

SMART CITY DEVELOPMENT

Applying European and international experience to the Mediterranean Region

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TRANSyT-UPM



ASSESSING SMART CITY INITIATIVES FOR THE MEDITERRANEAN REGION

www.eiburs-ascimer.transyt-projects.com

Luxembourg 07-03-17



European
Investment
Bank • Institute

By 2050 more than 70% world population will live in cities

70% of global GDP is generated by cities

Cities Global Challenges:

- Ageing population
- Pollution
- Climate change
- Traffic Congestion
- Lack of affordable housing
- Urban sprawl
- Rising cost of urban infrastructure
- Poverty
- Social Tensions

It is crucial to **manage growing cities** in ways that **support and drive economic growth** and **competitiveness** while **achieving social cohesion and environmental sustainability**

SOCIO-ECONOMIC ASPECTS

Integral Socioeconomic Development

Cross-sectorial ICTs

Public Services and Utilities

**SMART CITY
CONCEPT**

INITIAL EU ACTION FIELDS

Energy & Environment

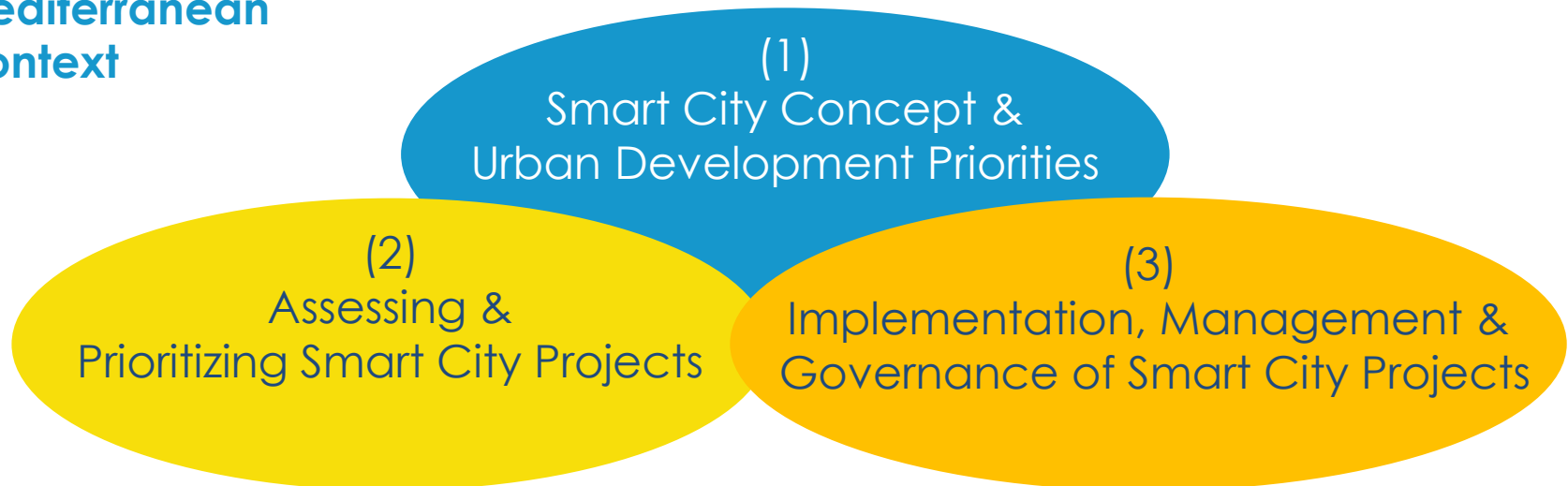
Transport & Mobility

Urban Development & Planning

Overall purpose:

- To **develop a comprehensive framework** to help public and private stakeholders **to make informed decisions** about **smart cities investment strategies** and to help them to **build the skills to prioritize, implement and develop** those strategies.

Mediterranean Context



Project team

UPM TEAM

RESEARCHERS



MSc. Fiamma Perez



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MSc. Victoria Fernandez

SUPERVISORS



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(Transport)



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UPM EXPERTISE



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(Architect)



Dr. Manuel Alvarez
(ITS)



Prof Oscar García
(Energy)



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(TICs)



Dr. Sergio Ramos
(TICs)

EXPERT REFERENCE GROUP



Amman (Jordan)
University of Petra



Baakline
(Lebanon)



Lyon (France)
ENTPE



Malaga (Spain)
Municipality



Milan (Italy)
University



Tangier (Morocco)
Urban Agency of
Tangier



Vienna (Austria)
TU Wien



1st ASCIMER WORKSHOP FACING THE CHALLENGES OF A NEW ERA: SMART CITY PROJECTS

16th-17th July 2015, La Granja, Spain



2nd ASCIMER WORKSHOP SMART CITY PROJECTS IN THE MEDITERRANEAN REGION

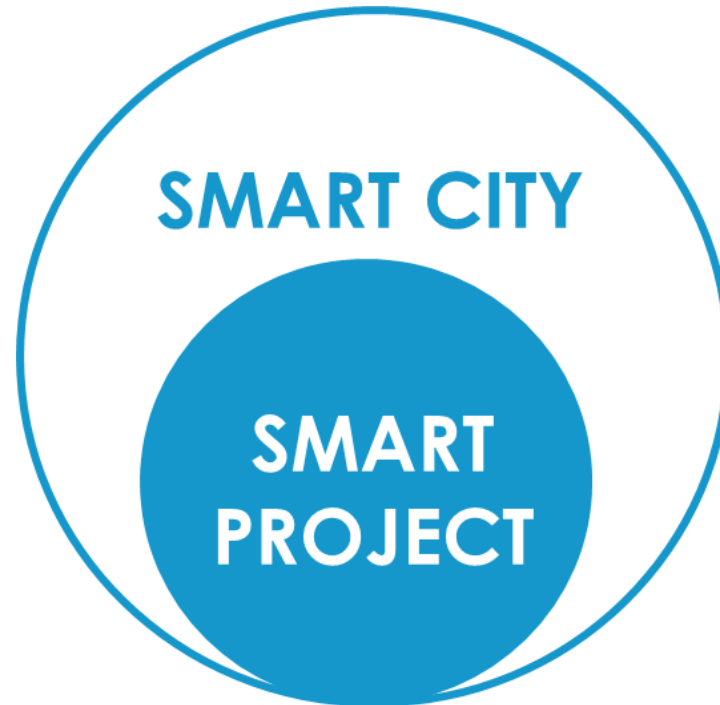
24th - 25th November 2016, Barcelona, Spain



FINAL EVENT and 3rd ASCIMER WORKSHOP IMPLEMENTING SMART CITY PROJECTS IN THE MEDITERRANEAN REGION

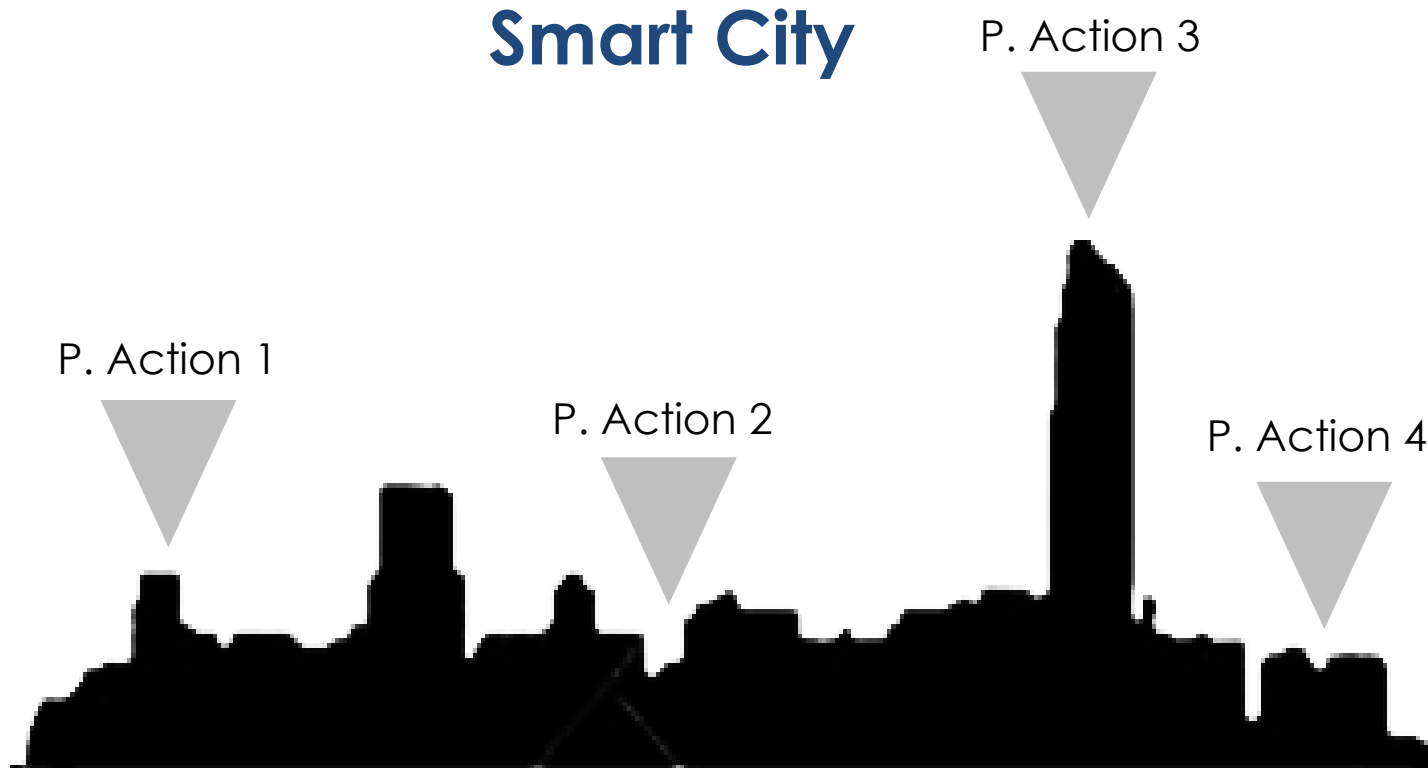
10th- 11th October, Casablanca, Morocco





Smart Cities implement **Smart City Projects**.
The aim of ASCIMER is to assess Smart City Projects.
However, city context will be key to assess them correctly.

Smart City

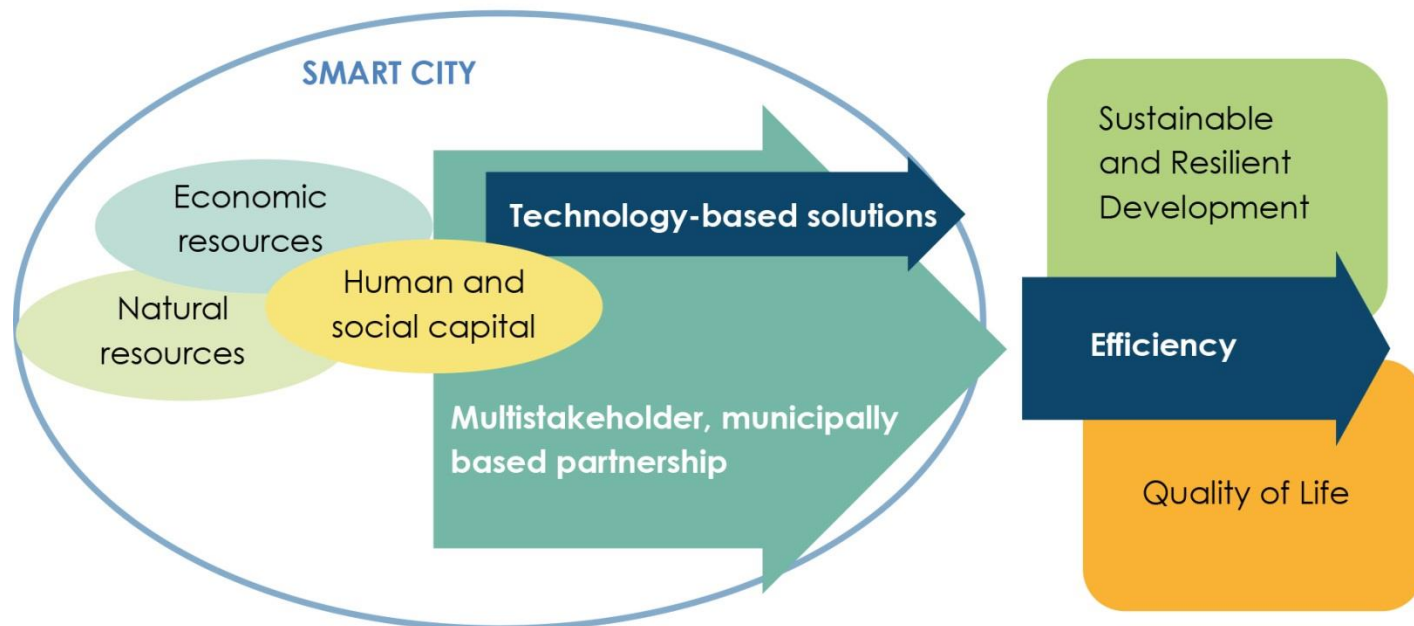


Smart City Projects can cover multiple areas and often are formed by diverse interrelated actions .

	BIG CITIES Usually capitals (i.e. Istanbul)	MEDIUM CITIES coastal cities or inner capitals (i.e. Amman)	SMALL CITIES (i.e. Baakline)
TECHNOLOGY USE	<ul style="list-style-type: none"> •High level •Big budget •Attractive to big companies 	<ul style="list-style-type: none"> •Medium level •Lower economic resources •Less attractive 	<ul style="list-style-type: none"> •Low access •Soft technology •Innovative solutions
GOVERNANCE ISSUES	<ul style="list-style-type: none"> •Difficulties at implementing global strategies •Problems: size and complexity 	<ul style="list-style-type: none"> •Theoretically: citizen-center approach •Practically, difficulties of communication with citizens. 	<ul style="list-style-type: none"> •Global vision •Citizens inclusion

“A Smart City is an integrated system in which human and social capital interact, using technology-based solutions.

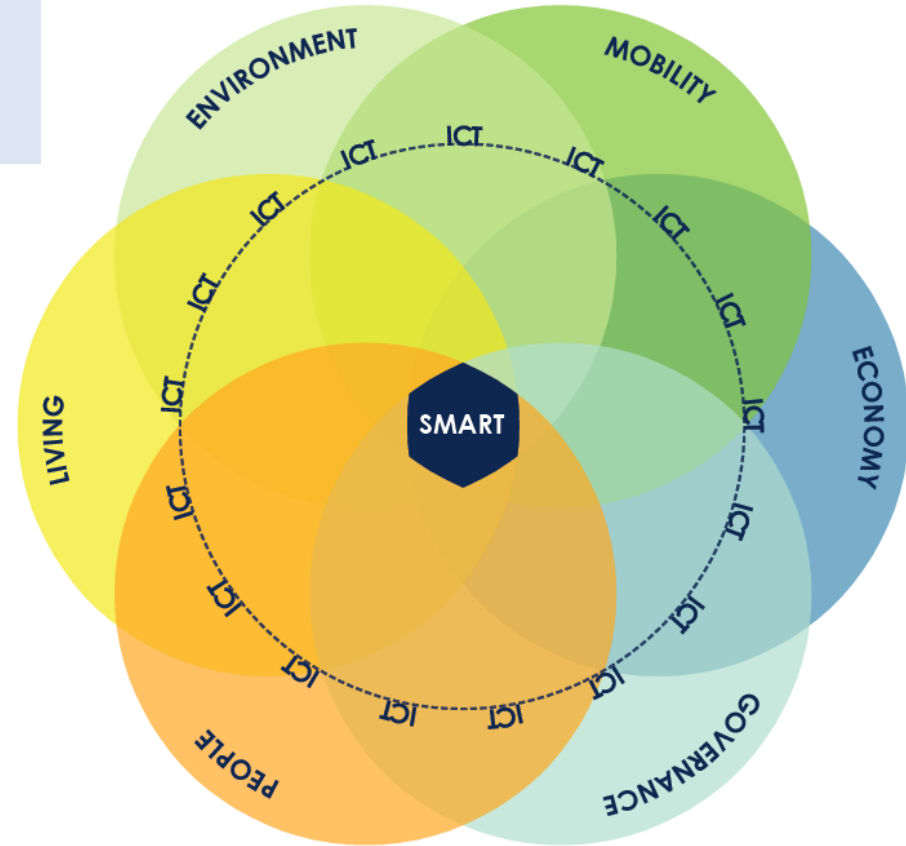
It aims to efficiently achieve sustainable and resilient development and a high quality of life addressing urban challenges on the basis of a multistakeholder, municipality based partnership.”



Smart City Dimensions

The Smart City can be divided in six main Dimensions in which Smart City Projects can be categorized.

- Smart Governance
- Smart Economy
- Smart Mobility
- Smart Environment
- Smart People
- Smart Living

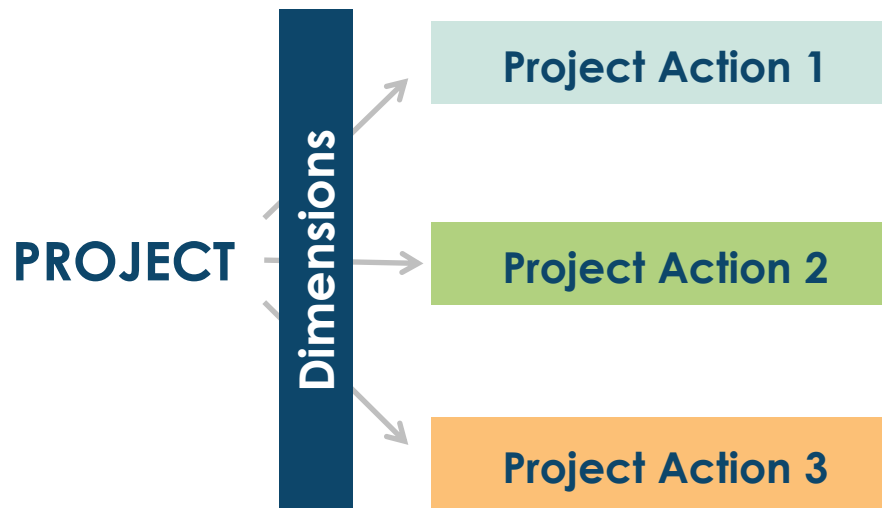


Smart city dimensions &
Technology as common enabler

Main sources:

European Parliament (2014) *Mapping Smart Cities in EU*
Giffinger, R. et al. (2007) *Smart Cities: Ranking of European Medium-Sized Cities*.

Each project can be classified according to the dimensions that it impacts, through the proposed scheme of Project Actions, that has two levels.



Project Actions (1st level)

Smart Governance	SGo1. Participation
	SGo2. Transparency and information accessibility
	SGo3. Public and Social Services
	SGo4. Multi-level governance

Smart Economy	SEc1. Innovation
	SEc2. Entrepreneurship
	SEc3. Local & Global interconnectedness
	SEc3. Productivity
	SEc5. Flexibility of labor market

Smart Mobility	SMo1. Traffic management
	SMo2. Public Transport
	SMo3. ICT Infrastructure
	SMo4. Logistics
	SMo5. Accessibility
	SMo6. Clean, non-motorised options
	SMo7. Multimodality

Smart Environment	SEn1. Network and environmental monitoring
	SEn2. Energy efficiency
	SEn3. Urban planning and urban refurbishment
	SEn4. Smart buildings and building renovation
	SEn5. Resources management
	SEn6. Environmental protection

Smart People	SPe1. Digital education
	SPe2. Creativity
	SPe3. ICT - Enabled working
	SPe4. Community building and urban life management
	SPe5. Inclusive society

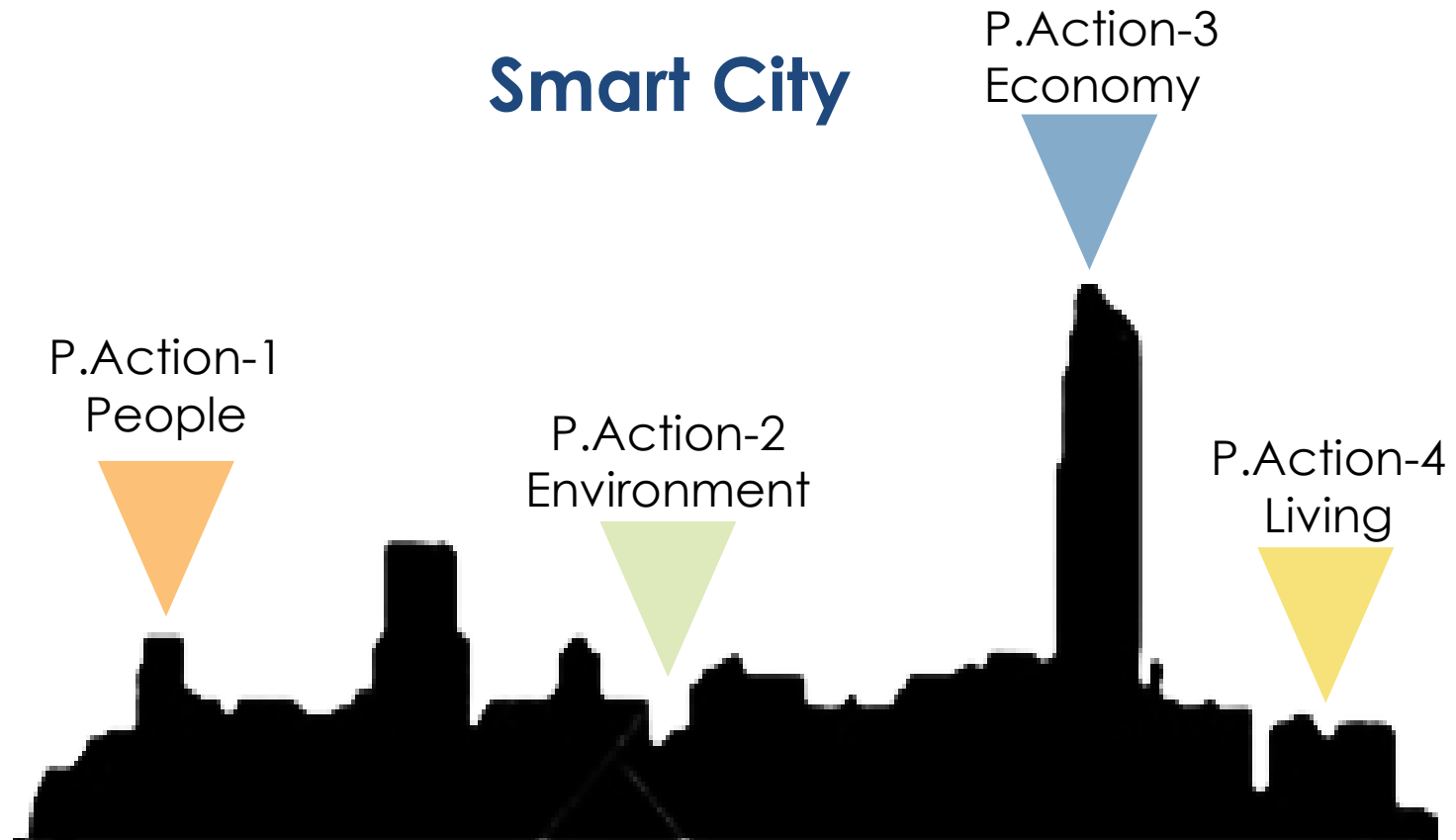
Smart Living	SLi1. Tourism
	SLi2. Culture and leisure
	SLi3. Healthcare
	SLi4. Security
	SLi5. Technology accessibility
	SLi6. Welfare & Social inclusion
	SLi7. Public spaces management

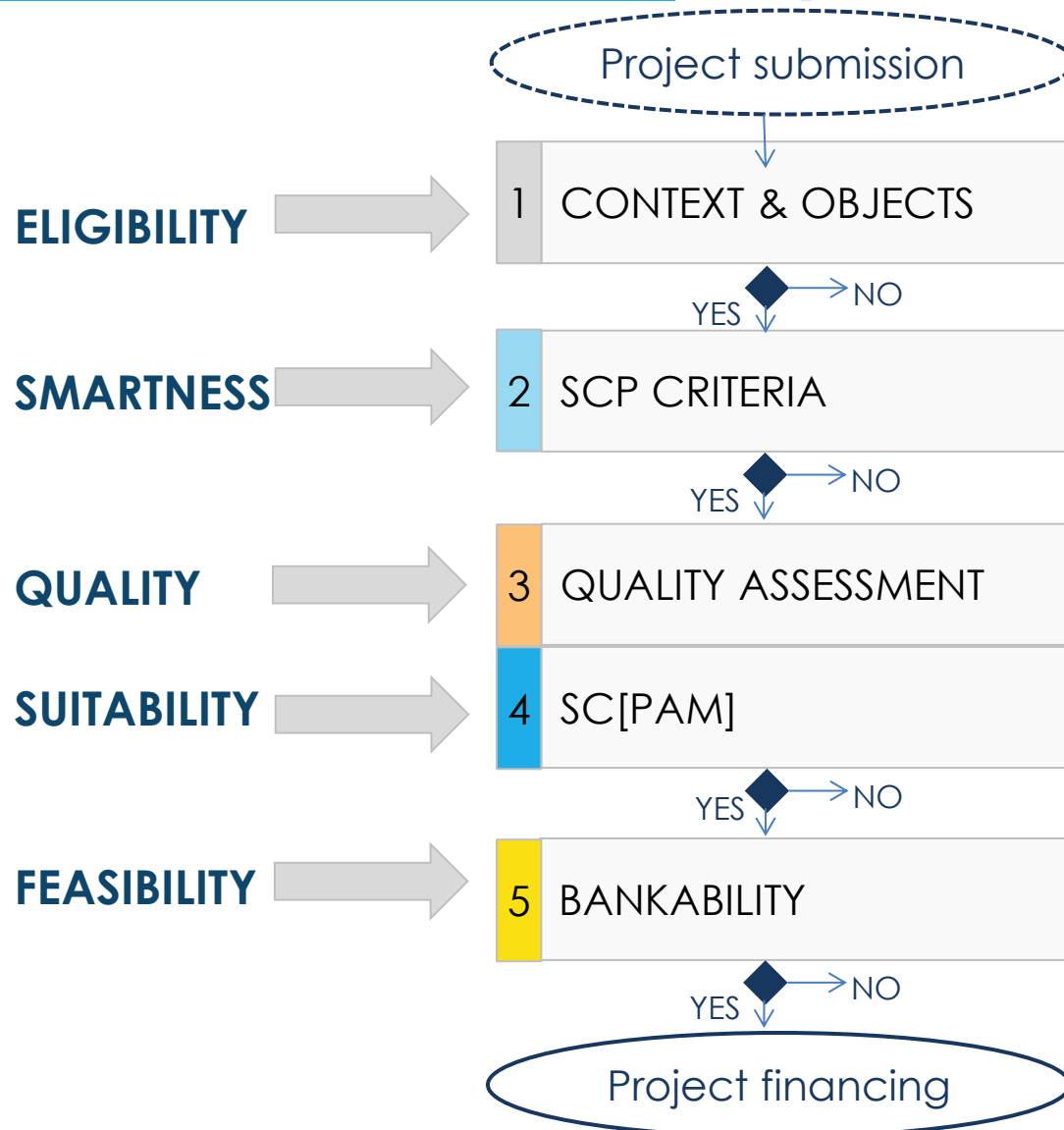
Sources:

- State of the art
- Web research
- On-line Survey
- Field Visits

Smart Mobility	SMo1. Traffic management	SMo1.1.Strategic corridor and network management
		SMo1.2.Incident management
		SMo1.3.Safety enhancement
		SMo1.4.Real time traveller information
	SMo2. Public Transport	SMo2.1.Real time traveller information
		SMo2.2.Real time operator information
		SMo2.3.Safety and security enhancement.
		SMo2.4. Public transport alternatives.
		SMo2.5. Integrated payment systems
	SMo3. ICT Infrastructure	SMo3.1. Systems for collection of data (monitoring and positioning systems)
		SMo3.2. Systems and protocols for communicating data
		SMo3.3. Systems and procedures to ensure quality of the data
		SMo3.4. Payment systems&Ticketing
	SMo4. Logistics	SMo4.1. Improvement on the trackability&traceability of goods
		SMo4.2. Fleet tracking&management
		SMo4.3. Stock management
	SMo5. Accesibility	SMo5.1. Enhancing physical accessibility
		SMo5.2. Enhancing digital accessibility
		SMo5.3. Enhancing socio-economical accessibility
		SMo5.4. Enhancing cultural accessibility
	SMo6. Clean and non-motorised options	SMo6.1. Clean energy in traffic and parking.
		SMo6.2. Cycling options.
SMo6.3. Walking options.		
SMo6.4.Alternative motorized options (car sharing)		
SMo7. Multimodality	SMo7.1.Passenger multimodality	
	SMo7.2.Freight multimodality	

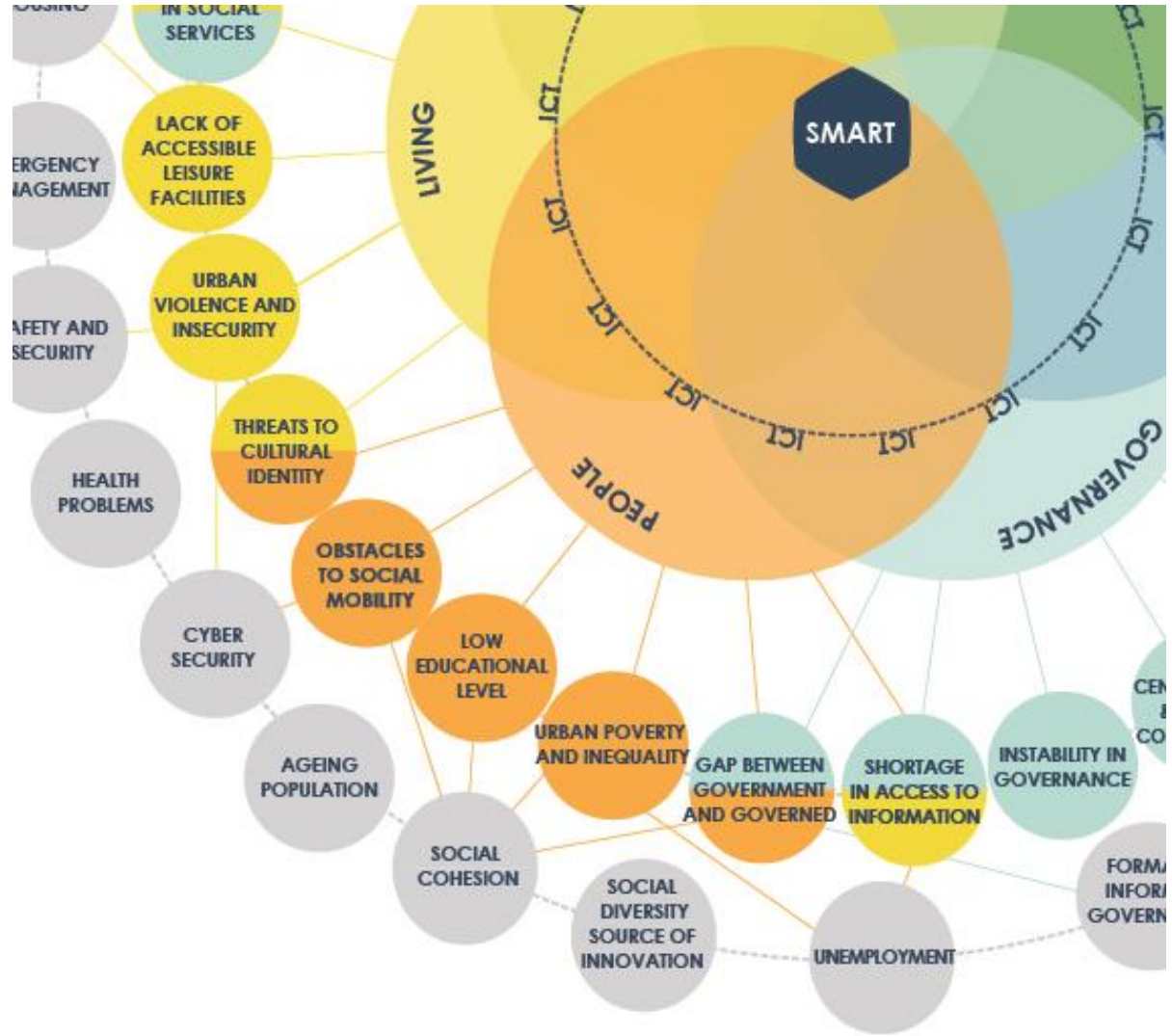
The result is the classification of projects in smaller pieces (project actions) to ease the assessment.





The methodology is a five step methodology that includes all the criteria a project must fulfil to be financed.

Relation between Smart City Dimensions, South & East Mediterranean Challenges and City general Challenges.



Help S&E

Mediterranean cities
to solve challenges
avoiding problems of
North cities

Field visits and literature review to:

- Understand **specific challenges** of each city
- Get a realistic picture of the main **advantages and difficulties** regarding the **implementation and management of SC projects**

FIELD VISITS' COUNTRIES

Jordan:

-Amman

Morocco

-Tangier
-Tetouan
-Chefchaouen
-Asilah
-Rabat

Lebanon

-Beirut
-Baakline
-Chouf Souayjani
(Federation of
Municipalities)

OTHER SURVEYED COUNTRIES

Tunisia

Egypt

Spain

France

Croatia

Turkey

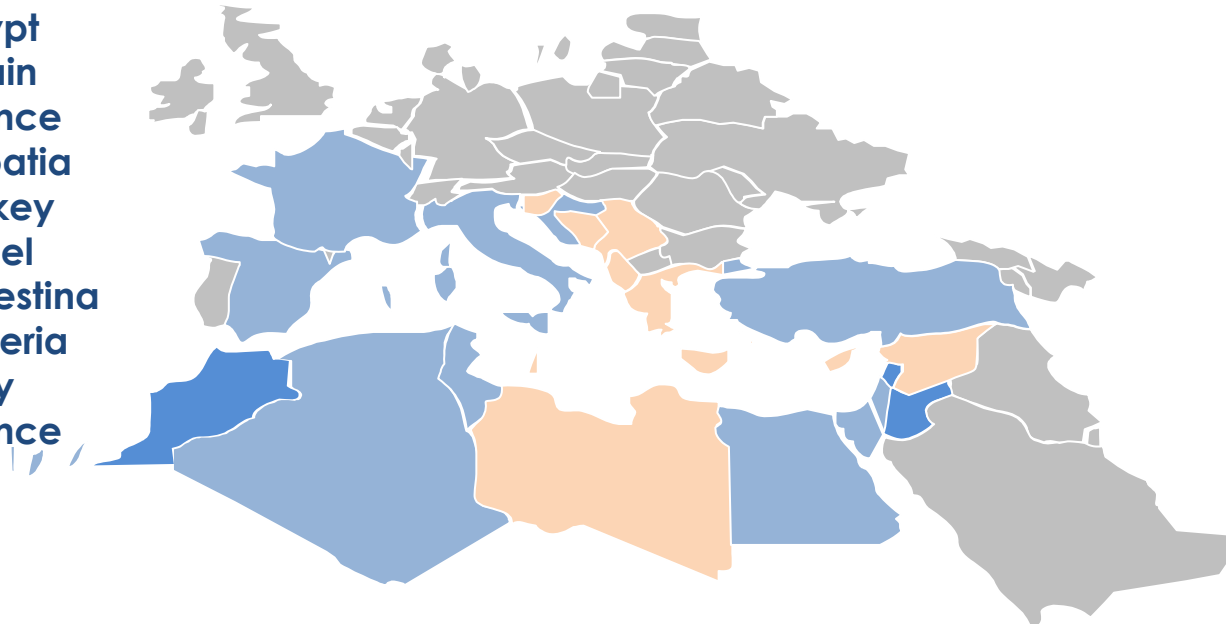
Israel

Palestina

Algeria

Italy

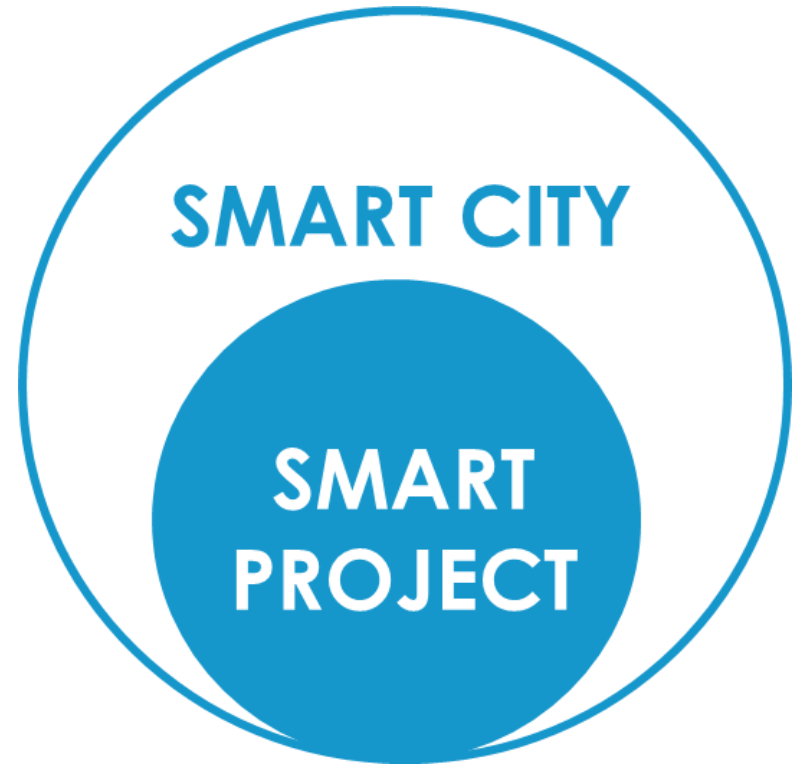
France



Smart City Project criteria

The main criteria for a project to be considered Smart were defined in the 1st ASCIMER workshop.

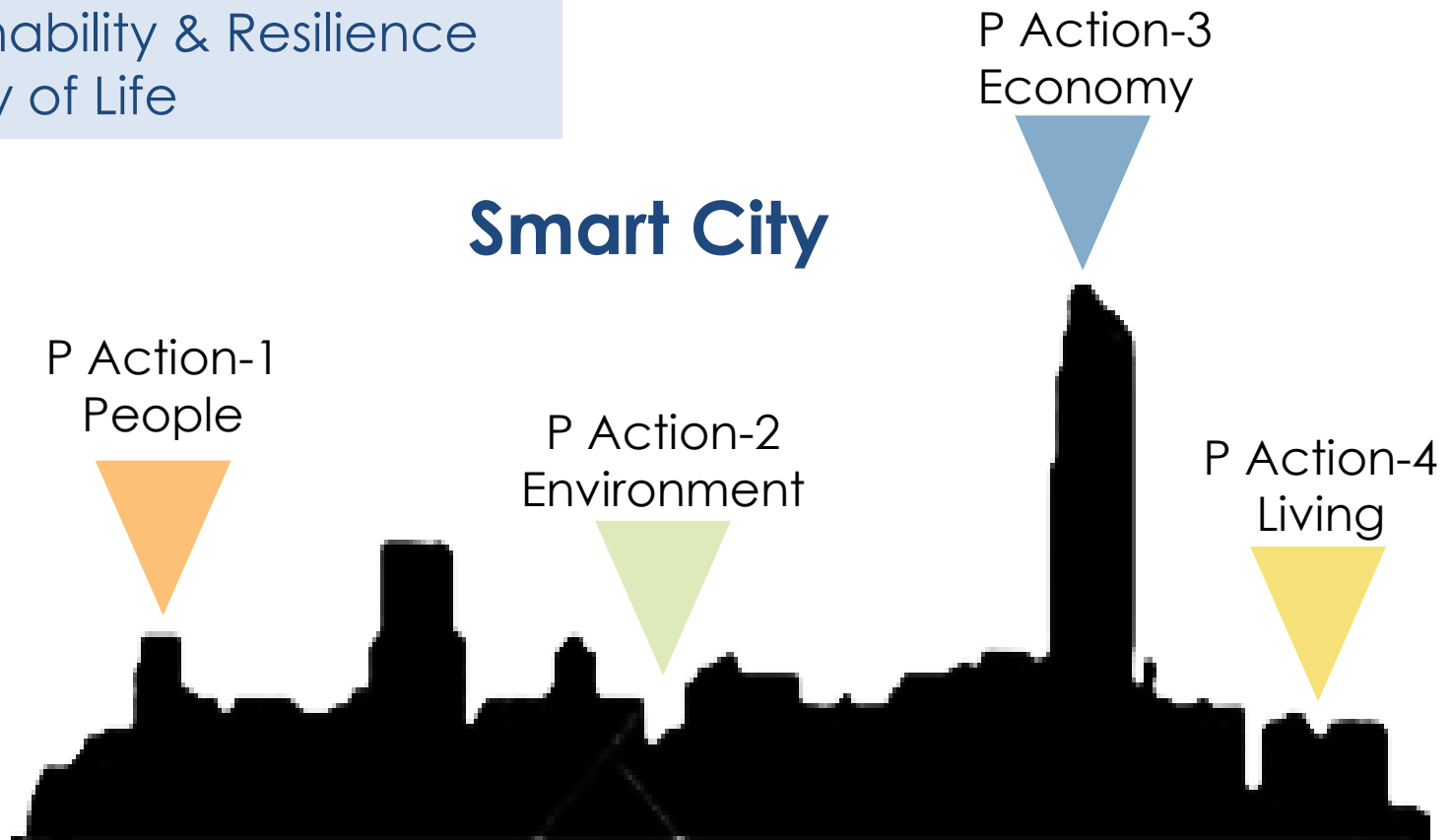
- Inclusion
- Integration
- Innovation



3rd step: QUALITY

Verifying the compliance with the objectives of the Smart City:

- Efficiency
- Sustainability & Resilience
- Quality of Life





SMART CITY PROJECT ASSESMENT MATRIX

4th - SC [PAM]



			DIMENSIONS																																						
			Smart Governance					Smart Economy					Smart Mobility					Smart Environment					Smart People					Smart Living													
			PROJECT ACTIONS																																						
			SGo1	SGo2	SGo3	SGo4	SGo5	SEc1	SEc2	SEc3	SEc4	SEc5	SMo1	SMo2	SMo3	SMo4	SMo5	SMo6	SMo7	SEn1	SEn2	SEn3	SEn4	SEn5	SEn6	SEn7	SPe1	SPe2	SPe3	SPe4	SPe5	SLI1	SLI2	SLI3	SLI4	SLI5	SLI6	SLI7	PROJECT	CITY IMPACT	FINAL VALUE
REF VALUE	CHALLENGES ASSESSMENT	QUALITY ASSES- MENT																																							
A	Low urban institutional capacities	9																																							
A	Deficit of social services	7																																							
B	Instability in governance	3																																							
A	Gap government - governed	10																																							
A	Centralization & lack of coordination	6																																							
B	Lack of awareness	7																																							
C	Shortage in access to information	9																																							
C	Lack of equity	6																																							
C	Unbalanced geographical development	4																																							
B	High infrastructures deficit	9																																							
C	Shortage in access to technology	6																																							
B	Lack of competitiveness	4																																							
B	Lack of urban economy diversification	9																																							
B	Important role of the informal economy	8																																							
A	Lack of public transport	3																																							
B	Increase of private car	9																																							
A	Pollution	6																																							
A	Very rapid urbanization	2																																							
B	Lack of quality on neighbourhoods	9																																							
A	Unefficient resources cycle	6																																							
A	Climate change effect	5																																							
A	Urban poverty and inequality	10																																							
A	Threats to cultural identity	6																																							
B	Low educational level and digital skills	4																																							
B	High obstacles to social mobility	9																																							
C	Lack of accessible leisure facilities	6																																							
A	Urban violence and insecurity	3																																							

5 BANKABILITY

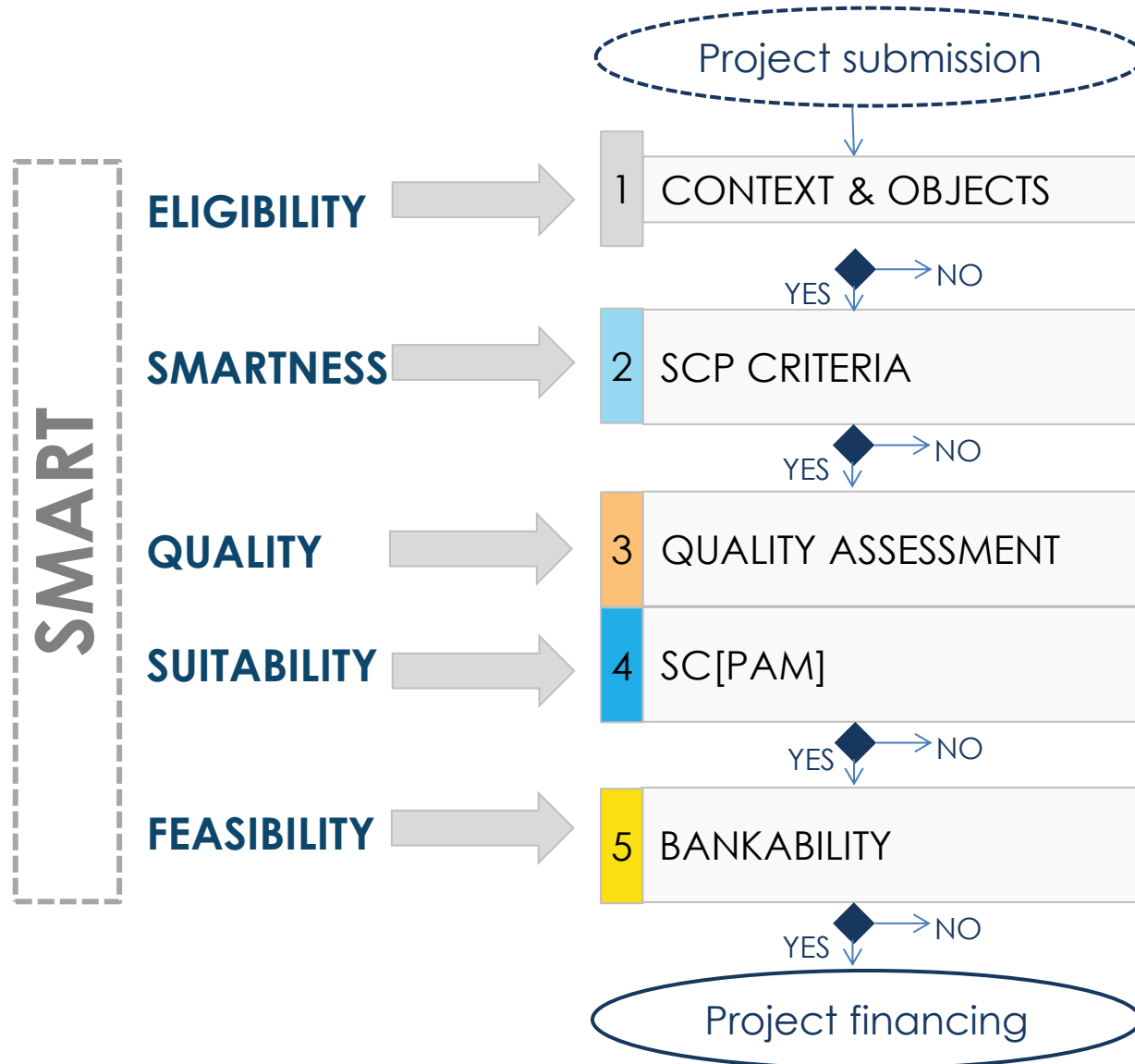


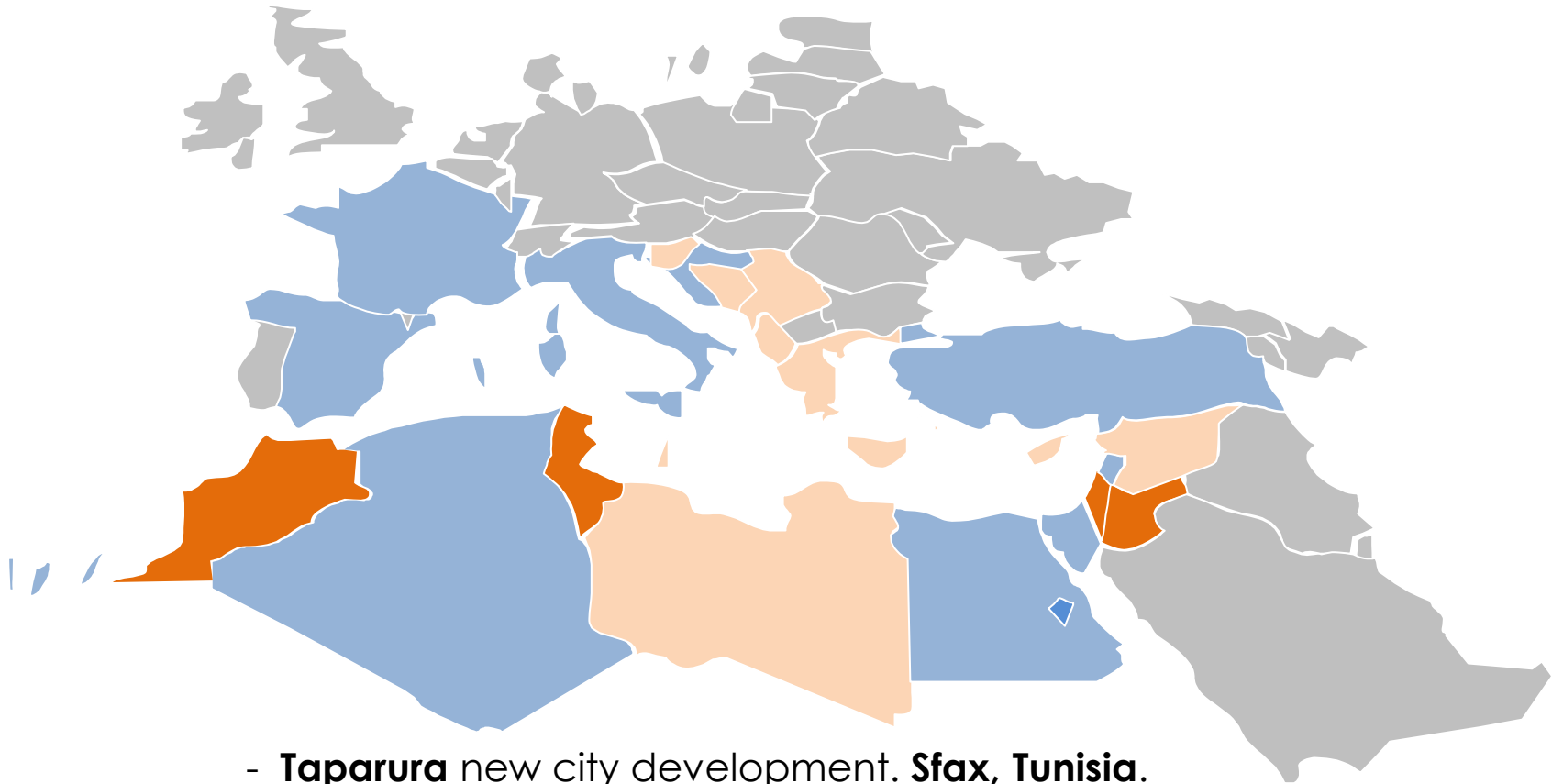
TECHNICAL – EIB Technical team

FINANCIAL – EIB Financial team

Feasibility is considered through the financial and technical assessment of the project:

- Technical feasibility
- Financial feasibility





- **Taparura** new city development. **Sfax, Tunisia.**
- **Zenata** new city. **Casablanca. Morocco.**
- e-navigation system. **Ramallah, Palestine.**
- Electric Vehicle initiative. **Amman, Jordan.**
- Open Street Map. **Chefchaouen, Morocco**

GIS App: include all city departments, citizens & tourists



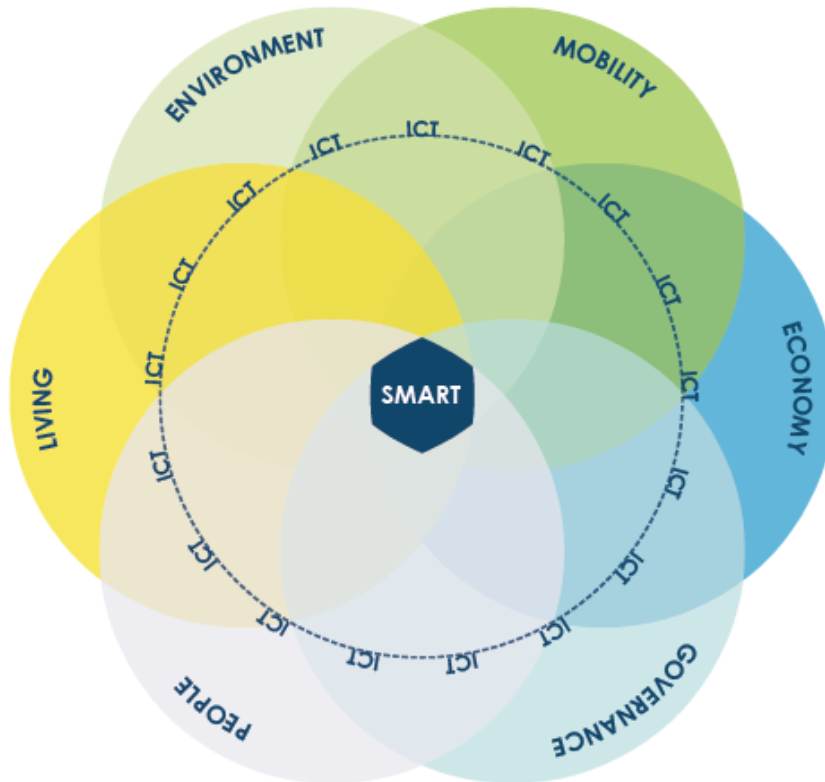
Ramallah is a Palestinian city located in the central West Bank.

In 2011, Ramallah created a GIS and an App to collect, manage, compile and analyze city information.

- Manages spatial data, updated in real time
- Provides logistical support to municipal services
- Tourist Interactive Map: **must see** in Ramallah
- Mapping sites
- Phone directory
- Weather forecast
- Citizen participation
- Tax payment tracking



Ramallah GIS App



PROJECT CHARACTERIZATION

Smart Governance	SGo1. Participation
	SGo2. Transparency and information accessibility
	SGo3. Public and Social Services
	SGo5. Efficiency in municipal management
Smart Economy	SEc1. Innovation
	SEc3. Local & Global interconnectedness
Smart Mobility	SMo3. ICT Infrastructure
	SMo5. Accessibility
Smart Environment	SEn5. Resources management
Smart Living	SLi1. Tourism
	SLi2. Culture and leisure
	SLi5. Technology accessibility

RESULTS

Ramallah GIS App

Context & Object

1. Eligibility

3. Quality

Strengths	Possible improvements
<ul style="list-style-type: none"> Administrations from different levels actively participating Addresses a real problem of citizenship. (Google block). 	<ul style="list-style-type: none"> Apparent lack of planning in the deployment of functionalities. May lead to inefficiencies.
86%	

Quality Assessment		
Project		
Efficiency: 80%	Sustainability & Resilience: 88%	Quality of life:
85%		

SCP Criteria

2. Smartness

Innovation, Integration, Inclusion	
Strengths	Possible improvements
<ul style="list-style-type: none"> Inclusive solution. Information made available for all. Integrated service for multiple municipal sections 	<ul style="list-style-type: none"> Open data access
96%	

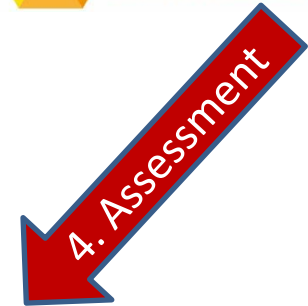
Impact	
Strengths	Possible improvements
<ul style="list-style-type: none"> Economic sustainability of the project 	<ul style="list-style-type: none"> Technologic accessibility improvement

Ramallah GIS App

RESULT: 3,259 (70%)

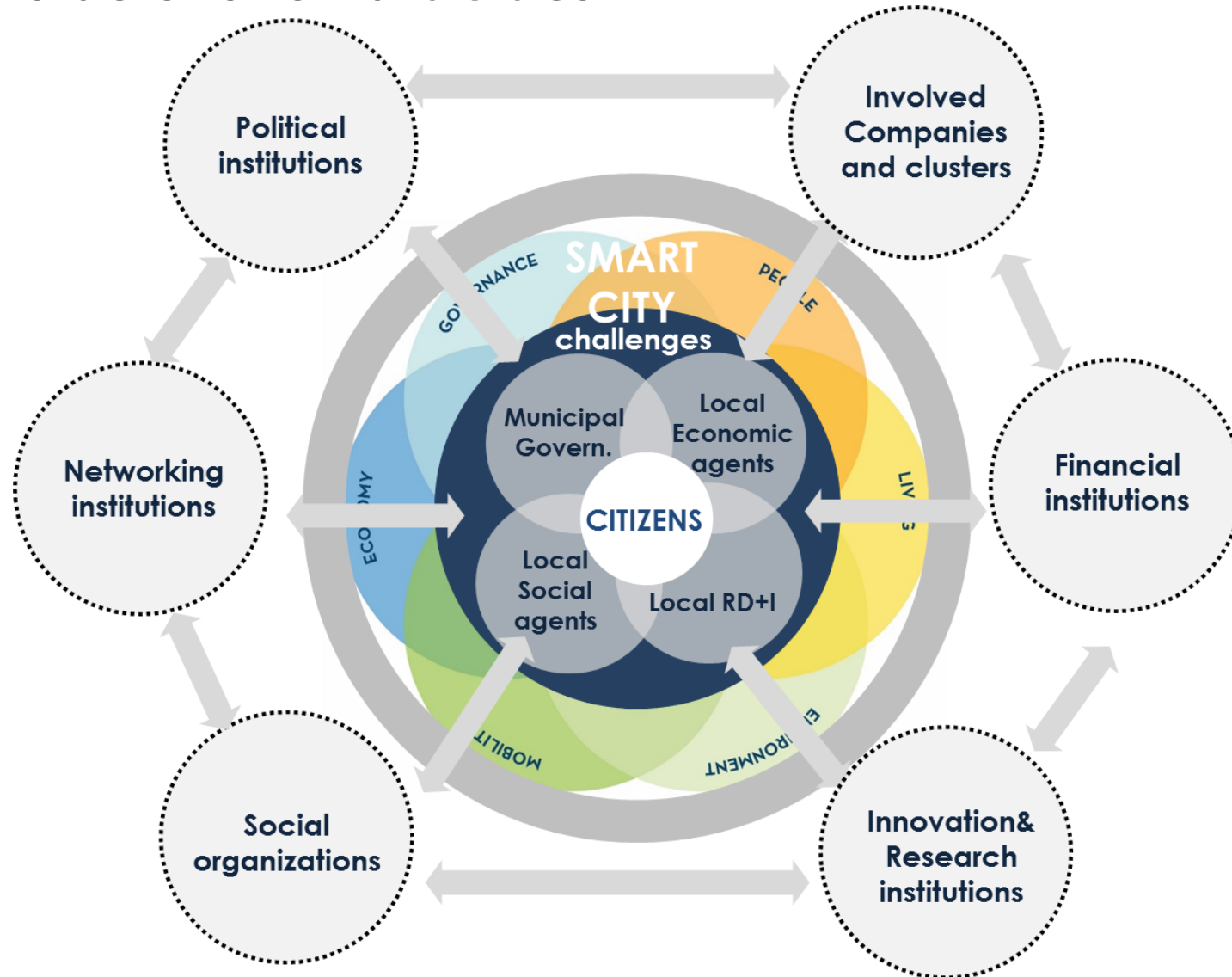
PROJECT ACTIONS

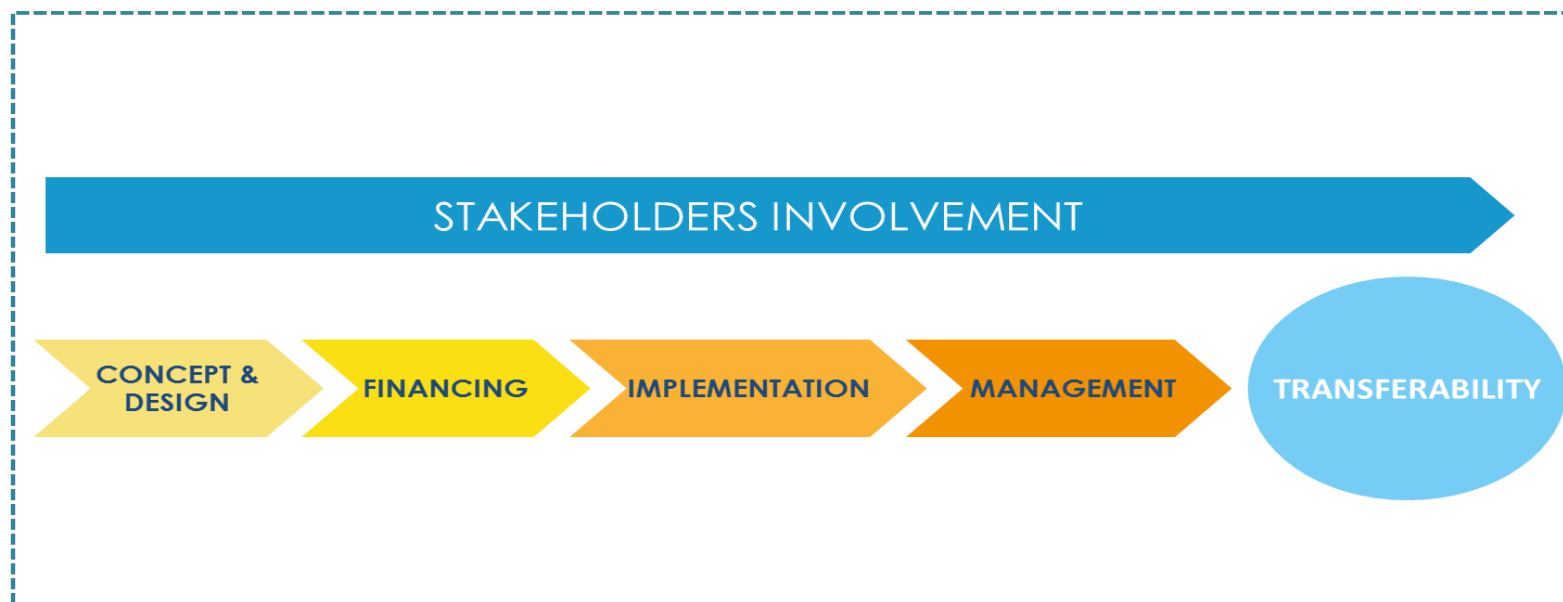
	Smart Governance			Smart Economy		Smart Mobility		S.Env	Smart Living	
	\$Go2	\$Go3	\$Go5	\$Ec1	\$Ec3	\$Mo3	\$Mo5	\$En5	\$Li1	\$Li2
project	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5
city impact	9,3	##	8,0	8,5	8,6	9,0	8,0	6,0	9,7	7,0
max. value	10	10	10	10	10	10	10	10	10	10
Assessment Value										
Local government value	8,9	9,3	8,3	8,5	8,5	8,8	8,3	7,3	9,1	7,8



CHALLENGES	REF. VALUE	CH	Local government value	PROJECT ACTIONS										Value per challenge	Max Value / Challenge		
				\$Go2	\$Go3	\$Go5	\$Ec1	\$Ec3	\$Mo3	\$Mo5	\$En5	\$Li1	\$Li2				
A	CH1	8	8	0	0	66	0	0	0	0	0	0	0	0	0	66	80
B	CH2	6	6	0	56	0	0	0	0	0	0	0	0	0	0	56	60
C	CH3	7	7	0	0	58	0	0	0	0	0	0	0	0	0	58	70
A	CH4	7	7	62	65	0	0	0	0	0	0	0	0	54	0	181	210
B	CH5	6	6	54	0	50	0	51	0	0	0	0	0	0	0	154	180
C	CH6	6	6	54	0	0	0	51	0	0	44	0	0	0	0	148	180
A	CH7	4	4	36	0	0	0	34	35	0	0	0	0	0	0	105	120
B	CH8	3	3	27	28	0	0	0	26	25	22	0	23	0	0	151	180
C	CH9	7	7	0	0	58	0	60	61	58	51	0	0	0	0	287	350
A	CH10	7	7	0	0	0	0	60	61	0	51	0	0	0	0	172	210
B	CH11	10	10	0	0	0	85	85	88	0	0	0	0	0	0	258	300
C	CH12	6	6	0	0	50	51	51	53	0	44	55	0	0	0	302	360
A	CH13	7	7	0	0	0	60	0	0	0	0	64	54	0	0	177	210
B	CH14	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	CH15	9	9	0	0	0	0	0	0	74	0	0	0	0	0	74	90
A	CH16	9	9	0	0	0	0	0	0	74	0	0	0	0	0	74	90
B	CH17	5	5	0	0	0	0	0	0	41	36	0	0	0	0	78	100
C	CH18	10	10	0	0	0	0	0	0	0	73	0	0	0	0	73	100
A	CH19	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	CH20	7	7	0	0	0	0	0	0	0	51	0	0	0	0	51	70
C	CH21	7	7	0	0	0	0	0	0	58	51	0	0	0	0	109	140
A	CH22	2	2	18	19	0	0	0	18	17	15	18	16	0	0	119	140
B	CH23	5	5	0	0	0	0	43	0	0	0	45	39	0	0	127	150
C	CH24	1	1	0	0	0	0	0	0	8	0	0	8	0	0	16	20
A	CH25	8	8	71	74	0	0	0	0	0	0	0	62	0	0	207	240
B	CH26	7	7	0	65	0	0	0	0	0	58	0	54	0	0	177	210
C	CH27	5	5	0	0	0	0	0	0	41	0	0	0	0	0	41	50
Value per project action				321	305	281	196	435	341	454	435	182	310	3259	ASSESSMENT		
max value/project action				800	800	600	300	1000	700	1200	1100	400	800	70	BANKABILITY		
														70	FINAL RESULT		

Stakeholders for Smart Cities





		STAKEHOLDERS' GROUPS							
		Citizenship	Municipal Governments	Political Institutions	Involved Companies and Clusters	Financial Institutions	Innovation & Research Institutions	Social Organizations	Networking Institutions
STAGES OF SMART CITY PROJECTS DEVELOPMENT	Concept & Design	3,76	4,79	3,93	2,93	3,34	3,83	3,90	3,45
	Financing	1,66	3,97	3,76	3,24	4,83	1,72	1,69	2,10
	Implementation	2,76	4,31	2,72	4,03	3,10	2,41	2,48	2,21
	Management	2,69	4,17	2,38	3,24	2,31	2,24	2,38	2,07
	Transferability	2,46	3,14	3,17	3,21	3,14	3,59	2,55	3,52
Average values		2,67	4,08	3,19	3,33	3,34	2,76	2,60	2,67

- Smart City assessment must take into account the **specific challenges of the different regions and cities**.
- Mediterranean Region Cities have **common challenges** that should be **weighted** according to the specific situation of the city.
- The ASCIMER methodology aims to establish **relations between projects' assessment and the specific challenges for the region**
- The **collaboration with stakeholders and municipalities** is key to develop tools to address specific targets of each city:

governance is key for a successful implementation

_ **Smart City Projects Assessment Matrix: connecting Challenges and Actions in the Mediterranean Region.** Journal of Urban Technology. Fernandez-Anez, Victoria; Velazquez, Guillermo; Perez Prada, Fiamma; Monzón de Cáceres, Andrés. (Expected in 2017).

_ **Smart City Projects Assessment Methodology.** Sustainable cities and society. Velazquez, Guillermo; Fernandez-Anez, Victoria; Perez Prada, Fiamma; Monzón de Cáceres, Andrés. (Expected in 2017).

_ **Governance and Smart City Projects in the Mediterranean Region.** Social Science Computer Review. Fernandez-Anez, Victoria; Monzón de Cáceres, Andrés, Velazquez, Guillermo; . (Expected in 2017).

_VELAZQUEZ; Guillermo; FERNANDEZ-ANEZ, Victoria; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés. (2017). Metodología ASCIMER de evaluación de proyectos de Ciudad Inteligente. Libro de Comunicaciones. III Congreso Ciudades inteligentes. Madrid, 26-27 Abril de 2017. Publicación

_FERNANDEZ-ANEZ, Victoria; MONZÓN DE CÁCERES, Andrés, VELAZQUEZ; Guillermo;.RAMIREZ VALADÉS, María (2017). Procesos de Gobernanza en Proyectos de Ciudad Inteligente en un Contexto Internacional: Metodología de análisis. Libro de Comunicaciones. III Congreso Ciudades inteligentes. Madrid, 26-27 Abril de 2017. Publicación

_FERNANDEZ-ANEZ, Victoria. (2016) "Stakeholders approach to smart cities: a survey on smart city definitions" First International Conference, Smart-CT 2016, Málaga, Spain, June 15-17, 2016, Proceedings, Lecture notes in Computer Sciences, 9704 pp. 157-167, 2016.

_FERNANDEZ-ANEZ, Victoria; VELAZQUEZ; Guillermo; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés. Addressing urban challenges: Smart City assessment within a Regional context. En: 56th ERSACongress Cities & Regions: Smart, Sustainable, Inclusive? 23-26 August 2016, Vienna, Austria.

_VELAZQUEZ; Guillermo; FERNANDEZ-ANEZ, Victoria; PEREZ PRADA, Fiamma; MONZÓN DE CÁCERES, Andrés. (2016). Proyectos inteligentes y Gobernanza en la región Mediterranea. Libro de Comunicaciones. II Congreso Ciudades inteligentes. Madrid, 13-14 Abril de 2016. Publicación

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Deliverables:

D1a- Smart Cities: concept & challenges

D1b- Smart Cities: best practices guide

**D2 – Assessment Methodology for Smart City
Projects**

**D3 – Governance and Implementation
Guidelines**

- Project Summary

