



RISC-KIT
RESILIENCE-INCREASING
STRATEGIES FOR COASTS - TOOLKIT
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RISC-KIT: Resilience-Increasing Strategies for Coasts – toolKIT

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Coastal flood risks in Europe

- Recent and historic low-frequency, high-impact events demonstrated coastal risk (Xynthia, 2010; Xaver/St. Nicholas storm, 2013; St. Agatha storm in the Adriatic, 2014; Mediterranean flash floods 2014, 2015)



La Faute sur Mer,
FR



Sandy,
NY



Cinque Terre,
IT



1953 Flood,
NL, BE, UK

Coastal flood risk in Europe and beyond

- Coastal zones will experience increased risk of flooding, erosion and damage due to the combination of
 - **Increased hazards** due to climate change
 - **Ongoing coastal development**
 - Without adaptation, flood damage on European coasts increase up to **11 billion Euros per year** (IPCC, AR 2014)
- Coastal authorities need to
 - **Assess risk** in coastal regions
 - Develop a **Disaster Risk Reduction (DRR) strategy**



IPCC 2014: three key risks of climate change for Europe

Europe				
Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Increased economic losses and people affected by flooding in river basins and coasts, driven by increasing urbanization, increasing sea levels, coastal erosion, and peak river discharges (<i>high confidence</i>) [23.2-3, 23.7] FLOOD	Adaptation can prevent most of the projected damages (<i>high confidence</i>). <ul style="list-style-type: none"> • Significant experience in hard flood-protection technologies and increasing experience with restoring wetlands • High costs for increasing flood protection • Potential barriers to implementation: demand for land in Europe and environmental and landscape concerns 			Very low Medium Very high
			Present	
			Near-term (2030-2040)	
			Long-term (2100-2100) 2°C 4°C	

High confidence in likelihood of increased hazards and consequences = increased risk

- High confidence in effectiveness of adaptation measures
- Obstacles:
 - Cost (3.5 billion Euros per year by 2100)
 - Land use/ environment
 - Regional differences

Upshot: Risk can be reduced through adaptation measures.



RISC-KIT questions:

- Where on the coast are **hotspot** areas of higher risk?
- What is the impact of **future** coastal hazard scenarios?
- What are effective **Disaster Risk Reduction (DRR)** measures at a hotspot?
- How can DRR measures **best be implemented**?

And

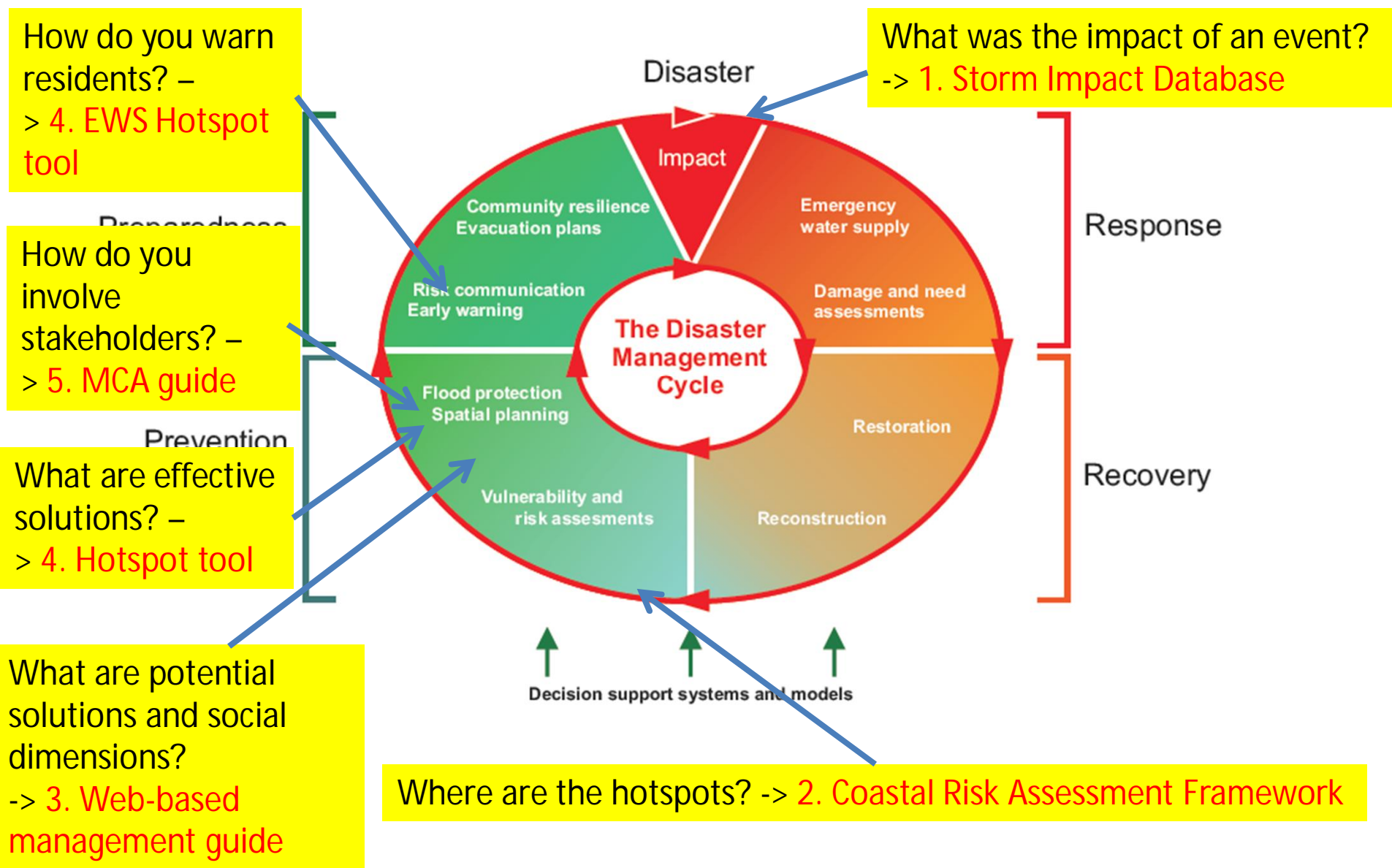
- What are the **socio-cultural and historic** aspects of DRR measures?
- Can a **generic approach** be applied across Europe, in data-rich and data-starved environments?

RISC-KIT: develop and apply tools

- 18 partners of different disciplines
- 10 case study sites in Europe
- Local end-user at each case study site



RISC-KIT Tools in the Disaster Management Cycle



The RISC-KIT Toolkit

1. [Storm Impact Database](#) of present and historic socio-economic and physical data.
2. [Coastal Risk Assessment Framework \(CRAF\)](#) to identify - at the regional scale (100's km) - present and future hot spot areas of coastal risk
3. Web-based [Management Guide](#) offering innovative, cost-effective, ecosystem-based DRR measures;
4. Quantitative, high-resolution [Hotspot Tool](#) (EWS/DSS) to evaluate the effectiveness of DRR measures in hot spots
5. [MCA Guide](#) to assess alternative DRR measures with stakeholders



1. Storm impact database

//riskit.cloudapp.net/riskit/#/map

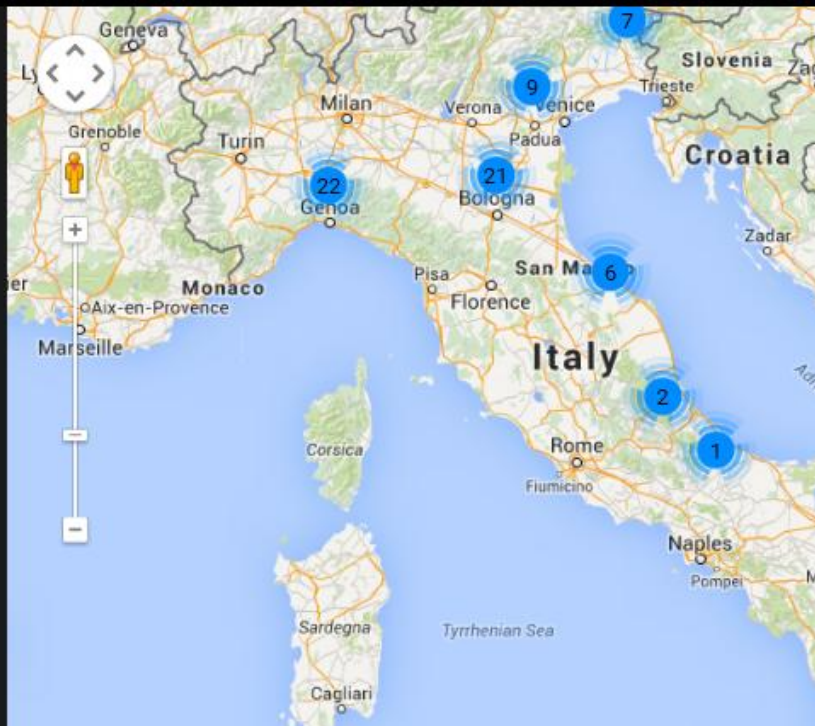


RisKit tool

Storm Impact Database for the Case Study Sites

The database contains forcing factors, observations and hindcast data, observed impacts and quantitative and qualitative socio-economic, cultural and environmental data. Links are provided on the database website to the latest IPCC climate scenarios downloadable from the IPCC website. Sources of data stored in the database include data obtained in Task 1.2 of the RISC-KIT project, deliverables from the FP7 MICORE project, scientific publications, data contained in the Marine Knowledge Gate and media analysis performed by the case study partners. To ensure its long-term continuity, the database has been redesigned with common data fields to those of the EU Floods Directive as well as the more general ISDR-GAR and CRED databases, meaning that there is potential for these database efforts to be merged.

MAP

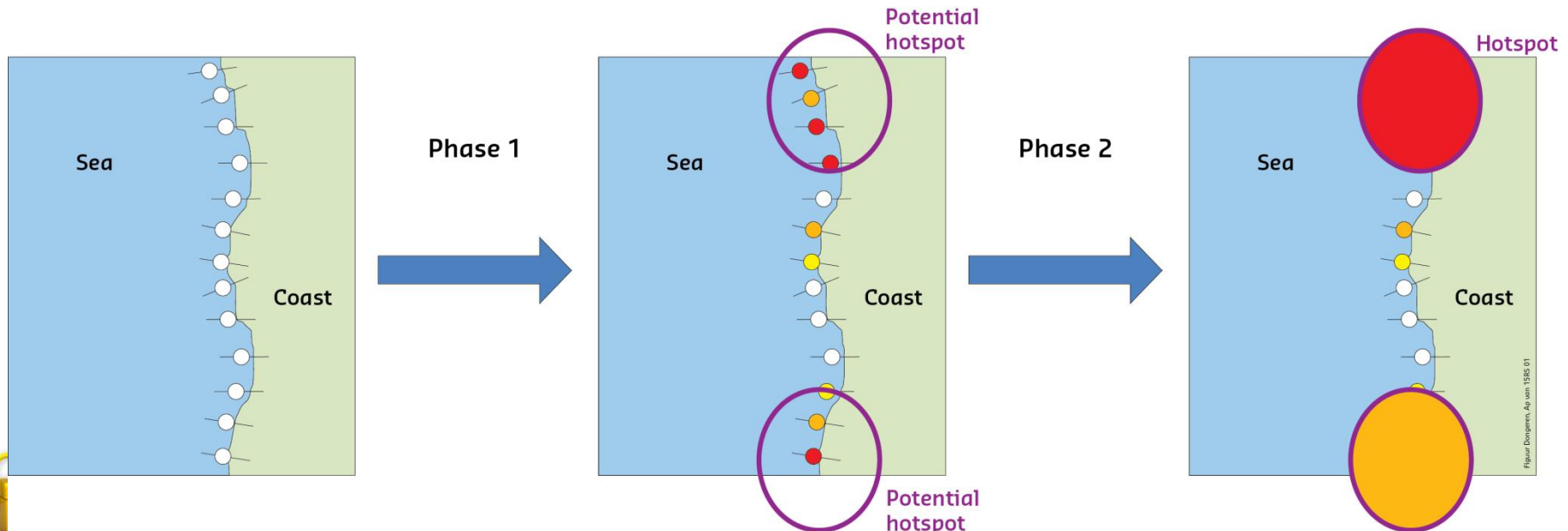


Database at riskit.cloudapp.net/riskit/#/

2. Coastal Risk Assessment Framework

Identify - at the regional scale (100's km) - present and future hot spot areas of coastal risk

- CRAF1: phase 1 to identify potential hotspots using empirical (simple) rules
- CRAF2: phase 2 to select hotspot using advanced tools
- Results stored in a web-viewer.



3 - Web-based management guide

Background information for coastal management approaches at all the study sites on:

Coastal measures, governance, people & stories

RISC-KIT

COASTAL ELEMENTS & MEASURES

GOVERNANCE

PEOPLE & STORIES

Operating in maintenance mode.



ESTUARINE FLOOD
COASTAL FLOODS



CHANNEL, COASTAL



LIMITED INTERVEN

Grey infrastructure

The primary function of
inundation by the sea are
not intended to preserve
or any adjoining, unprote

These structures have a
sloping sides to reduce
overtopping by flood wa

The municipality of Timmendorfer Strand is a German coastal municipality and seaside resort. It is located on the Baltic Sea coast of Schleswig-Holstein. The municipality has 12,000 inhabitants.



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TOURISTS COME FOR THE SEA

Local Resident, Germany

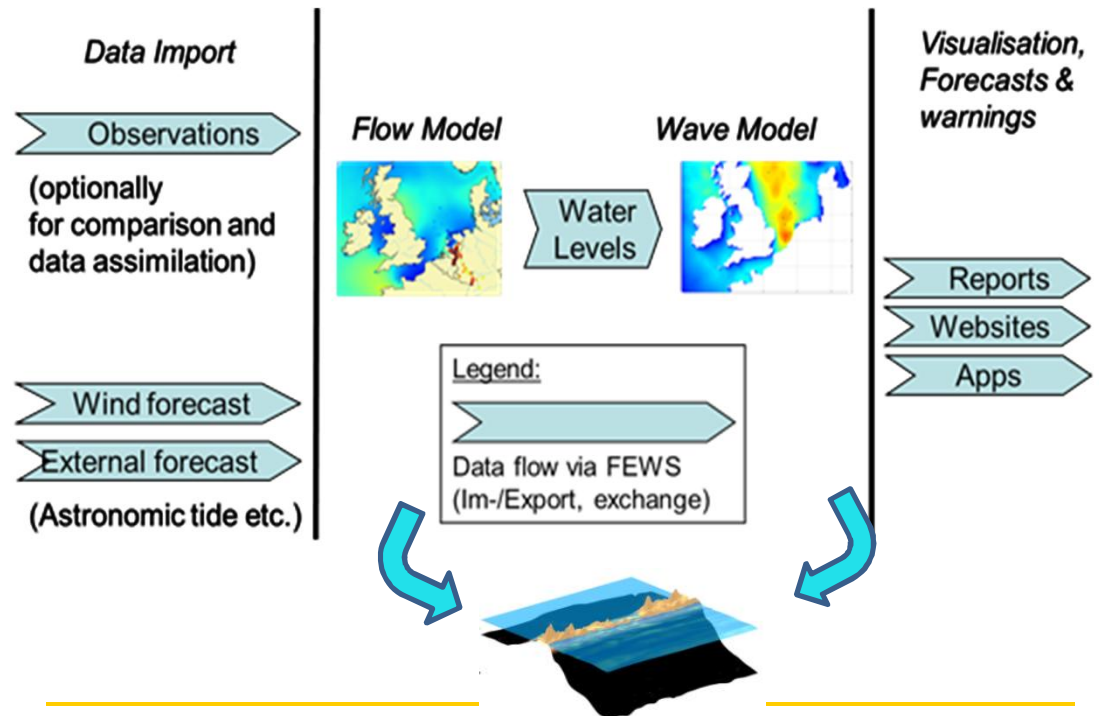
„The Baltic Sea, which we absolutely need to keep tourism here alive, is deeply tied to our consciousness. This is a very crafty and lively town, embossed by economy, especially tourism. But still the image of nature plays a very important role. Like, if there was no beach, then there wouldn't be any tourism anymore.“

An analysis of various social and economic parameters was performed. With these data and scientific principles, an innovative method for active public participation (the so-called sensitivity analysis) was applied. The results of this participatory process were used as a basis for a design competition among selected consultants. These three steps (valuation, sensitivity analysis and the competition of ideas) were used for the first time in a participatory ICZM-process.

4. Hotspot (EWS/DSS) tool

Quantitative, high-resolution Hotspot Tool to be used

- Ex-ante: evaluate the effectiveness of DRR measures in hot spots (with a scale of 10's of kms) ex-ante
- Real-time: as part of Early Warning System
- Based on FEWS system
- Originally developed for river floods
- Now for seas and coasts.



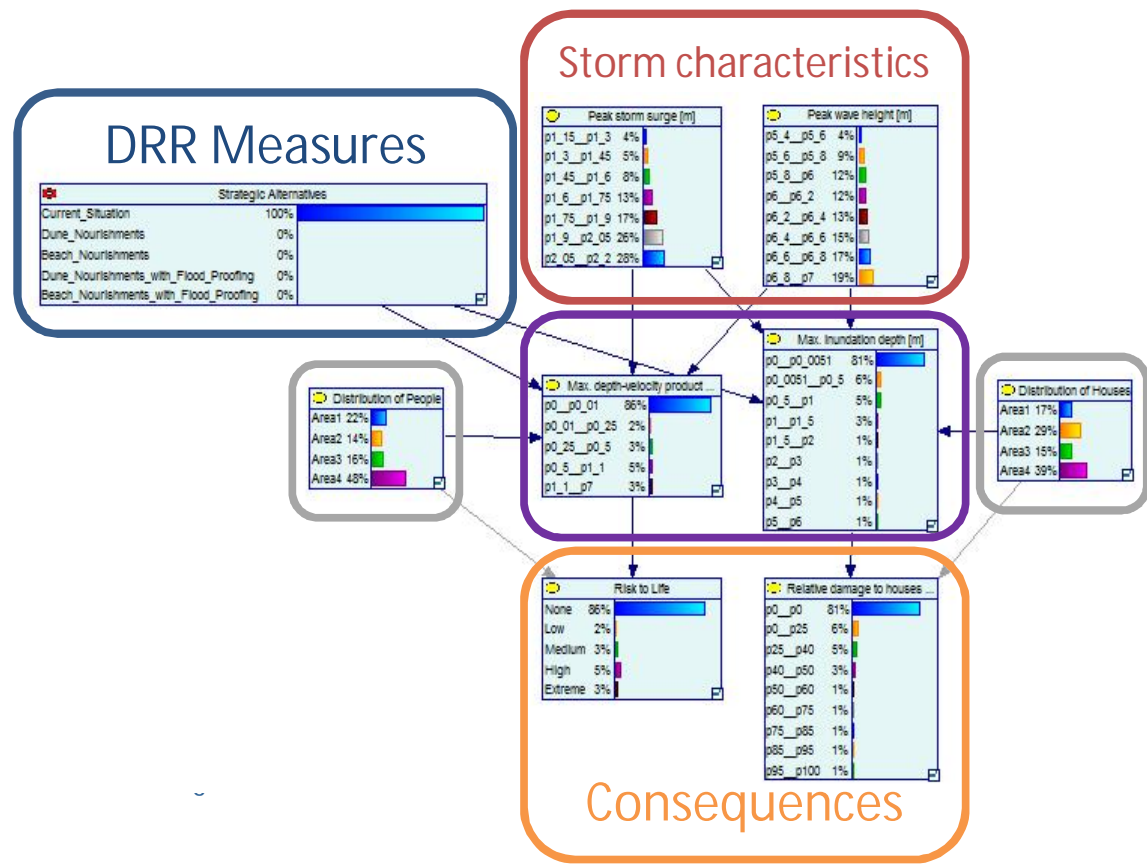
4. Ex-ante hotspot tool

• During planning/assessment phase 100s of model simulations can be run, connecting

- Hydro-meteo forcing (storm characteristics)
- Geo-morphologic setting
- Land use
- DRR measures
- Consequences

• Result are cast in **Bayesian Network**

• Interactive and efficient communication tool



Example: Praia de Faro, PT

Hydro-meteo forcing

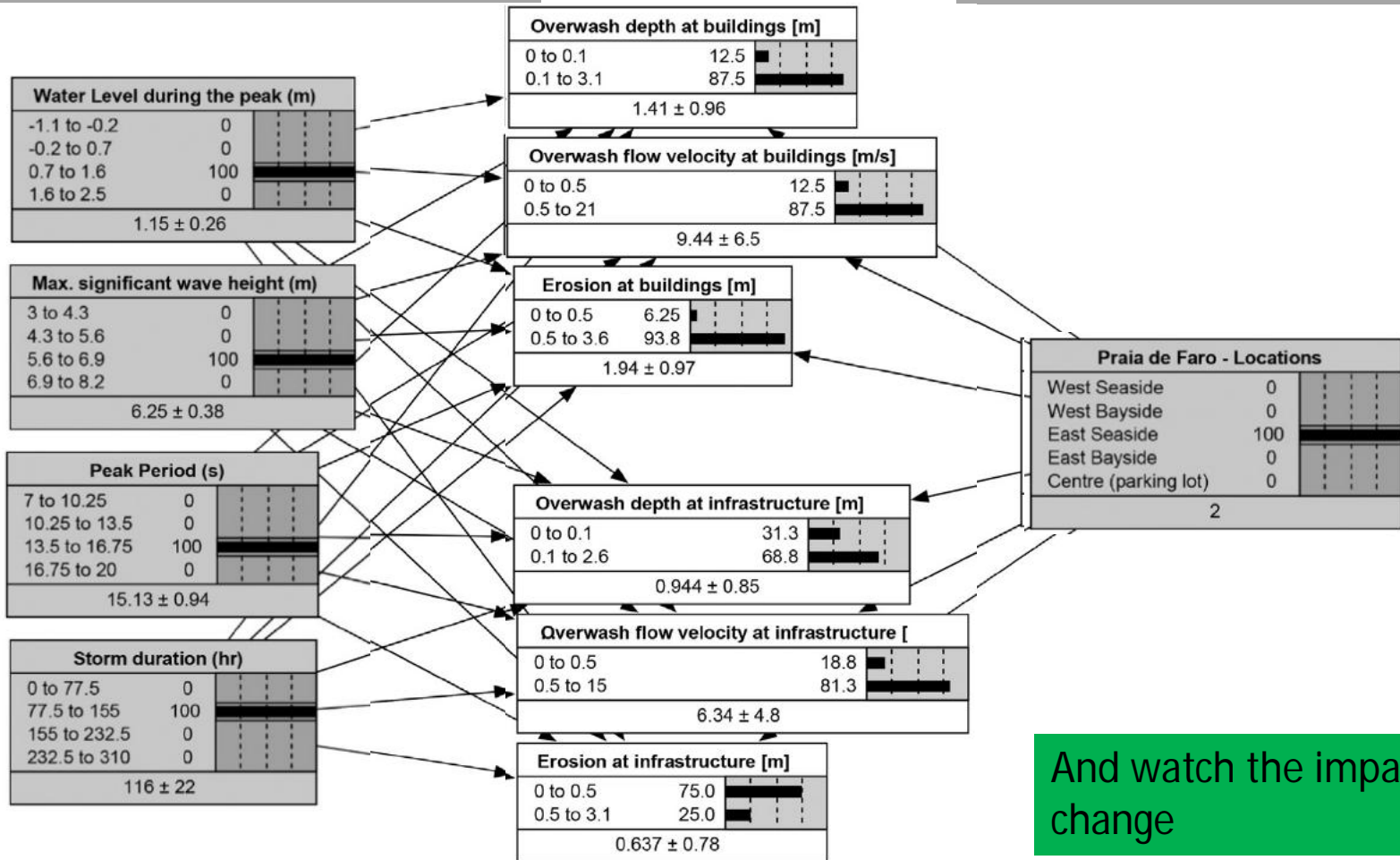
onshore impact

site characteristics



Constrain forcing to a particular storm

Consider one particular location



And watch the impacts change

5. Multi-Criteria Analysis Guide

- MCA helps stakeholders evaluate the effectiveness combinations of DRR measures and prioritize options.
- MCA sessions held in all case study sites
- Update of Guide available to other parties



Algarve, PT



Varna, BG



Liguria, IT

Synopsis:

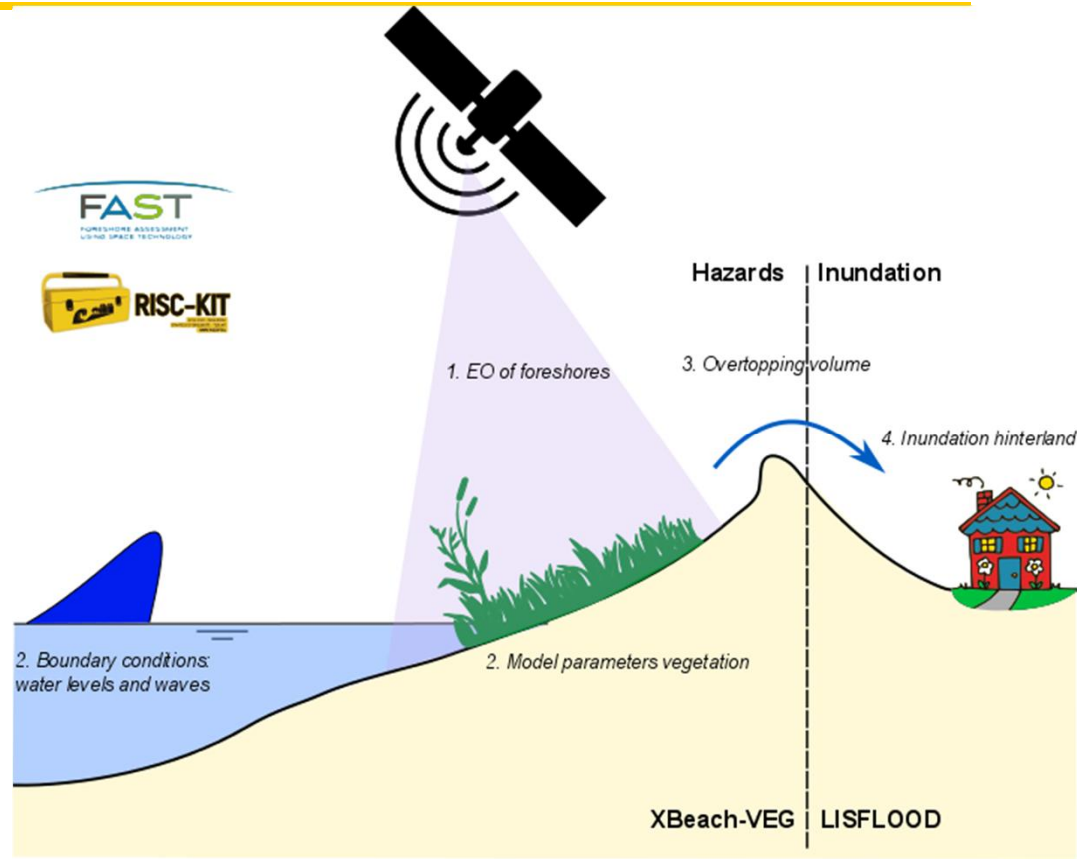
- RISC-KIT tool kit contains
 - **Coastal risk database** of current and historic data
 - **CRAF**: Regional-scale assessment of coastal risks
 - **Web-based management guide** of potential DRR measures and management practices
 - Evaluation of DRR measures and Early Warning with **Hotspot Tool**
 - **Multi Criteria Analysis** guide to evaluate solutions
- All software is free-ware and/or open-source
- See www.risckit.eu for details



RISC-KIT and EU-FAST course:

Learn about the combined use of Earth Observations to derive information about vegetation and XBeach to assess flood risk on coasts.

Delft, 1 November 2016



<http://www.dsd-int.nl/2016/courses/xbeach-earthobservation-advanced-assessment-of-nbfd/>, for details. Sign up via <http://www.dsd-int.nl/2016/>, only limited spaces left.

