CORFU
FP7 Collaborative research on flood resilience in urban areas

9th International Conference on Urban Drainage Modelling
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A resilience measures towards assessed urban flood management – CORFU project

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Outline

- Introduction
- Urban systems – scaling and mapping
- The resilience concept
  - Urban flood management and flood resilience
  - Evaluating flood resilience
- Conclusion

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Urban flooding and urban systems

What have past events bring us?

- Undeveloped disaster culture - ‘zero myth’
- Traditional flood risk management

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Water in the city?

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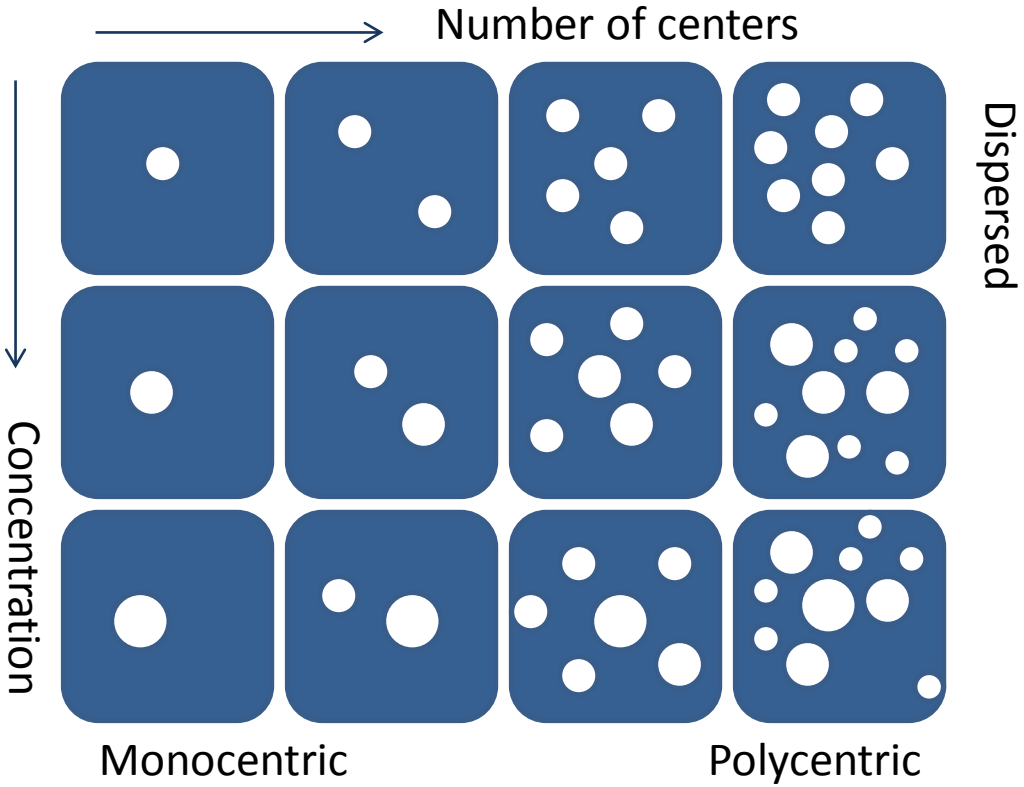
Urban systems – scaling and mapping



- Different developing modes
- Performing activities
- Mapping the city
  - Urban functions, Services
- Scaling the city
  - City, District, Block, Parcel

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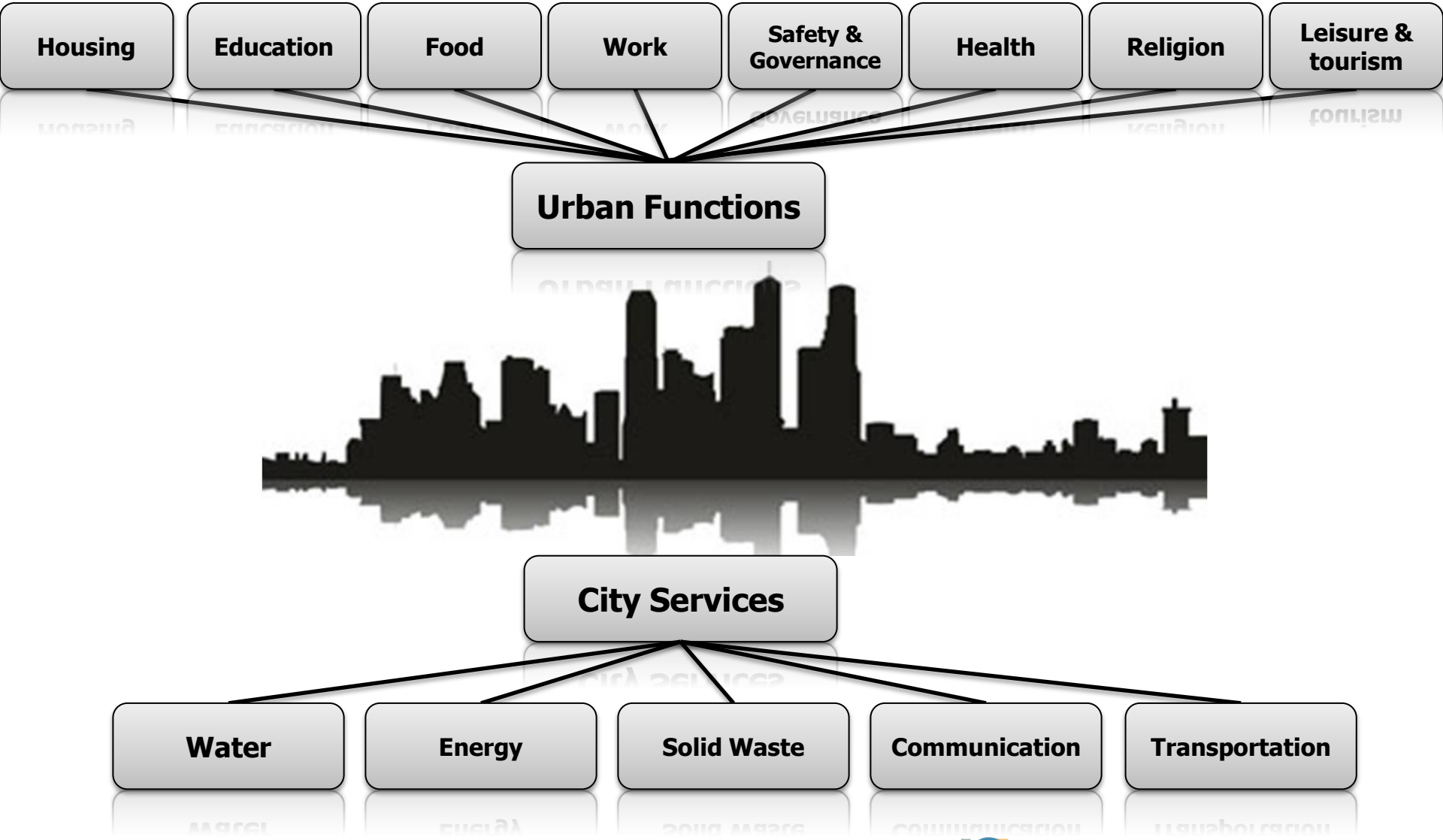
Urban systems – scaling and mapping



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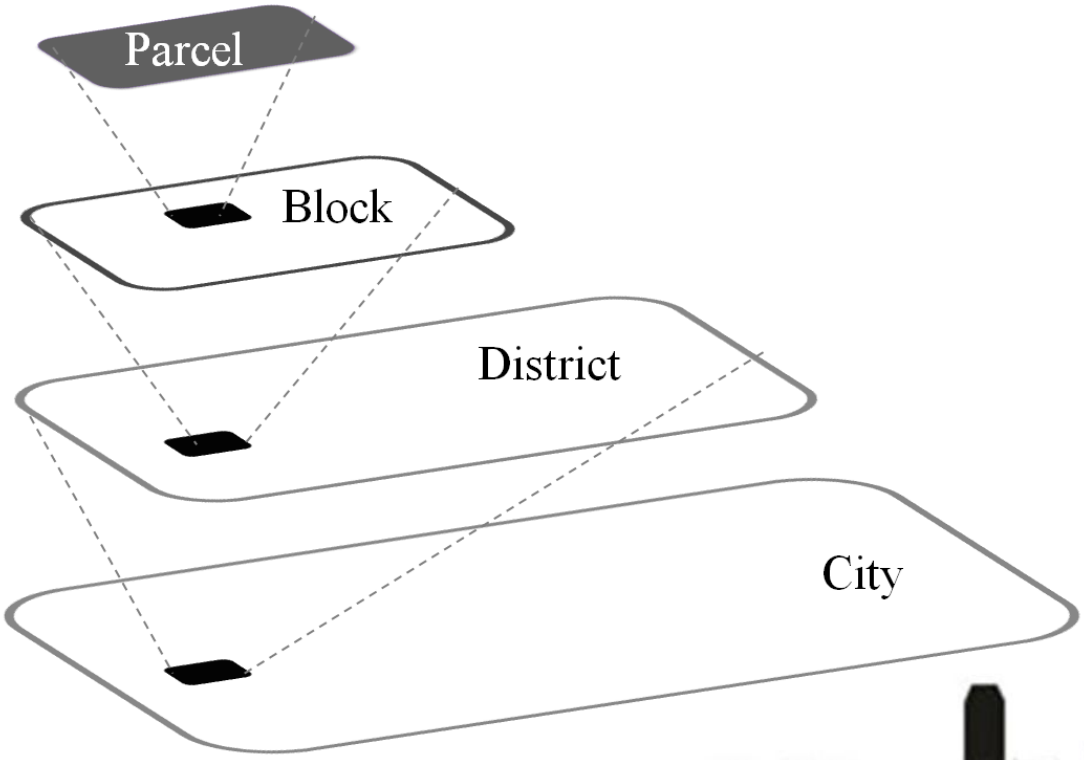
Urban systems – scaling and mapping



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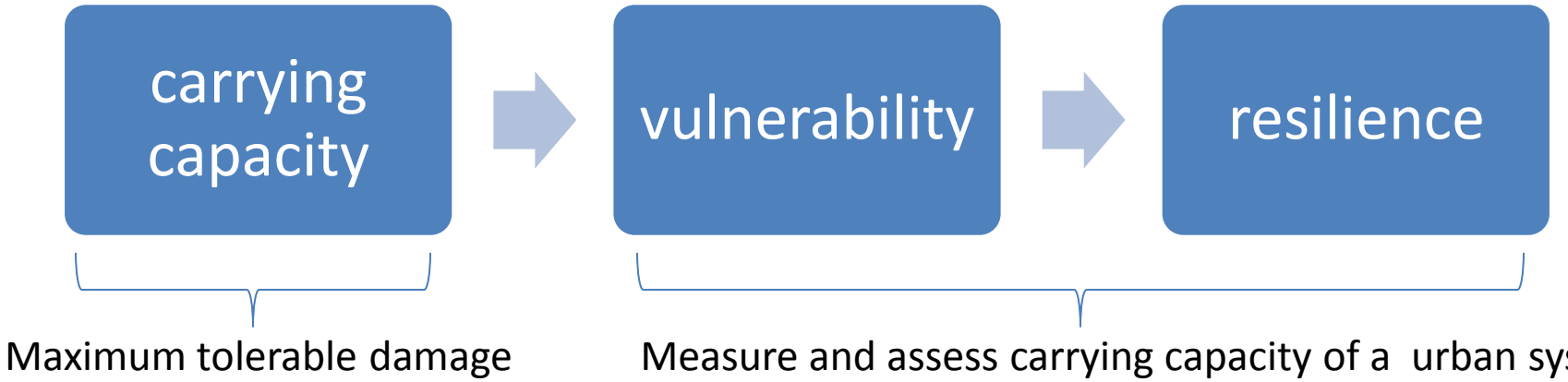
Example – city of Nice, France

Nice:
Old city, Medecin and Carabacel districts

Identification of location of urban functions and its transport infrastructures

The resilience concept

- System from an ecological point of view doesn't need to define the conditions which will provide some functionality and structure
- Driving approach to improve sustainability of urban systems to flooding processes (resilience concept)
- Resilience of physical and social components of urban system
- How to describe and assess flood risk in urban systems (city)?



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The resilience concept

- Not a general definition for resilience
- Resilience of urban systems – to what? Up to what level?
- It can be defined by identifying what system attributes are to be resilient, and to what kind of disturbances.

3 Directions for preventing an urban system to become unstable

Adjusting the thresholds of a system in respect to changes in response to flood waves

Defining the level to which system is capable of self organizing

Define the level to which system is able to build and increase capacity for learning and adaptation

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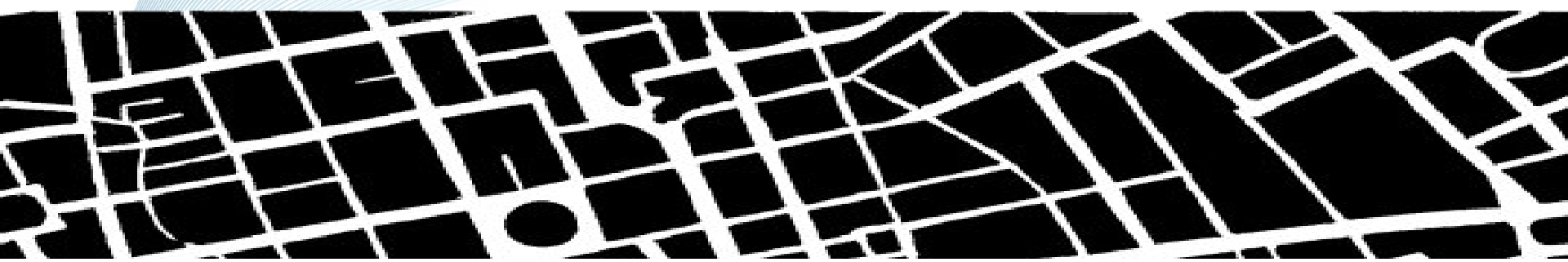
Towards new environments



Energy grid / smart grid → Convergence/ Resilience

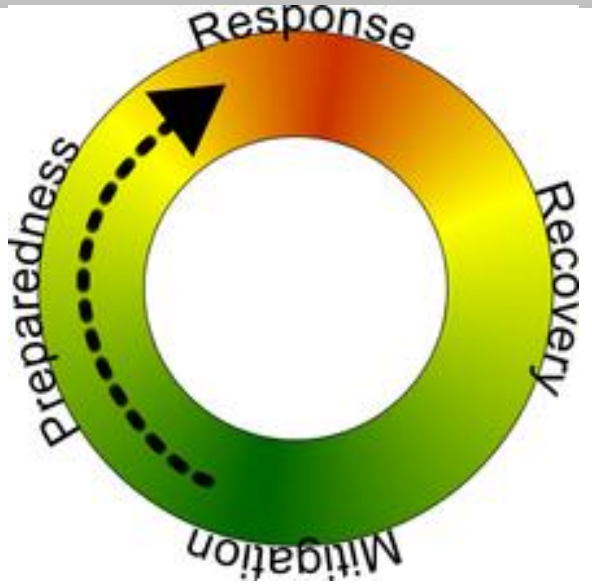
Water grid / water cell → Convergence/ Resilience

Risk management → Convergence/ Resilience

New urban environments based on urban cells integrating services (specific scale)

Urban flood management and flood resilience

- Measures taken to :
  - increase capacity building of human resources,
  - better land use management,
  - increased flood preparedness and
  - emergency measures that are taken during mostly usually and after flood event



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Flood resilience measures

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Capacity building of human resourses	Land use control	Flood preparedness	Contingency measures
•Information •Communication •Education	•Spatial planning •Building regulations	•Flood resistant buildings •Cascading flood compartment	•Financial response •Emergency response •Emergency infrastructure •Recovery

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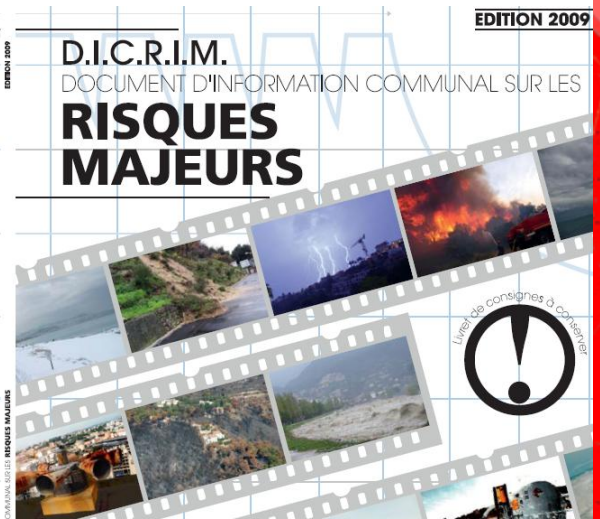
Capacity building of human resources

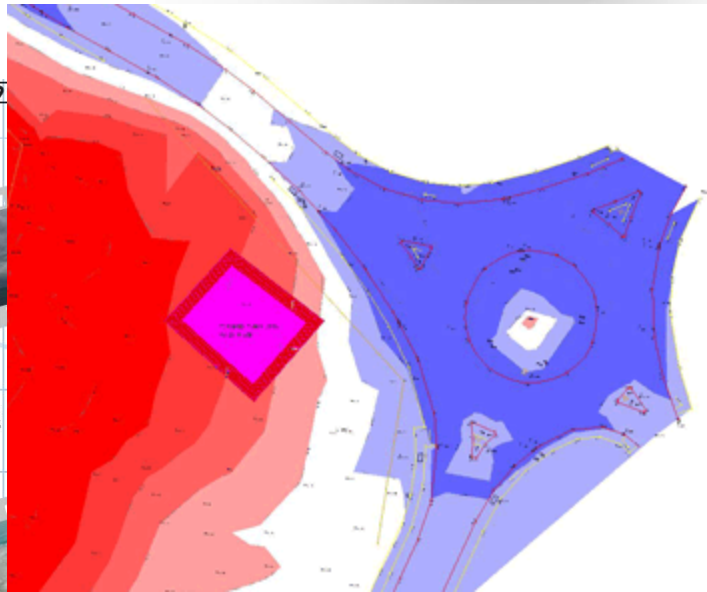
Information

- Inundation maps
- Flood risk maps
- Info material

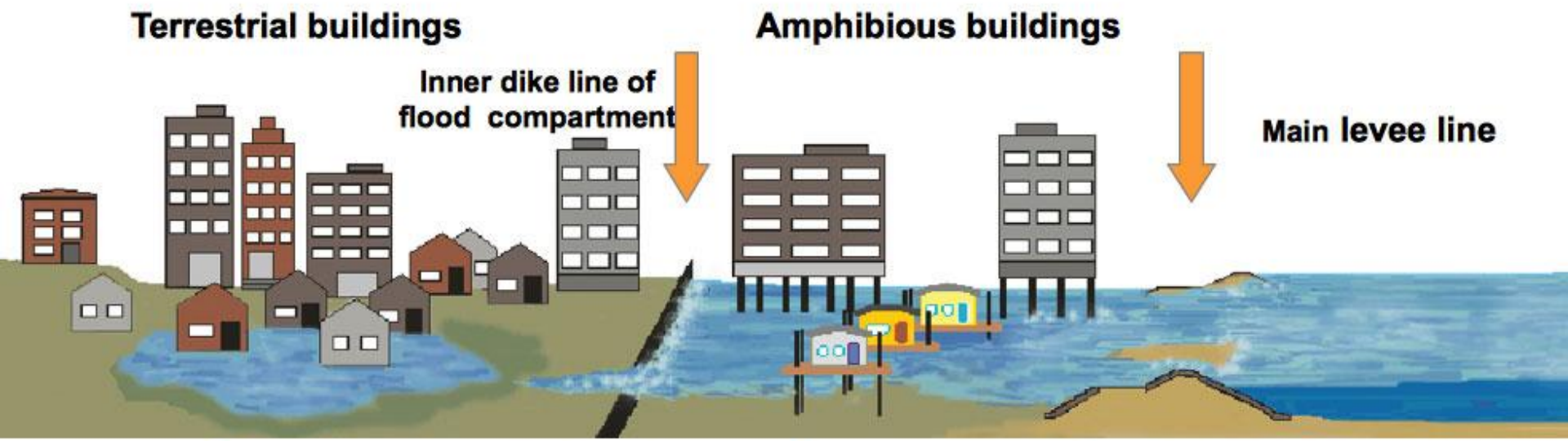
Education – communication

- Face-to-face learning
- Web-based learning
- Training
- Collaborative platforms





Land use control



adaptation to flooding by dry- and wet-proofing

adaptation to flooding by floatable buildings and buildings on piles

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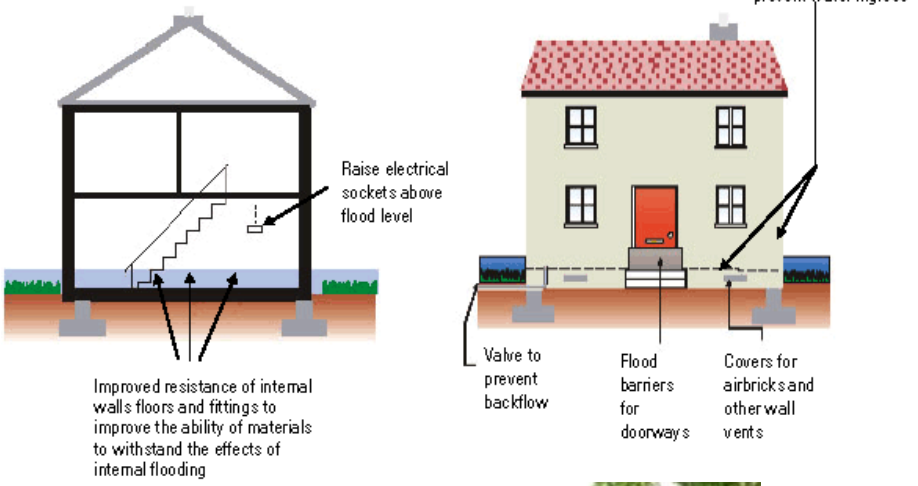
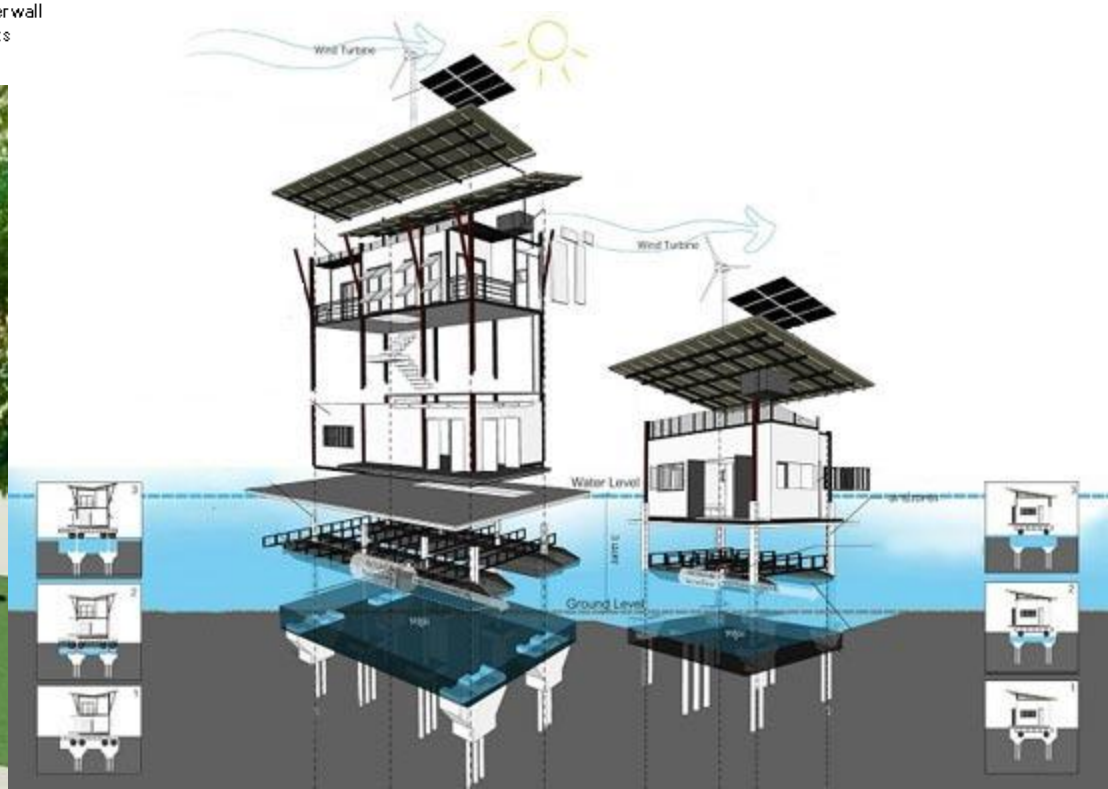
Flood preparedness





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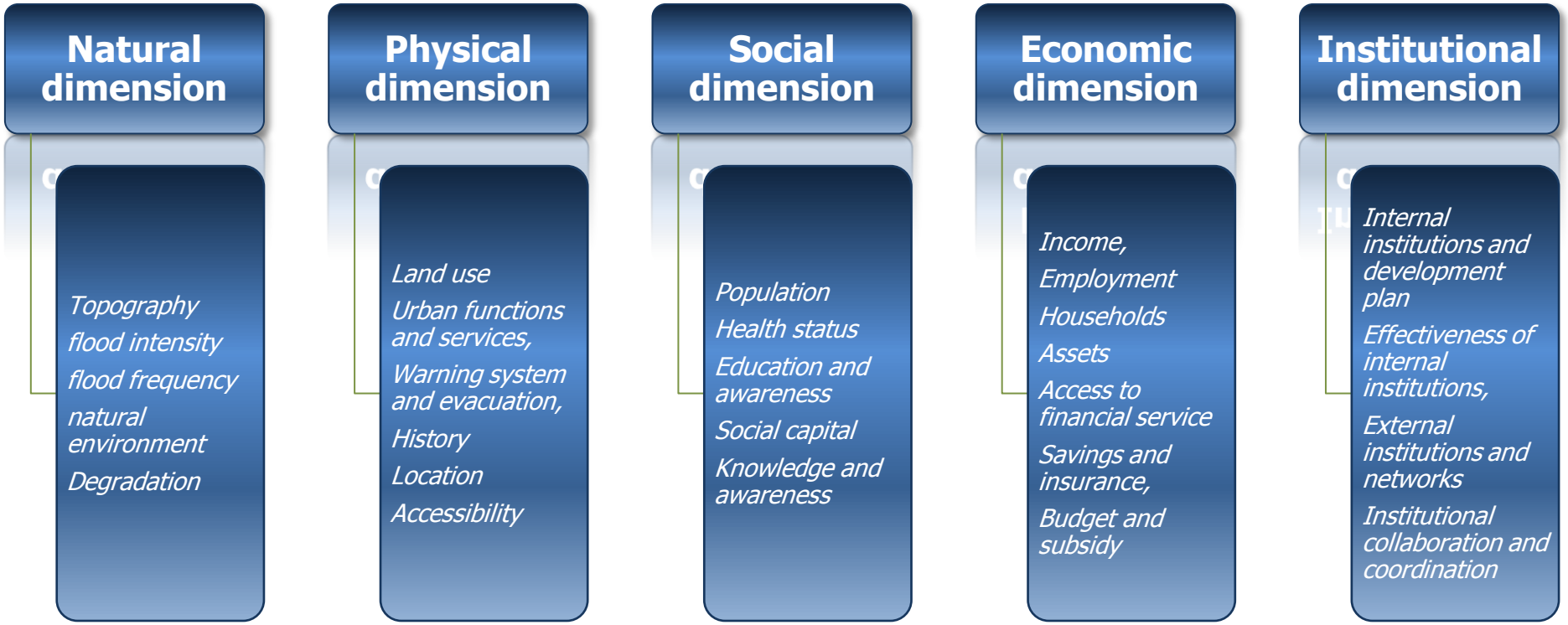
Contingency measures

Evaluating resilience

- Defining an index – Flood Resilience Index (FRI)



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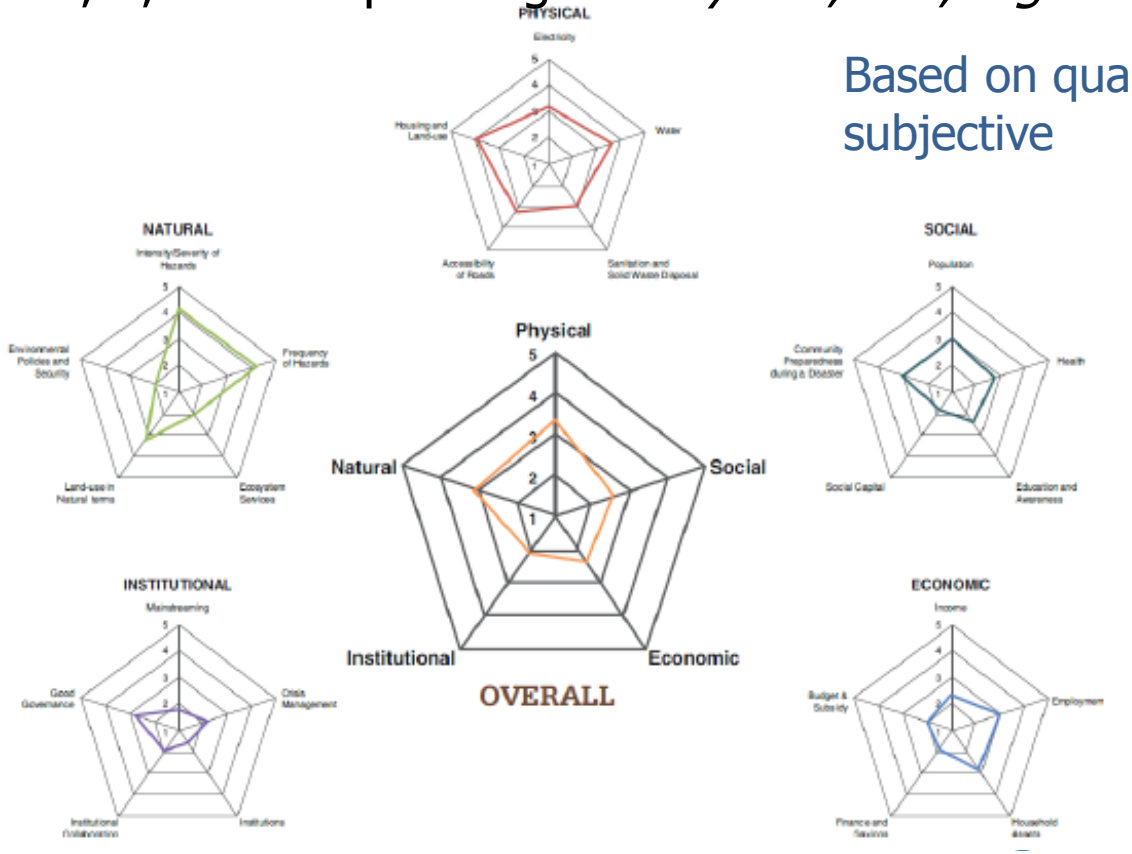
Evaluating resilience

- This data template is created based on several dimensions and its variables. It is in a form of a questionnaire survey
- The calculated averaged WMI of one dimension is the Flood Resilience Index (FRI) for that dimension. Rating scales have assigned numbers 1, 2, 3, 4 corresponding to *very low, low, high and very high respectively.*

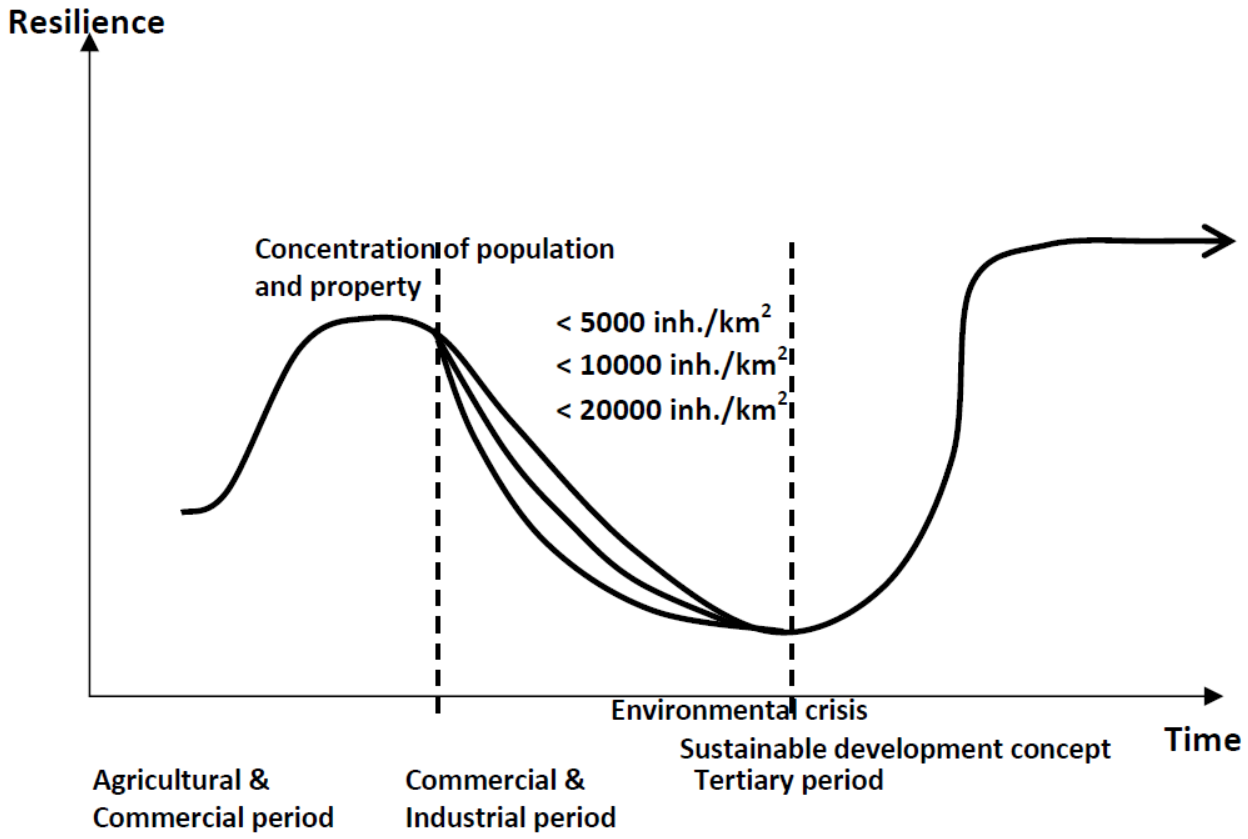


Based on qualitative assessment and it's subjective

Sample for presentation of FRI in radar chart form (Rajib Shaw and IEDM Team (2009))

Flood resilience curve

- FRM strategies are based on concept 'living with floods'
- Urban community are moving to a risk culture



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Conclusion

- Necessary to analyze flooding processes in the context of urban spatial development

- The dynamic characteristic of resilience challenges the urban flood management
- Bring urban water management to the minds of citizens, talk to the stakeholders. They will define the most reasonable systems if they understand the challenge….

- Necessity for enrolment of new building procedures, emergency protocols for inhabitants, special medical services during and after disaster etc is significant.

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Acknowledge

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Thanks for your attention!

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