

# Smart City Initiatives: an integrated vision



VICTORIA FERNÁNDEZ ÁÑEZ  
JOSÉ MIGUEL FERNÁNDEZ-GÜELL

**Researcher and urban planner**  
Urban analytics lab  
*Urban and Regional Planning Department*

*Universidad Politécnica de Madrid*

Lecciones urbanísticas de la burbuja inmobiliaria: dimensiones, costos y beneficios de las formas características del crecimiento urbano español. 1990-2006

Resiliencia funcional de las áreas urbanas: el caso del área urbana de Madrid

Cambio social, crisis económica y escasez de recursos, su impacto sobre las áreas urbanas

TRIGGER-TRansforming Institutions by Gendering contents and Gaining Equality in Research

Observatorio de la Vulnerabilidad Urbana

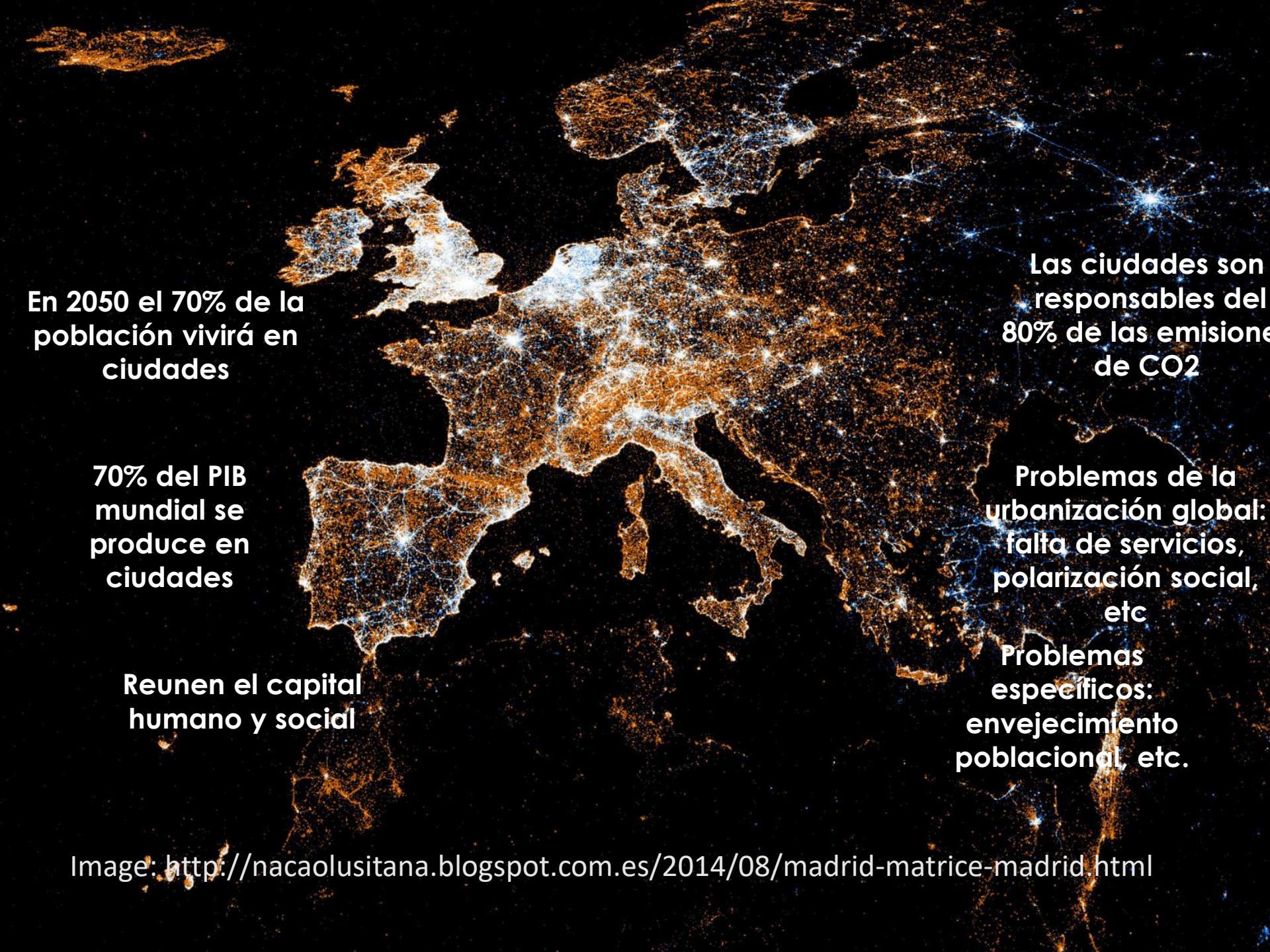


---

TRANSyT-Transport Research Center

ASCIMER Project  
EIBURS





**En 2050 el 70% de la población vivirá en ciudades**

**70% del PIB mundial se produce en ciudades**

**Reunen el capital humano y social**

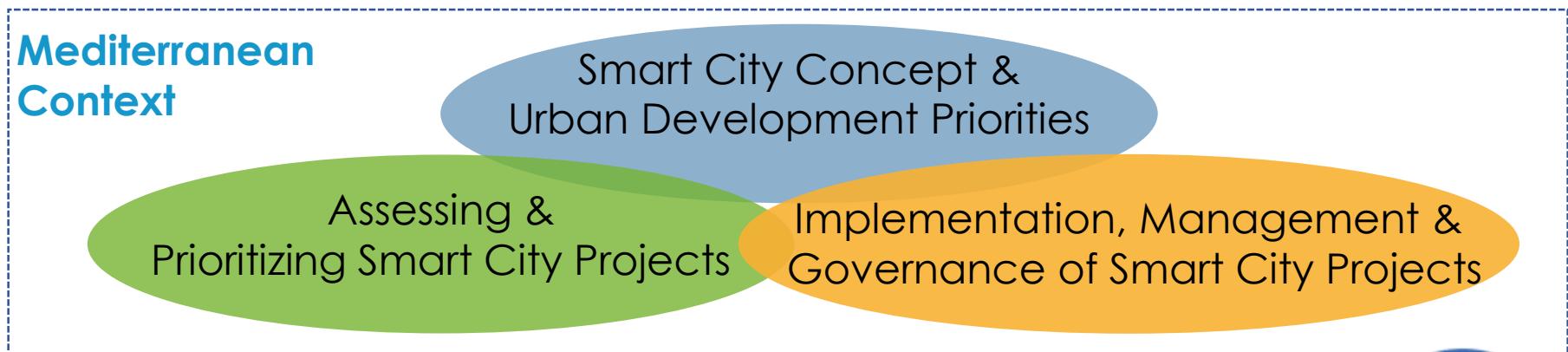
**Las ciudades son responsables del 80% de las emisiones de CO2**

**Problemas de la urbanización global:  
falta de servicios,  
polarización social,  
etc**

**Problemas específicos:  
envejecimiento  
poblacional, etc.**



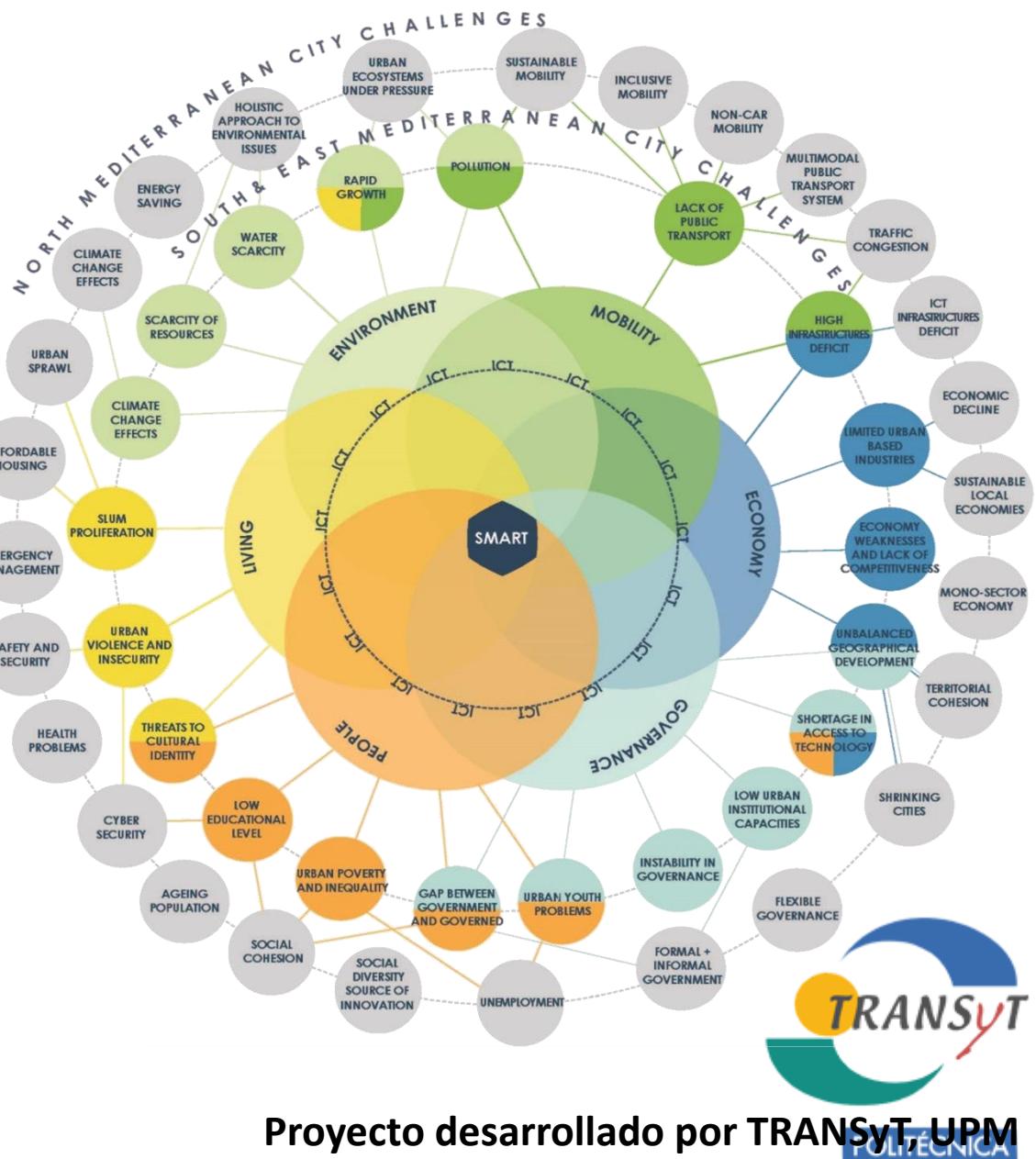
Main goal: Development of a methodology for assessing smart city initiatives in the Mediterranean region



# SMART CITY

## SMART PROJECT

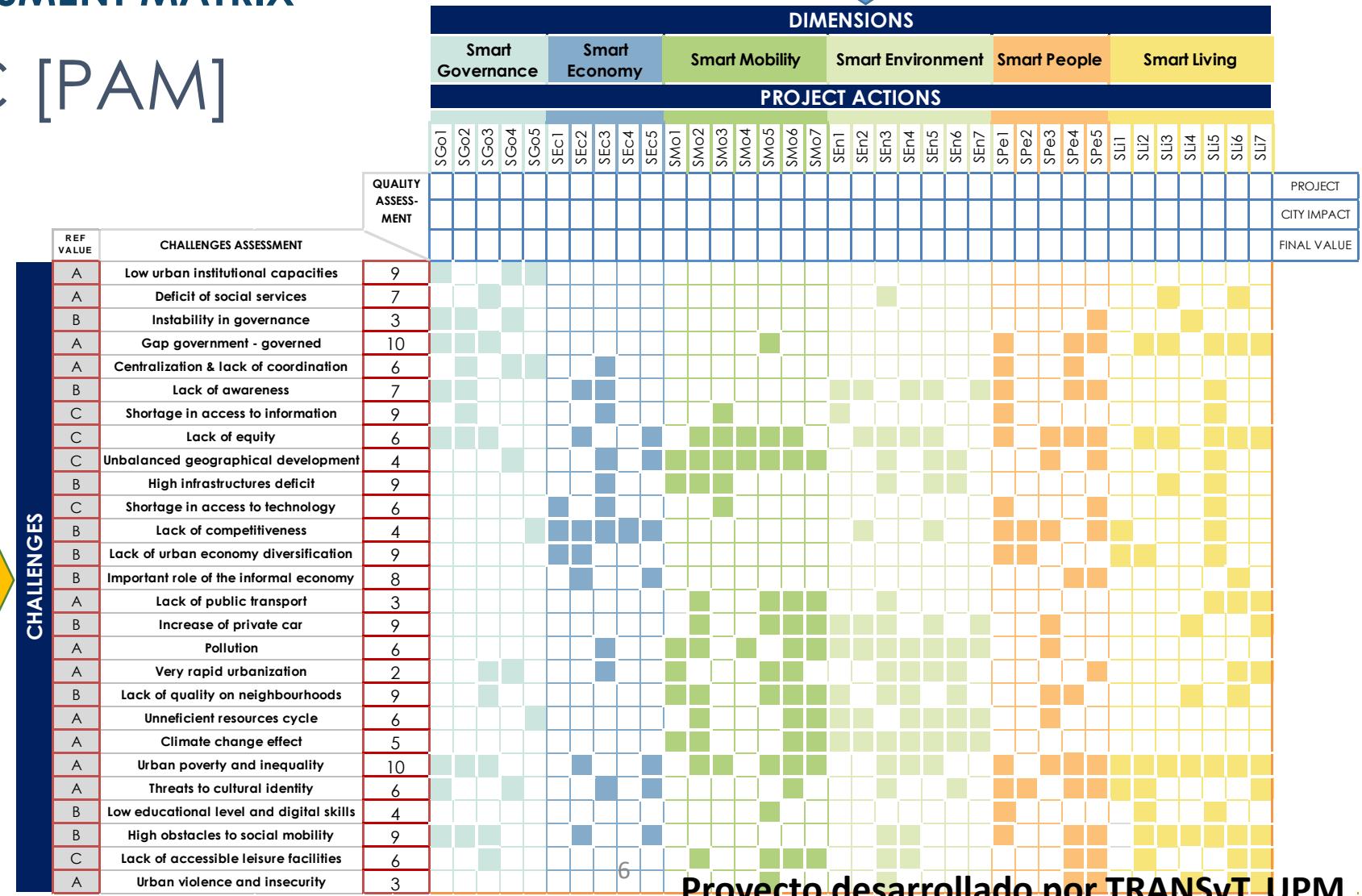
- Inclusion
- Integration
- Innovation



Proyecto desarrollado por TRANSyT, UPM

# SMART CITY PROJECT ASSESSMENT MATRIX

SC [PAM]

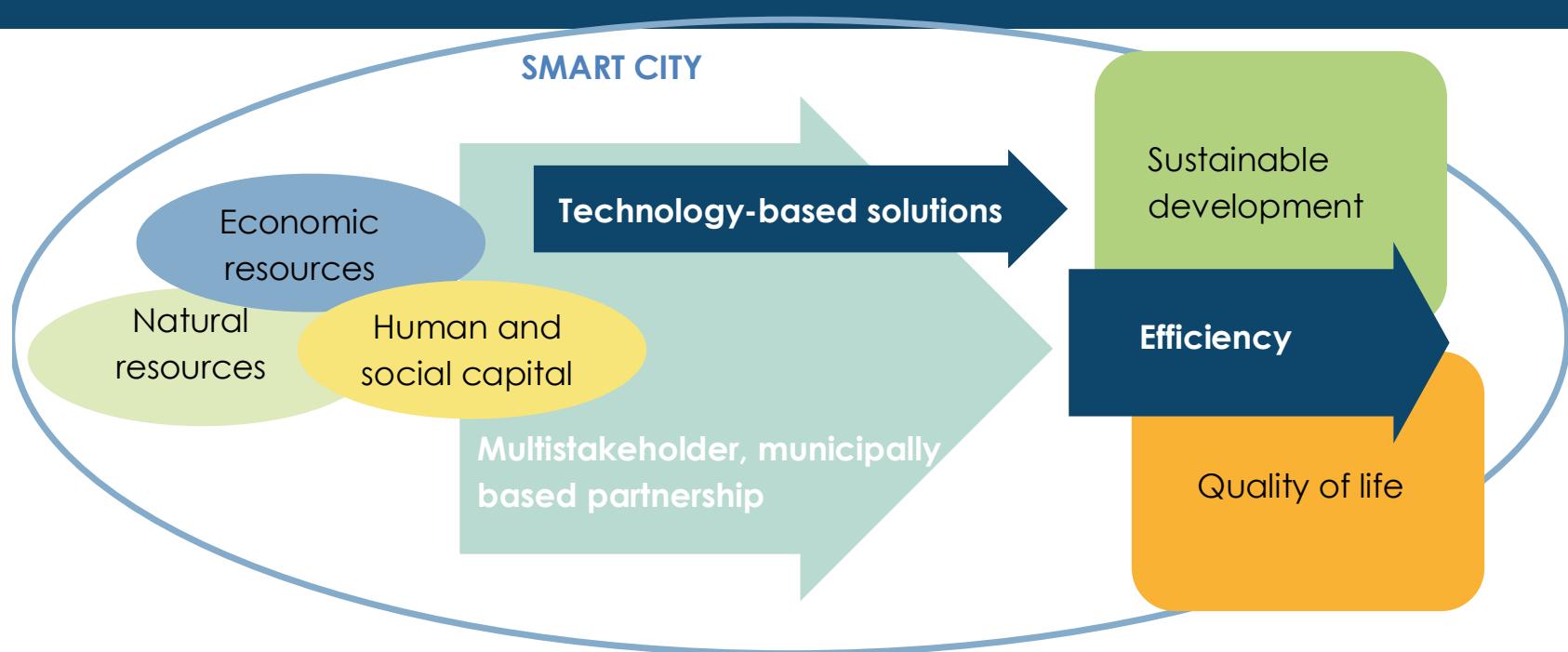


**“A Smart City is a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based Partnership”. EC, 2014**

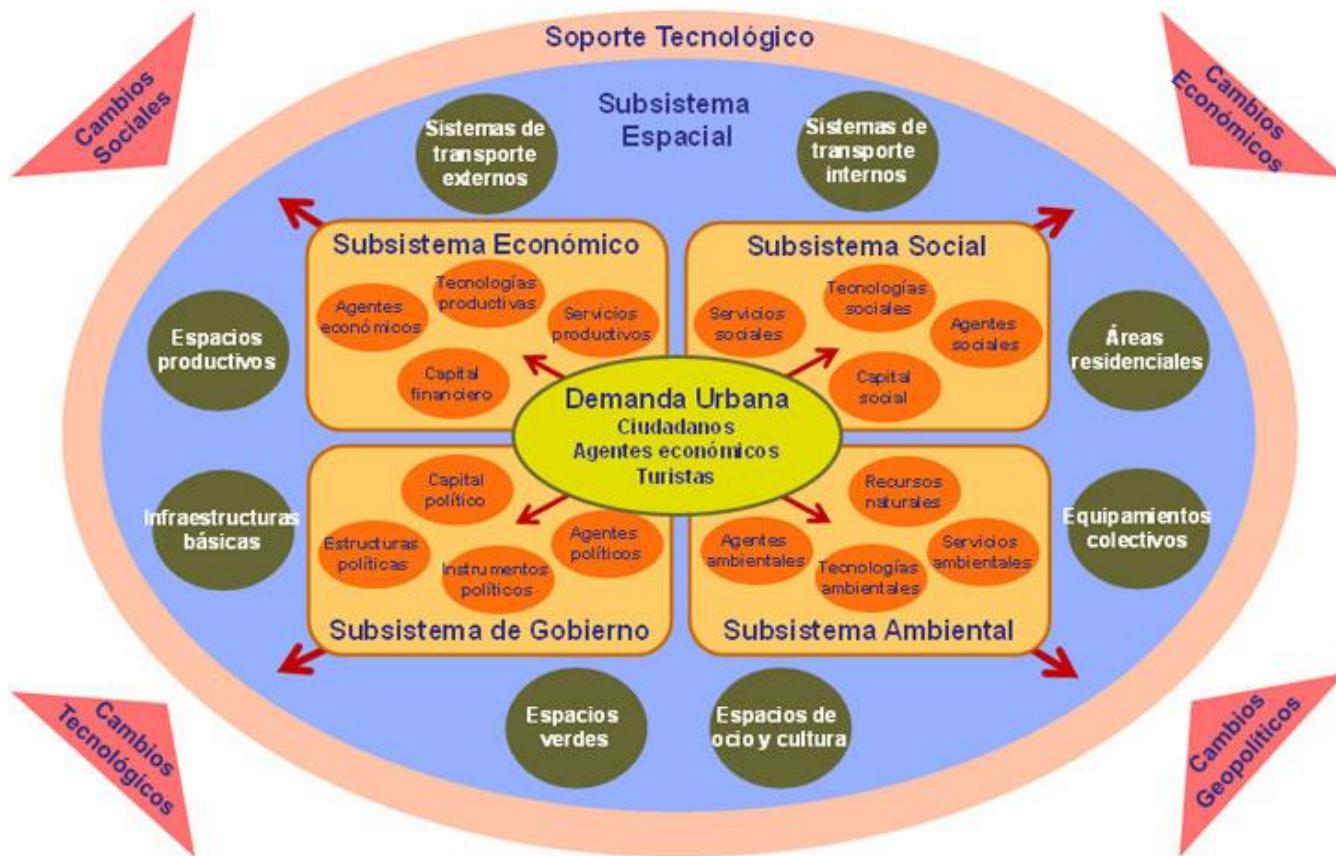
**"A Smart City is a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based Partnership". EC, 2014**

"La Smart City es un sistema integrado en el que los capitales social y humano interactúan mediante soluciones basadas en la tecnología.

Tiene como meta alcanzar un desarrollo sostenible y resiliente, proveyendo a sus ciudadanos con una alta calidad de vida, estableciendo para ello una cooperación de todos los agentes, coordinados por la municipalidad."



# System approach

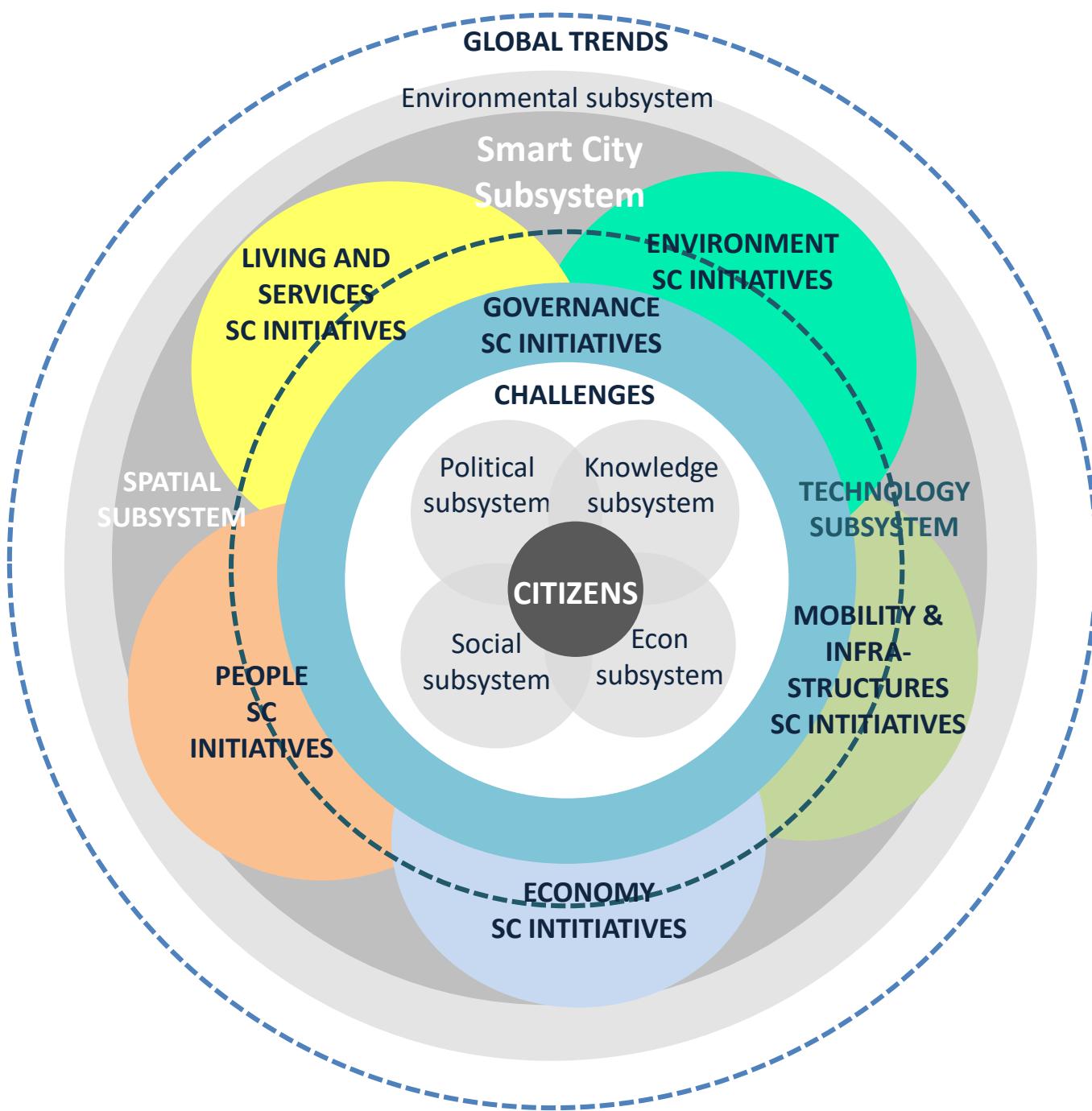


Fernandez-Güell et al., 2014

**RETOS**

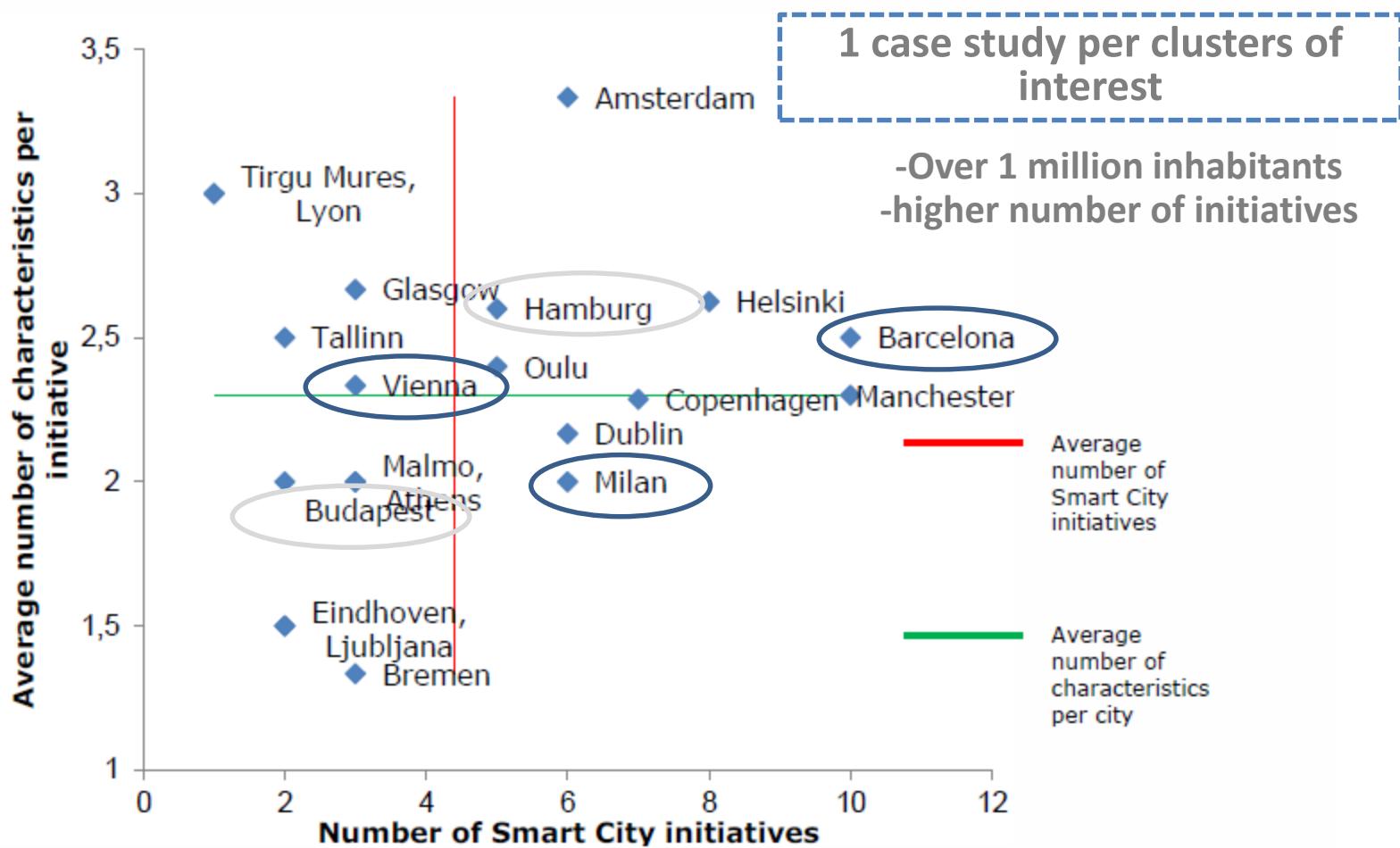
**PROYECTOS**

**AGENTES**



# Case studies

Figure 17: Cluster analysis of Smart City initiatives and the number of characteristics per initiative



# Case studies

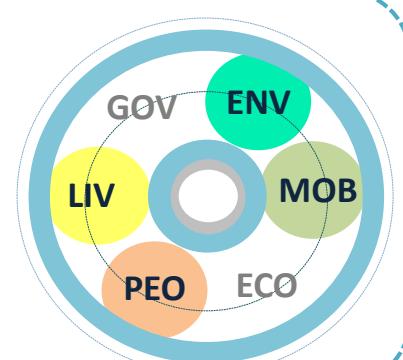
Urban audit + Mapping Smart Cities in the UE (EC, 2014)

## Vienna

- Population: city- 1,840,573 metro-2,600,000
- Density: 4326 hab/km
- GDP per capita (2010) : 44,300 €
- Employment rate (2012): 55%
- Expenditure in R&D (2011): 2,871 mio. €
- Main economic activities (2010): 82.6% tertiary sector
- People at risk of poverty and social exclusion (2012): 31.6%
- ICT baseline:  
household (2011): 76.8% ; 33% smart phones

## Smart city projects

- Aspern  
NICE  
iScope



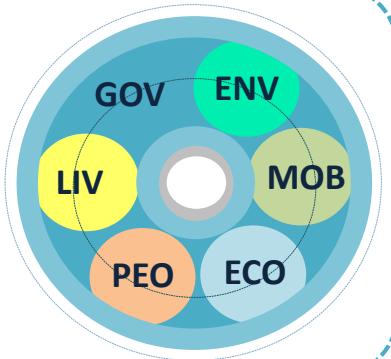
Evaluation 2020 objectives:  
63% coverage, 20% performance

## Barcelona

- Population: city- 1,604,555 metro: 5,375,774  
Density: 16000 hab/km
- GDP per capita (2010) : 35,800 €
  - Employment rate (2012): 65.6%
  - Expenditure in R&D (2011): 3,095 mio. €
  - Main economic activities (2010): xx% tertiary sector
  - People at risk of poverty and social exclusion (2012): xx%
  - ICT baseline:  
household (2011): xx% ; xx% smart phones

## Smart city projects

- Smart Streets of Barcelona  
Smart Grids and Smart Metering  
City protocol  
Solar and Hot water Ordinance/Solar energy  
Citadel, NICE, iCity, City SDK  
Common4U, Open Cities



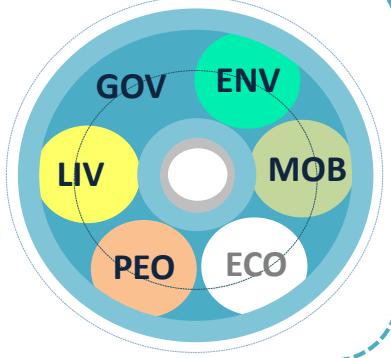
Evaluation 2020 objectives:  
100% coverage, 41% performance

## Milan

- Population: city- 1,343,163 metro 3,204,601  
Density
- GDP per capita (2010) : 35,137 €
  - Employment rate (2012): xx%
  - Expenditure in R&D (2011): <1% of municipality budget (2013) <14,6 mio.€
  - Main economic activities (2010): xx% tertiary sector
  - People at risk of poverty and social exclusion (2012): 29.9% (Italian datum ISTAT 2012)
  - ICT baseline:  
household with broadband(2011): 68% ; xx% smart phones

## Smart city projects

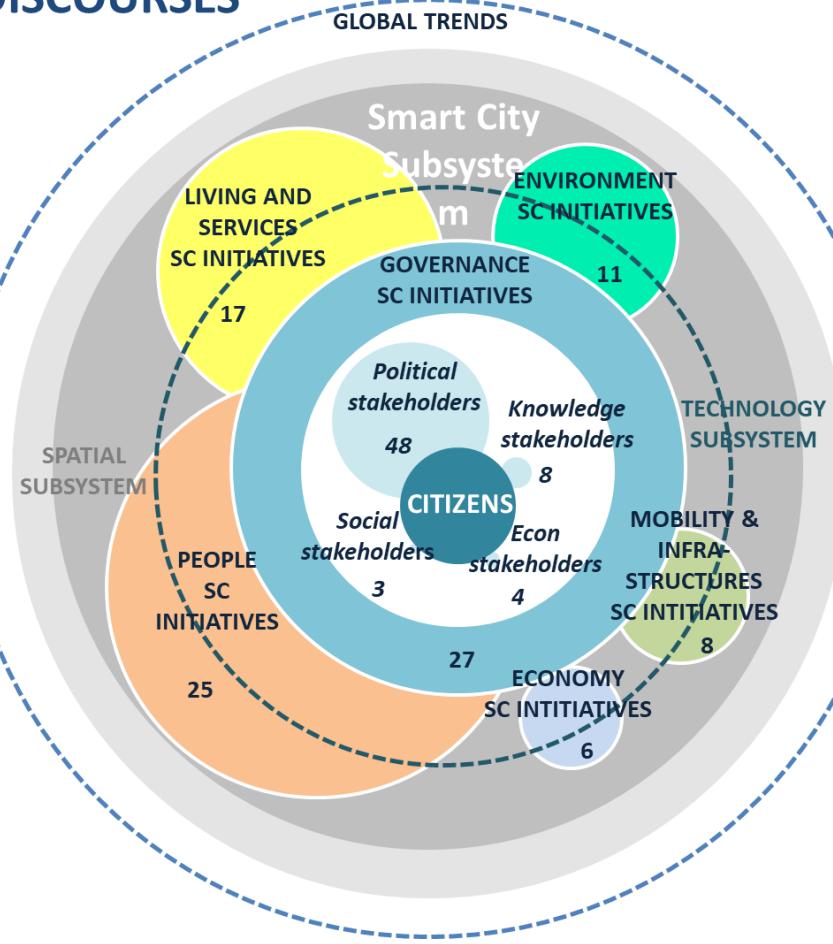
- Smart Light  
GOAL  
Peripheria  
TIDE  
SmartSpaces  
NICE



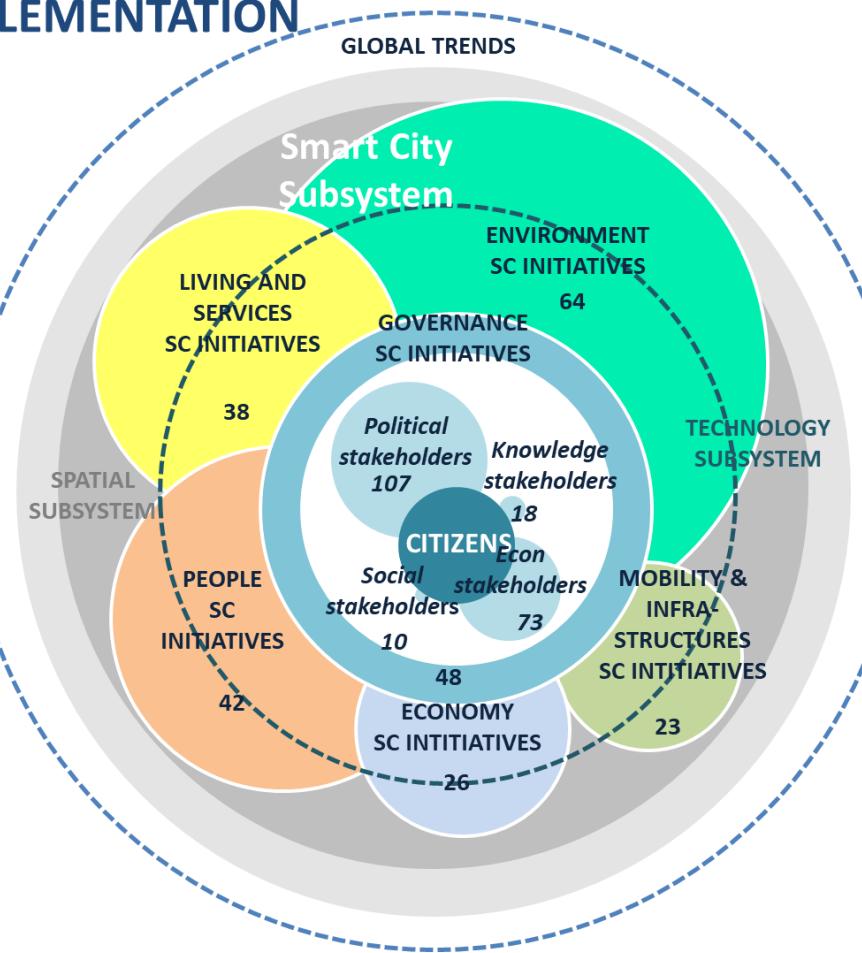
Evaluation 2020 objectives:  
88% coverage, 30% performance

# Vienna

## DISCOURSES

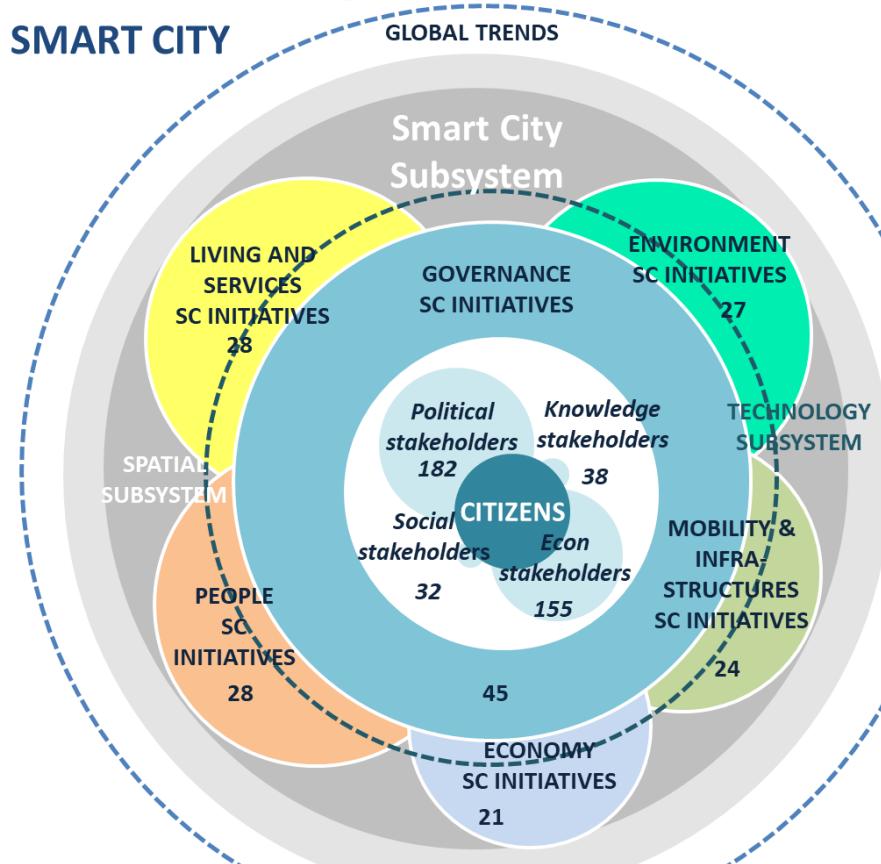


## IMPLEMENTATION

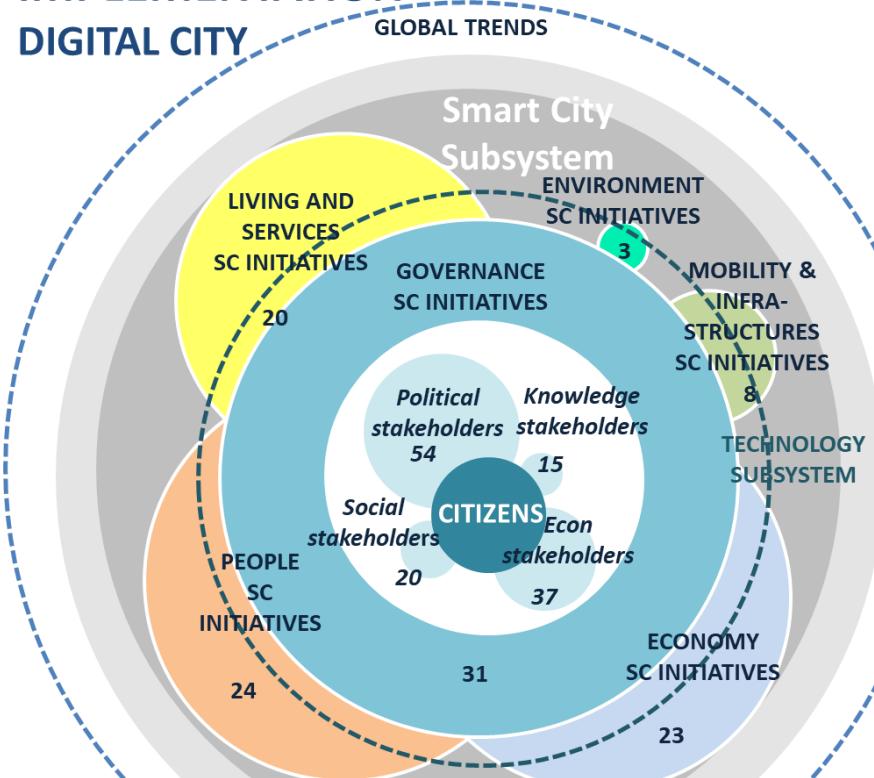


# Barcelona

## IMPLEMENTATION SMART CITY

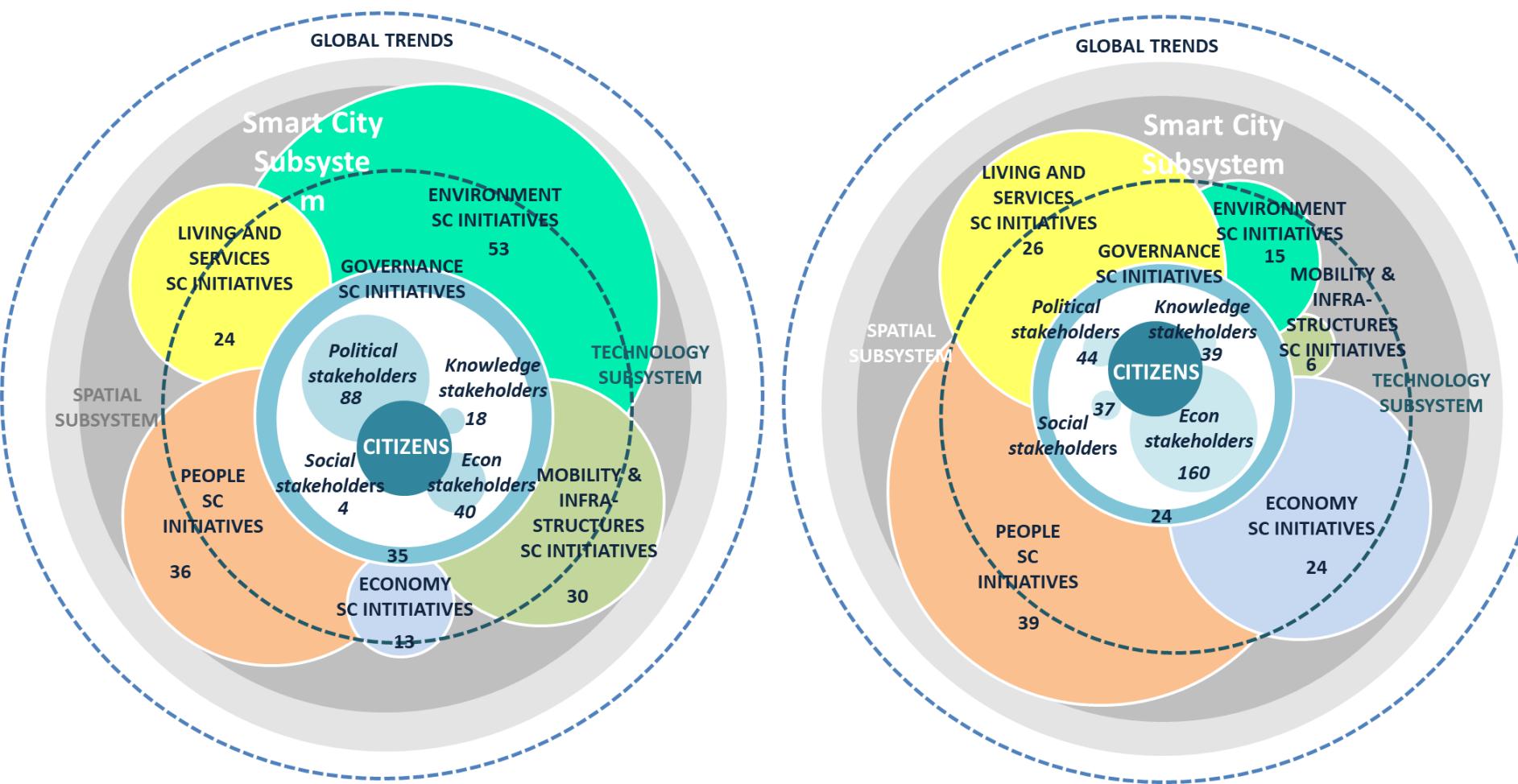


## IMPLEMENTATION DIGITAL CITY



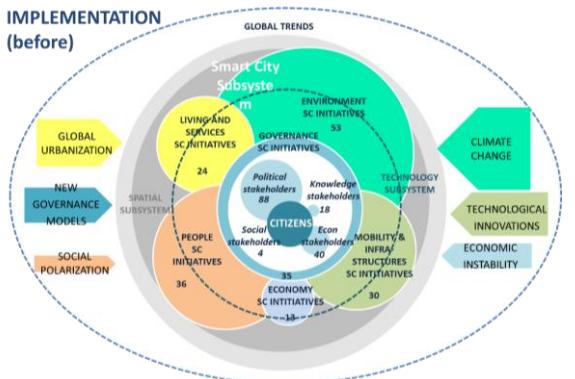
		SMART CITY	DIGITAL CITY	SMART CITY	DIGITAL CITY
Smart Governance	SGo1. Participation	15	10	SEn1. Network and environmental monitoring	8 1
	SGo2. Transparency and information accessibility	20	16	SEn2. Energy efficiency	12 0
	SGo3. Public and Social Services	16	9	SEn3. Urban planning and urban refurbishment	8 2
	SGo4. Multi-level governance	6	4	SEn4. Smart buildings and building renovation	1 0
	SGo5. Community building and urban life management	15	16	SEn5. Resources management	8 0
	SGo6. Efficiency in municipal management	19	14	SEn6. Environmental protection	5 0
Smart Economy	SEc1. Innovation	15	17	SPe1. Awareness rising and behavioral change	7 15
	SEc2. Entrepreneurship	5	14	SPe2. education and digital training	11 14
	SEc3. Local & Global interconnectedness	19	14	SPe3. Research	12 2
	SEc4. Productivity	1	2	SPe4. Creativity	3 9
	SEc5. Flexibility and conciliation in labor market	0	2	SPe5. ICT - Enabled working	1 2
Smart Mobility	SMo1. Accessibility	7	0	SPe6. Inclusive society	12 11
	SMo2. Clean, non-motorised options	5	2	SLi1. Culture and leisure	7 5
	SMo3. Public Transport	5	3	SLi2. Healthcare	4 1
	SMo4. Multimodality	2	0	SLi3. Security	1 1
	SMo5. Logistics	2	0	SLi4. Technology accessibility	13 12
	SMo6. ICT Infrastructure	11	4	SLi5. Welfare & Social inclusion	6 13
	SMo7. Traffic management	7	1	SLi6. Public spaces management	3 2
Smart Environment			Smart Living		
Smart People					

# Vienna vs. Milan

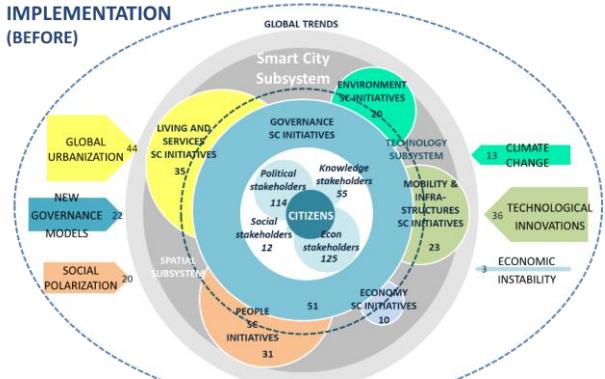


## VIENNA

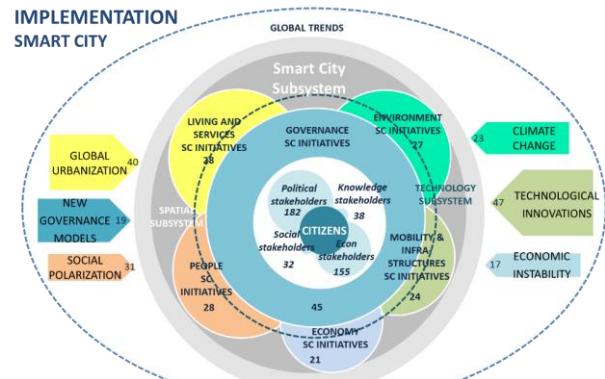
### IMPLEMENTATION (before)



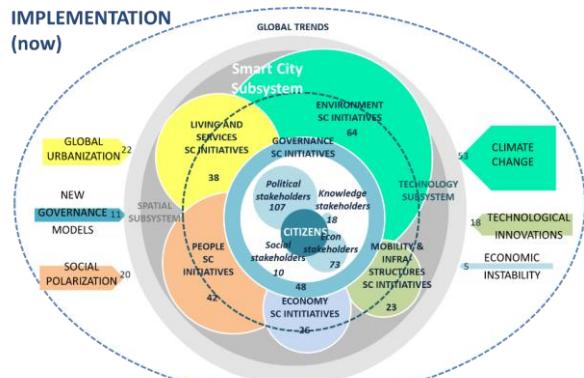
### MILAN IMPLEMENTATION (BEFORE)



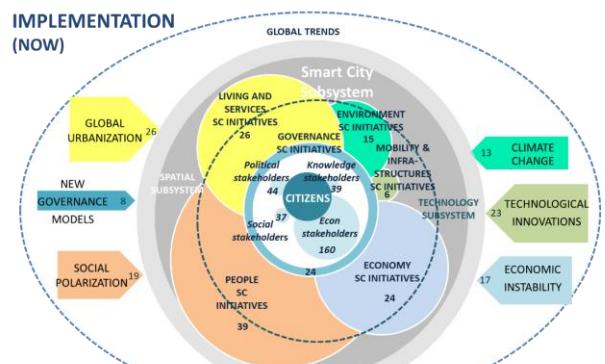
### BARCELONA IMPLEMENTATION SMART CITY



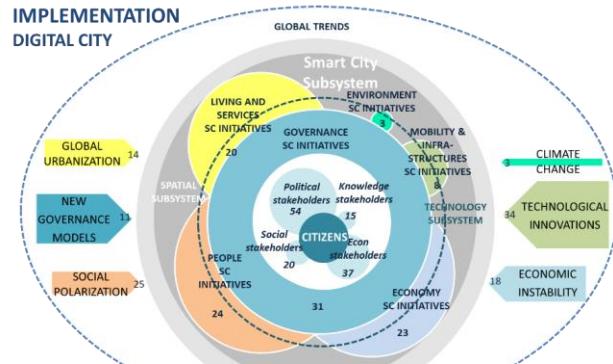
### IMPLEMENTATION (now)



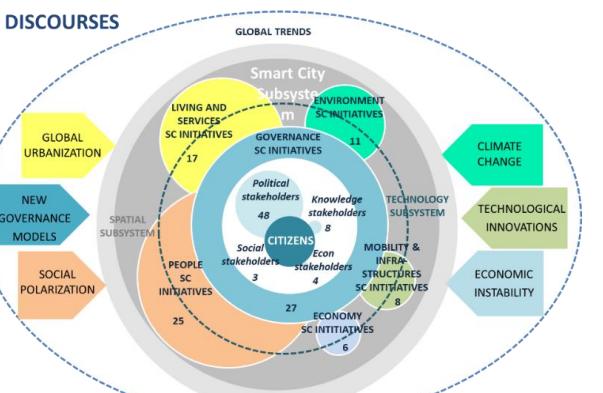
### IMPLEMENTATION (NOW)



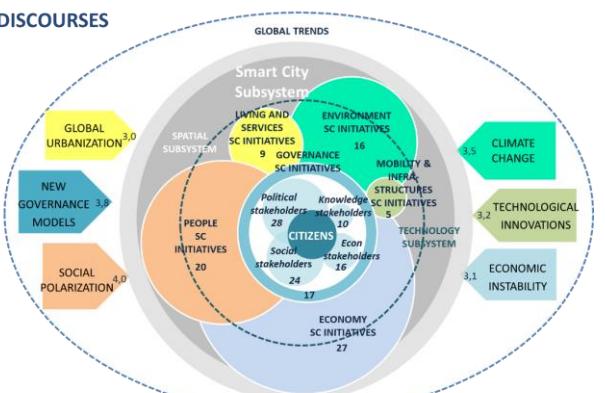
### IMPLEMENTATION DIGITAL CITY



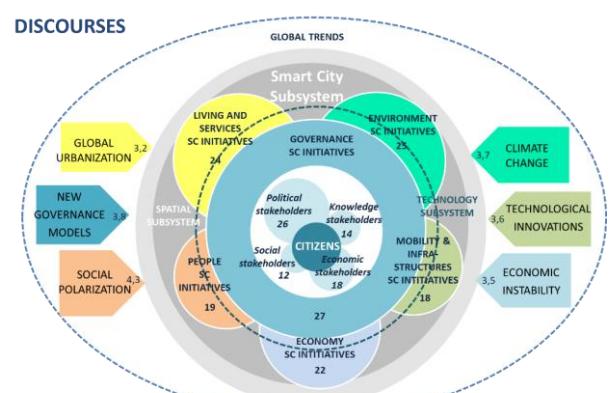
### DISCOURSES



### DISCOURSES



### DISCOURSES



# Guidelines for Smart Cities in Europe

1. The *governance* core: balance of stakeholders leaded by local government
2. New governance models at the core of the Smart City.
3. Smart City is not only technology, but technology governance is the key
4. Balance among dimensions.
5. The will of each city: involving stakeholders in key ideas definition and increasing awareness on the strategies
6. *Social polarization*: the main challenge of the Smart City.
7. A Smart City starts in *People*.
8. Economic development supported by social and human capital
9. Need of new approaches to *environmental* problems.
10. Increasing the awareness on *mobility*.

# 3

## Stages of Smart Cities in Europe

1. ICT,  
mobility and  
energy

2. Holistic  
approach

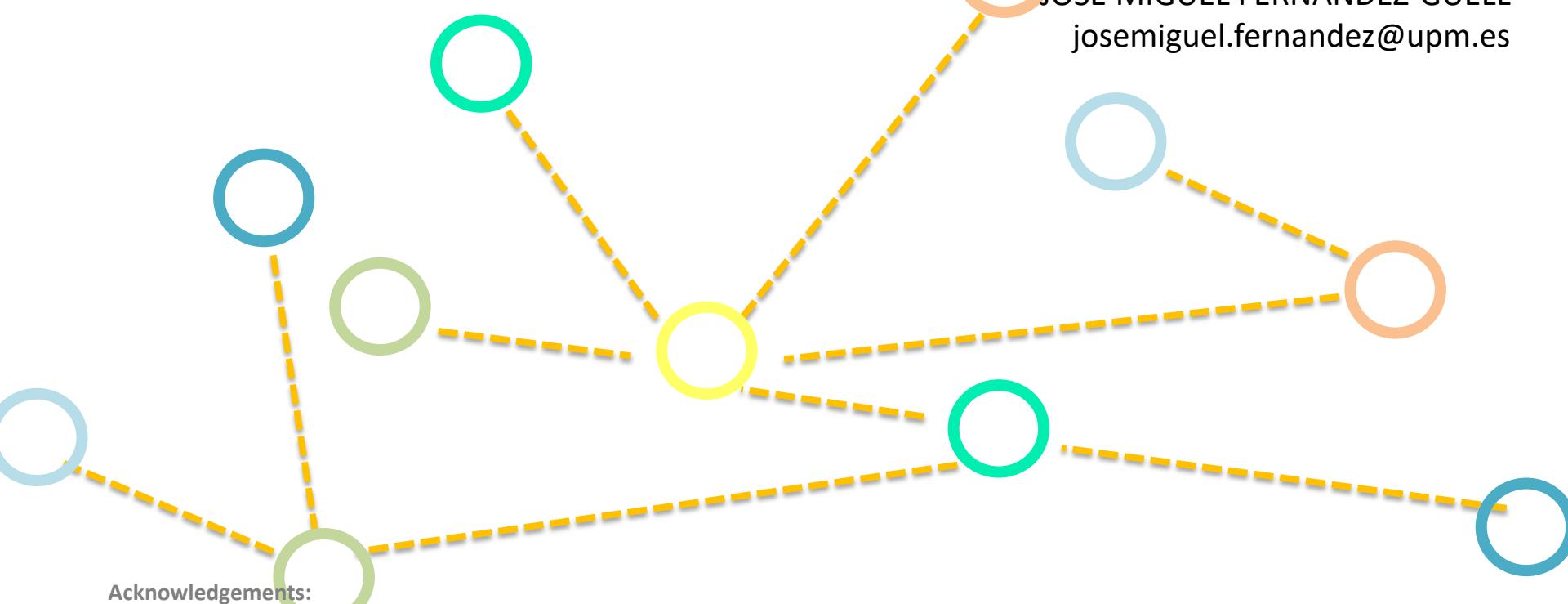
3. Technology  
governance  
and social  
capital based  
economy

Is it the  
END?

# ¡GRACIAS POR SU ATENCIÓN!

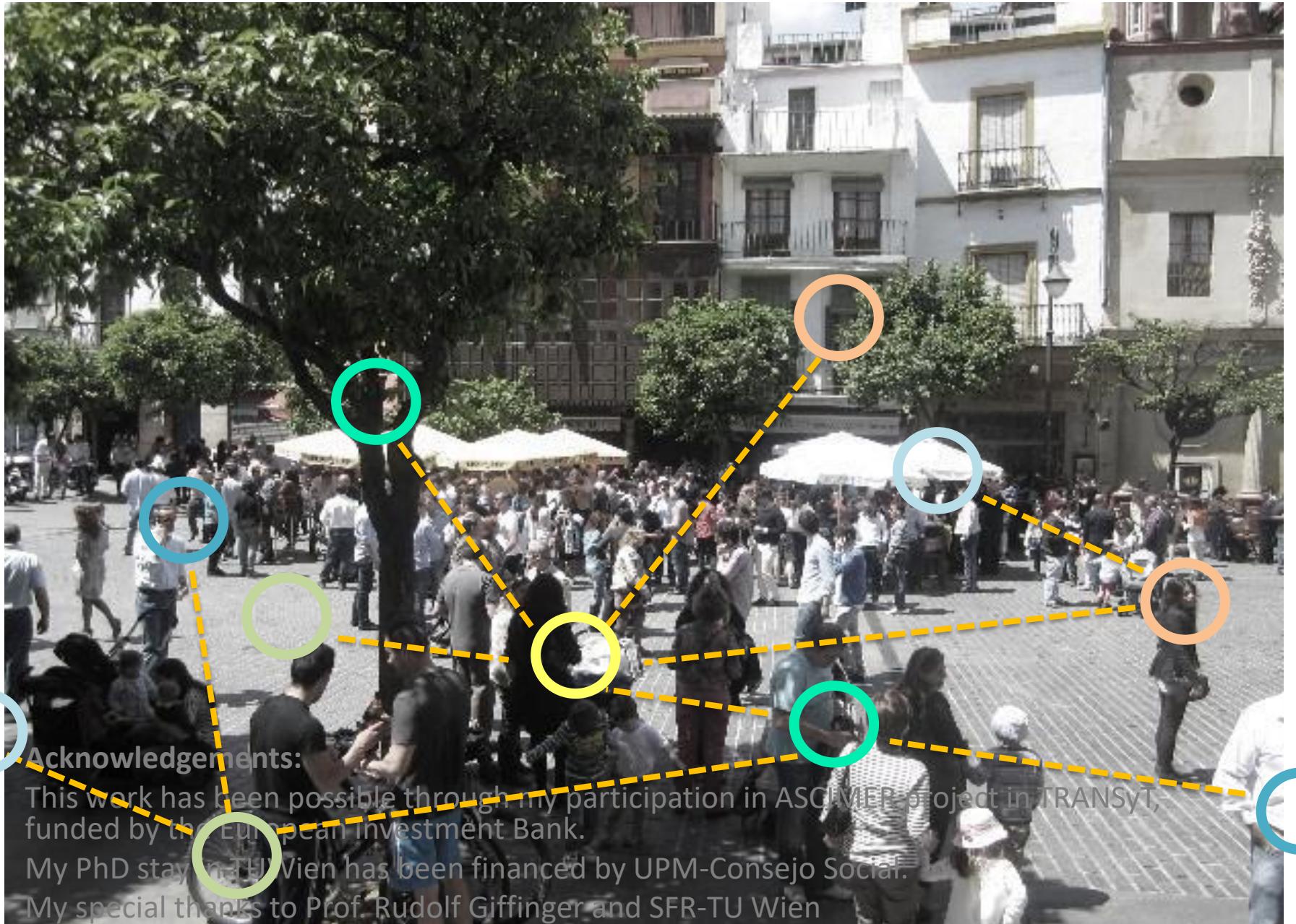
## THANK YOU FOR YOUR ATTENTION!

VICTORIA FERNÁNDEZ ÁÑEZ  
[victoria.Fernandez.anez@upm.es](mailto:victoria.Fernandez.anez@upm.es)  
JOSÉ MIGUEL FERNÁNDEZ-GÜELL  
[josemiguel.fernandez@upm.es](mailto:josemiguel.fernandez@upm.es)



### Acknowledgements:

This work has been possible through my participation in ASCIMER project in TRANSyT, funded by the European Investment Bank.  
My PhD stay in TUWien has been financed by UPM-Consejo Social.  
My special thanks to Prof. Rudolf Giffinger and SFR-TU Wien



# bibliografía

- **Smart City Projects Assessment Matrix: Connecting Challenges and Actions in the Mediterranean Region.** FERNANDEZ-ANEZ, Victoria; VELAZQUEZ; Guillermo; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés.(2018-aceptada pendiente de publicación) Journal of Urban Technology.
- **Smart City implementation and discourses: An integrated conceptual model. The case of Vienna.** FERNANDEZ-ANEZ, Victoria; FERNÁNDEZ-GÜELL, José Miguel; GIFFINGER, Rudolf.(2017). Cities
- **Incorporating a Systemic and Foresight Approach into Smart City Initiatives: The Case of Spanish Cities.** FERNÁNDEZ-GÜELL, J.-M., COLLADO-LARA, M., GUZMÁN-ARAÑA, S., & FERNÁNDEZ-AÑEZ, V. (2016). Journal of Urban Technology, 1–25.
- **Stakeholders approach to smart cities: a survey on smart city definitions.** FERNANDEZ-ANEZ, Victoria. (2016) First International Conference, Smart-CT 2016, Málaga, Spain, June 15-17, 2016, Proceedings, Lecture notes in Computer Sciences, 9704 pp. 157-167, 2016.
- **How to incorporate urban complexity, diversity and intelligence into smart cities initiatives** FERNÁNDEZ GÜELL, José Miguel; GUZMÁN ARAÑA, Silvia; COLLADO LARA, Marta; FERNANDEZ-ANEZ, Victoria. (2016) First International Conference, Smart-CT 2016, Málaga, Spain, June 15-17, 2016, Proceedings, Lecture notes in Computer Sciences, 9704 pp. 85-94, 2016.
- **Movilidad inteligente.** PÉREZ PRADA, Fiamma; VELÁZQUEZ ROMERA, Guillermo; FERNÁNDEZ AÑEZ, Victoria; DORAO SÁNCHEZ, Javier. (2015). Economía Industrial, 395, 17-28.

# bibliografía

- \_ **Ciudad inteligente y visión integrada: Barcelona, Milán y Viena.** FERNANDEZ-ANEZ, Victoria; FERNÁNDEZ-GÜELL, José Miguel; GIFFINGER, Rudolf, POLETTI, Angela. (2018). Libro de Comunicaciones. IV Congreso Ciudades inteligentes. Madrid, 30-31 de Mayo 2018. Publicación
- \_ **Procesos de gobernanza en proyectos de Ciudad Inteligente en un contexto internacional.**
- Metodología de Análisis.** FERNANDEZ-ANEZ, Victoria; MONZÓN DE CÁCERES, Andrés; VELAZQUEZ; Guillermo; RAMIREZ, María. (2016). Libro de Comunicaciones. II Congreso Ciudades inteligentes. Madrid, 13-14 Abril de 2016. Publicación
- \_ **Addressing urban challenges: Smart City assessment within a Regional context.** FERNANDEZ-ANEZ, Victoria; VELAZQUEZ; Guillermo; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés. En: 56th ERSA Congress Cities & Regions: Smart, Sustainable, Inclusive? 23-26 August 2016, Vienna, Austria.
- \_ **Smart city assessment methodologies: an opportunity for more sustainable cities.** FERNANDEZ-ANEZ, Victoria. En: 56th ERSA Congress Cities & Regions: Smart, Sustainable, Inclusive? 23-26 August 2016, Vienna, Austria.
- \_ **Stakeholders approach to smart cities: a survey on smart city definitions.** FERNANDEZ-ANEZ, Victoria. (2016) Smart CT, Málaga 14-15th June 2016
- \_ **How to incorporate urban complexity, diversity and intelligence into smart cities initiatives** FERNÁNDEZ GÜELL, José Miguel; FERNANDEZ-ANEZ, Victoria; GUZMÁN ARAÑA, Silvia; COLLADO LARA, Marta. (2016) Smart CT, Málaga 14-15th June 2016
- \_ **Smart City Assessment: a holistic approach to urban diversity.** FERNANDEZ-ANEZ, Victoria. (2015) Vienna Young Scientists Symposium. 9-10th June 2016
- \_ **Proyectos inteligentes y Gobernanza en la región Mediterránea.** VELAZQUEZ; Guillermo; FERNANDEZ-ANEZ, Victoria; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés. (2016). Libro de Comunicaciones. II Congreso Ciudades inteligentes. Madrid, 13-14 Abril de 2016. Publicación
- \_ **Smart Cities Definition: discourses and Stakeholders.** FERNANDEZ-ANEZ, Victoria. (2015. International Conference on City Sciences. Tongji University. June 2015 – Shanghai. Ponencia.
- \_ **Buenas Prácticas en Ciudades Inteligentes: Respondiendo a los retos urbanos** FERNÁNDEZ ÁÑEZ, Victoria; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés; TORREGROSA SANTANA, Andrea (2015). Libro de Comunicaciones. I Congreso Ciudades inteligentes. Madrid, 24-25 de Marzo de 2015. Publicación