



**EIP-SCC**

European Innovation Partnership  
on Smart Cities and Communities

# Smart Cities Guidance Package: implementation, scaling up and replicability of smart city projects

 NTNU

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ECB Annex 63

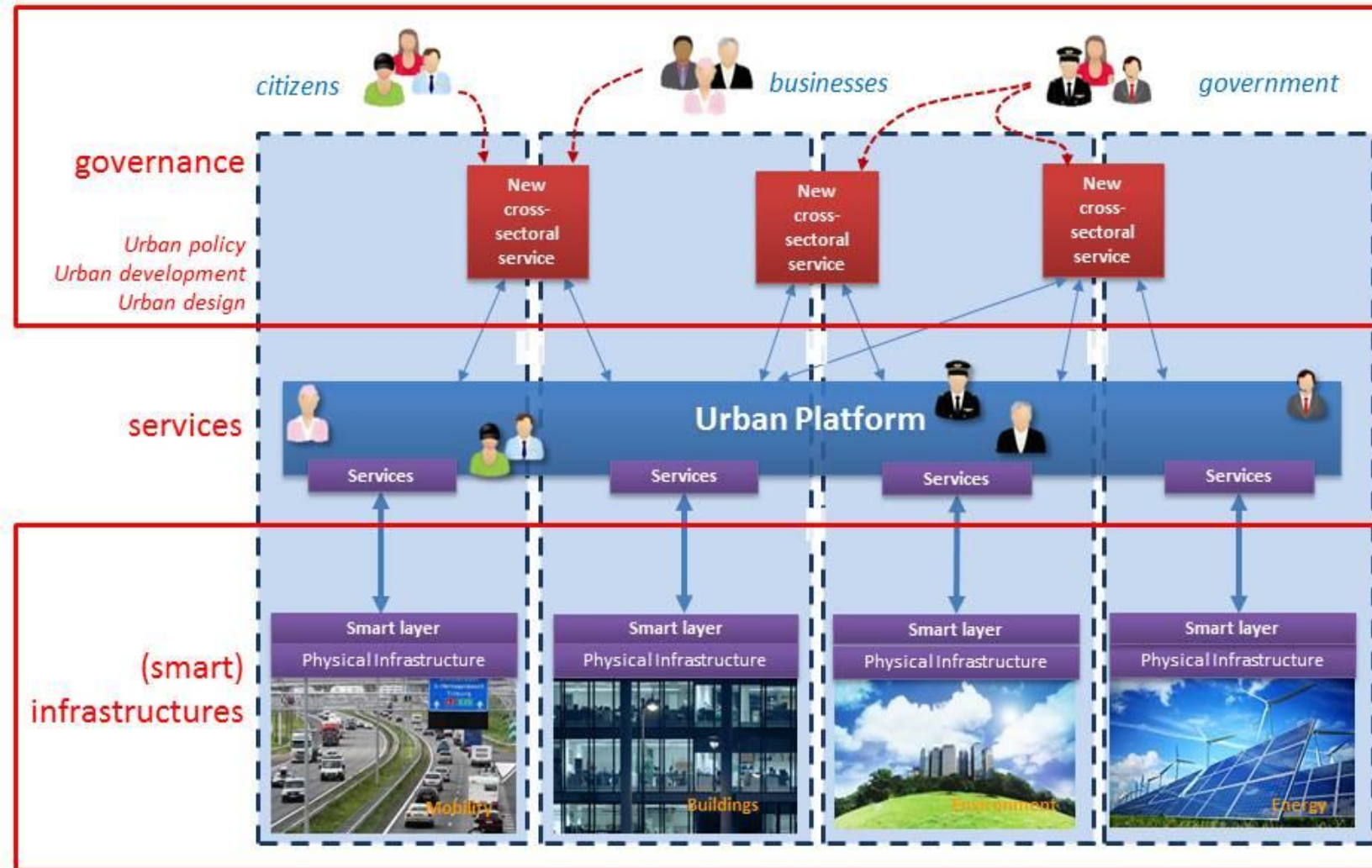


# Smart Cities: beyond CONCERTO and CIVITAS

- Increasing awareness of:
  - What the Internet-of-Things, urban data and ICT could really mean
  - That energy designs have to optimise between building and district scale level. Districts/cities are the scale level where energy designs should be made.
  - The benefits of an integrated approach of energy and mobility, but there are hardly any successful large-scale examples yet
  - That we need informed decision making because investments are huge (KPI's, good quality scenarios, insight into technology performance, other ways of value capturing in real estate and infrastructure)
  - That it is more than only technology (economy, social innovation) and that generic role models are lacking so everybody reinvents the wheel



# ICT skin on top of the physical infrastructure

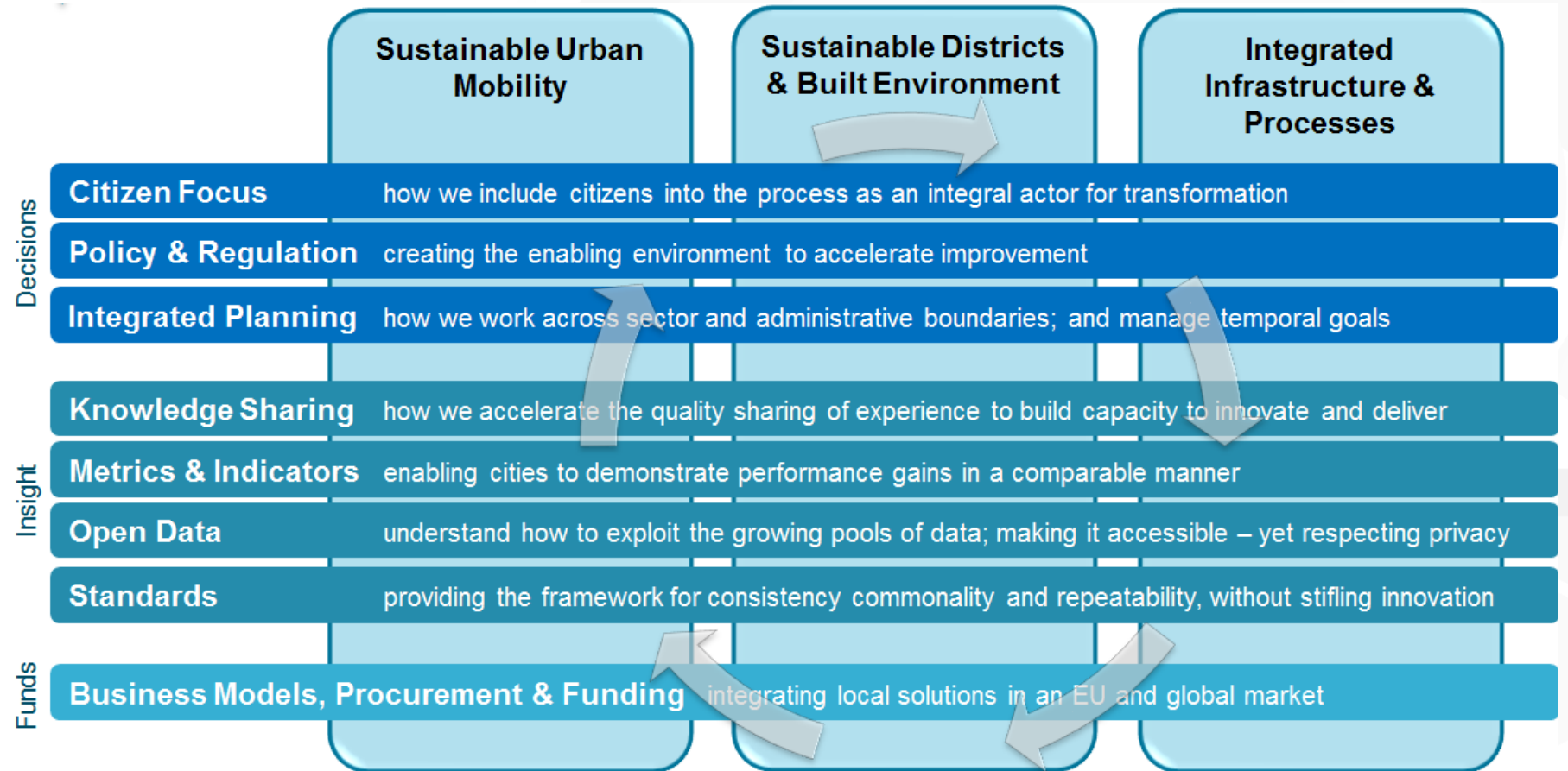


# History of EIP SCC:

- June 2011 **Smart Cities & Communities** Industrial Initiative as part of the SET-plan: in transport, buildings and industry, available technology opportunities for CO2 reduction must be turned into business opportunities. *Create conditions to trigger mass market take-up of energy efficiency technologies by support of pioneer cities that transform their buildings, energy networks and transport systems into those of the future, demonstrating transition concepts and strategies to a low carbon economy*
- November 2011: **SCC Stakeholder Platform** starts, cities not well involved
- July 2012: **European Innovation Partnership Smart Cities and Communities** starts collaborating, building upon Industrial Initiative, ICT added, High Level group and Sherpa group work on Strategic Implementation Plan
- July 2011 and July 2012, start calls for SCC proposals in **FP7**
- October/November 2013 **Strategic Implementation Plan** adopted, launch event in Brussels
- February 2014 Invitation for **Commitments** (non-subsidized)
- March 2014 Stakeholder Platform converted to **Marketplace SCC**
- May 2015 **Restructuring** of Marketplace, Action Clusters regrouped into Initiatives
- January 2017 new marketplace team and **roadmap for next 3 years, focus on market uptake**

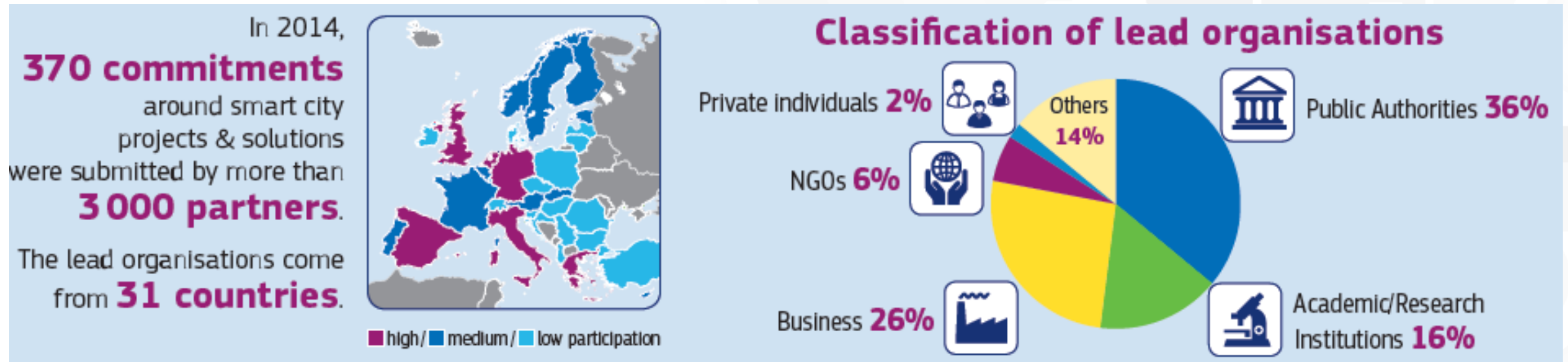


# European framework of vertical and horizontal actions in Strategic and Operational Implementation



# Achievements so far of EIP SCC

- 370 eligible commitments work together in Marketplace without any funding
- FP7 projects nearly finished and H2020 Lighthouse projects started (total 26)
- Incorporation of CONCERTO technical database in Smart Cities Information Systems (catalogue solutions and examples)
- Increasing attention from other parts of the world



Search for commitments, solution proposals, EU projects, publications...

Search

### Commitments

View all

Smart Cities for gender and diversity  
Connected vehicles concept based on inexpensive sm...  
Smart cities framework for the Mediterranean area

### EU projects

View all

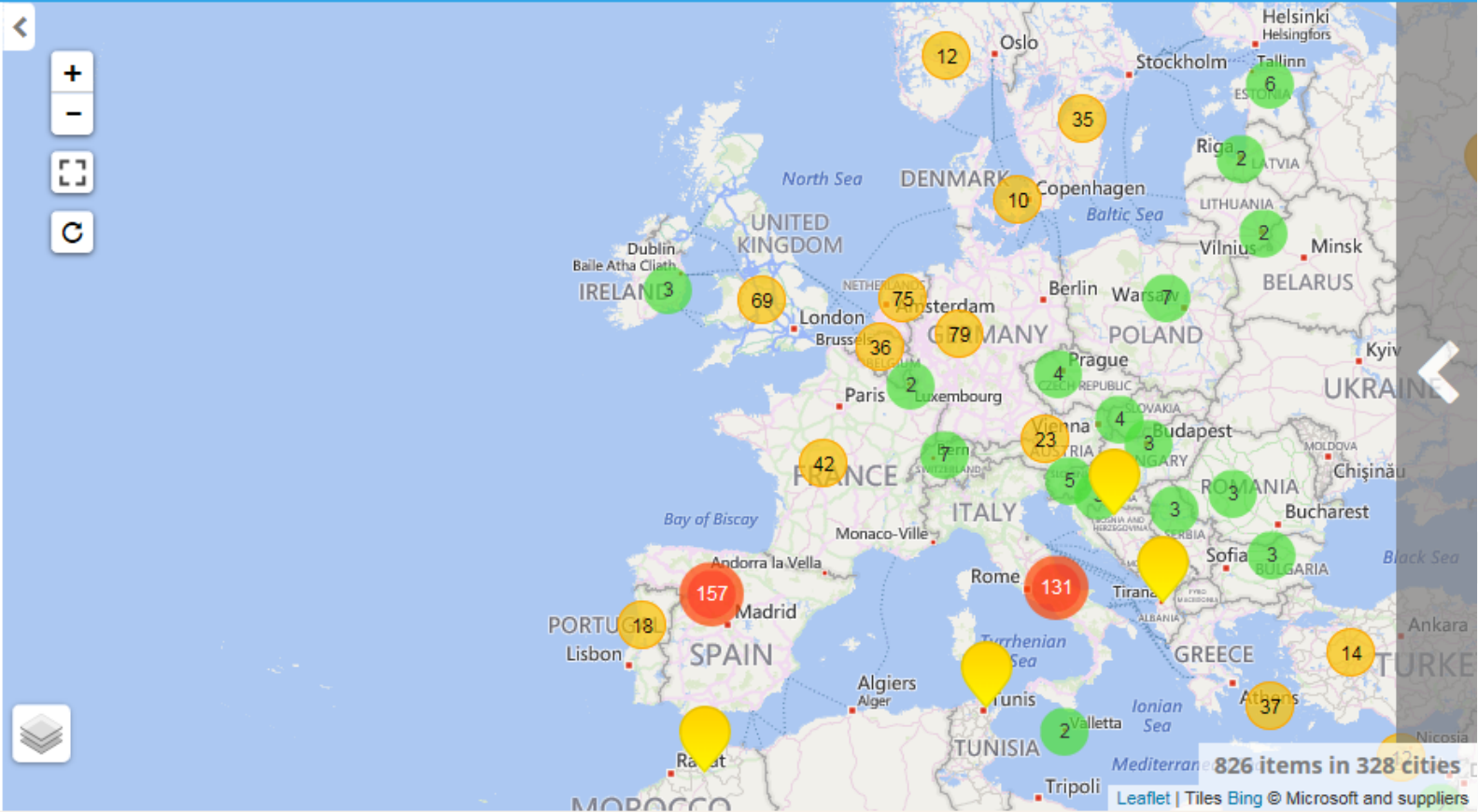
ready  
pleec - planning for energy efficient cities  
transform - transformation agenda for low carbon cities

### Solution proposals

View all

taxi kilometers, jams and co2  
bridging of time, location and enthalpy differences in...  
how to maintain stability of supply once a far greater...

View all 1066 results



# Action clusters

1. Business Models, Finance and Procurement
2. Citizen Focus
3. Integrated Infrastructures & Processes (including Open Data)
4. Policy & Regulations / Integrated Planning
5. Sustainable Districts and Built Environment
6. Sustainable Urban Mobility





# Diffusion Smart Cities so far

- Many cities are working on smart city strategies and implementation of smart city projects
  - Many projects in planning phase
  - Except Horizon2020 SCC01 lighthouse projects, smart city projects often singular, pilot phase, limited, lacking holistic perspective, quite small
- Why? It is very difficult
  - Lack of awareness, priorities from the side of key players
  - Many interdependencies between urban actors but no common operational picture
  - Risk aversion and lack of technological knowledge in financial institutes, time horizon ROI, mixed-funding
  - Hardly a transition: “urban acupuncture” instead of systemic changes, “islands of smartness”
  - Windows of opportunity for urban stakeholders from holistic smart city perspective largely unknown
- Integrated planning and implementation: how to do this



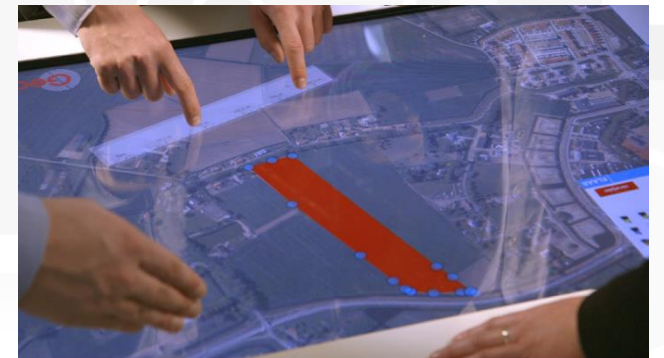
# What is needed for real transition

- **Better technologies:** e.g. energy storage
- **Governance:** variety of actors and interests: mapping, co-design, co-creation, common operational picture, instead of traditional participation. How to make the quadruple helix work?
- **Other ways of working:** from a culture of contracting and procurement to open innovation, experimenting
- **Other business cases,** business models and ways of funding and dealing with risks
- **Replication and upscaling** of outcomes experiments, pilots, living labs
- **Room for experimentation**



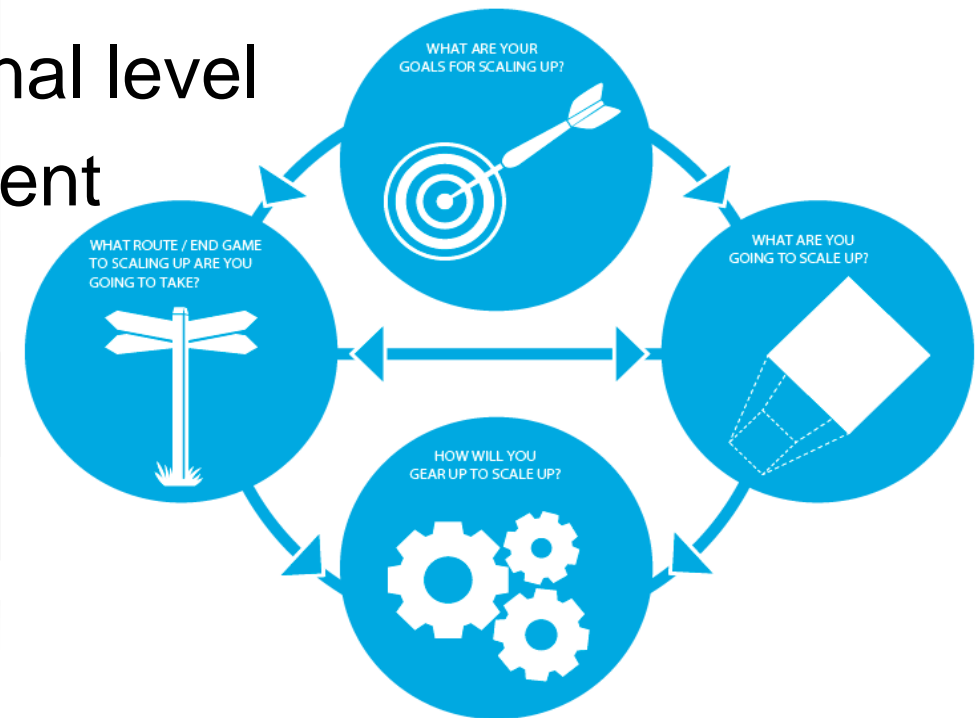
# Example of governance: multi-stakeholder decision making: PICO

- Dutch Topsector Kennis&Innovatie Energie: EnerGO
- **Partners:** Alliander, Ecofys, ESRI, Geodan, NRG 031, TNO
- **Aim:** realising sustainable energy districts by supporting multi-stakeholder decision & policy making and providing insight into the **spatial integration** of sustainable energy measures, in terms of energy (**reliable**), CO2 (**sustainable**) and costs/benefits (**affordable**)
- **How:** “PICO Tools”, interactive process, stakeholder support, (web-based) open data- & model platform, multi-touch table



# Smart City Guidance Package (SCGP)

- Initiative: 'From Planning and Implementation to Scaling up of Smart Cities projects'
- The goal of this initiative is to co-create a **Smart City Guidance Package (SCGP)** with more than 30 partners
- Addresses both political and operational level
- In the end a living, web-based document (e.g. creative commons)



# SMART CITY GUIDANCE PACKAGE FOR INTEGRATED PLANNING AND MANAGEMENT

Planning and implementation of Smart City projects: phases, common obstacles and best practices, key performance indicators, upscaling, and replication.



Action Cluster Integrated  
Planning/Policy and Regulation

Intermediate version June 2017



J. Borsboom-van Beurden, J. Kallaos, B. Gindroz, J. Riegler, M. Noll, S. Costa, R. Maio

Co-creation of a **Smart City Guidance Package (SCGP)** with European cities, businesses, NGOs and research:

- Support and guidance
- Bundling of experiences
- Learning and sharing
- Role of monitoring, KPIs, evaluation
- Ways for replication and upscaling

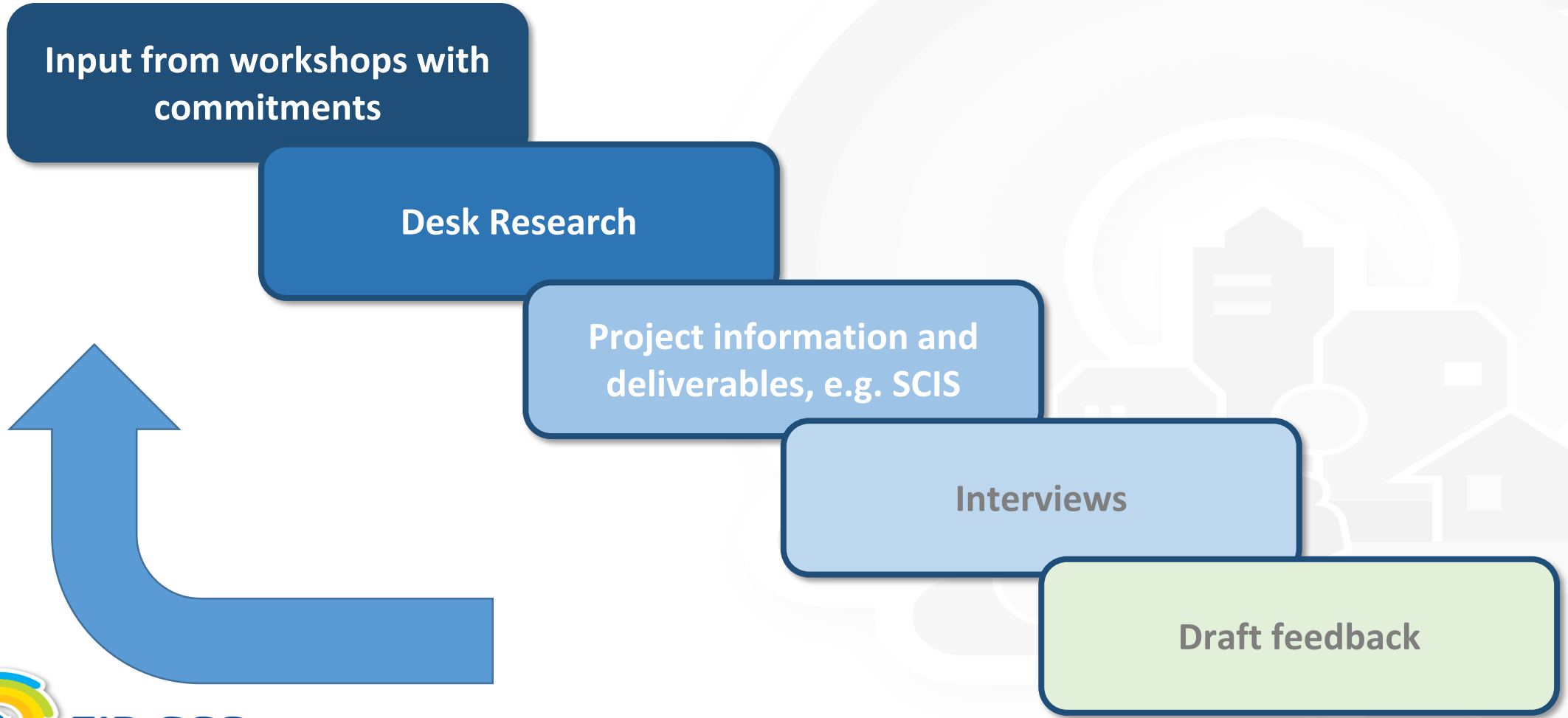
Validate and test with cities in Norway and Europe

# What has been done so far?

- Bundling of experiences, obstacles, and best practices in a draft **Smart City Guidance Package (SCGP)**, focusing on implementation and replication
- About 15 cities and several EU Smart City FP 7 and SCC1 projects contacted and committed (La Spezia, San Sebastian, Scottish Smart Cities, CELSIUS, TRANSFORM), outreach to many other cities
  - Several cities and projects contacted and interviewed - additional cities and projects to be included in next version of the SCGP
  - 17 additional medium-sized Smart Cities are involved, funded by ERANET and JPI Urban Europe
- Several workshops and webinars have been organized in 2016 and 2017
  - within the context of the EIP SCC, REMOURBAN study tour, JPI Urban Europe and network Norwegian Smart Cities
- Extensive desk research on implementation phases, obstacles and solutions
- Collaboration with “Tools for Decision Making, Management, and Benchmarking” (Bernard Gindroz) and “Scaling up & Replication of Smart City Plans” (Margit Noll and Johannes Riegler)
- Intermediate version (“advanced dummy”) published June 2017
- 70% draft available as Word version October 2017



# Methodology



# Smart City Guidance Package: Content

- How to use this guide
- Smart City strategies, plans, and projects related to integrated planning
  - Smart City plans
  - Ways to develop Smart City strategies and plans
  - Common phases of implementation
- Stakeholders, roles and networks
  - Smart City stakeholders
  - Roles of actors
- Ingredients for successful strategies and projects
- Challenges, solutions and workarounds
  - Categories
  - What is the challenge
  - Why is it a challenge or issue, where did it occur
  - Possible solutions
  - Examples of solutions
- Monitoring, KPIs, and tooling
  - Monitoring & how to use KPIs
  - Benchmarking
  - Standardisation development
- Acceleration factors
  - Urban transition through replication and scaling up of projects

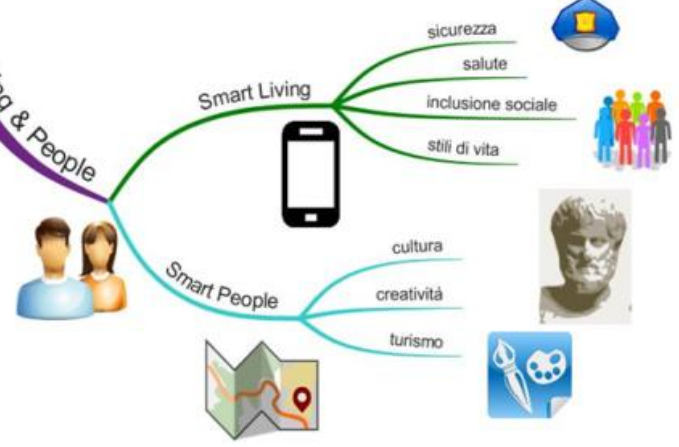
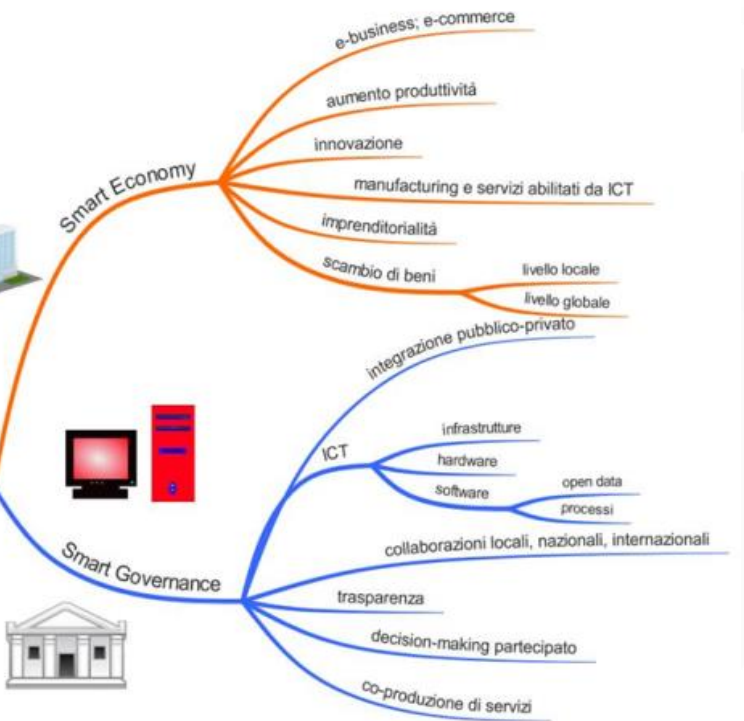
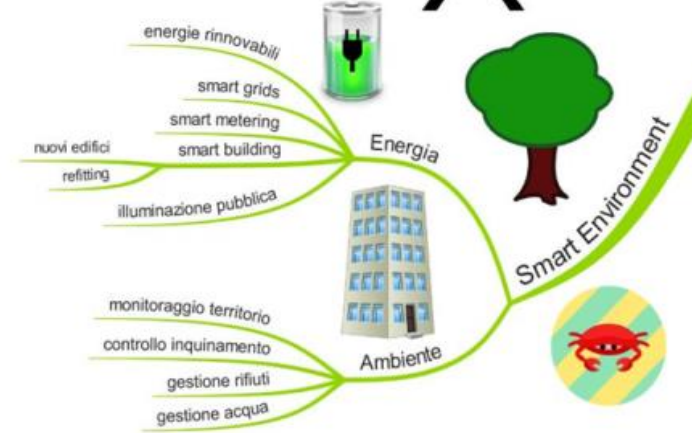
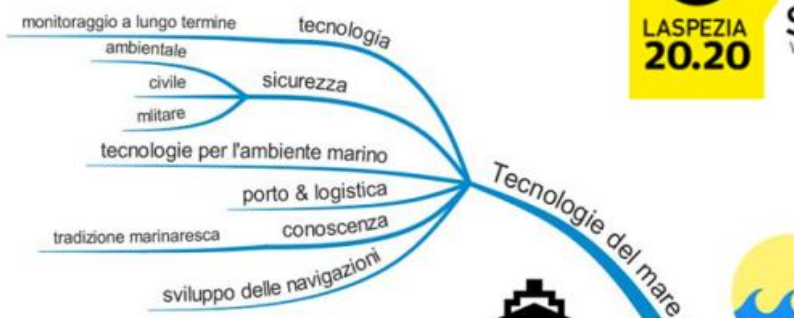


# Smart City Project Plans

## Scope and source of Smart City projects

- Smart city strategy
- Strategic energy action plan
- Sustainability or environmental plan
- Energy vision, energy plan
- Urban restructuring, rehabilitation
- Master plan and zoning plans for areas
- Refurbishment or renovation plan for buildings and urban infrastructures as
- Real estate project development
- Transport and mobility plan
- Lighthouse project plan
- Maintenance plan for utilities
- Economic vision
- FP7 or H2020 Smart City research and innovation project
- But also:
  - bottom-up initiatives,
  - Investment plans of private equity, pension funds and insurance companies
  - ICT plans

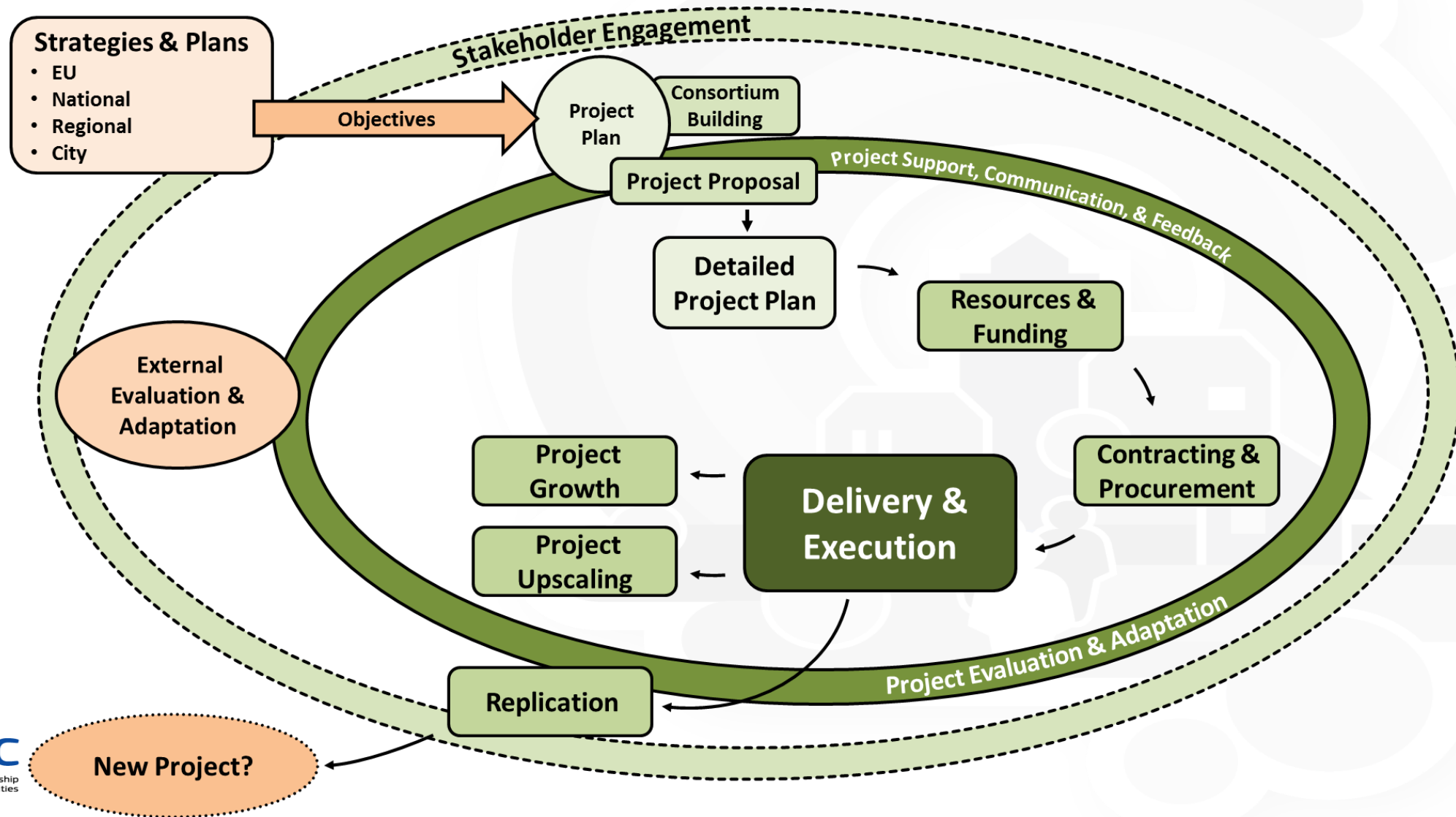




# Actor mapping



# Phases in implementation



# Clustering of obstacles

- **Financial**

- High initial costs & questionable profitability
- Perception of innovative solutions as too risky
- Lack of incentives or the existence of disincentives
- Split incentives

- **Governance and Administration**

- Silos: Lack of inter-departmental coordination and communication
- Incompatibility with public procurement policies
- Regulations limiting implementation
- Legislative or political instability
- Insufficient political will or commitment
- Administrative conflicts and cultural differences

- **Technical**

- Lack of staff capacity, technical competences
- Data privacy
- Data availability, sharing, and interoperability

- **Social**

- High investment costs and payback times
- Lack of awareness of financing opportunities
- Organizing collective agreement and action
- Lack of motivation – consumer priorities, attitude, and behaviour

- **To be added**

- Lack of overview of technological solutions
- No integrated planning
- Difficulties in setting up a monitoring system
- Lack of standardization in solutions, data and ICT
- .....

# Perception of innovative solutions as too risky

## 4.3.2 Perception of innovative solutions as too risky



### SUMMARY

New or innovative solutions are unproven by definition. These potential solutions are therefore considered to carry with them a higher implicit risk, leading to apprehension from many stakeholders, including public entities, private enterprise, the public, and financial lenders.

### Why a problem?

New or innovative solutions are generally unproven and unfamiliar, and often considered to incorporate more implicit risk. This risk can manifest itself in apprehension from public entities to support innovative projects, hesitation from private enterprise to get involved in projects where they lack experience, unwillingness for public consumers (end-users) to support unproven projects, and increased costs (or outright refusal) for funders to back innovative projects. Innovative processes are inherently unproven and generally do involve increased risk of failure; especially compared to the existing approach or business as usual.

Public entities have several concerns, including fear of making a bad decision with public money <sup>1</sup>, lack of experience combined with risk-aversion <sup>2</sup>, fears owing to lack of clear knowledge on costs and benefits <sup>1</sup>, and the fear of unforeseen or long-term risks emerging after project conclusion, which may trigger a loss of confidence and backlash against innovative projects <sup>2</sup>.

Private enterprise, including private partners in PPP, cite the public lack of demand and lack of internal awareness (esp. among architects and engineers) of innovative solutions <sup>1,2</sup>.

Public consumers: The public may be reluctant to adopt, convert to, or invest in more innovative solutions due to scepticism, unfamiliarity, expectations of unpredictability, and concern over the reliability of new technologies <sup>2,6</sup>. They may also lack willingness to try new things, or be comfortable in their routines and unwilling to behave differently or have to learn new skills.

Financial lenders: With increasing risks come increasing costs, and an increasing difficulty to secure funding. Much of this is due to the larger uncertainty inherent to the approach, leading to difficulty in properly characterizing the financial situation within an acceptable range of certainty. Banks may be unwilling to finance innovative projects due to lack of knowledge and lack of experience <sup>1,4,5</sup>.

<sup>1</sup> A. Rivada, E. Hoyos, E. Demir, M. Aksu, A. Stacey, B. Yorston, J. Shawyer, C. Degard, P. Compere, I. Nagy, Report on non-technical barriers and legal and normative issues, Horizon 2020 Framework Programme - REMOURBAN - REgeneration MOdel for accelerating the smart URBAN transformation, 2016. [www.remourban.eu/Technical-Insights/Deliverables/Reports/Downloadable-Deliverables.kl](http://www.remourban.eu/Technical-Insights/Deliverables/Reports/Downloadable-Deliverables.kl).

<sup>2</sup> EASEE, Identification of barriers and bottlenecks, 7th Framework Programme - EASEE: Envelope Approach to improve Sustainability and Energy efficiency in Existing multi-storey multi-owner residential buildings, 2012.

<sup>3</sup> HERON, Energy Efficiency Barriers in Buildings and Transport: 8 National Cases, Horizon 2020 Framework Programme - HERON: Forward-looking socio-economic research on Energy Efficiency in EU countries, 2016. [heron-project.eu/index.php/publications/deliverables-list](http://heron-project.eu/index.php/publications/deliverables-list) (accessed February 9, 2017).

<sup>4</sup> MENs, Training Market Barriers Report, Horizon 2020 Framework Programme - MENs - Meeting of Energy Professional Skills, 2015. [www.mens-nzeb.eu/en/information/expocenter/publications/63586468850150156/](http://www.mens-nzeb.eu/en/information/expocenter/publications/63586468850150156/) (accessed November 8, 2016).

<sup>5</sup> BEEM-UP, Final version of the exploitation and market deployment plan, 7th Framework Programme - BEEM-UP: Building Energy Efficiency for Massive market Uptake, 2014. [www.beem-up.eu/publications.html](http://www.beem-up.eu/publications.html) (accessed February 7, 2017).

<sup>6</sup> HERON, Synthesis Report on the Outcomes of the Questionnaire Survey, Horizon 2020 Framework Programme - HERON: Forward-looking socio-economic research on Energy Efficiency in EU countries, 2016. [heron-project.eu/index.php/publications/deliverables-list](http://heron-project.eu/index.php/publications/deliverables-list) (accessed February 9, 2017).

## Perception of innovative solutions as too risky



### SOLUTION AND WORKAROUNDS

Small-scale demonstration projects and living labs can help reduce some of the stakeholder issues regarding the implementation of innovative projects. Small-scale projects can provide a low-risk way for public entities to support test-beds for innovation; raise familiarity and skill levels by involving local partners in the project; reduce apprehension by verifying and validating the project claims; and alleviate unfamiliarity through public exposure and participation.



### EXAMPLE

*"The art of good innovation is spreading quickly with a growing number of 'Chief Innovation Officers' in cities throughout the county. This presents a strong opportunity to unite sustainability managers and innovation officers to advance the smart cities market. For example, the Environment Department in Boston works regularly with their new Office of Urban Mechanics – a joint venture in Boston and Philadelphia to create 'innovation incubators.' The offices focus on 'fail fast' innovation where new ideas are tested quickly to enable faster learning and therefore result in more robust solutions. The city has already made progress on using technology to increase citizen participation, building energy efficiency and boosting educational outcomes"<sup>1</sup>*

<sup>1</sup> E. Bent, M. Crowley, M. Nutter, C. Wheeler, Getting Smart About Smart Cities, Nutter Consulting and the Institute for Sustainable Communities (ISC) for the Urban Sustainability Directors Network (USDN), 2017. [usiscvt.org/wp-content/uploads/2017/01/Smart-Cities-RG.pdf](http://usiscvt.org/wp-content/uploads/2017/01/Smart-Cities-RG.pdf).

# Silos

## 4.4 Governance and Administration

### 4.4.1 Silos: Lack of inter-departmental coordination and communication



#### SUMMARY

Smart city projects are often managed by vertically structured departments (silos) in the local government. Other project stakeholders, including local businesses, solution providers, and universities, are often siloed as well. Since no single department has the full mandate (or ability) to implement a holistically designed project, this can lead to long negotiations, and delays or postponement of implementation of the project.

#### Elaboration

This “policy gap occurs when ministries, public agencies, authorities, departments work in silos without co-ordination mechanisms, and roles and responsibilities are not clearly allocated across levels of government”<sup>1</sup>. The lack of horizontal coordination, cooperation, collaboration, or acceptance between vertical departments is a well-known issue in organizations and projects, and a common problem in the implementation of smart city projects<sup>2-4</sup>. During implementation of integrated strategies and plans in siloed organisations, no department generally has full mandate for achieving the targets. This can lead to long negotiations, delays or even postponement of the implementation of the project. Siloed organizational structures can involve many issues that complicate the implementation process: information islands, the lack of an overall strategic vision, task fragmentation, and overlapping or blurred responsibilities. All of these can be a direct result of a lack of coordination and communication between departments.

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<sup>1</sup> OECD, *Water Governance in Cities*, Organisation for Economic Co-operation and Development (OECD), Paris, France, 2016. [www.oecd-ilibrary.org/governance/water-governance-in-cities\\_9789264251090-en](http://www.oecd-ilibrary.org/governance/water-governance-in-cities_9789264251090-en) (accessed March 19, 2017).

<sup>2</sup> BEEM-UP, Final version of the exploitation and market deployment plan, 7th Framework Programme - BEEM-UP: Building Energy Efficiency for Massive market UPtake, 2014. [www.beem-up.eu/publications.html](http://www.beem-up.eu/publications.html) (accessed February 7, 2017).

<sup>3</sup> R2CITIES, D2.1 Report on architectural barriers for green energy technologies, 7th Framework Programme - R2CITIES: Renovation of Residential urban spaces: Towards nearly zero energy CITIES, 2014. [smartcities-infosystem.eu/sites/default/files/r2cities\\_report\\_on\\_architectural\\_barriers\\_for\\_green\\_energy\\_technologies.pdf](http://smartcities-infosystem.eu/sites/default/files/r2cities_report_on_architectural_barriers_for_green_energy_technologies.pdf) (accessed February 7, 2017).

<sup>4</sup> A. Rivada, E. Hoyos, E. Demir, M. Aksu, A. Stacey, B. Yorston, J. Shawyer, C. Degard, P. Compere, I. Nagy, Report on non-technical barrier and legal and normative issues, Horizon 2020 Framework Programme - REMOURBAN - REgeneration MOdel for accelerating the smart URBAN transformation, 2016. [www.remourban.eu/Technical-Insights/Deliverables/Reports/Downloadable-Deliverables.kl](http://www.remourban.eu/Technical-Insights/Deliverables/Reports/Downloadable-Deliverables.kl).

<sup>5</sup> ECOSOC, Smart cities and infrastructure, Commission on Science and Technology for Development (CTSD), United Nations Economic and Social Council (ECOSOC), Geneva, CH, 2016. [unctad.org/en/Pages/MeetingDetails.aspx?meetingid=1048](http://unctad.org/en/Pages/MeetingDetails.aspx?meetingid=1048).

<sup>6</sup> A. Stacey, J. Sawyer, M. Aksu, B. Yenilmez, E.H. Santamaría, E. Demir, B. Kuban, C. Degard, I. Nagy, Methodological guide on the development of urban integrated plans, Horizon 2020 Framework Programme - REMOURBAN - REgeneration MOdel for accelerating the smart URBAN transformation, 2016. [www.remourban.eu/Technical-Insights/Deliverables/Reports/Downloadable-Deliverables.kl](http://www.remourban.eu/Technical-Insights/Deliverables/Reports/Downloadable-Deliverables.kl).

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<sup>1</sup> A. von Radecki, S. Singh, Holistic Value Model for Smart Cities, in: T.M. Vinod Kumar (Ed.), *Smart Economy in Smart Cities*, Springer Singapore, 2017: pp. 295–316. doi:10.1007/978-981-10-1610-3\_13.

<sup>2</sup> ECOSOC, Smart cities and infrastructure, Commission on Science and Technology for Development (CTSD), United Nations Economic and Social Council (ECOSOC), Geneva, CH, 2016. [unctad.org/en/Pages/MeetingDetails.aspx?meetingid=1048](http://unctad.org/en/Pages/MeetingDetails.aspx?meetingid=1048).

<sup>3</sup> D. Pringle, Time to replace silos with smart city strategists, RCR Wireless News. (2016). [www.rcrwireless.com/20160617/internet-of-things/time-replace-silos-smart-city-strategists-tag28](http://www.rcrwireless.com/20160617/internet-of-things/time-replace-silos-smart-city-strategists-tag28) (accessed May 24, 2017).

<sup>4</sup> J. Gibson, M. Robinson, S. Cain, CITIE: A resource for city leadership, CITIE (City Initiatives for Technology, Innovation and Entrepreneurship): a joint project of Nesta, Accenture, Future Cities Catapult and CITIE.Index, 2015. [citie.org/reports/](http://citie.org/reports/) (accessed May 14, 2017).

### Silos: Lack of inter-departmental coordination and communication



#### SOLUTION AND WORKAROUNDS

##### Solution/Workaround

The issue of silos can be resolved by the clear definition of a person or entity (a system integrator) in charge of horizontal coordination with sufficient responsibilities and mandate. Successful coordination would require the establishment of truly multi- or inter-disciplinary teams. This approach will need to be adapted for each instance, as there is no standardized organizational structure for municipalities or their agencies.

Some approaches to overcoming siloes initiated by cities include:

- installing cross-sector departments (New York City)
- creating “special staff units” (Ludwigsburg)
- installing informal interdepartmental working groups (Freiburg)
- outsourcing the duty to quasi-independent project management companies (Vienna)<sup>1</sup>

Another approach is to collect and aggregate the different city infrastructure data streams and control operations in a single structure - an operations centre. Co-located services and employees from different departments, working together, may act as a “nerve centre” to facilitate coordination and communication, breaking down some of the walls of administrative silos<sup>2</sup>.

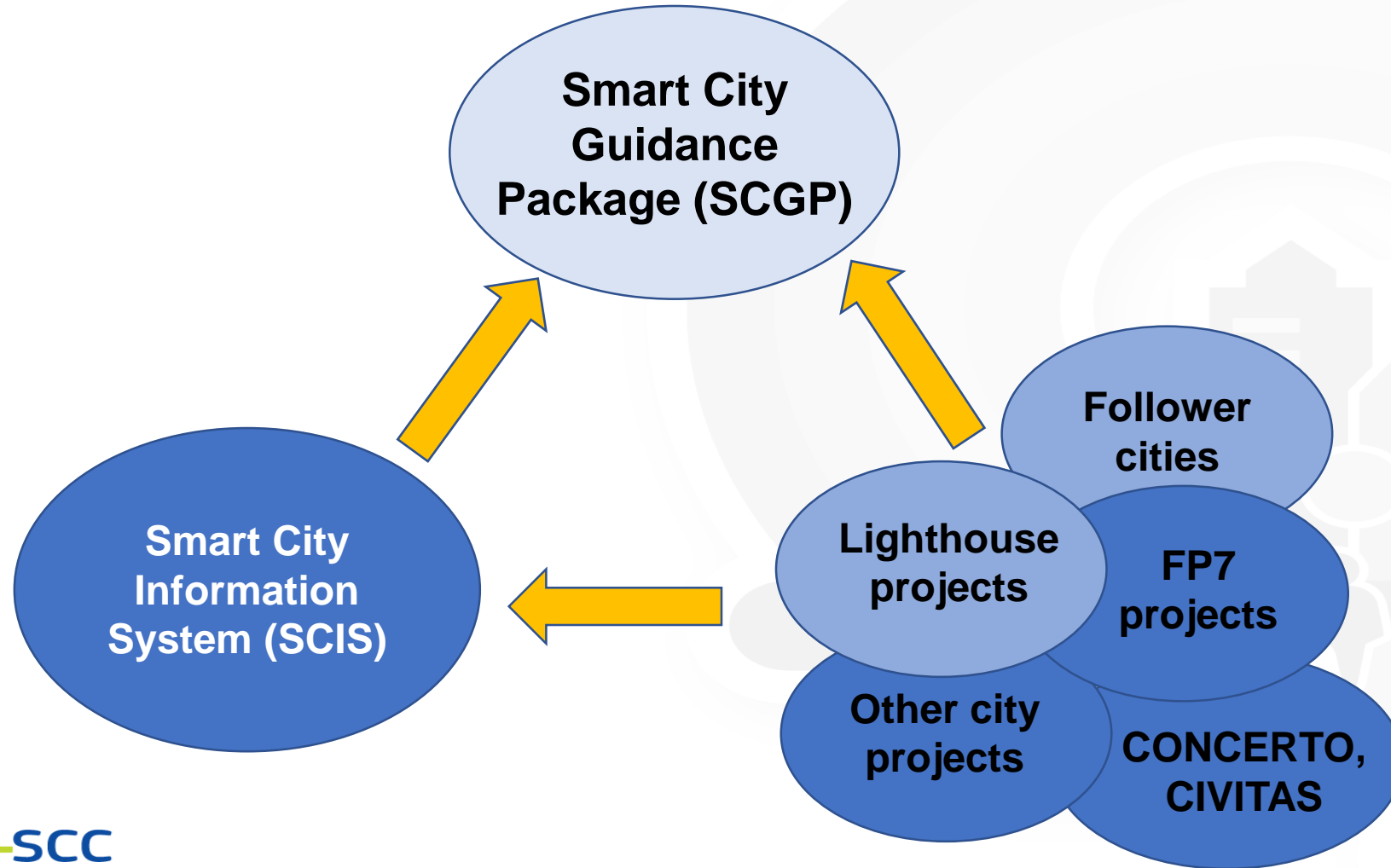


#### EXAMPLE

*“Bristol in the U.K.” has “given senior executives a broad smart city mandate. Bristol is also breaking down silos between different departments in the municipality. To save money on real estate and improve coordination, the local authority is planning to co-locate nine teams in one space, which should help the city adopt new sensing technologies on a citywide scale. Bristol is also making sure it has high-level expertise in-house, primarily to ensure it doesn’t become heavily reliant on a single vendor or systems integrator. The local authority has been astute enough to hire people with quite sophisticated technology and procurement backgrounds,” said Paul Wilson, managing director of Bristol Is Open, the smart city unit for Bristol. “We know our strategy and we will go to vendors to fulfill aspects of our strategy. We have the intelligence to know what our plan is and we are in charge. That is very important for a city or it will be blown around in the wind of vendor games.”<sup>3</sup>*

*“In March 2014, Amsterdam created the role of chief technology officer (CTO). The role is responsible for breaking down silos across the city government, setting overall strategic direction, providing a consistent face to external stakeholders and helping to navigate a complex political landscape”<sup>4</sup>.*

# Relation with SCIS and lighthouse projects





# Current status and next steps

1. Intermediate version released June 2017, final version May 2018
  - Mining of collected material, in particular on processes and tested solutions
  - Add information on ingredients & success factors
  - Gather more input on specific obstacles
  - Add more solid examples of solutions and best practices
  - Verify existing content and format
  - Validate usability, request feedback
  - Language editing toward policy and decision makers among urban stakeholders
2. Completing and validating the information through more (desk) research and interviews, webinars and workshops, also better involvement other AC's
3. Questionnaire on impact of specific preconditions on obstacles and solutions
4. Articulation windows of opportunity from spatial-economic point of view
5. Active collaboration with other Action Clusters and SCIS, in particular on obstacles and solutions, for instance business models
6. In-depth analysis of needs of urban actors working on planning and implementation, and gearing the content and style of communication of the SCGP towards that



# Planning until May 2018

- Establishment editing committee within AC
- Use in workshop Trondheim Kommune, supporting Smart City strategy development 3 November 2017
- Complete draft version 4.2 mid November 2017, Webinar
- Improved draft version 4.3 mid December 2017, Webinar
- Presentation INEA meeting Follower cities January 2018
- Testing in pilot cities and recruitment of ambassadors January – April 2018 (e.g. VTT, Madrid, Steinbeis Europa Zentrum)
- Improved draft version 4.4 February 2018, Webinar
- High-level workshop NTNU Brussels Office March 2018
- Brochure targeting political level, desk top publishing and language editing May 2018
- Webinar May 2018
- Final version 5.0
- Transfer to living document June 2018



# Thank You!

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## EIP-SCC

European Innovation Partnership  
on Smart Cities and Communities

URBAN EUROPE

NTNU

europa  
energy award

cen CENELEC