



SMART CITIES

White paper

Executive Summary

Each city has unique characteristics and each city can become smarter.

Smart cities transform our urban spaces through technological innovation, improve quality of life of citizens, and generate business opportunities, increasing possibilities for collaboration, education, recreation.

Smart cities include many components, from Smart Government to Smart Energy and Smart Grids, from Smart Mobility, to Smart Security. This White Paper gives a view of a possible solution to approach this complex scenario.

Members of the Public Organizations, Institutions, Government, Universities, Research Centers, experts, citizens: all stakeholders can help contribute and develop an ecosystem for the evolution towards Smart Cities.

Global scenarios

By 2050, the number of people living in urban areas will have doubled and 70% of the world population will be living in cities. The urbanization trend, together with a greater attention to the consumption of water and energy resources, environmental pollution, and economic and technological changes, is just one of the countless challenges facing urban centers in recent decades.

To address these phenomena and their transformations, cities need to become smart, leveraging the diffusion of ICT technologies to improve citizens' lives, respecting the environment and future generations and increasing local attractiveness and competitiveness, thus opening up to new opportunities for economic and social development.

What is driving the agenda



Smart answers to city challenges can be grouped around the following components:

- Smart Government
- Smart Citizen
- Smart Buildings
- Smart Energy and Smart Grids
- Smart Mobility
- Smart Health
- Smart Security

Smart Government

Governance involves managing hard factors (information, command and control of the city environment) and soft factors (citizen-government relationships).

Governments are presented with IoT and ICT as means to increase awareness, command and control of the city environment, and to increase the flow of information between government and citizen.

A city with smart governance must be capable of attracting and retaining talent, creating plans to improve education, and promoting creativity and research.

Smart Citizen

The main goal of any city should be to improve its human capital.

Smart city is all about synergies between technology and its citizen, without smart people the development of smart cities will not progressing effectively, the smart citizen/people is needed as the main driving force behind digital economic that will produce a radical change in economic future.

Smart Buildings

A smart building integrates the different available physical systems in an intelligent way to ensure that all the systems act together in an optimized and efficient manner. Smart building management systems can improve building energy efficiency, reduce waste and ensure an optimum usage of water, with operational effectiveness and occupant satisfaction. It is estimated that implementing smart building solutions could save as much as 30 per cent of water usage and 40 per cent of energy usage and reduce overall building maintenance costs by 10 to 30 per cent.

Smart Energy and Smart Grids

Smart energy management systems use sensors, advanced meters, renewable energy sources, digital controls and analytic tools to automate, monitor and optimize energy distribution and usage. Such systems optimize grid operation and usage by balancing the needs of the different involved stakeholders (consumers, producers and providers). There are a number of innovations in smart energy infrastructure, such as distributed renewable generation, microgrids, smart grid technologies, energy storage, automated demand response, virtual power plants and demand-side innovations such as electric vehicles and smart appliances. Such innovations provide an extended network of intelligent energy devices across a city, with a detailed view of patterns of energy consumption, enabling community-based energy monitoring programs and improving the energy efficiency of buildings. A key component of smart energy infrastructure is smart grids. A smart grid may be defined as an “electricity delivery system from point of generation to point of consumption integrated with ICT for enhanced grid operations, customer services and environmental benefits”.

Smart Mobility

Smart mobility is best described as approaches that reduce congestion and foster faster, greener and cheaper transportation options. Most smart mobility systems use data collected from a variety of sources about mobility patterns in order to help optimize traffic conditions in a holistic manner. Smart mobility systems include mass transit systems as well as individual mobility systems that feature bicycle sharing, ride sharing (or carpooling), vehicle sharing and, more recently, on-demand transportation. Intelligent transport systems integrate the entire array of multimodal transport options in a city, including both individual mobility and mass transit, in an efficient manner. Modern intelligent transport systems normally comprise inter alia a network of sensors, global positioning system-tracked public transportation, dynamic traffic lights, passenger information panels, automatic vehicle registration plate readers, closed-circuit television systems, navigation facilities, signalling systems and, most importantly, the capability of integrating live data from most of these sources. This can

lead to improvements in safety, network management, traffic congestion, environmental performance, accessibility, convenience and public perception.

Smart Health

The health and well-being of urban residents are of particular concern with regard to the sustainability of urban areas and their supporting ecosystems. Smart cities can develop the capacity to use technology such as big data to develop predictions or identify hotspots of population health (such as epidemics or health impacts during extreme weather events).²⁰ Smart health-care management converts health-related data into clinical and business insights, which include digital health records, home health services and remote diagnoses, treatment and patient monitoring systems. It also facilitates the provision of health care using intelligent and networked technologies that help monitor the health conditions of citizens. It is enabling a shift in focus to prevention instead of cures, with a broader view of overall care, healthy living and wellness management. Smart health-care systems have a great potential in ageing societies in developed countries, and may lessen inequality in health care between high and low-income groups. Examples of smart health approaches include crowdsourcing to collect data on epidemics and predict epidemic outbreaks and take the necessary precautions, remotely collecting patient health vitals and data for diagnostic purposes and establishing automated alerts for patients with regard to medications and health check-ups.

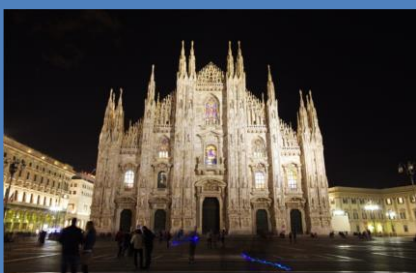
CASE STUDIES



San Francisco has been revolutionised by smart payment methods for fares, which allow passengers to pay for their commutes via their smart phones or contactlessly, streamlining the process. Smart Parking in San Francisco allows authorities to adjust the prices on parking in certain areas based on the number of available spaces over a length of time to control flow and congestion. San Francisco is also leading the way in many clean energy initiatives.



Valencia deployed a global platform, “Plataforma VLCi” for smart city management, that collects key indicators of municipal services , improving their efficiency and offering them transparently to the citizens.



Milan is investing in the safety of its residents and visitors -Emergency call pillars in all city parks, video surveillance at critical points and free Internet access via Open WiFi Milano –. The Italian metropolis is setting standards with its full-coverage fiber-optic network.

Smart city architecture layering approach to a complex scenario

Designing a platform for a smart city does not happen overnight, it is like a puzzle and you need to put all the pieces together in the right direction:

- a visionary leadership to lead the build out of the smart city platform architecture
- a great deal of collaboration, one initiative at a time
- some kind of national architecture model based on a service oriented architecture approach (SOA).

There are several possible approaches to achieving Smart Cities objectives and deployment strategies could vary case by case.

At one extreme, a city may adopt a fragmented approach in which different networks and systems are used to support multiple, discrete smart city services. At the other extreme a city may use a centralised approach, with a single network and platform being employed to support all smart city services, managed by a single central customer.

More than any other sector, smart cities require the union of a diverse set of technologies, requirements and capabilities (as showed in the bottom architectural picture: see fig. 1).

Citizens, public administrations, utilities, private and business sectors such as Architecture and Engineering facilities, all have a part to play in, and the potential to benefit from, this digital transformation and integration.

A layering approach in design and standardization is likely to not only enable newer and better services, but also allow far greater synergies and cost-effective deployments, reducing the lifecycle (total) cost of ownership of any Infrastructure in a city, with attendant environmental benefits, including carbon reductions.

Following the layers showed in the bottom architectural view, a Smart City has to integrate:

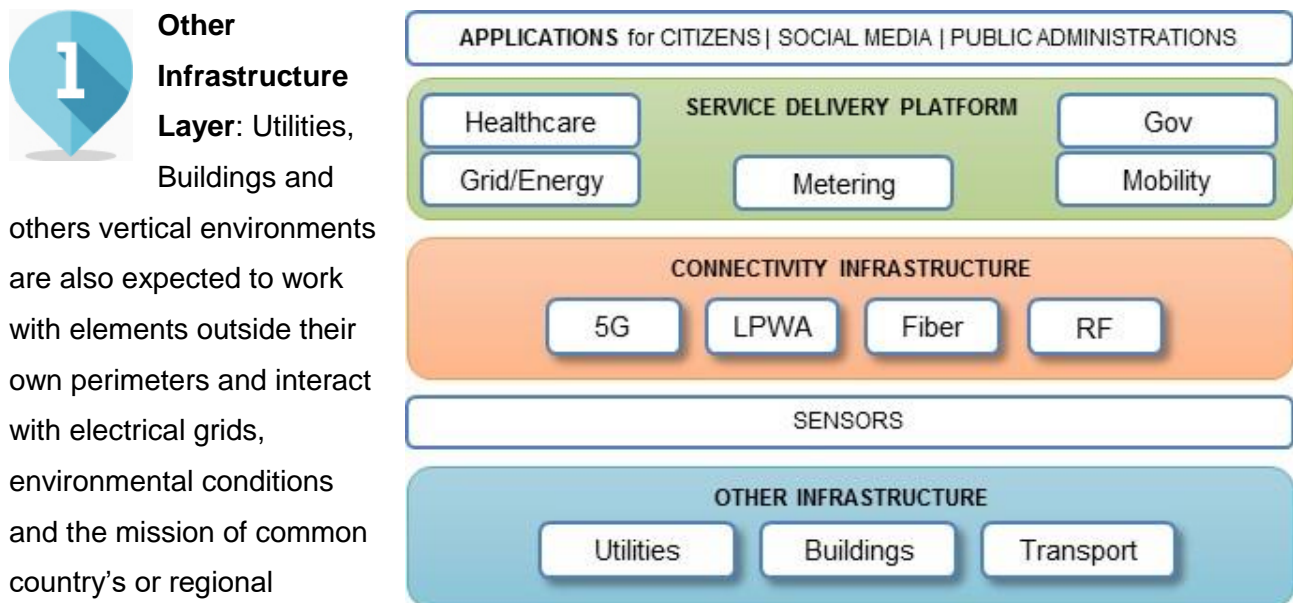


Figure 1- Architectural view

2 Sensors Layer: Sensors layer is one of the crowdest one (a lot of vendors, standards ecc.) and is one of the most important pieces of the smart cities' puzzle, because they gather data about its vital statistics and, in turn, ensure that a city functions smoothly. So a network of sensors, cameras, wireless devices, data centres form the key infrastructure, allows to provide essential services in a faster and more efficient manner. There are a lot of sensors in a Smart City with different purposes and deployed, integrated and managed by different stakeholders:

- Mobile sensors Devices
- Wearables sensors
- Indoor/Outdoor Air Quality sensors
- Automotive and Transport sensors
- Traffic & Security Cameras, Parking, Lighting, Metering, Waste and many more

3 Connectivity Infrastructure Layer: this layer involves many actors, such as Utilities, Telco Operators, Standardization Entities, and Government Legislators. There is a need to focus on the creation of a secure, standardized and open infrastructure model for the

delivery of services. This layer has to be designed combining standards-based, end-to-end software with a converged smart infrastructure gateway design with unified Last Mile Communication Protocol & Data Semantics to establish a common, open framework for secured service delivery and management



Service Delivery Platform Layer: creating a Service Delivery Platform (SDP) for smart city and smart building solutions is a lot of work. This puzzle's piece needs a SOA architecture vision and a secure and scalable solution with all the necessary connectivity options for connecting legacy equipment to the cloud and providing a Big Smart City Data Lake available for a set of stakeholders. It requires software for managing devices, collecting and processing their data, displaying results, automating functions, and delivering new services. In addition, there needs to be a high level API with access to normalized data so that application developers or verticals can use the infrastructure to deliver value-added applications at reduced time and cost.



Service & Application Layer: thanks to all the other layers, the provision of real-time information about urban and vertical specific environments, enable the opportunity to provide a set of different helpful applications and services. It is clear that the spectrum of application areas is very wide:

- Real-time travel information is essential for applications, which let people plan trips on public transportation. The user could have real time information about when the next bus or train is coming.
- Information about Parking is accessible, so drivers can promptly find free spaces.
- Information about Air quality, Traffic, and many others

Access to suitable data represents an opportunity for developers to create applications. In this way stakeholders can access wide online services, with portals for basic information, citizen services, business, and tourism, all based on a common infrastructure and data lake. Smart cities are deploying online services in different sectors and successful smart cities will offer:

- value to governments through efficiency savings and improved citizen engagement
- benefits to citizens through improvements in health, lifestyle and efficiency
- expansion and displacement opportunities for established enterprises, such as utilities
- dramatic growth opportunities for disruptive businesses.

Reimagining and redesigning vendors existing business models

The smart city concept is a framing device, which is driving huge investment across a range of city services and infrastructure. As the supplier ecosystem for smart cities continues to expand, established suppliers are moving into the market from the energy, transport, buildings, and government sectors, while startups are addressing a range of emerging opportunities with an Open Innovation Business Model Logic.

In fact, Smart Cities are seeking partners and suppliers to collaborate on ambitious programs for sustainability, innovation in public services, and economic development that depend on significant technology investments. The leading players in this market, such as Cisco, are delivering smart infrastructure, IT, and communications solutions to cities, supporting cities across multiple operational and infrastructure issues, having established ecosystems of partners network providing an important source of innovation in the market.

Due to the complexity of smart cities, and the layering approach, the market scenario trace an ecosystems of vendors, integrators, suppliers and startups with an Open Innovation Business model approach, highlighting the impossibility of a “full liner” game player for this business, and widening the opportunities to many actors.

About Italtel

Working where Telecommunications meet Information Technology, Italtel addresses some of the main technological challenges the world of communications is facing nowadays. IP Networking, Cloud, Network Function Virtualization, SDN, WebRTC, IoT, are just some of the areas where the company is present with end-to-end solutions.

Italtel offer includes proprietary products, engineering and network consultancy services, managed services and solutions. Italtel counts more than 40 customers worldwide, and among them there are several major Service Providers and multinational Enterprises. In addition to having a leading position in the Italian market, Italtel has focused its foreign operations on EMEA markets and Latin America.

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