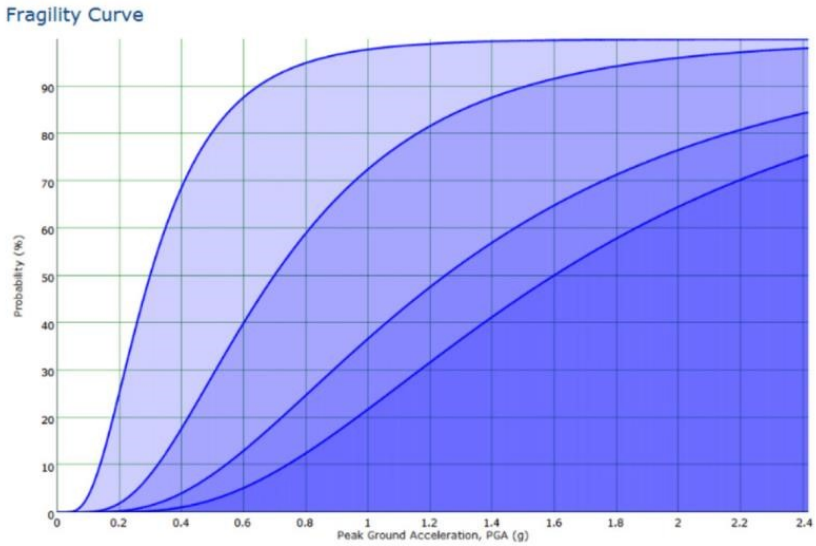
3.2 Methods for Natech Risk Assessment – RAPID-N (European Union)

OECD GP Activity	UN SF Activity	UN SD Goals / Targets
3. Natural hazard analysis, Natech Risk Analysis	1. Understanding disaster risk	17.6 Enhance ... regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing ...

Classification according to OECD Guiding Principles, UN Sendai Framework Priorities/Activities, and UN SDGs and Targets

Figure 1: Example RAPID-N risk analysis report fragility curve



Source: © European Union, 1995-2019

Figure 2: Example RAPID-N risk analysis report data

Data

No	Damage State	Median	Standard Deviation
1.	≥ DS2	0.3	0.6
2.	≥ DS3	0.7	0.6
3.	≥ DS4	1.25	0.65
4.	= DS5	1.6	0.6

Source: © European Union, 1995-2019

Short Facts:	Natural Hazard(s) Considered:
Governance approach: Risk assessment **Source:** Joint Research Centre, European Commission **Entry into force:** 2012 **Targeted Stakeholders:** Authorities, operators **Scope of applicability:** International to regional; enterprises, sites, installations	• Earthquakes • Flood (prototype) **Climate change:** So far not considered

Description

RAPID-N is a web-based, collaborative, and open-model system for the analysis and mapping of Natech risks. It was developed by the European Commission Joint Research Centre (JRC) with initial support from the Scientific and Technological Research Council of Turkey (TUBITAK). The system has been operational since 2012 and is publicly available at http://rapidn.jrc.ec.europa.eu.
The primary aim of RAPID-N is rapid local (e.g. single plant) or regional (e.g. multiple plants distributed over a large geographic area) Natech risk analysis with minimum data requirements. It can be used for land-use or emergency planning purposes by analysing the potential consequences of different Natech scenarios. It can also support emergency response activities by quickly identifying sites where Natech accidents might have occurred, so that first responders and the population in the vicinity of the plants can receive timely warning.
In order to analyse the Natech risk, RAPID-N first calculates natural-hazard severity parameters at the hazardous sites by using pre-calculated on-site hazard data (e.g. hazard maps) or hazard-specific data estimation functions. Natural hazard impacts are evaluated for each industrial installation (i.e. plant units) separately and the possible damage scenarios and their occurrence probabilities are determined. For each damage scenario, case-specific Natech accident scenarios are generated automatically by using appropriate risk states that relate damage scenarios to consequence scenarios, and finally the consequences are analysed by using the available consequence models. The results are presented as risk reports and interactive risk maps showing impact zones and their occurrence probabilities.
RAPID-N does not contain any hard-coded models for the analysis. For each Natech scenario, the required damage and consequence models are generated on-demand by using the individual model equations available in the system. This allows scalability, i.e. more simple or complex models can be used for the analysis considering the available data and the validity conditions of the equations. A starter set of equations based on U.S. EPA's RMP Guidance for Offsite Consequence Analysis methodology is available to all users. But the users can also define their own data and equations to customize the analysis based on their needs. User-specific modifications do not affect other users, allowing the users to experiment with different analysis scenarios and methods. Therefore, RAPID-N can be used as a test bed for Natech-related scientific research and development purposes. The system also features an open-model approach, in which all available equations and methods are fully documented and directly accessible from the analysis reports. Besides obtaining the analysis results, the users can also easily follow how each result was calculated, access the associated algorithms, and view related bibliographic references.
RAPID-N has data extraction capabilities to keep track of recent natural hazard events (e.g. earthquakes) and harmonize data automatically for risk analysis purposes. The system monitors online natural hazard data feeds in near real-time and collects information on recent events. Currently, RAPID-N contains world-wide information on over 22,000 earthquakes, 5,500 industrial plants (e.g. refineries, power plants) and 64,000 storage tanks collected from public sources. In order to preserve confidentiality, the system supports data access control for critical information, e.g. industrial plant and risk analysis data. User registration is needed for data entry, and further authorisation is required to carry out Natech risk analysis. All other data supporting the analysis process is publicly available. Comprehensive guides exist which describe the features of the system, including the details of the analysis framework, and provide step-by-step Natech risk analysis tutorials. Reference local and regional risk analysis case studies by using RAPID-N are also available. In order to support the competent authorities and other users, the JRC organises Natech risk assessment training seminars, which include hands-on RAPID-N training.

Link/Contact:

http://rapidn.jrc.ec.europa.eu/

Girgin, S., and Krausmann, E. (2013) 'RAPID-N: Rapid Natech risk assessment and mapping framework', Journal of Loss Prevention in the Process Industries, 26(6):949-960, doi:10.1016/j.jlp.2013.10.004.

Girgin, S. and Necci, A. (2018) 'Introduction to RAPID-N for Natech Risk Analysis and Mapping: A Beginner's Guide', EUR 29511 EN, doi:10.2760/78743

Comments by the UN/OECD Natech-Steering Group:

This tool is focused on Natech Risk Analysis and mapping.

Imprint

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