



Smart Cities

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DRIVERS FOR "SMART CITY" MARKET

URBANIZATION, RESOURCES CONSUMPTION, GDP GROWTH

CITIES ACCOUNT FOR



53%

OF THE GLOBAL POPULATION
(7.0 BILLION) BY 2010



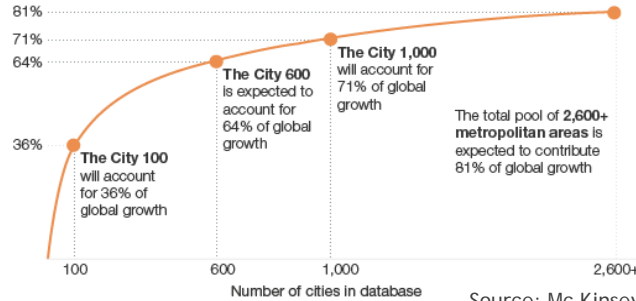
70%

WILL BE URBANITES
(OUT OF 9.3 BILLION) IN 2050

Source: United Nations

CITIES CONTRIBUTE THE MOST TO GDP

Projected cumulative contribution to global GDP growth, 2010-25, %



CITIES CONSUME THE MOST RESOURCES



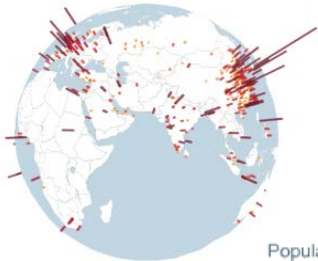
70%

OF ENERGY CONSUMPTION AND CARBON EMISSIONS



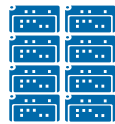
2%

OF THE EARTH'S LAND



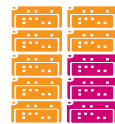
Population
LOW ← HIGH

A SOCIO-ECONOMIC SHIFT DOUBLED BY A GEOGRAPHIC SHIFT



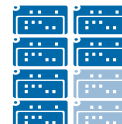
8,000

LARGE COMPANIES EXCEEDING \$1B IN REVENUE IN 2010



+ 7,000

NEW LARGE COMPANIES EXCEEDING \$1B IN REVENUE IN 2025



73%

OF 8,000 LARGEST COMPANIES' HEADQUARTERS IN DEVELOPPED COUNTRIES



70%

NEW ENTRANTS LIKELY TO BE BASED IN DEVELOPING COUNTRIES



76%

OF CONSOLIDATED REVENUE OF ALL LARGE COMPANIES

THE SITUATION IN ASIA PACIFIC

- By 2050 the number of people over the age of 60 is expected to triple, and will outnumber children under 15 for the first time in history. Some countries in Asia are currently facing an increase of elderly population (Japan, Singapore)
- Besides the doubling of the middle class from 80 million in 2012 to 160 million in 2015, the ASEAN population holds more than 50% of generation Y and Z, which means that this generation is a savvy user of advanced technologies, including mobility, cloud, social and Big Data.
- UN forecasts that ASEAN's urban population in 2050 will exceed 500 million - that was ASEAN's total population in 2000.
- Currently there are 21 mega-cities (with populations >10M). This is forecast to increase to 27 by 2020. Asia will have at least 10 mega-cities by 2025, including: Jakarta, Indonesia (24.9 million), Mumbai, India (33 million), Shanghai, China (27 million), Karachi, Pakistan (26.5 million) and Dhaka, Bangladesh (26 million).

3 CHALLENGES FOR THE REGION



Urbanization challenge

The continuous increase of urban population put pressure on transport, access to clean water, energy supply and telecom network. Infrastructure planning needs to be rethink to ensure a quality of life and security to citizen

Social cohesion challenge

Necessity to bridge the gap between the “have” and the “not have”
Given the dilemma between a rapidly growing urban population and a rural population that is falling further behind, governments must be careful in assigning priorities to development projects. Accelerating rural development is necessary to reach 100% coverage in those areas.

Environmental challenge

As business and policy leaders, all the stakeholders should avoid to do the same failure as occurred in the past. It requires to reduce energy consumption and to be respectful of the environment.

WHAT IS A SMART CITY ?

A type of city that uses new technologies to make them more liveable, functional, competitive and modern through the use of new technologies, the promotion of innovation and **knowledge** management bringing together 6 key fields of performance: the **economy**, mobility, the environment **citizenship, quality of life** and finally management. -

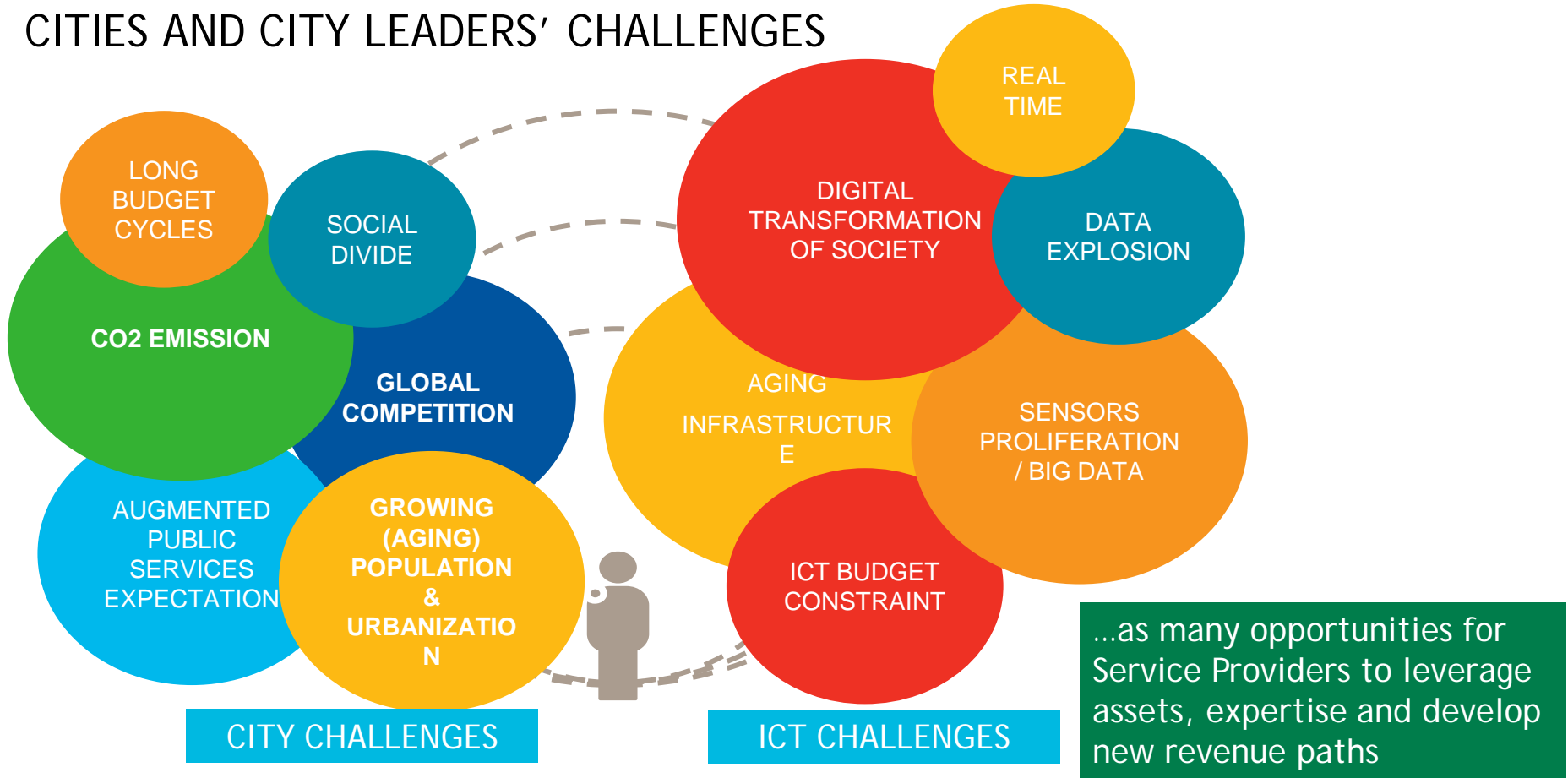
City of Bilbao

A city can be defined as 'smart' when investments in **human** and social capital and traditional (transport) and modern (**ICT**) **communication** infrastructure fuel **sustainable** economic development and a high quality of life, with a wise management of natural resources, through participatory action and engagement. -

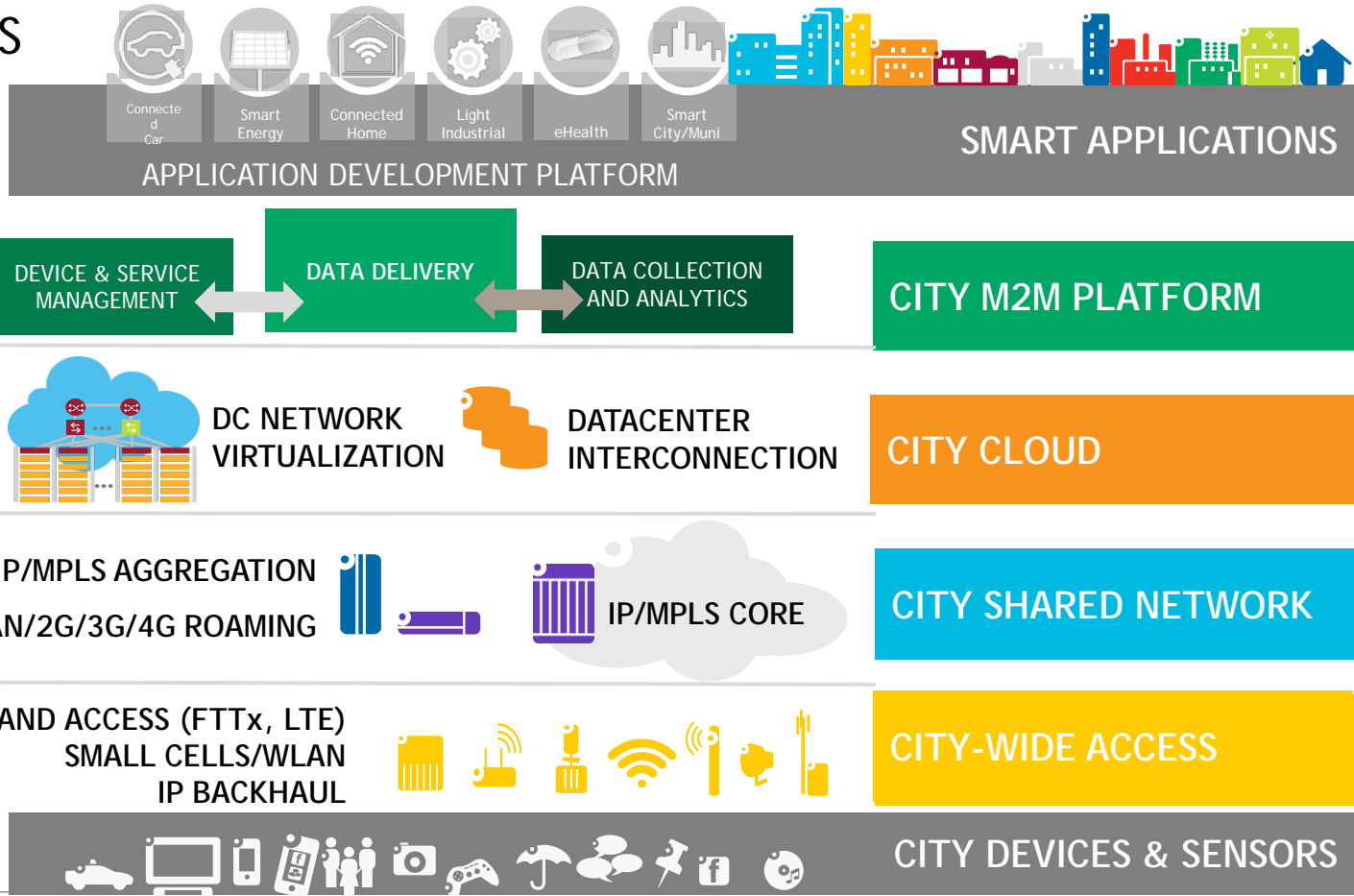
University of Amsterdam

A Smart city is an urbanized area where multiple **public and private** sectors cooperate to achieve sustainable outcomes through the analysis of contextual **real time information** shared among sector-specific information and operational **technology** systems - **Gartner**

CITIES AND CITY LEADERS' CHALLENGES

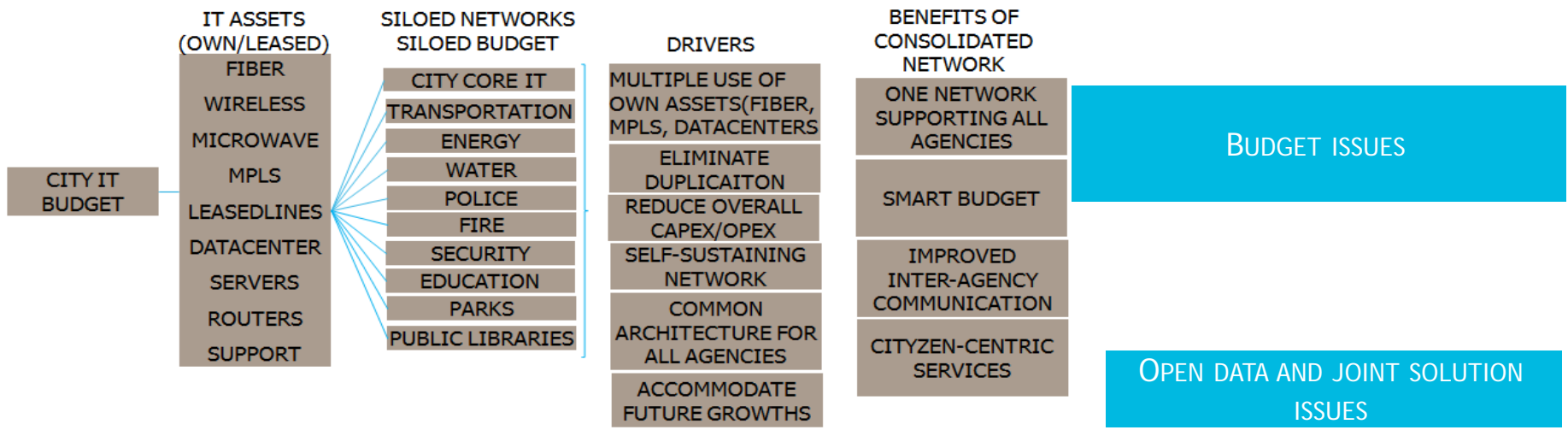


SMART CITY LAYERS & COMPONENTS



THE SILOS

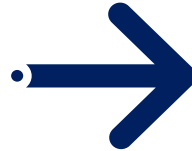
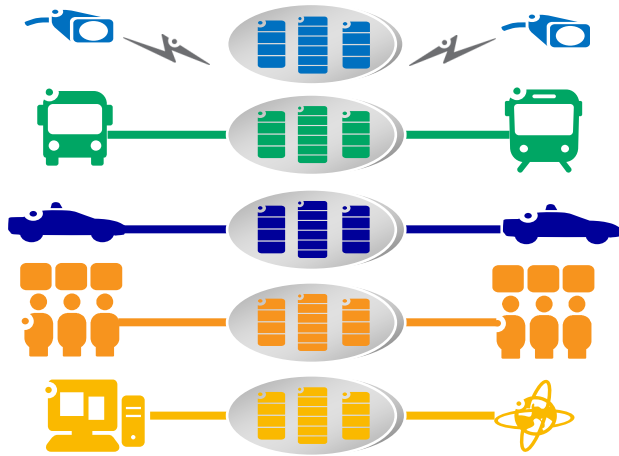
BUDGET AND INTERCONNECTIVITY MISS OF EFFICIENCY



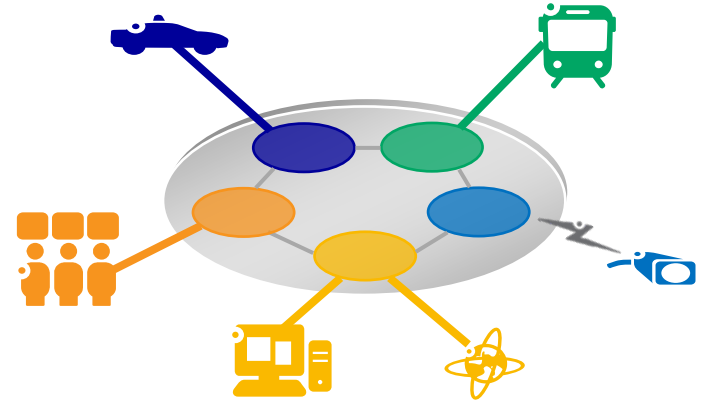
'A Smart Community is a community seeking to optimize the efficiency and effectiveness of useful and necessary processes, activities and services via ICT-based solutions on the basis of a multi-stakeholder, state and local government based partnership'.

MODERNIZATION OF ADMINISTRATION INFRASTRUCTURE ADDRESSING NETWORK CHALLENGES THROUGH CONVERGENCE

SEPARATE AGENCY/SERVICE NETWORKS



CONVERGED SERVICES NETWORK



EACH AGENCY HAS ITS OWN NETWORK
A COMPLEX MIX OF NETWORKING TECHNOLOGIES

ALL ADMINISTRATIONS ON A SINGLE NETWORK WITH
VIRTUAL NETWORK APPEARANCE AND CONTROL

Multiple use of own assets (Fiber, MPLS, datacenters)

Eliminate duplication

Reduce overall CAPEX/OPEX

Self-sustaining network

Common architecture for all agencies

Accommodate future growths

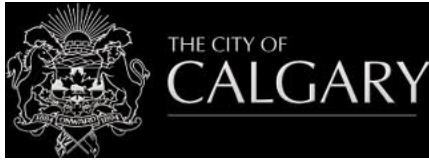
SOLVING THE SILOS

ADVANCED ULTRA BROADBAND NETWORK INTERCONNECTING DEPTS.

- Building a Smart City begins with an advanced Ultra-Broadband IP network infrastructure that enables optimized inter-agency, optimized public operations and enriched citizen services.
- It's enterprise-wide approach allows:
 - multiple public departments to fully leverage all network resources, increasing flexibility when deploying or changing services for internal operations or for citizens.
 - future proofing the Data Strategy: dealing with data tsunami and need for real time connectivity
 - a resilient architecture
 - securing operations at a lower total cost of ownership.

BY AGGREGATING BUDGET EXPENDITURES AND RESOURCES, THE SINGLE CONVERGED NETWORK MAKES HIGHER PERFORMANCE AND EFFICIENCY POSSIBLE, IS RESILIENT IN EMERGENCY SITUATIONS AND CAN ACCOMMODATE RAPID GROWTH.

CITY OF CALGARY, CANADA



Creating a common network infrastructure for the City – increasing security and efficiency while reducing costs

CHALLENGES

- Address exploding demand for bandwidth in growing city
- Reduce operating costs and improve ROI (leased fiber)
- Resilient & redundant solution for “silo’d “agencies
- Meet the future demand for long-term sustainability

SOLUTION

- Network design & equipments, engineering, implementation, project management
- Mission critical IP/MPLS network for all authorities operations (administrations, public safety, transportation...)
- Phase I: Core with OmniSwitch 10K (10 Gb), and aggregation/edge with OmniSwitch (10 Gb)

BENEFITS

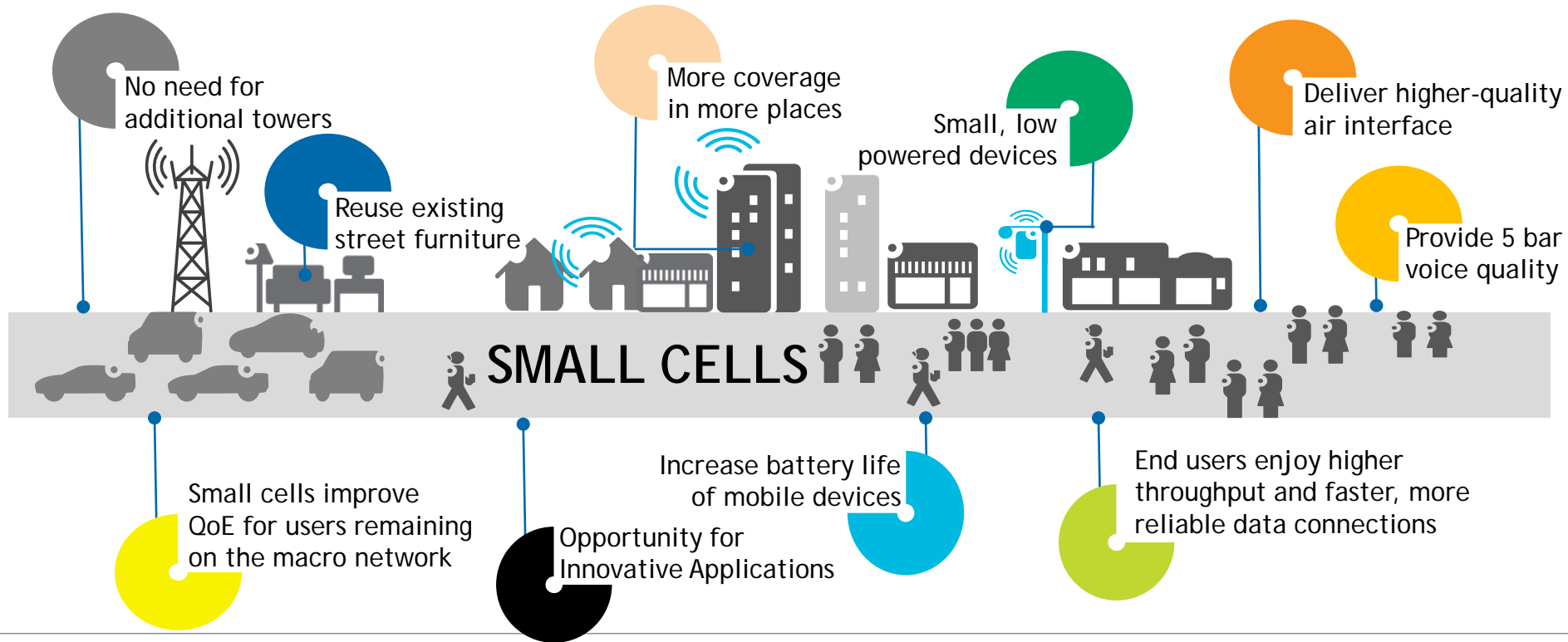
- Smooth migration to a converged and shared IP/MPLS infrastructure consolidating separate networks for high-quality user experience, lower network administration costs and a better return on investment (ROI)
 - Risk mitigation/disaster recovery - remote connectivity allocation over alternate paths in the event of failure,...
 - Consolidation of broadband/leased line requirements
 - Lease/sell to carriers the fiber surplus of fiber
 - Easier management
 - Ready to support real-time high speed applications (video, social media, customer service, collaboration,...)

CITY SHARED NETWORK



4G CITY COVERAGE AND CAPACITY CHALLENGE

CITY-WIDE ACCESS



REGULATIONS AND METRO CELL DEPLOYMENT

WHAT IT TOOK TELEFONICA O2 TO DEPLOY SMALL CELLS IN LONDON

“The London Boroughs of Westminster and Kensington & Chelsea were auctioning off their street furniture (i.e. lampposts) so O2 bought the rights to hang metro cells from them. Due to stipulations from the councils, O2 had to deploy within 6 months”

Has O2 built the biggest smallest network in the world

Stewart Baines

www.wilson-street.com

“ ... O2 still had to compete 400 individual planning applications in order to use the street furniture as metro cells ...”

Has O2 built the biggest smallest network in the world

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“In London's council of Westminster, the only people allowed to install anything on a lamppost are the folks who hang the Christmas lights each year ...”

Small Cell Network Planning Poses Problems

Michelle Donegan
Light Reading Mobile
June 25, 2012

“... only one additional fuse box is allowed to be installed for powering the access point, which means each lamppost is able to take just one access point from one operator.”

Small Cell Network Planning Poses Problems

Michelle Donegan
Light Reading Mobile
June 25, 2012

NATIONAL/REGIONAL REGULATORY APPROVALS

WHAT'S INVOLVED?

CITY-WIDE ACCESS

COMPLIANCE WITH RF EXPOSURE LIMITS

- Sets RF exposure limits for equipment
- Ensures equipment meets RF exposure limits by setting certification process

PLANNING POLICIES

- May issue degrees that limit the scope of local authorities in setting planning policies
- Sets planning restrictions for sensitive areas as defined at a national level
- Sets public domain rights-of-way & other mutualization requirements

SECTORIAL REGULATIONS

- May set primary and back-up power regulations
- May require that backhaul use public right-of-ways

TAXES AND FEES

- May impose national taxes and fees per equipment type

APPROVALS REQUIRE SHOWING COMPLIANCE WITH RF LIMITS, PLANNING POLICIES & SECTORIAL REGULATIONS

A TALE OF TWO CITIES

CHATTANOOGA TN USA, ZURICH SWITZERLAND



1800s - called the
Dynamo of Dixie for its thriving
manufacturing

1970s - known as the
Dirtiest city in America

Today - has become a gig city with the
fastest internet in North America

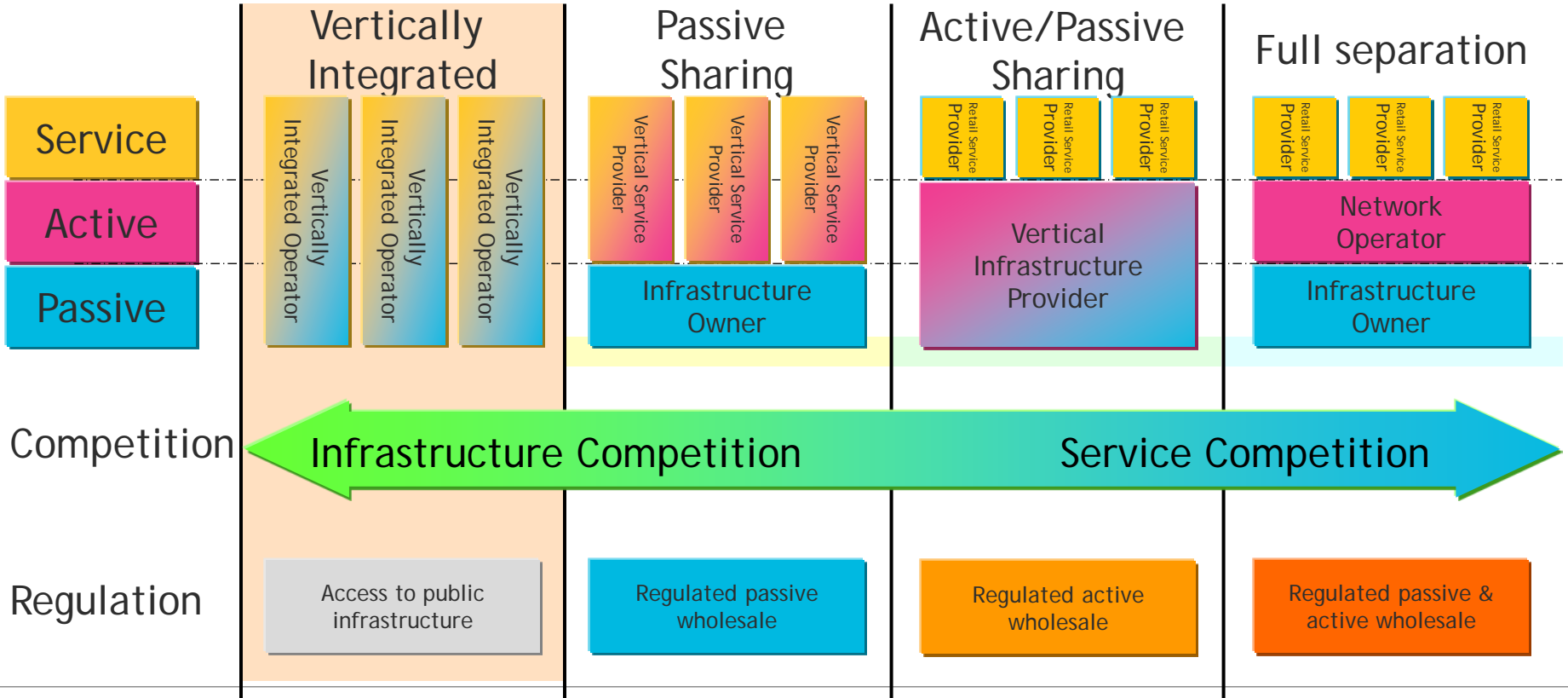


Prosperous modern city World's banking
capital

Zurich Strategies 2025

Smart grid & open access
2,000 Watt Society

CHOSING THE RIGHT BUSINESS AND ENGAGEMENT MODELS



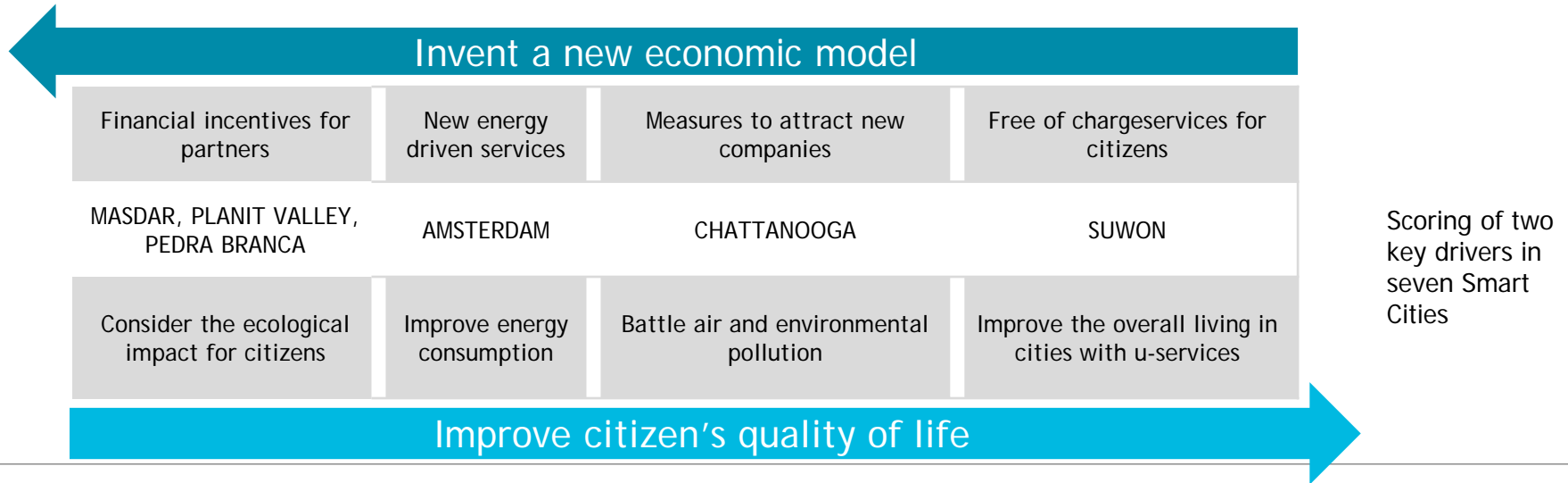
KEY INITIATION MODELS FOR SMART CITY PROJECTS

INITIATOR	EXPLANATION
Government	<p>The government alone takes the initiative with the key objective to rationalize infrastructure (existing or to be deployed). Examples:</p> <ul style="list-style-type: none">• Masdar city, where a presidential law created a special economic zone• Cape Town, where the local government issued a decree transforming the way local government services are delivered• Suwon city, where the Korean Ministry of Information and Communication, in collaboration with the Ministry of Construction and Transportation, created a task force to cope with issues related to Ubiquitous city (U-city) environments that will be realized mainly in newly created communities
Government with partners	<p>Governments work closely with private companies or other partners to improve existing processes and reach pre-defined targets. Examples:</p> <ul style="list-style-type: none">• Amsterdam, where the city government (Amsterdam Innovative Motor) in cooperation with an electric grid operator (Liander), started a project to reduce energy consumption and tackle related ecological challenges• Birmingham, where the city council worked with partners from the business, public, and local communities to stimulate economic growth and inward investment• Dublin, where the city government cooperated with an energy agency (Codema) to reduce energy consumption and CO2 emissions
Private companies	<p>Private companies take the initiative, backed by the government, to realize well-defined development projects. Examples:</p> <ul style="list-style-type: none">• Jubail, where Bechtel started the project to make better use of natural gas resources and to develop related industries with the active support of the government• Lavasa, where the Lavasa Corporation in partnership with Wipro (MyCity Technology, Ltd.) plans, builds and manages ICT services• Malaga, where the Spanish energy company Endesa took the lead managing over 50 partners for a project to reduce energy consumption and CO2 emissions• Songdo city, where Gale International, a U.S. real estate firm, and Posco, a Korean steelmaker, were the main backers of a project to build a new city on a 1500 acre man-made island off the coast of Incheon

A VARIETY OF DRIVERS

Along with the many stakeholders involved in a Smart City development, each project is also driven by a variety of factors.

- **Construct or invent a new economic model (the economic driver):** This was clearly the case in Masdar, where the driving idea was to change the oil-based business model of Abu Dhabi Emirates to one based on renewable and alternative energy sources.
- **Reduce energy consumption (the eco-sustainability driver):** The best example of this is the Amsterdam Smart City project, where reducing energy consumption and more efficient energy usage were the key motivations for the project.
- **Improve the quality of life in a city environment (the social driver):** This is best exemplified by the Suwon Smart City project where the initial goal was to improve the lives and education of citizens, and improve government services



KEY POINTS

- Smart City projects are very complex and require expertise in many different fields to succeed: funds, urban planning, architects, transport, energy, telecoms... They also require cooperation between public and private sector in order to embrace all the dimensions: financing, public interest and technologies
- The implementation of the necessary layers related to ICT services (for example, communication infrastructure, IT and applications layers) is usually determined by drivers behind the project and those who initiate it.
- Along with the many stakeholders involved in a Smart City development, each project is also motivated by a variety of drivers:
 - Construct or invent a new economic model (the economic driver)
 - Reduce energy consumption (the eco-sustainability driver)
 - Improve the quality of life in a city environment (the social driver)
- Smart Cities present a viable business opportunity to the ecosystem – for instance, utilities, real estate companies and public sector – active in today's projects. a variety of business models and approaches to provide, supply, operate and manage the Smart City services can be developed.

Every success
has its network