



The Making of Smart Cities: Working Together

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Chair, IEEE Computer Society e-Government STC

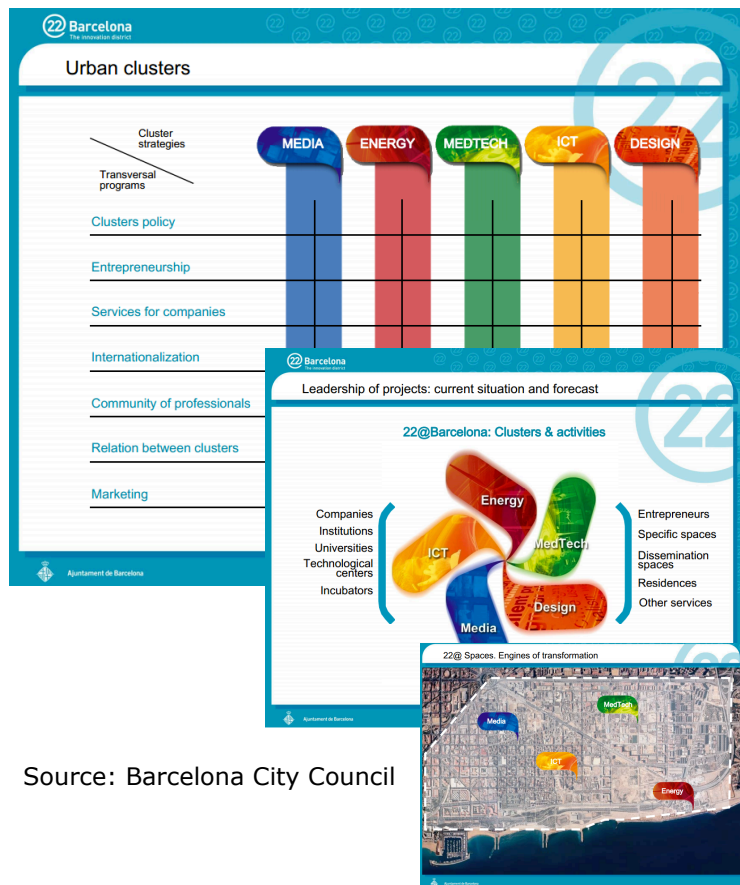
IEEE Smart Cities Committee

ITU/UNESCO Forum on Smart Sustainable Cities
Montevideo, March 2014

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Defining Smart Sustainable Cities



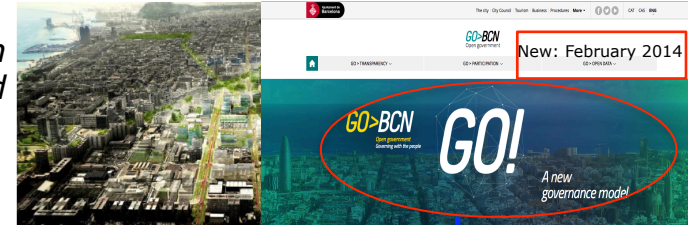
Source: Barcelona City Council

AREA	GENERAL AIMS	INTERVENTIONS
Information	<ul style="list-style-type: none"> Increasing the transparency of municipal management. Encouraging social use of public data. Promoting innovation and the economic fabric. 	<ul style="list-style-type: none"> Sensorisation of urban elements, i.e. Traffic: installation of cameras in public spaces; magnetic loops and Bluetooth sensors to control the volume, speed and flow, etc. Creation of a unified platform for management: administrative procedures through electronic applications such as e-Contracte, e-Document, e-Signature, inspection, e-files, licensing work files, etc. OpenData BCN project: a platform which makes all municipal government data available to everyone, except those aspects of information subject to privacy.
Infrastructure	<ul style="list-style-type: none"> Providing direct access to the network and, also, to information and services managed through the online platform — ubiquity—. 	<ul style="list-style-type: none"> Special Infrastructure Plan: 325 km. of optical fiber, mainly used for internal communications —both data and voice— by the local police, the fire department and municipal buildings, as well as traffic management. Free public WiFi service offered through 416 access points located inside municipal facilities.
Smart Services	<ul style="list-style-type: none"> Provision and management of public services via internet-based applications and devices. 	<ul style="list-style-type: none"> Barcelona virtual office: website to sort out administrative procedures for citizens and companies. iBicing: application for mobile phones to help users of the public rental bicycles service to locate bike stations and verify the availability of units.
Human Capital	<ul style="list-style-type: none"> To attract talent and companies in the Knowledge Based Economy (KBE) related industries. 	<ul style="list-style-type: none"> Urban transformation of the 22@ district.

Policies. Source: Gavaldà & Ribera-Fumaz (2012)

Defining Smart Sustainable Cities

From Digital City to Smart City nowadays: Smart City's Strategy in Barcelona has been "embedded" in the progressive ICT (and urbanization) adoption along the years.

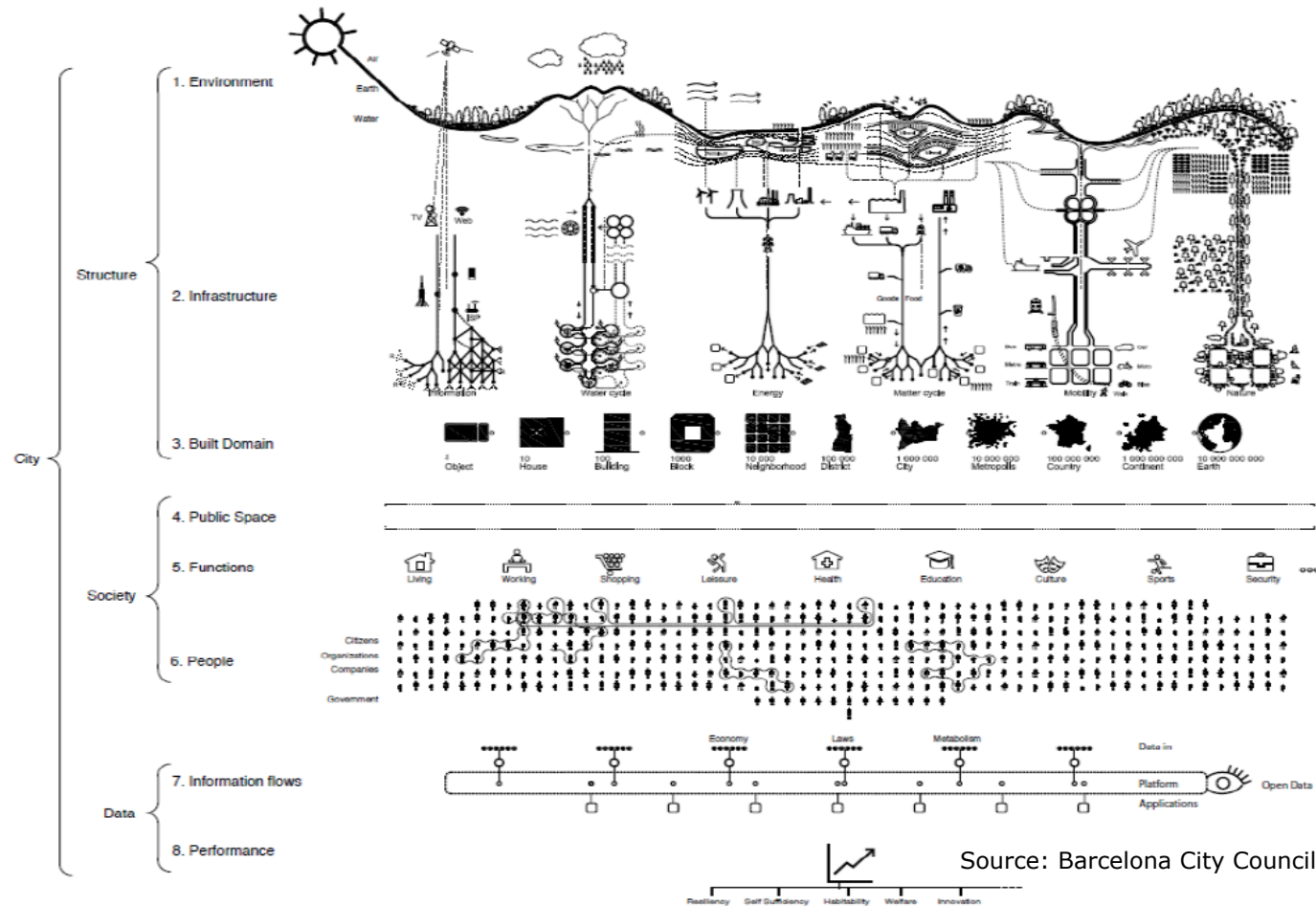


Sources: Barcelona City Council



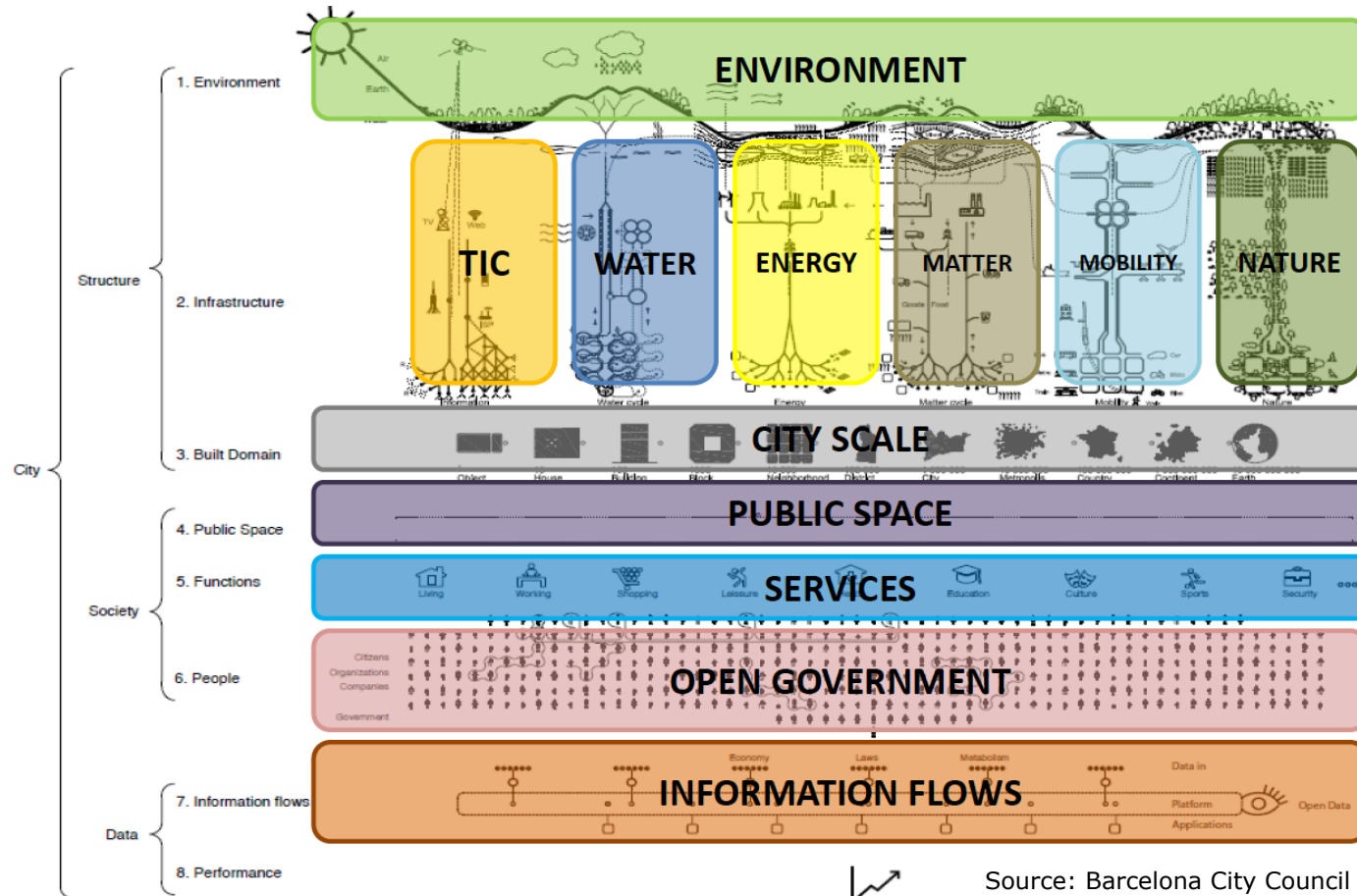
Defining Smart Sustainable Cities

›Balanced and Optimized “System of Systems”



Defining Smart Sustainable Cities

›Balanced and Optimized “System of Systems”



Source: Barcelona City Council

Defining Smart Sustainable Cities

- ▶ Strategy and plans (continuity)
- ▶ Mechanism to use ICT strategically
- ▶ Technology as enabler
- ▶ Layers: People/Information/City Structure
- ▶ Transversal projects (intelligent data...)
- ▶ Vertical projects ([open government](#)...)
- ▶ Collaboration (Public, Private and People...)
- ▶ Test in Laboratory (Tech Urban Labs...)

Questions...

- ▶ Some questions:
 - Are we measuring and evaluating?
 - If yes... what are we measuring?
 - What metrics are we using?
 - Do we have a maturity model?
 - What we know about our technologies?
 - Do we have standards?
 - Are we having the highest knowledge level about the options?
 - Will we interoperate?
 - Do we have security?
 - Are we educating?

- ▶ Some answers....

IEEE Smart Cities



IEEE Smart Cities

1990:

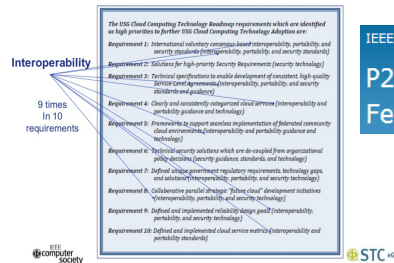
The IEEE Standard Glossary of Software Engineering Terminology (Std 610.12-1990, The Institute of Electrical and Electronics Engineers, New York) defines

Interoperability

As "the ability of two or more systems or components to exchange information and to use that has been exchanged"



US Government Cloud high priority requirements - 2011

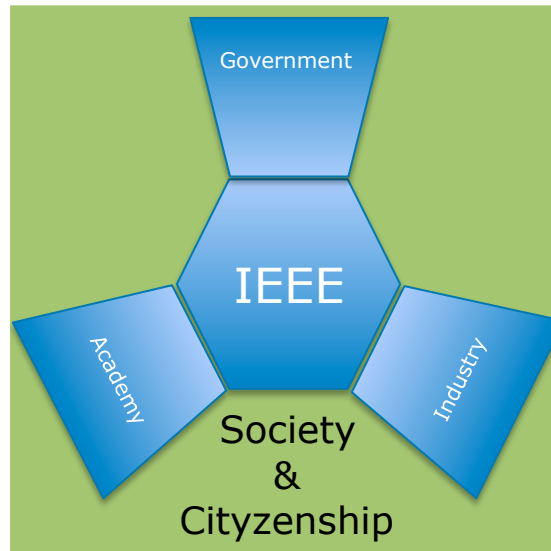


IEEE PROJECT

P2302 - Standard for Intercloud Interoperability and Federation (IEEE)

IEEE STANDARD

2030-2011 - IEEE Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), End-Use Applications, and Loads



Smart Territories' Governance: ...When Interoperability Meet Open Government

Smart Cities and IEEE's Future Directions



From Big Data to Extreme Data



The IEEE holistic view:
strategy, standardization, alignment, education, evolution, SUSTAINABILITY



IEEE Smart Cities

► Some highlights...

- Technology as a tool, not as an end (defined targets)
- Standards and aligned systems' plans. Strategy, planning and evaluation. (management)
- E-Government ([Open-Smart](#)) & e-Governance
- P⁴:Public, Private & People Partnership (collaboration)
- Education (Institutions have to be educated too)
- Continuity, even if political changes (evolution)
- Citizens' & city needs: target (citizen involvement)

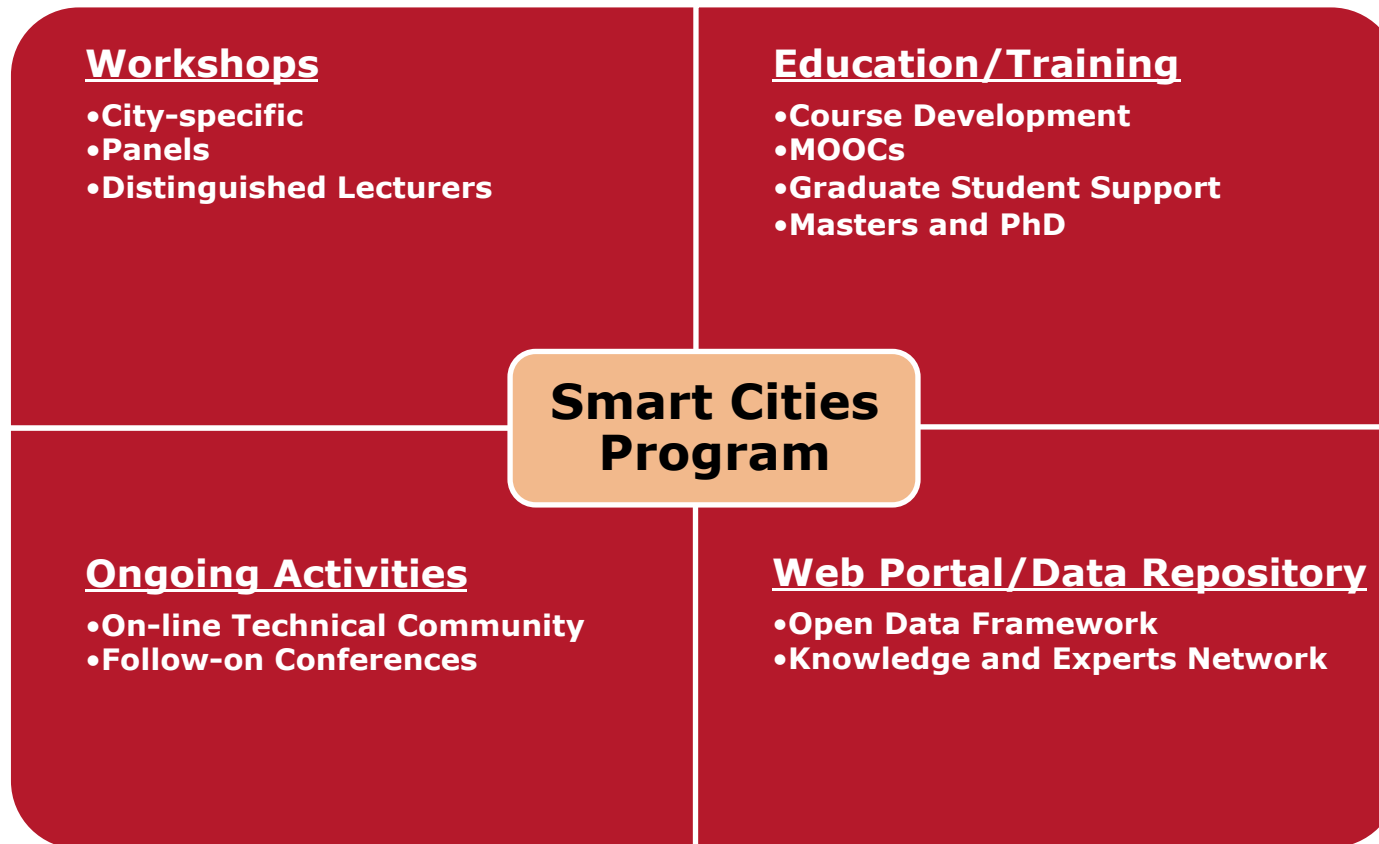
IEEE Smart Cities

› IEEE is assisting in managing transition to Smart City in Key Partnership with ITU:

- ❑ Funding Municipalities' Projects
- ❑ Educating & Teaching: Technologies
- ❑ Assisting & Advising: Standards & Technologies' alignment
- ❑ Promoting P⁴ (Public, Private & People Partnership)
- ❑ Holistic Knowledge & View
- ❑ ...



IEEE Smart Cities



IEEE Smart Cities

- ▶ Measuring Smart Cities
- ▶ Qualitative and quantitative approaches
- ▶ Neutrality. No second intentions
- ▶ Sharing criteria and results
- ▶ Partnership
- ▶ Educating and training
- ▶ Free of cost advisory for institutions

IEEE Urbanization Challenge: Guadalajara

- Has a concrete plan and funds to become a Smart City
- Local constituency welcomes IEEE involvement
- Local authorities have interest in sharing experiences at the international level and becoming a path leader
- Local IEEE Chapter and Section has assumed local responsibility for the project
- Local university interested in working the Smart Cities space as well as some form of local industry commitment

GUADALAJARA
CIUDAD CREATIVA DIGITAL

CCD LOCATION:

- In **Guadalajara's Historic center**
- Around **Parque Morelos**
- It is part of a Comprehensive strategy for the **revival and regeneration** of the main city area
- CCD core area is **40 hectares+ Parque Morelos**
- Area of direct beneficial influence is **380 hectares.**
- **DUIS certification** is a prerequisite for the Digital Creative City



IEEE Urbanization Challenge: Guadalajara

■ Workshop - Pilot event

- 29-30 October 2013; Guadalajara, Mexico
- In collaboration with Ciudad Creativa Digital (CCD), IEEE Guadalajara section, and the local IT industry chamber
- FDC funded
- Program content
 - 4 Panels, 8 talks, 6 whitepaper working groups
 - Topics include: physical infrastructure, information infrastructure, big data, data visualization, societal impact, cyber security, public policy....
- Attended by 70 people from academia, industry and government
 - Participation of ITU and EIT ICT LABS
 - Agreed talks recorded and slides available on web site:
 - <http://smartcitygdl-ieee.org/media.html>
 - Several ideas and issues emerged through working teams
 - Creation of a White Document under progress. Expected public availability in January 2014. To be presented at the Guadalajara Municipality and State Government
- Potential to become an Open Air – Live Lab

Workshop



IEEE Urbanization Challenge: Guadalajara

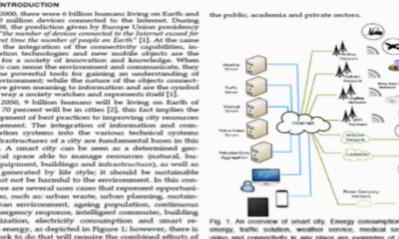
Peer review process..

Network Architecture based on Virtualized Networks for Smart Cities

A.D. Guerrero-Pérez, A. Herrera, F. González and D. López

Abstract. Over the next three decades, steady increase of the global population will be in place. This fact makes the development of best practices to improve city resources management. The integration of information and communication systems into the various technical systems and architectures of a city are fundamental issues in smart cities. A smart city must combine legacy networks and new communication architectures, in order to configure existing communication networks to increase connectivity and interoperability. The requirements demand a network that change frequent and need control of data processing, increasing equipment and its own expansion. In addition to this fact, the network infrastructure programs, designing of functionalities in a networking environment to develop new networking programs, services and best practices for smart cities.

Index Terms. Data communication, Emerging technologies, Network Communication, Optical Fiber



1 INTRODUCTION
 In 2009, there were 6 billion humans living on Earth and 200 million devices connected to the Internet. During 2010, the population given by Europe Union grew by 1.5 million people and the number of people on Earth [1]. At the same time, the integration of the connectivity capabilities, information technologies and new mobile objects are the basis for a society of innovation and knowledge. When objects can sense the environment and communicate, they become connected tools for getting an understanding of the environment and the status of the objects connected. We have given meaning to information and see the symbol of the very a society watches and represents itself [1].
 By 2050, 9 billion humans will be living on Earth of which 70 percent will be in cities [2]. This fact implies the development of best practices to improve city resources management. The integration of information and communication systems into the various technical systems and architectures of a city are fundamental issues in this project. A smart city can be seen as a distributed geographical space able to manage resources (thermal, human, equipment, buildings and infrastructure), as well as wastes generated by life styles it should be sustainable and must not be harmful to the environment. In this context, there are several uses cases that represent opportunities areas, such as urban waste, urban planning, sustainable urban environment, aging population, continuous care, emergency response, intelligent communities, building automation, electricity consumption, and smart renewable energy, as depicted in Figure 1; however, there is much work to do that will require the combined efforts of

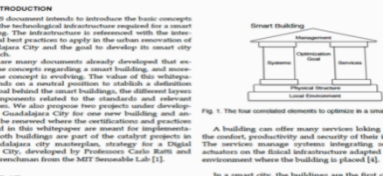
Information and communication are key to the intelligent city of tomorrow [3]. A smart city must combine legacy networks and new communication architectures to increase connectivity and interoperability while utilizing the best of both worlds and their networks.
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IEEE-CCD Smart Buildings Introduction

V.M. Larrosa, J.G. Huérfano, L. Gómez, and F. Pinson, IEEE-CCD

Abstract. As an open architecture, IEEE-CCD is intended to be an enabler to develop the smart buildings and their products for the development of smart buildings. Open standards are intended to create interoperable smart buildings. The IEEE-CCD Smart Buildings City, see new and another to review, are described as a part of concept under development and being part of the strategy to develop the smart city established based in a master plan.

Index Terms. Environmental Sustainability, Information Technology and Systems Applications, IT Applications, Smart Buildings, Smart Cities



1 INTRODUCTION
 The development intends to introduce the basic concepts of the technological infrastructure required for a smart building. The infrastructure to be developed with the international best practices to apply in the urban renovation of Guadalajara City and the goal to develop its smart city approach.
 There are many documents already developed that explain the concepts regarding a smart building, and moreover, the concept is evolving. The value of this challenge per stands on a neutral position to establish a definition and a good behind the smart buildings, the different layers and components related to the standards and urban development. We also propose two projects under development of Guadalajara City for our smart building and an offer to be reviewed where the certifications and practices proposed in this whitepaper are meant for implementation.
 Both buildings are part of the catalyst projects in the Guadalajara city metropolitan strategy for a Digital Creative City, developed by Professors Carlo Ratti and Detlev Froehman from the MIT Senseable Lab [1].
 In a smart city, the buildings are the first cells and the sum of many smart buildings can be seen as an important smart city.

2.1 Smart Building Definition
 A smart building is a construction with an advanced design and technological support to maximize its life cycle and control for their occupants with the precision to reduce their operational costs, and extend the life of the physical structure [2]. The smart building adapted in a local environment look to optimize its basic correlated elements: physical structure, system services and management [3]. The figure 1 shows relationship.

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Cloud Computing Architecture for digital services into Smart Cities

J.F. Hernandez, V.M. Larrosa

Abstract. Population growth, the use and evolution of the internet and ability of increasing computer times and constant user activities have allowed to generate any state on to improve the quality of services of the users around the world as this state, the smart cities are an emerging project related trends to incorporate information systems, storage and analysis of data to support a sustainable environment in the paper we propose an architecture for cloud computing and IoT as a platform to enhance the smart city digital services. Some of the key services are related to parking, data processing, traffic and security management. For the next, we present the use of cloud computing as a platform to enhance the smart city digital services. The characteristics of some services to analyze their behavior and propose an ontology for services based in a cloud architecture. The contribution is based on the review of other smart cities approaches on health, Medical Imaging or Animation. Finally, we will show the importance of updating educational programs in the universities and create cloud computing necessary to the city in order to promote innovation in services.

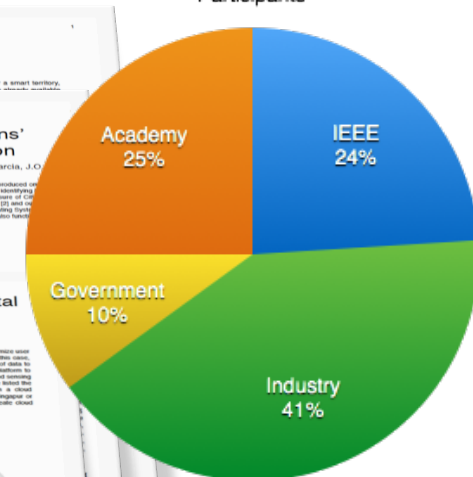
Index Terms. Distributed Systems, software engineering, security, smart city.

1 INTRODUCTION
 Cloud computing has become a preferred option in information systems because it can optimize, organize and maintain software services and hardware across the internet [1]. The use of this technology has allowed companies to reduce costs of maintenance and support. In addition, the companies reach an efficient and flexible use of hardware and software resources on demand. The cloud is divided into 3 main areas:
 1) Public, as a service offered for general users with the use of hardware and software resources and scalability.
 2) Private, as hardware resources and software applications with restrictions. The cloud could be free or with a fee.
 3) Hybrid, mixing public with the control of the hardware and software resources and they are able to enable them on demand.
 4) Hybrid: a mix of the two precedent areas.
 All areas of cloud offer a service representing the use of a product accessible by vendor/client purchases (temporarily or permanently) through an exchange. The service usually is paid with money. In addition to these 3 areas, the cloud has different levels of service [2], see Fig 1. The service levels are: 1) IaaS (Infrastructure as a Service) and it contains servers, connections and switches that create a logical infrastructure through virtualization for different working sessions. 2) PaaS (Platform as a Service), it can be used to develop applications without the complexity of managing the underlying hardware and software. 3) SaaS (Software as a Service), it is an application or system in which mounted over Internet (cloud) and it provides some service for a specific client and 4) MaaS (Metal as a Service) proposed



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IEEE Industry Government Academy Participants



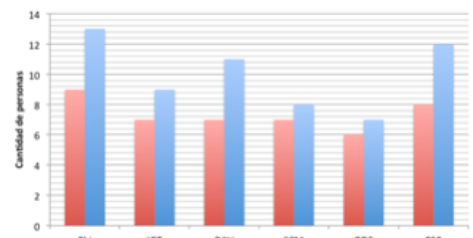
6 Working groups:

- PHI – Physical Infrastructure
- IOT – Internet of Things
- ODF – Open Data Framework
- DAV – Data Analytics & Visualization
- MTX – Metrics for Smart Cities
- EDU – Education for Smart Cities

First goal to **achieve the whitepapers** from the Kickoff

Focus to Identify local pragmatic & social impact issues for each working group

Esperados Vs Asistentes



Grupo de trabajo: PHI - Physical Infrastructure, IOT - Internet of Things, DAV - Data Analytics and Visualization, SCM - Smart City Metrics, ODF - Open Data Framework, ESC - Education for Smart Cities



Building Smart Sustainable Cities

- › If you are thinking on building a Smart Sustainable City
 - Strategy
 - Plans
 - Partnership (Academia+Industry+Government+IEEE)
- › IEEE Smart Cities is looking for municipalities to continue ahead. Maybe yours can be interested?

Contact us!

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Thank you

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