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# *Municipalities' understanding and importance of the concept of Smart Cities: an exploratory analysis in Belgium*

Jonathan Desdemoustier

PhD Researcher HEC-Liege SCI

Crutzen Nathalie, Associate Professor in Strategy and Sustainability at HEC-Liège: Management School of the University of Liege. Director of the Smart City Institute

Giffinger Rudolf, Professor of Regional Science, Head of the Centre of Urban and Regional Research in the Department of Spatial Planning, TUWien

# Agenda

1. Evolution of the concept Smart City
2. Theoretical models
3. Methodology
4. Typology of understandings
5. Analysis and Results
6. Discussion

# Research question

**How do Belgian municipalities understand the phenomenon Smart City?**

- Which orientation of the concept of Smart City -sustainable, technologic, creative, human- do apprehend Belgian municipalities?

We response to these questions thanks to:

- A construction of a typology of municipalities' understanding of the phenomenon
  - Comparison with some intrinsic characteristics of Belgian municipalities
  - Impact on municipal Smart City priorities and developments

# Smart City: evolution of the concept

- The phenomenon of Smart City has been perceived as a new way to transform territories
- Smart Cities can be seen to embody characteristics that include digital infrastructure, ICT usage, business-led, urban development, high-tech and creative industries, social capital and environmental and social sustainability
  - (Caragliu, Bo, and Nijkamp 2009).
- The concept Smart City is fuzzy :
  - Not yet well defined
  - Not fully understood
  - Lack of a proper conceptualization
    - (Anthopoulos and Vakali 2012; Lazaroiu and Roscia 2012).
- In the literature, Smart City is subject of numerous debates and critics on:
  - The techno-centric approach
  - The self-congratulatory claims of cities
  - The position of private companies
  - The few rigorous analytical or statistical analyses of the concept and its application on territories
- The concept Smart City has (partially) integrated these critics
  - Focus on a human-centered approach
  - Integration of open governance, sustainability, creativity…
- A more holistic vision of the Smart City appears (European researcher, peer review) (Mora, Bolici and Deakin 2017)

# Theoretical models

- Core components of the Smart Cities (Nam and Pardo, 2011):
  - **1. Technology** (infrastructures of hardware and software)
  - **2. Human** (creativity, diversity, and education)
  - **3. Institution** (governance and policy)

- Ideal-typical definitions (Meijer and Bolivar, 2015):
  - **1. Smart technology** (technology focus)
  - **2. Smart people** (human resource focus)
  - **3. Smart collaboration** (governance focus)

- 3RC framework (Kummitha and Crutzen, 2016):
  - **1. Restrictive school:** high importance on technology and low priority to human centric orientation
  - **2. Reflective school:** human approach but with technological interventions.
  - **3. Rationalistic school:** technological adoption behind enhanced human capital: holistic Smart Cities.
  - **4. Critical school:** neither technological advancements nor human centric approaches but neoliberal lobbying and ends

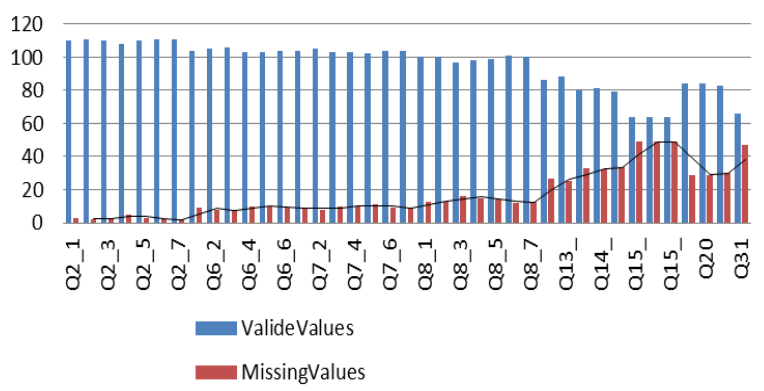
# Methodology

- ***Population***
  - 589 municipalities of Belgium

| Municipalities | Population | Sample | Rate % |
|---|---|---|---|
| Belgium | 589 | 113 | 19 |
| Urban | 455 | 85 | 19 |
| Rural | 134 | 29 | 22 |
| Wallonia | 262 | 53 | 20 |
| Brussels | 19 | 8 | 42 |
| Flanders | 308 | 53 | 17 |
| Cities >100 000 | 9 | 8 | 89 |
| Cities > 50 000 | 31 | 23 | 74 |

- ***Data collection:***
  - Online survey: SurveyMonkey/French and Dutch
  - **40** questions (ranking and MCQ)
    - **+- 200 lines of responses**
  - Two Diffusion Channels: Belfius (Bank) and SCI
  - Period: May to October 2016 (5 months)

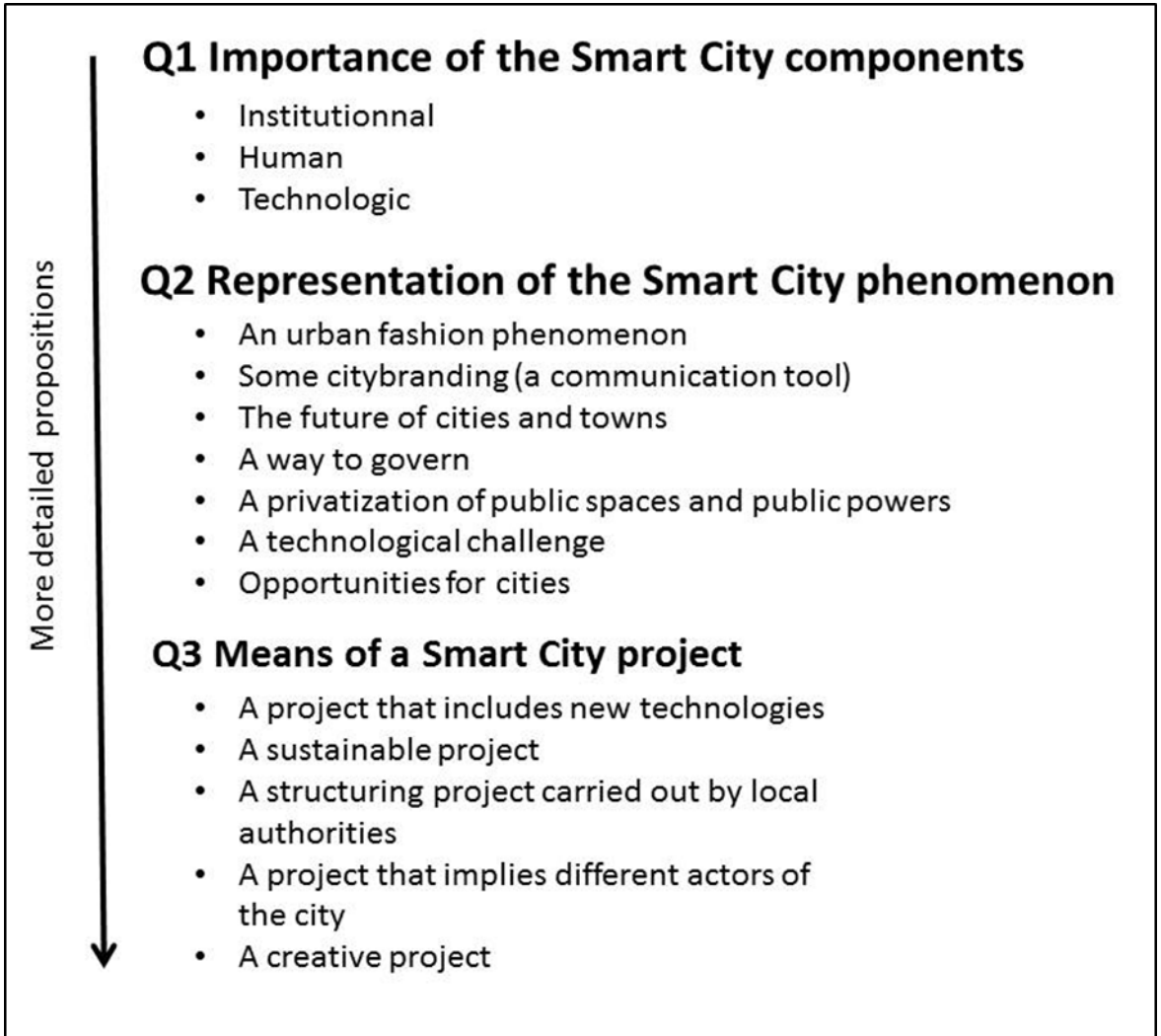
- ***Sample***
  - ***113 municipalities (19%)***
  - Representativeness:
    - Rural/ urban municipalities
    - Flemish / Walloon/ Brussels' municipalities
  - Not representative for the size of municipalities




- ***Respondents:***
  - General directors and heads of departments (55%)

# Analysis: Typology of understandings

- Use of three questions out of the questionnaire



# Analysis: Typology of understandings

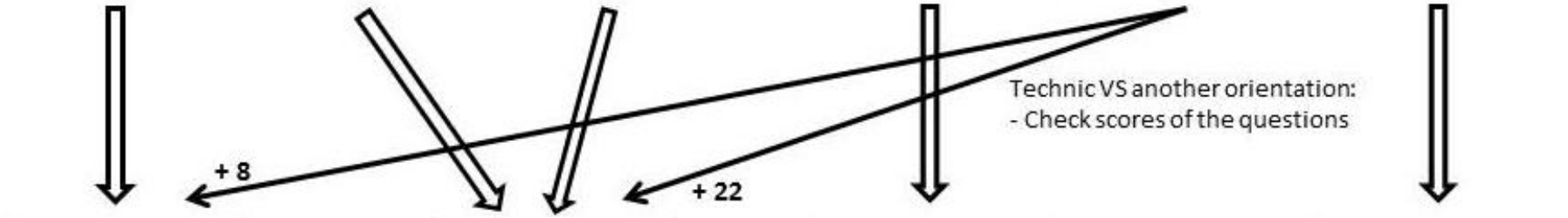
## Step 1: Orientations through 3 questions

**Q1 Importance of the Smart City components / Q2 Representation of the Smart City phenomenon / Q3 Means of a Smart City project**

| Technic Orientation | Human and sustainable Orientation | Governance Orientation |
|---|---|---|
| **4-5/5:** Technology | **4-5/5:** Human | **4-5/5:** Institutionnal |
| **4-5/5:** A technological challenge | **4-5/5:** Sustainable future of cities and towns | **4-5/5:** A way to govern |
| **Selection:** A project that includes new technologies | **Selection:** A sustainable project / A creative project | **Selection:** A project that implies different actors of the city |

## Step 2: Classification by subgroups and categories of conceptions

| Subgroup 1: Exclusive conception | | | Subgroup 2: Several or absence of conception(s) | | |
|---|---|---|---|---|---|
| Technologic (1) | Gouvernance (2) | Human and Sustainable (3) | Triple conception (4) | Double conception (5) | Any conception (6) |
| 21 | 8 | 8 | 20 | 30 | 26 |




| Technological (I) | Specialized (II) | Holistic (III) | Inexistent (IV) |
|---|---|---|---|
| 29 | 38 | 20 | 26 |

## Step 3: Classification by understandings

# Analysis: Relevance of the typology

- **Use of the tests: Pearson Chi Square and Phi-Cramer's V**

- **Belgian municipal characteristics : relevant (Statistically significant)**
  - **Sizes of municipalities**: Small: fewer than 10 000 inhabitants / Medium : between 10 000 and 30 000 inhabitants / Large: over 30000 inhabitants
  - **Nature of municipalities:** Urban or rural, based on OCDE standard
  - **Institutional belonging:** Flanders, Brussels and Wallonia

| Sample | | Size | | | Nature | | Institutionnal ownership | | |
|---|---|---|---|---|---|---|---|---|---|
| Typology | Distribution | Small | Medium | Large | Urban | Rural | Flanders | Brussels | Wallonia |
| **Technological** | 29 | 15 | 10 | 4 | 16 | 13 | 11 | 2 | 16 |
| | **26%** | **41%** | **19%** | **17%** | **19%** | **45%** | **21%** | **25%** | **30%** |
| **Holistic** | 20 | 2 | 12 | 6 | 18 | 2 | 9 | 4 | 7 |
| | **18%** | **5%** | **23%** | **26%** | **21%** | **7%** | **17%** | **50%** | **13%** |
| **Specialized** | 38 | 10 | 19 | 9 | 33 | 5 | 23 | 0 | 15 |
| | **34%** | **27%** | **36%** | **39%** | **39%** | **17%** | **44%** | **0%** | **28%** |
| **Inexistence** | 26 | 10 | 12 | 4 | 17 | 9 | 9 | 2 | 15 |
| | **23%** | **27%** | **23%** | **17%** | **20%** | **31%** | **17%** | **25%** | **28%** |
| **Total** | 113 | 37 | 53 | 23 | 84 | 29 | 52 | 8 | 53 |
| | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

| Tests | Value | df | Asymp. Sig | Value | df | A. Sig. | Value | df | Asymp. Sig |
|---|---|---|---|---|---|---|---|---|---|
| Pearson Chi-Square | 10,906 | 6 | 0,091 | 12,362 | 3 | 0,006 | 12,43 | 6 | 0,053 |
| Likelihood Ratio | 11,653 | 6 | 0,07 | 12,68 | 3 | 0,005 | 13,499 | 6 | 0,036 |
| Phi | 0,311 | / | 0,091 | 0,331 | / | 0,006 | 0,332 | / | 0,053 |
| Cramer's V | 0,22 | / | 0,091 | 0,331 | / | 0,006 | 0,235 | / | 0,053 |

# Analysis: Relevance of the typology

- **Municipal priorities in Smart City : not relevant**
  - Priorities in the 6 dimensions of Smart City
    - Three levels : Prior (1-2/6), neutral (3-4/6), subsequent (5-6)
  - Not statistically significant (Except for Smart Economy: not a priority)

- **Progress in some fields of Smart City : not relevant**
  - Perception of progress in some Smart City fields
    - Three levels of progress: Low (notation 1-2/5), neutral (3/5) and high (4-5/5)
  - Not statistically significant (Except Open Data: low development)

| | 4 Understandings | |
|---|---|---|
| **Dimensions** | Pearson | Cramer's V |
| **Smart Economy** | 0,084 | 0,327 |
| **Smart Mobility** | 0,964 | / |
| **Smart Environment** | 0,96 | / |
| **Smart People** | 0,942 | / |
| **Smart Governance** | 0,641 | / |
| **Smart Living** | 0,553 | / |

| | 4 Understandings | |
|---|---|---|
| **Smart Fields** | Pearson | Cramer's V |
| **Waste management** | 0,874 | / |
| **Citizen participation** | 0,331 | / |
| **Environmental renewal** | 0,825 | / |
| **E-locket/E-administration** | 0,166 | / |
| **Modal and soft mobility** | 0,117 | / |
| **Open Data** | 0,087 | 0,172 |
| **Smart Lighting** | 0,172 | / |

# Analysis: Relevance of the typology

- **Municipal perception of difficulty to implement SC projects: relevant**
  - Three levels of difficulty: Low (notation 1-2/5), neutral (3/5) and high (4-5/5)
  - Statistically significant

- **Relevance of the concept Smart City for the territory: relevant**
  - Dummy variable: agree or disagree
  - Statistically significant

| Sample | | Level of difficulty | | | Relevance | |
|---|---|---|---|---|---|---|
| Typology | Distribution | High | Neutral | Low | Yes | No |
| **Technological** | 29 | 16 | 1 | 3 | 10 | 19 |
| | 100% | **80%** | **5%** | **15%** | **35%** | **66%** |
| **Holistic** | 20 | 10 | 7 | 0 | 19 | 1 |
| | 100% | **59%** | **41%** | **0%** | **95%** | **5%** |
| **Specialized** | 38 | 10 | 17 | 3 | 32 | 5 |
| | 100% | **33%** | **57%** | **10%** | **87%** | **14%** |
| **Inexistence** | 26 | 14 | 5 | 2 | 12 | 13 |
| | 100% | **67%** | **24%** | **10%** | **48%** | **52%** |
| **Total** | 113 | 50 | 30 | 8 | 73 | 38 |
| | **100%** | **57%** | **34%** | **9%** | **66%** | **34%** |

| Tests | | Value | df | Asymp. Sig | Value | df | A. Sig. |
|---|---|---|---|---|---|---|---|
| 4 Under-standings | Pearson | 17,871 | 6 | 0,007 | 30,758a | 3 | 0 |
| | Likelihood R | 21,708 | 6 | 0,001 | 33,425 | 3 | 0 |
| | Phi | 0,28 | / | 0,391 | 0,526 | / | 0,006 |
| | Cramer's V | 0,198 | / | 0,391 | 0,526 | / | 0,006 |

# Results:

- ***Technological understanding and Inexistence of understanding:***
  - Comprise less populated cities (small size)
  - Include rural municipalities
  - Mainly in Wallonia
  - Rejection of concept Smart City
  - Perception of high level of difficulty to set up projects

- ***Holistic understanding and specialized understanding:***
  - Comprise municipalities of medium and large sizes
  - Include urban municipalities
  - Mainly in Brussels (Holistic) and Flanders (Specialized)
  - Appropriation of the concept Smart City
  - Perception of medium level (Specialized) and high level of difficulty (Holistic)

# Results:

- ***Cleavage of understandings between urban and rural municipalities and between municipalities in the three Belgian regions***

# Discussion and future researches:

- **Does the concept of Smart City relevant for most populated, service based, economically advanced cities or territories?**
  - Exploratory explanation:
    - Back on policies on cities development “triumph of cities”
    - Competitions and collaborations between cities + Smart City branding
    - Poor adaptation of the concept of Smart City for small and rural municipalities (Smart rurality ?)

- **Which is the influence of regional Smart City dynamics and strategy on the local level ?**
  - Difference between regions

- **Future researches:**
  - How territorial characteristics do impact the understandings of the phenomenon Smart City ?
  - How the concept of Smart City may adapt to different territorial realities, mainly for rural areas and for small municipalities ?

- **Limits:**
  - Size and nature of the respondents

# Thank you for your attention