

# Identifying how the strategies used to evaluate flood damage can affect the results of the evaluation

*Julian ELEUTERIO<sup>(1)(2)</sup>*

Anne ROZAN<sup>(1)</sup>, Robert MOSE<sup>(2)</sup>

<sup>(1)</sup> UMR Cemagref/ENGEES Management of Public Utilities, France

<sup>(2)</sup> UMR CNRS/UdS/ ENGEES Mechanical Institute of Fluids and Solids – UTR Urban Hydraulics, Strasbourg, France

# Summary

- Context
- Objectives
- Methodology
- Results and Perspectives

# Context

- Generalities on flood risk
  - Flood risk management (reduction of overall losses)
  - Decision-making process: cost/**benefit** and multi-criteria analysis...
- Flood damages in France
  - **1/3 of municipalities** concerned.
  - flood losses represent **80 % of damages** associated to natural hazards (**250 M€ per year** in average)
  - **Absence of** national standard methods to evaluate damages of future floods (forecasting)

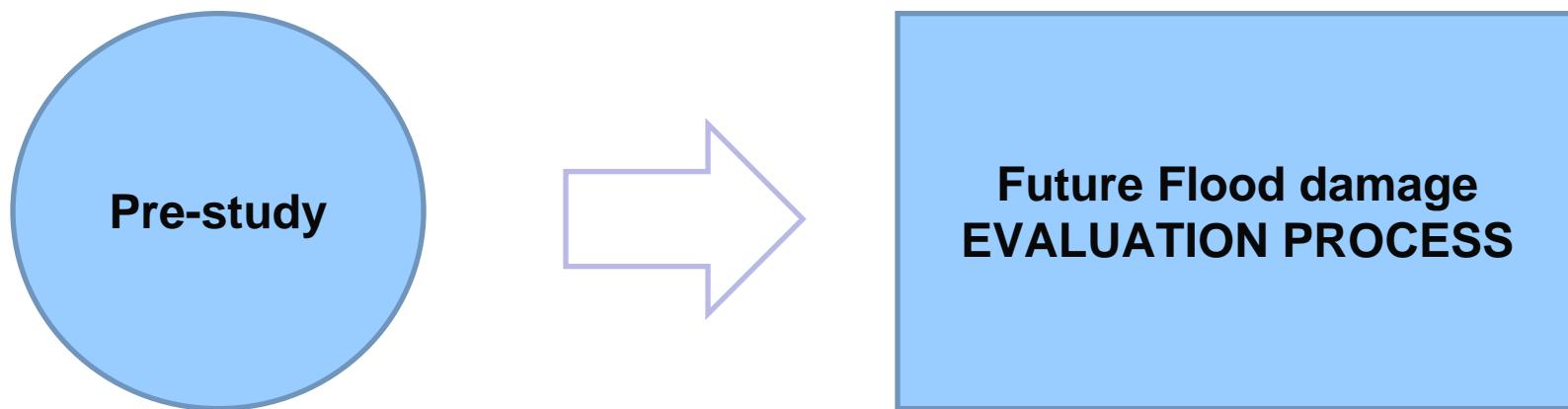
- Evaluation of future flood damages **in practice**
  - Great majority of studies consider **only part of total damages caused by floods** (ex. buildings and contents)
  - Methods, models are generally determined **in function of budget restriction and data availability.**
  - **Uncertainty rarely discussed and studied**

# Objectives

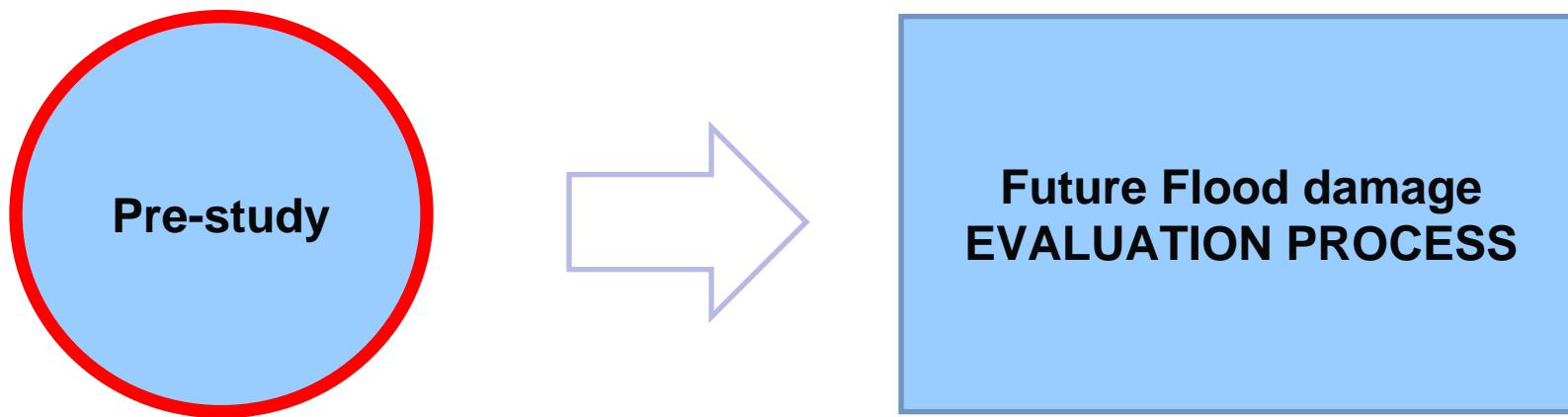
- Scientific:
  - Develop a **research framework** to analyze the **impact of different strategies** used to evaluate flood damages on the **feasibility** of the evaluation and on the **accuracy** of its results
- Practical:
  - **Support** the application of future flood damage assessment methods

# Methodology

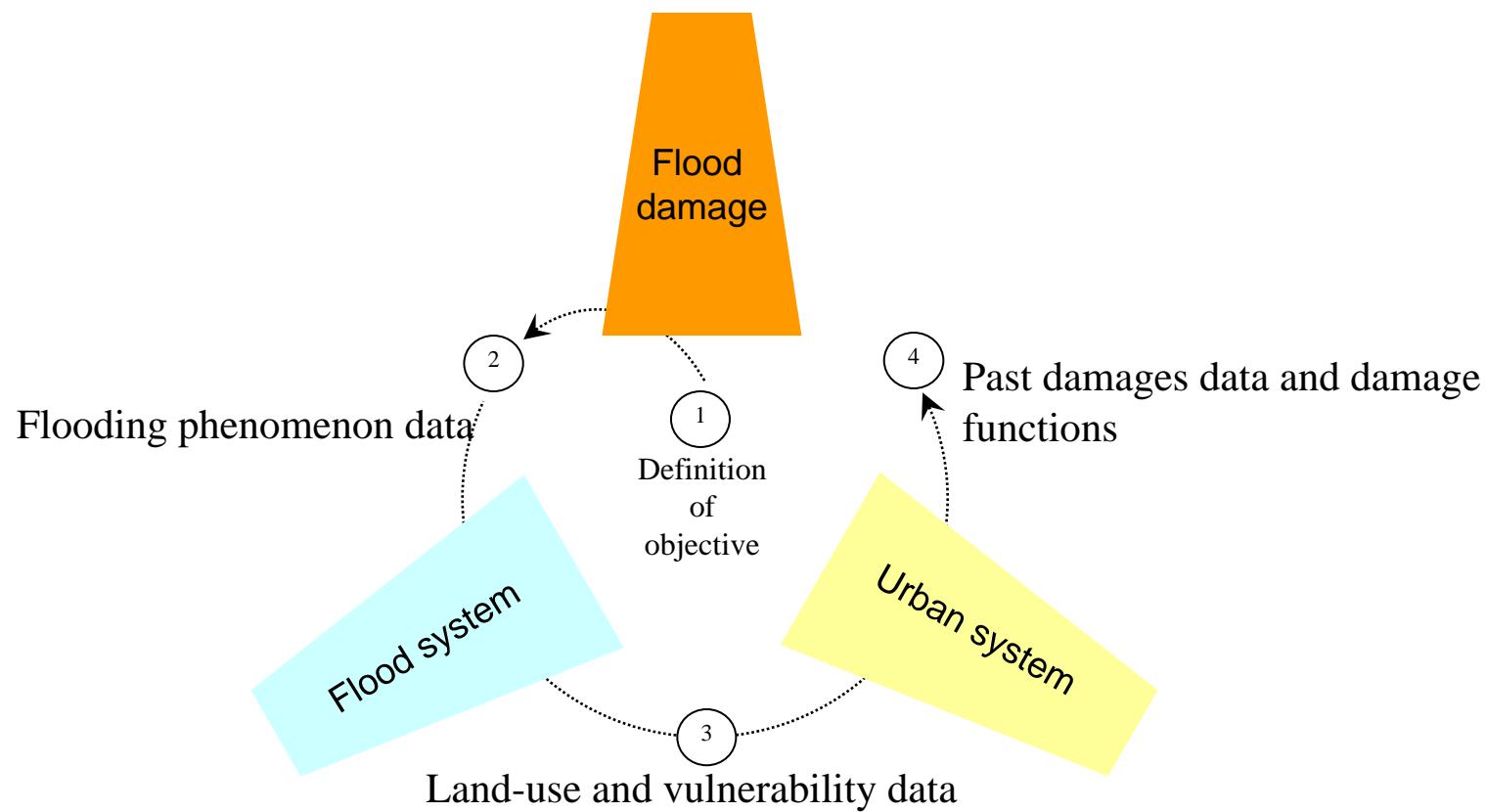
- Evaluating future floods damage potential



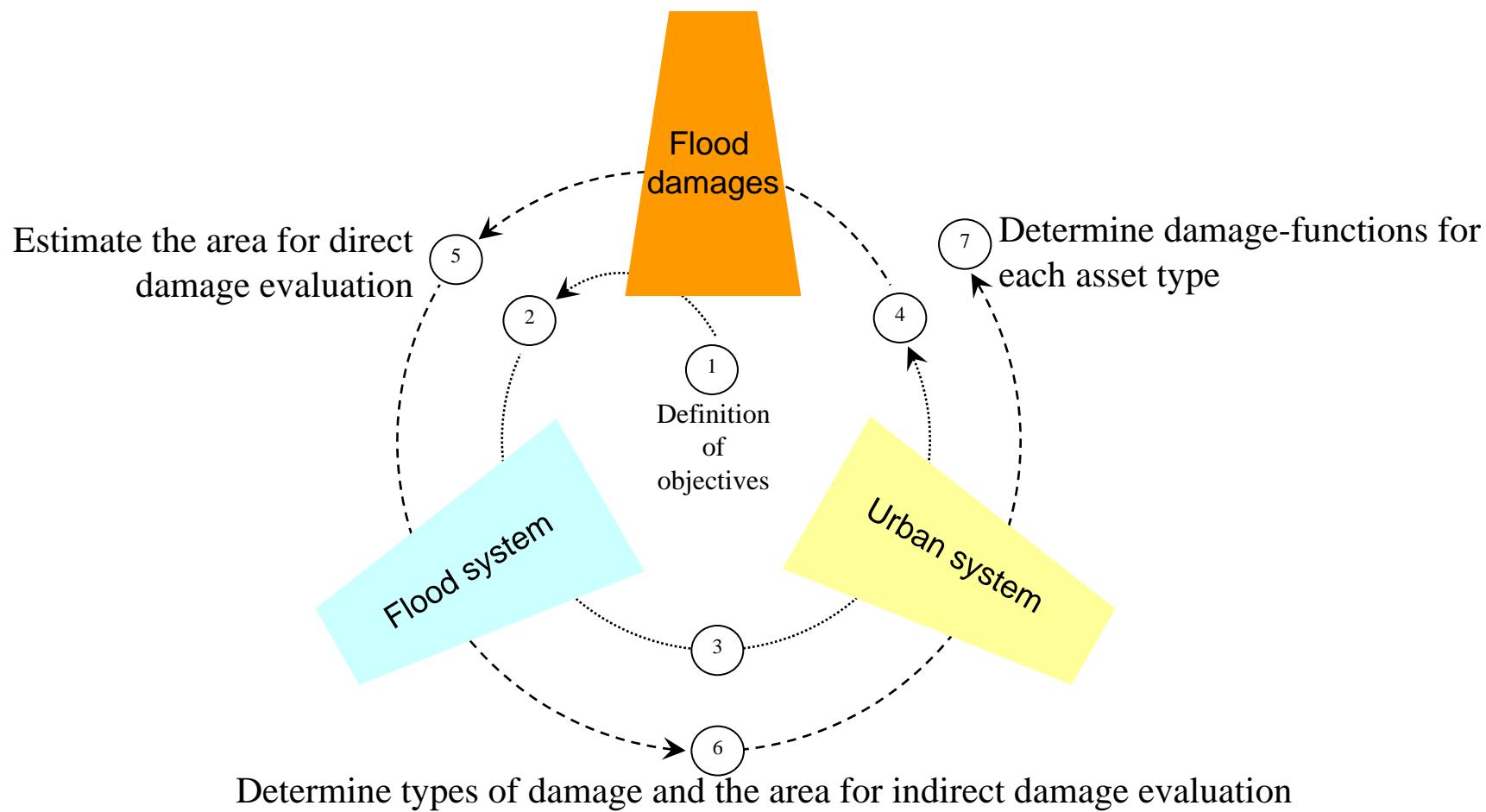
- Evaluating future floods damage potential



- Pre-study

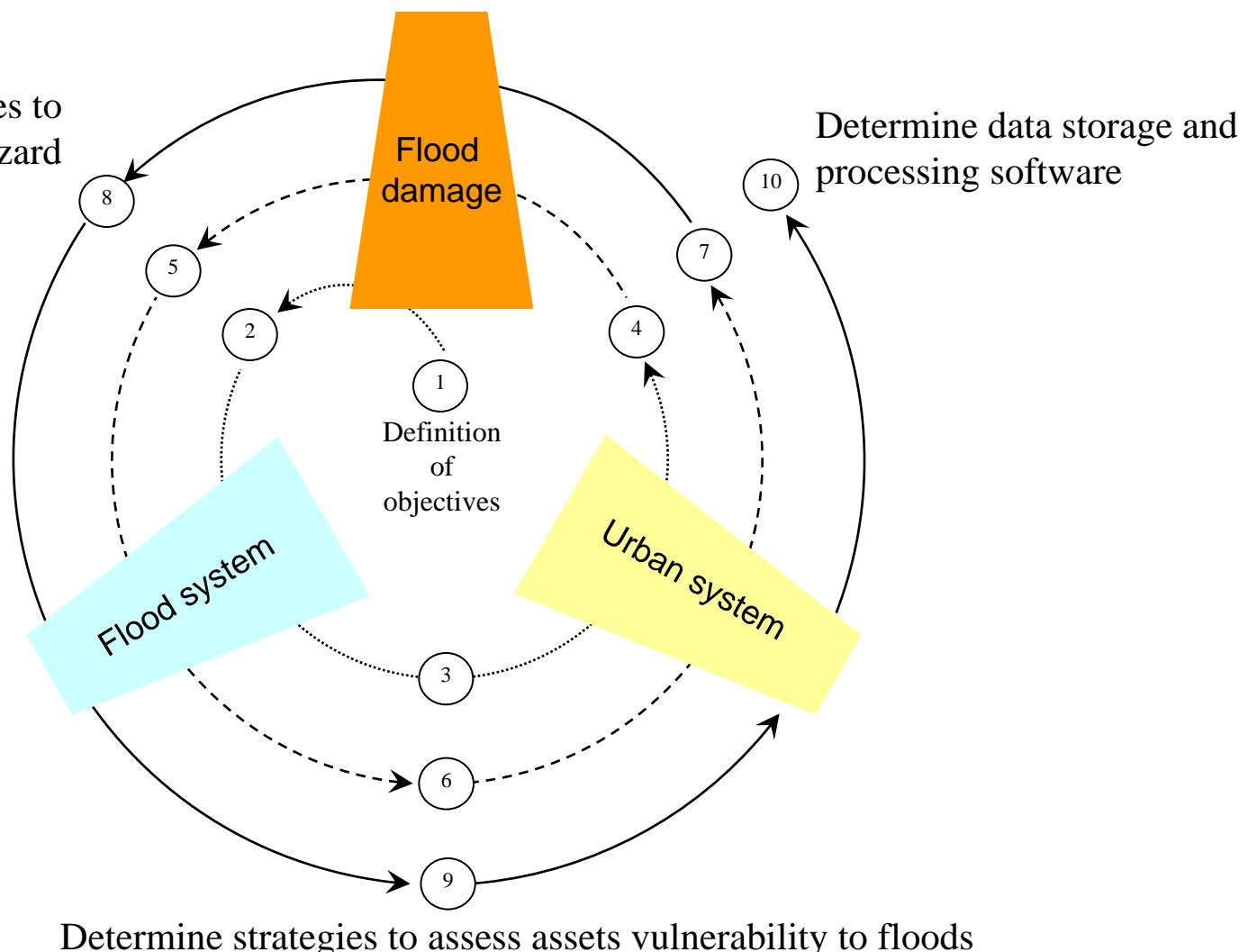


- Pre-study

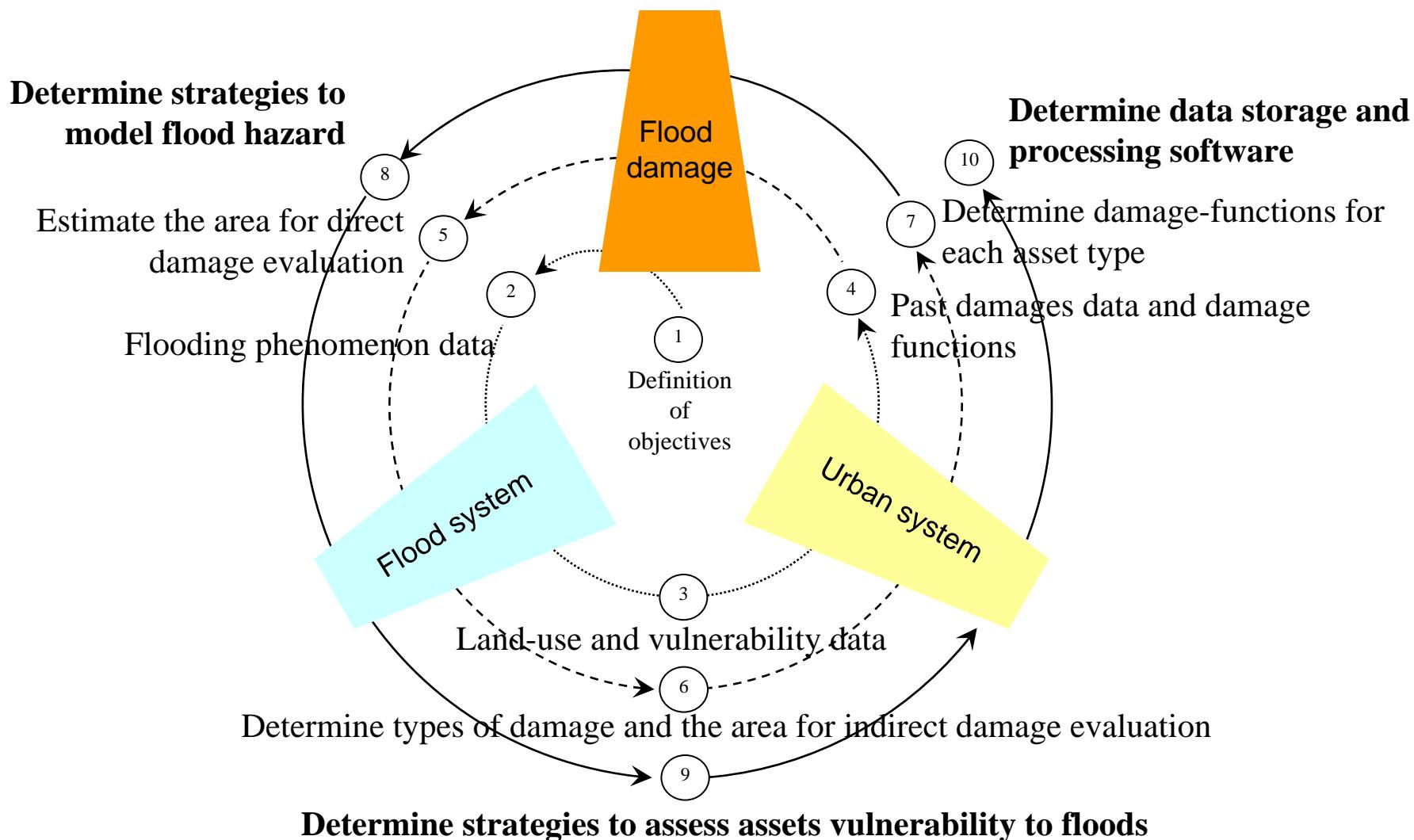


## • Pre-study

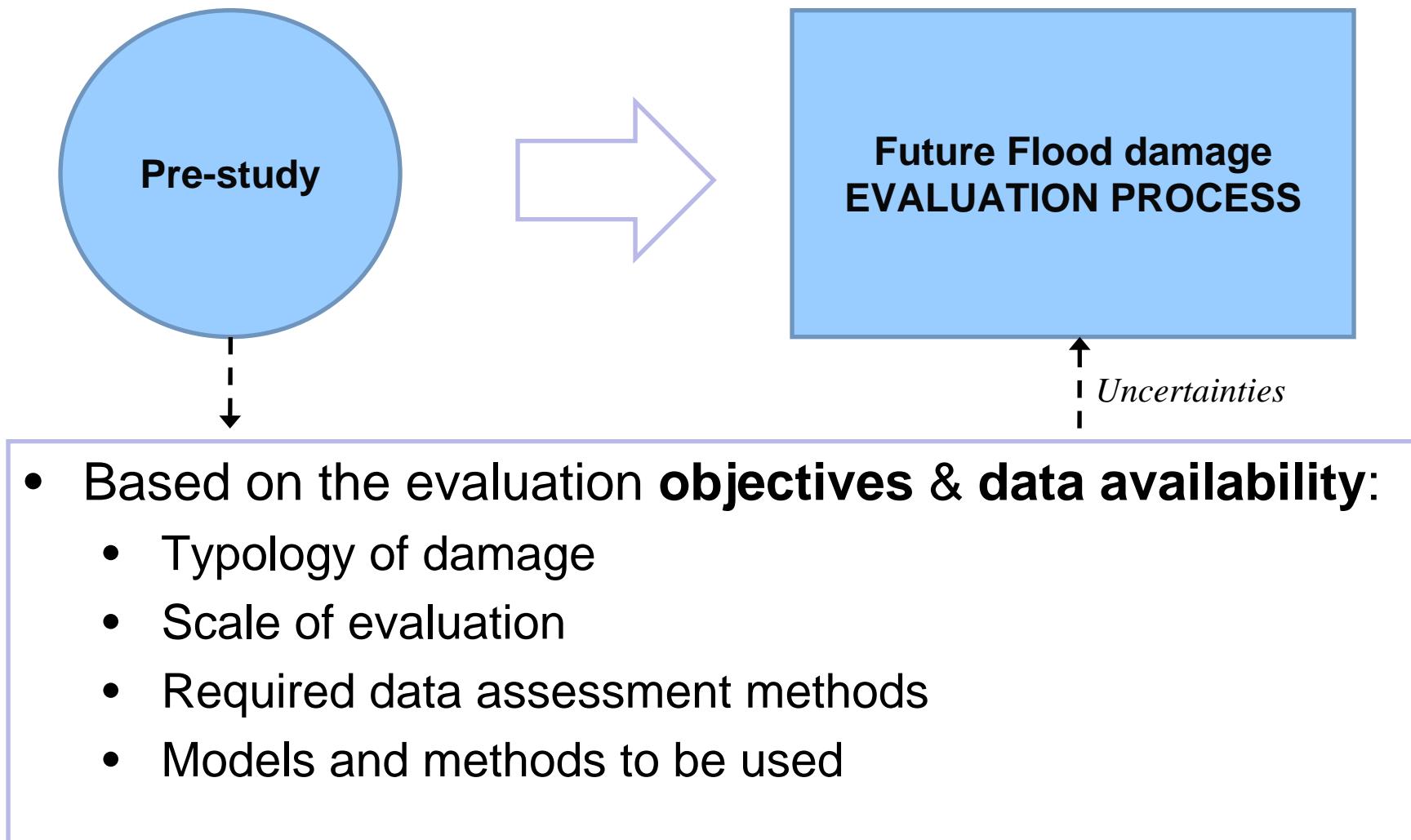
Determine strategies to model flood hazard



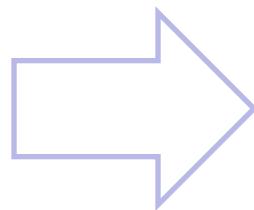
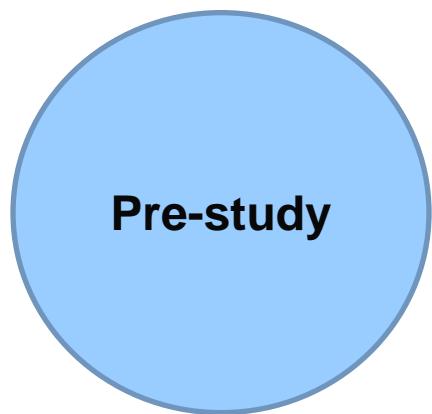
- Pre-study (**3C method**)



- Evaluating future floods damage potential

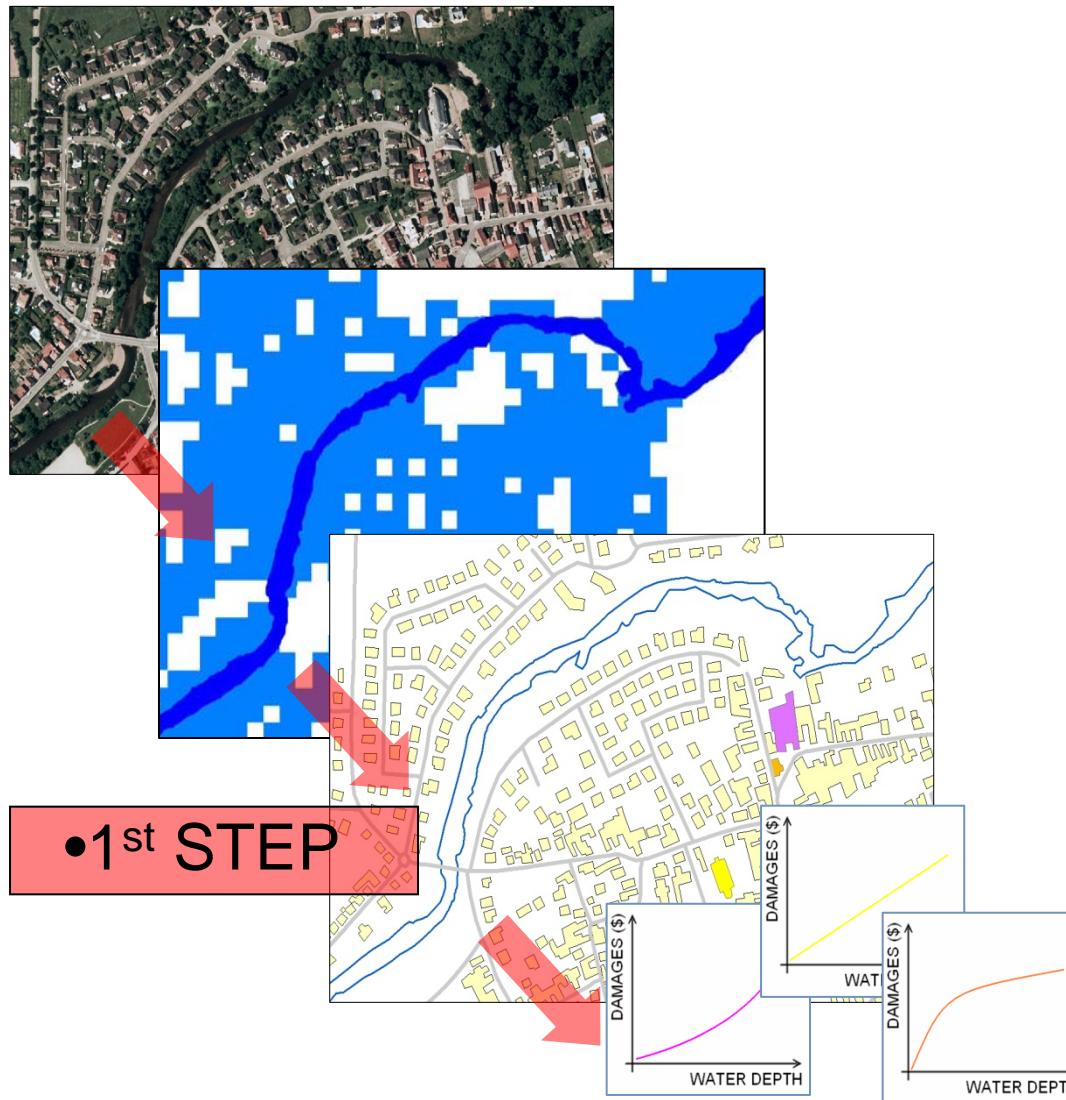


- Evaluating future floods damage potential

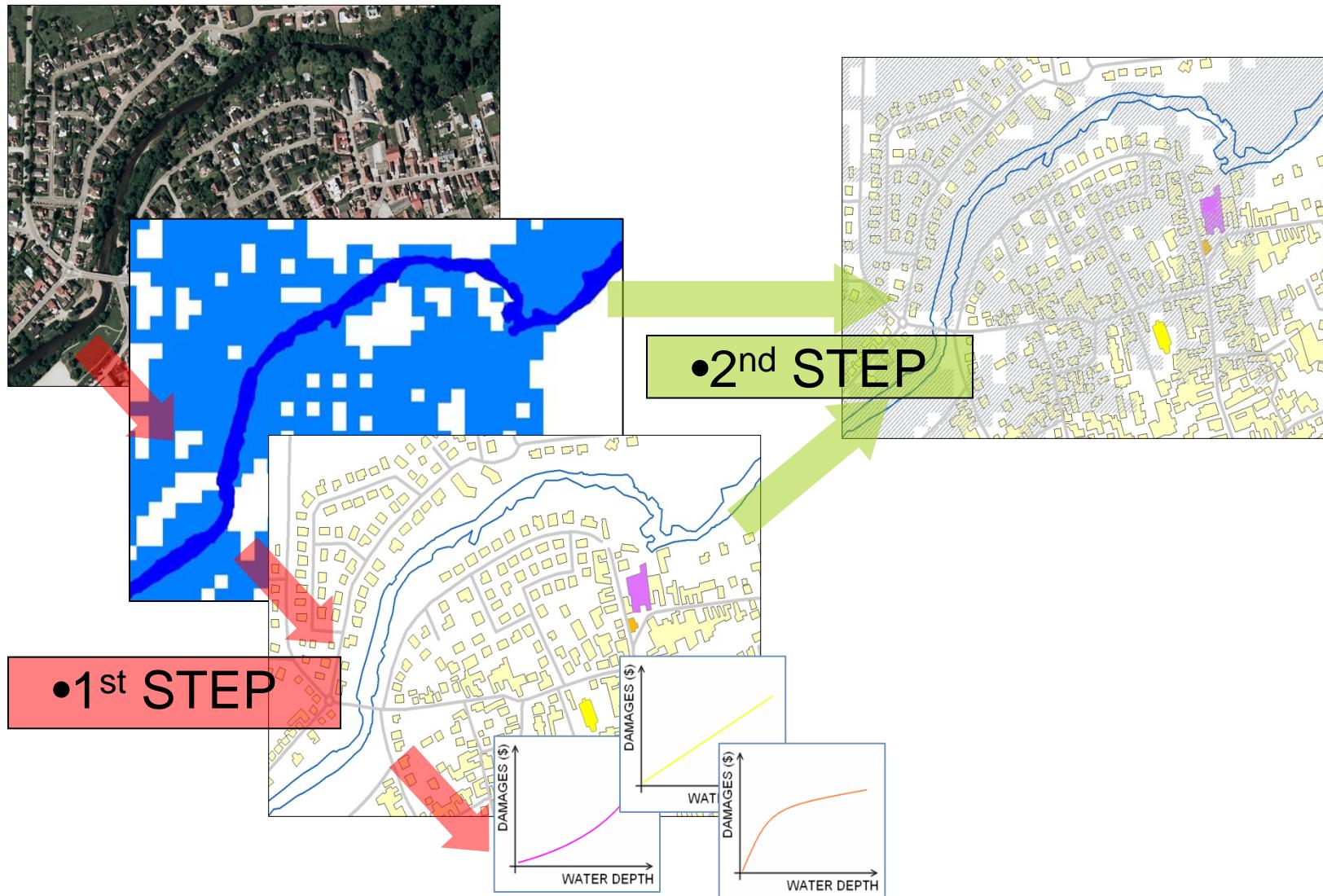


**Future Flood damage  
EVALUATION PROCESS**

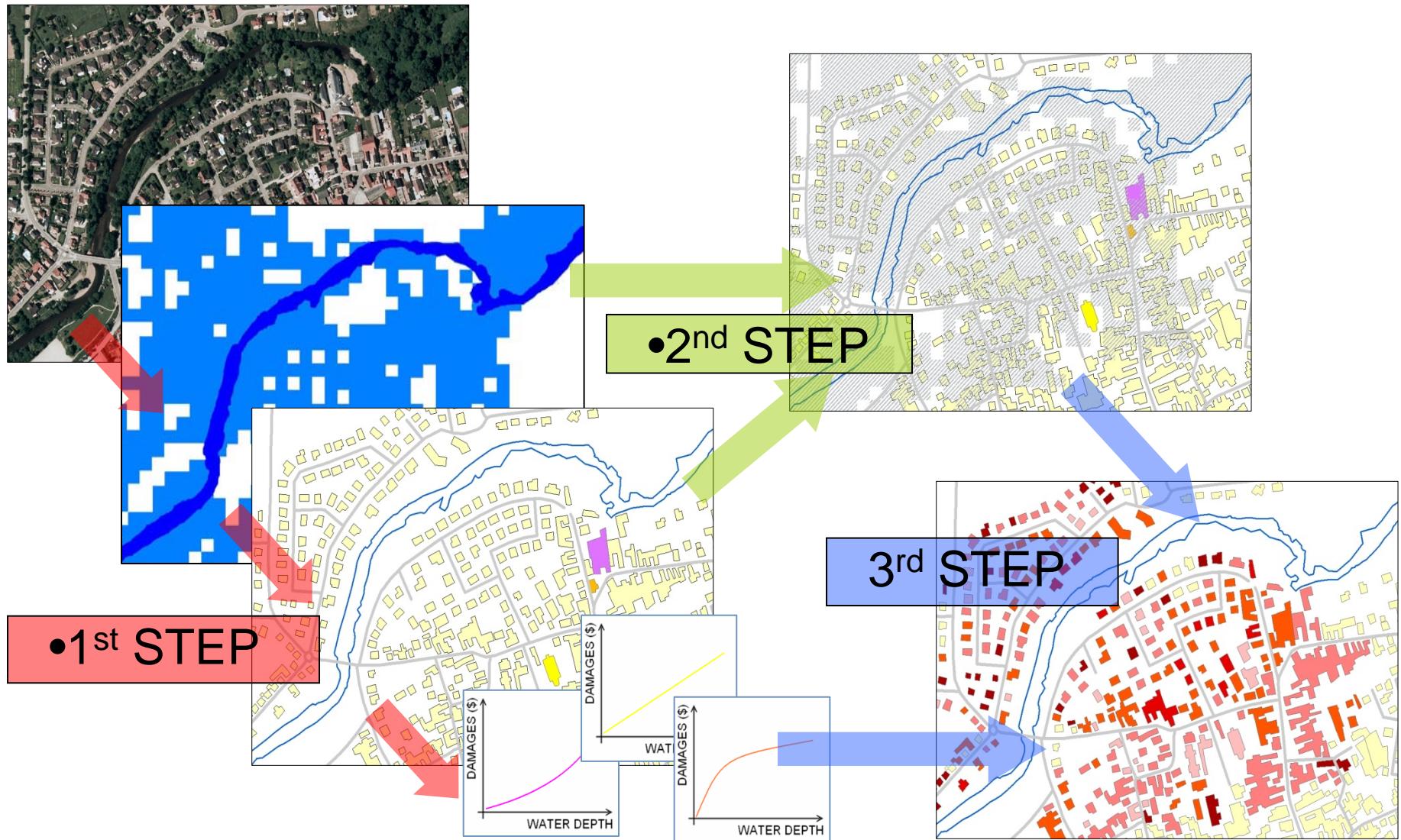
- Evaluation process



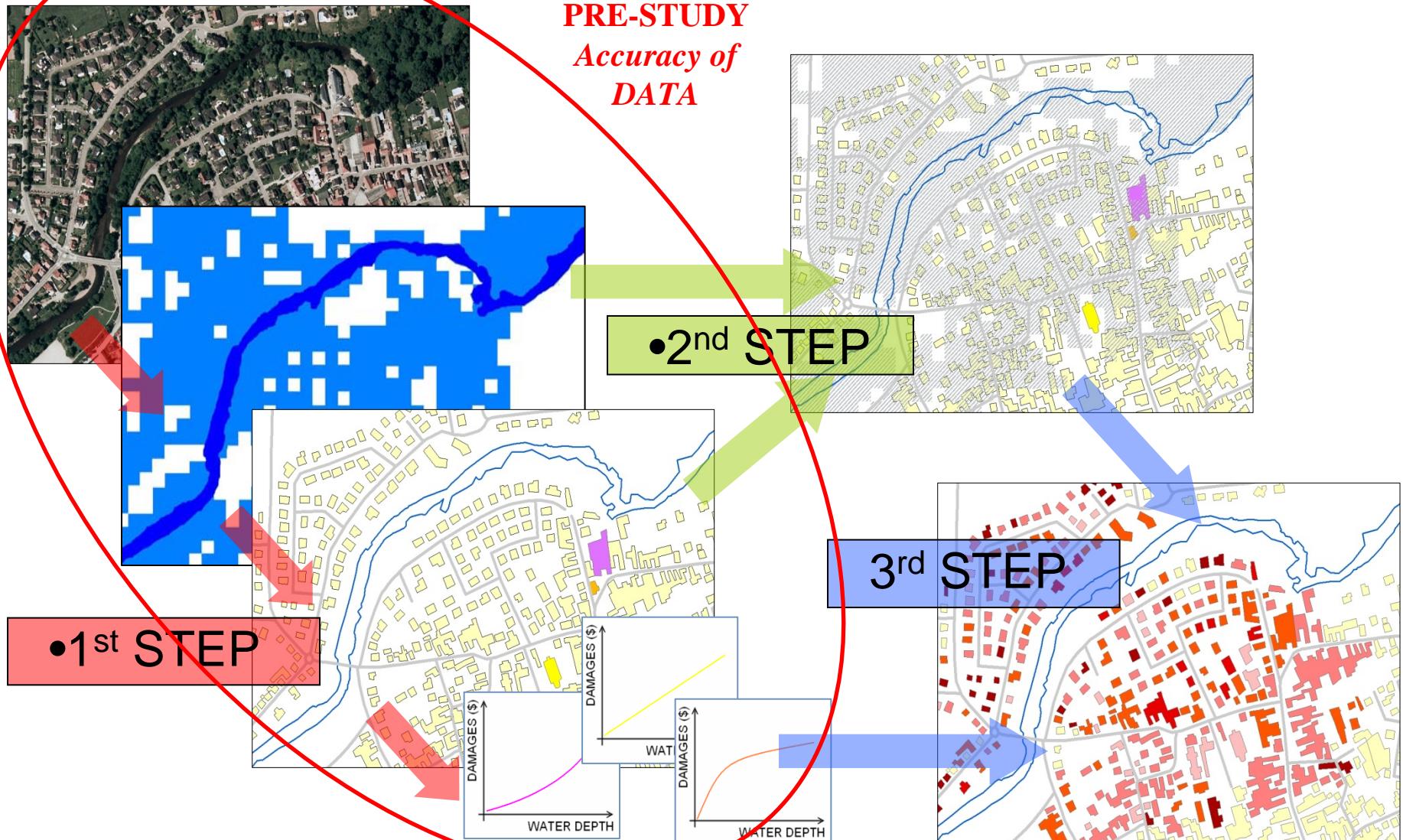
- Evaluation process



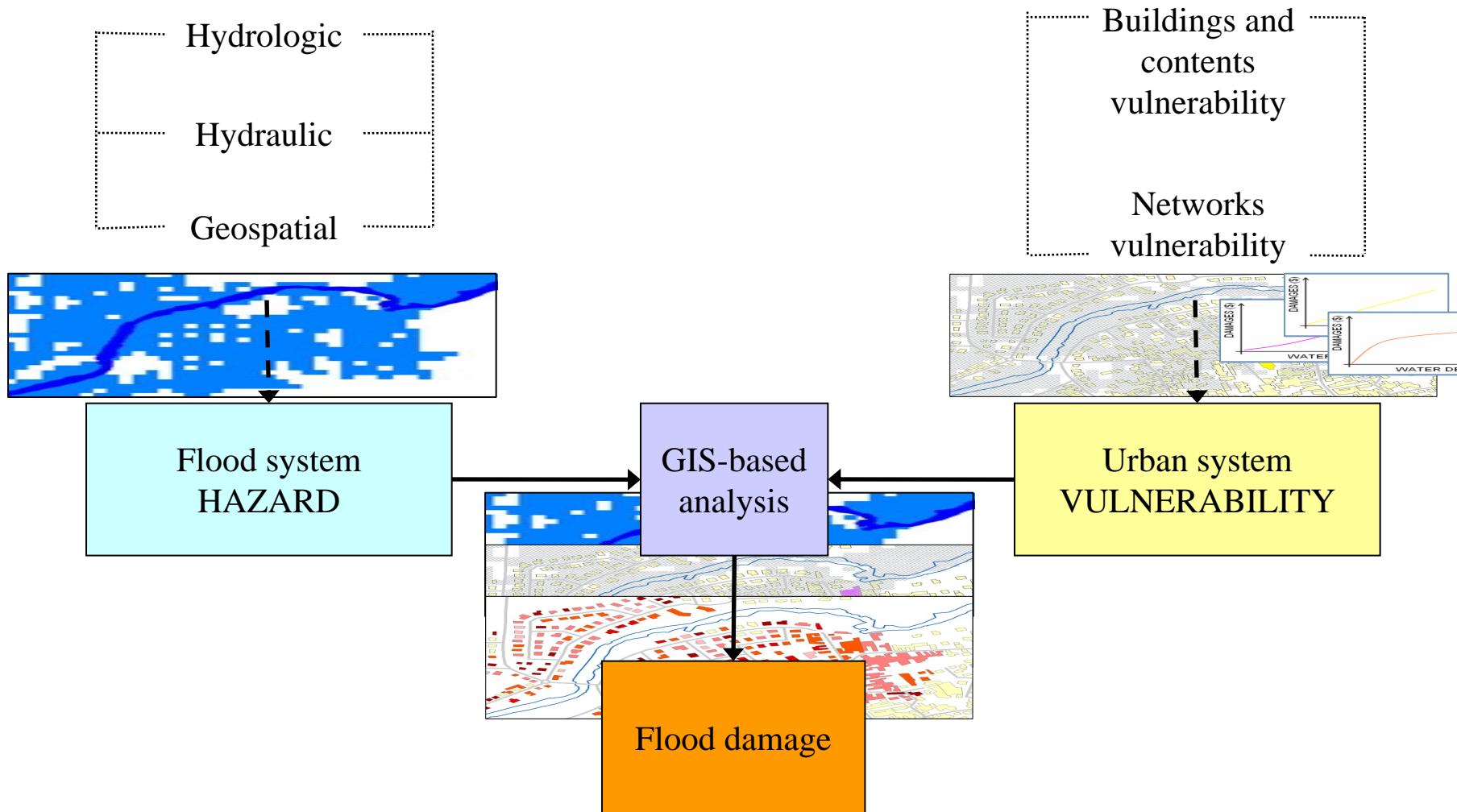
- Evaluation process



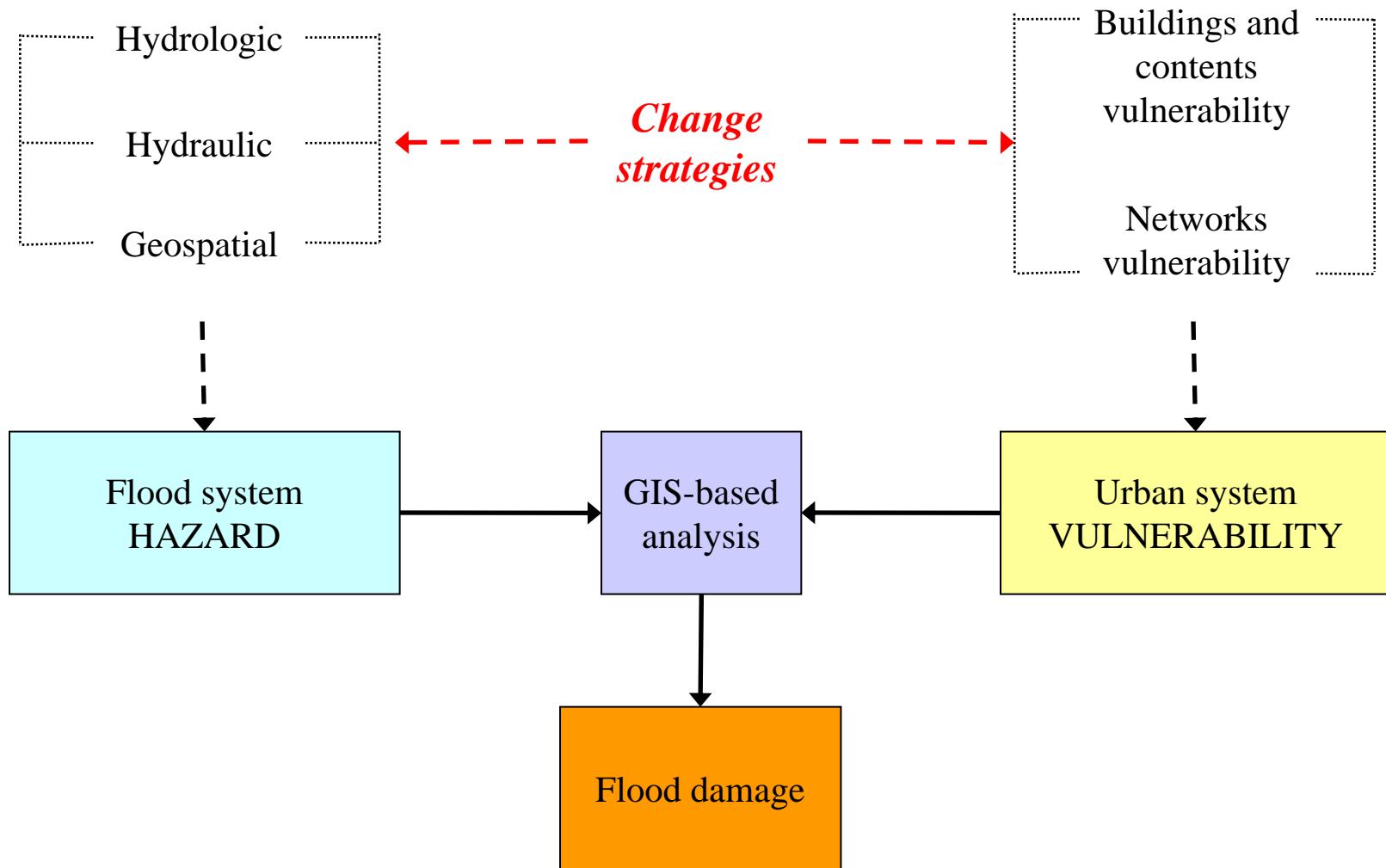
- Evaluation process



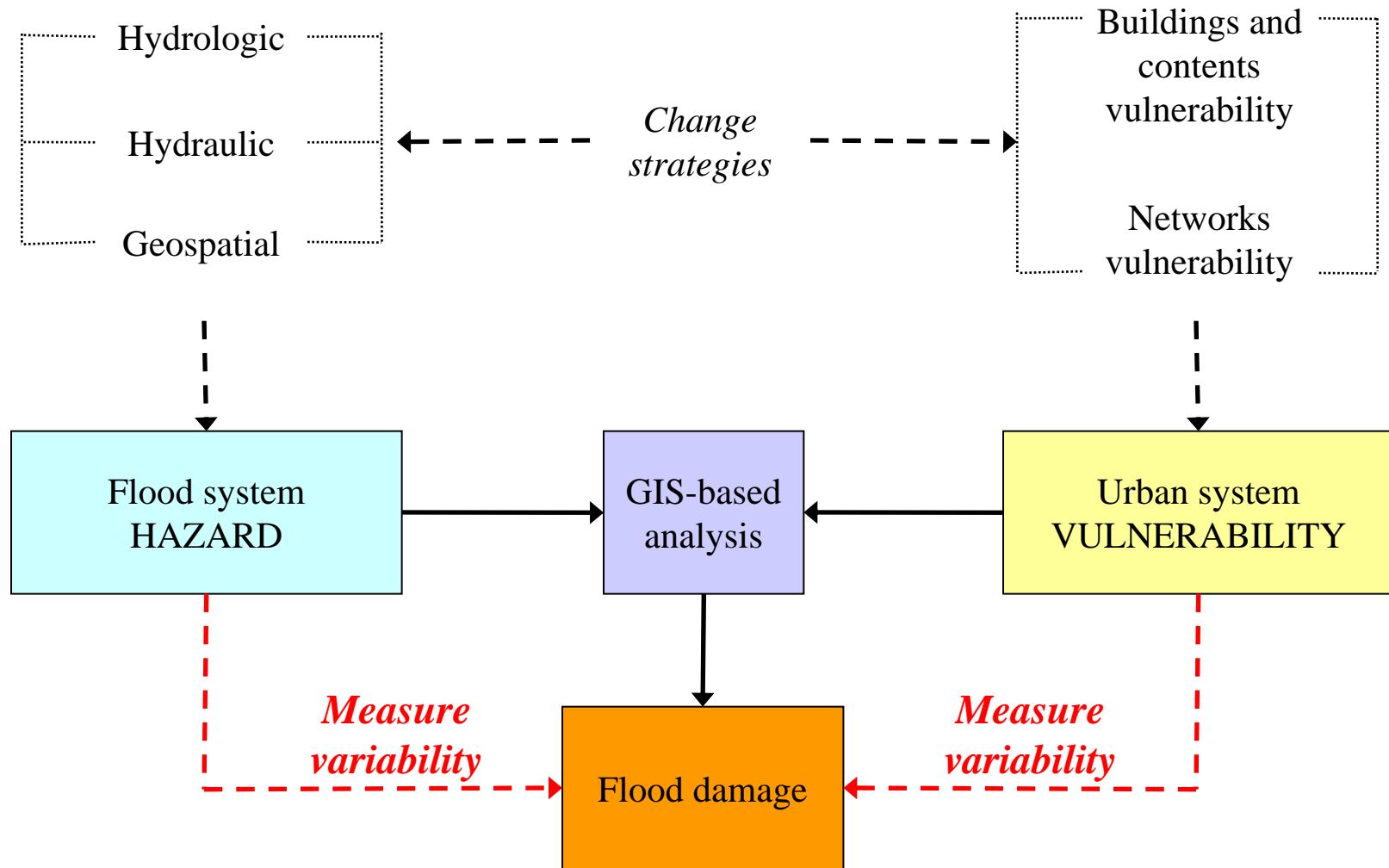
- Evaluation methodology



- Correlating **feasibility** with **uncertainty potential**

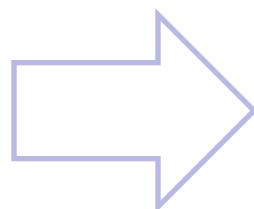
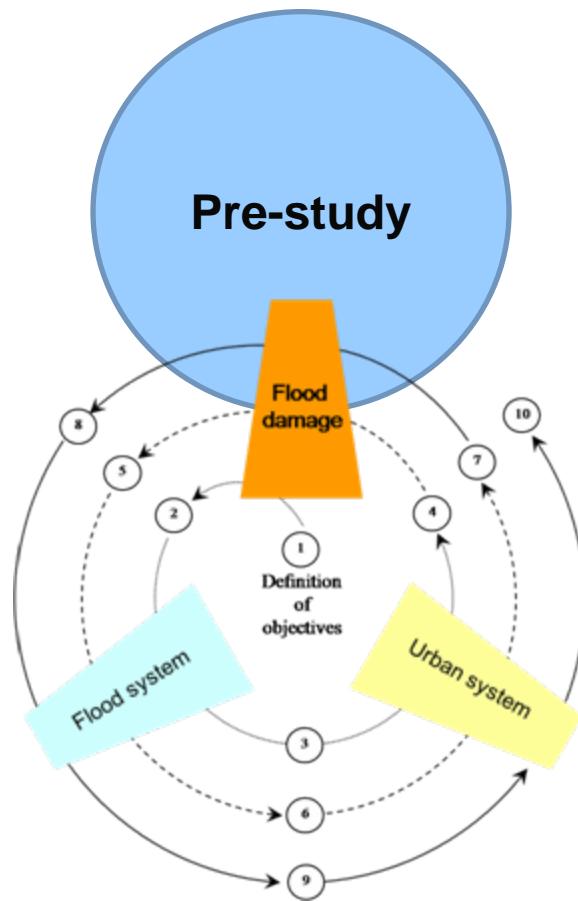


- Correlating feasibility with uncertainty potential

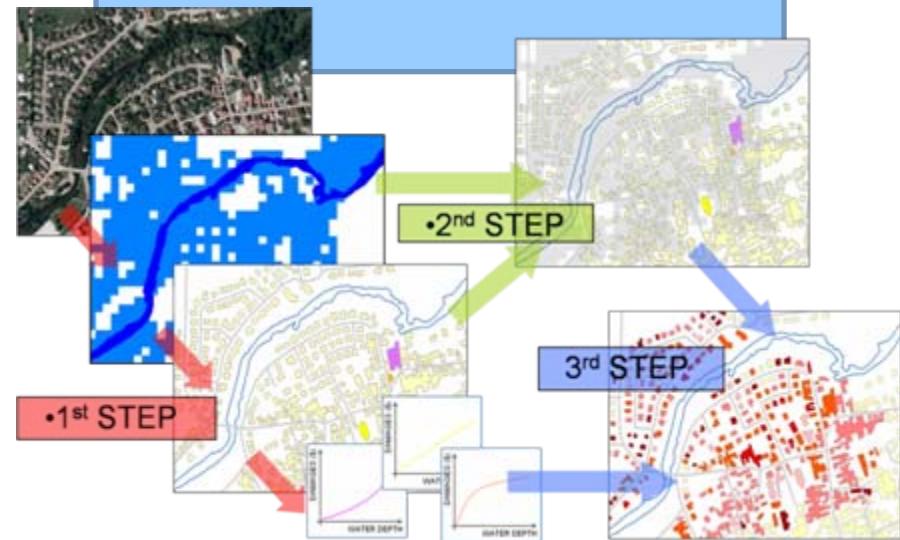


# Results and Perspectives

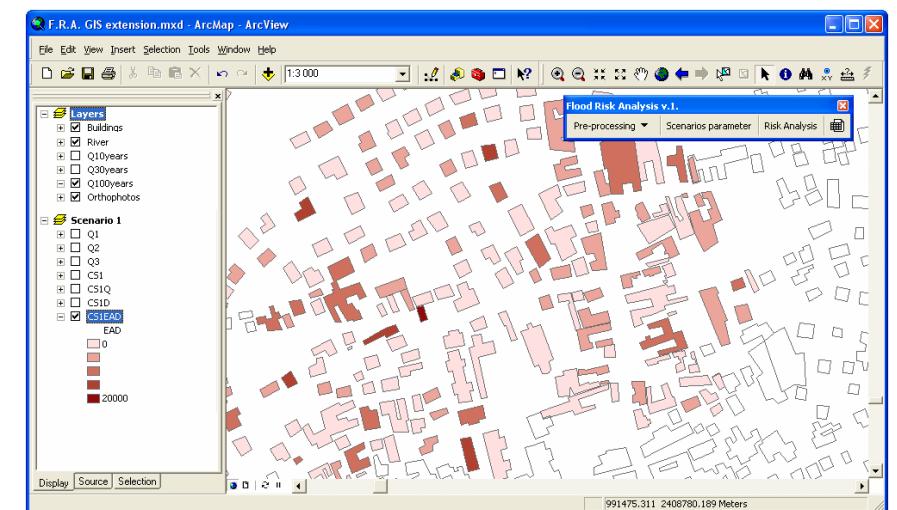
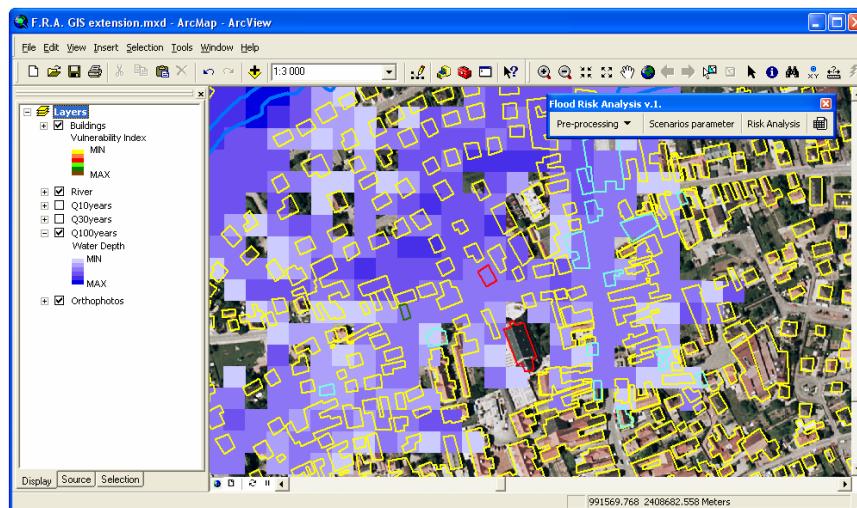
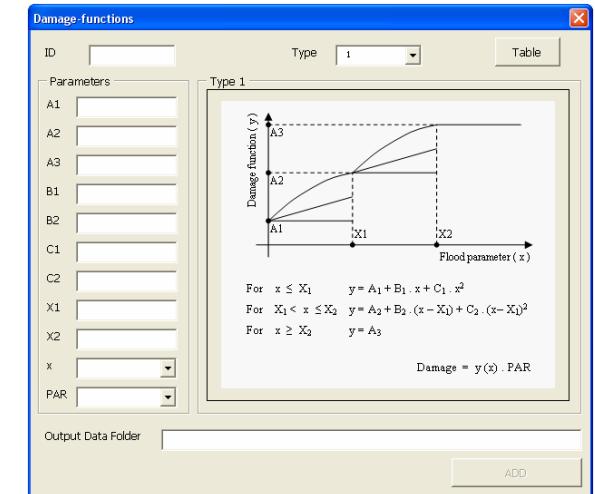
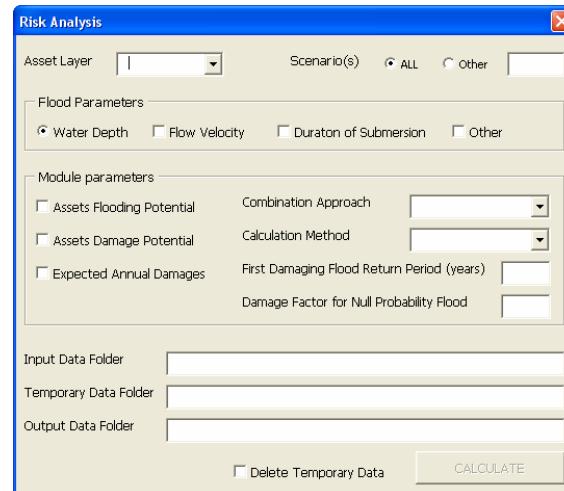
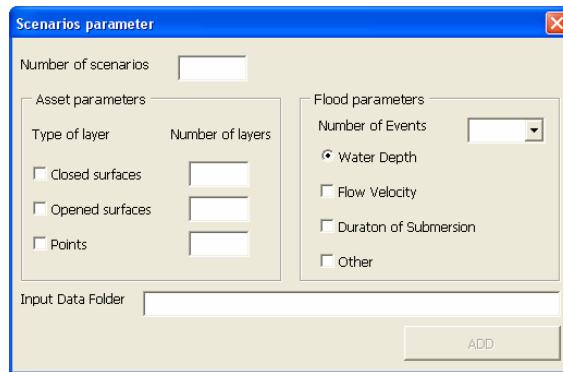
# Methodological & Operational



## Future Flood damage EVALUATION PROCESS

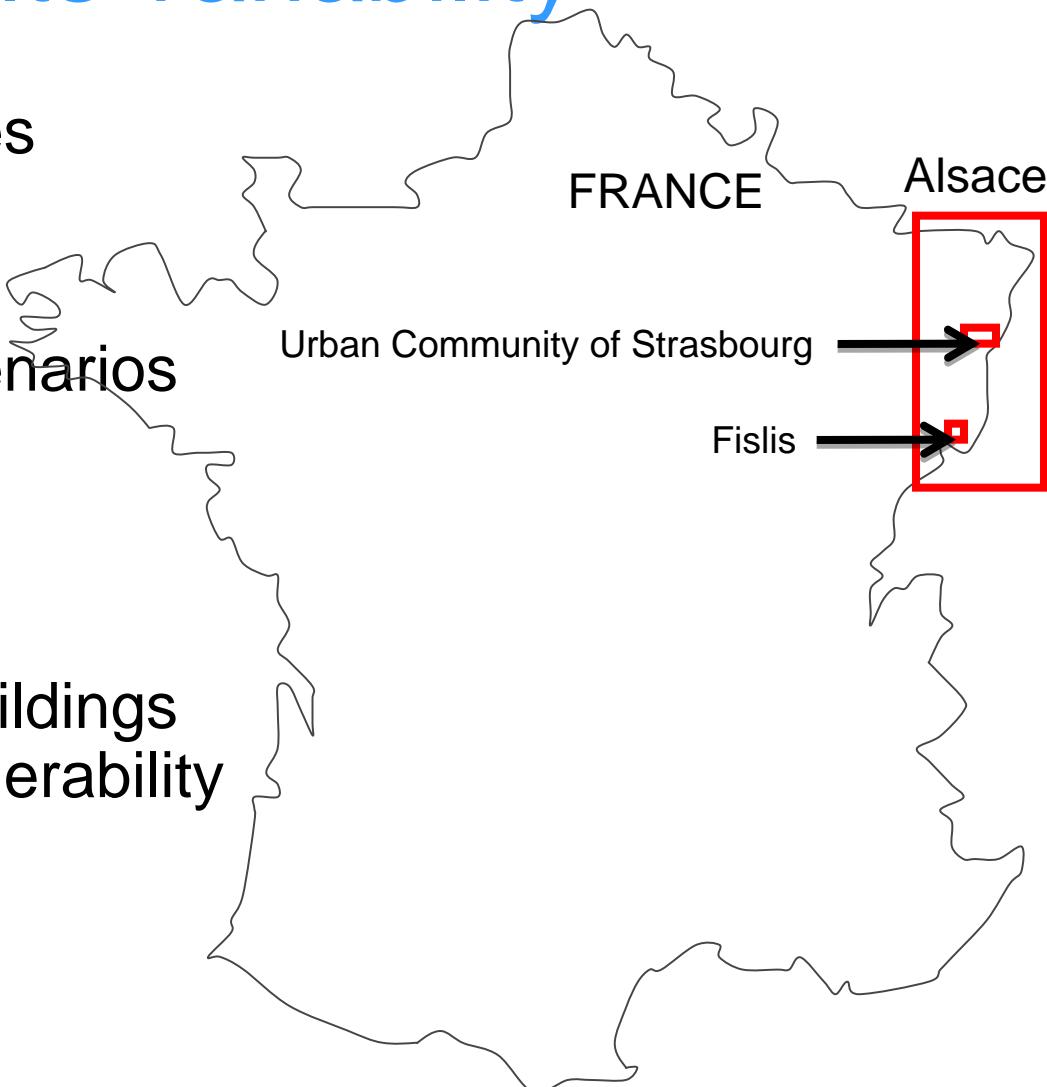


# • F.R.A. GIS extension v.1



# Results variability

- Based on case studies
  - Construction of hydrodynamic scenarios
  - Assessment of buildings and networks vulnerability



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**JULIAN.ELEUTERIO@ENGEES.UNISTRA.FR**

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# ANNEXES

EAERE 2009 presentation

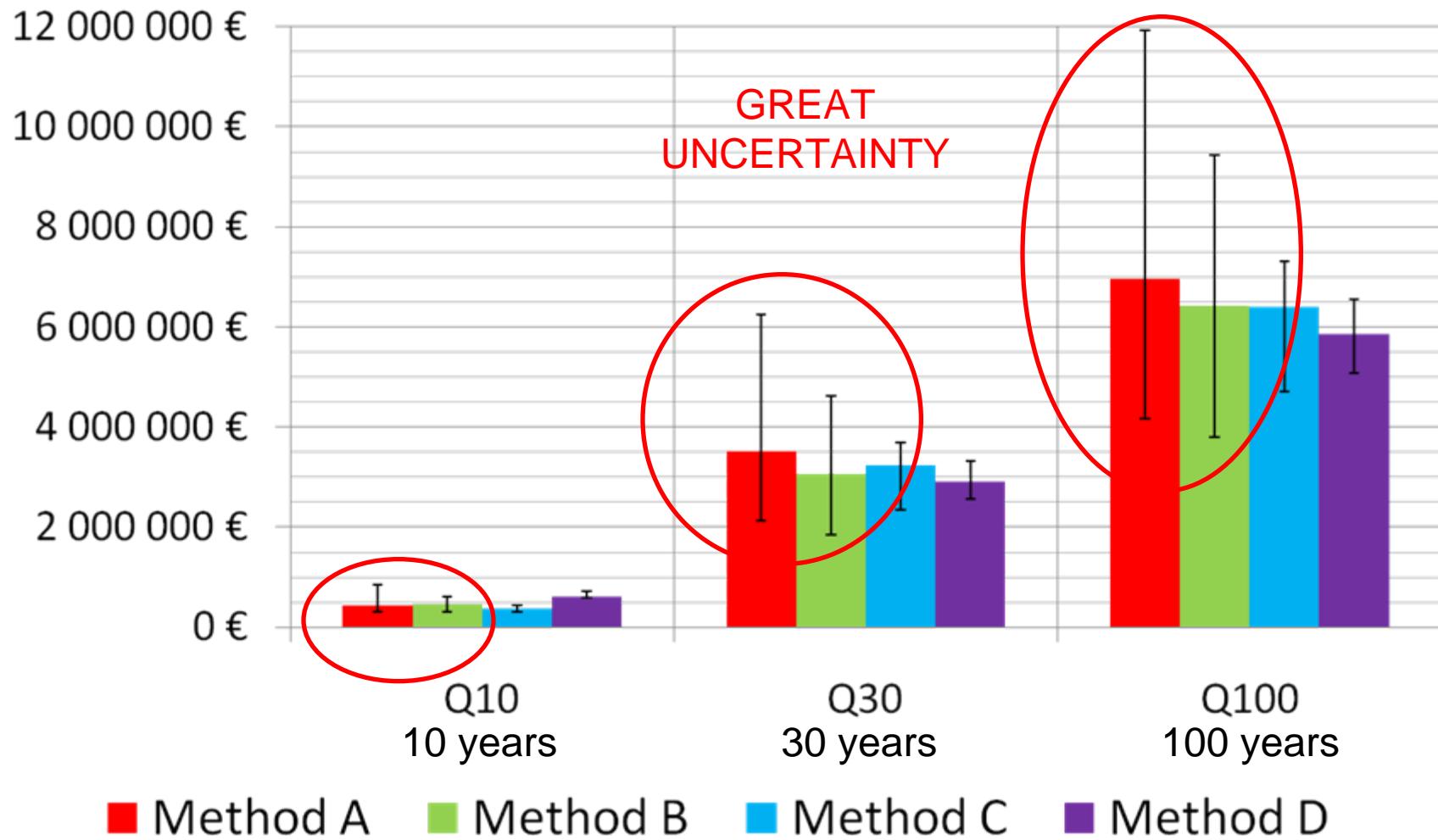
# Damages

- For floods with different return periods:

$$D = (\sum D_{residential}) + (\sum D_{activities}) \times 1,5$$

- $D_{residential}$  = damages to residential buildings
- $D_{activities}$  = damages to commercial, industrial and other buildings

# Results: Potential damages (€)



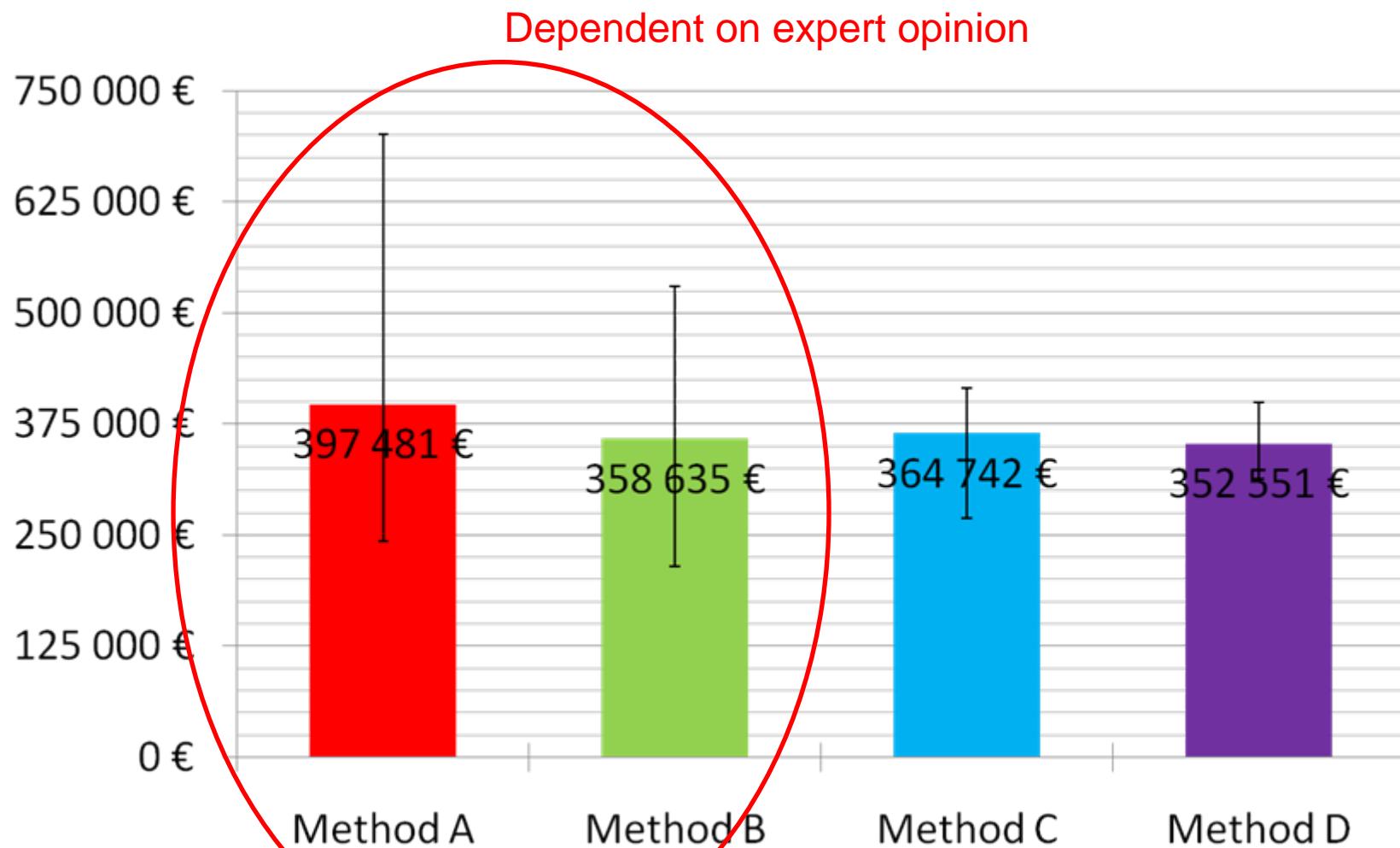
# Damages

- Annual Average Costs (AAC)

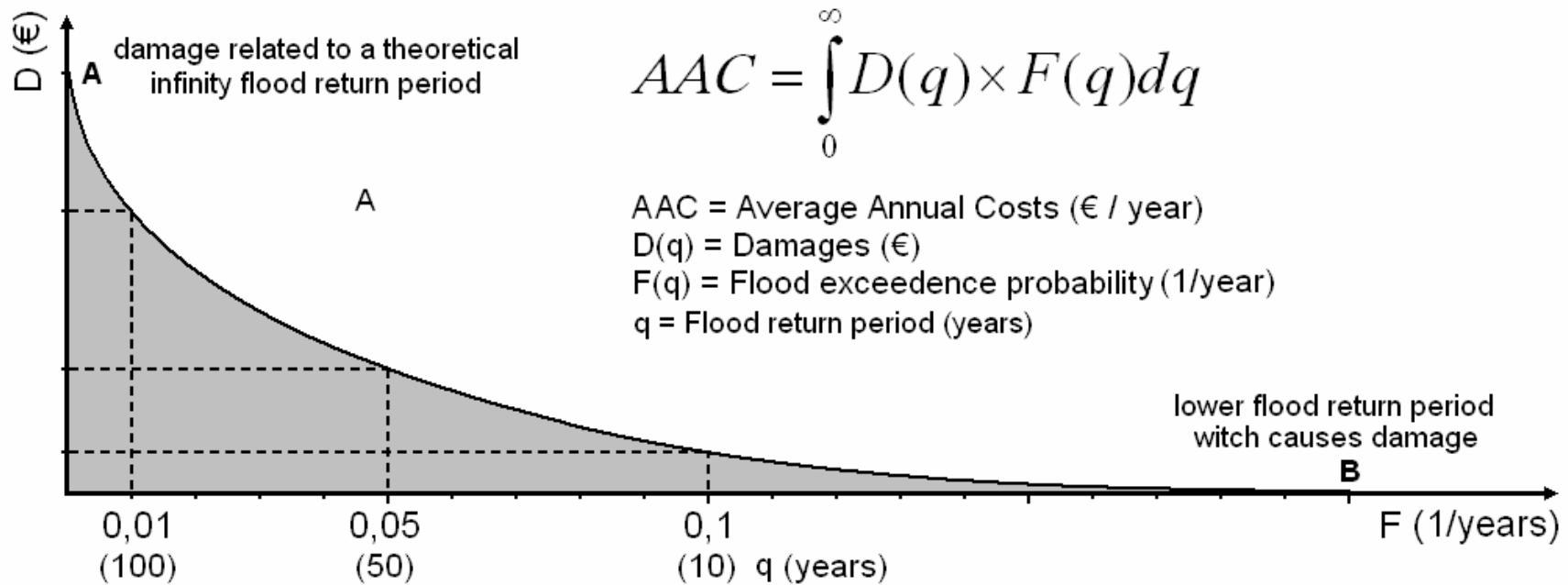
$$AAC = \int_0^{\infty} D(q) \times F(q) dq$$

- $D(q)$  = total damage caused by a flood ( $q$ ) with frequency ( $F$ )
- $F(q)$  = frequency of the flood ( $q$ )

# Results: Average Annual Cost (€/year)



# Average Annual Costs



# Damage-functions

