WP5 - Early Warning System Phylosophy

Piet Haerens – WP5 leader

WP5 – Early warning system

Outline of the presentation

- Introduction
- Existing warning systems
- EWS Generic concept
- The use of Frame of Reference & SII's
- Developments within MICORE
- Future plans
- Conclusions

WP5 – Early warning system

Introduction

"The primary goal of the MICORE project is to develop and demonstrate on-line tools for reliable predictions of the morphological impact of storm events in support of civil protection mitigation strategies."

"Morphological models will be linked to wave and surge forecasting models to demonstrate a real-time warning system and to implement its usage within civil protection agencies."

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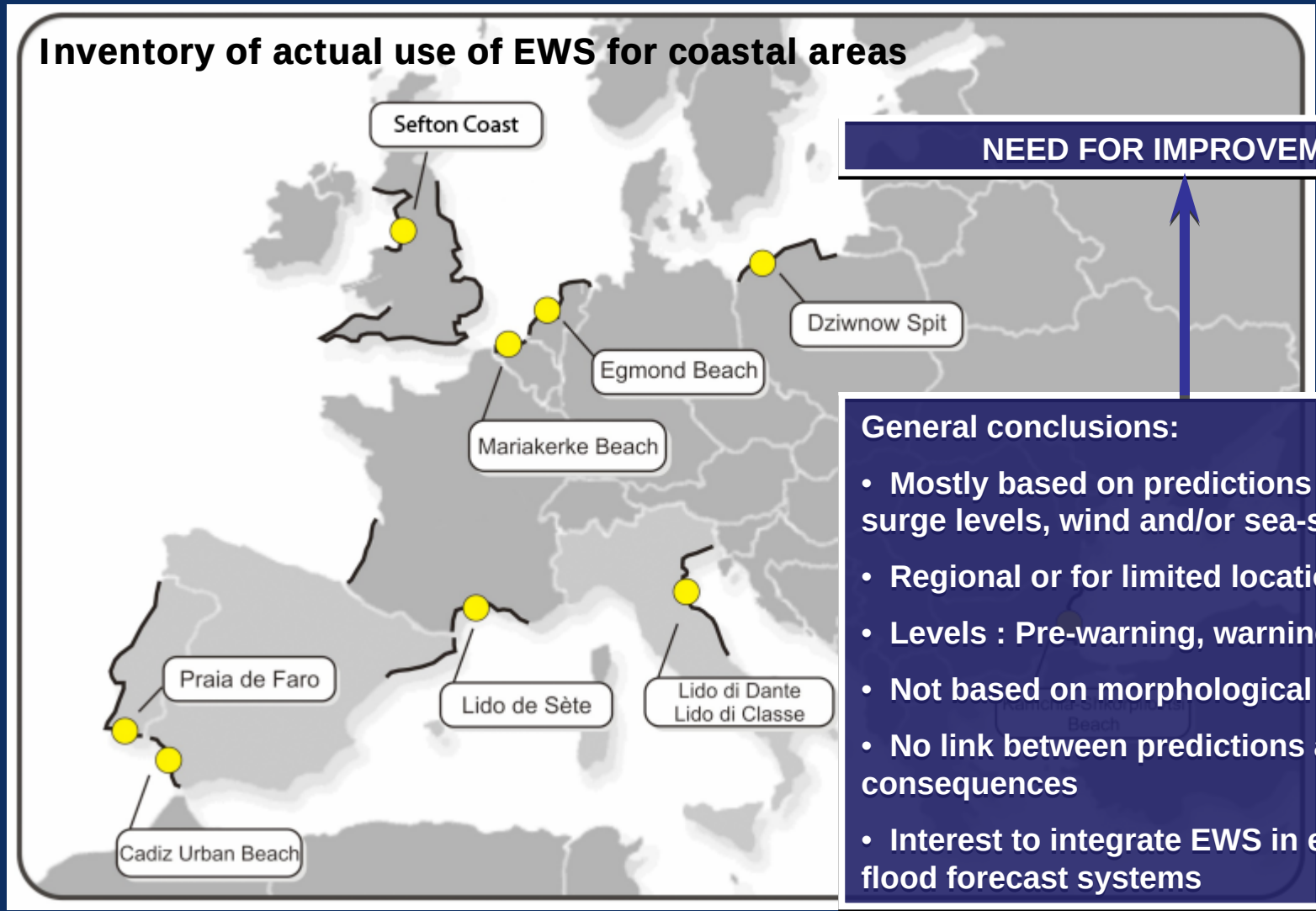
Existing EWS for coastal areas



NEED FOR IMPROVEMENT

General conclusions:

- **Mostly based on predictions of storm surge levels, wind and/or sea-state (Hs)**
- **Regional or for limited locations**
- **Levels : Pre-warning, warning and alarm**
- **Not based on morphological predictions**
- **No link between predictions and consequences**
- **Interest to integrate EWS in existing flood forecast systems**

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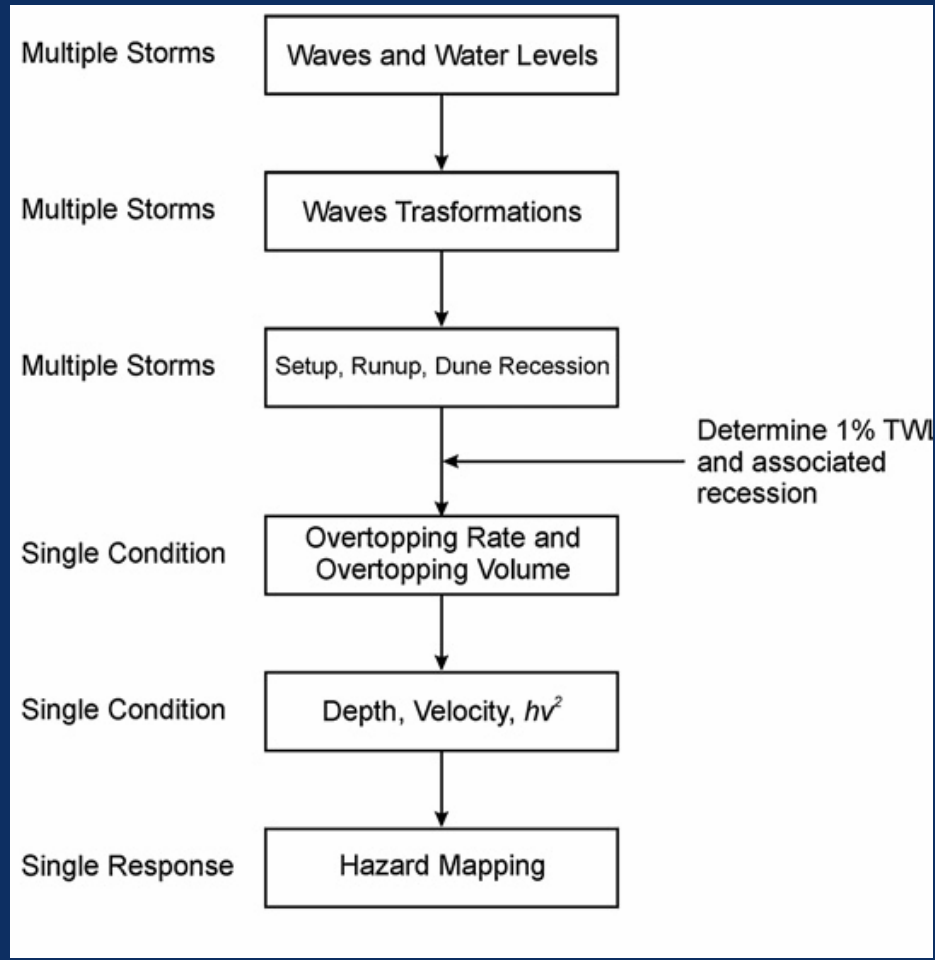
Generic Concept

- Exist for flood calculations:
  - e.g. FEMA
  - Reaction of beach morphology on storm events not fully included
  - Only valid for extreme events
  - Improvements needed



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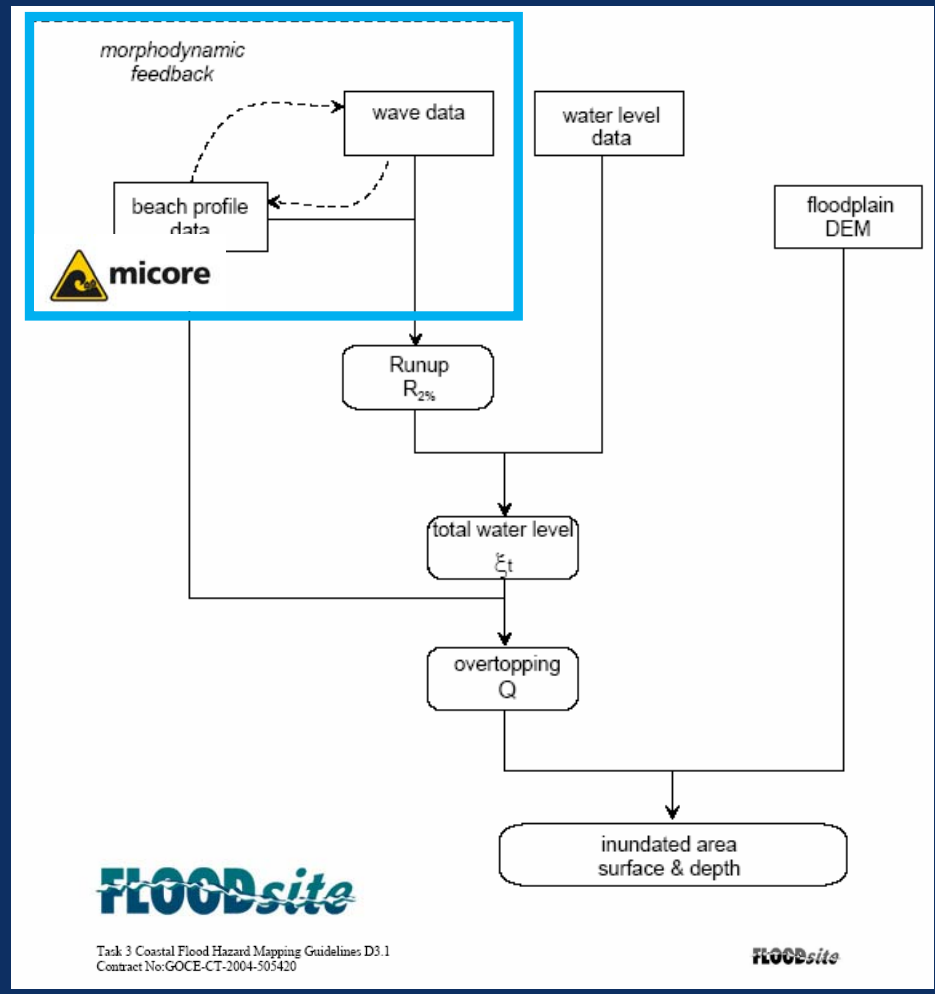
Generic Concept

- Developed starting from Floodsite outcome:
  - Importance of morphological feedback loop
  - Run-up
  - Overtopping
  - Input for simulation of coastal flooding
  - Improvements needed



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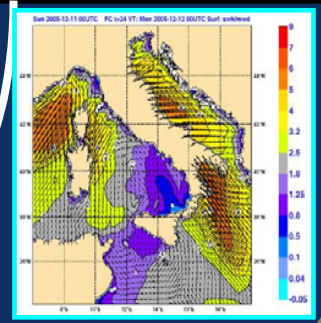
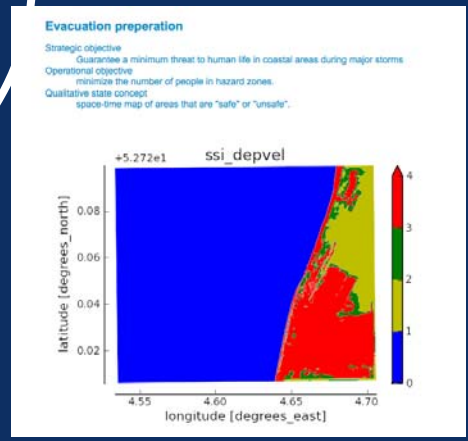
Generic Concept

1 Observation module

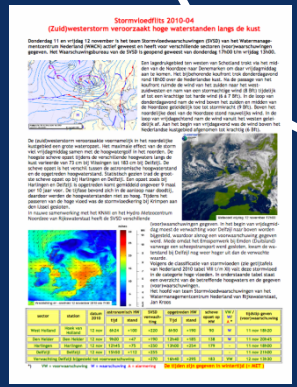
2 Forecast module



3 Decision Support module



4 Warning Module



5 Visualisation Module

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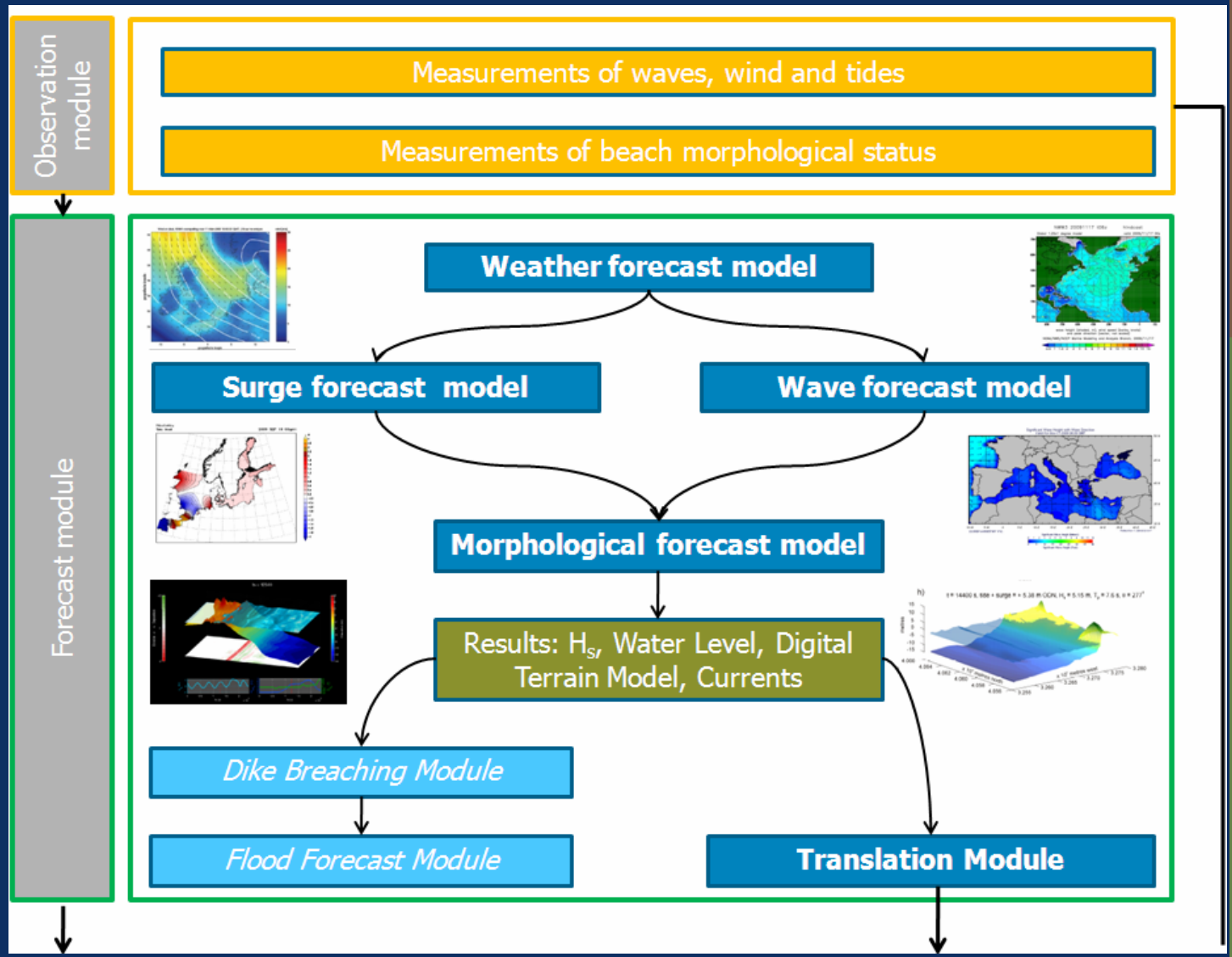
- Details:



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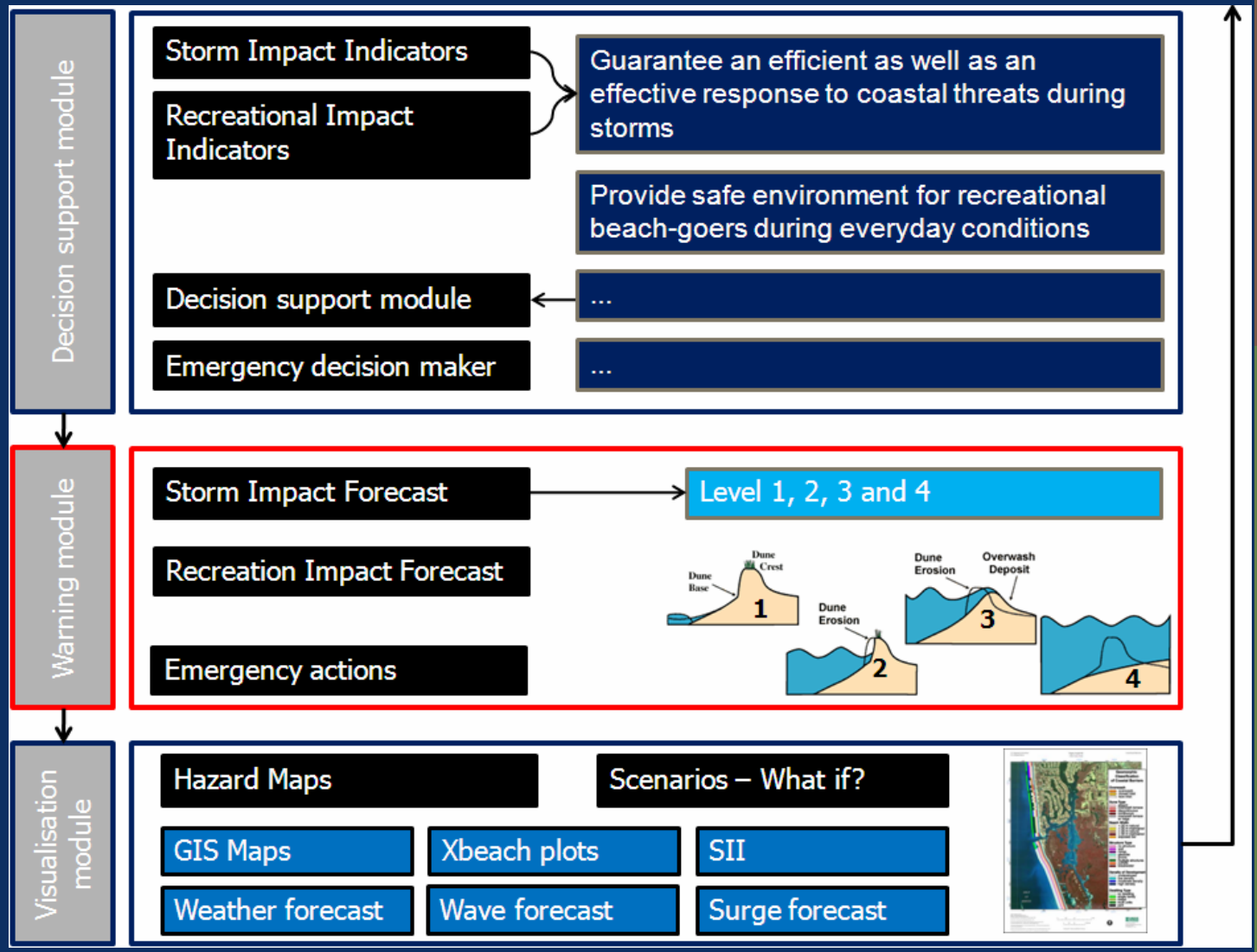
- Details:

Generic Concept



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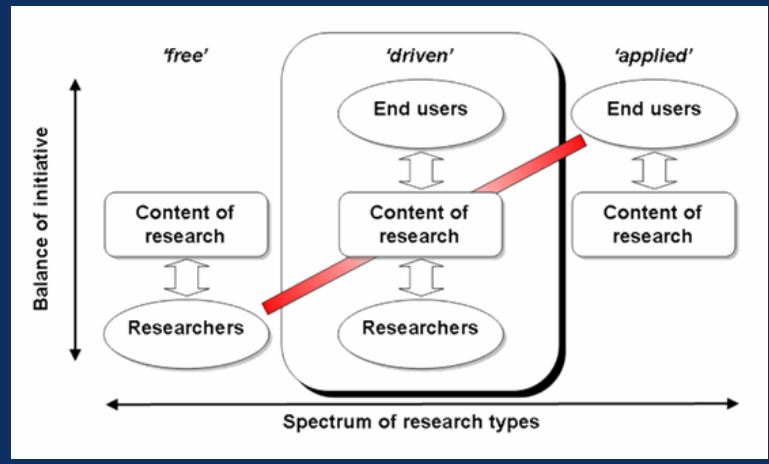
Indicator based Early Warning system

- From physical parameter to management plans:
  - Actually warnings are based on physical parameters that not necessary are linked with real actions! E.g. predictions of wave heights, water levels, wind,…
  - MICORE = a research project with a clear orientation to practical application
  - A different way of working than academic ‘free’ research was needed



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The use of SII's

- Previous EU project experience shown that producing practical & relevant results requires:
  - A properly focus on research activities (objectives, criteria, actions) ...
  - A carefully balance between research efforts & end-user needs ...
- The FoR approach has proven its worth in projects similar to MICORE

Recommend for research projects with end-users needs

The CoastView Project

Developing coastal video monitoring systems in support of coastal zone management

Last update 31 March 2005

- The Project
- Coastal Video Systems
- Coastal Management
- Coastal State Indicators
- Field Sites
- Data Archive
- Project Output
- Gallery
- Links
- Contacts
- Deliverables
- Meetings
- Timetable
- Document Library
- Work Packages
- Home

Supported by the EC Under Framework V Research & Technical Development (RTD Action).

The CoastView Project aims to:

- Simplify the task of the coastal manager by developing simple video-derived parameters (Coastal State Indicators or CSIs) that are directly related to management issues, and are informative about the current state and evolutionary trends the environment. These Coastal State Indicators

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Morphological Impacts and Coastal Risks Induced by Extreme Storm Events

» home

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- project overview
- consortium
- management structure
- deliverables & public documents
- events
- media centre
- useful links
- glossary
- contacts

The MICORE Project

Both the EU and The United Nations are now taking seriously the predicted climate change scenarios of the IPCC. Of particular relevance to Integrated Coastal Zone Management is the predicted increase in the intensity and frequency of powerful storm events characterised by larger peak wind speeds and consequently larger waves.

photo: Marcel Bakker, Deltares

The MICORE project will provide the knowledge necessary to assess the present day risks and to study the economic and social impact of future severe storm events. The project will also develop operational predictive tools in support of emergency response to storm events. Together, these elements will have an important strategic impact on the safety of the people living in coastal areas. The project will also investigate with stakeholders and end-users the possibilities of producing EU-wide guidelines for a viable and reliable risk mitigation strategy.

photo: Marcel Bakker, Deltares

MICORE will produce an up-to-date data base for each partner country that will include: an historical review of storms; an inventory of data related to the forcing signals; quantification of the morphological response of coastal

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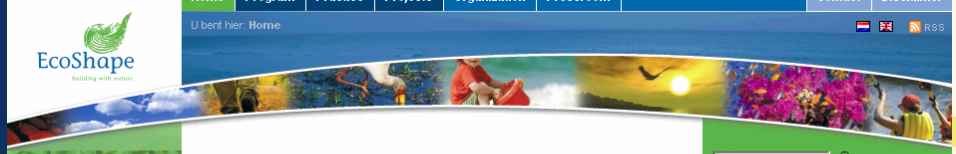

Welkom op de website van Building with Nature

'Building with Nature' (ecodynamisch ontwikkelen en ontwerpen) biedt ons de kans om te bouwen, gebruik makend van de dynamiek van het natuurlijke systeem. Daarbij maken we gebruik van de krachten in de natuur om waterbouwkundige infrastructuur tot stand te brengen en tegelijkertijd kansen te scheppen voor die natuur.

Naarmate we de dynamiek van de natuur beter begrijpen, kunnen wij onze mogelijkheden vergroten om de natuur in het ontwikkel- en ontwerpproces te integreren. Met behulp van nieuwe inzichten en kennis wordt de natuur dan zelf een drijvende kracht achter de duurzame ontwikkeling van waterbouwkundige infrastructuur.

Subsidie

EcoShape ontvangt co-financiering van EFRO, (Europees Fonds voor Regionale Ontwikkeling), de Gemeente Dordrecht, het Ministerie van Verkeer & Waterstaat en Rijkswaterstaat

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CONSCIENCE

Concepts and Science for Coastal Erosion Management

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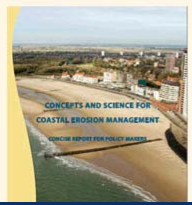
REPORT

'Concepts and Science for Coastal Erosion Management. Concise report for policy makers'. (M. Marchand, Ed., Deltares, Delft. 2010)



CONCEPTS AND SCIENCE

An operational support structure for sustainable coastal erosion management

The EU-FP6 CONSCIENCE project was launched in 2007 with a view to enhancing the implementation of a scientifically based sustainable coastal erosion management in Europe. It has been testing scientific concepts and tools in six pilot sites around Europe.

It has shown that the sediment balance approach can be applied for almost any coastal type, but that this approach to achieve sustainable coastline management is often hampered by lack of a well defined and institutionalised government policy for Integrated Coastal Zone Management (ICZM).

Learn more about it ...

- Project
- Guidelines for sustainable erosion management
- Documents online

EVENTS

Final CONSCIENCE Event - APRIL 2010

The **final public event of the CONSCIENCE project**, including the participation of local study sites end-users has taken place at the occasion of the International Conference on Coastal Conservation & Management in the Atlantic & Mediterranean, http://icccm.dcea.fct.unl.pt/, 11th -17th April 2010, in Cascais, Portugal.

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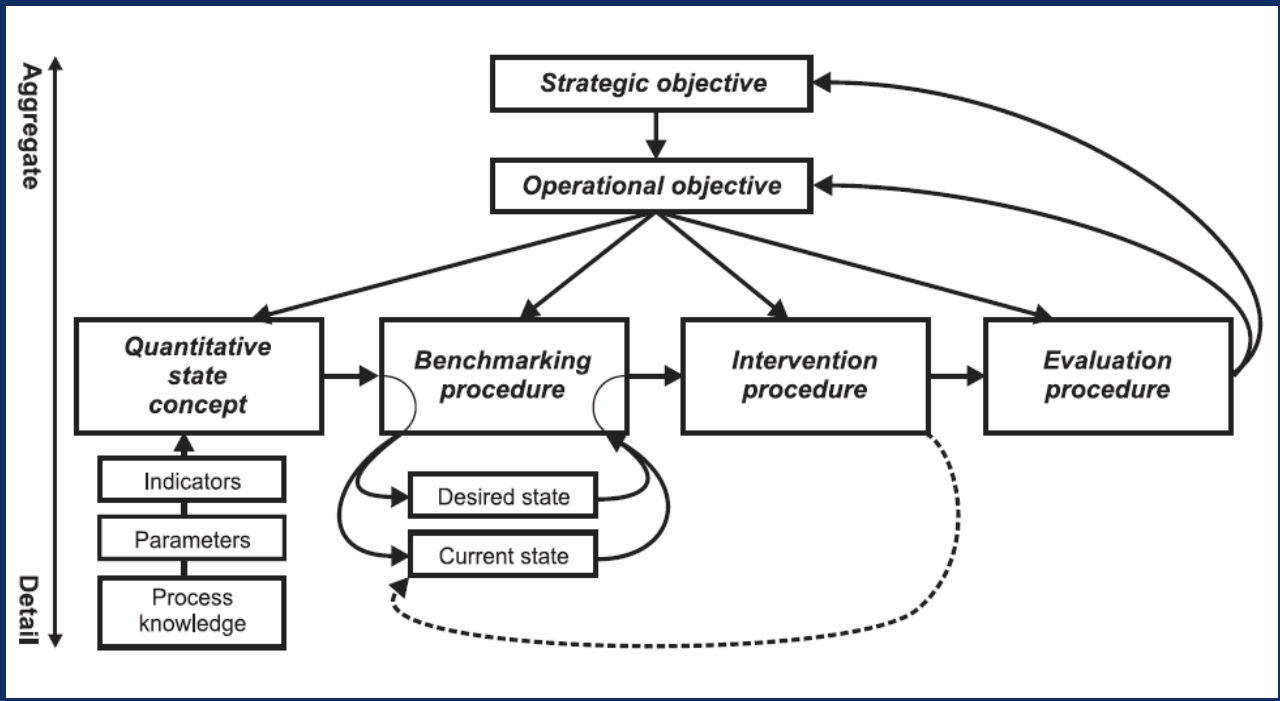
The use of SII's

- FoR way of working was applied



FoR makes the link between science & decision makers or end-users

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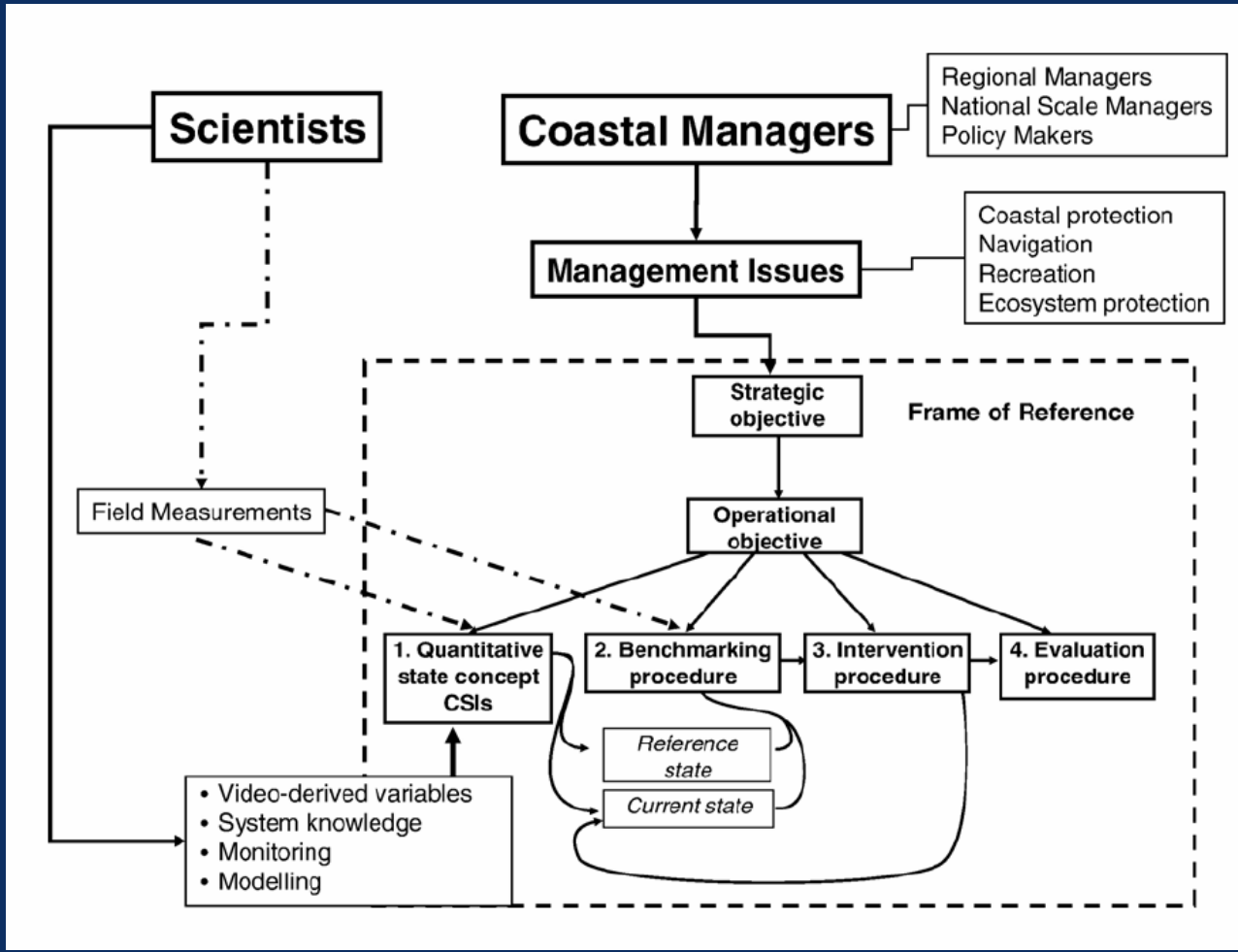
The use of SII's

- FoR and SII's part of a larger process:



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The use of SII's

- Example of a SII:
  - Dune stability

Strategic Objective	Operational Objective	QSC	Benchmarking Desired State	Benchmarking Current State	Intervention Procedure	Evaluation Procedure
Maintain stability of dunes	Maintain a minimum dune volume	Map indicating current state of dune	Safe is defined when DSF > 75%, medium risk when 20% < DSF < 75% and high risk	Online prediction of DSF	Warning to park and local authorities	After an alert, undertake visual and/or quantitative surveys

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Developments within MICORE

- Improve the observation module (Argus, video camera imaging,…)
- Set up of the complete model train:
  - Link existing forecast modules to provide input for Morphological module (XBeach)
  - Develop Translation module to translate XBeach outcome to SII's
  - Develop decision support
  - Define SII + related warnings
  - Automatic visualisation

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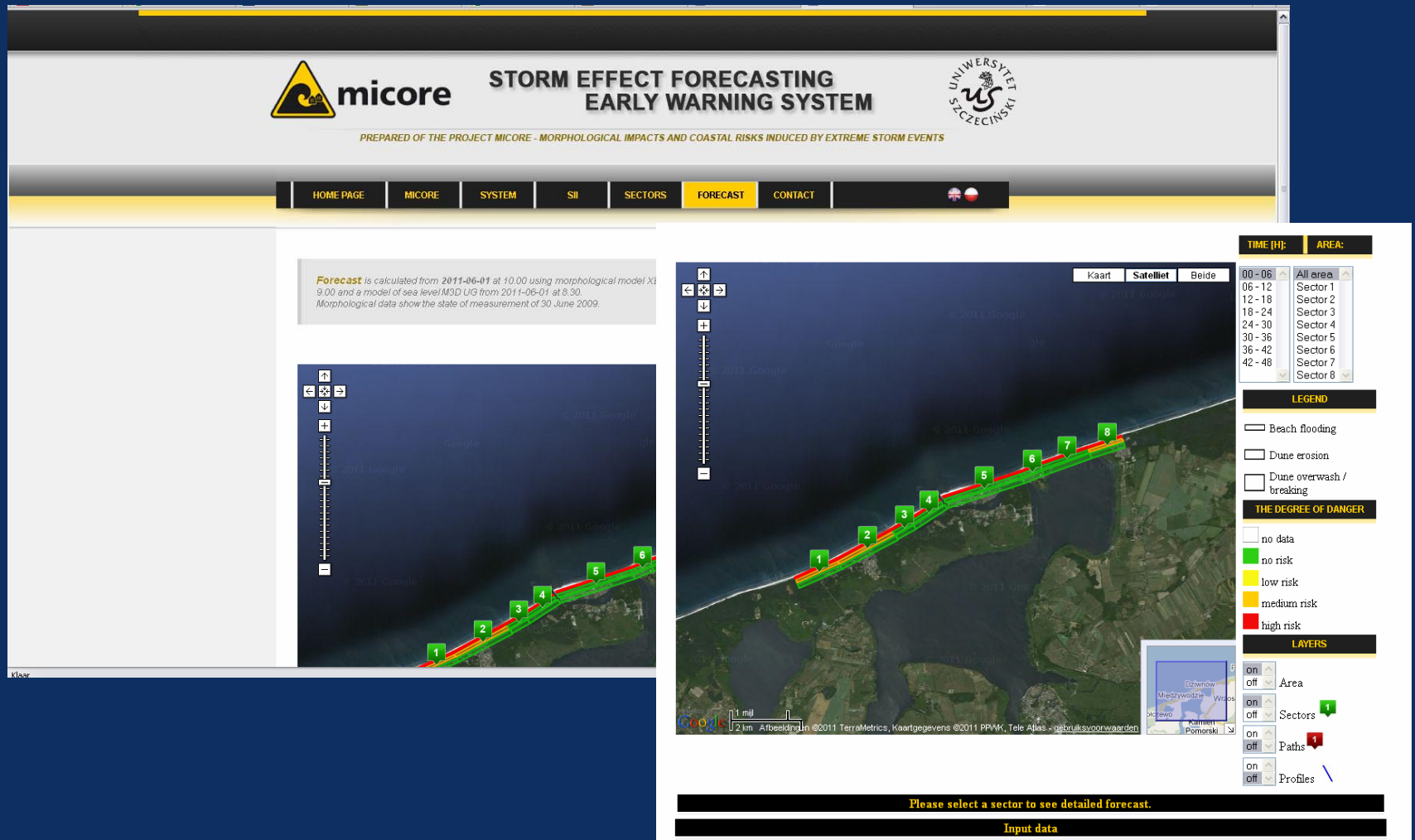
Developments within MICORE

- Poland



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Developments within MICORE

- Portugal

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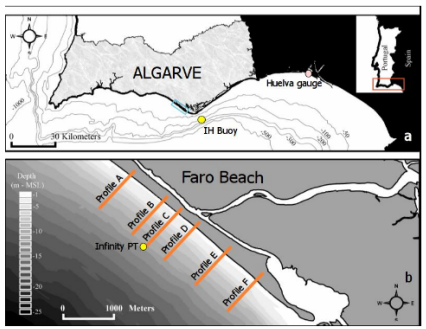
Project
Specific Objectives
Portuguese Study Site
Storm Impact Indicators
Risk Maps
Early Warning System
Publications
Other Links

MICORE Project is financed by the EU Environment research programme under the FP7 Framework programme under grant agreement number 202798

Early Warning System

Using data from computer models, that predict water levels, erosion due to the storm and impact on coastal areas, the Early Warning System (EWS) facilitates the creation of risk maps that are based on a combination of morphology maps, flood depth maps, erosion maps, economic impact assessments, etc. The EWS is able to predict the risk of storms on coastal areas and could be easiliy and effectively transferred to other sites. It is an excellent example of how the combination of coastal hazard research, remotely-sensed data, 3D visualization capability and GIS mapping technology is used to determine acute coastal change and to develop site-specific warning system. For details on how does the EWS was set-up please contact Michalis Vousdoukas .



Xbeach is a two-dimensional model for wave propagation, long waves and mean flow, sediment transport and morphological changes of the nearshore area, beaches, dunes and backbarrier during storms. It is a public-domain model that has been developed with funding and support by the US Army Corps of Engineers, by a consortium of UNESCO-IHE, Deltares (Delft Hydraulics), Delft University of Technology and the University of Miami.

Fig.1. Map of the study area showing the location of the wave forecast and the Xbeach profiles

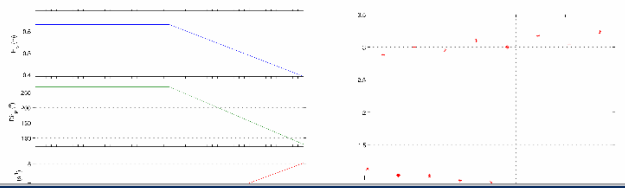


Fig.4. (A) Modelled morphological response using Xbeach (red indicates erosion); (B) Xbeach run, Beach profile response

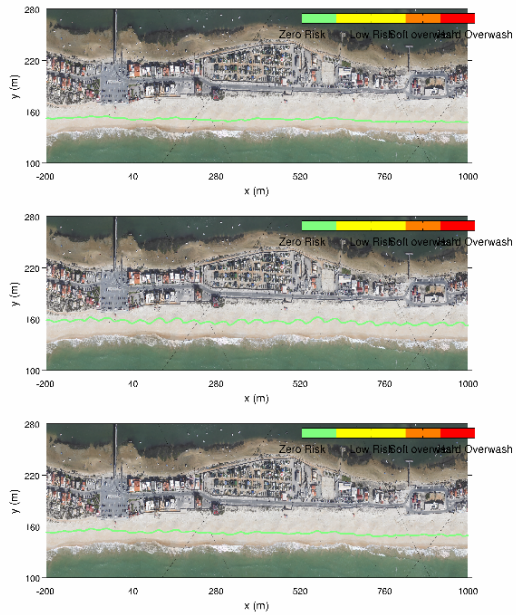


Fig.5. Predicted Wave-RunUp heights according to: (A) Holman (1984) formula; (B) a site-specific formula using video images by Voudouskas (); (C) the Xbeach modelling

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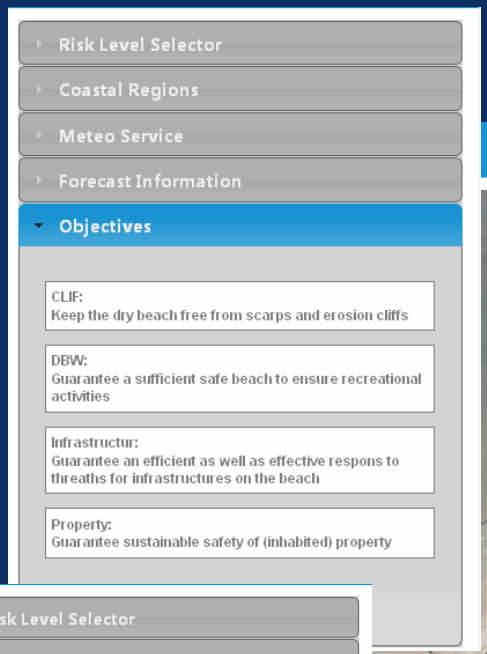
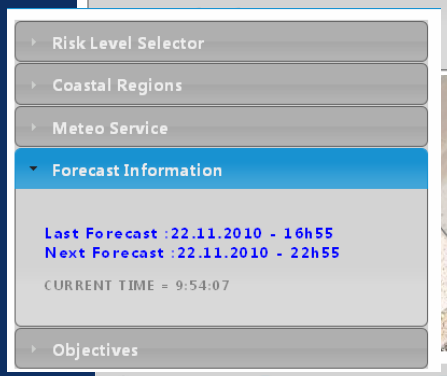
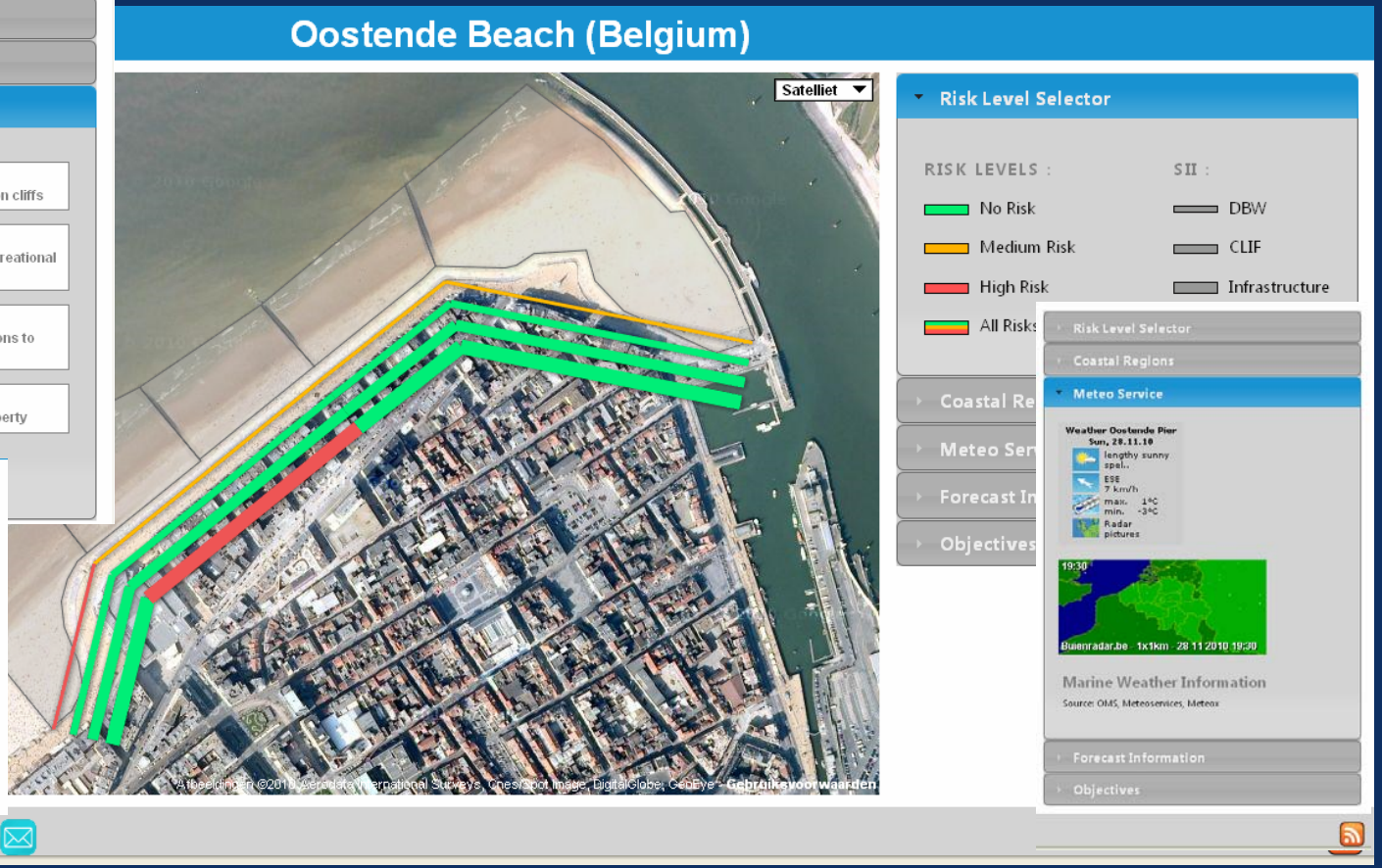
Developments within MICORE

- Belgium







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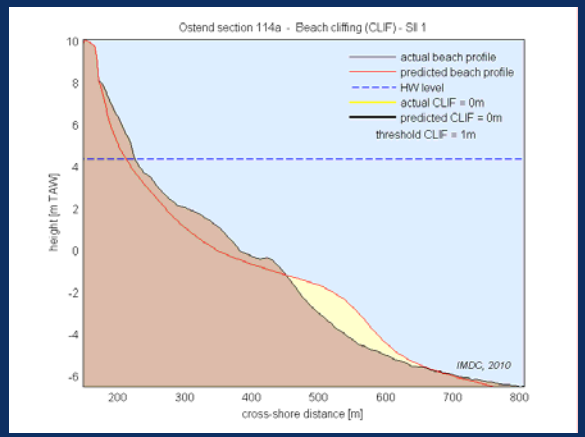
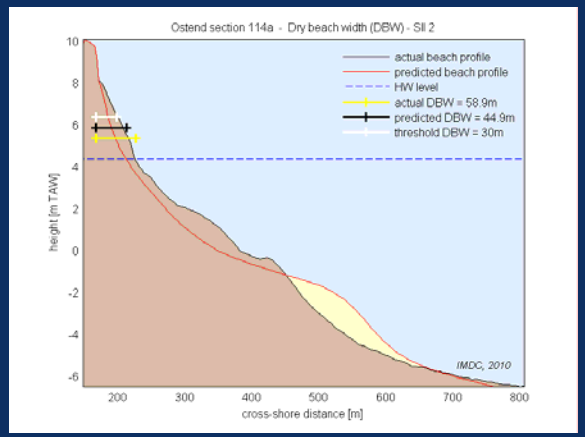
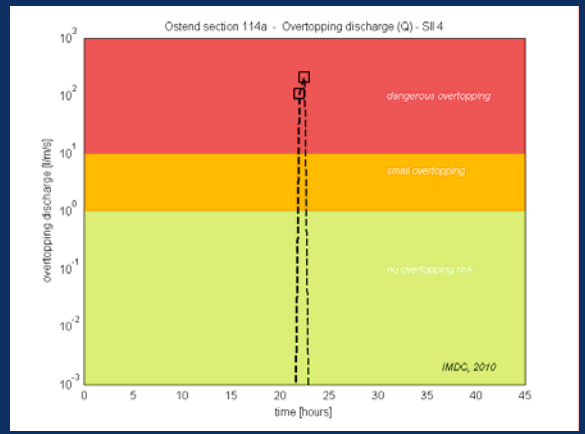
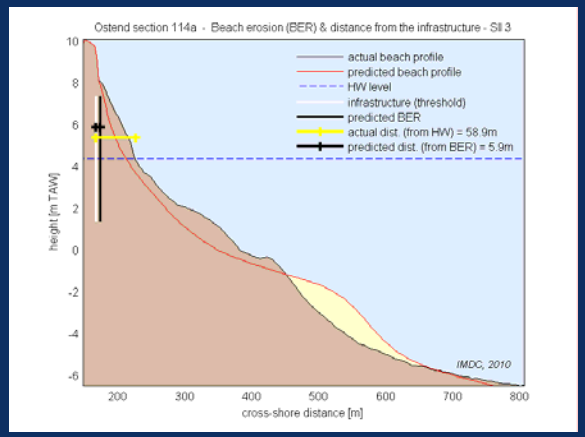
Developments within MICORE

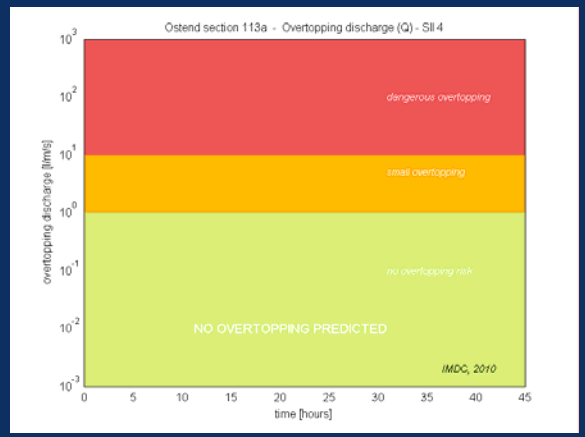
- Belgium:
  - Forecast of SII's based on XBeach output:

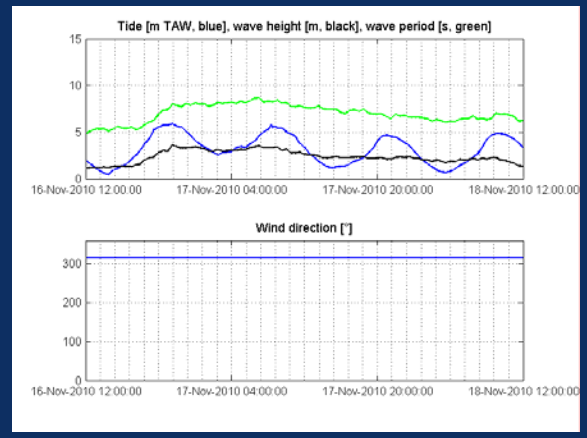












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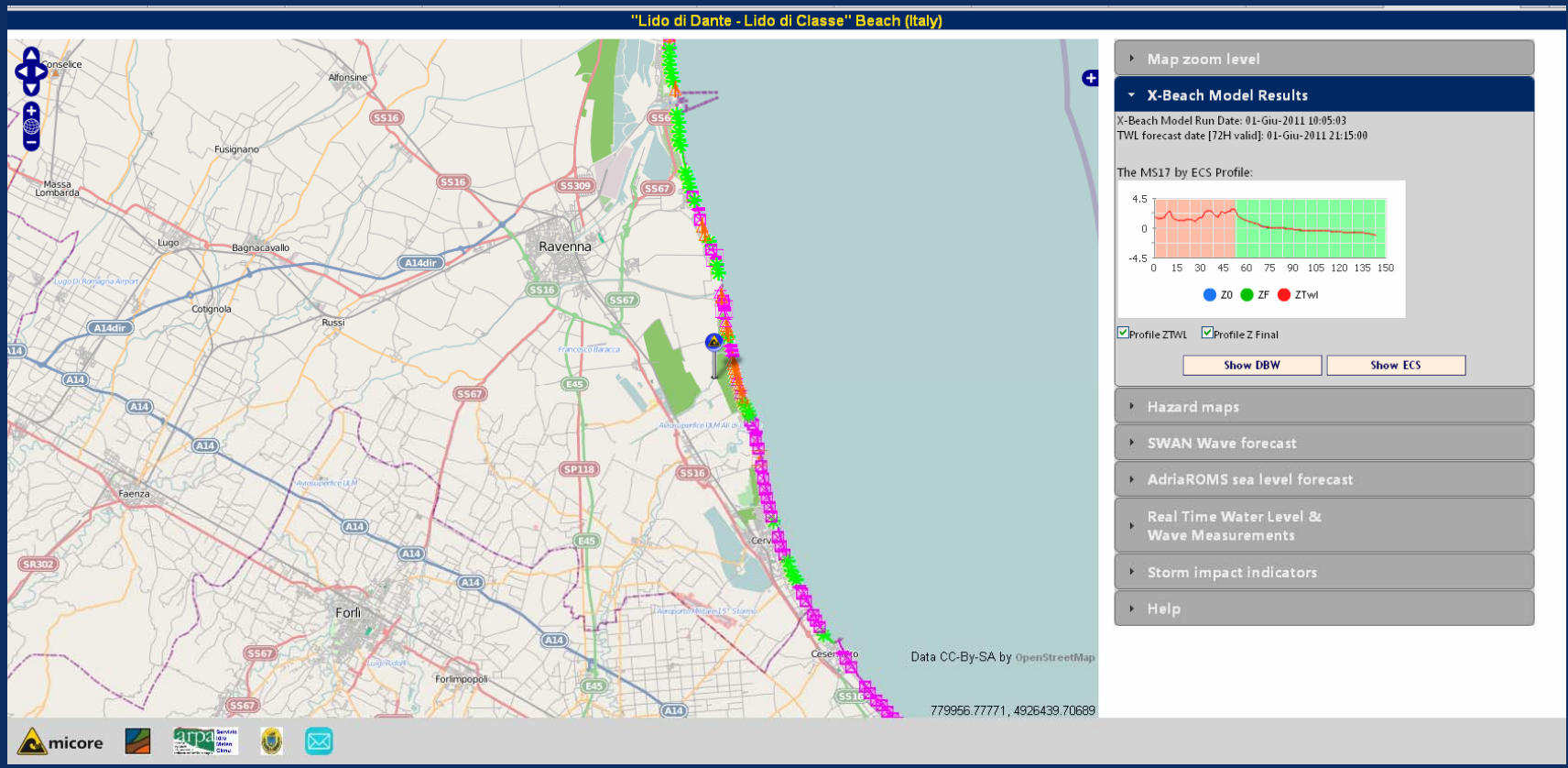
Developments within MICORE

- Italy



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What brings the future

- Future developments:
  - Improve wave forecast models – for some countries the wave forecast is sufficiently accurate to cover the entire coastline
  - Couple morphological forecast to flood & dike breaching forecast
  - Develop reliable & operational forecast
  - Extent the applicability from regional to national level
  - Improve civil protection schemes + actions + plans for evacuation => based on coupling

Add to existing regular warnings on wind, rain etc. a warning for storm erosion

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Conclusions

- EWS:
  - Need for Morphological Module = obvious
  - Link between physical parameters and SII = essential for appropriate and related actions/emergency plans
  - FoR = very useful concept
  - Demonstration level
  - Need for further developments:
    - Fully operational for the entire coastline (national/EU)
    - Increase & test reliability and confidence
    - Actions plans and link with new civil protection schemes

Conclusion = EWS developed within MICORE is a first step not the finish

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Thank you for your attention

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