

# Loss-calculator: a tool for multi-hazard risk assessments

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# Challenge

- All-in-one tool for different hazards and cascading events
- Working with new generations of detailed building-specific exposure model databases
- Loss assessments at different aggregation levels (building, grid, multi-resolution grid)
- All data stored in a database for easy and fast processing
- Open source (AGPL)





# Outputs



Damage



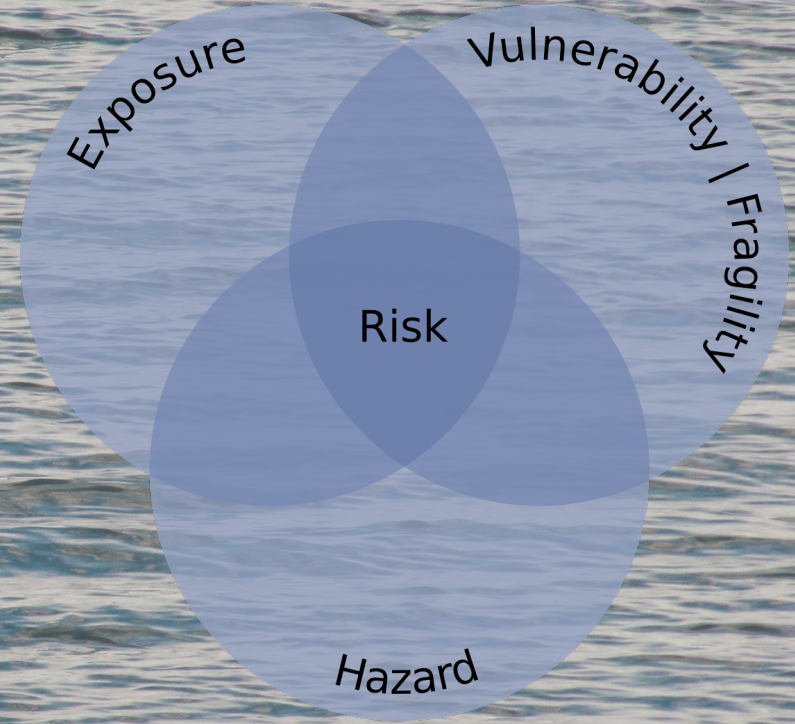
Fatality



Loss



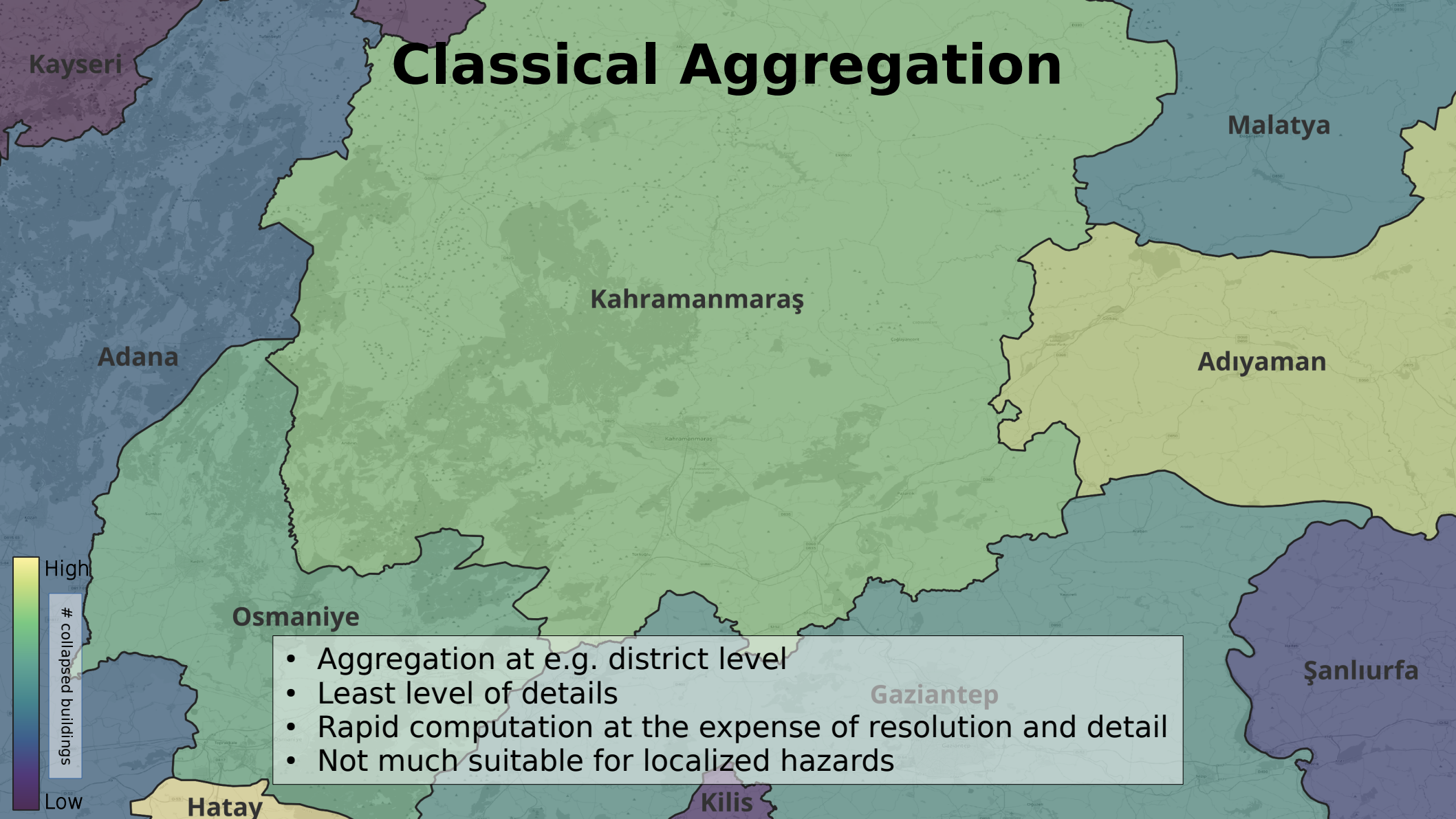
# Inputs



- Intensity measure for different hazards:
  - Earthquakes: ground-shaking
  - Flood: Inundation map
- Vulnerability/Fragility models:
  - Parametric vs. Non-parametric functions
  - Lookup tables
- Exposure models:
  - Various resolutions

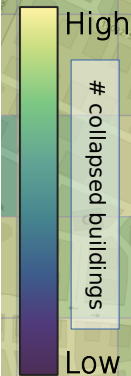


# Classical Aggregation



- Aggregation at e.g. district level
- Least level of details
- Rapid computation at the expense of resolution and detail
- Not much suitable for localized hazards

# Grid-Based



- Regular grid, often 1km x 1km (here 100m x 100 m)
- For enhanced spatial distribution using proxy data such as earth observation datasets



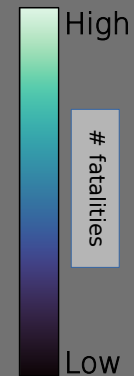
# Building-Based



- New style of high-resolution exposure model on building level
- Precise building locations allow to identify affected buildings (e.g. for flood hazard as shown here)



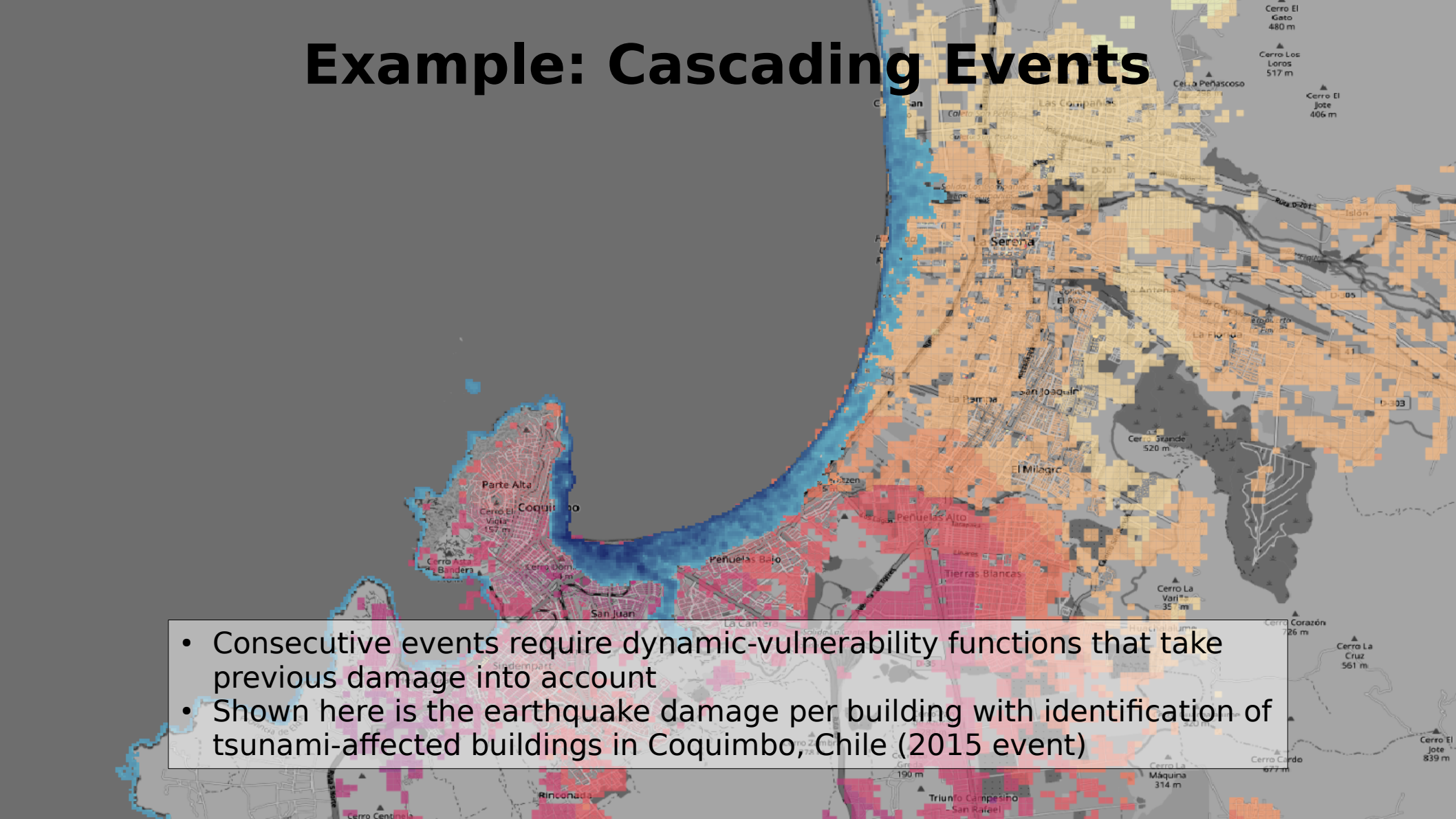
# Multi-Resolution



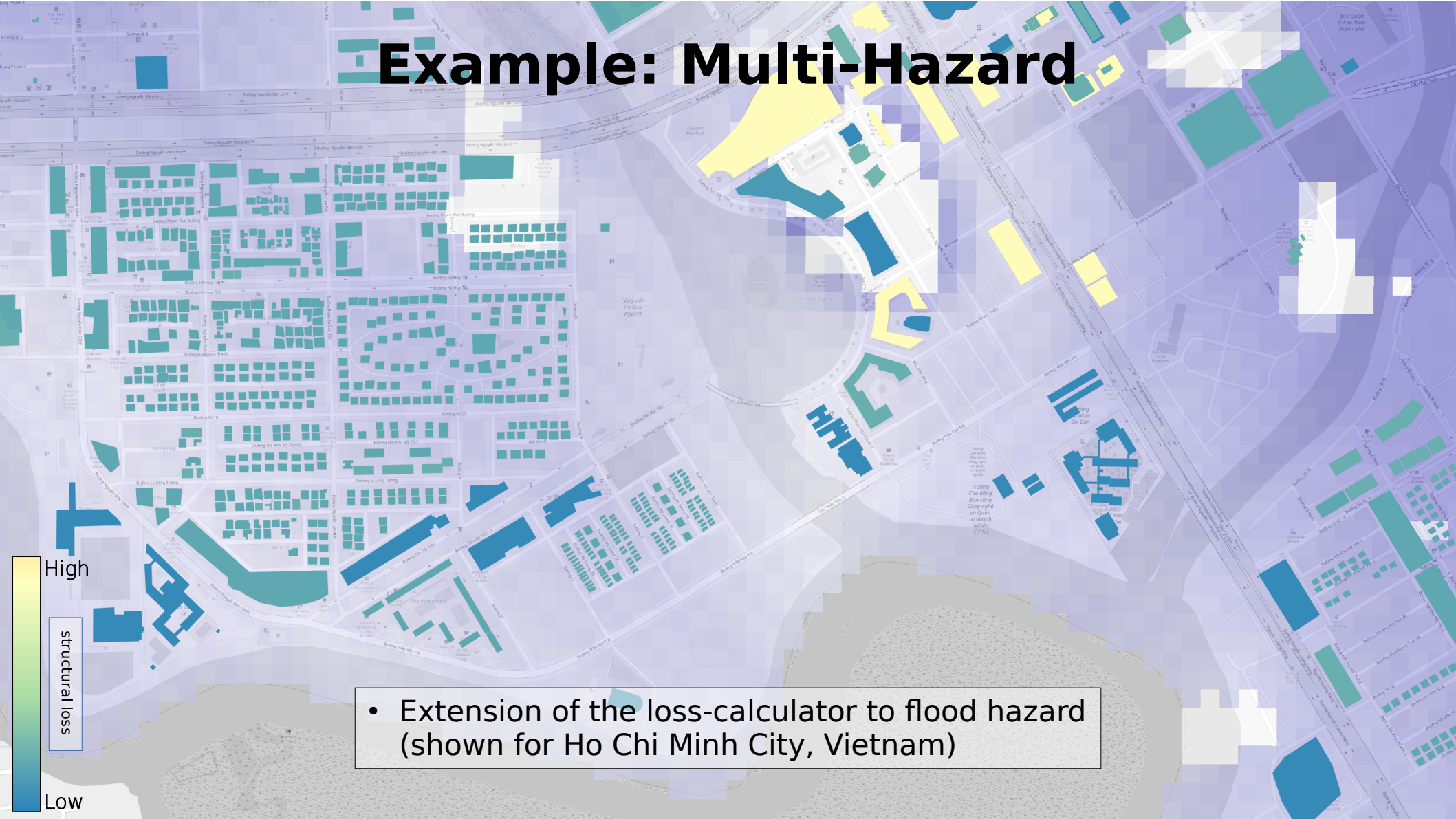
- Aggregation of results to bigger grids for privacy protection
- Multiple resolutions based on data density



# Example: Cascading Events

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- Consecutive events require dynamic-vulnerability functions that take previous damage into account
  - Shown here is the earthquake damage per building with identification of tsunami-affected buildings in Coquimbo, Chile (2015 event)

# Example: Multi-Hazard







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Loss-calculator



<https://git.gfz-potsdam.de/dynamicexposure/globaldynamicexposure/loss-calculator>

#### Summary on the loss-calculator:

- All-in-one tool for different hazards and cascading events
- Rapid loss assessment
- Working with new generations of detailed building-specific exposure model databases
- Loss assessments at different aggregation levels (building, grid, multi-resolution grid)
- Plot-friendly (various pre-defined database view for all kinds of inputs and outputs)
- Fully open source (AGPL)