

JIP regional dialogue\ Floods, 2nd Capacity Building Event (CBE2):
Flood Warnings & Decision Support to Civil Authorities and the Public
Phase I: Flood Forecasting Systems & Tools (On-line)

Italian flood early warning system

Angela Corina
WMO RAVI Regional Hydrological Adviser

webinar, 23 March 2022



PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

ITALY: A COUNTRY PRONE TO DISASTERS

Earthquake

Most of Italian territory is prone to seismic risk



Volcanoes

10 volcanoes, 2 active and 8 quiescent.
Vesuvio and Campi Flegrei at very high risk



Hydraulic and Hydrogeological risk

82% of Italian municipalities are exposed to hydro-geological risk



Forest Fires

30 % of the Italian territory is exposed to the risk of forest fires



Tsunamis

Italy has been affected by historical tsunamis



Drought

Due to climate change the drought risk has increased

A LONG HISTORY OF DISASTERS AND LESSONS LEARNED

1905

Calabria

Nicastro
Earthquake, CZ
557 casualties

M=7

1908

Sicily and
Calabria

Messina
Earthquake
85.926 casualties

M=7,1

1915

Abruzzo

Marsica
Earthquake
32.610 casualties

M=7,1

1920

Tuscany

Garfagnana
Earthquake
171 casualties

M=6,5

1919

Tuscany

Mugello
Earthquake
100 casualties

M=6,4



A LONG HISTORY OF DISASTERS AND LESSONS LEARNED

1963

Veneto

Vajont dam
disaster

1917 casualties

1966

Tuscany

Florence
Flood

38 casualties



1968

Sicily and
Calabria

Belice
earthquake

296 casualties

M=6,4

1976

Friuli

Friuli
earthquake

965 casualties

M=6,5

1980

Campania

Irpinia
earthquake

2734 casualties

M=6,8



THE BIRTH OF THE SYSTEM

1980

Terremoto
Irpinia

MW 6.8

Campania

2734 vittime

Epicenter of the seismic
event still to be defined
**3 days after
emergency outbreak**



Despite the tremendous
effort this disaster came
to prove the **initial lack
of coordination**



1982 - ESTABLISHMENT OF THE DEPARTMENT OF CIVIL PROTECTION

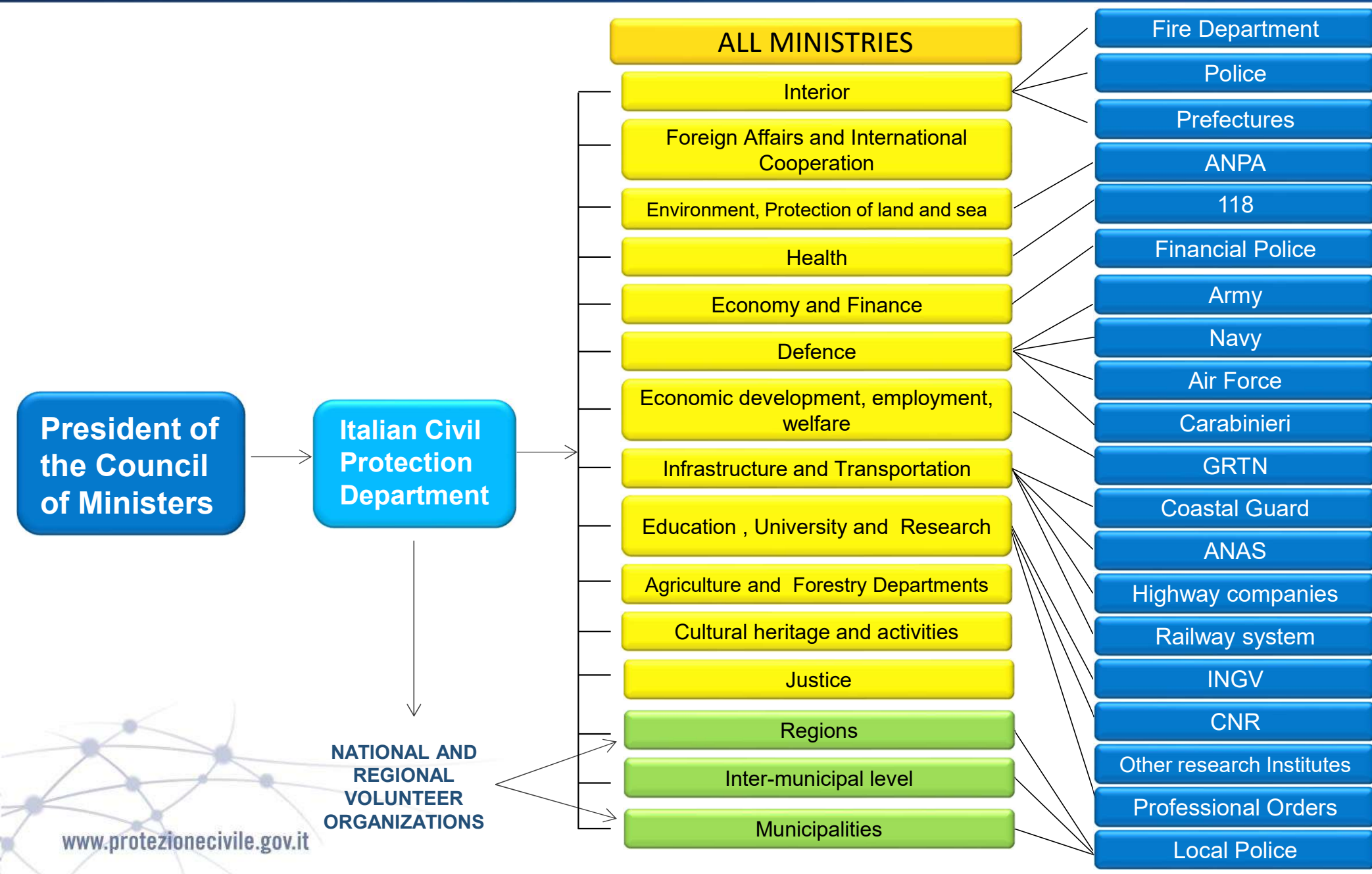
FUNDAMENTAL ASPECTS



Not only **RESCUE** but
**PREVENTION, PREPAREDNESS,
OVERCOMING THE EMERGENCY**
and **ORGANIZATIONAL
COORDINATION** among various
Administrations

The **Department of Civil
Protection** is placed directly
under the **Presidency of the
Council of Ministers**

ORGANISATIONAL STRUCTURE DURING AN EMERGENCY



MAIN ACTS

1982

Establishment of
the **Department** of
Civil Protection

1992

Law 225

Establishment of
the National Civil
Protection Service

2018

Leg.D. 1 02.01.2018

Italian Civil
Protection Code

From **1992 to 2018**
the civil protection
System has evolved
through other
regulatory
measures

MANDATE

“To safeguard human life and health, goods, the national heritage, human settlements, animals and the environment from both natural or man-made disasters”.

Whole-of society approach

The **Italian Department of Civil Protection** coordinates the **National Service of Civil Protection** which involves several Private and Public Bodies/ Organisations :

PUBLIC (Government, Ministries, Regions, Provinces, Municipalities, Emergency Services & other “Operational Bodies” etc.)

SCIENTIFIC/ACADEMIC

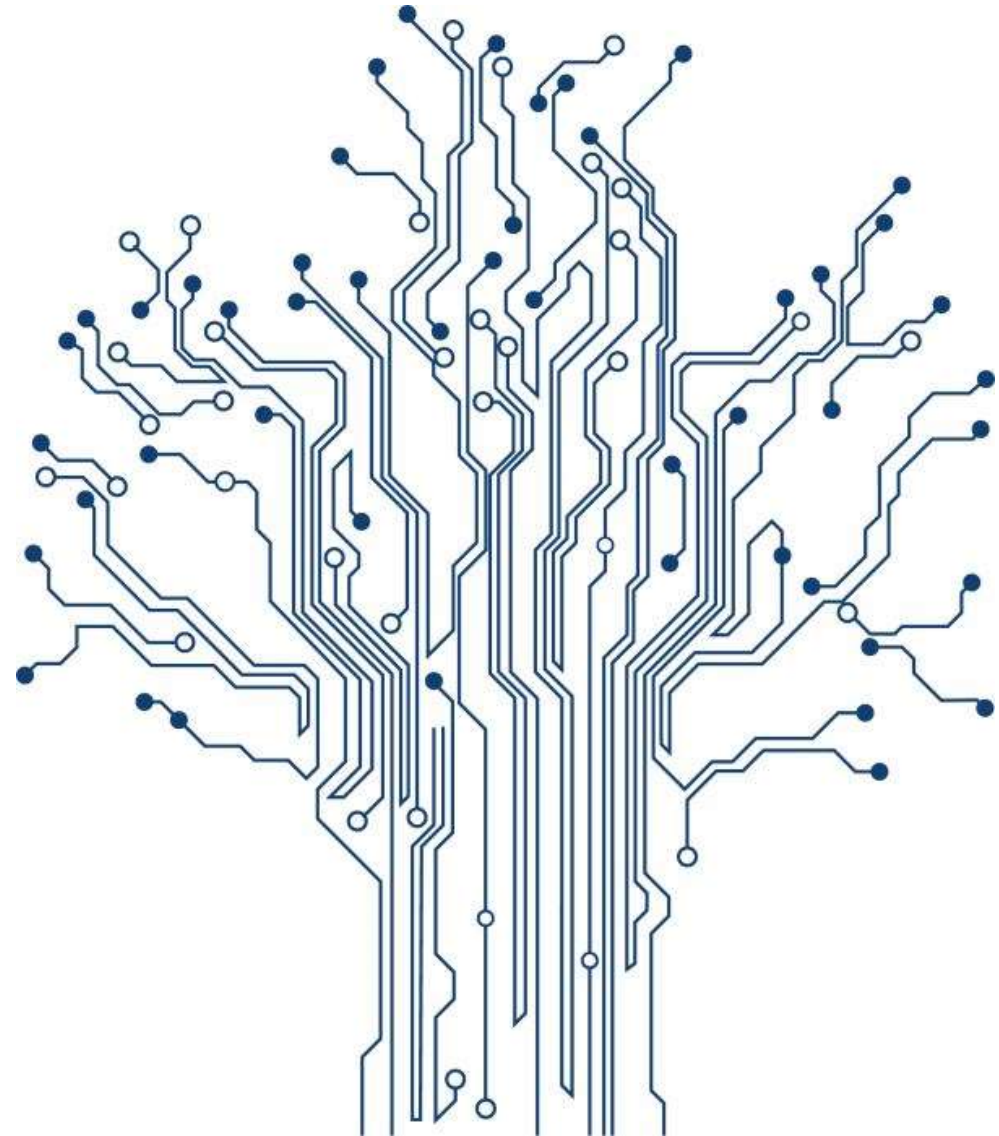
INSTITUTIONS (Universities, Research Bodies, etc.)

CIVIL SOCIETY (Volunteers, private companies, professional associations, etc.)



A SYSTEM BASED ON FUNCTION

Civil protection in Italy can be equated to a **FUNCTION** within a COMPLEX and COMPREHENSIVE SYSTEM and **NOT** TO A TASK assigned to a **single administration**



CLASSIFICATION OF CIVIL PROTECTION EVENTS

The **National Service of Civil Protection** distinguishes emergencies between natural and man made events based on the impact they have:

A – local level

B – provincial and regional level;

C – national and international level.

A and **B** events can be managed through **ordinary relief operations**

C events must be managed through the use of **extraordinary means and powers**.

The state must intervene only where and when the local authorities are unable to respond (vertical subsidiarity).


MOBILIZATION OF THE NATIONAL CIVIL PROTECTION SERVICE

IN CASE OF
EXTRAORDINARY
EVENT
(type C)

The President of the Council of Ministers, by Decree provides for the **extraordinary mobilization** of the National Service in support of the regional systems of interest

Deployment of the mobile resources by other Regions and Provinces and national volunteer organizations


CIVIL PROTECTION OPERATIONAL COMMITTEE



Activated in case of an emergency of national relevance



Convened at the Headquarter Office of the Department of Civil Protection in Rome

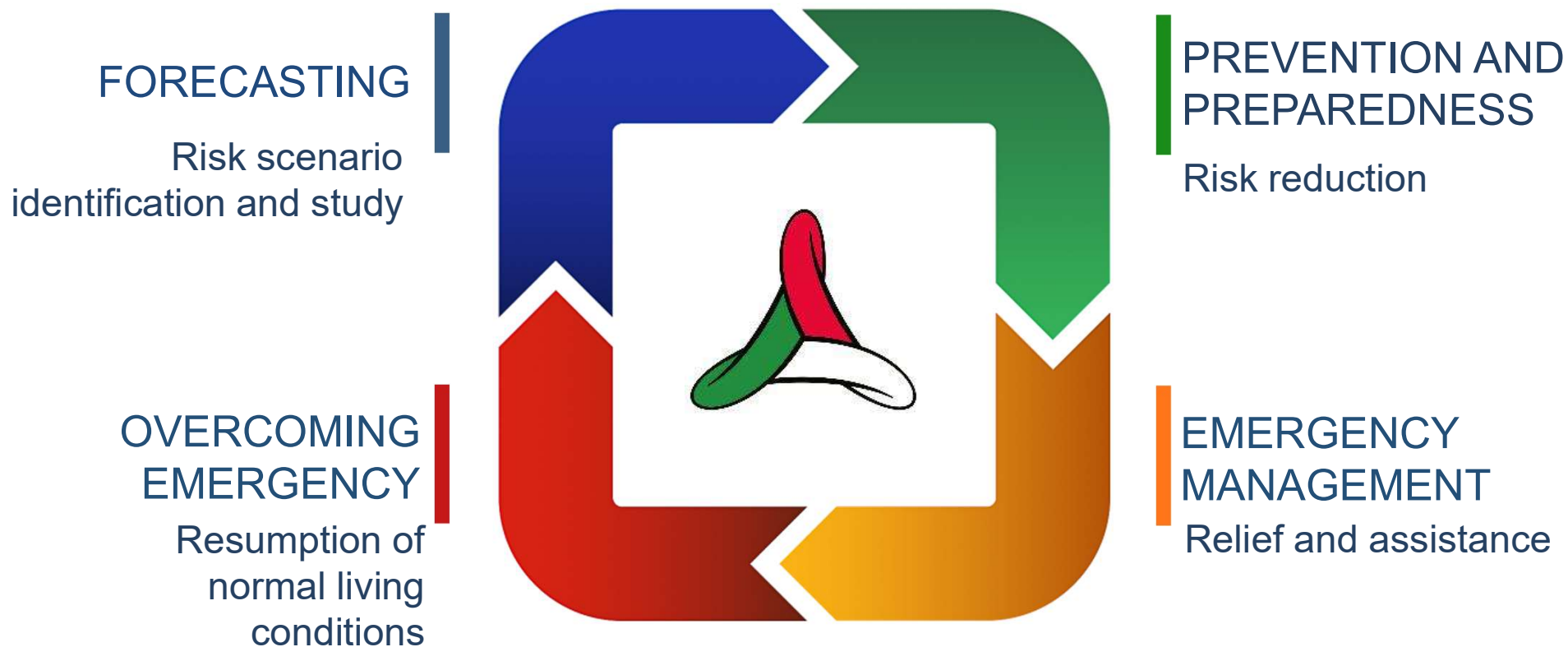


It ensures an efficient and coordinated management of all relief operations in response to a national scale emergency.

DECISION-MAKING



Full cycle of DISASTER RISK MANAGEMENT



A LONG HISTORY OF DISASTERS AND LESSONS LEARNED: TOWARDS THE EWS

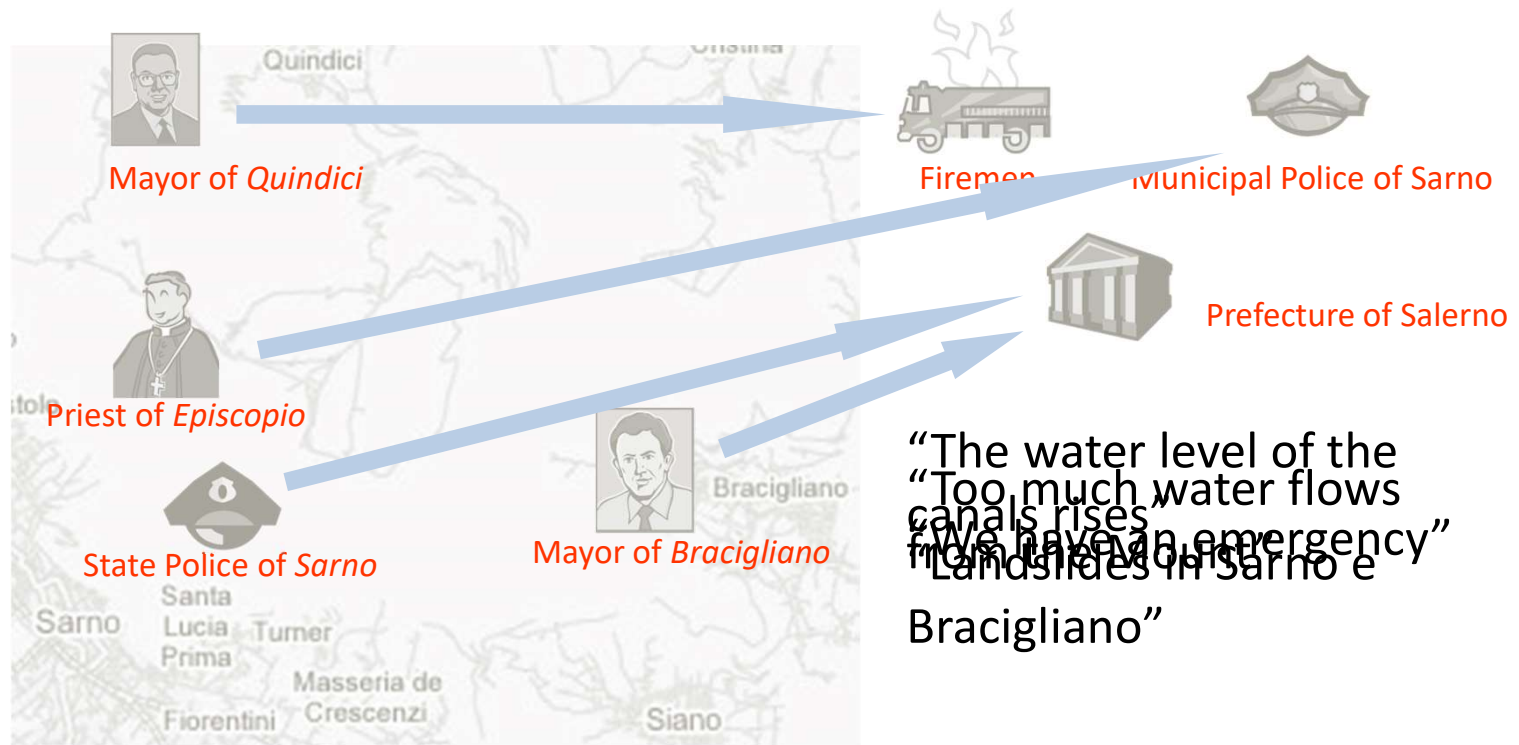
1998
Campania

Mudflow, Sarno
160 casualties



SARNO disaster: communication flow analysis during the disaster

From 14:00 to 17:00 (first victims) and 18:00 (main mudflows) several notification calls of minor precursory events were addressed to a number of recipients, but the dimension and severity of the disaster was unclear and partial.



A LONG HISTORY OF DISASTERS AND LESSONS LEARNED: TOWARDS THE EWS

1998

Campania

Mudflow, Sarno

160 casualties

2000

Calabria

Flash Flood, Soverato

11 casualties



Early warning system

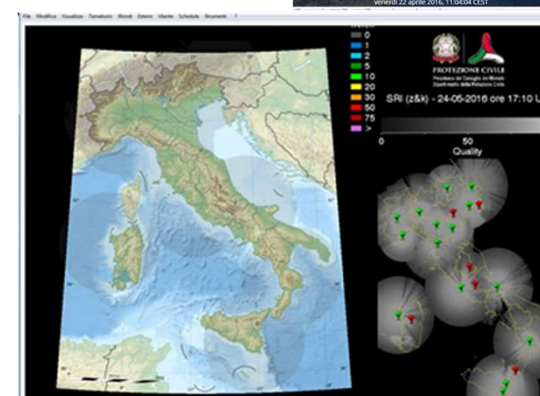
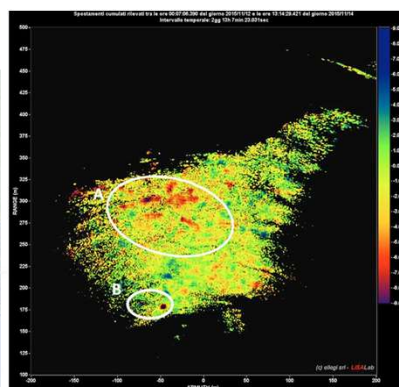
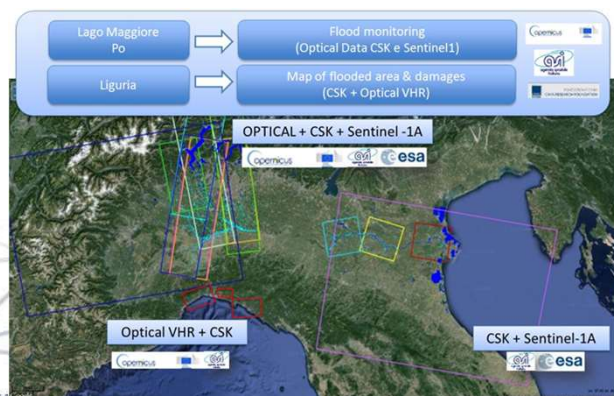
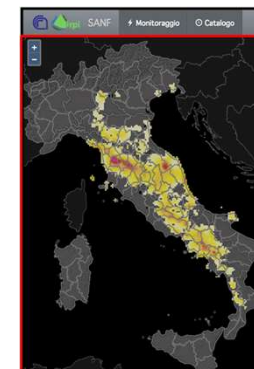
legal framework: d.p.c.m. 2004

Italian EWS managed by 21 regional centers for forecasting and surveillance and 1 statal center

Each Regional Centre of Civil Protection has the responsibility of meteo-hydrological alerts in its territory

Coordination by the National Department of Civil Protection

30 knowledge centers (Universities, Agencies, research dept. ex.CimaFoundation...)



***Centers for Technological and
Scientific services,
development and transfer***



network of ***Centers for Technological and Scientific services, development and transfer:***
relevant part of the national early warning system.
(universities, research centers, public or private, etc.)

Activities, even extraordinary and temporary ones, that contribute to assure urgent actions aimed to protect people, goods, settlements and environment by damage arising from dangerous events

REAL TIME

CIVIL PROTECTION
DEPARTMENT

REGIONS

NO-REAL TIME

Ministry of
Environment

Regions/River
basin authorities

REAL- AND NO-REAL TIME ACTIVITIES

HYDRAULIC AND
HYDROGEOLOGICAL RISK

Real time



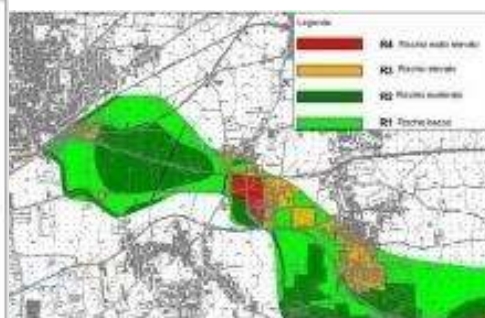
No-real time

Ordinary planning of interventions aimed to assure permanent and homogeneous conditions for promotion, conservation and recovery of environmental and territorial circumstances suited to the interests of communities and quality of life

MINISTRY OF ENVIRONMENT/ BASIN AUTHORITIES/REGIONS

D.Lgs.152/2006

Environmental code



R1: **Low Risk** (low social and economic damages).

R2: **Medium Risk** (low damage to buildings, infrastructures and cultural heritage without the involvement of persons).

R3: **High Risk** (Possible damage to persons, buildings and infrastructures with interruption of social-economic act).

R4: **Very High Risk** (Possible loss of human lives, serious damages to buildings, infrastructure, environment and destruction of social-economic activities).

CIVIL PROTECTION DEPARTMENT/ REGIONS

Dir.P.C.M. 27/02/2004

National early warning system
Centres for forecasting and surveillance



Ordinary severity (flooding of basements, temporary and punctual traffic problems near small watershed due to surface runoff phenomena, accidental loss of life)

Moderate severity (temporary and punctual traffic problems, damages to individual buildings or to small towns affected by slopes instability, damages to agricultural activities, industrial and residential areas situated in floodplains, accidental loss of life and possible widespread damage to people)

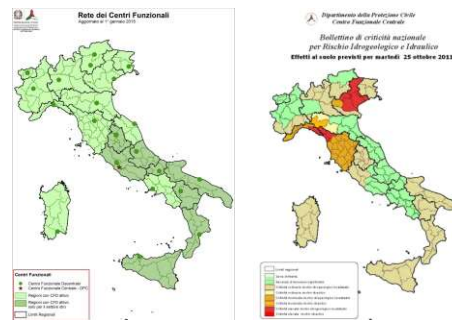
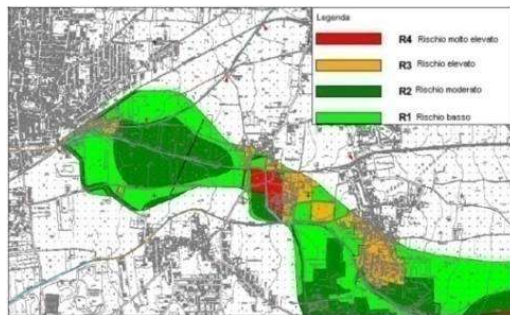
High severity (damages to agricultural activities, industrial and residential areas situated near rivers and streams, damage or destruction of towns, possible loss of life or serious injury to people)



Real time and no real time risk assessment

“risk assessment” : the activity, performed in terms of months and years, to identify, in a given territory, the potential hazards, the related causes, mechanisms and their consequences.

“real time risk assessment”: the activity, performed in term of hours, to predict the evolution in space and time of the hazard event and its effects, taking into account the estimated distribution of exposed subjects and their vulnerability (risk scenario).



Definition of EWS in italian CP law

EWS system comprises tools, methods and procedures to develop and acquire, in **real-time**, knowledge, information and **assessments** relating to the advance warning in terms of **probability**, and the real-time monitoring and surveillance of events and the consequent evolution of risk scenarios in order **to timely and effectively activate civil defence actions** at various territorial levels.



THE ITALIAN EARLY WARNING SYSTEM

The national **early warning system** for **hydrogeological** and **hydraulic** risk is managed by the **Civil Protection Department** and all the **Italian Regions** through the **Centres for Forecasting and Surveillance network**

Dir. P.C .M. 27/02/2004



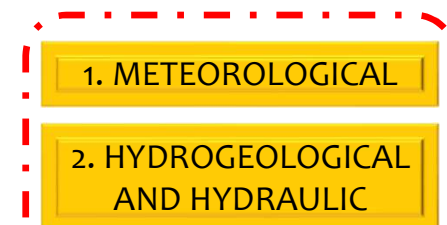
TASKS

- ☐ Announcement, monitoring and surveillance of risk scenarios in real time
- ☐ Declaration of the expected severity levels
- ☐ Warnings → activation of operative response in real time at different territorial levels

2 phases



2 areas



500/21 CF
persone

5200
stazioni

22
radar

H24
365 giorni/anno

NCDP: guidelines, coordination and subsidiarity ☐ 10 forecasters (6 Italian Air Force, 4 Civilian)

☐ H24 - 2 forecasters, 365 days/year

Meteo technical group: NCDP , Air Force,
Arpa Piemonte , Arpa Emilia

Meteorological area--Regions



Forecast products and activity

QPF in 45 areas

“Bollettino di Vigilanza”

Weather warnings

Regional forecasts

Special forecasts for emergencies (ex. Giglio)

Forest fires

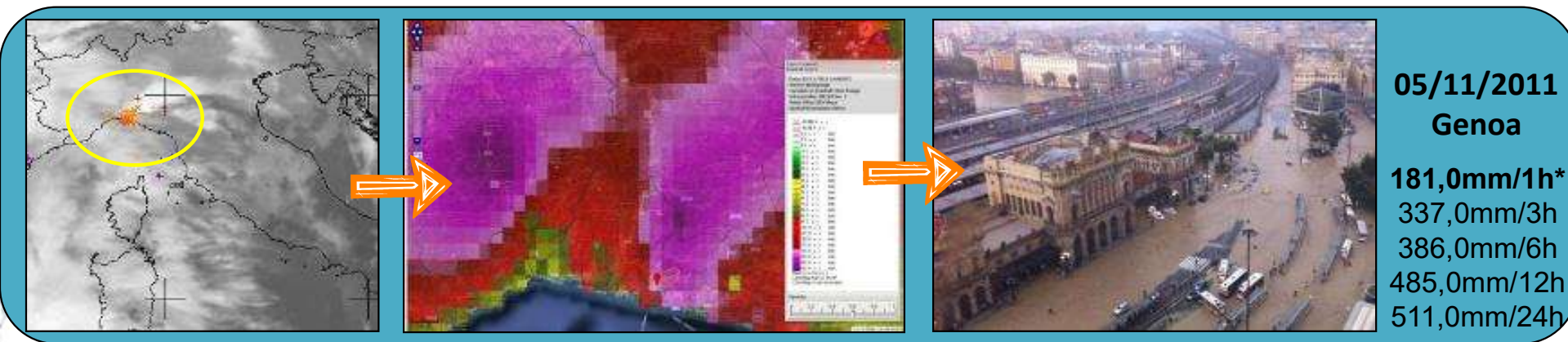
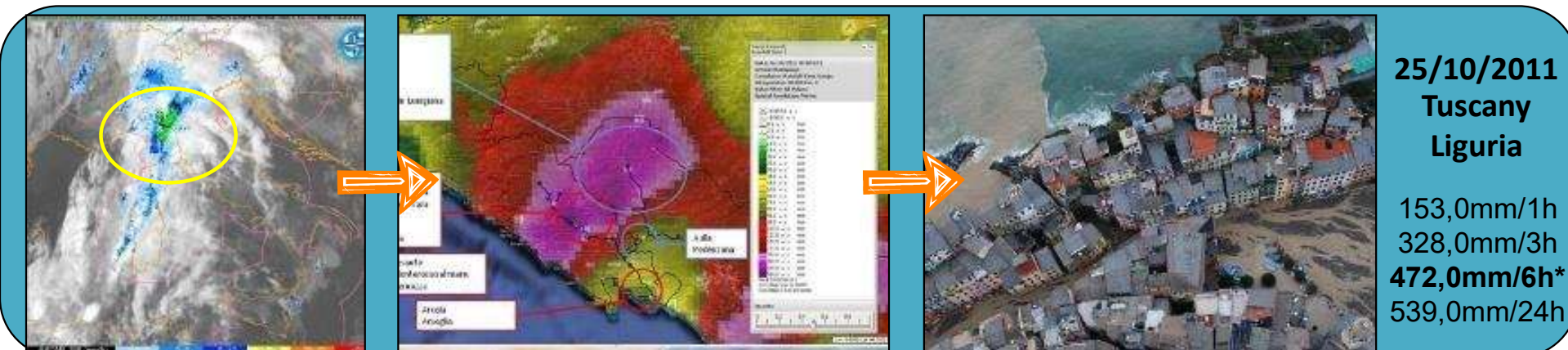
Medium range forecast (2 t weekly)

Briefing in DPC

Emergency Meetings (Operative Committee)

Radio/newspapers/Tv

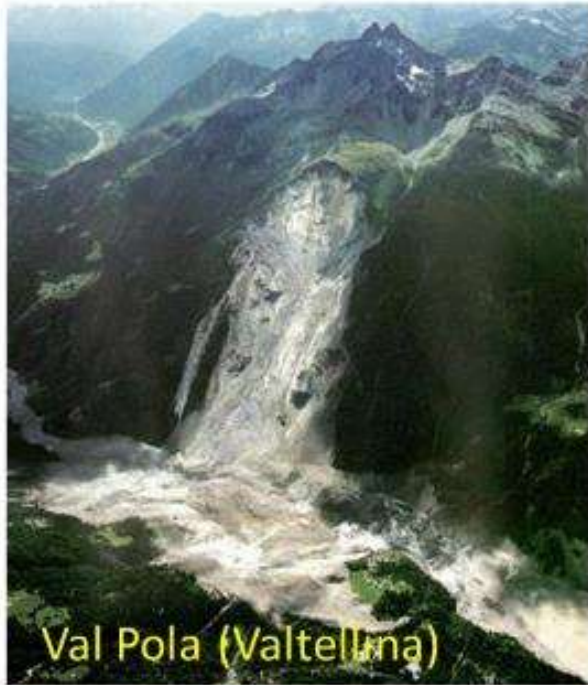
Reports (after event)





PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

hydraulic and hydrogeological risk in italy



Torrente Quiliano (Savona)



weather



DATA E ORA:	02/05/2014 11.29
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Avvisi meteo regionali ricevuti, precisazioni.

Rovesci o temporali:

-  DIFFUSI
-  SPARSI
-  ISOLATI

N.B. (dal glossario del Bollettino di Vigilanza Meteorologica Nazionale pubblicato su www.protezionecivile.it): quando i fenomeni sono previsti a carattere di rovesse segnalati corrispondono alla cumulata attesa in un numero significativo di località all'interno dell'area considerata, fermo restando che in un sottoinsieme più limitato scrosci più intensi, capaci di dar luogo ad una cumulata maggiore, talvolta anche molto maggiore, di quella indicata. Quest'ultima va quindi intesa moltiplicabile per 5, con probabilità decrescenti. Tale grado di incertezza, sia nelle localizzazioni che nei quantitativi, è insito nel carattere dei fenomeni a carattere temporalesco.

[illegible]

THE ITALIAN EARLY WARNING SYSTEM



Centro Funzionale Centrale - Settore Meteo

BOLLETTINO DI VIGILANZA METEOROLOGICA NAZIONALE

RIFE/ / DIRETTIVA PRESIDENTE DEL CONSIGLIO DEI MINISTRI 27-2-2004:
INDIRIZZI OPERATIVI PER LA GESTIONE ORGANIZZATIVA E FUNZIONALE DEL SISTEMA DI ALLERTAMENTO NAZIONALE, STATALE E REGIONALE, PER IL RISCHIO IDROGEOLOGICO E IDRAULICO AI FINI DI PROTEZIONE CIVILE.

FENOMENI SIGNIFICATIVI O AVVERSI PER IL GIORNO 2 MAGGIO 2014

Precipitazioni:

- da sparse a diffuse, a prevalente carattere di rovescio o temporale, su Emilia Romagna, Toscana centrale ed orientale, Lazio centro-meridionale e settori occidentali della Sardegna, con quantitativi cumulati moderati;
- sparse, localmente anche a carattere di rovescio o temporale, su Piemonte meridionale, Marche, Umbria, Abruzzo, Molise occidentale e Campania centro-settentrionale, con quantitativi cumulati puntualmente moderati;
- da isolate a sparse, localmente anche a carattere di rovescio, sul resto del Centro-Nord e sulla Sicilia, con quantitativi cumulati deboli.

Visibilità: nessun fenomeno significativo.

Temperature: in sensibile diminuzione le massime sulle regioni settentrionali e sulla Sardegna.

Venti: forti nord-occidentali sulla Sardegna, con rinforzi di burrasca specie sui settori occidentali e meridionali dell'isola; tendenti a forti settentrionali sulla Liguria.

Mari: molto mosso, tendente ad agitato, il Mar di Sardegna; tendenti a molto mossi il Tirreno centro settentrionale, il Canale di Sardegna ed il Mar Ligure al largo.

FENOMENI SIGNIFICATIVI O AVVERSI PER IL GIORNO 3 MAGGIO 2014

Precipitazioni:

- diffuse e persistenti, anche a carattere di rovescio o temporale, sulla fascia collinare ed appenninica ed adiacenti settori di pianura dell'Emilia Romagna, con quantitativi cumulati generalmente moderati;
- da sparse a diffuse, a prevalente carattere di rovescio o temporale, su Marche, Abruzzo, Molise centro-orientale, Puglia settentrionale, Campania centro-meridionale e settori tirrenici di Basilicata e Calabria settentrionale, con quantitativi cumulati puntualmente moderati;
- sparse, localmente anche a carattere di rovescio o temporale, sui restanti settori di Campania e Calabria tirrenica e su settori prealpini e pianeggianti di Lombardia e Veneto, Toscana centro-settentrionale, Umbria, settori orientali e meridionali del Lazio, Puglia meridionale, Sardegna e Sicilia nord-orientale, con quantitativi cumulati generalmente da deboli a puntualmente moderati;
- isolate, anche a carattere di breve rovescio, sul resto del Centro-Sud e su Piemonte, Trentino, Friuli Venezia Giulia e Liguria, con quantitativi cumulati deboli.

Visibilità: nessun fenomeno significativo.

Temperature: in sensibile aumento le massime sul nord-ovest.

Venti: forti dai quadranti occidentali con rinforzi di burrasca su Sardegna e Sicilia; tendenti a localmente forti nord-orientali in serata sul triestino e sulle coste ed arcipelago della Toscana; localmente forti settentrionali sulla Liguria.

Mari: agitati il Mare e Canale di Sardegna, lo Stretto di Sicilia; molto mosso il Tirreno meridionale.

FENOMENI SIGNIFICATIVI O AVVERSI PER IL GIORNO 4 MAGGIO 2014

Precipitazioni:

- da sparse a diffuse, anche a carattere di rovescio o temporale, su Marche meridionale, settori adriatici di Abruzzo e Molise e su Puglia, Basilicata e Calabria centro-settentrionale, con quantitativi cumulati puntualmente moderati;
- da isolate a sparse, localmente anche a carattere di rovescio o temporale, sui restanti settori di Marche, Abruzzo, Molise e Calabria, e su Romagna, settori orientali e meridionali di Umbria e Lazio, Campania e settori meridionali della Sardegna, con quantitativi cumulati generalmente deboli.

Visibilità: nessun fenomeno significativo.

Temperature: nessuna variazione significativa.

Fenomeni meteorologici

01/05/2014 10:00:00 UTC

weather



Centro Funzionale Centrale - Settore Meteo



LEGENDA

Arece di vigilanza meteo Quantitativi giornalieri di Precipitazione previsti

	Assenti o non rilevanti
	Deboli
	Moderati
	Elevati
	Molto elevati

Caratteristiche delle precipitazioni previste

	Pioggie sparse o intermittenti
	Pioggie diffuse e continue
	Nevischio deboli e moderate
	Nevischio abbondanti
	Rovescio o temporali a carattere isolato
	Rovescio o temporali a carattere sovrato
	Rovescio o temporali a carattere diffuso

Altri fenomeni meteorologici di rilievo

	Venti
	Burrasca
	Tempesta
	Frequenti raffiche

	Gelate
	Diffusa formazione di ghiaccio al suolo a quote collinari
	Diffusa formazione di ghiaccio al suolo a quote di montagna

	Nebbie
	Nebbie diffuse nelle ore notturne e del primo mattino
	Nebbie diffuse e persistenti anche nelle ore diurne

	Mari
	Molto mosso
	Agitato e molto agitato
	Grosso e molto grosso

Moto ondoso

	In aumento
--	------------

	Temperature
	In sensibile aumento
	Stabile o in lieve calo
	In sensibile calo
	Temperature minime in calo



Weather warning (only if necessary)

AVVISO METEO

N.° 13043 PROT. DPC/RIA/ 21123 DATATO 06 APRILE 2013

OGGETTO: AVVISO DI CONDIZIONI METEOROLOGICHE AVVERSE

RIFE././ DIRETTIVA PRESIDENTE DEL CONSIGLIO DEI MINISTRI 27-2-2004. "INDIRIZZI OPERATIVI PER LA GESTIONE ORGANIZZATIVA E FUNZIONALE DEL SISTEMA DI ALLERTAMENTO NAZIONALE E REGIONALE PER IL RISCHIO IDROGEOLOGICO E IDRAULICO AI FINI DI PROTEZIONE CIVILE".

UN VORTICE DEPRESSIONARIO PROVENIENTE DAL GOLFO DI BISCAGLIA, TENDE AD INTERESSARE, OGGI, LA SARDEGNA E SUCCESSIVAMENTE LA SICILIA E LA CALABRIA, APPORTANDO CONDIZIONI DI SPICCATA INSTABILITA'.

PER QUANTO ESPOSTO NEL BOLLETTINO DI VIGILANZA METEOROLOGICA NAZIONALE DI IERI, VENERDI 05 APRILE 2013; SULLA BASE DELLA CONCERTAZIONE SINOTTICA DI OGGI NELL'AMBITO DEL GRUPPO TECNICO CON IL SERVIZIO METEOROLOGICO DELL'AERONAUTICA MILITARE, I SETTORI METEO DEI CENTRI FUNZIONALI DELLE REGIONI PIEMONTE ED EMILIA-ROMAGNA; TENUTO CONTO DELL'AVVISO DI AVVERSE CONDIZIONI METEO EMESSO DAL CNMCA; SULLA BASE DEI MODELLI E DELLE INFORMAZIONI DISPONIBILI, ALLE ORE 11,00 DI OGGI, SABATO 06 APRILE 2013, SI EMETTE IL SEGUENTE:

AVVISO DI CONDIZIONI METEOROLOGICHE AVVERSE

"DAL POMERIGGIO DI OGGI, SABATO 06 APRILE 2013, E PER LE SUCCESSIVE 24-36 ORE SI PREVEDONO PRECIPITAZIONI DA SPARSE A DIFFUSE, ANCHE A CARATTERE DI ROVESCIO O TEMPORALE, SULLA SARDEGNA, IN ESTENSIONE A SICILIA E CALABRIA. LE PRECIPITAZIONI POTRANNO ESSERE ACCOMPAGNATE DA ROVESCII DI FORTE INTENSITA', FREQUENTE ATTIVITA' ELETTRICA E FORTI RAFFICHE DI VENTO."

PER LE REGIONI INTERESSATE SI CONFERMANO LE RACCOMANDAZIONI CONTENUTE NELLA DIRETTIVA A RIFERIMENTO. QUESTO DIPARTIMENTO SEGUIRA' L'EVOLVERSI DELLA SITUAZIONE. SI PREGA, QUINDI, DI PORRE ATTENZIONE AI SUCCESSIVI BOLLETTINI DI VIGILANZA EMESSI SUL SITO INTERNET <http://www.protezionecivile.gov.it/>

AI DIRETTI DESTINATARI DEL PRESENTE MESSAGGIO SI COMUNICA CHE LA RICEVUTA DI TRASMISSIONE DELL'INVIO A MEZZO FAX RAPPRESENTERA', PER QUESTO DIPARTIMENTO, LA CERTIFICAZIONE DELL'AVVENUTA NOTIFICA.

ROMA, 10 aprile 2013

IL DIRETTORE DELL'UFFICIO
RISCHI IDROGEOLOGICI ED ANTROPICI
ING. SILVANO MEROI

THE ITALIAN EARLY WARNING SYSTEM



Hydro-Geo

Fenomeni meteorologici significativi previsti per il giorno 22/10/2008



QPF

Stazione	Altitudine (m)	Valori previsti										Valori reali	Valori previsti	Valori reali
		1	2	3	4	5	6	7	8	9	10			
Stazione 1	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 2	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 3	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 4	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 5	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 6	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 7	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 8	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 9	1000	10	10	10	10	10	10	10	10	10	10	10	10	10
Stazione 10	1000	10	10	10	10	10	10	10	10	10	10	10	10	10

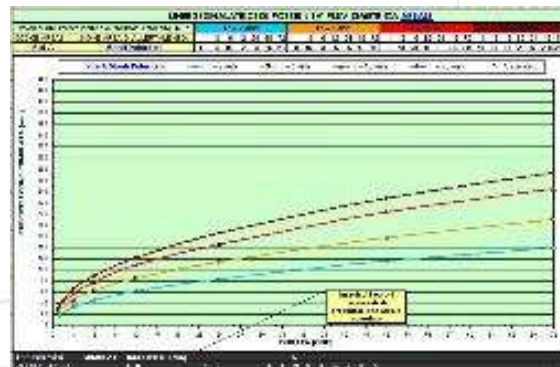
Rain gauges data

Soil moisture

River gauges data

snowmelt

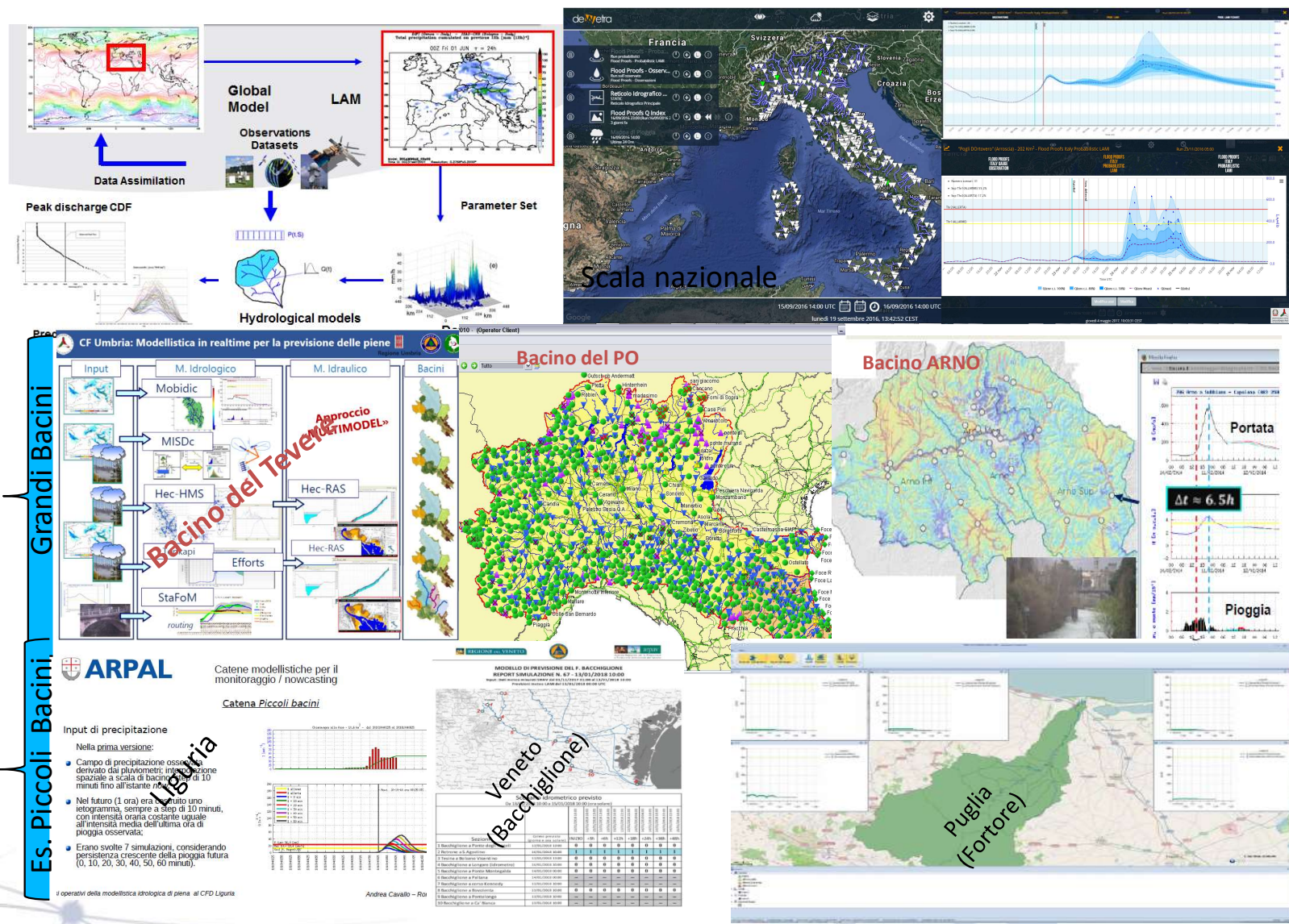
landslides



Complex thresholds



Modellistica in realtime operativa presso la Rete dei Centri Funzionali

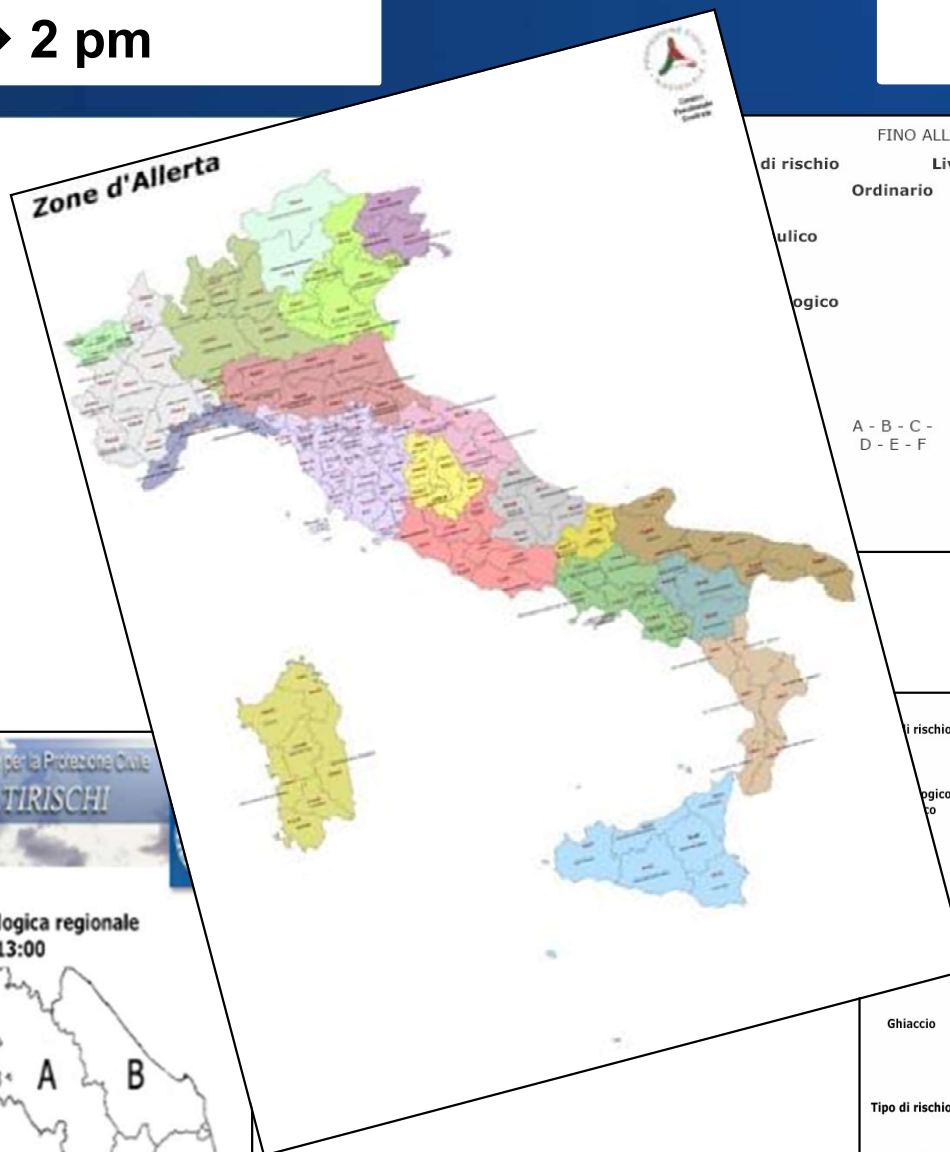


THE ITALIAN EARLY WARNING SYSTEM



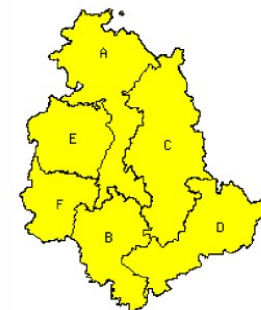
11 am → 2 pm

Hydro-Geo



FINO ALLE ORE 24 DI OGGI Giovedì, 20 Gennaio 2011

di rischio	Livello di criticità			Mappa di sintesi delle criticità
	Ordinario	Moderato	Elevato	(ordinaria, moderata, elevata)
Idrologico				
Idrogeologico				



A - B - C -
D - E - F

REGIONE MARCHE
Dipartimento per la politica integrata di Sicurezza e per la Protezione Civile
CENTRO FUNZIONALE MULTIRISCHI

**Bollettino di Vigilanza Meteo-Idro-Geologica regionale
di Giovedì 20/1/2011 - ore 13:00**

Data Emissione 20/1/2011 ore 13:00 locali
Inizio validità 21/1/2011 ore 00:00 locali
Fine validità 21/1/2011 ore 24:00 locali

Avvertenze di carattere meteorologico: Per la giornata di venerdì 21 segnalano nevicate fino a quote basso-collinari più abbondanti nelle zone interne.

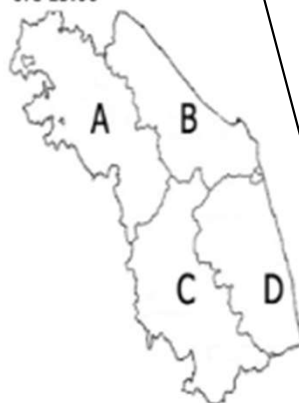
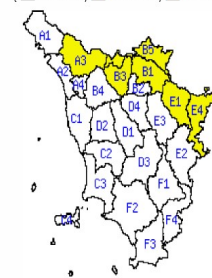


Tabella di Sintesi Giovedì, 20 Gennaio 2011

di rischio	Livello di criticità			Mappa di sintesi delle criticità
	Ordinario	Moderato	Elevato	(ordinaria, moderata, elevata)
Idrologico				
Idrogeologico				

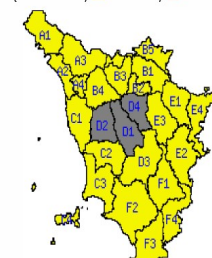


A3 - B1 - B3 - B5 -
E1 - E4

Ghiaccio

Tabella di Sintesi Venerdì, 21 Gennaio 2011

Tipo di rischio	Livello di criticità			Mappa di sintesi delle criticità
	Ordinario	Moderato	Elevato	(ordinaria, moderata, elevata)
Idrogeologico				
Idraulico				



Vento

D1 - D2 - D3 - D4 -
E1 - E2 - E3 - E4 -
F1 - F2 - F3 - F4

Mareggiate

Neve

A3 - B2 - B3 - D1 -
D4

THE ITALIAN EARLY WARNING SYSTEM



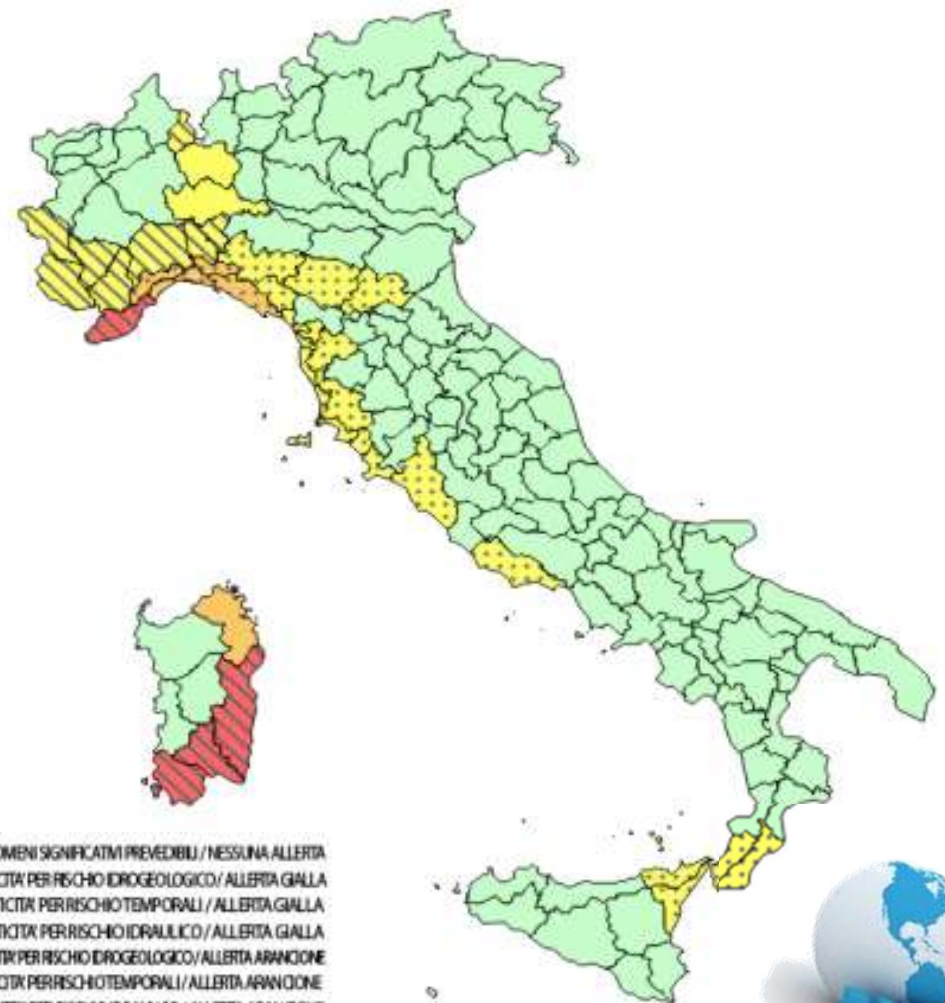
4 pm →

Hydro-Geo



AGGIORNAMENTO EFFETTI AL SUOLO PREVISTI PER Mercoledì 10 ottobre 2018

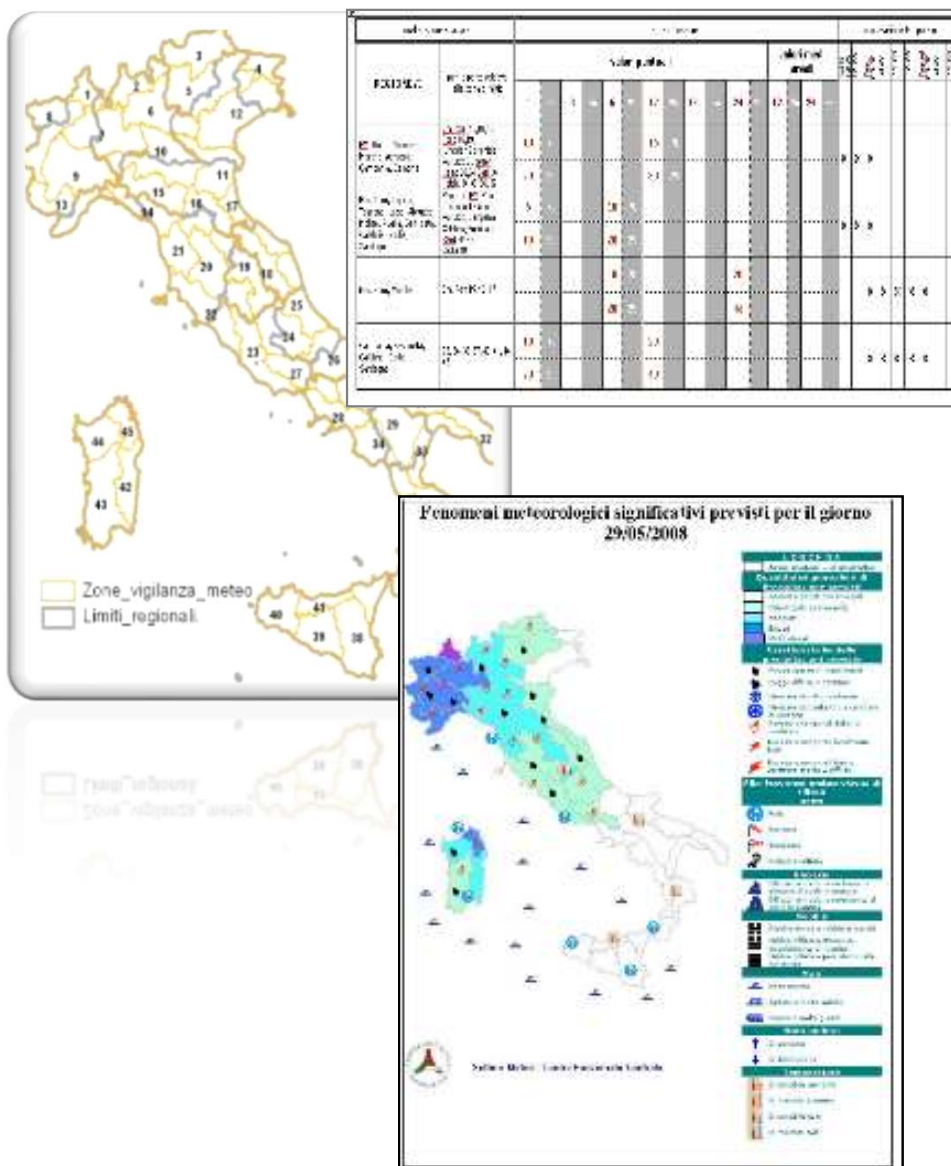
EFFETTI AL SUOLO PREVISTI PER Giovedì 11 ottobre 2018



- ASSENZA DI FENOMENI SIGNIFICATIVI PREVEDIBILI / NESSUNA ALLERTA
- ORDINARIA CRITICITÀ PER RISCHIO IDROGEOLOGICO / ALLERTA GIALLA
- ORDINARIA CRITICITÀ PER RISCHIO TEMPORALI / ALLERTA GIALLA
- ORDINARIA CRITICITÀ PER RISCHIO IDRAULICO / ALLERTA GIALLA
- MODERATA CRITICITÀ PER RISCHIO IDROGEOLOGICO / ALLERTA ARANCIONE
- MODERATA CRITICITÀ PER RISCHIO TEMPORALI / ALLERTA ARANCIONE
- MODERATA CRITICITÀ PER RISCHIO IDRAULICO / ALLERTA ARANCIONE
- ELEVATA CRITICITÀ PER RISCHIO IDROGEOLOGICO / ALLERTA ROSSA
- ELEVATA CRITICITÀ PER RISCHIO IDRAULICO / ALLERTA ROSSA
- VALUTAZIONE NON TRASMESSA



WEATHER



HYDRO-GEO

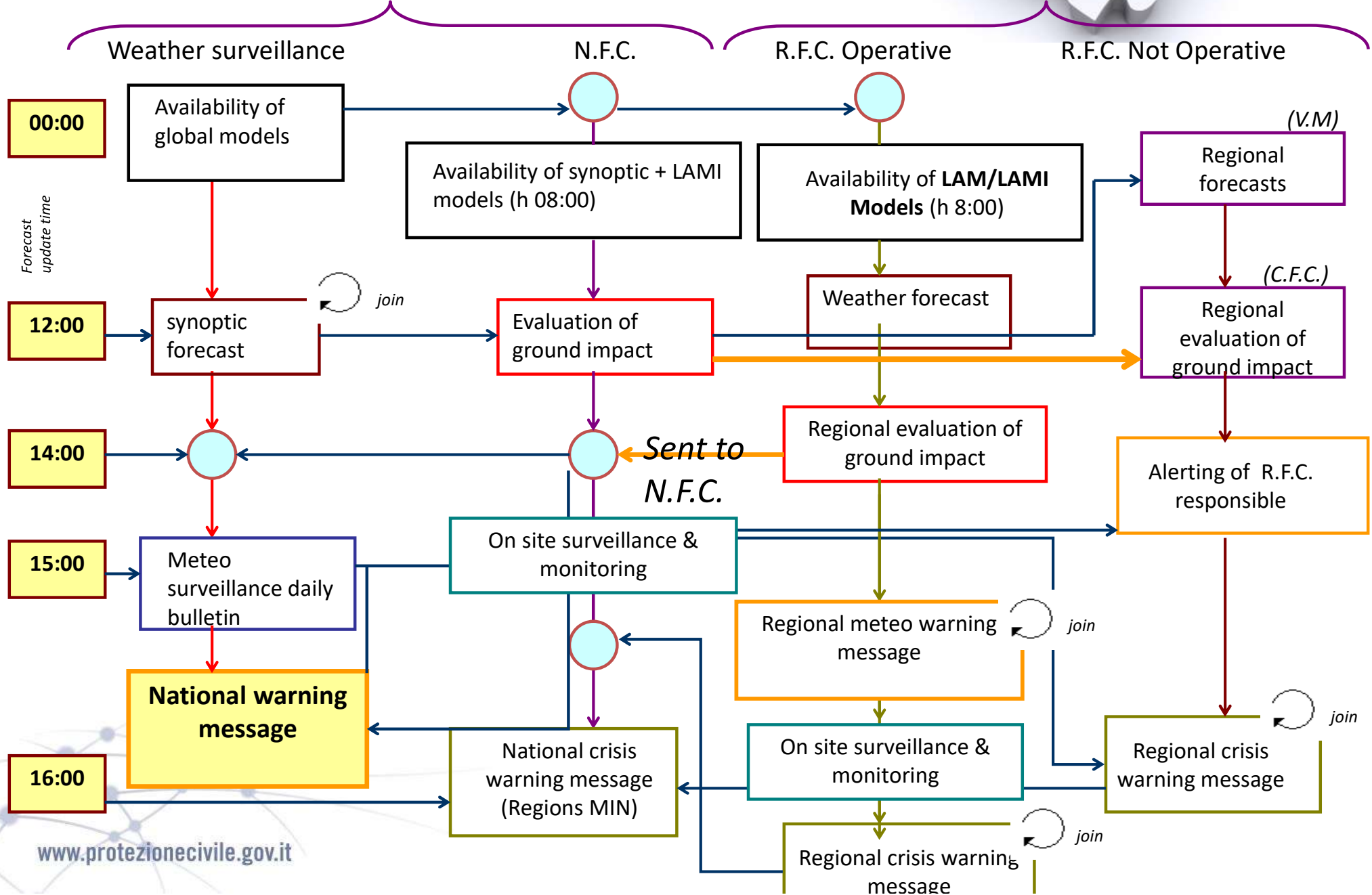


Standard Operational procedure

Centro Funzionale Centrale



Regions

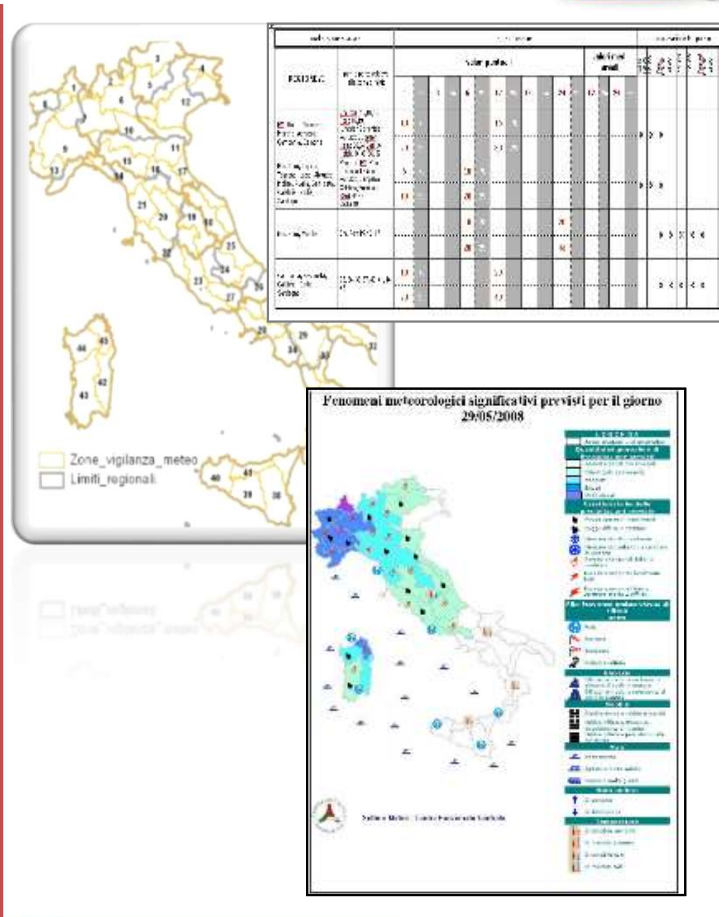


Impact based forecasting

Dir. P.C .M. 27/02/2004

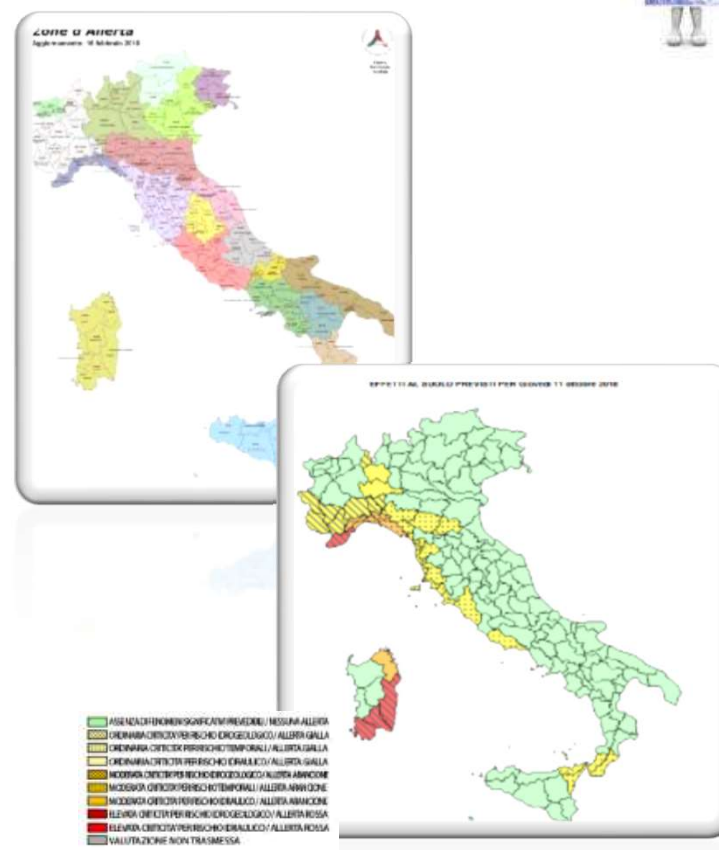
WEATHER

METEO



HYDRO-GEO

HYDRO

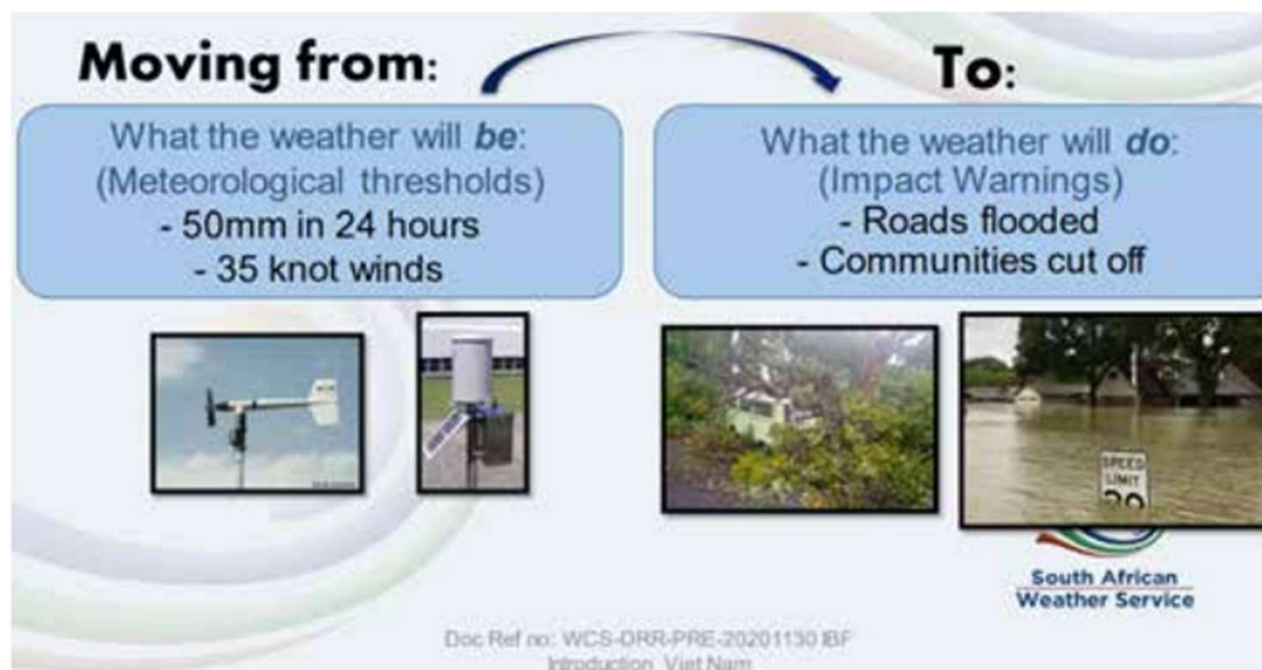


Why do the user need impact based forecasting?

Are 50mm/24 hr an heavy/exceptional rain?

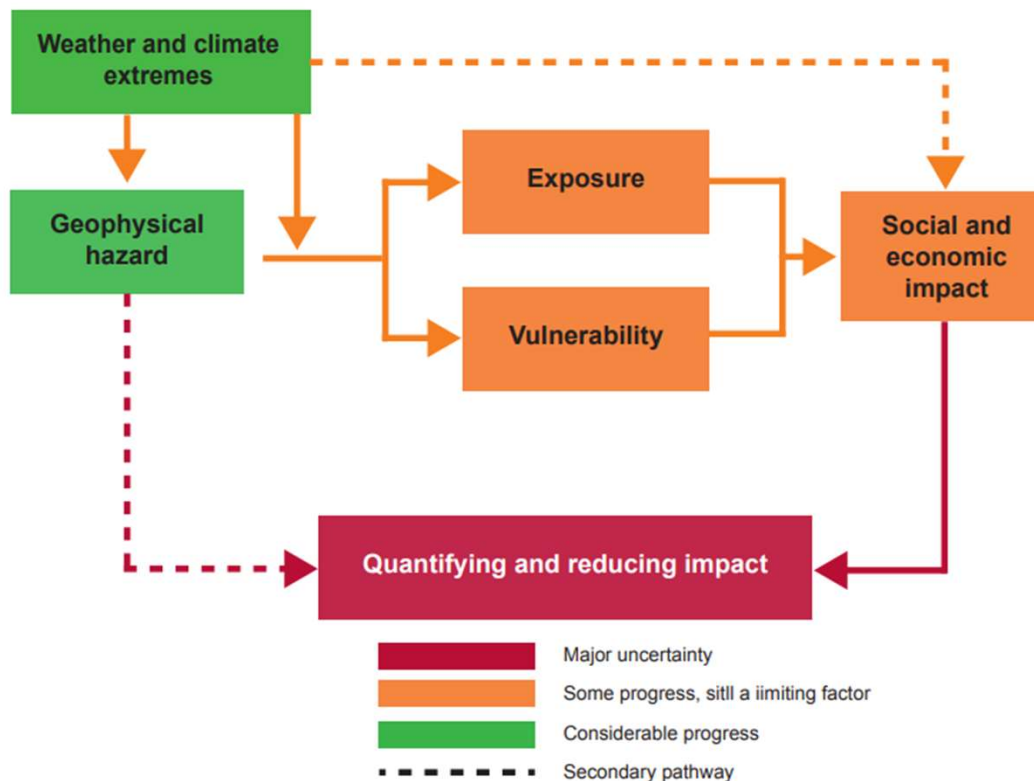
Could 50mm/24hr cause any damage in this area?

Which kind of effects I can expect?



Impact based forecasting conceptual paradigm

Similarly to Flood directive approach:
Flood risk has to be evaluated in the 3 components: H,V,E (and then managed, in the 3 components: H,V,E)

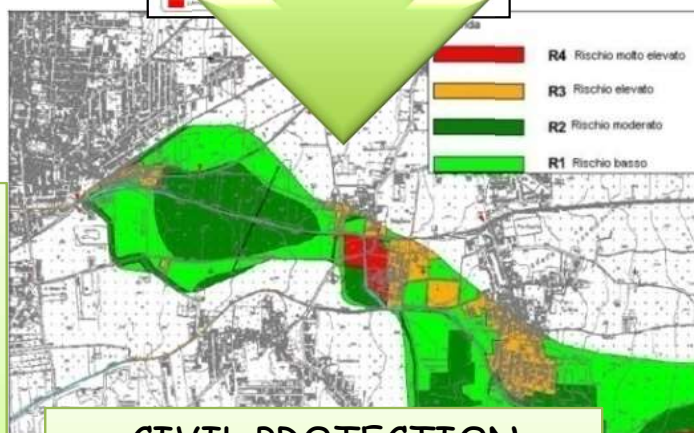
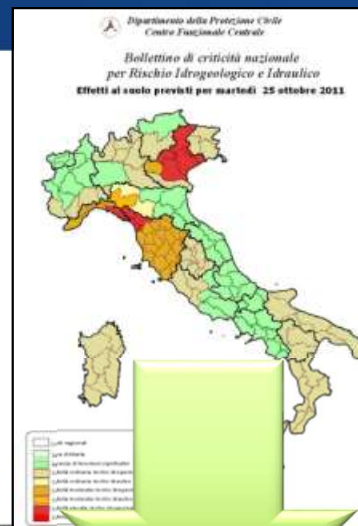


«phased» impact based warning

REAL time
assessment

NO-REAL time
assessment:
FRMP+study of
local mechanisms
of flooding

CIVIL PROTECTION
PLANS



Warning messages
predefined **generic impact
scenario** (assumptions on E,V
at alert area scale)

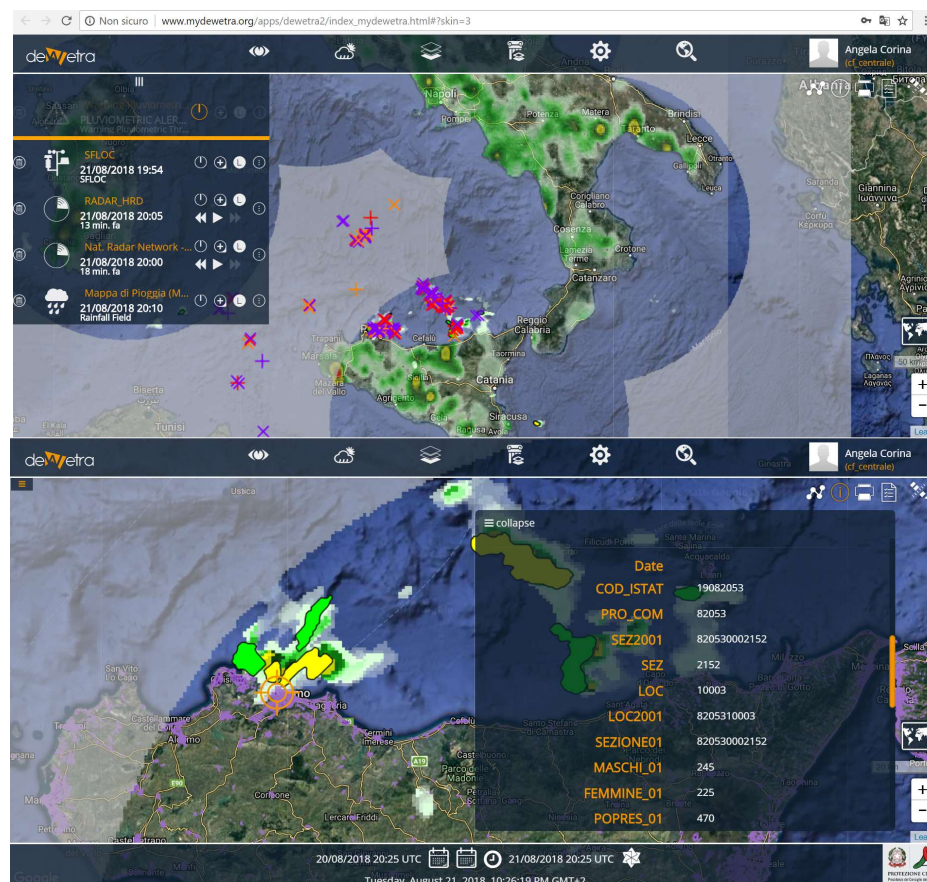
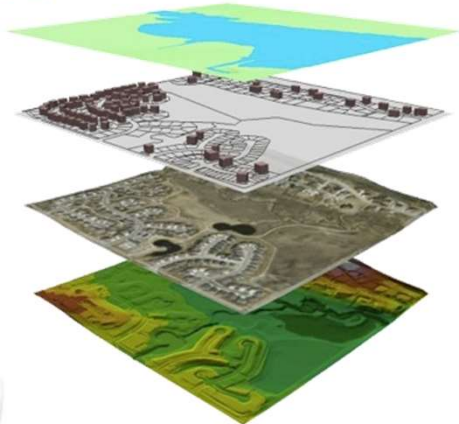
Communication to
the public:

- **Specific impact
scenario (Exposure,
Vulnerability)**
- actions to mitigate
risk
- safety instructions

Impact-based monitoring

myDEWETRA is an integrated system for real-time monitoring, prediction and prevention of natural disasters worldwide.

It improves the accessibility and comparability (Compare, Integrate and Synthesize) of hazard, exposure and risk information and data at multiple level

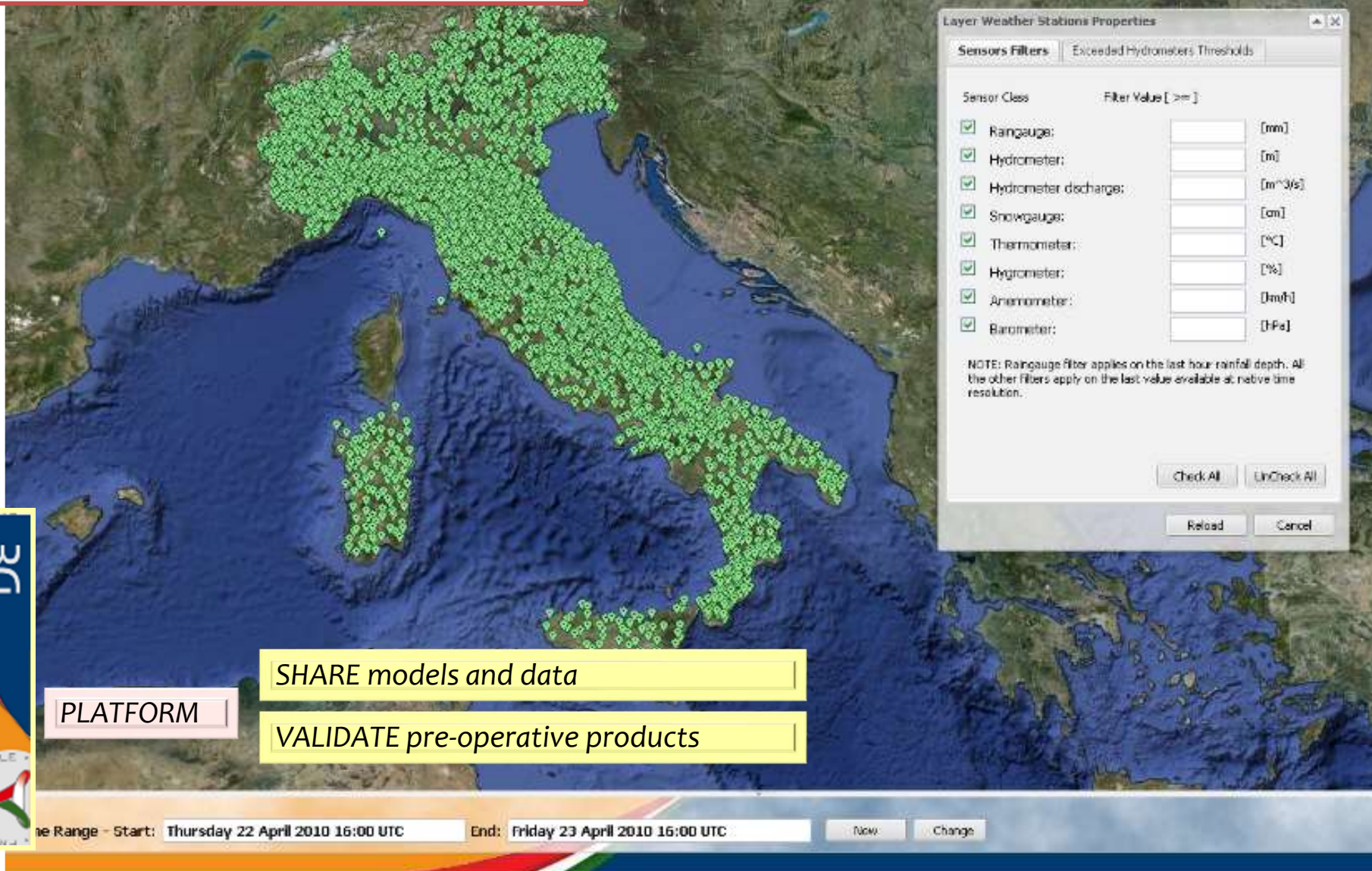




EWS Monitoring phase

> **5200** stations, including:

- rain gauges,
- river gauges
- other sensors (termometers, snow gauges, anemometers)



EWS Monitoring phase

RI - 22-05-2013 ore 12:20 UTC



VMI - 22-05-2013 ore 12:20 UTC



EWS Monitoring phase

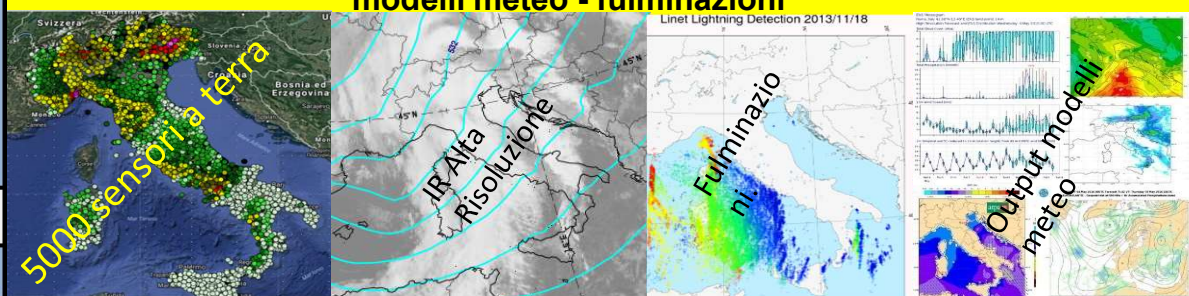




- ✓ **Acquisisce 200 Volumi Polari ogni ora complessivamente**
- ✓ **Genera più di 200 prodotti ogni ora complessivamente**
- ✓ **Genera e dissemina prodotti a scala nazionale H24 con Frequenza di 5 min attraverso diverse piattaforme**

APPROCCIO MULTI SENSORE- MULTI PARAMETRICO

**Sinergia radar – rete a terra – rete satellitare
modelli meteo - fulminazioni**



Raw	Basic	Precipitation	Warnings
ClutterMask Quality VPR Attenuation PBB BrighBand KDP Sampling	VMI ETM CAPPI (8) Quality	SRI VIL POH SRT_1h_24H SRI_adj SRT_adj SRT_Merging Radar-Pluvio Persistenza	HRD HRW HRM HRT
Dati	Prodotti		
23 Radar oltre 200 Volumi/h	oltre 100 Prodotti/h	oltre 50 Prodotti/h	48 Prodotti/h
Distribuzione	Utenti		
Sito ftp HDF	oltre 20 utenti ogni 5 minuti HDF BUFR TIF SHP JPEG		

Validation	Satellite	Models	Sensors	Volcano
Assessment Adjustment Reports Intercalibration	TOP AMV RGB IR_108	FLH GroundTemp Wind	Raingauges Radiosoundings Lightnings GRISO	VAM MDR Mass



Italian EWS: the chain of responsibilities (Dir. PCM 27 Feb 2004)

RETE DEI CENTRI FUNZIONALI



DICHIARAZIONE DEI LIVELLI DI CRITICITÀ ATTESI

Assenza di fenomeni significativi prevedibili

Criticità ordinaria

Criticità moderata

Criticità elevata

REGIONI - PROTEZIONE CIVILE



DICHIARAZIONE DEI LIVELLI DI ALLERTA

Allerta gialla

Allerta arancione

Allerta rossa

Interventi strutturali

CITTADINI



NORME DI AUTOPROTEZIONE



COMUNI



ATTIVAZIONE DELLE FASI OPERATIVE PREVISTE NEL PIANO DI EMERGENZA COMUNALE

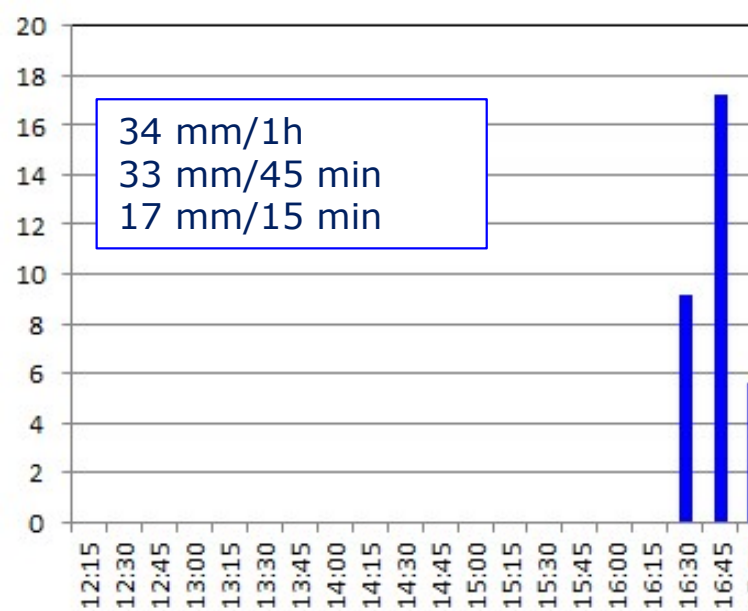
Attenzione

Preallarme

Allarme



VULNERABILITY



The problem !

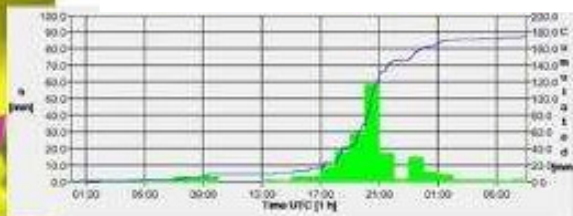
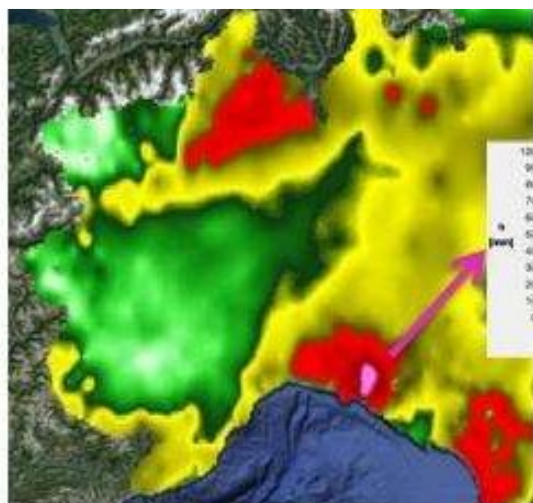
FORECAST PHASE

Bollettino di criticità
November 15th, 2014



Forecast for the Centa river performed by CF of Liguria Region on 14th Nov for the day after (source CF-ARPA Liguria)

MONITORING PHASE



- 58,4 mm in 1 h
 - 104,6 mm in 3h
 - 174,8 mm in 24 h

Satellite activation



Observation. Prediction. Prevention.

Guest



PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

WMO makes freely available a GIS web-platform – **my dewetra** – intended to improve the national capacity for real time risk assessment and access and sharing of world-wide risk data, tools and methodologies



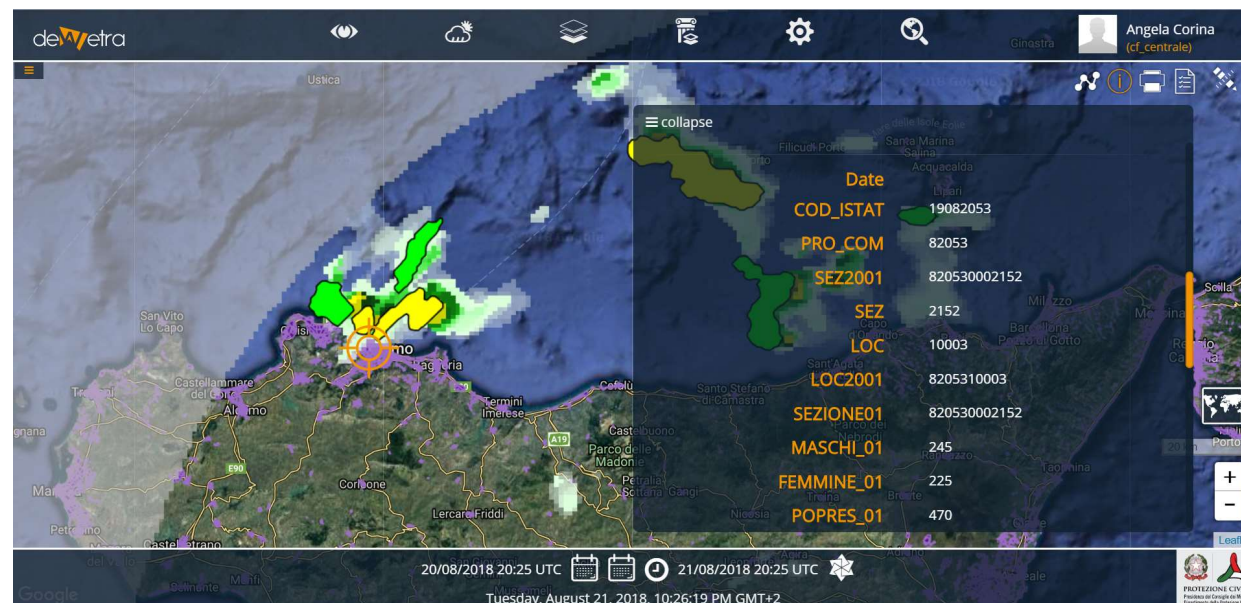
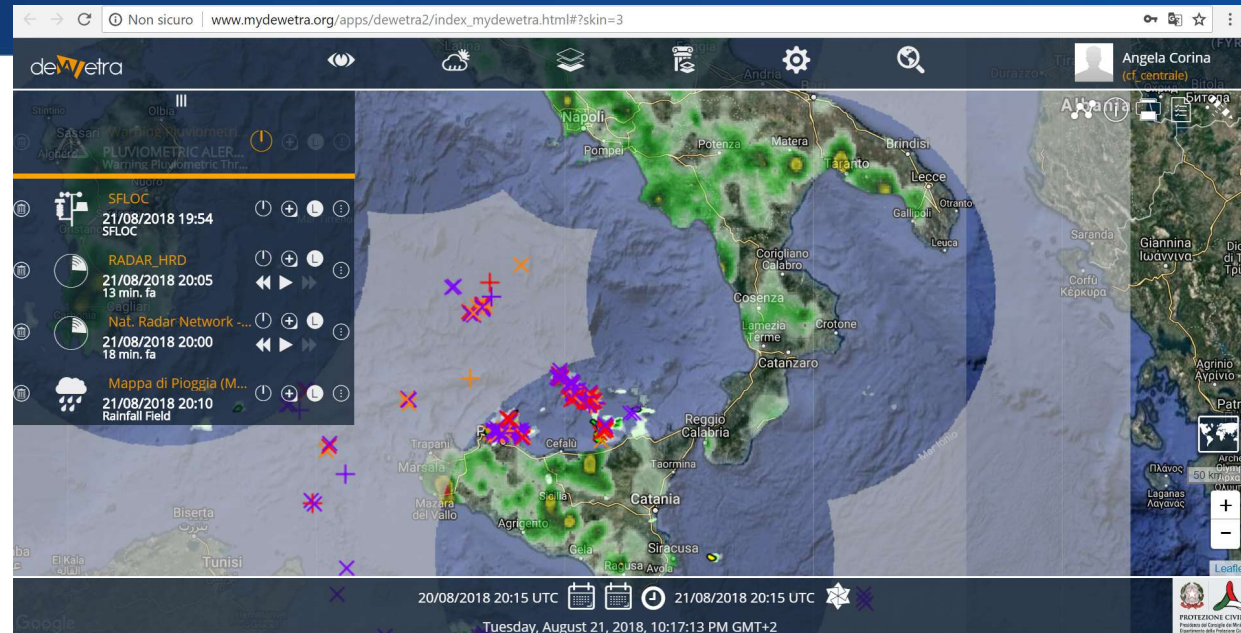
My Dewetra: Real time Risk data hub and DSS

the basic idea

myDEWETRA is an integrated system for real-time monitoring, prediction and prevention of natural disasters worldwide.

It improves the accessibility and comparability (Compare, Integrate and Synthesize) of hazard, exposure and risk information and data at multiple level

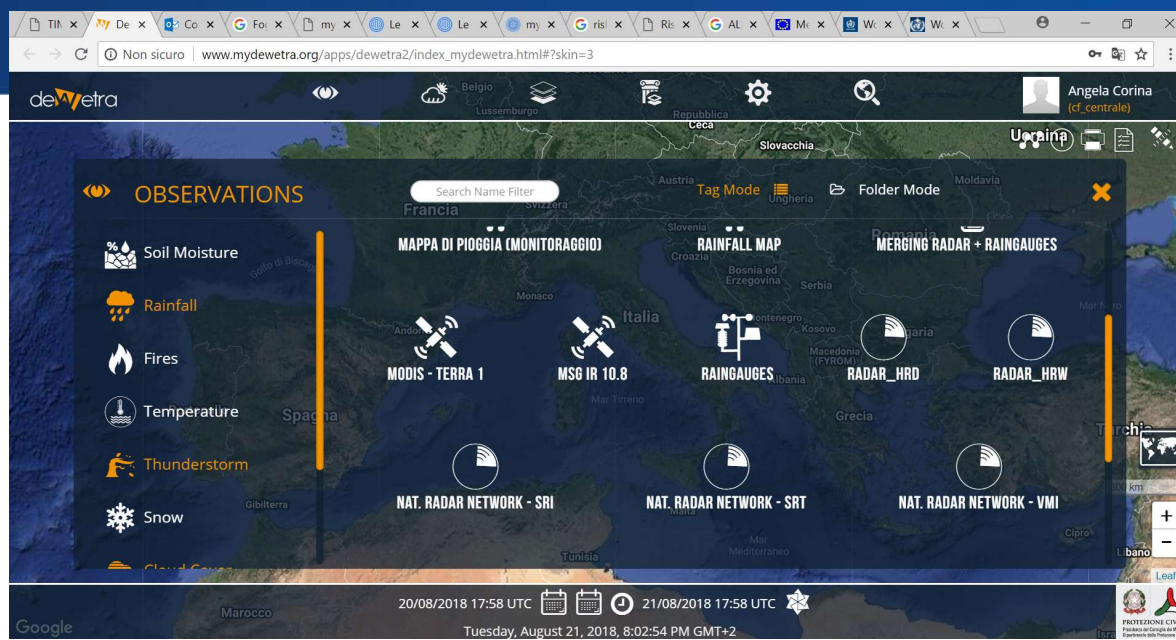
$$R = E \times V \times H$$



My Dewetra: convergence platform

Integrating different data sources

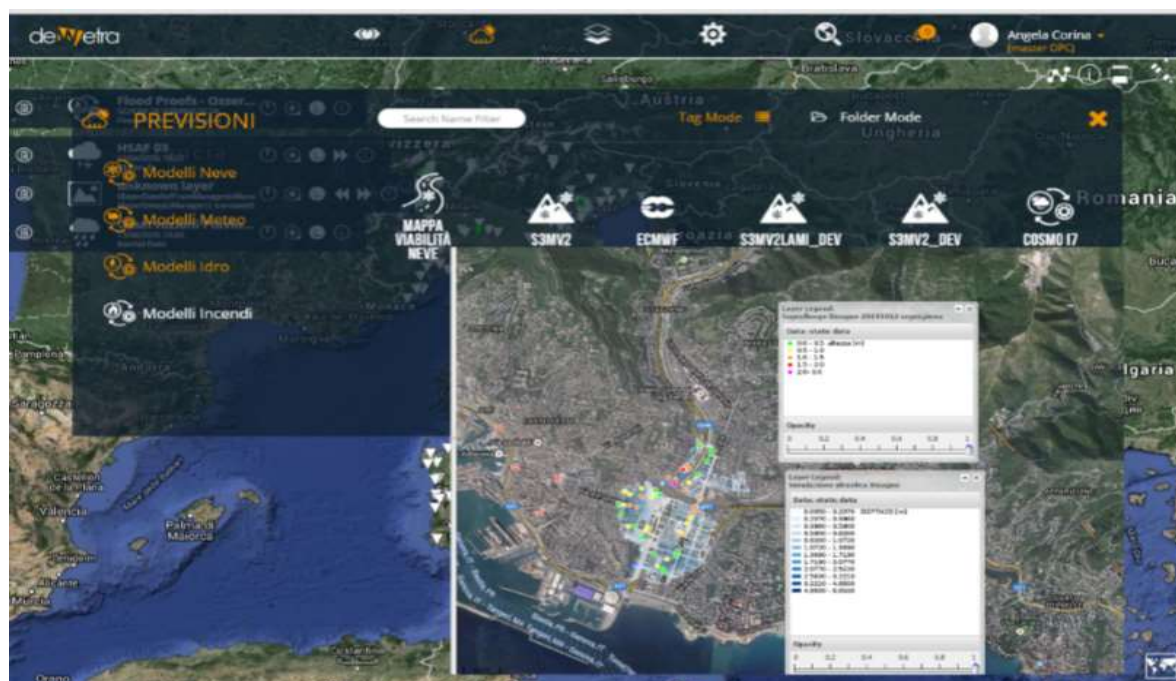
The platform MyDEWETRA is a web-portal aimed at data visualization from different sources and ensures interoperability with already existing webservices and complies with main relevant international standards



Geospatial, Logical, Temporal integration

Integrating GIS and weather/water observations and predictions

All spatial scales: from global to local
dynamic data synchronization

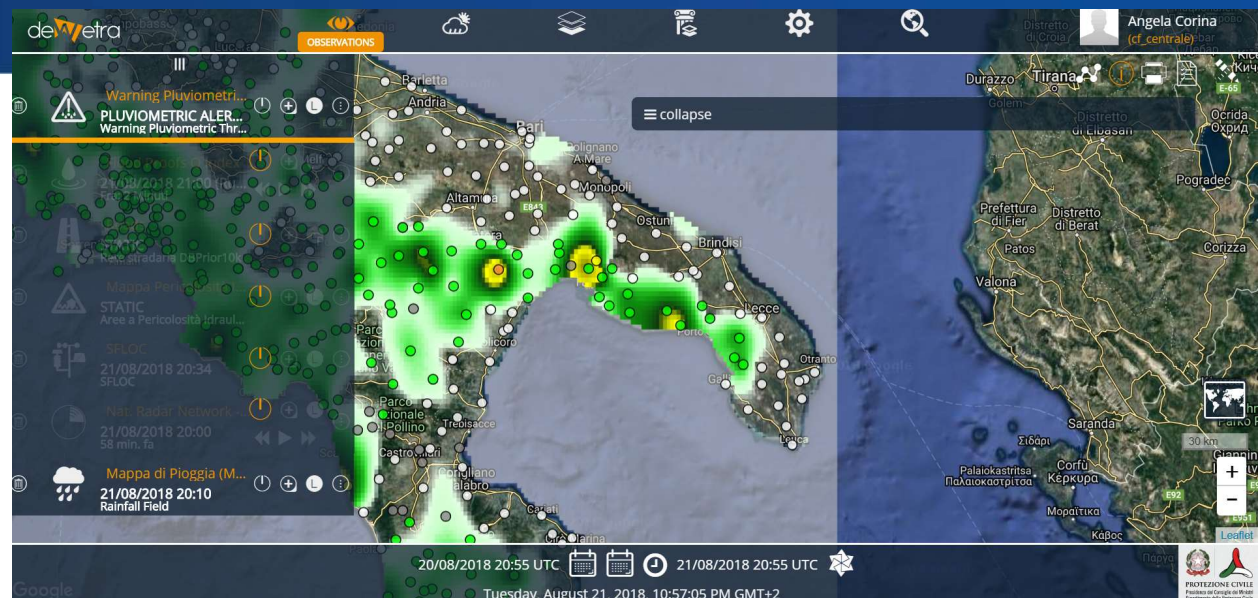


My Dewetra: synthesis

synthesis

the system allows to render data collected in a immediate, understandable and valuable way.
hazard warning functions automatically notify forecasters when user-defined thresholds for a user-defined variable/ parameter are crossed.

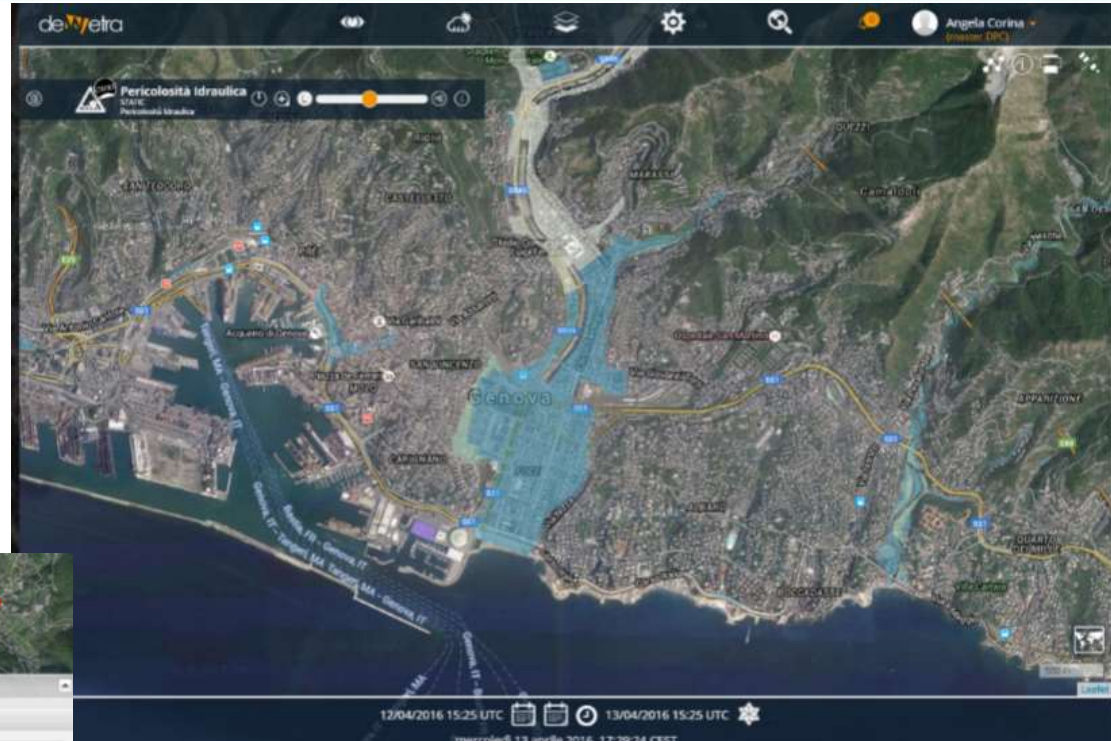
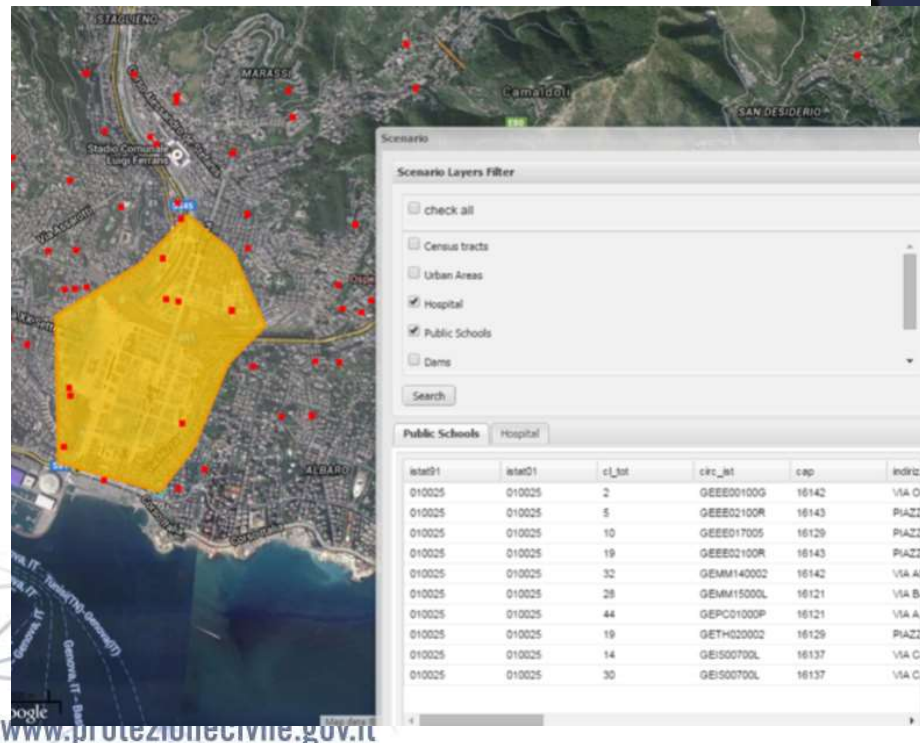
Different levels of aggregation from national to local level and in time, intuitive and user-friendly graphical interface.



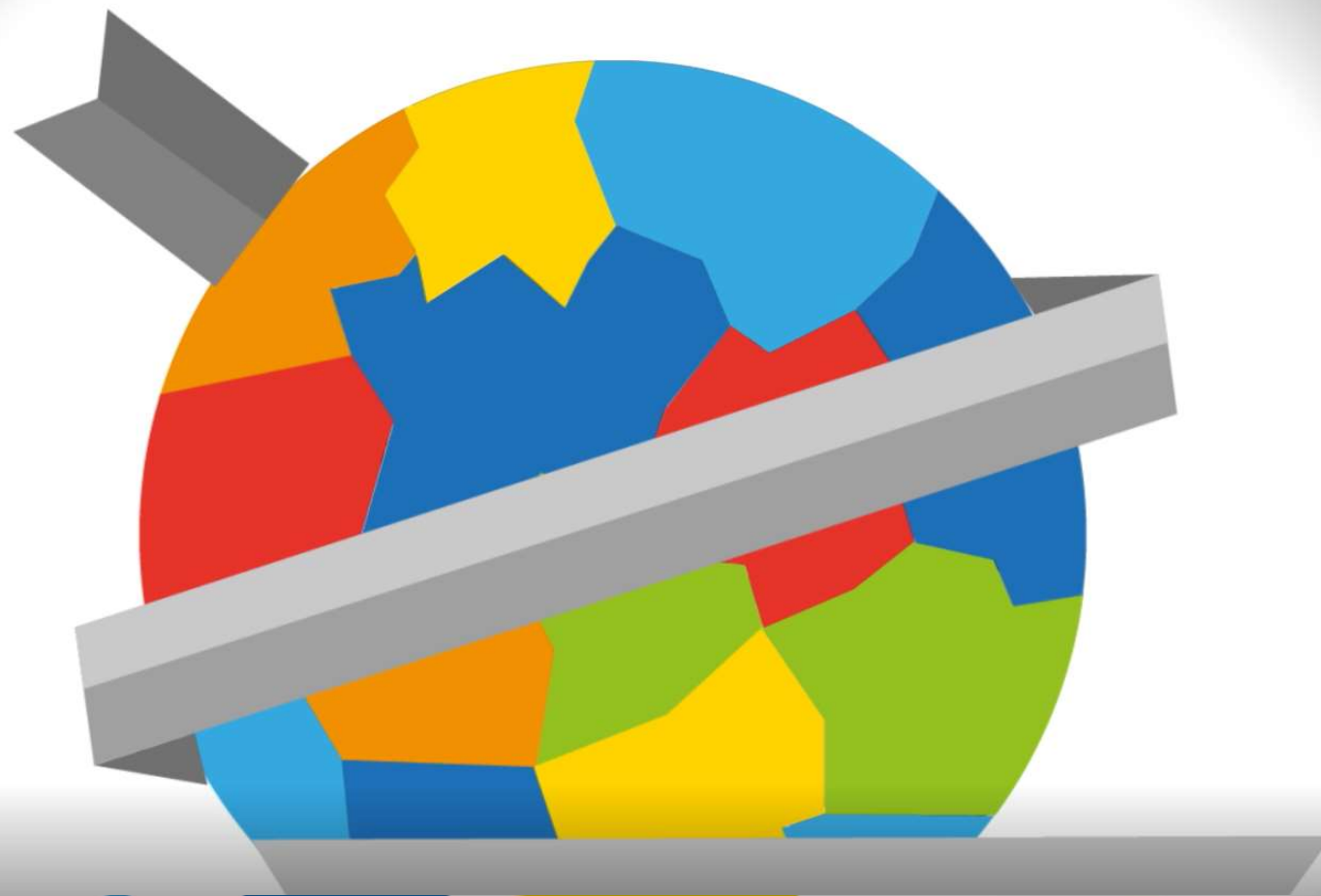
My Dewetra: risk scenario builder

impact based analysis

The application provides, through a graphical interface, a high-resolution and continuously updated information, allowing the user to monitor weather and flood events, to build detailed risk scenarios and evaluate the potential impact of the phenomena on communities and infrastructure.

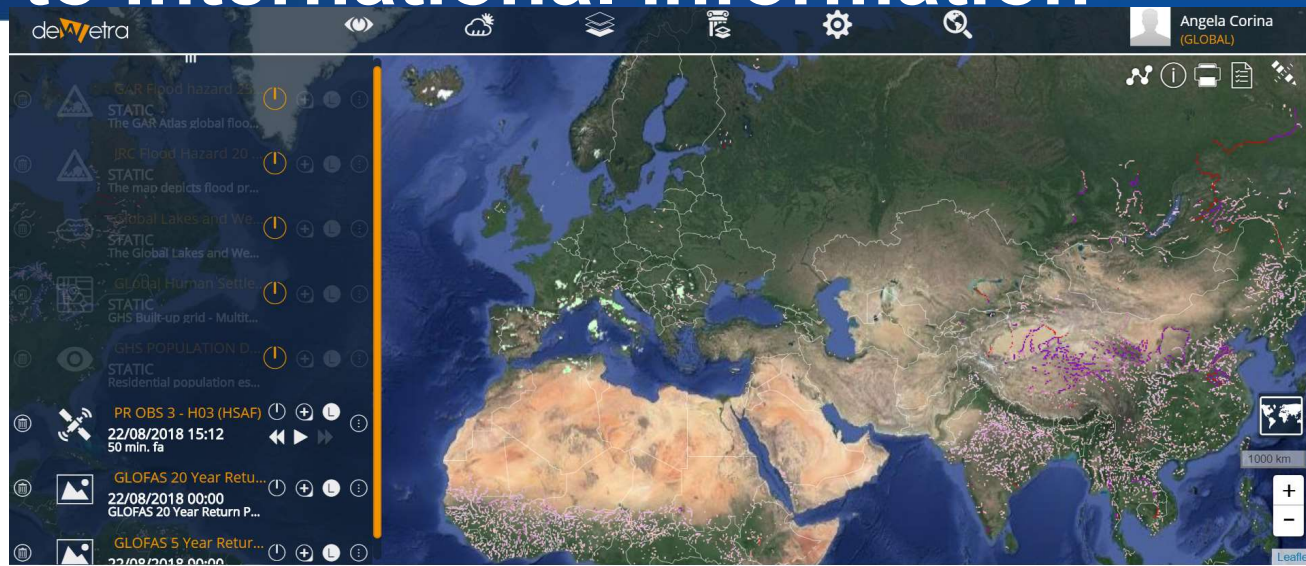


MYDEWETRA.WORLD



MYDEWETRA.WORLD: single access point to international information

Several monitoring and forecasting products and global datasets are included as a basic version of MyDEWETRA; the data are either free available or open data. A number of products and datasets are already available to Partner Countries and others are in the way to be integrated



HOME

ABOUT

USERS

TRAININGS

ACCESS

NEWS

FAQ

PORTAL LOGIN

OBSERVATION. PREDICTION. PREVENTION.

myDEWETRA.world

Overview of risk dataset, products and services considered (draft)

Observational data	Fonte
GSMaP (Satellite product: rainfall rate)	NASA-JAXA
IMERG 1-day / 3h / 30min (Satellite product: rainfall rate)	GPM
HSAF H03B/H05B (Satellite products: instantaneous and cumulated rainfall rate)	DPC (HSAF) – as demonstration
MSG IR 10.8 (Cloud cover and Could top Temperature)	EUMETSAT
Fire Radiative Power	EUMETSAT LSA-SAF

Dato	Fonte
GHE -global hydro estimator	NOAA-NESDIS
OPERA	EUMETNET
Global Precipitation Climatology Centre (GPCC)	NOAA
Climatic Research Unit Timeseries (CRUTS)	NOAA
Stazioni a terra non ufficiali	METEO-NETWORK
Stazioni a terra non ufficiali	WEATHERUNDERGROUND
Dati idrologici	WHYCOS/ WHOS
SPEI	Spanish National Research Council
SPI	Columbia University
NASA Landslide Viewer	NASA
LHASA	NASA
ASCAT	NOAA
ASCAT/AMSRE/MIRAS-SMOS	NOAA/ EUMETSAT
Dati a terra umidità del suolo	International Soil Moisture Network (ISMN)
GLDAS	NASA
HSAF	Eumetsat
MSG composites	EUMETSAT
GOES	NASA
HIMAWARI-8	JMA
Active Fire Data	NASA
MODIS burned area products	NASA
Dati bio-geofisici dello stato del suolo	Copernicus Global Land Service
Dati bio-geofisici dello stato dell'aria	Copernicus Atmosphere Monitoring Service
Disaster Alert in RT	GDACS
Dati satellitari Land-SAF	Land-SAF
Copernicus Global Land Service	

Overview of risk dataset, products and services considered (draft)

Forecast data	Fonte
GFS 0.5 / 0.25 (meteorological forecasting system)	NOAA
RISICO World (fire danger forecast)	CIMA
EFAS*	JRC
* In development	

Forecast data	Fonte
Flash Floods Guidance System	HRC San Diego
GLOFAS	ECWMF
EFFIS	JRC
Meteoalarm	MeteoAM
Forecast cone track	NHC
GMAS	?

Event data	Fonte
EMDAT	Centre for Research on the Epidemiology of Disasters (CRED)
NatCat	MunichRe
DesInventar	UNISDR
Disaster loss data	
Copernicus EMS	Copernicus

Overview of risk dataset, products and services considered (draft)

Dato	Fonte
GHS BUILT-UP GRID (LDS)	JRC
GHS POPULATION GRID (LDS)	JRC
Flood Map Global	JRC
Administrative Boundaries	GADM
GAR 2015 Flood risk maps	UNEP/UNISDR
GAR 2015 Physical exposure to flood	UNEP/UNISDR
GAR 2015 Economical exposure to flood	UNEP/UNISDR
Global Health facilities	HOT, ICRC, IHF
Hydrosheds River Network and basins	USGS, WWF
Global road transport network	ESRI
Global Lakes and Wetlands Database	WWF
Road transport	OSM
European Settlements Map	JRC
10m 2016	
Population density in Europe 2016	Eurostat

Dato	Fonte
ESM 2014	JRC
GEOSTAT 2011 and GEOSTAT 2006 population grid dataset	Eurostat
NUTS 2016	Eurostat
Corine Land Cover (2012)	Copernicus
Flood Map Europe	JRC
Sud America, Africa, Asia	University of Southampton
Risk data hub	JRC eroga la piattaforma fonti diverse per ogni dato
ESDAC	JRC
pfra-apsfr	EU

Dato	Fonte
GHS SETTLEMENT GRID (LDS)	JRC
GHS BUILT-UP Sentinel-1 GRID	JRC
GAR 2015 Earthquakes exposure and risk maps	UNEP/UNISDR
GAR 2015 Fire density	UNEP/UNISDR
Land cover, Fire burned area, vegetation, water bodies	Copernicus Global Land Service
ESRI data and maps	ESRI
Global Reservoir and Dam Database	Global Water System Project, Bonn, Germany
Different data on population land use, infrastructure and environment	Sedac (NASA)

an **integrate real-time** system for **hydro-meteorological forecasting and monitoring for Civil Protection**



-  Interactive map on web gis platform
-  Charts
-  Maps animation
-  Automatic Warnings for forecasters
-  Spatial and temporal data synchronization
-  On-the-fly data aggregation

-  Open Source
-  International Standards:
OGC and INSPIRE Compliant
-  System in Cloud
-  Multi language
English, Italian, Spanish and French
-  Multiple user profile
-  Intuitive and user-friendly
graphical interface

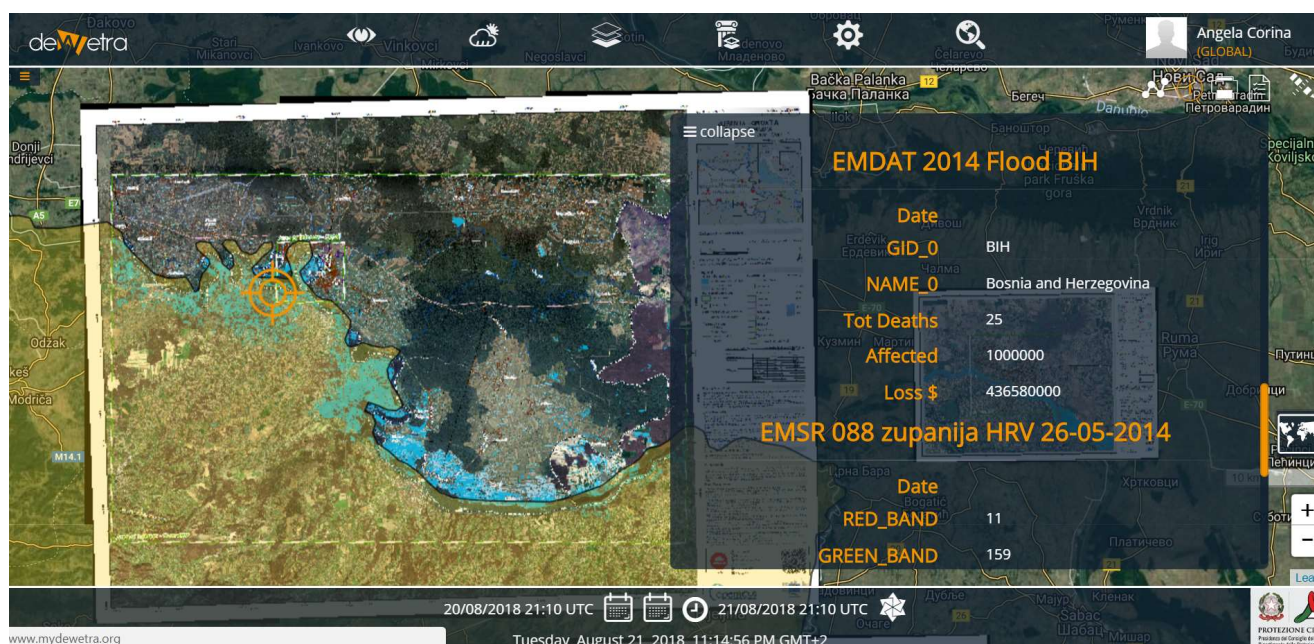
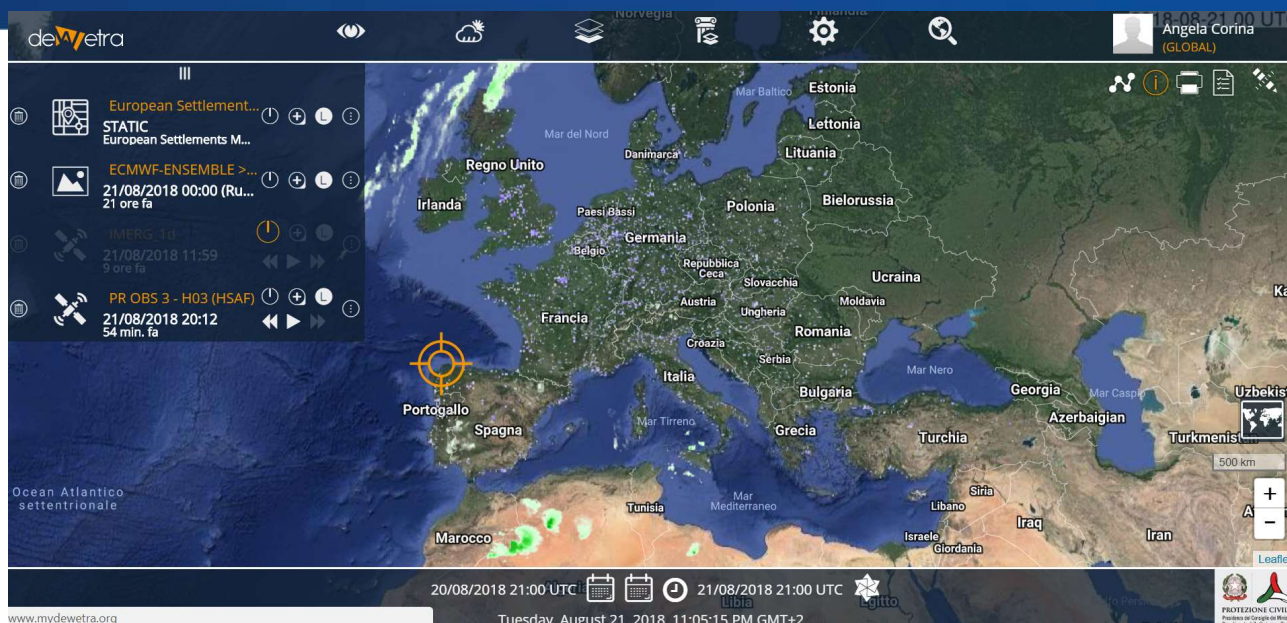
Implementation in a Partner Country

MyDewetraWorld+ Country Partner customization

My dewetra aims to help single member states to prepare their own real time risk assessment, using detailed data coming from all administrative levels, (ad-hoc configuration and link to local db).

Scalable components: HW, staff skills, maintenance and assistance, implementation, trainings.

Anyway, the possibility to access the version of the platform with global risk data (myDewetraWorld) is offered



MYDEWETRA.WORLD WMO-NCDP



myDEWETRA

AN INTEGRATED REAL-TIME SYSTEM FOR HYDRO-METEOROLOGICAL FORECASTING AND MONITORING



www.mydewetra.world

Table 1: Summary table for myDEWETRA.world configurations

	LEVEL 1			LEVEL 2		LEVEL 3
	Level 1.0 myDEWETRA.world Id	Level 1.1 myDEWETRA. world + local geospatial data	Level 1.2 myDEWETRA.world + local geospatial data + dynamic data	Level 2.0 NAME.myDEWETRA.world Id + local geospatial data	Level 2.1 NAME.myDEWETRA.world + local geospatial data + dynamic data	Level 3.0
Available Datasets	Global datasets					Global datasets can be linked
Additional Data sets	No additional data can be uploaded	Static data can be uploaded through a local geoserver or on the Cloud server managed by CIMA on behalf of DPC	Additional to Level 1.1, dynamic data can be uploaded through the installation of myDEWETRA node (data server) on a local server. Dynamic data should be provided in formats compatible with myDEWETRA data infrastructure	Static data shall be uploaded through a local geoserver or on the Cloud server managed by CIMA on behalf of DPC	Additional to Level 2.0, dynamic data can be uploaded through the installation of myDEWETRA node on a local server. Dynamic data should be provided in formats compatible with myDEWETRA data infrastructure	Static data shall be uploaded through a local geoserver, dynamic data can be uploaded through the installation of myDEWETRA node on a local server. Dynamic data should be provided in formats compatible with myDEWETRA data infrastructure
Required Hardware and Software	PC, browser and good internet connection	PC, browser and good internet connection	PC, browser, server(s) with specific requirement as per Annex C	PC, browser, server(s) for geoserver(s), and good internet connection	PC, browser, server (s) with specific requirement as per Annex C	PC, browser, server(s) with specific requirement as per Annex C
Required staff for maintenance	None	GIS for uploading new data	GIS for uploading new data and IT expert for uploading new dynamic data and ensuring data transmission	GIS for uploading new data	GIS for uploading new data and IT expert for uploading new dynamic data and ensuring data transmission (usually the personnel is available in Partner Organization, no additional staff required)	IT administrator + GIS for uploading new data and IT expert for uploading new dynamic data and ensuring data transmission (at least one additional IT administrator)
Customization of myDEWETRA.world Interface	Interface cannot be customized			Interface can be customized Dashboard can be changed as well		Interface can be fully changed and customized. Dashboard can be changed as well
Maintenance of the system	Maintenance of the web interface and the global datasets is free of charge for the Partner Organization and is guaranteed by DPC through technical support of CIMA	Maintenance of the web interface and the global datasets is free of charge for the Partner Organization and is guaranteed by DPC through technical support of CIMA. Partner Organization will be responsible for the maintenance of the local geoserver	Maintenance of the web interface and the global datasets is free of charge for the Partner Organization and is guaranteed by DPC through technical support of CIMA. Partner Organization will be responsible for the maintenance of the local myDEWETRA.world node (dataserver)	Maintenance of the web interface and the global datasets is free of charge for the Partner Organization and is guaranteed by DPC through technical support of CIMA. Partner Organization will be responsible for the maintenance of the local geoserver	Maintenance of the web interface and the global datasets is free of charge for the Partner Organization and is guaranteed by DPC through technical support of CIMA. Partner Organization will be responsible for the maintenance of the local myDEWETRA.world node (dataserver)	Maintenance of the web interface is under the responsibility of Partner Organization
Integration of new functionalities developed by the Partner Organization	Possible, after approval of DPC	Possible, after approval of DPC	Possible, after approval of DPC	Possible, after approval of DPC	Possible, after approval of DPC	Yes
System Upgrade	DPC, through CIMA, guarantees automatic upgrade of the system	DPC, through CIMA, guarantees automatic upgrade of the system; geoserver needs to be updated by Partner Organization	DPC, through CIMA, guarantees automatic upgrade of the system; local myDEWETRA.world node (dataserver) needs to be updated by Partner Organization	DPC guarantees the free and automatic upgrade that does not implies modification of Interface. If Partner Organization has developed new functionalities of the system, Partner Organization will need to update based on new version	DPC guarantees the free and automatic upgrade that does not implies modification of Interface. If Partner Organization has developed new functionalities of the system, Partner Organization will need to update based on new version	Based on new agreements with DPC
Remote Support	Based on Agreement					
Required Assistance	Configuration of groups, username and password according to user permissions	In addition to what it is envisaged for Level 1.0, assistance for the first installation of geoserver (s) (if needed)	In addition to what it is envisaged for Level 1.1, assistance for first installation of myDEWETRA node (s)	Customization of interface, configuration of groups, users, assistance for the first installation of geoserver (s) (if needed)	In addition to what it is envisaged for Level 2.0, assistance for first installation of myDEWETRA node(s)	Assistance for first installation of myDEWETRA client and node(s), configuration of the system, customization of interface
	Training for end- users: 5 days	Training for end- users: 5 days	Training for end-users: 5 days training for end-user	Training for end-users: 5 days training for end-user	Training for end-users: 5 days training for end-user and GIS	Training for end-users: 5 days

Info: <https://infomydewetra.world>

Request to WMO by Country PR, or to NCDP by Foreign Affairs/Civil Defence Ministry

You will find some introductory information on the MyDEWETRA World project in

- The introductory video available at: <https://drive.google.com/open?id=1ydOBPapsZrv9kJ8BXfxs9uQXPrIV-0ps>
- the dewiki application incorporated in the platform and
- the introductory document which describes the platform along with available datasets and possible implementation options (send a request to dewetra@protezionecivile.it or angela.corina@protezionecivile.it)

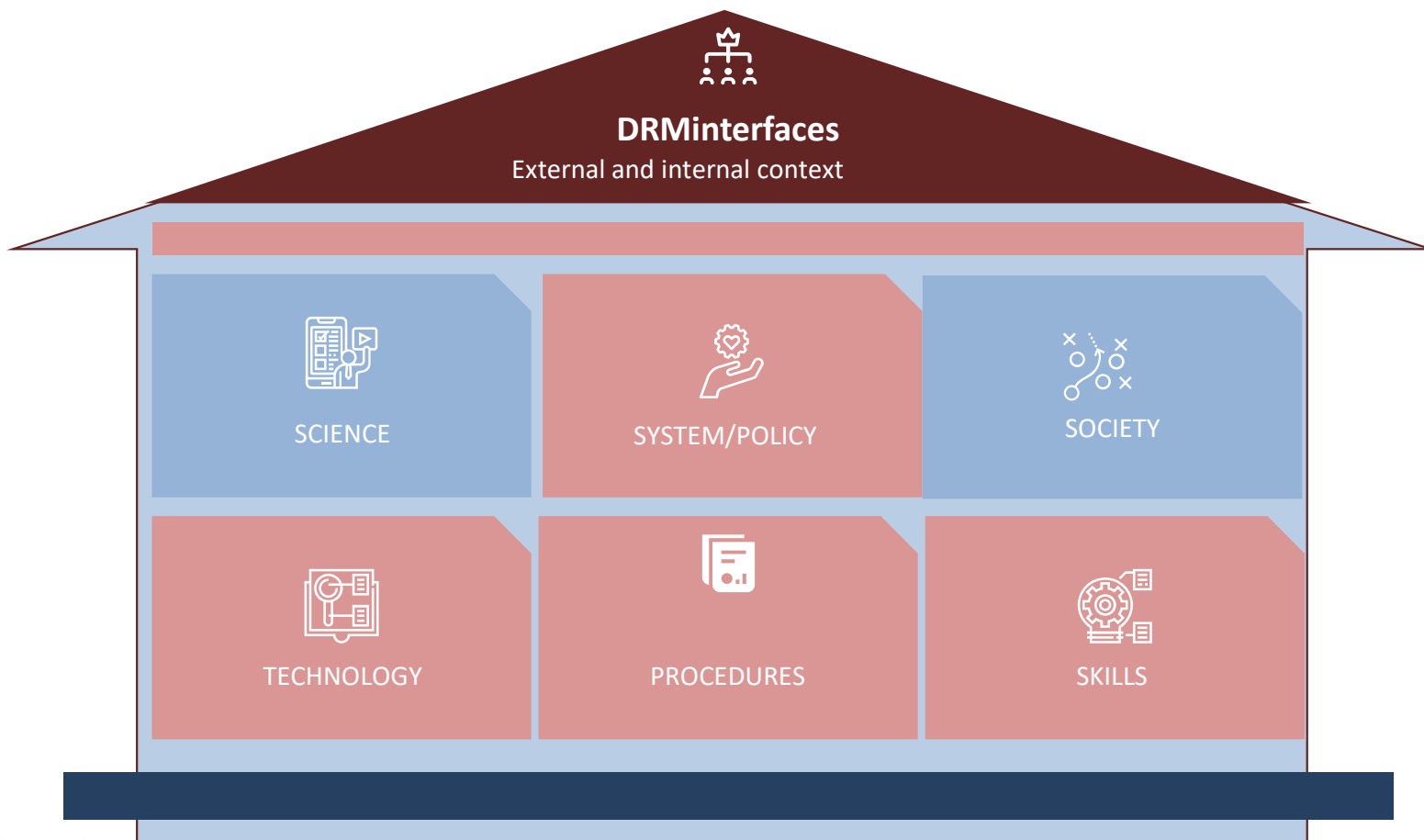
risk data **integration** can significantly increase the **value** of information available and the **knowledge** level of forecasters and decision makers.

Integration bw national and international data as the way forward for effective flood management.

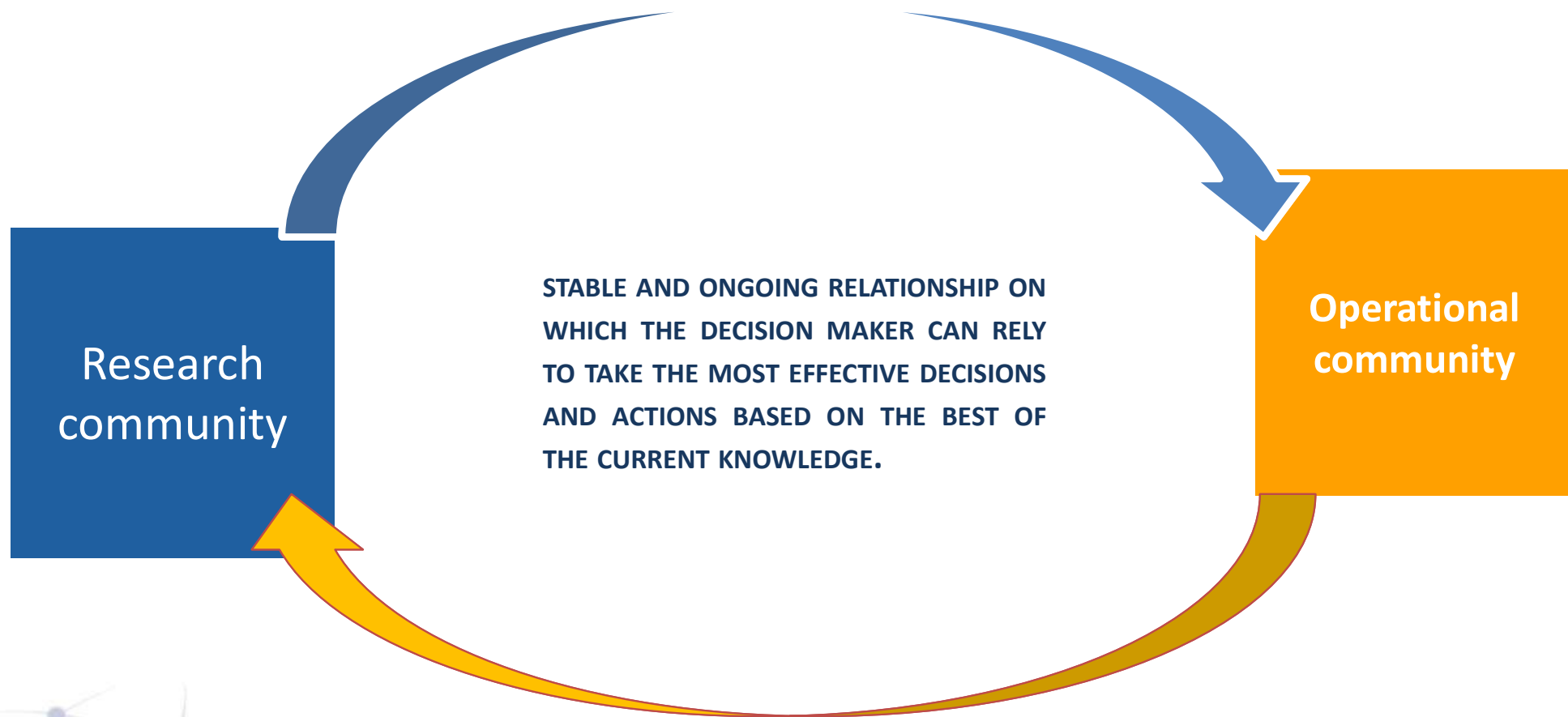


The whole is more than the sum of the pieces

EWS Pillars



Research and operational communities: a collaborative approach



Research and operational communities: a collaborative approach



RESEARCH COMMUNITY

- Update scientific Information
- Innovative tools and methods
- technological solutions



OPERATIONAL COMMUNITY

- Define the acceptable level or risk
- Apply research outcomes operationally
- Force the research towards a more applied investigation
- Give feedback on the reliability of developed tools



The Italian experience: the National Committee of Major Risks

It is the **SCIENTIFIC TECHNICAL CONSULTATION BOARD** of the National Department of Civil Protection



5 Risk areas:

Volcanic
Risk

Seismic Risk

Chemical,
Nuclear,
Industrial and
Transport
Risk

Environment
and Forest Fire
Risk

Meteo, Hydro-
geological,
Hydraulic and
Landslide
Risk

The Italian experience: the Competence Centres

A network of
*Centers for
Technological
and Scientific
services,*

Provide support
in terms of skills,
know-how, tools
and technologies



Public awareness

It should be noted that in order to sustain the four traditional components of an EWSs (risk knowledge, monitoring and warning service, dissemination and communication) it is necessary to have strong political commitment and durable institutional capacities, which in turn depend on **public awareness** and an appreciation of the benefits of effective warning systems. This is not a simple task, because of high technical issues of EWS: so, **the involvement and active participation of the population is essential.**



Decree legislative n. 1/2018

The National Service of Civil Protection promotes initiatives in order to increase communities resilience, **fostering citizens participations to civil protection planning, knowledge and the dissemination of civil protection culture.**

Components of the National Service of Civil Protection provide citizens information about risk scenarios and organization of the territorial civil protection services, also to foster the adoption of selfprotection measures in emergency situations.

During emergency situations, citizens must comply with provisions given by Civil Protection Authorities.

The role of volunteers



Volunteers play a key role not only during emergencies, but also in the framework of communication activities.

The role of volunteers in the communication activities is crucial, especially in terms of involvement of the population and in warning dissemination to remote households and communities.

Furthermore, volunteers may play a significant role also in the framework of the information to the population concerning risk knowledge and self-protection rules, before, during and after the event. However, relevance of training in communication activities must be kept well in mind.

Public awareness campaign: The Italian experience



Io non rischio – I don't take risks is a national communication campaign on best practices of civil protection.

www.protezionecivile.gov.it



Public awareness campaign: The Italian experience

I don't take risks is about the following risks:

- Flood;
- Tsunami;
- Earthquake;
- Volcano.



Volunteers meet people in selected squares and streets and explain them fundamental notions about risk knowledge and self-protection measures.

The choice of civil protection volunteers for this task is due to their capillary presence and to their “joining link” role with the territory.

We talk about meeting, and not informing, to put the accent on the philosophy on which the campaign is funded. Volunteers don't do leafleting. They don't just leaflet. They just leave informative material to people, they stop and talk with them, illustrate the problem, and somehow they narrate remaining at the people's disposal for possible questions and clarifications. Also after the days of the campaign are over, as we have already said, volunteers operate and live in the territory in which they communicate.

Dissemination, communication & information



- Tailored warning presentation and content:
 - identification of the stakeholder, user
 - customization of messages/ dictionary/ frequency
- ☐ Identification of the needs of individual communities;
- ☐ Cultural, social, linguistic and gender issues;
- ☐ Understanding of the values, concerns and interests;
- ☐ Risk perception;
- ☐ Effectiveness of communication;
- ☐ Warning response;

Early warning system **key words**



Instruments: reference models provide objective risk evaluation



Decision makers provide subjective evaluation..



..by using a well defined system of **procedure**



Thank you!

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