Urban Resilience and Transformation

Implications for assessment indicators

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Objectives of this presentation

• Provide ingredients for workshop discussion

• Main message: Indicators selection and their interpretation depend on urban strategy: resilience or transformation

Method

1. Focus on one indicator: connectivity
2. Review resilience literature → idea on what connectivity may imply
3. Explore connectivity in a case study
4. Bring lessons for other assessment indicators
Connectivity is generally high in the built environment as it allows the system to continue functioning in the face of shocks (Ahern, 2011).

An overconnected system can also lead to undesirable outcomes due to an increase of the rigidity in its control (Holling, 2001).
Implications for resilience and transformation management (II)

• In the context of **transformation**, network connectivity is not necessarily a desirable property of the system.
  
  – It helps to spread the change, but...
  
  – If connectivity increases, the number of non-linear feedbacks might also increase.
  
  – When planning for transformation, this implies having to deal with a **more complex system**
  
  – The number of **possible futures might increase exponentially**.
**BILBAO**

- **41 km²**
- **349,356 inhabitants (2013)**

**Economy:**
- Iron and shipyard industry
- Industrial crisis in the 80s.
- NOW service city
- Economic motor of the Basque Country

- The GDP 31,054 € (2013)
Only 2% of consumed energy is self-generated

Case study objective:
- Gain knowledge about how the energy system is structured and performs
- Explore the different ways to transform the city in a (climate)resilient and sustainable city
Method: Fuzzy Cognitive Mapping (FCM)

- Semi-quantitative mind mapping
- Participatory methodology
- Aggregation
- Causal networks

Olazabal 2014.
Urban systems are complex:
- Adaptive
- Connected
- Dynamic
- Highly informed

Knowledge is not concentrated
“What do you think influences the use of energy in Bilbao and what are its impacts?”

14 stakeholders:

- civil administration, NGOs, representatives of the general public, academics and employees of private companies
- diverse technical backgrounds including law, planning, sustainability, social behaviour, building, energy infrastructures and management
• Perceptions
• Experience
• Knowledge and expertise
IV. Tiempo de apertura (n° de horas) del centro.
Analysis of the aggregated map

Density (D) of the network
Centrality (Ct) of each element
- Outdegree (O)
- Indegree (I)

86 concepts
161 connections
- **D= 0.022**
- **2.2% of the connections that could potentially exist in theory between the 86 concepts are actually made.**

(Olazabal and Reckien 2015)
Energy Price (households) Ct max = 13.25

Variables with relative Ct > 20%

Workshop on Urban Resilience Indicators, 7th December 2015
Method:
1. Selection of three policy options to achieve sustainability & resilience
2. Build Sustainability Reference Scenario (SRS)
3. Compare each scenario against SRS

**Scenario A:** Use of economic incentives
**Scenario B:** Strong social education and awareness
**Scenario C:** Strong local-institutional initiative

![Graph showing sustainability reference scenario with number of variables and degree of change.](image)
Scenario A: Use of economic incentives

Scenario B: Strong social education and awareness

Scenario C: Strong local-institutional initiative

Results in Scenario B&C
According to the combined knowledge of participating stakeholders...

1. **Strong negative impact of economic subsides** → indicates **strong resilience** of the economic unsustainable system

2. Better and **reinforced positive impacts** are obtained **combining local-institutional and social initiative**

All this depends on
- **which variables** are you looking at (how you build your scenarios) and
- **what centrality (i.e. connectivity)** have those variables
Recommendations for the selection of resilience assessment indicators (I)

1. **There is no rule of thumb**

2. **We should apply the analogue of “resilience of what to what” with each indicator.** E.g. Connectivity of what *for/to* what

3. **Indicators should be selected, studied and interpreted case-by-case**
   - In each specific resilience situation (of what)
   - Depending on the general resilience strategy (to what)
1. Indicator (def.): *Sign that shows you what something is like or how a situation is changing*  
   (www.oxforddictionaries.com)

2. Challenges:
   - Ambiguities
   - Measurement
   - How many indicators do we need?
   - Double-counting
   - Trade-offs, incoherencies, incompatibilities

**We have much to do!!!!**
Thank you!

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Reference papers:
