factors in the decision-making process. This collaboration is important to help Rotterdam evolve to a Smart Delta City."

Paula Verhoeven

Climate Office Director
Rotterdam

CITY SITUATION:

Somerset is a county in South West England. The county government, known as Somerset County Council, serves more than 500,000 residents. The county town of Somerset is Taunton, which is in the south of the county. The town, including its suburbs, had an estimated population of 61,400 in 2001.

Somerset is a rural county of rolling hills such as the Mendip Hills, Quantock Hills and Exmoor National Park, and large flat expanses of land including the Somerset Levels. Agriculture is a major business in the county. Farming of sheep and cattle, including for wool and the county's famous cheeses (most notably Cheddar), are traditional and contemporary. Unemployment is lower than the national average, and the largest employment sectors are retail, manufacturing, tourism, and health and social care.

ADDRESSED ISSUE:

Faced with rising costs, an economic downturn, aging technology infrastructures, and growing gaps between service expectation and affordable delivery, three public-sector entities in the UK (Somerset County Council, Taunton Deane Borough Council, and Avon and Somerset Police) wanted to cooperate more closely and produce better results within their existing capacities. Several key drivers brought the three agencies into the joint venture. One of the biggest was the desire to transform the way they deliver services. They were looking for more efficiency, lower costs and better service for the public. Budget constraints made all these things critically important.

SOLUTION:

The three public-sector bodies took an unprecedented step toward the governance model of the future: innovative collaboration. After months of negotiations, Southwest One began providing services for the two councils in November 2007. The police department later joined as the fourth partner, with service delivery commencing in June 2008. These authorities joined forces with IBM to leverage their respective resources and strengths toward a common purpose. The result is a unique public/private joint venture partnership - Southwest One, a 10-year joint venture to transform both frontline services and back-office operations of the three entities

The company was established to provide service delivery to Somerset residents in 11 key areas. These areas include customer access and contact services, enquiry offices and support services in the field of finance,

human resources, procurement, information and communications technology, design and print, facilities management, property, revenues and benefits.

More than 1,400 employees from the three authorities work at Southwest One. All are still employees of the councils or the police, but they're now managed by Southwest One. There are 660 workers from the county council, 164 from the borough council and 650 from the police department.

TECHNICAL INFORMATION:

Within the project there were implemented several improvements in access to services for citizens living in local communities – a new Customer Contact shared service including new world-class customer relationship management (CRM) system for handling customer enquiries or a new portal and combined county websites with one single "entry" point. Improvement of back office services was done through implementation of the SAP Enterprise Resource Planning system for Human Resources, Finance and Procurement.

RESULTS AND BENEFITS:

Southwest One transformation goals included improved service delivery, greater efficiencies, lower costs and access to advanced technologies. Although it's early in the life of the 10-year contract, the shared services business model has already shown strong results. Southwest One received the honour from the Society of Procurement Officers in Local Government (SOPO). The councils and police are already seeing greater productivity and lower costs. Improvements include less bureaucracy, more electronic workflows with decreasing paperwork, and greater ability to share information with other organizations. There are more first-time fixes within the call centre, with fewer instances of citizens needing to be called back before getting the information or help they need. There are also internal IT improvements; PCs are being repaired more quickly and system availability is higher than before. Cost savings should be significant. Total savings in all areas for the three government agencies are expected to be 376 million pounds ($553 million) over 10 years. Collaboration between the two councils and the police in Southwest One has helped them work together more smoothly on other projects.

FURTHER INFORMATION:

http://www-01.ibm.com/industries/government/ieg/pdf/southwest_one_case_study.pdf

http://www-304.ibm.com/easyaccess/publicuk/contenttemplate/!!/xmlid=176490

http://www.southwestone.co.uk/

"The cost and the time taken to make those interact with each other to become a central database were huge. We needed to get better at this."

Roger Kershaw

Corporate Director of Resources
Somerset County Council

STOCKHOLM

DYNAMIC TOLL SYSTEM BASED ON THE FLOW OF VEHICLES

CITY SITUATION:

Stockholm is the capital and the largest city of Sweden. Stockholm is located on Sweden's south-central east coast, where Lake Mälaren meets the Baltic Sea. The central parts of the city consist of fourteen islands that are continuous with Stockholm archipelago. Stockholm is the most populous city in Sweden with a population of 829,417 in the municipality, approximately 1,25 million in the urban and 2 million in the metropolitan area.

Stockholm has an extensive public transport system, one that by at least one measure is the most expensive in the world. It consists of bus, metro, regional/suburban rail, light rail, tram and archipelago boat operation. Private transportation in central Stockholm is difficult. Small one-way streets, congested bridges and limited parking all present problems. Stockholm has a congestion pricing system, Stockholm congestion tax.

ADDRESSED ISSUE:

In Stockholm traffic congestion has been a growing aggravation for years, with over half a million cars travelling into the city every weekday. By 2005, average commute times were up by 18% from the year before. That's why, in the beginning of 2006, the Swedish National Road Administration (SNRA) and the Stockholm City Council set out to find a way to reduce both the number of traffic jams in Stockholm and its air pollution levels.

SOLUTION:

Congestion Tax system was introduced. With help from IBM and its partners, a plan was devised to charge vehicles as they passed control points on the way in or out of the Stockholm city centre during weekday, rush hour times. The city implemented a free-flow roadside system using laser, camera and systems technology to seamlessly detect, identify and charge vehicles. As part of the project, 18 roadside control points located at Stockholm city entrances and exits were set up to identify and charge vehicles depending on the time of day — higher during peak times, lower during off peak hours. Once a vehicle passes a roadside control point during designated congestion hours, it is recognized by the transponder that is read by sensors. In addition, cars passing through these control points are photographed, and the license plate numbers are used to identify those vehicles without tags and to provide evidence to support the enforcement of non-payers. The information is sent to a computer system that matches the vehicle with its registration data, and a fee is charged to the owner. Drivers can install simple transponder tags that communicate with receivers at the control points and trigger automatic payment of road use fees. Drivers can also pay their bills at local banks, over the Internet and at area convenience stores, like 7-Eleven.

TECHNICAL INFORMATION:

The SAP applications and IBM design, project management, consultancy, software and hardware services have combined to provide Stockholm with a congestion charging system. IBM designed a solution based on SAP software running under IBM AIX on the IBM System p platform. Two p690 servers are partitioned into 20 logical partitions to handle the SAP financial and CRM applications from SAP, as well as SAP NetWeaver Business Intelligence (SAP NetWeaver BI) and various IBM DB2 databases. Further processing power is provided by six IBM BladeCenter systems containing more than 60 IBM HS20 blade servers, powered by Intel Xeon EM64T processors, as well as 10 Intel-based IBM System x servers. These Intel platforms run WebSphere Application Server under Linux, supporting a Web portal, and Citrix under Windows, which provides desktop applications for the call centre. As Web and call centre traffic increases, it will be simple to add processing capacity, simply by increasing the number of hot-pluggable blade servers in each of the BladeCenter chassis. The technologies at work also include RFID tags, which use radio waves to automatically identify objects, and wireless sensors, that detect and measure real-world conditions and convert them into signals that are sent to computers. Another emerging technology—optical character recognition software—is used to identify license plates from any angle. Because of varying degrees of illumination, bad weather and sometimes awkward camera angles, not all license plates photographed by cameras at the roadside control points can be automatically identified by standard systems. Hence IBM Research developed a sophisticated recognition system that uses algorithms to make a second attempt at identifying unclear license plate images. These algorithms use techniques such as image enhancement and comparison of front and back license plates to analyze the entire image and search for predefined patterns. Mimicking the human eye, the algorithms decipher images of often barely legible text by moving the image around until an optimal viewing angle is found, and the expected pattern can be recognized. When the license plate is identified, data concerning the owner of the vehicle is extracted from the National Car Registry – an IBM DB2 database – and billing information is sent to the SAP financial applications, which issue tax notices and deal with payment and fines. Drivers can settle their account by direct debit if they have a transponder installed in the vehicle, or can pay at 7-Eleven or Pressbyrån stores, at banks, or over the Internet. IBM WebSphere Application Server interfaces between the back-end SAP software and the Web portal which the stores use to communicate with the congestion charging system. Operational information about the system is also sent to SAP NetWeaver BI.

RESULTS AND BENEFITS:

The road charging system has made a real impact in congestion and overall quality of life for the citizens of Stockholm. By the end of the trial, traffic was down nearly 25 percent. Public transport schedules had to be redesigned because of the increase in speed from reduced congestion. During the spring of 2006, 40,000 more travellers used Stockholm Transport on an ordinary weekday than the year before—an increase of six percent. Moreover even inner-city retailers saw a six percent boost in business. The reduction in traffic during the Stockholm Trial has led to a drop in emissions from road traffic by eight to 14 percent in the inner-city. Greenhouse gasses such as carbon dioxide have fallen by 40 percent in the inner-city and by 2-3 percent in Stockholm County.

"Traffic has remained substantially lower since the pilot with IBM, which has brought significant benefits to Stockholm residents. The scheme is meeting the objectives set by the city of reducing traffic volumes, improving accessibility for buses and cars, and improving the environment,"

Birger Hook

Director
Swedish Road Administration's traffic registry

FURTHER INFORMATION:

http://www.ibm.com/podcasts/howitworks/040207/index.shtml

SYSTEM NAVIGATING TOURISTS AND ENABLING SMARTER TOURISM

CITY SITUATION:

Venice is a city in northern Italy, the capital of the region Veneto, with a population of 271 thousands inhabitants. Together with Padua, the city is included in the Padua-Venice Metropolitan Area with a population counting 1,600,000.

Venice is one of the most important tourist destinations in the world, due to the city being one of the world's greatest and most beautiful cities of art. The city has an average of 50,000 tourists a day. In 2006, it was the world's 28th most internationally visited city, with 2.927 million international arrivals that year. Venice's popularity as a major worldwide tourist destination has caused several problems, including the fact that the city can be very overcrowded at some points of the year.

ADDRESSED ISSUE:

While its position as a leader in tourism is very beneficial for the municipality of Venice, the city also faced the following issues: increasing pollution, massive threats to the area's extremely fragile ecosystem, day-by-day degradation of its historic and artistic treasures, and an urgent need for foot-traffic and crowd-flow regulation. To address its issues, the city decided to open an office dedicated to controlling and managing the flow of tourism by tracking and coordinating with tourists before, during and after a visit to the city. Initially, the office launched a Web portal, which allows users to plan and manage stays in Venice, and positioned the city to plan accordingly. However, the city still needed better ways to manage the flow of tourists throughout the city, support each tourist's visit, guide tourists to some areas instead of other areas, help them discover less-known areas of the city and – by consequence – stimulate the economic activity in those areas and gather feedback from tourists. Additionally, the city wanted to find solutions that would involve local players, control the quality of content and information it distributed, and address the technical installation issues posed by the city's salt water environment.

SOLUTION:

IBM worked with the City of Venice on a mobile phone-based initiative to guide tourists to discover lesser known parts of the city, provide instant information on historical sites and prevent "walking jams". Venice Municipality initiated a pilot project based on application TagMyLagoon, a solution developed by IBM Human Centric Solutions Center EMEA in cooperation with IBM Italy, IBM Business Partner Neotilus and the Venice

Tourist Guide Association. The Venice Tourist Guide Association then placed passive sensors on select locations around the city, denoting points of interest. A user simply takes a picture of a place of interest using his or her mobile phone and the system automatically pushes contextual information and prompts to the user. Likewise, the system can pull important contextual data, such as location, from the user. Users can interact also with sensors and devices, putting them in connection with people, physical locations and other information.

TECHNICAL INFORMATION:

For the pilot project, IBM utilized one IBM System x3850 M2 server running the Microsoft Windows operating system. The server hosts a variety of applications, including IBM WebSphere Process Server V6.1.2 software, an IBM DB2 9.5 data server and spatial extender, IBM HTTP Server software and NemoBox software from Neotilus. The WebSphere Process Server software provides a service-oriented architecture (SOA) infrastructure

that facilitates adaptability and enables customization, while the NemoBox software functions as a connector between the WebSphere Process Server software and the TagMyLagoon mobile application. The DB2 data server delivers a high-performing, robust platform to store and manage geographic data. The TagMyLagoon solution is based on IBM Human Centric Solutions open architecture framework that works to allow users anywhere, anytime and using any device to seamlessly access relevant multilingual multimedia information, including text, images, sounds and video; localization services, such as guidance help; and real-time information, including consultation, advice, alerts and social networks, based on each user's profile and location. IBM Global Services - Global Business Services helped the city design scenarios and offered consultancy services.

RESULTS AND BENEFITS:

Venice Municipality anticipates that the new solution will help it to become citizen-focused by optimizing resources, propelling tourism and improving the quality of life for both citizens and tourists. The TagMyLagoon solution allows users to interact with sensors and devices, helping the city to locate and guide tourists, as well as measure, control and eventually predict and optimize tourist flows and routes. The pilot project helped Venice evaluate the effectiveness of using of the technology to manage and promote alternative touring routes. And because the solution leverages the network infrastructure already in place, including the mobile

devices owned by visitors and the city's existing WiFi network, the solution requires minimal maintenance and can be easily diffused into the mass market, allowing the city to rapidly develop smarter and more customized routes.

"With more than 20 million visitors a year, one of the world's most famous cities is also facing increasing pollution, mounting pressure on a fragile ecosystem and an urgent need to manage the flow of visitors. Working with IBM, we hope that the TagMyLagoon project will help to address some of the challenges we are facing and make the city smarter and more efficient by using existing infrastructure to optimize our resources."

Michele Vianello
Vice Mayor of Venice

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/27926.wss

http://www.tagmylagoon.com/

http://www.veniceconnected.it

CITY SITUATION:

Washington, the District of Columbia, is the capital of the United States of America. The District has a resident population of 599,657; because of commuters from the surrounding suburbs, its population rises to over one million during the workweek. The Washington Metropolitan Area, of which the District is a part, has a population of 5.3 million, the ninth-largest metropolitan area in the country.

The Washington Metropolitan Area used to be often cited as having some of the nation's worst traffic and congestion. In 2007, Washington commuters spent 60 hours a year in traffic delays, which tied for having the worst traffic in the country after Los Angeles. However, 37.7% of Washington commuters take public transportation to work, also the second-highest rate in the country. The Washington Metropolitan Area Transit Authority (WMATA) operates the city's rapid transit system, Metrorail, as well as Metrobus. With an average of one million trips each weekday in 2009, Metrorail is the nation's second-busiest rapid transit system in the country, after the New York City Subway.

ADDRESSED ISSUE:

In terms of passenger volume and the number of trains, buses and other assets it monitors and maintains, the Washington Metropolitan Area Transit Authority (WMATA) runs one of the most complex and busiest transportation systems in the United States. WMATA manages more than 12,000 bus stops and train stations, 106 miles of track, 1,144 railcars and 1,500 buses. Beyond the transportation assets, it must properly maintain the 594 escalators and 275 elevators bringing passengers from the streets to the trains and buses. The transit authority relies on system-wide visibility in order to keep its schedules accurate and all of its equipment working optimally. To keep commuters satisfied and its trains running on time, the WMATA wanted to use technology to further improve the safety and reliability of its mass transportation services.

SOLUTION:

The transit authority created a monitoring system - based on IBM software - to discover when its buses, trains and related equipment needed to be repaired or replaced, before they broke down. The system tracks, monitors and manages over 267,000 transportation assets from one control centre, using onscreen display. The monitoring system determines exact conditions and location of all transportation assets. Once information is gathered from across the transportation system, the IBM software helps manage nearly 180,000 work orders each month. The system provides mechanics with suggested work plans for standard maintenance procedures to ensure that the equipment is repaired before it even breaks.

TECHNICAL INFORMATION:

WMATA's IT systems utilize the IBM hardware and operating system software. WMATA has deployed most of the functionality in several webbased state-of-the-art applications over the last few years. These applications leverage IBM Maximo Software, which unifies comprehensive asset life cycle and maintenance management on a single platform, to create a monitoring and management system. The current release, IBM Maximo Asset Management 7.1 is the third release built upon a J2EE Service Oriented Architecture. It is an Enterprise Asset Management, Service Management and IT asset management suite of applications that are scalable and easily integrated into existing Enterprise Resource Planning (ERP) systems.

RESULTS AND BENEFITS:

By being able to see the exact condition and location of all of its assets, the WMATA can help ensure safe and on-time service for millions of passengers each week. This level of preventative maintenance allowed the transit authority to improve its procedures by integrating them with contract management, as well as by monitoring the repair facilities and equipment. As a result, the organization lowered operational costs (including fuel consumption across the city), while increasing productivity (reducing travel delays), prolonging the life span of equipment and, ultimately, improving the safety and reliability of its services

FURTHER INFORMATION:

http://www-03.ibm.com/press/us/en/pressrelease/28580.wss

http://www.wmata.com/

"IBM is helping us provide passengers with higher quality service while allowing the maintenance teams better manage the complex process of keeping equipment in top shape."

Deven Sha

Deputy IT chief

Washington Metropolitan Area Transit Authority