




UN Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
Forty-eighth session
Vienna, 7-18 February 2011



*The construction of risk
scenarios combining remote
sensing and physical models*

the experience of the Italian pilot
projects

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pre-vision

Scientists foresee and check among themselves the scenarios of what can happen using scientific jargon



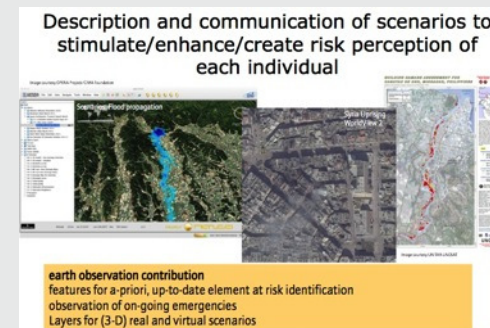
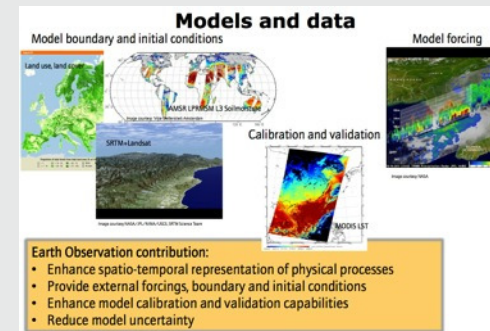
pre-diction

Decision makers understand scientific scenarios and translate them into “perceptible” scenarios and communicate



perception

Individuals, as potential victims, and their representative organizations conceive a mental picture of the impacts on themselves and their community, and take consequent decisions

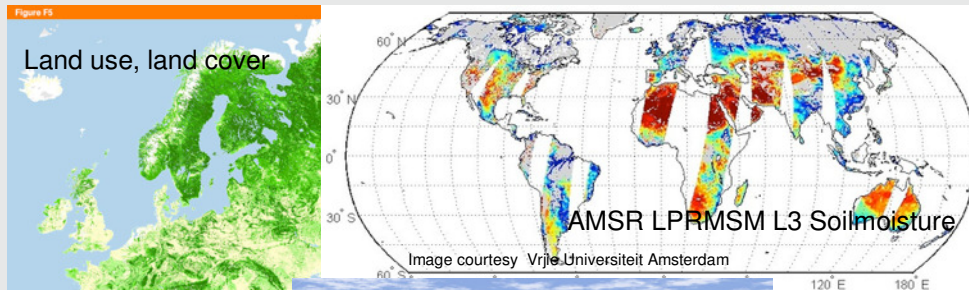




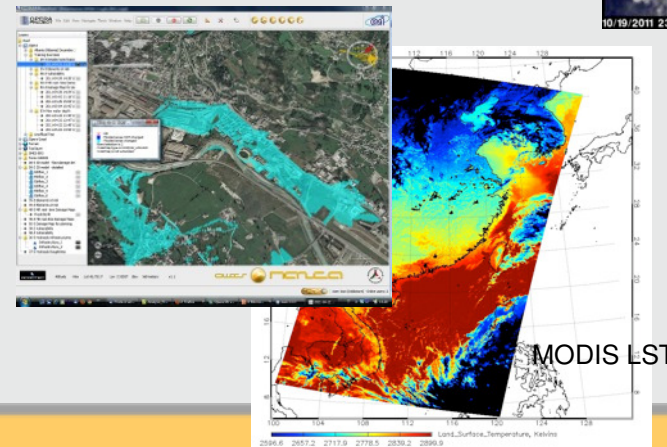
pre-vision

models and data

model boundary and initial conditions



calibration and validation



model forcing

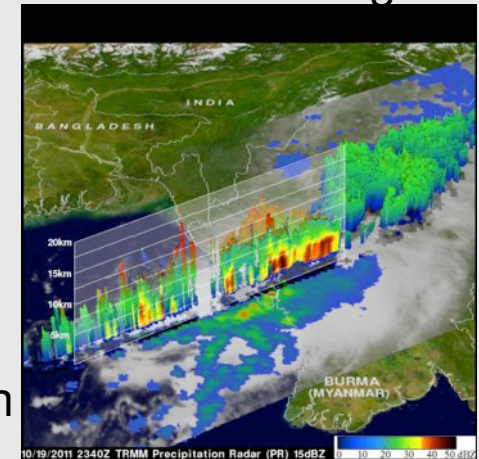


Image courtesy NASA

earth observation contribution:

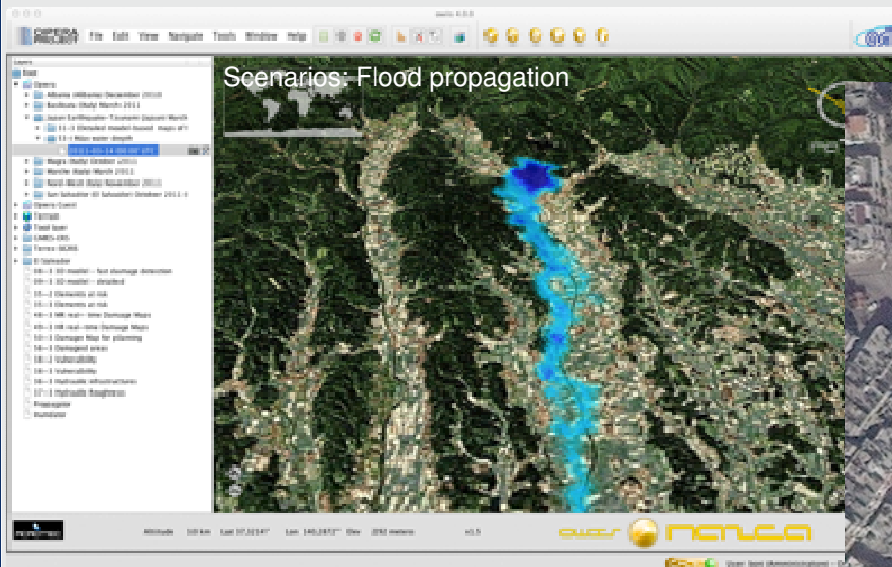
- enhance spatio-temporal representation of physical processes
- provide external forcing, boundary and initial conditions
- enhance model calibration and validation capabilities
- reduce model uncertainty



pre-diction

Description and communication of scenarios to stimulate/enhance/create risk perception of each individual

Image courtesy OPERA Project/CIMA Foundation



Scenarios: Flood propagation



Syria Uprising
WorldView 2

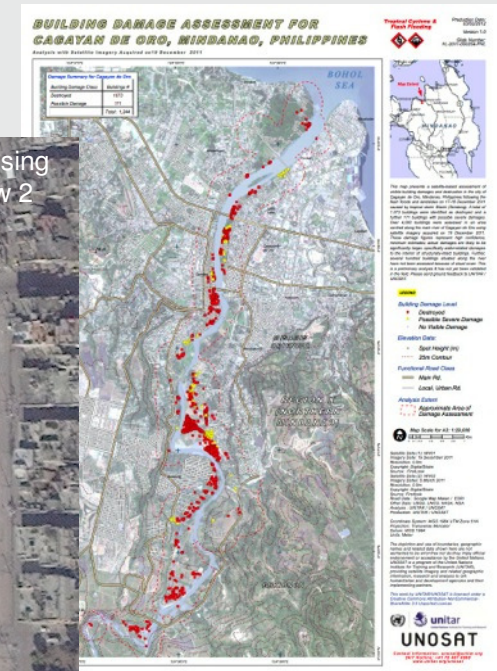


Image courtesy UNITAR-UNOSAT

earth observation contribution

features for a-priori, up-to-date element at risk identification

observation of on-going emergencies

Layers for (3-D) real and virtual scenarios

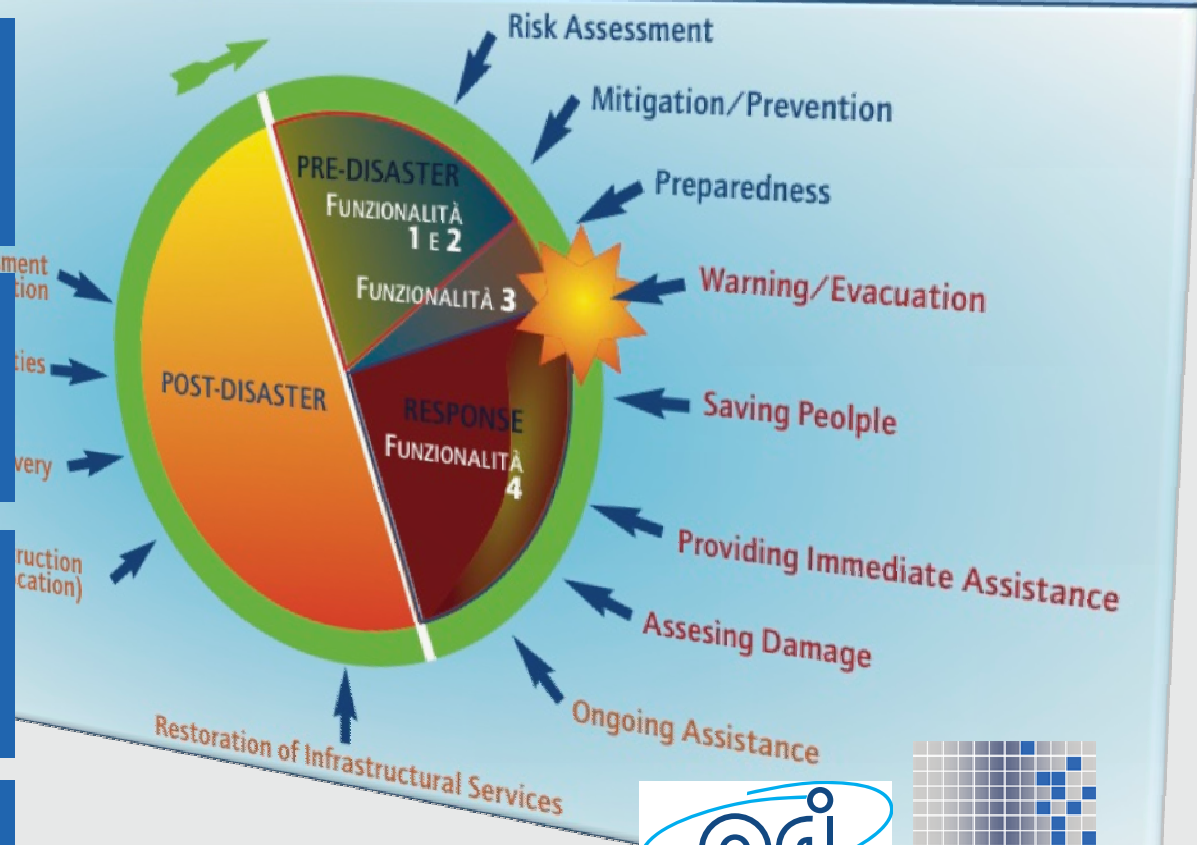
some words about OPERA project

Functionality 1
a-priori knowledge for civil protection activities
(pre-vision, pre-diction and perception)

Functionality 2
soil moisture mapping
(pre-vision)

Functionality 3
flood monitoring and forecasting
(pre-vision)

Functionality 4
monitoring in the emergency phase and damage evaluation
(pre-diction and perception)



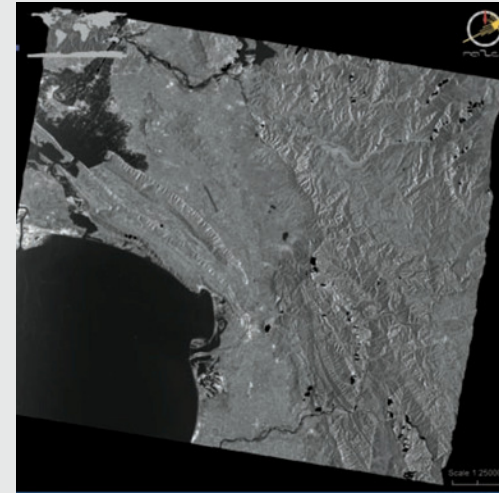
Catalogue of 56 EO-based products for assimilation into models and rapid mapping



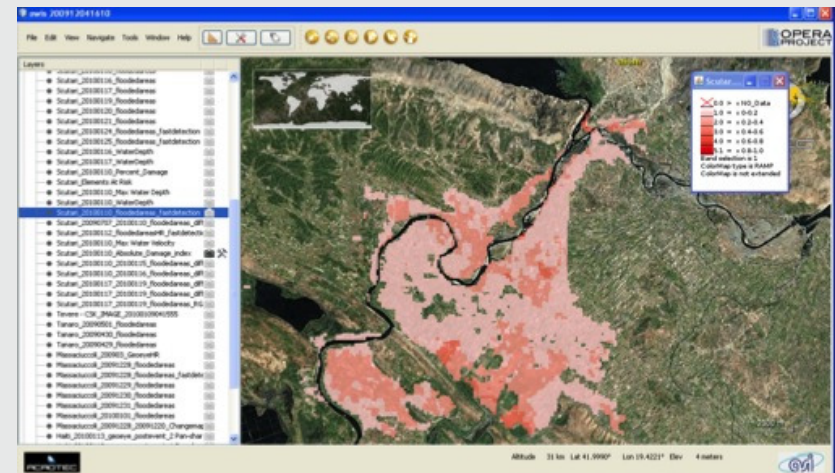
OPERA PROJECT
Protezione civile dalle alluvioni.

scenes and scenarios

✓ Scene: is a still image of a specific moment of a disaster.



✓ Scenario: is the set of observational data (both in-situ and remotely sensed) and model outputs of a process at a given moment during a disaster.



real time scenarios

Humidity Mdl + GM + Sat (Variational assimilation)

Flood forecast Mdl + GM + Sat

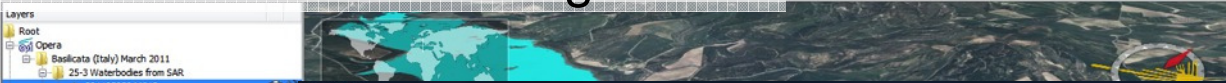
Time Range - Start: Monday 28 February 2011 14:00 UTC End: Friday

Time Range - Start: Monday 28 February 2011 14:00 UTC End: Friday 04 March 2011 14:00 UTC

<http://dewetrabk.cimafoundation.org/dewetra/app.html#>

Real time scenarios

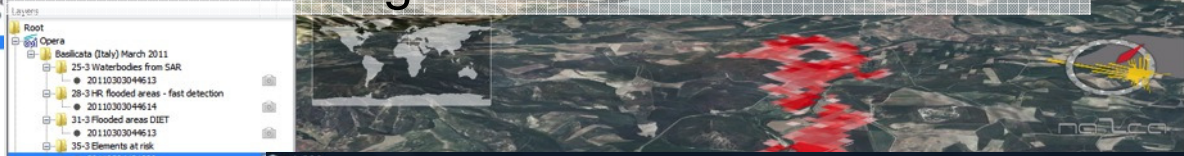
Water Bodies Monitoring



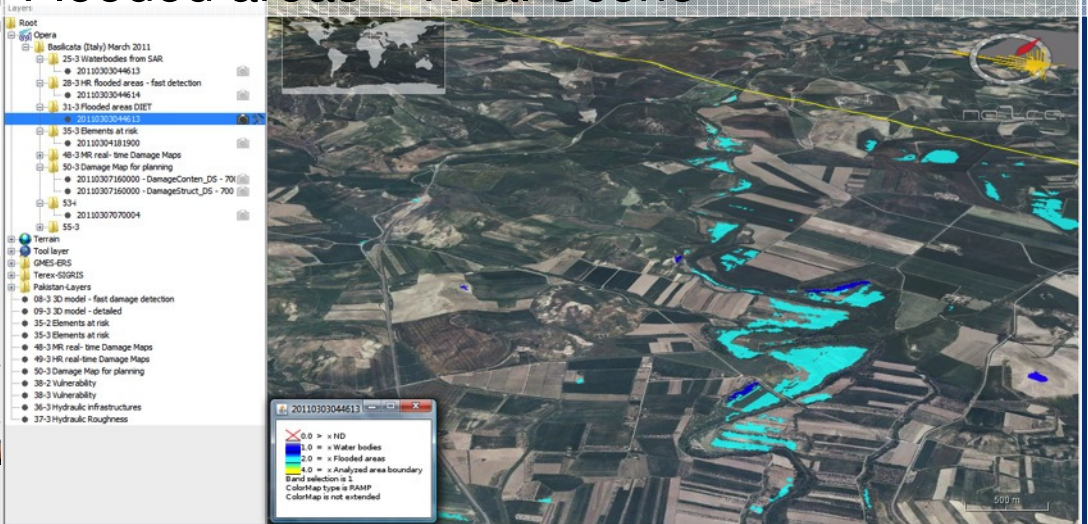
Water Depths – DAM outflow scenario



Possible Damage – DAM outflow scenario

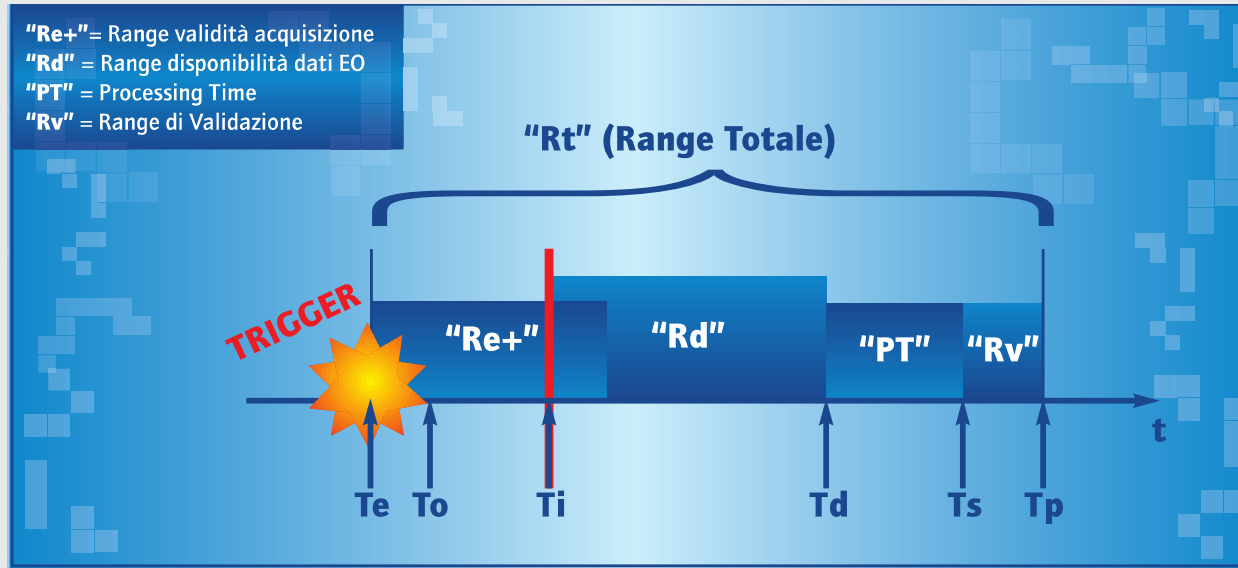


Flooded areas – Real Scene



building scenarios in real time

Not only a technical problem....



T_e – Trigger time
Acquisition validity range

T_o – Acquisition planning time
availability range

T_i – Acquisition reference time
time range

T_d – EO data availability time
Validation range

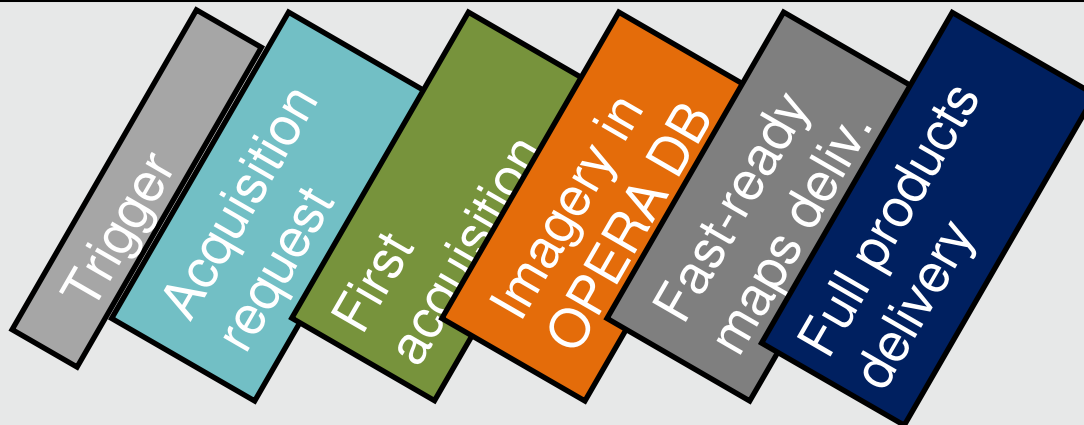
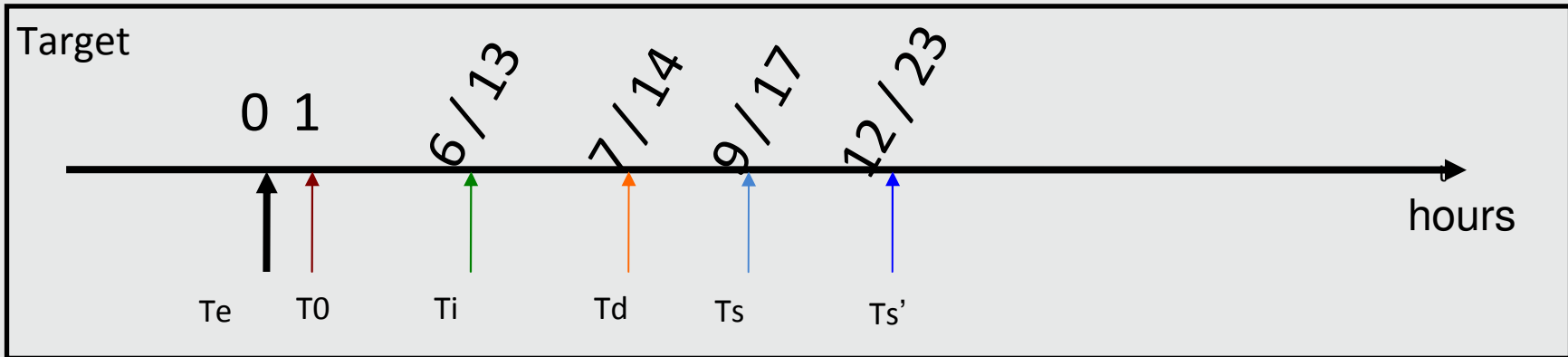
Re+ -

Rd – EO data

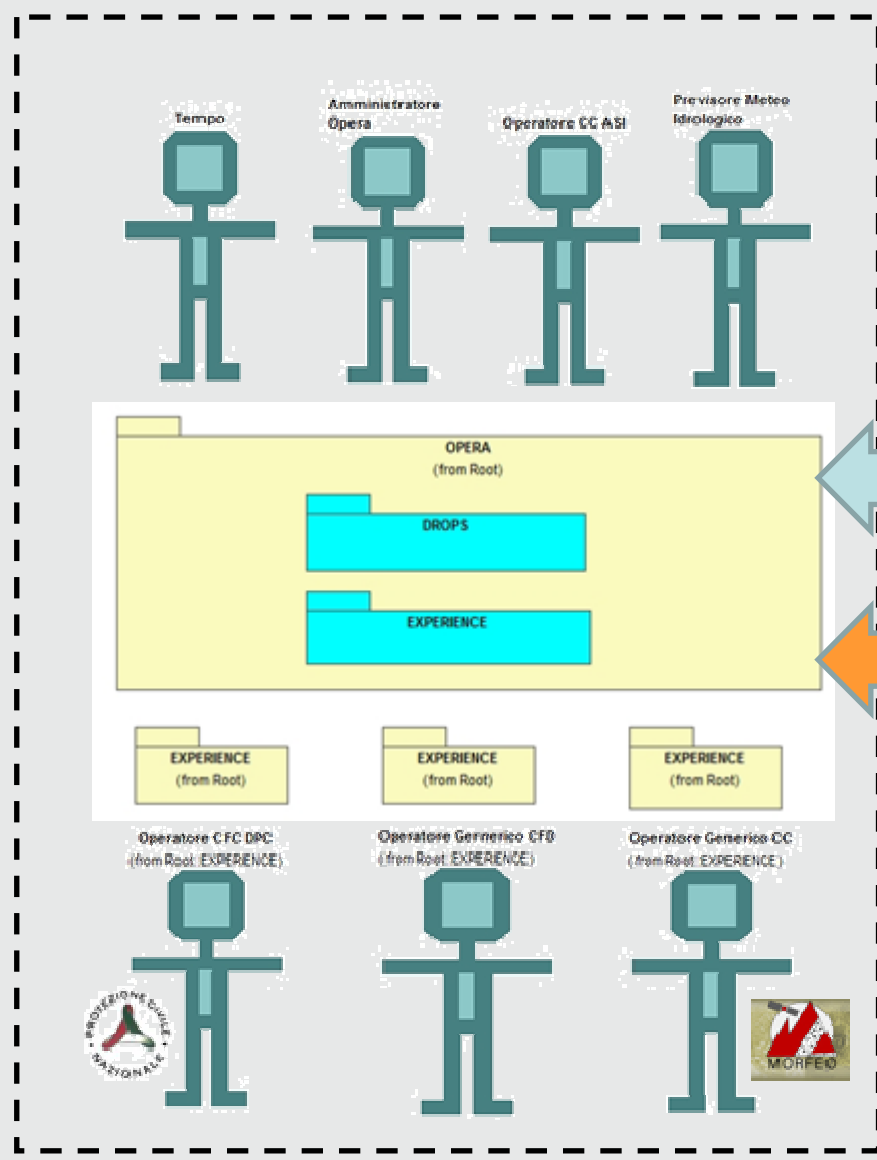
PT – Processing

Rv –

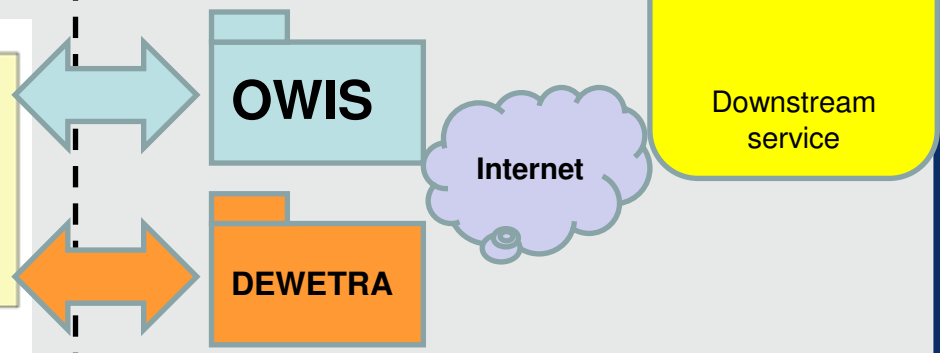
Quantifying the timing constraints



The system architecture



All the features of OPERA can be managed remotely via Web, including generation of products directly from OWIS. *An experienced user decides which instances, among those generated, must be made public.*

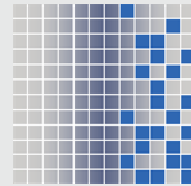


In particular, more remotely, all instances of by-products of OPERA can be published directly on the operational end-user tools (DEWETRA)

Acknowledgements



ASI: Ing. Laura Candela, project manager



**OPERA
PROJECT**
Protezione civile dalle alluvioni.

The OPERA team

Paolo Campanella Daniele Debernardi Michele Greco Giuseppe Squicciarino Andrea Botto Fabio Castelli Alessandro Burastero Giuseppina Cappelluti Alessandro Cottino Adriano Fedi Fabio Pintus Lauro Rossi Tatiana Perrone Fabio Delogu Mattia Fiorini Giorgia Macchiavello Cosimo Versace Roberto Rudari Stefania Traverso Elena Angiati Michaela De Martino Giorgio Boni Silvana Dellepiane Gabriele Moser Bruno Serpico Franco Siccardi Lorenzo Campo Guido Ceccherini Mauro Pierdicca Luca Pulvirenti Monica Palandri Gianfranco Pandiscia Andrea Crosta Davide Persi Luisa Colla

