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science-policy interface: the italian experience

Hydrological science and responsibility decisions

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Abstract

Over the last 15 years, in the framework of the Italian early warning system, managed directly by the civil protection authorities, the gap between science and policy have been positively bridged with the Knowledge Centres: a national strategy, with a formal architecture that has build a dialogue between scientific community and responsibility services.

The applied research, tailored on operational user needs, has been funded and supported leading to the development of advanced applications in coupled meteo-hydrological modelling, satellite rapid damage analysis, hydraulic modelling, levees vulnerability estimation etc.

Similar interface models are being created in the European institutions (DRMKC, European Commission) or in the international expert Agencies (Research Panel, WMO).

The general positive dialogue among science and policy, in a mutual enrichment, is presented in this paper.

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



other risks

THE NATIONAL SERVICE CAN BE ACTIVATED FOR THE FOLLOWING TYPES OF RISKS:

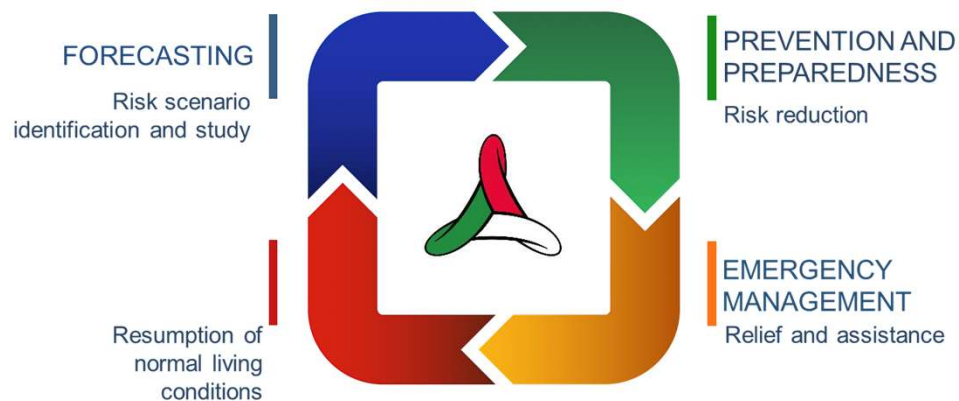
- Chemical
- Nuclear
- Radiological,
- Technological
- Industrial
- Transport
- Environmental,
- Sanitary,
- Return or fall to earth from outer space of objects and space debris
- Kinetic effect
- cyber/hybrid attacks



**MORE THAN 1000 INDUSTRIAL PLANTS
AT SIGNIFICANT RISK**

1992 - Establishment of The Civil Protection Service

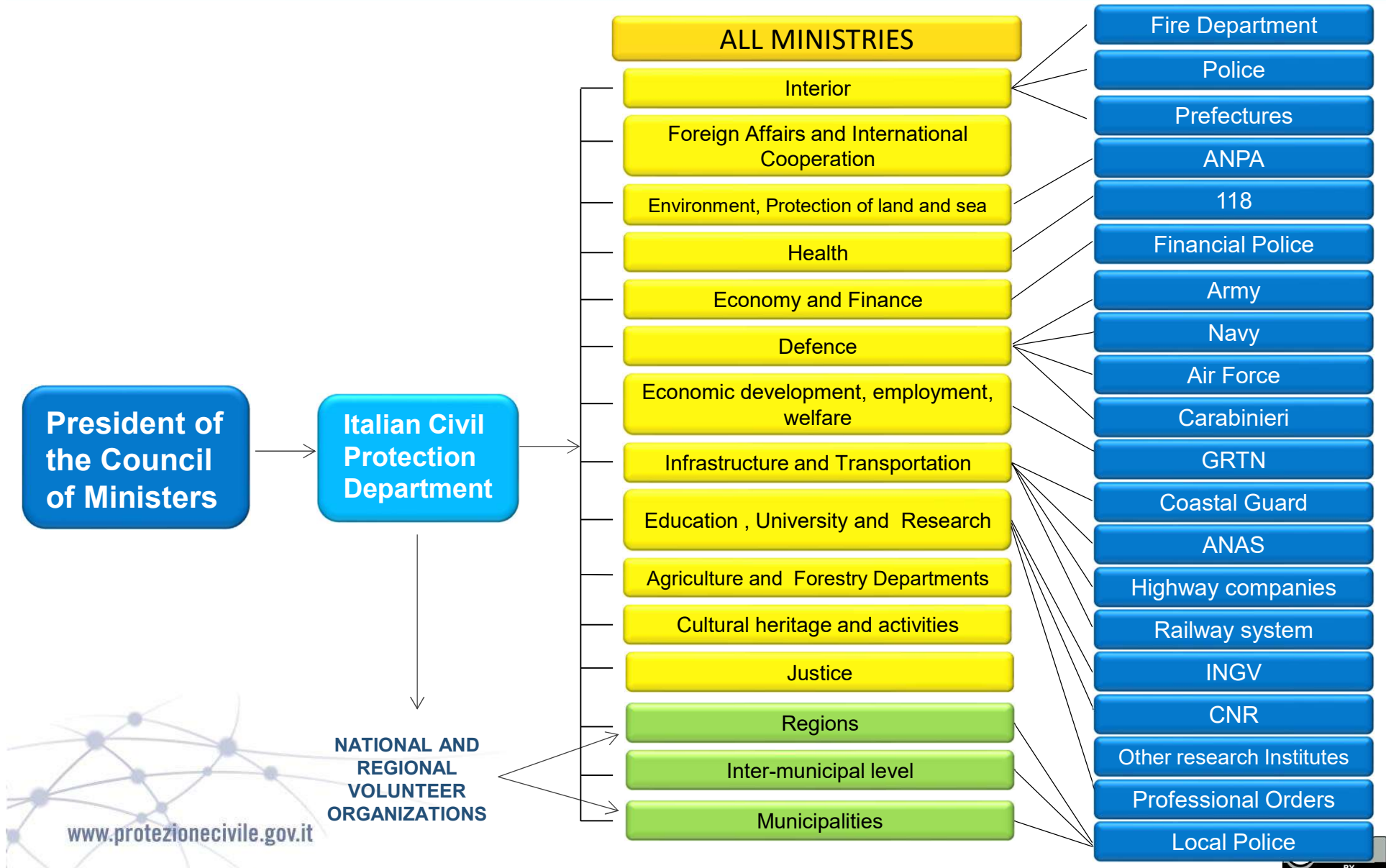
FUNDAMENTAL ASPECTS



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



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, which jointly participate in the system according to their specific responsibilities :

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.)



National Committee for the Forecasting and Prevention Of Major Risks

- the opportunity to engage the scientific community was clear since the 1992, with the formalization, in the CP law of the National Committee for forecasting and prevention of major risks (CGR)
- The aim was to work on the basis of shared, reliable and accurate scientific information
- The way was to engage the representatives of the scientific consensus on specific areas

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

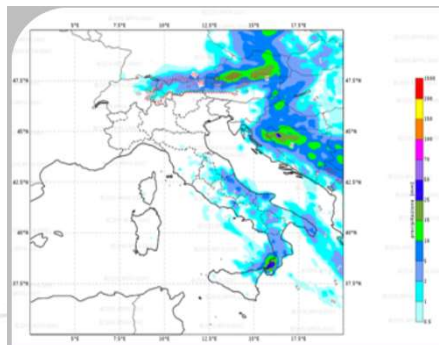
**Environment
and Forest
Fire Risk**

Meteo, Hydro-
geological,
Hydraulic and
Landslide
Risk

forecasting and preparedness hydro-meteorological sector

In 2004, the Italian government issued a Directive(P.C.M 27th February 2004) that identified all stakeholders involved in the hydrogeologic risk forecasting and prevention and defined their roles and responsibilities, establishing a clarified organisation of the National Early Warning System.

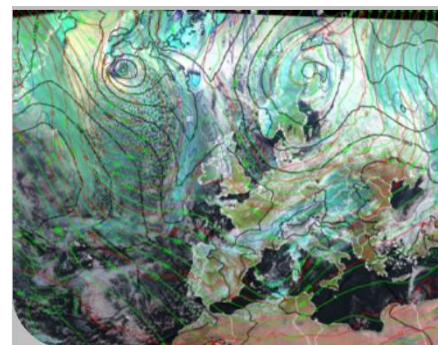
In the Directive a **national coordination mechanism** has been established , in which scientific activities are promoted and cofunded by NCPD though a programme with Competence centers (or Knowledge Centers)



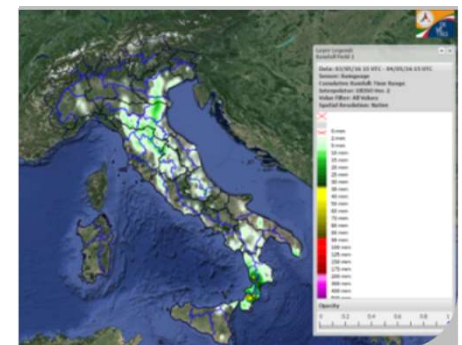
FORECASTING



HYDRO-
GEOLOGICAL



WEATHER/METEO



MONITORING

actors of the national EWS: role of the Competence Centers

The national warning system is provided by national DPC and Regions by means of:

- ✓ **“Functional Centres”** (Centres for Forecasting and Surveillance of Effects - CFSE), which collect, elaborate and exchange every kind of data to provide a **multiple support system for decisions**.
- ✓ **“Competence Centres”** (Centres for Technological and Scientific services, development and transfer - CTS), scientific institutions which provide **services, information, data, elaborations, technical and scientific contributions** for specific topics, to **share the best practices in risk assessment and management**.



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Center of Competences



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.)

Different type of activities envisaged By Competence Centers

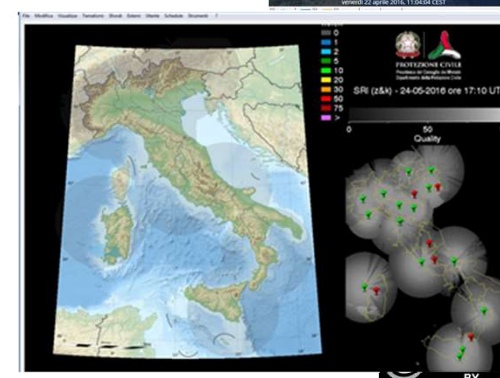
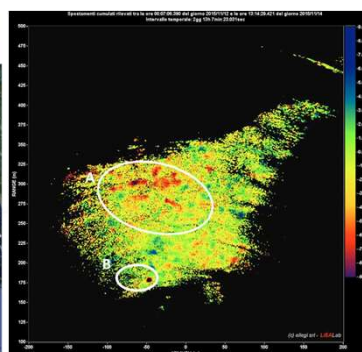
- Operational service activities :

- Implementation/maintenance of data banks (radar data, ground based station network, lossdatabases,...) and numerical prediction models
- Support to meteo/hydro monitoring, real time risk assessment, development of IT applications
- Support to residual risk assessment during emergencies: on site surveys



- Pre-operational service activities and finalized research activities :

- Validated research products are translated into products for a CP pre-operational experimental phase (coupled meteo hydro modelling, satellite-derived products, levees vulnerability db, risk profile assessment...



types of contributions of science to civil protection

Other types of contributions of science to civil protection are available:

1. Commissions for CP on specific subjects (ex Covid -19 emergency)
2. Research activities funded by other subjects to produce results of interest for CP (e.g. EU project)
3. Spontaneous research work producing results of potential interest for CP without any involvement of CP

But:

- **Scientific activities permanently made** by scientific institutions on behalf of CP
- **Finalised research** funded by CP
- **Permanent commissions** (e.g. CGR) or consultants of CP

Are the consolidated and effective way of mutual collaboration

From a Decision maker perspective... 1/2

There are some issues with scientific products (not necessarily for the hydrological science, but it happens for other risks...) made available spontaneously:

- Multitude of information on the same subject, inconsistent or conflicting among them
- Totally new information “ standing out from the crowd” proposed as innovative/revolutionary , often conveyed to the public through media Totally new valuable information, which needs adaptation for cp operability
- Sometimes, immediate full operability of new scientific findings for CP actions is expected, without caring for their reliability

On the contrary it is necessary to :

- **Verify the scientific correctness and reliability** as well as the **consensus of the scientific community**
- **Select the best or the right** product among the many available



From a Decision maker perspective... 2/2

Scientific products, i.e. any scientific result, tool, finding, are often not derived from an overall view of the reality:

- They tend to emphasize some aspects, while oversimplifying others
- Results can turn out to be unreliable for practical application, sometimes falsely precise.
- Some products characteristics cannot be compatible with operational activities needs (e.g. the computational time of a hydraulic model, etc)

To be useful to decision makers, CP finalized research should proceed in **close cooperation** when **defining objectives and products to achieve**, as well as when **validating results and /or tools**



mutual enrichment opportunities

Despite the relationships between science and CP are very complex, they can benefit from each others perspective

- Scientific advances can allow for more effective CP decisions and actions that, due to the relevance of the mission , must rely on the best knowledge available.
- The scientific community can also benefit from the enlargement of the investigation perspectives, the clear finalization of the research activities and positive social implications

Stable and continuous relationships between science and Civil protection are to be pursued, making every effort to overcome language misunderstanding, roles distortions, etc.



new directions in the international approach

The creation of stable relationship between institutions and science has been also improved in the framework of international organizations in the recent period. Some examples:



Scientific Advisory Panel

The Scientific Advisory Panel shall draw up opinions and recommendations to intergovernmental WMO bodies on matters concerning WMO research strategies and the optimal scientific directions to support the evolution of its mandate in weather, climate, water and related environmental and social sciences.



DRMKC, ENHSP service

The DRMKC of EC provides a networked approach to the science-policy interface in DRM, across the Commission, EU Member States and the DRM community within and beyond the EU
The European Natural Hazard Partnership is a pool of experts that can provide hazard-related services to ERCC.

On the other hand, the participation of CP organization to research projects is now strongly encouraged by EU research funding policy.

While some years ago only a generic endorsement was looked for by the research consortia, now active participation as partners or end user advisors is required.

Conclusions

The Italian science-operations national coordination mechanism, in the framework of the EWS, is an example of a **positive collaborative dialogue** between scientific community and operation services.

the best interface between scientists and decision makers has been found in the forms of **stable and continuous relationship** mechanisms, so that the responsibility role of CP can structurally rely on the wealth of existing scientific knowledge and evidence.

the promotion of user-driven Science (tailored on decision makers need , through **ad-hoc applied research**) is the way forward for effective decisions at all stages of the DRM cycle, with several advantages (reduction of the cycle between research and application, enlargement of the research perspectives, new opportunities of funds..)

towards an Operational Science: not an oxymoron but a positive dialogue between two needs, in a mutual enrichment approach

Weakness/opportunities

From **scientific individualism** to **structured collaboration**

Not single initiatives but structured collaboration, to create knowledge network , research lines coordinated and shared between universities and institution in the hydrology field

Invest on the **cultural mediation** of the information channels : science correctly disseminated to help building people trust in the institutions and to improve efficiency of risk prevention system, avoid also poliphony of disomogeneous voices.

Large **gaps** still exist between scientific approach and decision makers actions (probabilistic approach affected by uncertainties vs yes/no answers, need of data and long time vs necessity to give an immediate response, balancing probabilities with consequences, taking into account multi- factors drivers- economical, social, political, etc)

thank you

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