ENTER.HUB

European Network exploiting Territorial Effects of Railway Hubs

New Technologies – Smart Cities

Thematic Report

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2014

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A. Introduction

When ENTER.HUB was designed, the need to look at new technologies emerged from direct challenges, such as the following:

■ How to exploit the new technologies for (1) communication, transmission to users of the potential of the hubs, in terms of transport connection (real time information) and (2) data recording and representation useful for the understanding of the hub working and users needs;

■ How to develop integrated information and ticketing/payment systems of the different channels, so increasing the potential of hubs if there is a low barrier intermodal exchange.

At the core of issues like these and others, however, are people, their institutions, and how they interact or relate with technology. Be it in the role of users, planners, managers, or policy-makers. So we must not forget to equate in this new theme, the context of governance and participation frameworks.

We are concerned how to make best use of new, smart **information and communication technologies (ICT)** for engaging citizen participation and for a more participative process in benefiting of such spaces like Fast Train/ Multi-mode transport stations, thought as a Hub of mobility and as an interesting spatial framework. Any significant endeavor such as these, in a context of consolidated urban space, in a large set of European cities, represents a fantastic opportunity to contribute to paradigm changes, and current crisis shows we badly need to think different.

Smart Cities is a concept that caught a lot of attention in the last 10 years. For many it is seen as a key route to bring attractive innovation and new opportunities of development to our cities. For others it is seen as a buzzword that may cover-up growing inequalities and non-sustainable modes of development. These are important dimensions to guide us into the Smart City & ICT thematic.

Having in mind the goals of Enter Hub, we base this report directly and literally on the experience and contributions from Enter Hub City partners, on selected examples from smart-city industry main vendors, and on targeted state-of-the-art research (a few good examples are *Mapping Smart Cities in EU, Potentials for polycentric development in Europe, EU Smart cities Ranking of European medium-sized cities, e-Planning Agenda on Smart Cities*, etc.)

In this report, we consider therefore the following components: The concept of smart cities as a hub, and current views on defining what is a smart city; Examples of projects in Enter Hub partner cities, that are valid experiences towards a “smarter” city; The current status and perspectives of that envision the smart use of new ICT within Enter Hub city network; The major challenges and issues that the smart city paradigm brought to the table; and leading to the major recommendations that arise from these experiences and perspectives.

B. Smart Cities as Hubs

1. An integrated view of a smart city

Some authors define Smart City as a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership. The term Smart City is also used regarding the education of its inhabitants. A Smart City has therefore smart inhabitants in terms of their educational grade. In other literature the term Smart City is referred to the relation between the city government and administration, and its citizen. Good governance as an aspect of a smart administration often also referred to the usage of new channels of communication for the citizens, e.g. "e-governance" or "e-democracy".

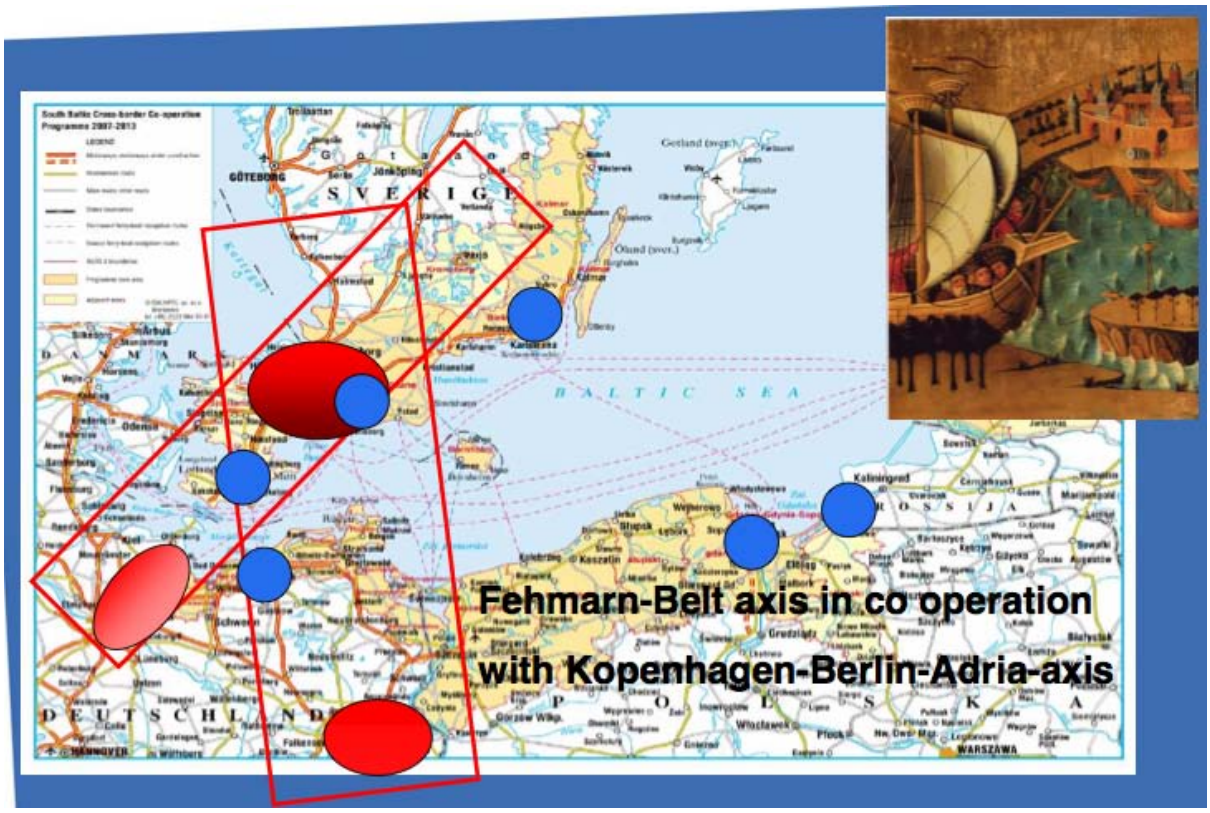
In one or other way, the Smart City concept implies the use of modern technology in everyday urban life. This includes not only ICT but also, and especially, modern transport technologies. But it specially implies an integrated view of a city, where all components are well articulated, since they are interdependent in their functionality.

Logistics as well as new transport systems as "smart" systems, which improve the urban traffic and the inhabitants' mobility, have a central role. But all other key aspects referring to life in a city, like security/safe, green, efficient & sustainable, energy etc. must be interconnected, or we cannot speak of a true 'Smart City'

2. Connected places have an edge

A smart city is frequently thought as a city capable of both "competitiveness" and "sustainability", by integrating different dimensions of development. Smart infrastructural investments should be able to support economic growth as well as the quality of life of communities, a more careful management of natural resources, a greater transparency and participation to decision-making processes (Papa ref). But the short-term expectation is that city "smartness" will provide an edge on competitiveness. ICT potential for increased connectivity is therefore one key dimension.

Recent studies show that places that can be reached for day-return business trips have an advantage in today's economy. The network of such places in Europe shows a clear centre-periphery pattern. While air is the prime transport mode for inter-metropolitan business trips, high-speed rail is gaining relevance (and strategic importance; one has only to remember the recent crisis resulting from volcano ashes within EU airspace). The national orientations of rail networks make high-speed less attractive than it could be for cross-border travel (Poly ref).



Transportation Axis Context (Rostock analysis)

However, the same studies also show that smart, connected places are not only urban. A wide range of rural areas belongs to this group. Some benefit from high accessibility to urban centers, others combine unique local assets with direct and virtual connectivity into the global economy.

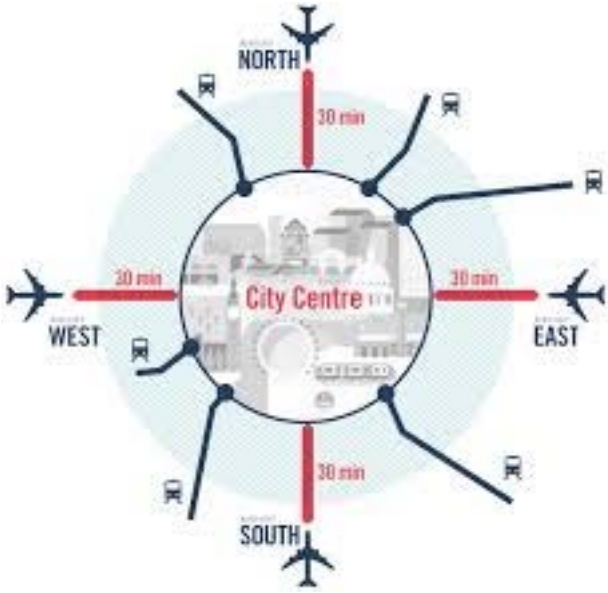
The border line between urban and rural is fuzzier around major metropolitan areas. More relevant to the point is to identify the density gradient of the space of human interaction.

A first aspect to keep in mind is that connectivity is key, a second one is that no "smart city" is viable if it is not integrated in "smart territory", in particular in what concerns connectivity.

3. Smart city as a Gateway

The high population density of the European core and the short distances between major urban areas in that part of Europe, are an economic asset. Large labor and consumer markets confer on a trans-national scale some urbanization advantages typical of agglomeration economies.

During last decades, innovations in technology and transportation and the rising levels of affluence, have been arguably the main driving forces behind the increasing mobility of people in the last few decades. The reorganization of economical activities due to specialization, among other factors such as suburbanization and regional centralization, conform the time-space convergence (Schafer and Janelle refs). The ability to connect quickly and reliably with suppliers, clients and customers is vital in today's just-in-time economy. It follows that the concept of potential accessibility is a useful indicator. It shows how many people can be reached from a region weighted by the time needed to reach them.



One interesting tool is to plot the "web of one-day trip locations". Despite the growth of the capacity for conducting business through modern communications mechanisms like internet conference calls and internet telephony, face to face meetings remain an important business practice. But the time of senior staff is expensive; few can be spared from their office for an extended period. This aspect may therefore increase the market value of locations that can be reached in a trip that can be contained to a single day, i.e. leaving early morning and being back home in the late evening. In a smart city, this "gateway effect" can be designed to benefit properly of last ICT developments.

Published research (poly ref) on the possibilities for one-day business trips, based on current travel times and allowing for at least 6 hours at the destination, show the European core-periphery pattern as well as the importance of rail for inter-metropolitan relations.

The overall pattern in these studies shows a high level of integration within the European core, including also large parts of the UK. The Iberian Peninsula is linked to the core, and also the links between the core and eastern countries like Poland and Hungary are clearly visible, but in all these cases the intensity is lower than what can been seen inside the core. There are fewer flights and less choice for travelers from those parts of Europe; Naturally, this reflects in particular on individuals traveling for business. Other studies in 2003 (Djist ref) compared long distance trips both in the UK and the Netherlands, showing almost 90% of the long-distance business trips both in the UK and the Netherlands undertaken driving a car. This also points to the potential to improve long-distance mobility, reducing traffic, encouraging optimized multimodality and transport integration.

The possibilities for one-day trips from or to Estonia, Latvia, Lithuania, Romania, Bulgaria, Greece, and Turkey, at the time of these studies (2007) did not exist. It is no surprise: distance, however shortened, remains a barrier and crossing it always consumes resources (time and money). Economy theories of agglomeration explain how proximity does confer some advantages.

4. Smart city as a hub of information – the new centrality

A major challenge in urban innovation is to supply for the new demands of the citizens, resulting from technology developments. These include fast, accurate and information, and accessible from multiple sources. This is one of the factors that sparked the perception of need for 'smartness' in the city. Given the complexity of a city system, it is not easy to keep up with the constant upgrade of urban factors - people, institutions and technologies – highlighting thus the importance of ICT integration and a compromise to sustainability.

Relation between "smart city" and ICT (Hitachi)

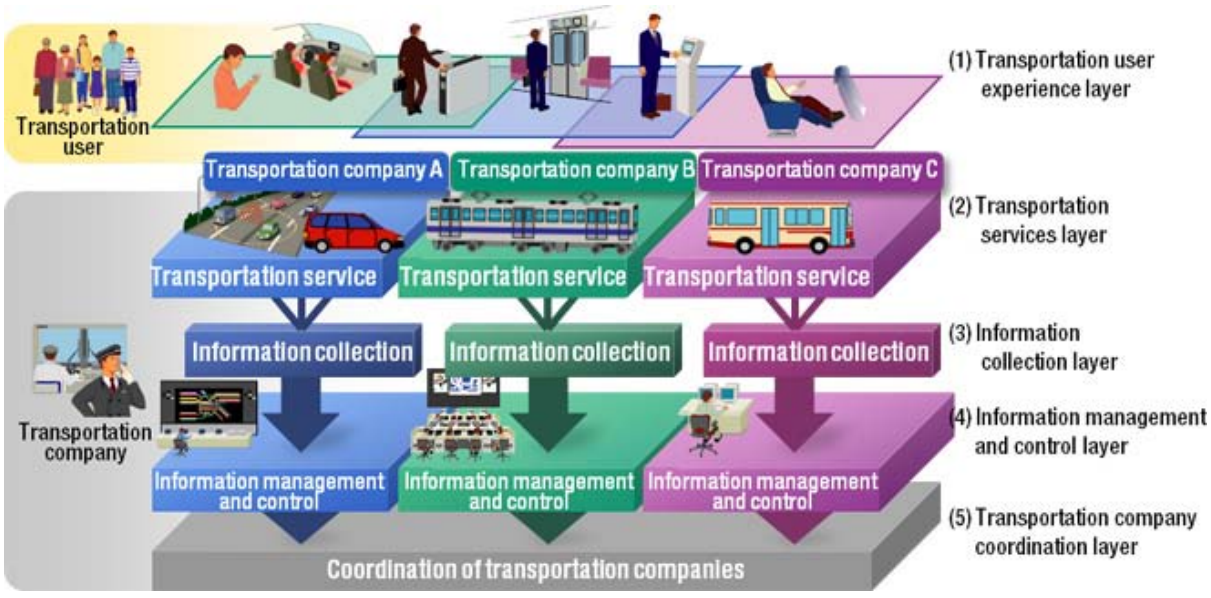
"Smart City" term is used by some literature in a holistic way, describing a city with certain attributes, and by others to describe various aspects, which range from Smart City as an IT-district to a Smart City regarding the education (or smartness) of its inhabitants.

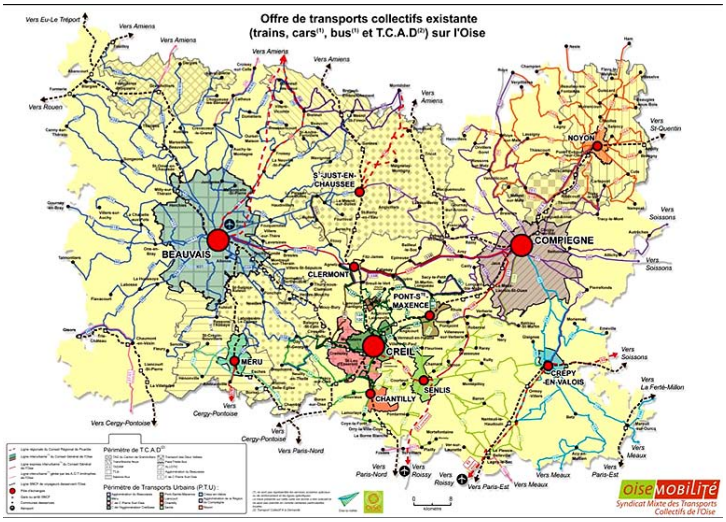
In association with economy or jobs *Smart City* is used to describe a city with a "smart" industry. That implies especially industries in the fields of information and communication technologies (ICT) as well as other industries implying ICT in their production processes. Also business parks or own districts comprising of companies within this field use more and more frequently the designation of Smart City.

In what concerns Enter Hub approach; of a smart city as a hub, the most relevant factor here is that new ICT allows for a different dimension of centrality. A city may not be as "central" as another, in the classic measure of physical connectivity, but it may acquire a different centrality through investment in ICT infrastructure (*information highways*), and therefore acquire virtual centrality. If such ICT investment is strategically combined with an investment on physical connectivity (such as a modern multi-modal hub), this can be a game changer.

5. Smart city as a multi-modal hub for mobility

City hubs, as multimodal interfaces with several levels of transit services should be efficient in planning; coordinating and optimizing the mobility of transport systems (public, shared or private) for an integrated urban development and economic, social and cultural regeneration.





Public and shared means of multi-modal transportation are the main concerns for smart mobility.

Sustainability in transportation requires that all logistics are efficient, and that the impacts on the environment are as low as possible.

Improving the efficiency the unnecessary waste (time, CO2 emissions, etc.) will be reduced and users will be an active part of a sustainable and smart urban system.

All stakeholders have role – and a responsibility - in the process: the end-users (citizens or visitors) the municipality (that is responsible for city mobility), transport providers (as the companies that operate physical transport services), service providers (accountable for maintaining the infrastructures) and financial providers. Communication is key to 'smart mobility', if we are to reach the goals proposed by Enter Hub.

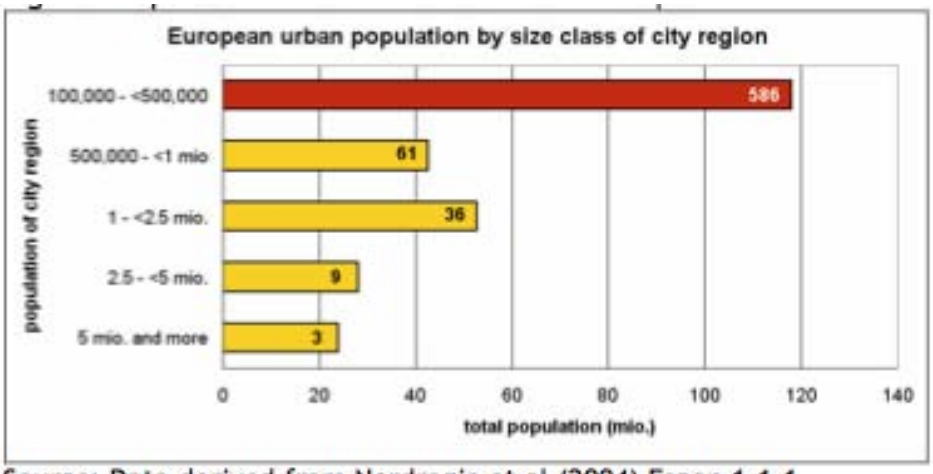
6. Mid-size cities as a turbine for the "smart city" dynamic

The most significant cluster of cities in Europe is medium-sized cities.

40 % of all urban citizens in Europe live in near 600 cities, with a population between 100,000 and 500,000 inhabitants. This leads to the claim that these 600 cities are the key engines of economic development in EU: that because of their large number they are the most decisive actors in order to make Europe more competitive and at the same time to make spatial development more sustainable.

One of the most comprehensive overview of cities or functional urban areas (FUA) in Europe provides the Espon 1.1.12 study incorporating almost 1,600 entities in Europe.

Medium-sized cities as cities often also understood as "second cities" on a European scale. These cities may not have visible relevance on a European scale, but often are of crucial importance on a national and regional scale. Even more than in the case of metropolises, medium-sized cities have to be highly specific in their approach to attractiveness.



Source: Data derived from Nordregio et al (2004) Espon 1.1.1

There is no doubt the medium-sized cities represent a key profile from where can be extrapolated important lessons learned on solutions and strategies to address problems and opportunities – like the examples in the following table (IBM).

The need for progress is clear	The opportunity is here
Traffic congestion costs the European Union over **1% of GDP**, or over **100 billion Euros** per year	A European city reduced traffic by up to **18%**, and increased use of public transit by **80,000 passengers per day**. Citizens voted to support the project.
60% of consumer sentiment around the U.S. air travel industry is negative, and there are **19%** fewer brand-loyal travelers in 2008 than 2006—a recipe for commoditization	A European airport reduced mishandled baggage by **60%** using an innovative RFID-based solution
U.S. road traffic congestion in 2007 wasted **2.8 billion gallons** of fuel and **4.2 billion hours**. Total cost of wasted fuel and time was **$87.2 billion**.	**One ton** of rail freight can be moved **423 miles** using **one gallon** of fuel. A **single freight train** can replace **280** trucks, reducing fuel use, congestion and emissions.

Enter.Hub network, who fits in this category, has therefore a very promising potential to reflect, timely, the major issues and concerns in the type of cities that are, in fact, more representative of the urban Europe.

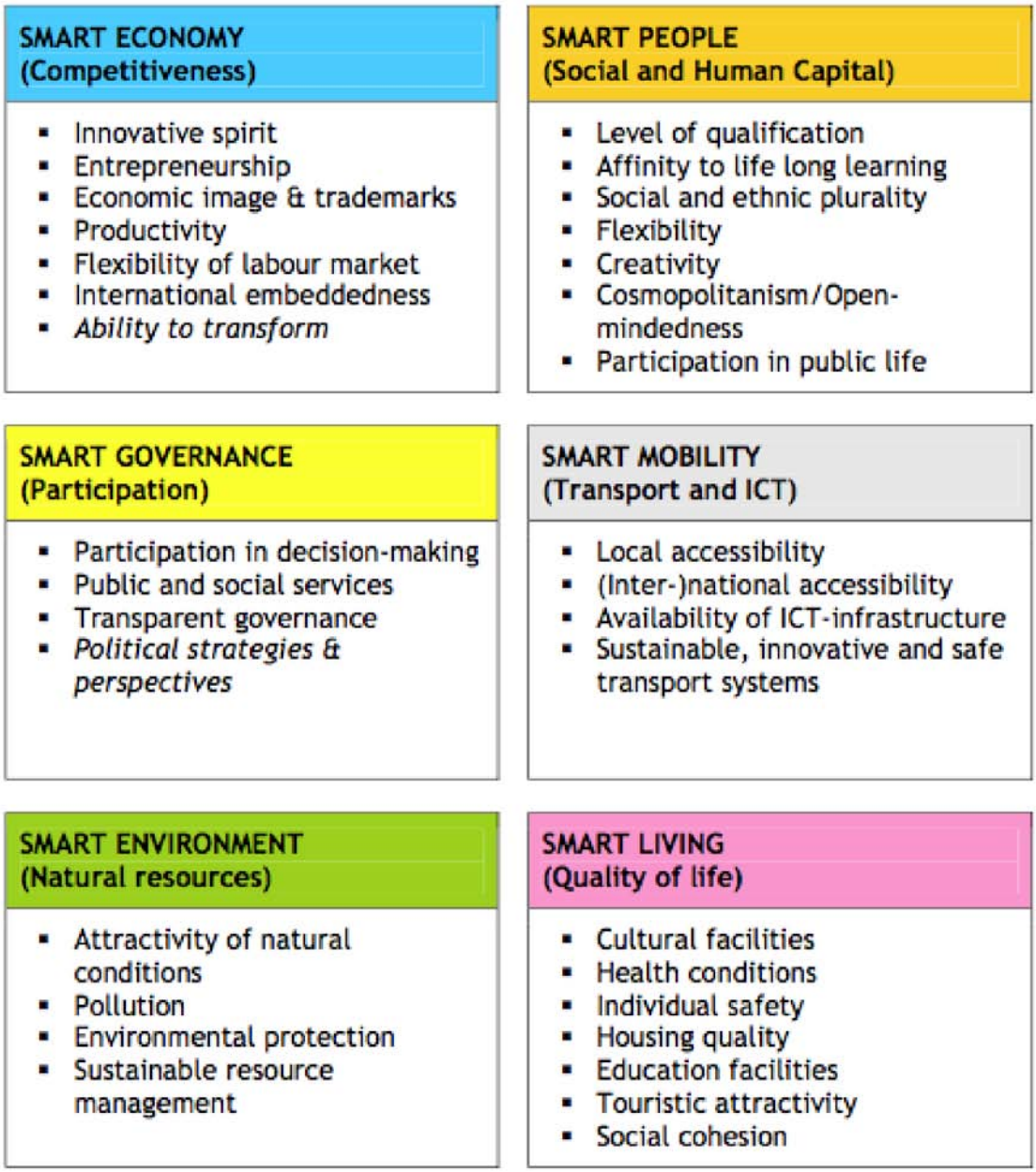
7. Measuring the Performance of a city

There are many models that try to capture all essential components of a city dynamics, and the several fields of activity which are described in literature in relation to the term Smart City: industry, education, participation, policy, regulation, technical infrastructure, various 'soft factors'.

One example is an aggregation of indicators in six characteristics (table below.).

For these criteria, a Smart City is a city performing well, in a forward-looking way, in these six characteristics, built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens.

But the proponents (*Centre of Regional Science, Vienna*) emphasized that we are currently only able to draw a picture of the present state of a city. Further research that builds on time-series data can either complete, or challenge, the "snapshot" view.



Framework for smart city indicators - *Ranking European Smart Cities, Centre of Regional Science, Vienna*

C. Enter Hub partner cities & ICT

As a framework to help bringing thoughts and information on the thematic of ICT and Smart Cities, all Enter Hub city partners were encouraged to answer four main questions:

1. What are the current uses / know-how / installed components of ICT? Can you bring a demonstration to Lugano?
2. What are the projected ICT uses?
3. What is your vision of a Smart City Enter.Hub?
4. What is the key institutional & regulatory framework in place dealing with new technology usage?

1) What are the current uses / know-how / installed components of new technologies?

Ulm

Actors / Stakeholders related with ICT	**Stages of ICT uses in Hubs**	**Levels of ICT uses in Hubs**	**Technologies & Priorities**	**ICT Ethical issues**
Administration • operating department • EU, ÖA, SUN, Z/PS, ZS/T, etc. Others • politics • city council • media & press • citizenship • pressure groups • passenger / tourists • internet community company	• Planning (Early Information) • Building (Feedback-Loop) Running (Innovation-Phase)	• added value for the public • added value for the administrative process	•Innovation Centre ('Innovationsregion Ulm') •City station ('Citybahnhof') •Tram ('Linie 2') transport development plan ('Verkehrsentwicklungsplan')	• Representativeness of participation or rather of the process blended projects in combination of digital and non-digital instruments

Porto

Porto – MOVE.ME app is a service that has been implemented within the framework of the European project CIVITAS ELAN. This is a prototype of an application that allows mobile access to a diverse and comprehensive set of information about public transport available in the city of Porto.

Reggio

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
the new technologies are enabling citizens to know quickly and easily about all the transport opportunities offered to travel from a place to another and it can be done by taking advantage of an integrated transport system in a shape of a network.	Information platforms of the train schedule and timetable with their visual aids for the public are currently used. They belong to the Italian Railway Network (RFI		• Mobile parking payment system • Regional unique transport ticket already available both for urban and extra-urban public buses, regional trains (FER). • Information platforms of the train schedule and timetable with their visual aids for the public are currently used. They belong to the Italian Railway Network (RFI).	

Girona

A new system was created for improving with ICT the field of heritage, cultural tourism , sustainability and mobility, including intelligent parking. The app **"**Girona in", offers information about the city and a fast access to over the city in an easy and quickly way. This new system will also allow the payment and renewal of the blue zone ticket via mobile smartphones.

In terms of mobility, it has been implemented a system of artificial vision smart camera, with a system of license plate recognition that allows the access of the neighbours. A Masters' degree in Smart Cities was also planned.

Girona university is also providing solutions for mobility and intelligent parking .

The car-sharing platform Fesedit applies geolocation as a key element to promote shared trips. With 211.690 trips recorded in 2013, is a demonstration of the advantages of intelligent systems.

Orebro

Currently there is an older real-time system in place, but only a few bus lines within the city of Örebro are connected to it. It is currently impossible to buy a bus-ticket with cash when entering the bus.

Case of Orebro: the new system for public mobility.

Nowadays in Örebro (Sweden), traveling with public transports take 20% more time than traveling by car.

The challenge was to create a new real-time system for busses, to be implemented in 2015. The infotainment system is planned for the busses in the Region of Orebro, which shall be linked to the real-time system and will among other things provide information about which connecting lines are leaving in how many minutes from the next stop. As well as regulating traffic lights, prioritizing busses and making them more compatible with cars and reducing the travel time. Further uses like news, information to the population and advertisement are currently discussed.

One of the challenges is to establish a collaboration between regional traffic administration, the Swedish traffic administration and the regional and municipal authorities; as well as create the institutional and regulatory framework in place dealing with the issues at stake is the "Personuppgiftslagen" (Personal Data Act) created by the national Data Inspection Boar.

Lodz

The City of Łódź implemented in 2008 a Traffic Control System for Łódź Regional Tramway (ŁTR) covering 60 crossings on and along the route. The objective of the project was to give a traffic priority to tramways on ŁTR line and to improve the information system by installing electronic timetables at the tramway stations.

Gdynia

Actors / Stakeholders related with ICT	**Stages of ICT uses in Hubs**	**Levels of ICT uses in Hubs**	**Technologies & Priorities**	**ICT Ethical issues**
Administration • Railways operators – decision makers about ICT usage in the hub • City departments, administration on regional level • Public transport authority • Police, City Guards – in case of accident • Users: citizens / tourists / passengers	• ICT was introduced in the hub based on rules, laws after agreement between institutions, but without users participation • ICT in place during implementation	• Generally, each ICT system in Gdynia HUB is for basic usage: safety, information, ticketing • System of ticketing could be considered as special use – to count number of passenger and create users profile	• ERMTS (in project) + first level of ETCS • Computer railway traffic control • Monitoring of the hub area (a view is available for security and manager of railway station) • Passenger information system (voice & electronic boards) • Electronic system of ticketing • WiFi and plugs to electronic devices charging • Safety systems (fire alarm, access control • Parking zone	• Data security • Control of people movement • Done without users opinions/consultations/ acceptation

2) What are the already projected / planned uses of new technologies?

Ulm

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
Administration • operating department • EU, ÖA, SUN, Z/PS, ZS/T, etc. Others • politics • city council • media & press • citizenship • pressure groups • passenger / tourists • internet community • company	• Planning (Early Information) • Building (Feedback-Loop) • Running (Innovation	• usage of ICT not only for the communication process but also for E-Government use	• shop window of innovation ('nanuuu') 'novum aus neu-ulm und ulm' • Regio S-Bahn Donau-Iller • r potential further Projects in new technologies and social media ('ulm 2.0')	• communication of the added value of a 'Smart Enter.Hub'

Girona

City Council is developping a plan to make the city a leader in the use of new technologies.

During 2014 is expected to introduce parking sensors blue areas, so you'll find through smartphones , for example, if there's free parking area or not. This new system will also allow the payment and renewal of the blue zone ticket via mobile smartphones.

In terms of mobility, it has been implemented a system of artificial vision smart camera, with a system of license plate recognition that allows the access of the neighbours. Other projects being carried out in Girona as smart city are in the field of heritage, cultural tourism , sustainability and mobility.

Regarding the field of heritage and cultural tourism, the city will develop in the coming months new itineraries " Girona, historic city " combined with signs of historic buildings and the lighting of the old Roman remains of the "Força Vella" thanks the use of QR codes . There are also works to adapt interior signage of muesums with QR codes augmented reality, as well as using virtual museography thanks to 3D technology .

In terms of sustainability, a project is being implemented energy management facilities and municipal services through remote control of heating that 2010 to 2012, has reduced consumption by 27% and achieve a savings of 29%.

Orebro

- a new real-time system for busses is planned. It will be implemented during 2015 and will contain all lines within the city of Orebro.
- an infotainment system is planned for the busses in the Region of Orebro. It shall be linked to the real-time system and will among other things provide information about which connecting lines are leaving in how many minutes from the next stop. Further uses like news, information to the population and advertisement are currently discussed. The implementation will take place after the implementation of the real-time system.
- it is planned to provide free internet access on all express busses within the Region of Orebro. These busses are mainly in use between the centers of the 11 municipalities and the center of the region, the city of Orebro. A decision about how and when the implementation will take place is made in 2014.

- so far the drivers of the busses within the Region of Orebro communicate with each other or the central traffic control of the region via mobile. The development of the new system is ongoing and the implementation will be made in 2015.
- a system to prioritize busses at traffic lights will be available by the end of 2015. It shall be implemented in 2016 and manage that busses get about always a green traffic light when they approach traffic light crossroads. Through this the travel time shall be further reduced, making busses more compatible in relation to cars.
- In 2015 will also a new ticket system be implemented which will make it easier to select and to buy a ticket.

Porto

Porto is currently a "Living Lab" under the project called "Future Cities" that involves 67 partners (universities, IT companies, PT operators, etc.) and 40 researchers, aiming the development and testing of several applications in a real-life urban environment, like the "SenseMyCity" application for smart phones.

Porto: tourist development

The strategic urban developing guidelines of Porto are related to tourism. The main segments of this strategy contemplate urban tourism, city break and the business tourism. The view on tourism is orientated according to cultural tourism, events, scientific tourism and nautical tourism. In a complementary way, the strategy focuses the tourism oriented to food & wine, touring and cultural landscape, as well as health, wellness, nature tourism and religious tourism.

To make Oporto smarter, there was a need to find a solution for coordinating all the different areas of development, using a unified tool, which considers time management as well as space design. For that aim, a global online portal has been developed. The structure of the portal is based on three different ways for living the city: visiting, living and making business. The main functions available are searching information such as articles, opportunities, routs and tours; using geo-referencing tools and leaving recommendations.

Considering the relationship between policy makers and citizens, the portal was conceived with the aim of bringing transparency to the decision making process and to make available information about all the regulation and plans, to the users.

Reggio

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
	• Next summer public transport info mobility will be available. • An interregional project funded by National Government (GIM, Informed Managed Mobility) is next to be finished: using GPS on-board devices, and AVM technologies, a real time buses position monitoring will be provided; bus monitoring system will send information about real timetable and position to bus stops. • In the near future a common unique platform for the timetable / schedule of all the means of transport will be available. It will include the schedule of local trains, national trains, buses, taxi etc. • In a near future this information will be available as an app for mobile phones too. Starting from next May the Regional unique transport ticket will include also regional routes provided by national railway company (Trenitalia).		• Starting from next May the Regional unique transport ticket will include also regional routes provided by national railway company (Trenitalia). An App for smart-phones could act as a "one-stop-shop" of information and facilitate choices.	

Lodz

Is conducting the design–build tender procedure for Territorial Traffic Control System – East-West Route. Modern system of traffic control will be implemented, covering over 200 crossings, with such features as mounting 10 information boards for car drivers, dozens of passenger information signs at tramway stops and the launch of a mobile information system. The date of the realization is 2015.

In 2014 is in a preparatory phase for Monitoring and Safety System (SMIB) which's aim is to increase the level of safety of residents and visitors of Łódź. The conception of ICT vision monitoring system with computer infrastructure analyzing events and a center for monitoring, system of safety analysis and alerting in the area of NCŁ. Is willing to implement a complex project management system along with the methodology of project management and coordination of activities within the New Center of Łódź program (2013 - a preparatory phase; 2014 – 2016 – implementation of the system).

Gdynia

Actors / Stakeholders related with ICT	**Stages of ICT uses in Hubs**	**Levels of ICT uses in Hubs**	**Technologies & Priorities**	**ICT Ethical issues**
• Local and regional administration • Decision makers • Railway operators • University • Public Transport Authority	• ICT was considered many years ago and the hub was a certain place of it location, but talks are conducted now – at the start of project	• Usage not only for transport aspect but also for information about events in Gdynia	• TRIP (Passenger Information Interactive Points) • Busses priority in traffic • Real-time passenger information on stops in hub	• Commercials • Afraid of 'it's done, but not useful for users'

3) What is your vision of a Smart City Enter.Hub?

Ulm

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
• Ubiquitous mobility concept • Solution for the problem of the 'last mile' • Information • Participation • Collaboration	ICT for • Improvement of use Improvement of quality of life	Better relationship between citizenship, administration and carrier • early information • continuous feedback • continuous innovation Smart Enter.Hub as first impression and real / digital business card to passengers and visitors	• Smart integration of all different local mobility concepts • Flinkster (carsharing) • Car2Go • remote bus (Fernbus) • SWU local public transport • Ding • Taxi • Supply of live open transport data for internet community Support of data API's,(application progamming interface)	• Idea of connected mobilization • Delivering International ization • Positive user experience • More comfort • Railway as a connecting idea Considering ideas of several different target groups

Girona

Girona: local synergies coordination

Currently, the proposal to convert Girona into a Smart City is quite embryonic, although it has an application for mobile devices, Girona in, which offers information about the city and a fast access to over the city in an easy and quickly way.

The main problem is that there is a lack of co-ordination amongst different agents and a lack of communication. Initiatives could be more effective if they worked more from the beginning in planning. They lack synergies, e.g. there are municipality / metro and local transport authorities with different regional frameworks, and also the city centre. The creation of the Chair Girona Smart City on 2013, and its Masters' degree in Smart Cities at the University of Girona are considered two essential elements for the positioning of Girona as a smart city.

Reggio

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
A smart city lets the everybody's life much easier			• Technologies should improve people accessibility to services, i.e. giving real time information about mobility services or allowing mobile payments. Technology is only a support to improve services and the way to access them.	

Orebro

Door to door solutions have to be offered, including waiting time. Therefore it is of greatest importance to improve the waiting facilities at the travel center in Örebro.

A tight collaboration between regional traffic administration, the Swedish traffic administration and the regional and municipal authorities is required.

Porto

From the user perspective it should provide real time and accurate information on PT. This information should be on multiple platforms (web, mobile, local facilities) and easily understandable.

Gdynia

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
• Public participation with health balance between demands and possibilities	• ICT should be consulted and available on every stages – planning, building and running (upgrades)	• Open for users innovations/applications • Compatibility • Continuous innovation • Useful and easy in operation for 'every day user'/ business passengers/ tourists	• Multimodal Navigation System • Integrated Fare Collection Service • Service to Smooth Transfer between Bus and Train (no wasted time, bus priority) • EV Bus Charging Management System • "All in one devices" • Compatibility	• Big brother • Data Security • Plan B

4) What is the key institutional & regulatory framework in place dealing with new technology usage?

Ulm

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
• Conformation to political process on all federal levels	• Conformation to legal requirements in the administrative process	• Privacy protection	• Usability • Data security	• Paradox of safety and usability at once

Girona

The current regulatory framework allows the introduction of new technologies in the field of mobility, however, we must thoroughly study the degree of involvement in funding by the government. Is also important, keep in mind that the privacy of citizens and ethical uses of information collected, as well as the control over the population are issues that current regulations should define to ensure basic rights.

Orebro

The institutional and regulatory framework in place dealing with the issues at stake is the "Personuppgiftslagen" (Personal Data Act) created by the national Data Inspection Board.

Porto

The administration, national, regional or local, must be the active link between the different stakeholders. It should be developed a common strategy in order to get the most benefit from the economical investment and the pre designed objectives avoiding redundancy between entities.

Gdynia

Actors / Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
• Administration on national, regional and local levels • Tender procedure actors	• It depends on requirements in the administrative process	• It depends on tender procedure and other installation issues		• Afraid of 'it's done, but not useful for users'

Reggio

- The Emilia-Romagna Region as general regulatory authority, together with the Provinces and Municipalities, through the Agency for Mobility, are entities that allow to complete the process of realization of investments on sustainable mobility. In general technology usage is allowed in services but is quite restricted in controlling systems to ensure the rules respect.

- The public transport systems is an important element of qualification of our social system. Most limits of the legal and regulatory framework deal with privacy rules (to avoid the "big-brother"

Enter.Hub Discussion:

Round-table on new technologies / smart cities from Enter.Hub partners

Girona:

There is a lack of co-ordination amongst different agents and a lack of communication. Initiatives could be more effective if they worked more from the beginning in planning. They lack synergies, e.g. there are municipality / metro and local transport authorities with different regional frameworks, and also the city centre. Smart cities is a very big implementation. People don't want 'complicated'.

Gdynia:

The big issue is that of user participation in the creation of ICT systems

Ciudad Real:

There is a problem with politicians not attending. It is difficult to communicate how the project is going. They are working to improve the new network to create a geographical information system, like smart city branches, which people can use. It's a challenge for a small city.

Preston:

New technologies are very fragmented. There is the question of who would own the ICT and would be responsible for communicating it. Preston works in a 2-tier authority area and then there is Network Rail / Government. The position is complicated. Preston's vision is of a connected network, which would enable people to move seamlessly through the city accessing information relevant to them as they go.

Lugano:

It is not possible to solve every problem. Problems must be solved in a pragmatic way rather than aiming for perfection. It is important to fix some problems while having the bigger design in mind. Technologies are not rocket science, it is using a digital infrastructure. There is no excuse for not having minimum quality standards. Smart cities has created a lot of hype. Need to work to create quality and standards.

Brainstorming – words / phrases connected with smart cities

Smart city	Participation	Something for everyone
User friendly	Balance	
GIS	Compatibility	Inclusive
Attractive	Ease of use	Cost effective
Management systems	Efficiency	Eco
All-in-One	Hospitality	Safe
Network of networks	Informative	Funding
Inter-modality	Sustainable	Partnerships

Creating an ICT system ID Card

This is about creating a system all partners can share (using new and innovative technologies, not just ICT)

We should not be worried about commonality ("*McDonalds effect"*). On the other hand, there are different conditions in cities and it is important that local identity is not lost in standardisation. Compatibility / inter-operability is more important than standardisation or not communicating with each other. Therefore what should we standardise? For example, signage could be standardised as this is internationally understood.

How to measure satisfaction – there is a way of doing it which will get user feedback on good spots / poor spots.

Identifying a key technology:

What about panels with information on delays, e.g. real time information for local buses?

Girona already has this.

Preston did have it through the Civitas project but the panels have recently been switched off due to lack of funding and not seen as a priority

Lugano introduced it on its main stops across the city and is investigating the possibility of people being able to access the information via smart-phones

Gdynia does not have this system

Lisbon information is not advanced, nor is it updated very often and it is only for buses.

What needs does it respond to?

Responds to users' needs, communicates real time information / delays etc

Political – kudos if publicly owned

Operators – return on investment is based on ridership / occupants benefits from those using it as users trust operators to get them to work / home, etc on time.

Limitations / problems:

Interface: ensuring that the real time information system for the user has sufficient inter-modality; keeping it simple (e.g. via GPS), back office captures information and translates it to users, very low barriers in keeping system (i.e. automation), connecting operators, municipalities and users

Compatibility: who can reach it & where (bus / train / smart phone application / internet)

Cost – of capital investment; maintenance; who should pay for it? who benefits – the users / public authorities / operators? how do you calculate these things? If it's the public who pays, it will be through taxes. Private systems fail without the public using them (e.g. citizenshops – one stop shop application created by an entrepreneur to enable people to check waiting times. Provided a public service but it disappeared).

Not secured / sustainability / not priority

Can end up excluding people from using it – only benefits user who should be but if they don't use it, they won't pay for it

Discussion Summary on ICT for Enter.Hub Smart Cities

I. Smart Traffic Control System

All cities referred to the importance of a smart traffic control system that promotes road safety, the reduction of fuel consumption and consequently the low emissions of polluting gases in the city, as well as improving mobility for all citizens;

II. Information of Public Transport

Enter.Hub partner cities find it very important that all users can get accurate information about the operation of public transport in the city, including the real-time information for buses, tram and trains. This information can be at PT stops, on the internet, inside the vehicles, and particularly in the hubs. To achieve this, we need to equip all the stops with technology, free" wi-fi" in vehicles and at interfaces, modernization of transport infrastructure and geographical information system with GPS devices on the PT vehicles.

III. Information about the mobility behavior of TP users – the payment system

In Orebro, cash is not accepted for the payment of public transport service. Each user must use a preloaded card. Also in Porto, the payment of PT travel is made using a multi-modal ticket. This ticketing system provides information about the PT users behavior, facilitating decisions or actions, with the goal of continuously improving the quality of public transport. However, this system can't identify the locations of exit of passengers only allows to know the point of entry.

IV. Car – Sharing

ULM has a car-sharing system, developed by Mercedes. Besides the recognized innovative attributes of this individual PT system, parking is permitted outside the places reserved.

V. **Citizen Participation**

Gdynia's has the issue in relation to their Transport Passenger Information machines. Users don't have an influence over their positioning. If they did, would they be more engaged. Perhaps using a means of access / survey so users could vote or give their opinions would help. They are also looking to encourage people to change from car to public transport but then users need to be able to find the information to help them do so.

Discussion summary on a vision for an Enter.Hub smart city:

From the user perspective it should provide real time and accurate information on PT. This information should be on multiple platforms (web, mobile, local facilities) and easily understandable. On the other side, it has to bring intermodal flexibility and compatibility between PT facilities, communications, vehicles and tickets.

From the point of view of the Hub, it's important to modernize the transport facilities.

Lugano is developing a roadmap on the city's website which will align services for citizens online. Of particular importance is selling Lugano as a safe city (so crime mapping and analysis has been done) but open borders brings a price to pay (e.g. property issues).

Discussion summary on regulatory & institutional frameworks for a Smart City Enter.Hub:

The administration, national, regional or local, must be the active link between the different stakeholders. It should be developed a common strategy in order to get the most benefit from the economical investment and the pre designed objectives avoiding redundancy between entities.

If it's a national benefit, should be a national framework – prevents fragmentation of different systems by individual cities and allows individual city opt-in or opt-out. May be too large a scale. Local scale not right scale either as will lose the inter-modality. Regional scale is more appropriate – it is where inter-modality is managed.

Level of aggregation for regulatory framework and for institutions, will guide who pays.

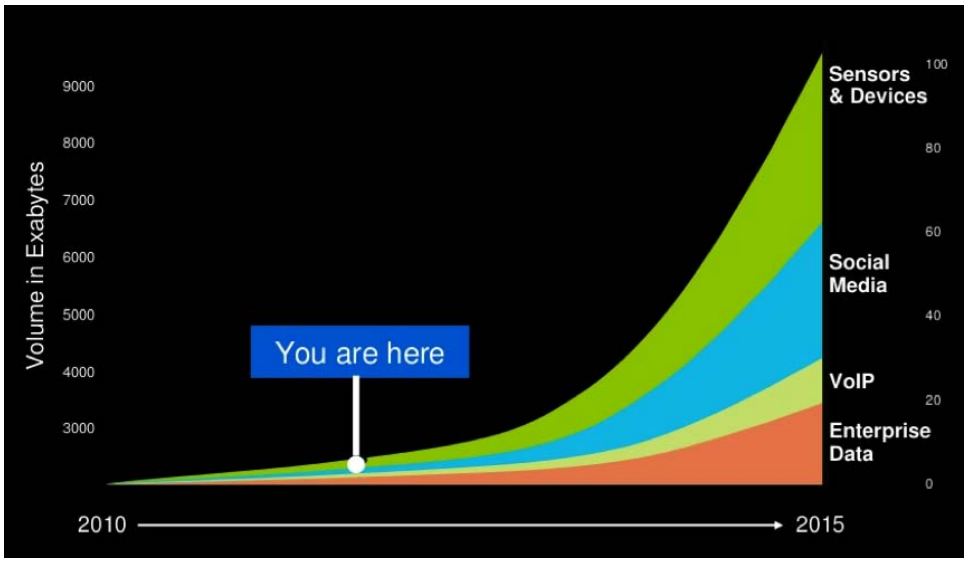
Orebro synthesis framework

	Actors/Stakeholders related with ICT	Stages of ICT uses in Hubs	Levels of ICT uses in Hubs	Technologies & Priorities	ICT Ethical issues
What are the current uses / know-how / installed components of new technologies?	Regional Transport Administration National Transport Administration Municipality Regional Development Council Companies Media IT Citizens Tourists	Running Improving	Basic uses	Partly old Partly modern	Low danger due to low standard
What are the already projected / planned uses of new technologies?		Planning Implementing Running Improving	Special uses	State-of-art customised to the needs in the region	Financial interests vs. Security vs. Privacy
What is your vision of a Smart City Enter.Hub?		Planning	Innovative uses	Innovative	Financial interests vs. Security vs. Privacy
What is the key institutional & regulatory framework in place dealing with new technology usage?	Data Inspection Board Citizens IT Authorities Transport Administration	Running Improving	Overarching	Unknown	Financial interests vs. Security vs. Privacy

D. Smart Cities Challenges and Major Issues

The Smart City paradigm faces several challenges and has to face up to major issues that confront city planners, policy-makers and decision makers. While we cannot address them without further research and discussion, it is pertinent to identify the ones that have a closer relation with Enter.Hub, and point to what they entail.

1. - The big data sets problem.



(2012 IBM presentation)

One of the consequences of the fast pace of the ICT revolution, is to submerge us with an incredible amount of data, in all kinds and forms, and in real-time.

This is particularly true in the case of a city.

Since most of this data is clearly an asset, we cannot just dismiss it.

So we are faced with the question: how to handle trillions of data and different sources, formats, jurisdictions?

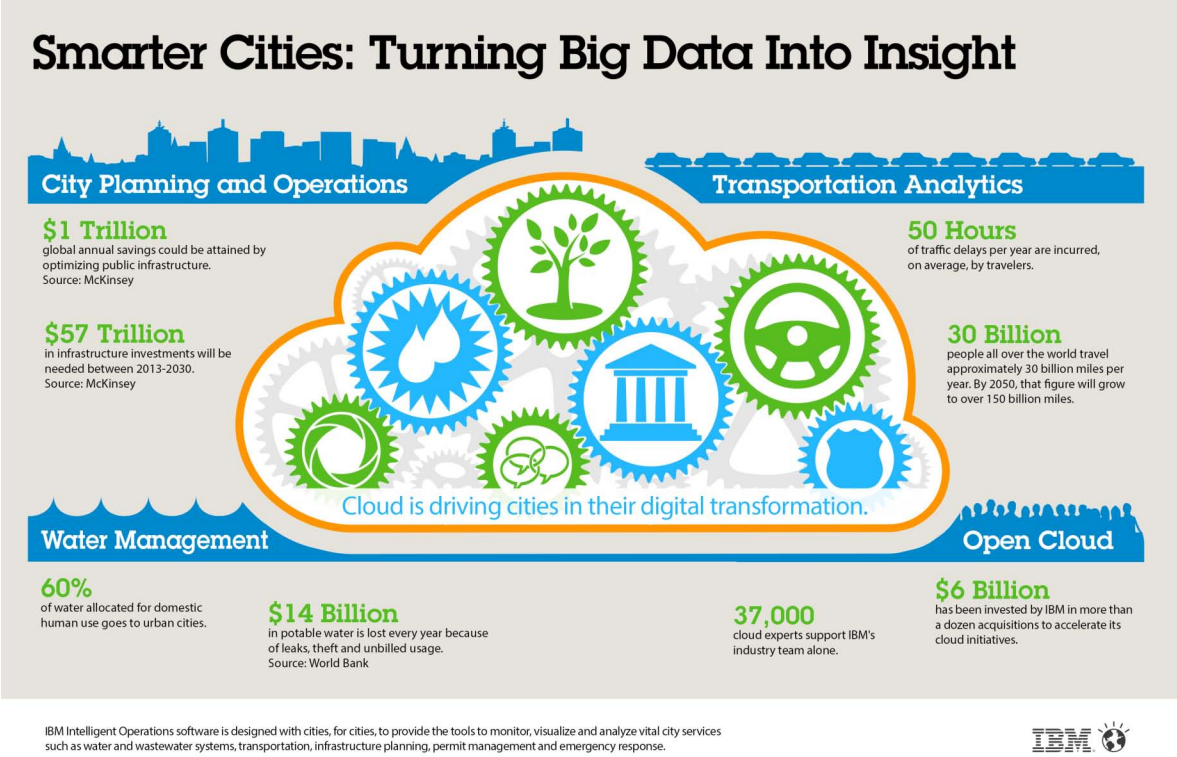
Some of the key facets of the big data problem for Enter.Hub are:

1.a) Technology to handle big data sets, including special system architectures;

1 b) Regulatory and Institutional Framework for a multiple-sources and multi-data sharing, management and use environment;

1.c) Ethical issues, on privacy, transparency and accuracy;

1 d) Economical issues, on data ownership, and added-value opportunities.



2 - Integrated systems vs. distributed intelligence.

Smart Cities require, as we discussed, integrated systems. This is one of the main vendor flags of the industry supplying technology and systems, pointing to it as the paramount of modern approach, and rightly so. But there are subtleties that may make a big difference:

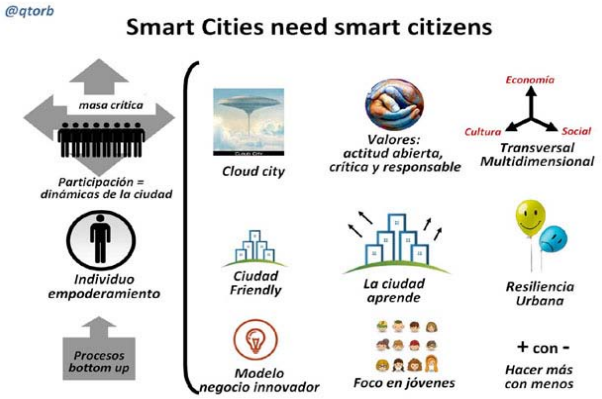
a) Integrated systems do not mean necessarily inter-communicability. As presented by Rostock partner experience, vendors tend to create closed-eco-systems, which are proprietary (vs. open) in data standards and protocols, and thus creating serious problems if a city does not want to be captured by a single supplier.

- Rostock - cross border- real time – multioperator information

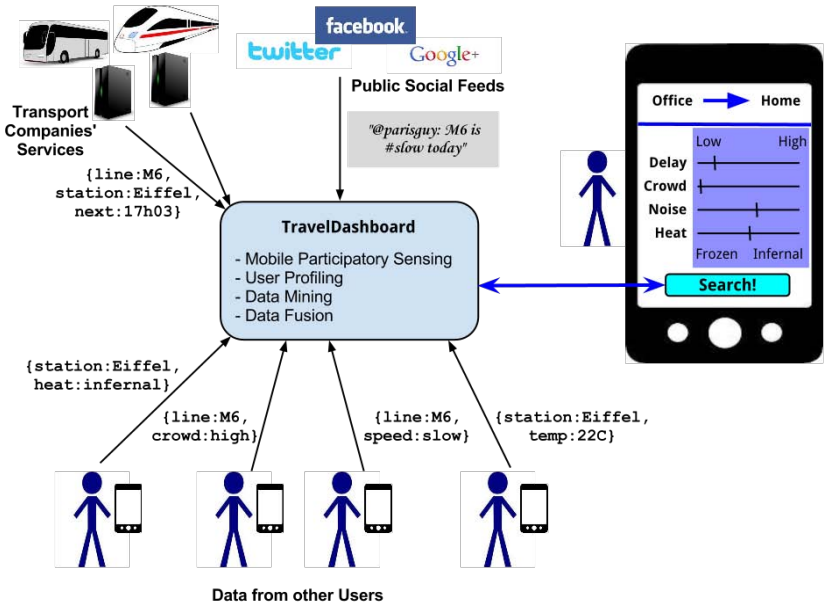
b) Integrated systems can be centralized, favored by industry suppliers of smart systems, but can also be decentralized, both technology and systems, based on collaborative sources from citizens and entities, e.g. sensors and apps in smart phones with qualified / deliberate citizen input.

For instance, Santander system in Spain, built 12000 sensors, to measure traffic, air quality, noise, etc.

Santander – Espanha.

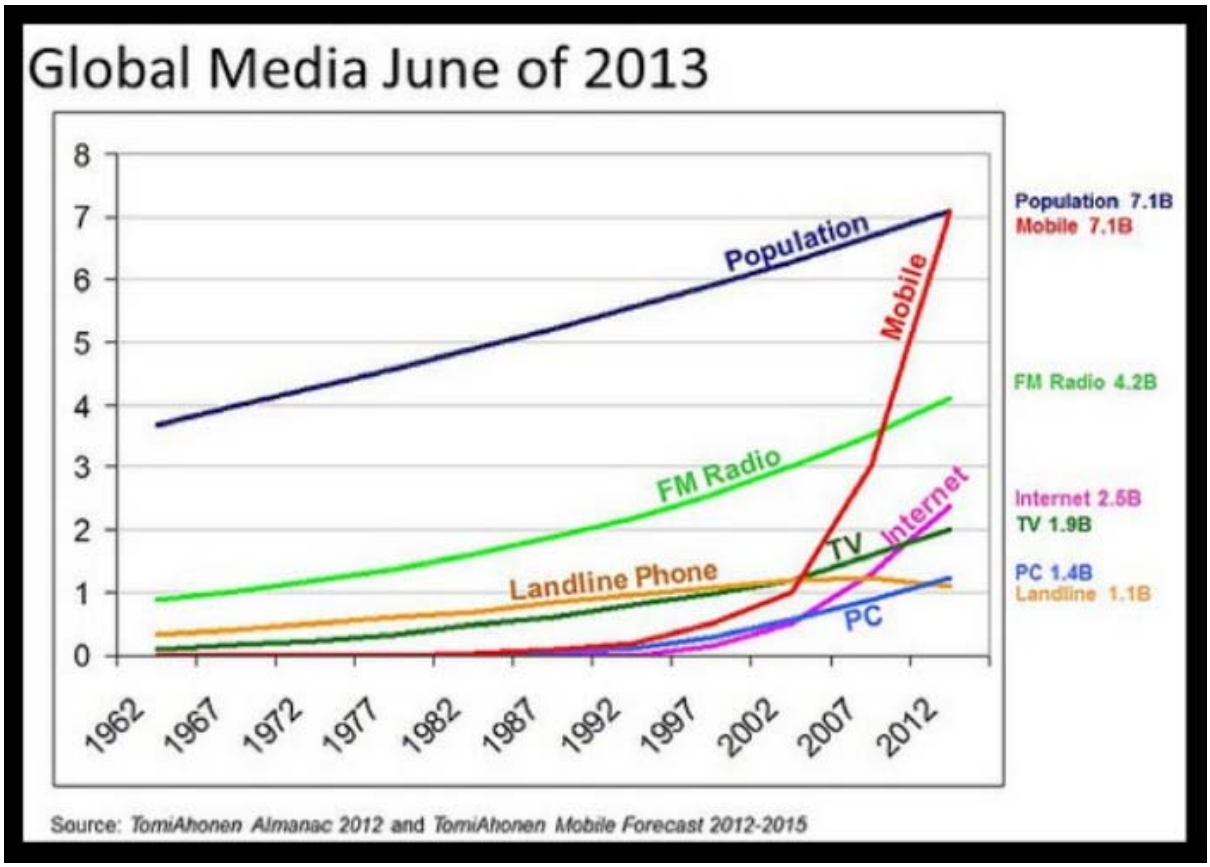


But other approaches are based on decentralized architectures and technology, and chose instead to engage citizens through portable technology, including smart phones. This is the case of EuroLifeNet for Air Quality (www.eurolifenet.eu), by CITIDEP, (www.citidep.net), and many other examples, as the one on the left.



Distributed architectures have clear advantages, such as adaptability (how long until Santander 12000 sensors will become obsolete, and placed far from new people routes?), and engaging citizens directly, allowing for a closer fit with end-user needs, as well as facilitating communication between planners and users.

On the other hand, technology trends point clearly to distributed, portable devices.



3. - Digital inclusion or aggravating the digital gap

- There is an on-going important debate, expressing the concerns of many that the trendy push for high-tech in smart cities is bound to aggravate inequalities and increase the digital divide. One thing is certain, we need to be careful and deliberate in our options, because any solution that will not promote digital inclusion is not sustainable in the long run.

On the other hand, the argument "High Tech is for High Income, Low Tech is for Low Income" may, as a paradox, aggravate the social exclusion, by directing advanced research and development resources away from solving the digital inclusion problem.

On the left is an example of a "smart citizen kit", which could well benefit from such kind of concerns, rather than targeting only upper class citizens.

- An excellent area where ICT can make all the difference, favoring inclusion, is the area of special mobility needs. The project "Trails of Accessibility" (www.e-planning.org , www.citidep.net), promoting use of smart phone apps to engage citizens in the process of identifying obstacles to mobility, is one of many good examples in this area, as the one below.

Caceres, Spain

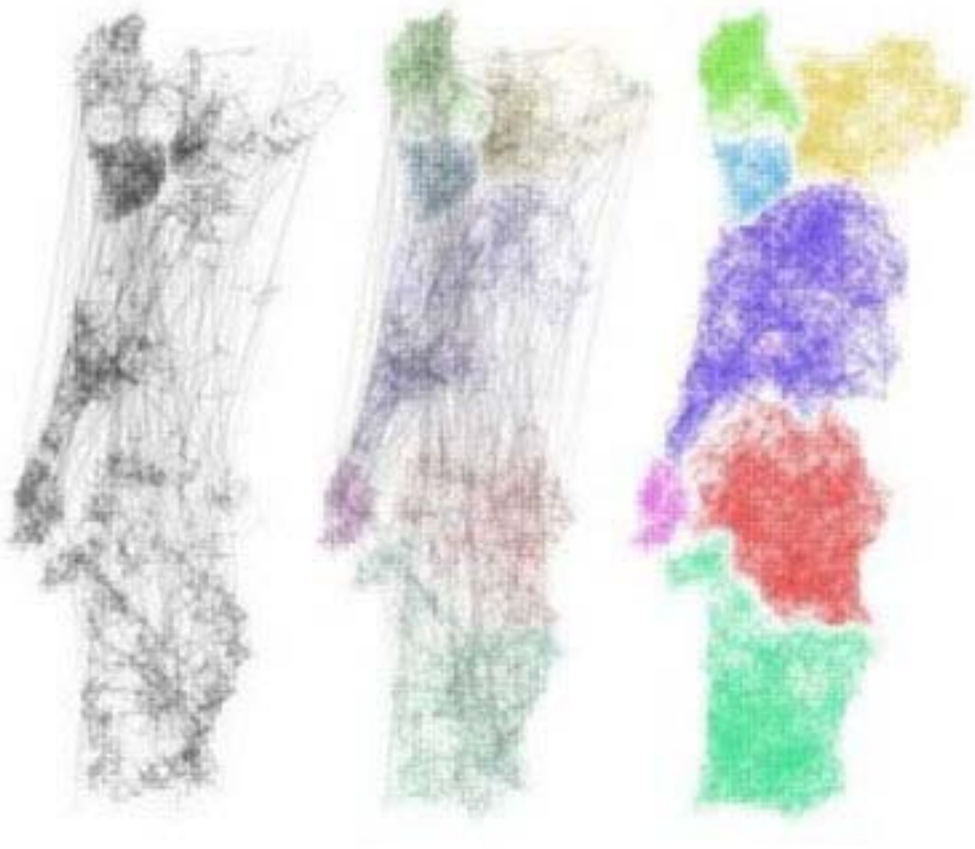
4. - Smart Cities vs. Smart Territories

One of the major issues for smart cities is… the rural surroundings. Can a smart city be sustainable within a "dumb" Territory? Evidence from many studies point this is not the case. So, we are faced with the need to bring to the table another dimension, that does not fit strictly in the 'smart city' agenda. Two components have special relevance for Enter.Hub:

- The weight of territorial cohesion in inclusion and sustainable development, without which no city can be competitive, let alone 'smart'

- Connectivity, be it physical or virtual, relies upon a physical infrastructure, and such infrastructure cannot connect cities without connecting territories.

A good example, is a recent study that show how territories in Portugal change significantly their "distance" relationship, when we consider the reality of economic and social interaction based on phone calls and data transfers. The map below on the left represent communication flows in Portugal (continent); the one in the middle, represent such flows, merged with traditional historical regional borders; the one on the right, show the new regional borders, if we consider the current communication flows.



Portugal, communication flows, MIT Senseable Lab

Some regions merged (Beiras/Estremadura, Alentejo/Algarve), some expand (Lisbon and Porto metropolitan areas); and, more unexpected, some other peripheric regions (Minho, Tras-os-Montes, Alto Douro), consolidated their identity and borders.

E. 10 Recommendations

1. Preserve Citizens' security, identity and privacy.

This is one of the great challenges of modern, ubiquitous ICT, and a serious requirement for any sustainable process.

2. Reduce inequality by universal access to technologies

Universal access implies adequate choice of technology and its deployment, comprehensive user-needs assessment, with a clear effort to consider special needs, such as low-income citizens and other situations.

3. Use ICT for accountability and transparency.

Balanced agendas imply good governance control and auditing tools, but also tools to promote and secure a participatory process, open to all citizens / stakeholders.

4. Develop International cooperation for improving the regulatory framework.

Besides mandatory cooperation to articulate institutions and regulations at local and national level, globalization is a hard fact in major transport networks, which are the most important context of city hubs – such as Enter.Hub.

5. Promote open data standards as opposed to proprietary data and protocols

In many procurement areas in developed countries, it is a well-established practice to mandate for open standards, when public moneys are at stake. Experience show this is a key factor to avoid the capture of public interest by private interests, in what concerns the smart city industry.

6. Favor integrated, decentralized / distributed architectures for ICT systems.

While centralized systems may in some cases allow for better integration, and be the most adequate, distributed systems tend to be more flexible, easier to maintain and to engage users. Decentralized systems require, however, open data standards enforcement for real integration.

7. Unify local and regional transport with a common ticketing system.

Integrated ticketing systems ("one trip – one ticket") are at the core of any rational, integrated, multi-modal transportation system. It also allows for true market-driven efficiencies, facilitating multiple operators without hindering the system. Such unified ticketing system requires tools that give responses to a Query (Origin – Destination) structured for the citizens to use.

8. Integrate ICT into a global urban strategy before hard investments

One potential good approach is to establish a 'Smart City Officer' at the municipality.

9. Promote territorial cohesion as the base for true "smartness" in a city.

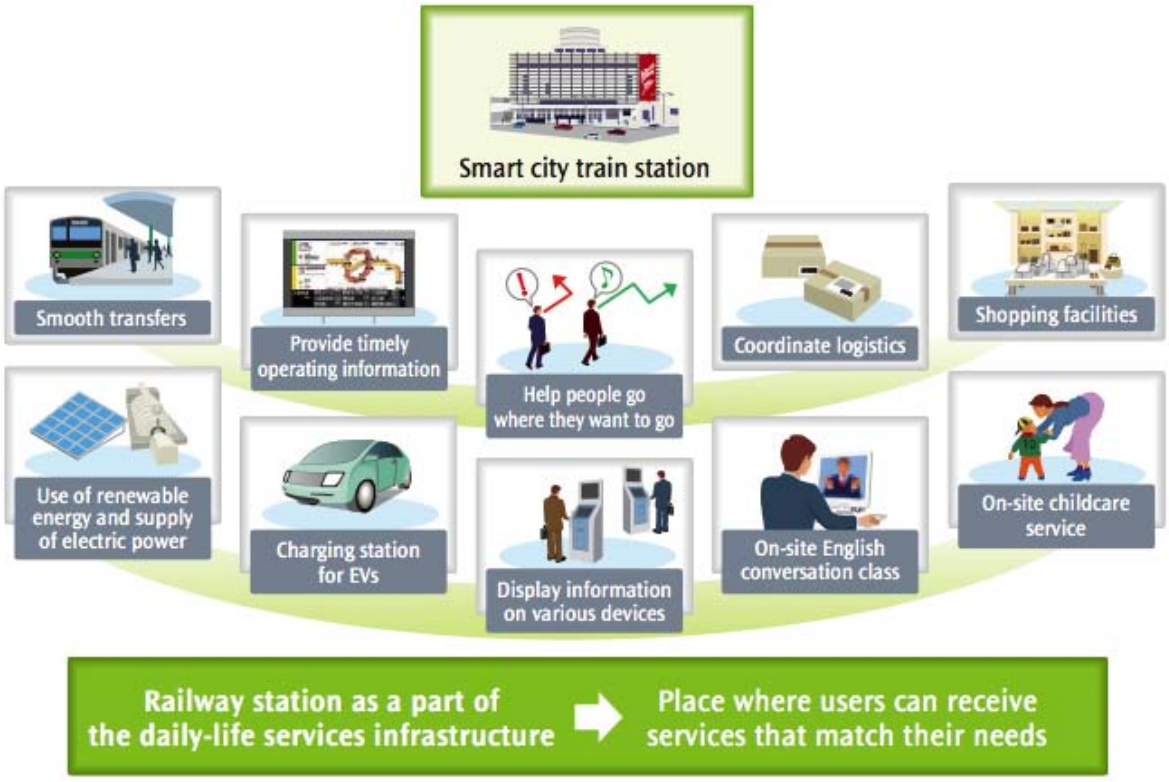
When planning for smart infrastructures, non-urban areas must be accounted for.

10. Make sure that the new technologies answer to a true need.

ICT utilization depends on integrated policy and communication, and the evolution of ICT-related procurements should be followed through a long-term contract.

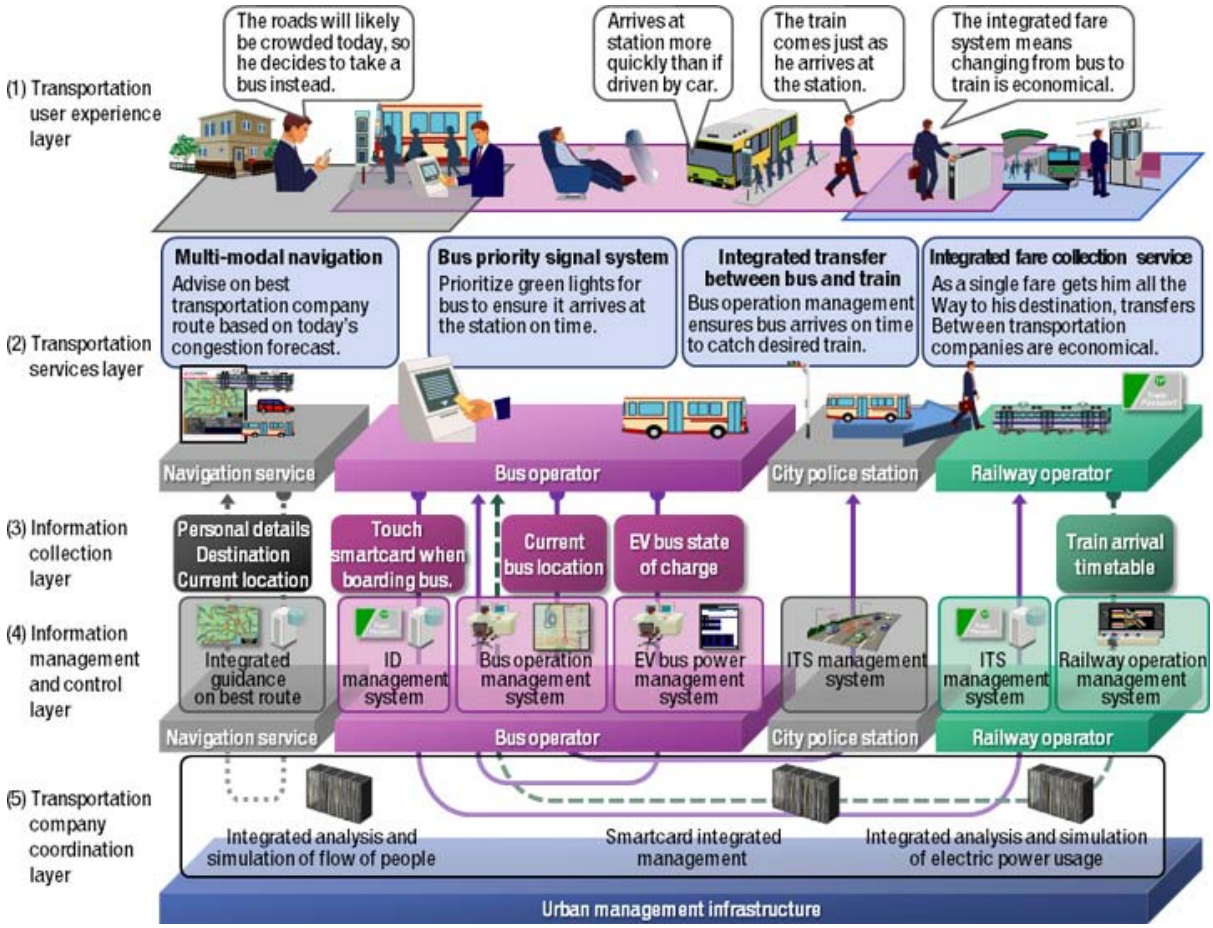
F. Conclusion

A smart train station, within a city, can be seen as the Enter.Hub core.



(Hitachi white paper)

But the concept of Hub implies to consider a multi-modal space, even before we think of the rail dimension. By the same token, the data requirements put at the center of Enter.Hub all the issues derived from ICT layers and is therefore mandatory to think of Enter.Hub as a smart, integrated system, with strong ties with practical all aspects of the life in a city.



Enter.Hub may represent a timely opportunity to develop a mid-size city common strategy, with an integrated view of all "smart-city" components relevant for quality of life, that are mutually dependent; but also with a flexible, distributed design, able to adjust to the fast pace of technology changes and social dynamics, and to better benefit from the trend towards ubiquity, distributed, portable technology, at the level of each citizen.

Such common strategy will allow mid-sized cities, after all the dominant profile of urban life in Europe, to get the most benefit from the economical investment, avoid redundancy and accelerate knowledge-transfer of best practices and lessons learned.

ANNEX - Enter.Hub Conceptual maps for Smart Cities & ICT