

European Natural Hazard Scientific Partnership

# ARISTOTLE

#### All Risk Integrated System TOwards The hoListic Early-warning

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# Outline



**Background and introduction** The ARISTOTLE-ENHSP > Approach > Operational Service > Pillars Outlook Considerations



#### Background and Introduction: The rationale behind







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New directions in the UCPM:

"(3.e ) to increase the availability and use of scientific knowledge on disasters"

SCHOOL

"(8.a) to further develop and better integrate transnational detection and early warning and alert systems of European interest in order to enable a rapid response, and to promote the inter-linkage between national early warning and alert systems





#### Information need versus availability







#### ERCC meteo**alarm** forecasting ervice OK Information available Need for information < full screen opacity << 0.9 >> Print screenshot arthquake Haz search for location. automatic PAGER **C**ECMWF CSEM EMSC NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION EWS Forecasts Helmholtz Centre TRIDEC Cloud **GDA** U.S. Geological Survey ards Program ShakeMap

Multiple sources of information in different locations Requirement: From data/information to **WHAT IT MEANS** 

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# Background and Introduction: **ARISTOTLE**





Background and Introduction:

### **Combines national operational centers with ERCC** activities











**ERCC** 





#### **Background and Introduction: ARISTOTLE Pilot** Implementation and deployment of a 24x7 operational system in 1 year Preparation of the first-ever "European Natural Hazard Scientific Partnership" (ENHSP) European Natural Hazard Scientific Partnership a shall be ? Cold spells in Europe 30/11/2017, 29/01/2018 08/04/2017 20/06/2017, 27/07/2017 alkans Flooding. Moldova Flash Flooding Cyclone Ophelia 20/06/2017, 27/07/2017 flood alerts Heat Wave across Europe Tropical cyclone, LAN Earthquake off-shore Alaska 16/03/ 23/08/2017, 12/11/2017 24/08/2017 Mount Etna Eruption, It raq, Iran - Earthquakes Tropical cyclone, 16 7/07/2017 17/11/2017, 04/0 13/09/2017 Dodecannese Islands - EarthquakeIsraeli-Palestine SW Tropical cyclones Doksuri, Talim 19/09/2017 7/02/2017 TC MORA-1 Central Mexico - Earthquake Pakistan -Earthquake 2/2017, 28/04/2017, 6/07/2017 Aug/Sep 2017 quakes in Philippines Hurricanes Harvey, Irma, Maria 23/01/2018 14/06/2017, 8/09/2017 21/12/2017 25/05/2017 Eruption Mayon Volcano Mexico - Earthquake 24/02/2017 Tropical cyclone TEMBIN Sri Lanka Flooding Earthquake in Zambia 21/03/2017 05/03/2017 Peru - Floods and Landslides opical Cyclone ENAWO-17 28/09/2017 23/09/2017 Eruption at Ambae Vanuatu Indonesia - Agung volcand 14/01/2018 03/04/201 15/01/2018 Peru - Earthquake Earthquake in South Africa **Tropical** cyclone Bergutta 14/02/2017 **Tropical cyclone Dineo 17** Updated January 30, 2018 EARTHQUAKE / TSUNAMI Volcano Severe Weather FLOODING

#### **Background and Introduction:** ARISTOTLE-ENHSP: 46 Activations (10/2018 – 4/2020) Monitoring activities # of reports Enhanced monitoring 8 94 Routine Severe Weather & Flooding 22/03/20 10/05/2019-06/11/19 30/10/2018 EQ, Croatia Floods, Bosnia Herzegovina - + Croatia, Montenegro Multi-hazard routine 121 Severe weather, central Europe monitoring 08/08/2019+24/01/2020 EQ, Turkey - 22/09/2019 + 26/11/2019 EQ, Albania - 23/02/2020, EQ, Iran/Turkey borders 20/12/2019 29/03/2019 Floods, Portugal, Spain, France 09/10/2019 SW, Iran 06/07/2019 30/04/2019 Typhoon Hagibis, Japan EQ, California 24/12/2018 TC FANI, India, Bangladesh 27/08/2019 08/11/19 Etna volcano eruption, Italy 26/06/2019 09/01/2019 Tropical Cyclone, EQ, Iran 24/03/19 Panama Floods. 28/01/2019 Dorian,Caraibi Tsunami warning, Thailand Stromboli Eruption, Italy SW, Lebanon Lebanon EQ, Pakistan 24/11/18 19/11/2018 24/10/19 Tropical cyclone USAGI, Vietnam Volcano Fuego eruption, Floods, South Sudan, 08/01/2010 Guatemala Ethiopia, Somalia, Kenya 14/05/2019 EQ, Puerto Earthquake, Papua 10/04/2019 14/11/2018 15/02/2019 Nova Guinea 2/04/2019+ Severe Weather, Kenya Tropical Cyclone GAJA-18, Heavy Rainfall and floods Floods, Brazil 15/12/2019 India, Sri Lanka Perú-Ecuador EQ, Philippines 10/03/19 22/02/2019 TC IDAI, Mozambique 26/05/2019 09/02/19 05/11/2018 Earthquake, Perú-Ecuador Tropical cyclone Tsunami, New Caledonia 05/04/2020 GELENA, Rodrigues Island 09/02/2019 22/12/2018 TC, Vanuatu Tropical Cyclone, EQ, Mozambique Mauritius 23/04/2019 TWENTYFOUR TC in Comoros, Madagascar, Mozambique

EARTHQUAKE AND TSUNAMI

VOLCANOES

Updated April, 16th 2020

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### The **ARISTOTLE-ENHSP** approach: **Sustained operational service**



### The ARISTOTLE-ENHSP project



Aims:

- deliver to the ERCC/ERCC Analytical Team world leading multi-hazard scientific advice through a flexible and scalable operational service
  - implement the European Natural Hazard Scientific Partnership (ENHSP) in all its components.



The **ARISTOTLE-ENHSP** approach: **Sustainable operational service** 

### The ENHSP concept









#### **Operational Service:**

#### The service timescales





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#### Operational Service: The 24x7 service blueprint





- Based on a pool of expertise
- Real Multi-hazard approach
- Tailored products
- Fully scalable design



ERCC/JRC



#### Operational Service: **Reporting**



### The Iran-Iraq M7.2 Earthquake on the 11/12/2017





#### **Operational Service:**

#### **Reporting: ERM report**



#### **EXECUTIVE SUMMARY**

- A MAJOR earthquake with magnitude 7.2 occurred on Sun Nov 12 18:18:19 2017 (UTC) with latitude 34.93°N, longitude 45.79°E and depth of 33.9 km. This is a inland event situated at the border between Iran and Iraq. The earthquake was strongly felt in Northern Iran, Central Turkey and United Arab Emirates.
- The earthquake can have induced landslides. The weather in Iran is very guiet and settled at the momen and for the coming week is expected no rain or significant wind and there is no tsunami threat. No other multi-hazard components could be revealed with the information available at this moment.
- According to USGS PAGER and ARISTOTLE exposure analysis, very few people or no people have been exposed to Mercalli intensities larger than VIII level. However, about 447.000 people suffered Mercalli scale intensities greater or equal than VII which can result in damage considering that Irak is in a "very high risk" class (see INFORM). The closets largest city (723.000 people) is As Sulaymaniyah in Irak at ~80 km distance. Testimonials inform that people evacuated building in many cities, from Kuwait city to Baku.
- At the moment, very little information has been collected within the first 50 km of the epicentre, either because damage is significant - which is the likely seismological scenario - or because of poor communication. However, early reports indicate damage and tens of casualties in the villages near the epicenter However, a few hundreds of casualties may have occurred given that ~35.000 people are present within 20 km from the epicenter, o people nave so rar lost their lives in the city or gasi-e Shirin, Kermanshah province: Governor of Qasr-e Shirin, many injured.
- The Mosul dam is ~300 km distant from the epicenter and the ShakeMap indicates Mercalli degree IV which should not induce any damage
- The first estimation provided by GDACS was a "Red Earthquake" indicating a high humanitarian impact.ARISTOTLE judgment. indicates orange on a national level
- As consequence of the earthquake, it now started at eartquake sequence that will last several months
  Earthquakes like this one can have major aftershocks sometimes larger than magnitude o which can result in additional damage.

GEOGRAPHICAL LOCATION **IRAN-IRAQ BORDER REGION: 34.93** 45.79 Magnitude 7.2, depth 33 km **OVERALL IMPACT** Medium LACK OF COPING CAPACITY HIGH (6.9)Iraq ALERT LEVEL X act High Medium ma Low Required Sub-National Resources national

Inter-

national

#### **Basic description**

Potential cascading effects / Weather assessment and forecast

Impact assessment with the available information within 3 hours

Potential evolution





### Operational Service: Routine reporting: the New MH ROM report lifecycle



Updated till April 17th, 2020



#### Pillars: Implementation of the ENHSP





The **ENHSP Pillars**—include all the key elements required to funnel the best operational practices, science and team to be integrated into the operational delivery of the service.





#### Pillars: The Innovation Pillar





#### **The Innovation Pillar**

Focus on identifying and implementing the key innovative research performed to increase efficiency and improve performance of the service to the ERCC.

#### Three specific Experts Groups:

- Global (excluding Europe) Flood
- 2. Forest Fires
- 3. Global Volcanoes



#### Pillars:

### **Science and Research Pillar**







#### Outlook:

#### **Outreach and the feedback loop**





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#### Considerations: Achievements



- Successful MH partnership consisting of GEO & METEO hazards experts from MS main European institutions
  - 7\*24 service provision within of emergency report
  - New MH Routine monitoring (ROM) through 3 times per week reports for all hazards and verbal interaction with ERCC
  - Developed an IT platform to gather information and assemble the reports that exploits community driven web services and developed specific ones



#### Considerations :

### Challenges



- Rapid MH impact assessment requires specific tools and products to be refined or developed
  - Need for uncertainties and probabilistic estimates ("ad hoc" working groups ?)
- Potentially sensitive information deriving from impact estimates (e.g., number of fatalities) must be treated carefully and be consistent with similar ones provided at national level in order to avoid possible inconsistencies
  - Close synergy between ARISTOTLE and national actors





# Thank you for reading (!)

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