WHAT BUSINESS MODELS FOR SMART CITY ASSETS?

FINAL PRESENTATION 2019
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Executive Summary

**Purpose:** to further understand which assets and business models are being deployed as Smart-City investment strategies, alongside how they are being financed

- **33 projects** from 24 countries
- Higher response rate (16 people filled out the entire survey, another 17 filled out partially)
- **Asset domain:** mobility
- **Median initial investment:** EUR 500,000
- **Biggest challenge:** securing partnerships between private and public sector

**Future Recommendations**

- Build and grow professional connections
- Improved use of the EIB’s expertise and institutional leverage
- Work to improve the confidence of survey respondents
- Build and develop upon the current survey

**Conclusion:** Successful business models are ones where public and private sectors cooperate to improve technical knowledge, financial assistance and capacity building.
General Overview

- Context and objectives
- Methodology and approach
- Survey results: General information, financial information, evaluation information
- Lessons learned and conclusions
- Future recommendations
Context and Objectives

- Smart Cities use digital intelligence, technological solutions or proceed with new service and user designs to improve existing urban systems.
- Little public evidence or financial information available on Smart Cities business models.

“Smart city as a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order create a sustainable, greener city, competitive and innovative commerce and an increased life quality.” Bakici et al (2012)

Objectives

- Produce an updated Smart City Asset survey with an increased survey response rate
- Create a Smart City dataset across a variety of indicators and Smart City contacts
- Analyse our data and the latest Smart City developments to help the EIB identify business models and benchmarks for future investment plans in urban infrastructure
# Process

## Concept Review
**September - November**
- Project kick-off meeting
- Literature review
- Discussion with the EIB on project expectations
- Sending of the “thank you notes” to last year’s respondents
- Debrief with the previous Sciences Po EIB team
- Discussion on survey methodology and design

## Survey Design & Implementation
**December - March**
- Finalise contact database
- Iterative survey design and testing with the EIB
- Survey & concept review with Smart City experts
- Final survey sign off
- Survey implementation
- Survey circulated at the 2019 Smart City Summit & Expo via ICDI
- Survey included in Smart Cities Council newsletter

## Result Analysis
**April - May**
- Quantitative and qualitative data analysis of the survey results
- Sending of survey reminders
- Survey closure
- Data comparison and results analysis
- Completion of the 2019 draft survey and report

## Final Delivery
**May**
- Sending of the draft report
- Review of the draft report with EIB team
- Sciences Po projet collectif closure and feedback meeting
- Sending of the final report
- Final presentation in Luxembourg
General Information - Key Findings

Smart City Projects

- Smart City Projects vs Smart City Assets
- **32** projects
- 32 locations (cities/municipalities)
- Geographical area: entire city with suburbs

![Geographical area chart]

- Entire city with suburbs: 11
- Entire city: 8
- Certain districts only: 7
- Region: 6
- Other: 2
Our 2019 Smart City Survey reached:

- Received by **over 300 policymakers**
- Across **6 continents**
- Who preside or shape policy for **27.8 million in their local populations**
<table>
<thead>
<tr>
<th>Leading entity in charge</th>
<th>Smart City Project</th>
<th>Asset</th>
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<tbody>
<tr>
<td>Hong Kong Special Administrative Region Government</td>
<td>Smart City Blueprint for Hong Kong</td>
<td>Multi-functional Smart Lampposts Pilot Scheme</td>
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<td>Hong Kong Government</td>
<td>Car-parking system</td>
<td>car parking system</td>
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<td>Osaka Prefecture, City of Osaka</td>
<td>Osaka Smart City Strategy</td>
<td>Open data platform</td>
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<td>Fujisawashi</td>
<td>Fujisawa SST</td>
<td>Push notification TV system</td>
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<td>Tainan city Government</td>
<td>Mosquito control Facilitated by GIS &amp; IOT in the Cloud</td>
<td>TDEGIS(Tainan Dengue Epidemic Geographic Information System)</td>
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<td>Mubadala</td>
<td>Masdar</td>
<td>Smart transportation</td>
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<td>Kampala Capital City Authority</td>
<td>Kampala Smart City Project</td>
<td>Revenue Administration</td>
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<td>Municipality of Marsa</td>
<td>Smart Containers</td>
<td>Platform for waste collectors</td>
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<td>Prefeitura Municipal de São Paulo - São Paulo</td>
<td>WiFi Live SP</td>
<td>Public WiFi</td>
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<td>City of Stavanger</td>
<td>Stavanger Smart City</td>
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<td>City of Gdynia, Poland</td>
<td>Trolley 2.0</td>
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<td>Montpellier Méditerranée Métropole</td>
<td>Cité intelligente</td>
<td>Solid digital foundation</td>
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<td>Leading entity in charge</td>
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<td>Bordeaux Métropole</td>
<td>Sharing Cities</td>
<td>IOT</td>
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<td>Sarpsborg</td>
<td>Charge Court Inspiria</td>
<td>V2G</td>
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<td>L’Aquila (Clean Air City) and Roma Capitale (Resilient cities program)</td>
<td>Clean Air City</td>
<td>Intelligent equipments for air cleaning and as multiservice enabler</td>
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<td>Hasselt in Limburg in Belgium</td>
<td>EV Carsharing Hasselt</td>
<td>Public EV Charging Infrastructure</td>
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<td>Municipality of Trento</td>
<td>Trento Smart City</td>
<td>Online form</td>
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<td>Comune di Trento (Municipality of Trento)</td>
<td>Trento Smart City</td>
<td>City dashboard</td>
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<td>H2020 Manchester, Eindhoven, Stavanger, Leipzig, Prague, Sabadell</td>
<td>Triangulum</td>
<td>Process learning / services</td>
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<td>Antwerp, Carouge, Eindhoven, Manchester, Milan, Porto, Santander, Helsinki</td>
<td>SynchroniCity IoT Large-Scale Pilot</td>
<td>OASC Minimal Interoperability Mechanisms (1-3 combined)</td>
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<td>Zaragoza</td>
<td>Zaragoza Citizen Card</td>
<td>Citizen card</td>
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<td>University of Gdansk for City of Gdynia, Poland</td>
<td>Trolley 2.0</td>
<td>Electric vehicles: hybrid trolleybuses</td>
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<td>South Eastern Norway</td>
<td>15 Smart Cities and Communities, Norway</td>
<td>Energy</td>
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Smart City Assets

- **23** assets
- Deployment status: deployed and in operation
Financial information - Key findings

- Considerations of confidentiality were one of the main obstacles encountered while administering the survey as we have faced respondents who were uncomfortable sharing their figures and other respondents who were constrained by non-disclosure agreements.

- The number of users varied greatly depending on the size of the city in which they were implemented and the nature of the project.

- The construction phase for assets was relatively short: 1-2 year timespan. In adequation with initial investment: Infrastructure VS digital

**Case Study, Sao Paulo, Marsa**

A free wifi project in a large city directed to everyone (Sao Paulo) serves more users than a digital platform for waste collectors (City of Marsa).
Financial information - Key findings

- The initial investment is lesser for assets that serve a direct purpose as opposed to costlier groups of assets that form a project.

- The main investment priorities for cities are “Environmental and energy”, “Infrastructure” and “Cost reduction”.

- Grants are the most popular source of financing for smart city assets, and overall, the public sector provides a more important part of financing than the private sector.

**Case Study, Triangulum project, Tainan**
An online learning platform, that is comprised of different assets (both digital and physical) is costlier than a Mosquito control asset.
Financial information

- We observed a large span of responses for operating costs. Overall, we witnessed a positive correlation between the initial investment outlay and operating costs. At the median of operating cost, these represented **7.68 times** the initial investment outlay. e.g. digital VS physical infrastructure.

**Case study: Montpellier, France**
A large digitalisation platform comprising highly sophisticated IOT asset (Montpellier Cité Intelligente) that initially had the highest investment outlay also possessed the highest operation costs.

**Case study: Sarpsborg, Norway**
A large mobility asset that requires high initial investment but for which the operating costs are significantly lower.

- The most common revenue streams for assets which are in operation were Advertising, and other indirect sources of funding, as well as as public subsidies, with direct payment of users being the third most recurrent funding stream.

**Case study: Mobility projects**
Free-to-ride mobility projects were funded through public subsidies while users provided funding for those who weren’t.
Financial information - Key findings

- Concerning the operating model, most assets followed a Build-Operate-manage structure, or a build-operate-transfer model.

**Case study: Build-operate-manage assets**
Mainly in the categorical domain of mobility (car parking system, hybrid trolley-cars) or economic development (platform for revenue administration), showing a willingness for decision makers to leverage value for money from the private sector

**Case study: Build-operate-transfer assets**
Mainly in the field of engagement and community, sustainability and energy. This shows a willingness from decision makers to safeguard the quality of social services (Open Data platform in Osaka) or strategic assets (Energy sources in Norway)

- The procurement process for assets mostly occurred through competitive selection and secondly through in-house development, meaning that decision makers were often the ones initiating the process for acquiring assets.
Correlation between categorical domain and investment priorities. Exceptions: almost all Smart City have several objectives and contribute positively to different areas. Mobility and economic development are the most important, security and housing being the least (secondary goals).

**Case Study, Masdar City (UAE)**
Smart transportation → mobility
Investment priorities include environment, infrastructure and security. Security as secondary goal.
62.5% of Smart City have used cooperation, most often international or domestic regional but least domestic national (regional 5 times more than national) → importance of the local environment.

Main reasons for cooperation: technical, considering Smart Cities require a lot of technical capabilities.

Case Study, Trento (Italy)
Open data platform
Both international and domestic regional cooperation in order to gain technical assistance
Evaluation information - Key Findings

**Most recurrent challenges**

1. Cooperation between public & private partners
2. Limited financial resources
3. Accumulating citizen participation

Tensions due to differences in procedure, funds available or level of involvement between public and private entities. Smart Cities can also seen as exclusive and thus fail to ensure citizen participation.

**Key Success Factors**

Found rather homogenous results.

1. Strong involvement of all parties
2. Sound business model

Underlines the importance of planning beforehand with highly motivated and involved team.

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**Case Study, Sao Paulo (Brazil)**

Public Wifi

*Challenge* being cooperation between public and private (collaboration to ensure data protection)

*Success Factor* is a sound business model
Lessons learned

- **We encountered a very diverse set of Smart City assets:** from Kampala’s Revenue Administration to Rome’s Intelligent equipments for air cleaning and as multiservice enabler.

- **Our contacts were reluctant to share financial information.** The response rate dropped to 16. “Can’t specify the amount as this is a confidential information and part of a none disclosure agreement between the parties.” Mubadala

- **In terms of investment, size is a key factor.** A large scale Smart City project like Smart City Blueprint for Hong Kong required more initial investment than a single-asset project like Hong-kong’s car-parking system

- **Most of the project used grants as primary source of finance.** From transnational project like SynchroniCity IoT, to local project like the Smart containers of Marsa,

- **We observed overall a positive correlation between initial investment and operational costs,** with some exceptions, like the case of Sarpsborg’s V2G
Lessons learned

● For revenue streams, the more cited of these were advertisements and other indirect sources, followed by direct payments.
● The construction phase was relatively short mostly between 1 and 2 years, specially for digital assets like the electronic citizen card of Zaragoza however bigger projects like the Cité Intelligente de Montpelier took more time to be set. Strong correlation with initial investment.
● The majority of respondents indicated competitive selection as their major form of procurement.
● Most assets followed a Build-Operate-manage structure or build-operate transfer model. Even, if private partnership is rare, one of the biggest challenge that projects faced is the cooperation with the private sector and that they required technical, financial and capacity building.
● Given this, a successful business model could be one that allows Smart City Projects find fruitful partnership with private actors for technical, financial and skill requirements.
What business models are successful?

- Sound business model established as an important key to success
- Difficult to provide a single answer

- One where public and private actors cooperate with each other. Yet, main challenges is the cooperation between the public and private. Key to success is to split the responsibilities clearly (regulations, investments, operations).
- One clearly defined in advance
- One based on cooperation in order to gain all knowledge and capabilities necessary, leveraging the private sector’s access to technology, competencies and outsourcing the risk factor and ability to work under stricter time constraints
## Case Study

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<thead>
<tr>
<th>Montpellier Cité Intelligente</th>
<th>Sarpsborg, Charge Court Inspira</th>
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<tbody>
<tr>
<td>● Solid digital foundation</td>
<td>● Vehicle to grid (V2g)</td>
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<td>● Users: 480,000</td>
<td>● Users: 2,000</td>
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<td>● Initial investment: EUR 8,000,000</td>
<td>● Initial investment: EUR 1,339,609</td>
</tr>
<tr>
<td>● Financing: 50% from local government, 30% central government, 20% private</td>
<td>● Financing: 40% from public central, 40% private, 10% public international, 10% public local</td>
</tr>
<tr>
<td>● Operating costs: EUR 1,500,000</td>
<td>● Operating costs: EUR 1,000</td>
</tr>
<tr>
<td>● Revenue Streams: advertising, direct payments and subsidies</td>
<td>● Revenue Streams: advertising, direct payments by users</td>
</tr>
</tbody>
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The EIB’s mission and future projects

EIB’s new strategies to help Smart Cities flourish

1. **Financing products**
   - 56,25% respondents say lack of financing hindered the project.
   - Value public financing rather than private

1. **Importance of advisory services: financial and technical**
   - 50% of projects had needed technical assistance

→ EIB has great potential to help more Smart Cities, both by financing and advisory. Priority, increasing visibility. 60% of respondents knew nothing about the EIB’s mission and wished to know more and see if they could benefit from their help in the future.
Conclusion

- The assets surveyed depend mostly on the public sector rather than the private. The vast majority of respondents indicated they had some cooperation, however merely with public administrative entities. There is a demand for fruitful partnership with the private sector.

- Given that the majority had their assets developed first by a trusted partner and indicated that they sought cooperation mostly for technical and financial assistance and capacity building, then the real issue with Smart City assets is to find real networks that could help them to create partnership with private entities to develop them.

- The EIB could therefore have a relevant role to play assisting Smart City projects given their important body of expertise that could bring relevant guidance for technical and financial issues linked to Smart Cities. Most of the projects are unaware of EIB’s work according to our survey, which implies that the EIB should promote its activities to Smart Cities.
Future recommendations for the project

1. Build and grow professional connections with a range of international actors
2. Improved use of the EIB’s expertise, institutional leverage and network
3. Ensure clarity regarding the project brief, key deliverables and communication channels
4. Work to improve the confidence of respondents to provide confidential financial information
5. Build and develop upon the current survey for next year, incorporating respondent feedback
6. Provide specific KPIs and individual development for team members
7. Push the Sciences Po Projet Collectif team to improve operational efficiency
Acknowledgements

European Investment Bank Group
  Mrs. Florence Biro & Mr. Stefano Trotta

European Investment Bank Group – JASPERS Team & Project Lead
  Mr. Louis-Philippe Carrier

International Climate Development Institute
  Ms. May Lin & Mr. Kung-Yueh Camyale Chao

Sciences Po Smart City Experts & Project Supervisor
  Mr. Antoine Courmont & Ms. Weiting Chao

Sciences Po Project Collectif Team
  Mrs. Christine Piers Daval & Mrs. Lucille Egloff

Smart Cities Council Newsletter Editor
  Mr. Philip Bane

2017/18 Sciences Po Smart City Assets Team

2018/19 Sciences Po Smart City Assets Survey Respondents
References / Literature review

• 2018 McKinsey Global institute “Smart Cities” report.
• EIB framework for “Investing in Smart Cities”.
• Albino, Vito et al. (2015). “Smart Cities: Definitions, Dimensions, Performance and Initiatives”
THANK YOU!

Q&A

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