RESIN Project – Climate Resilient Cities and Infrastructures

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www.resin-cities.eu
Project RESIN

Climate Resilient Cities and Infrastructures

- Co-funded by: EU H2020 research framework programme
- Type: Research and Innovation Action (RIA)
- Start date: May 1, 2015
- Duration: 42 months
- Planned effort: 866.75 PM
- Partners: 17
- Coordinator: Peter Bosch, TNO
- Website: http://www.resin-cities.eu
How important are cities for Europe?

- “Built-up areas — defined as cities, towns and suburbs — provide a home to almost three quarters (72.4%) of the EU-28’s population.” (EUROSTAT)

- By 2050 it is expected that 82% of the population in Europe will live in urban areas

- “Cities generate up to 80% of a country’s GDP” (BMZ, Germany)

- Cities are central to a well-functioning European economy and society

Source: Eurostat
Effects of Climate Change and extreme weather …

… threaten Cities and Infrastructures in Europe

• The concentration of people and assets in cities also renders them extremely vulnerable to the effects of extreme weather events and climate change.
• Disasters threaten people’s lives, critical infrastructure systems, and value chains.

How well are cities prepared for this?

• The development of urban climate change adaptation strategies has been slow.
• A report of the EEA notes the poor integration of different domains, such as housing, sanitation, water management, and traffic management, within urban adaptation strategies.
• Urban adaptation strategies are imbalanced in how they address vulnerable sectors.
Resilience: For whom?

Bilbao

Paris

Bratislava

Manchester
RESIN partners and tier-2 cities

Research & development partners:
- TNO
- Fraunhofer
- ITTI
- Siemens
- Arcadis

Academic & research partners:
- Tecnalia BC3
- University of Bratislava
- University of Manchester
- Engineering School Paris

Tier-1 cities:
- Bilbao
- Bratislava
- Greater Manchester
- Paris

Tier-2 cities:
- Padova
- Alba
- Almada
- Zadar
- Burgas
- Vilnius
- Radom
- Sfantu Gheorghe
- Lahti
- Newcastle
- Reykjavik
- Ghent
- Nijmegen
- London
- Athens
- Warsaw
- Strasbourg

Mentoring:
- CRITIS 2017

Dissemination & standardisation partners:
- Uniresearch
- NEN
- ICLEI
Work approaches in RESIN

Co-creation, case studies and dissemination

• Develop methods and tools in a co-creational way (research partners and cities)
  – Risk-based Vulnerability Assessment
  – Adaptation options
  – Decision support (eGuide)
• Perform city case studies
  – For all methods and tools
  – For all tier-1 cities
• Disseminate knowledge and methods to a wider audience
  – Tier-2 cities and beyond
  – Concrete standardisation activities (ISO, NEN, DIN)
Vulnerability – IPCC AR5 Schema

Intergovernmental Panel on Climate Change – Assessment Report 5 (2014)

• The latest report of the IPCC (AR5, 2014) brought a change of paradigm
• Vulnerability assessment is now risk-oriented
• This harmonises Climate Change related vulnerability assessment (VA) with risk assessment in other areas, including
  – disaster risk reduction
  – critical infrastructure protection
• Lacking: suitable methods

Vulnerability is the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt’ (IPCC 2014).
Risk = \langle \text{probability of adverse event} \rangle \times \langle \text{consequences} \rangle
Vulnerability Assessment in RESIN

Risk-based VA for complying with concepts in IPCC AR5

• Novelty:
  Impact and Vulnerability Assessment for Vital Infrastructures and built-up Areas (IVAVIA)
  Modified Vulnerability Sourcebook (VSB) method
    – modular approach
    – originally developed by German society for international collaboration GIZ
    – BUT risk-based (complies to newer IPCC AR5 concepts)

• Collaboration and exchange with authors GIZ and EURAC
The IVAVIA Modules

M1–M6 correspond to the 8 modules of the VSB but are adapted to AR5

- **M0**: Selecting hazards and drivers
- **M1**: Preparing the Vulnerability Assessment (VA)
- **M2**: Developing Impact Chains
- **M3**: Identifying Indicators and Data Acquisition
- **M4**: Normalisation, Weighting and Aggregation of Indicators
- **M5**: Aggregating Components to Vulnerability / Risk
- **M6**: Presenting the Outcomes of your VA

**New**

Qualitative

Quantitative
What is an Impact Chain?

(Source: RESIN glossary)

- Impact chains permit the structuring of *cause-effect relationships* between drivers and/or inhibitors affecting the *vulnerability* of a system
- Impact chains
  - allow for a *visualisation of interrelations and feedbacks*,
  - help to *identify the key impacts* and on which level they occur, and
  - allow *visualising which climate signals* may lead to them

- They further help to *clarify and/or validate the objectives* and the *scope* of the *vulnerability assessment* and are a *useful tool to involve stakeholders*
Impact Chain Diagrams …

… and adaptation

- The areas of an ICD **structure** already the possibilities for adaptation
- Adaptation **measures** could be aimed at
  - reducing the sensitivity of the exposed object
  - increasing the coping capacity of the exposed object
  - reducing the influence of (negative) stressors (non-climatic drivers)
  - reducing the direct and indirect impacts
City Case studies for IVAVIA

Co-creation in RESIN

• Bilbao:
  Conduct a full vulnerability assessment on district level

• Greater Manchester:
  Develop Impact Chain diagrams for vulnerability of selected infrastructures

• Paris:
  paired with Greater Manchester

• Bratislava:
  Selection and aggregation of indicators (quantitative analysis)
Conclusion

Risk-based vulnerability assessment in RESIN

- The co-creation process allows for more intense collaboration with practitioners and more timely adaptation of developed methods and tools
- Practical application of the method generates impact already during the project
- The qualitative part of IVAVIA is currently the best evaluated one
- Positive feedback, but practitioners’ lack of resources limits what could be done
- Expressions of interest for applying IVAVIA from tier-2 cities and beyond
- Several modules of IVAVIA will receive IT tool support
  - a specialised graphical editor for impact chain diagrams
  - a statistics tool for aggregating indicator values
Thank you!

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