Transportation for Smart Cities: a systematic review

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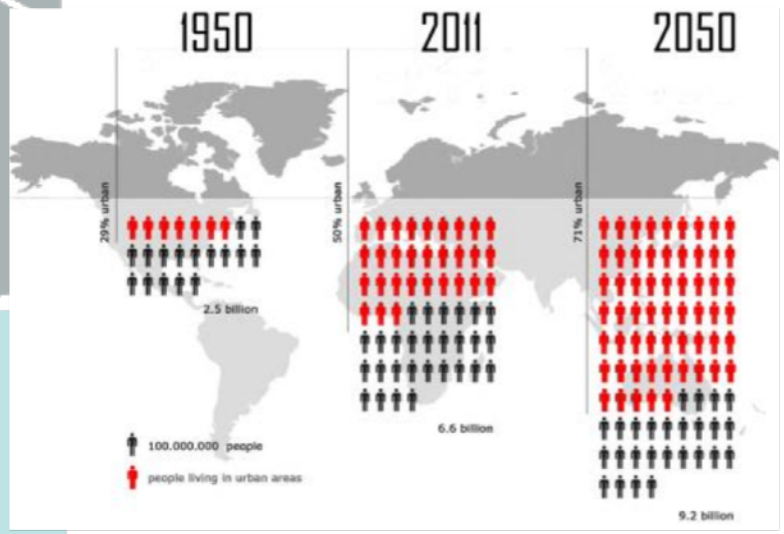


Increasing urbanization

80% of the Earth's surface affected by the human footprint

68% of world's population projected to live in urban areas by 2050

Increasing interests in Smart Cities

193 pilot Smart Cities projects in China by the 2013

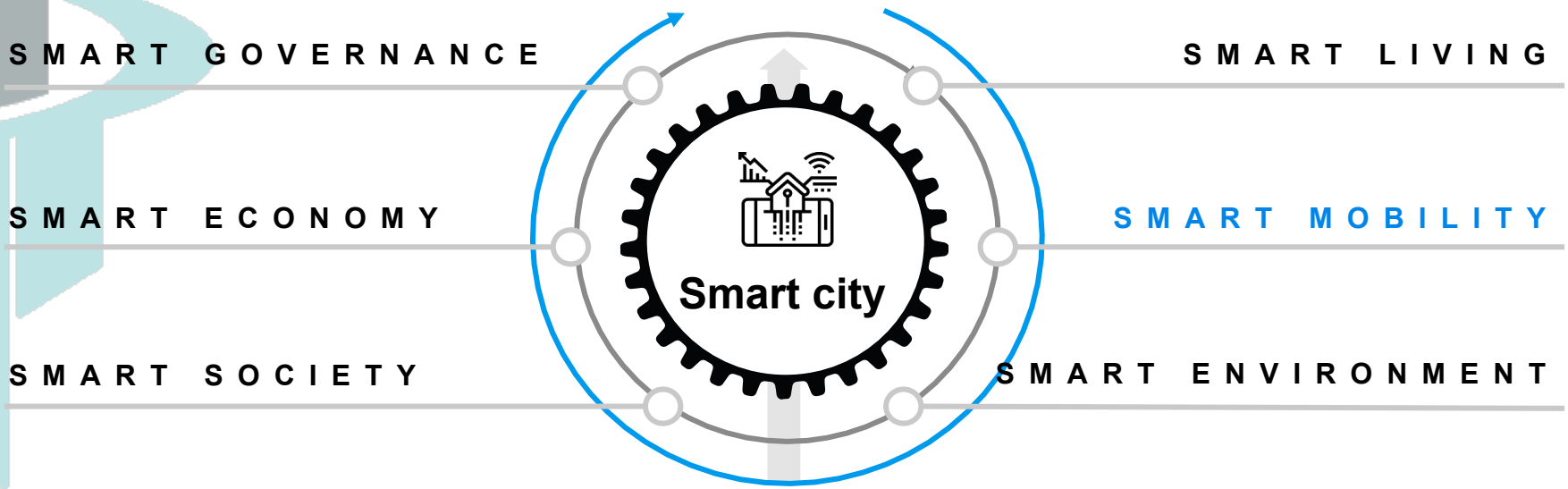
Overview

- There is no universally accepted definition of a smart city

- Concept varies depending
  - level of development
  - willingness to change
  - resource and aspirations of the city
  - availability of funds

- No longer just information and communication technologies
  - *Giffinger et al.* (2007) proposed a broader definition, compared to the prior studies, including other components of the city management

Overview



Improvement of people mobility and freight transportation in urban areas through the adoption of ICT solutions.

Internet technologies, cloud-based services, IoT allow meeting the citizens' demand-driven requirements in City Logistics

Research questions

- Which is the relationship between Smart Cities and City Logistics?
- Can we see any lack in current frameworks, in terms of the global view of the Smart City and City Logistics, current trends and future paths?
- Can we find a series of keywords/axes such that we can categorize any project dealing with Smart City and City Logistics?

Methodology

- Cluster analysis of smart city projects
- Taxonomy with polythetic classes
- Sample of 199 outstanding smart city projects
  - ended/on going projects already funded in 2018
  - worldwide
- GUEST methodology
  - lean Business methodology
  - managerial perspective of smart city

Methodology

55 projects in Canada

25 projects in USA

20 projects in Brazil

25 projects in Europe

48 projects in Asia

26 projects in Australia

Methodology

Description			
Objectives	Key Enabling Technologies	Project initiator	Stakeholders
Water	*Cloud Computing*	*Private*	*City*
E-Governance	*Data Base*	*Public*	*Consumers / Citizens*
Buildings	*DSS*	*Mixed*	*Administration*
CO_2 Emissions	*ICT*		*SMEs*
Energy	*Innovative Sensors*		*University*
Security	*Legal and financial tools*		
Social Innovation	*Other new technologies*		
Transportation	*Portable Smart Devices*		
	Smart Grids		

Business Model		
Management	Infrastructure financing	Financial Resources
Private	*Private*	*Private*
Public	*Public*	*Public*
Mixed	*Mixed*	*Mixed*

Purpose		
Client	Product	Geographical target
Private	*Specific*	*Urban*
Public	*No Specific*	*National*
Mixed		*International*

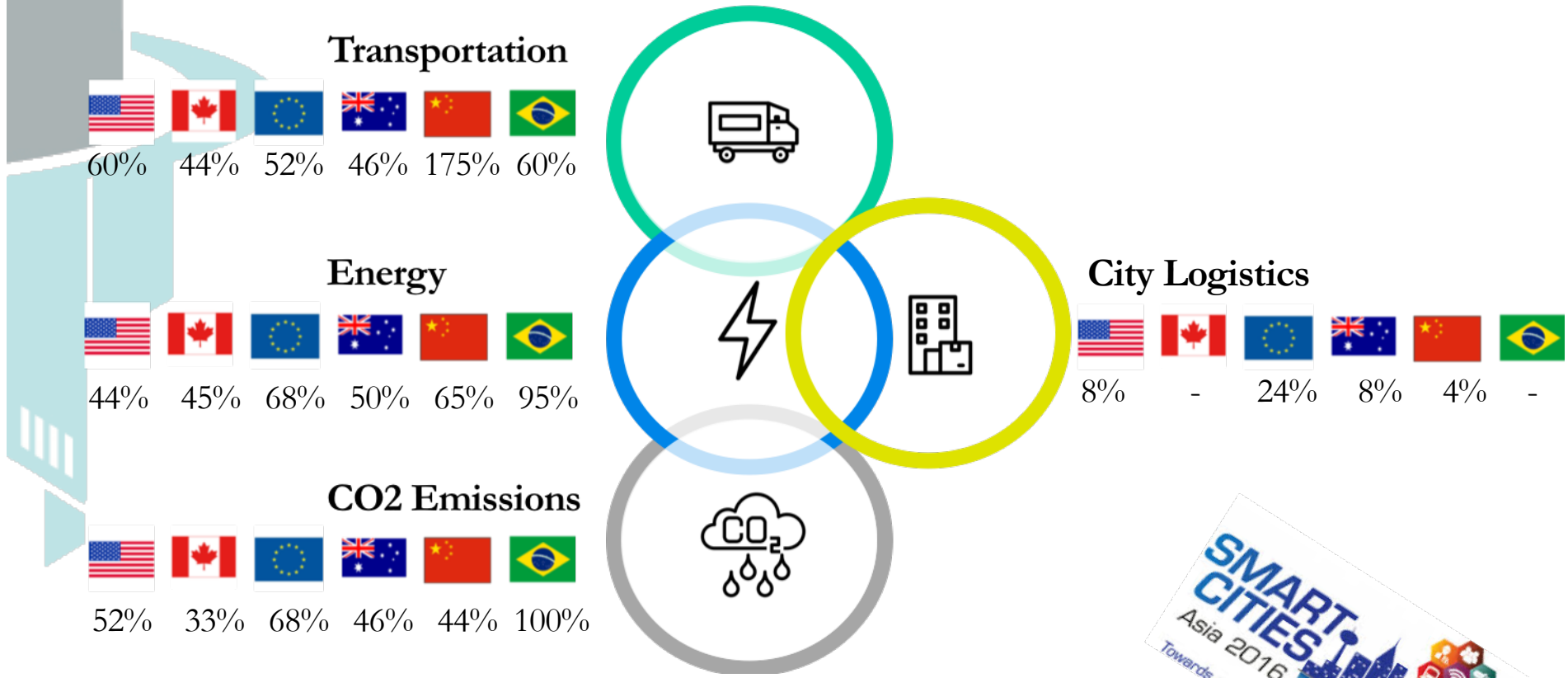
Methodology

- Description:
  - Overview of the project and its context
    - objectives faced and the industry (Objectives)
    - tools and technologies adopted (Key Enabling Technologies)
    - nature of the project initiator (Project initiator)
    - key actors involved in a Smart City project (Stakeholders)

- Business Model:
  - New business models and governance mechanism
    - nature of the project manager (Management)
    - nature of providers of infrastructures, equipment and financial resources (Infrastructure Financing and Financial Resources)

- Purpose:
  - Final goal of the project
    - user that will adopt and benefit from the solution (Client)
    - type of product (Product)
    - geographical area of interest (Geographical target)

Results


Transportation
60% 44% 52% 46% 175% 60%
Energy
44% 45% 68% 50% 65% 95%
CO2 Emissions
52% 33% 68% 46% 44% 100%
City Logistics
8% - 24% 8% 4% -
CO2

SMART CITIES
Asia 2016
Towards a
one city at a time

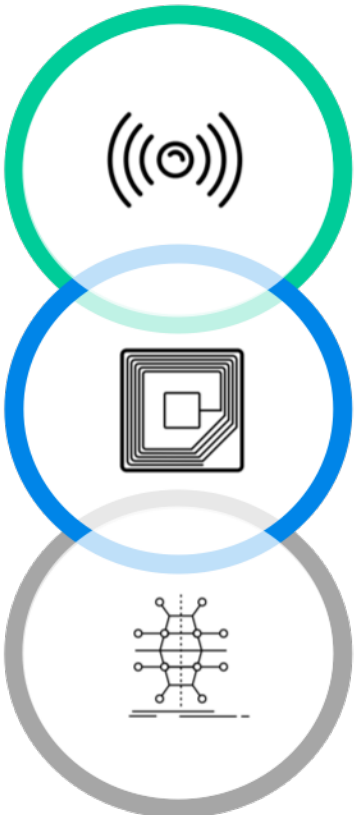

HORIZON 2020

Results

IoT and sensors

New technologies

Smart Grid



Cloud computing

Data base

Smart City and City Logistics

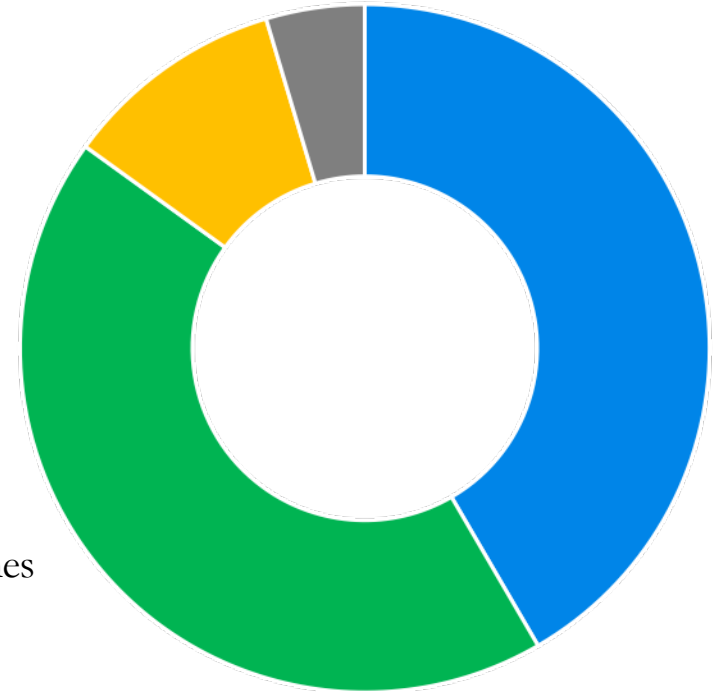
New business models 17%

Green vehicles

Last-mile cargo bikes

Regulation 8%

Smart parking and loading zones management



Technology 75%

On board unit

Online platform for logistics management of last mile and booking loading/unloading zones

GPS monitoring system

IoT and sensors

Infrastructure 72%

Loading zones

Off-street loading facilities

Consolidation centers

Mobile depot

Results

- Massive engagement of the public sector in the smart city projects focused on the urban freight transportation
  - in North America the project initiator is private
    - historically, more shaped by pro-business influences
  - in Europe the project initiator is public
    - historically, more welfare-oriented
  - in China the project initiator is mixed
    - strong collaboration between IT companies and the government (*Li et al., 2015*)
- The City Logistics initiatives fail due to the lack of support and commitment from the different actors in the urban areas (*Marcucci et al., 2015; Russo and Comi, 2012*)
- Private companies (shippers and receivers) perspectives are missing
- Strong participation of citizens

Conclusions

- Increasing diffusion of the IoT paradigm for Smart mobility and City Logistics
  - e.g., URBeLOG, Smart Columbus, Grow Smarter projects
- Integration of Computer science, Operation management and Operation research
- Current smart city projects are too focused on people mobility

Conclusions

- Shift to the Smart City Logistics and social sustainability, compared to the past (*Russo and Comi, 2010*)
- City Logistics measures rarely survive to the end of the Smart City pilots
  - more attention should be paid to Innovation and Business Development methodologies

Thank you for your attention