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

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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 comprehensive territorial analysis of the country
- A presentation of the current trends on Smart Cities in the three Belgian regions
- A construction of a typology of municipalities' understanding of the phenomenon

- Is the typology relevant with some intrinsic characteristics of Belgian municipalities ?

- How do these understandings impact municipalities' Smart City priorities and developments ?

Agenda

1. Evolution of the concept Smart City
2. Theoretical models
3. Belgian territorial realities and regional Smart City dynamics
4. Methodology
5. Typology of understandings
6. Analysis and Results
7. Discussion

Smart City: evolution of the concept

- The phenomenon of Smart City has been perceived as a new way to transform territories

- 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).

- 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; Hollands 2008).

- 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 and has change
  - 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)

Smart City: evolution of the concept

- A comprehensive definition of the concept has been developed by Caragliu:

- "*We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance*."

- (Caragliu, Del Bo, and Nijkamp 2011)

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

Belgian territorial realities

- **Socio-economic and demographic trends: differences across Belgian regions**
  - **Flanders:** strong economic growth/ wide SME network, high-tech industries, research centers, ports and an open economy / One of richest European region / high incomes and GDP per capita / low rate of unemployment / aged population
  - **Wallonia:** weak economic growth / European post-industrial region / timid development of service activities (pharmaceutic, biotechnology, logistic) / sharp deterioration of GDP per capita / elevated level of unemployment / young population
  - **Brussels:** important service economy / attraction of productive companies / third European regions on GDP per capita / huge unemployment rates / low incomes for inhabitants / young and immigrate population

- **Centre-periphery relationship**
  - Low incomes in central municipalities
  - Cultural, administrative, social and commercial activities and services offered City center
    - **=> Problem of mobility and municipal budget**

- **Urban and rural relationship**
  - Urban exodus
  - Rurbanisation
  - Use of rural areas for economic purposes

- **Dominant territorial policy tendencies: back in cities**
  - Reinvestment in cities
  - Attraction of higher social strata of the population
  - Slowdown of land use of rural areas

  - Not legal recognition of metropolitan level and strong respect of municipal autonomy

Smart City regional dynamics

- The institutional Belgian level newly integrates Smart City strategies

- In Wallonia and in Flanders: 'smartization' of the regional territory are performed through the development of ICT, data flow and digital economy
  - Digital Wallonia (2015) (Regional scope / meeting of core cities)
  - Smart Flanders (2017) (13 municipalities, Antwerp as City Lab)
    - Flanders develop an environmental approach thanks to some research centres like Energyville and Vito…

- In Brussels, the Smart City strategy is more holistic (Safety, mobility, social, service and infrastructure)
  - SmartCity.brussels (2014)
    - Implication of parastatal agencies of Brussels
    - Based on a white book (2014, BRIC)

- The federal level is not yet involved in a concrete Smart City strategy
  - Strategy Digital Belgium
  - Preparation of a national investment plan with Smart Cities aspects
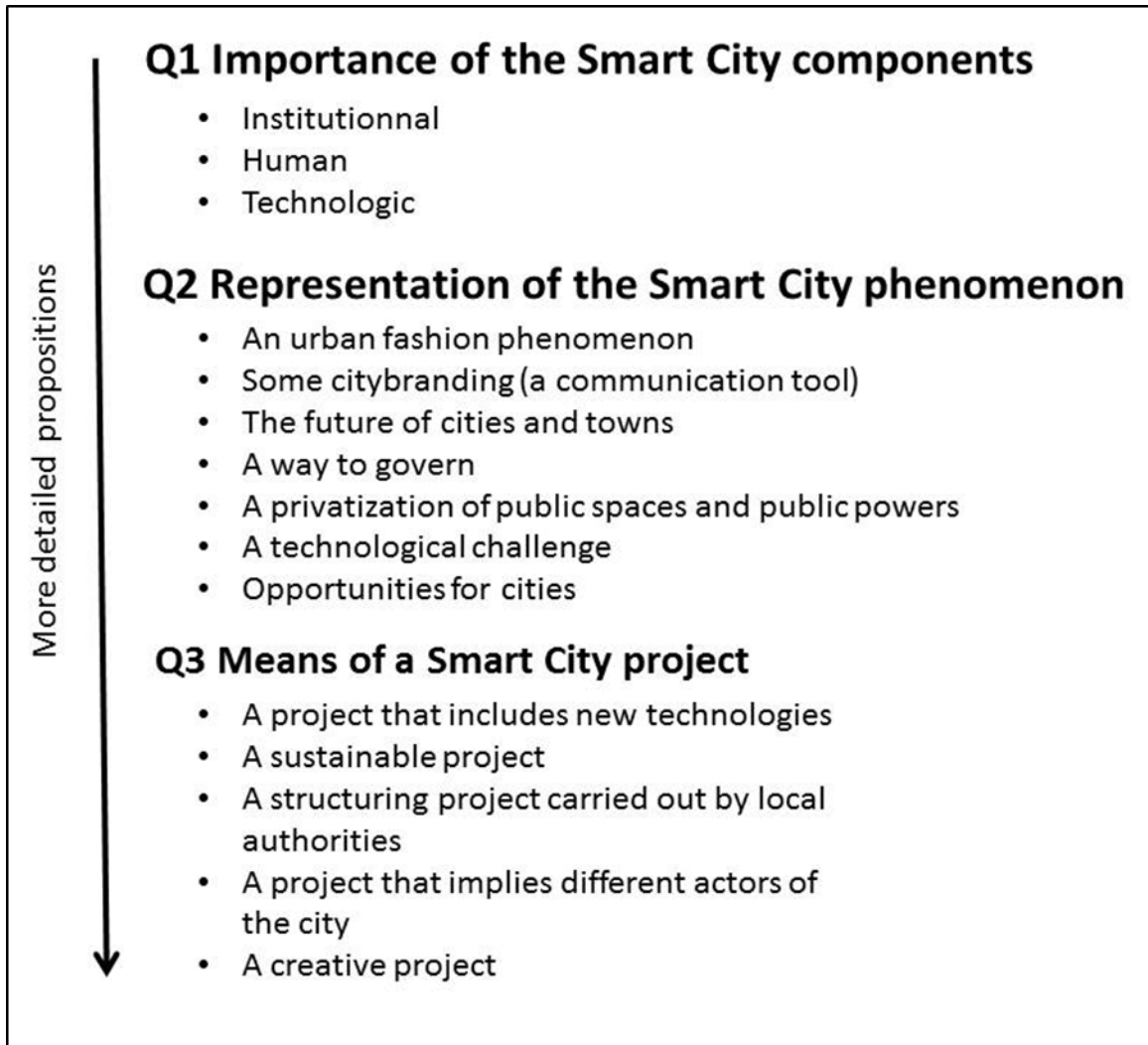
Methodology

- **Population**
  - 589 municipalities of Belgium

- **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%)

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
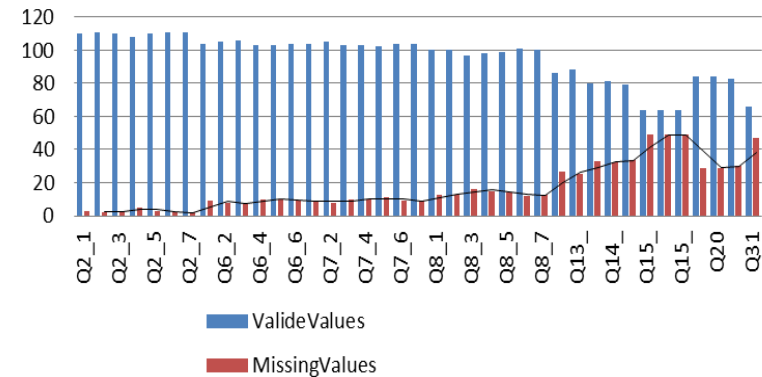
Analysis: Typology of understandings

- Use of three questions out of the questionnaire

Q1 Importance of the Smart City components
- Institutionnal
- Human
- Technologic

Q2 Representation of the Smart City phenomenon
- An urban fashion phenomenon
- Some citybranding (a communication tool)
- The future of cities and towns
- A way to govern
- A privatization of public spaces and public powers
- A technological challenge
- Opportunities for cities

Q3 Means of a Smart City project
- A project that includes new technologies
- A sustainable project
- A structuring project carried out by local authorities
- A project that implies different actors of the city
- A creative project

More detailed propositions

Analysis: Typology of understandings

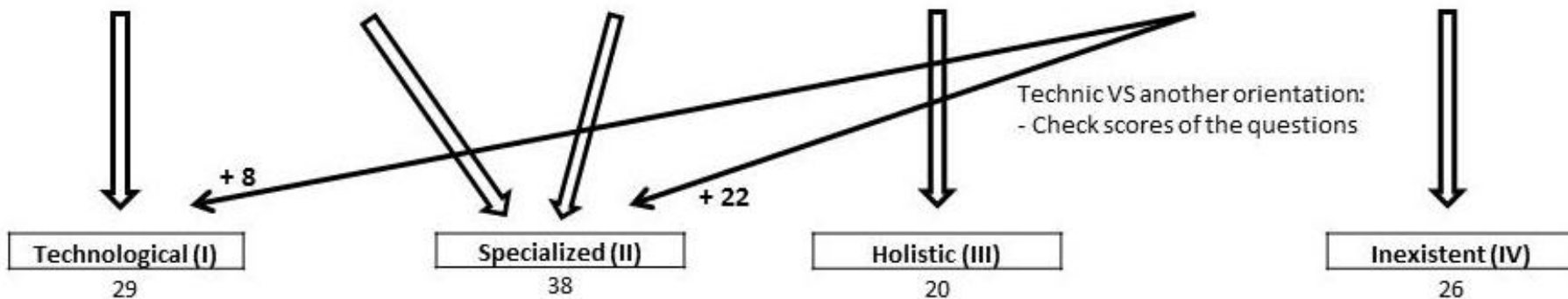## Step 1: Orientations through 3 questions

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:** A technological challenge **Selection:** A project that includes new technologies	**4-5/5:** Human **4-5/5:** Sustainable future of cities and towns **Selection:** A sustainable project / A creative project	**4-5/5:** Institutionnal **4-5/5:** A way to govern **Selection:** A project that implies different actors of the city
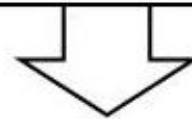
Step 2: Classification by subgroups and categories of conceptions

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

+ 8

+ 22

Technic VS another orientation:
- Check scores of the questions

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 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 SC : 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 Smart Economy: not a priority)

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

Dimensions	4 Understandings	
	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	/

Smart Fields	4 Understandings	
	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)

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

- *No relationship between priorities in the dimensions of the Smart City and the understandings of Belgian municipalities*
  - Smart City priorities of municipalities are not yet clearly defined in Belgium
  - 11 municipalities possess a strategic Smart City plan.
- *No relationship on the progress of Belgian municipalities in some Smart City fields*
  - Weak numbers of municipalities with Smart City projects
  - 49% of Belgian municipalities do not yet developed a Smart City project.

Discussion and future researches:

- **Does the concept of Smart City only relevant for most populated, richer, service based, economically advanced cities or territories?**
    - Back of policies on cities development
    - 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 plan on local level ?**
    - Difference between regions

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

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

Thank you for your attention

Which are your questions ?