

**Possible IAWN Input on Terminology
Related to Extraterrestrial Hazards
through UNOOSA/UNSPIDER to the UN
Office for Disaster Risk
Reduction (UNDRR)**

**9th IAWN Steering Committee MtG
12 September 2019**

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UN Office for Disaster Risk Reduction (UNDRR) / International Science Council (ISC) Technical working Group on the Sendai Terminology Review and Classification

Hazards - Scope of the Sendai Framework



To strengthen technical and scientific capacity to capitalize on and consolidate existing knowledge and to develop and apply methodologies and models to assess disaster risks, vulnerabilities and **exposure to all hazards;** (paragraph 24 j)





UNDRR/ISC technical Working Group on the Sendai Hazard Terminology Review and Classification

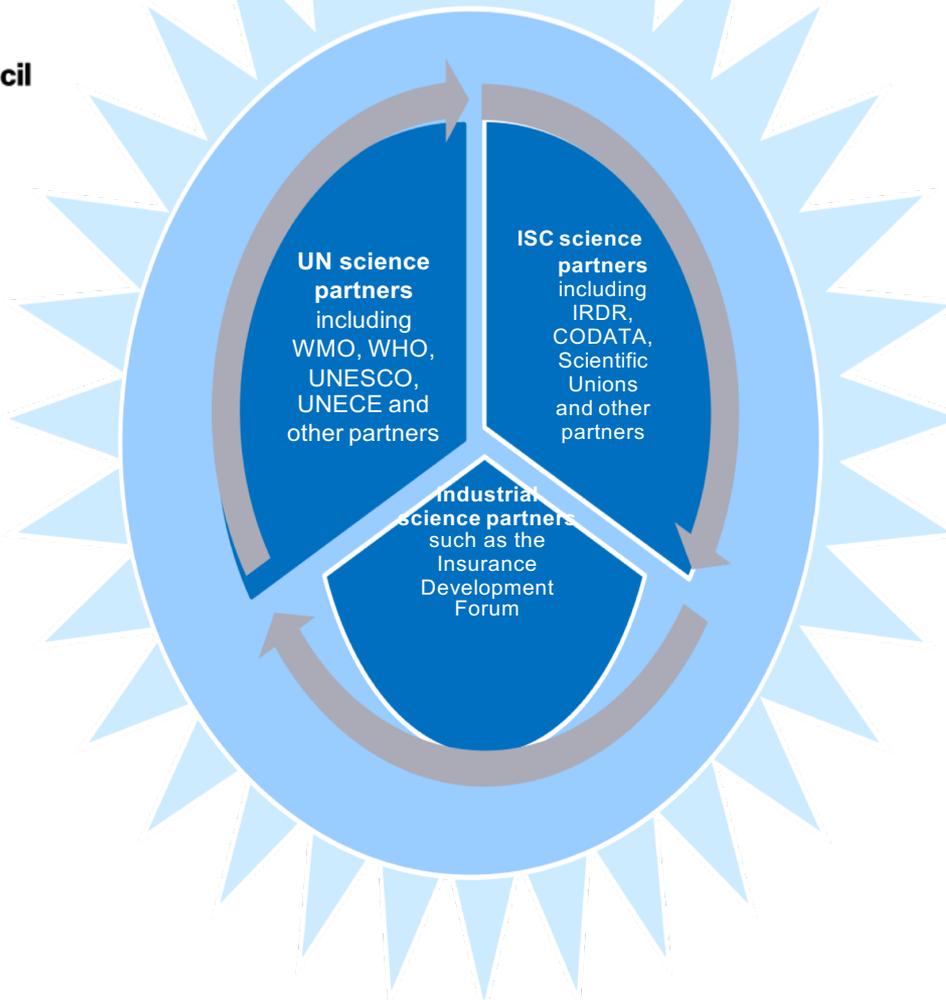


- AIM: develop a scientific list of hazard definitions encompassed by the Sendai Framework, linking to the SDGs and the Paris Agreement by November 2019
- PROCESS: in partnership across
 - UNDRR and UN science partners
 - ISC and related scientific organisations
 - global, regional, national and if possible at local scales
- Proposed next steps – in 2020, develop report to address cascading and complex hazards





UNDRR/ISC Technical Working Group on the Sendai Hazard Terminology - Stakeholders/Governance



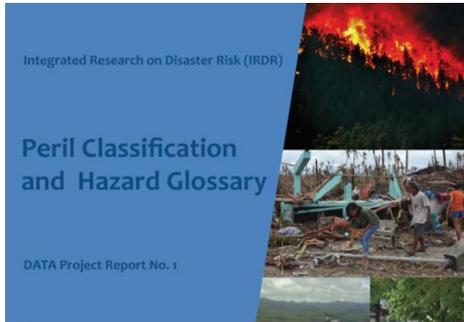
Task team – GEO, Risk KAN, IRDR, ISC, CODATA, ODI, NOAA, GEM, GRAF, IDF, UNDRR, UNECE, WHO, WMO, OECD, UNESCO

+ *Representatives from Global and Regional STAGs*

Wider Expert Advisory Group – includes over 100 scientists and technical experts from a range of disciplines!



IRDR Perils Classification and Hazard Glossary 2014



- **Geophysical:** a hazard originating from solid earth. This term is used interchangeably with the term geological hazard.
- **Hydrological:** a hazard caused by the occurrence, movement, and distribution of surface and subsurface freshwater and saltwater.
- **Meteorological:** a hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that last from minutes to days.
- **Climatological:** a hazard caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability.
- **Biological:** a hazard caused by the exposure to living organisms and/or their toxic substances (e.g. venom, mold) or vector-borne diseases that they may carry. Examples are venomous wildlife and insects, poisonous plants, algae blooms, and mosquitoes carrying disease-causing agents such as parasites, bacteria, or viruses (e.g., malaria).
- **Extraterrestrial:** a hazard caused by asteroids, meteoroids, and comets as they pass near earth, enter the Earth's atmosphere, and/or strike the Earth, or changes in inter planetary conditions that effect the Earth's magnetosphere, ionosphere, and thermosphere.

Hazard

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

Annotations: Hazards may be natural, a predominantly associated with natural processes. Induced hazards, are induced entirely or partially by human activities. Hazards may include the occurrence or risk of armed conflict, subject to international humanitarian law. Hazards may be associated with a combination of natural degradation and climate change.

Hazards may be single, sequential or co-occurring. Hazards may vary in location, intensity or magnitude, frequency, predictability, infectiousness or toxicity, or other characteristics. Hazards may vary in case fatality rate and estimation of the potential impact.

Multi-hazard means (1) the selection of hazards for analysis in contexts where hazardous events may occur simultaneously, taking into account the potential interrelationships between them.

Hazards include (as mentioned in the SDR in alphabetical order) biological, environmental, technological and phenomena.

Biological hazards are of organic origin and include microorganisms, toxins and bioactive substances, venomous wildlife and insects, poisonous plants and mosquitoes carrying disease-causing agents.

Environmental hazards may include chemical, natural and biological hazards. They can be created by environmental degradation or physical or chemical pollution in the air, water and soil. However, many of the processes and phenomena that fall into this category may be termed drivers of hazard and risk rather than hazards in themselves, such as soil degradation, deforestation, loss of biodiversity, salinization and sea-level rise.

Geological or geophysical hazards originate from internal earth processes. Examples are earthquakes, volcanic activity and emissions, and related geophysical processes such as mass movements, landslides, rockslides, surface collapses and debris or mud flows. Hydrometeorological factors are important contributors to some of these processes. Tsunamis are difficult to categorize: although they are triggered by undersea earthquakes and other geological events, they essentially become an oceanic process that is manifested as a coastal water-related hazard.

Hydrometeorological hazards are of atmospheric, hydrological or oceanographic origin. Examples are tropical cyclones (also known as typhoons and hurricanes); floods, including flash floods; drought; heatwaves and cold spells; and coastal storm surges. Hydrometeorological conditions may also be a factor in other hazards such as landslides, wildland fires, locust plagues, epidemics and in the transport and dispersal of toxic substances and volcanic eruption material.

Technological hazards originate from technological or industrial conditions, dangerous procedures, infrastructure failures or specific human activities. Examples include industrial pollution, nuclear radiation, toxic wastes, dam failures, transport accidents, factory explosions, fires and chemical spills. Technological hazards also may arise directly as a result of the impacts of a natural hazard event.



1 Financial Shock



2 Trade Dispute



3 Geopolitical Conflict



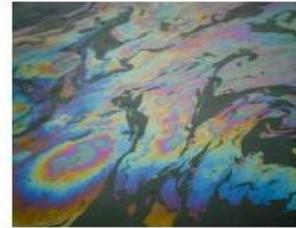
4 Political Violence



5 Natural Catastrophe



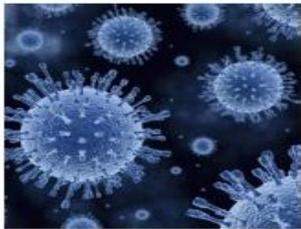
6 Climatic Catastrophe



7 Environmental Catastrophe



8 Technological Catastrophe



9 Disease Outbreak



10 Humanitarian Crisis



11 Externality



12 Other Shock

<http://cambridgeriskframework.com/downloads>

WHO Classification of hazards

WHO Classification of Hazards

| Generic groups ¹ | 1. Natural | | | | | | 2. Human-induced ^{2,3} | | 3. Environmental |
|---|---|---|--|--|--|---|--|--|--|
| Groups | 1.2 Hydro-meteorological | | | | | | 2.1 Technological | 2.2 Societal | 3.1 Environmental degradation ¹⁷ |
| Subgroups | 1.1 Geophysical ⁴ | 1.2.1 Hydrological ⁴ | 1.2.2 Meteorological ⁴ | 1.2.3 Climatological ⁴ | 1.3 Biological ⁵ | 1.4 Extraterrestrial ⁴ | | | |
| Main types -subtypes [sub-subtypes] | Earthquake: - <i>ground-shaking</i> - <i>tsunami</i> Mass movement (geophysical trigger): - <i>landslide</i> - <i>rock fall</i> - <i>subsidence</i> Liquefaction Volcanic activity: - <i>ash fall</i> - <i>lahar</i> - <i>pyroclastic flow</i> - <i>lava flow</i> | Flood: - <i>riverine flood</i> - <i>flash flood</i> - <i>coastal flood</i> - <i>ice jam flood</i> Mass movement (hydro-meteorological trigger): - <i>landslide</i> - <i>avalanche (snow)</i> - <i>mudflow</i> - <i>debris flow</i> Wave action: - <i>rogue wave</i> - <i>seiche</i> | Storm: - <i>extratropical storm</i> - <i>tropical cyclone</i> [cyclonic wind, cyclonic rain, cyclone (storm) surge] - <i>convective storm</i> [e.g. tornado, wind, rain, winter storm, blizzard, derecho, lightning, thunderstorm, hail, sand/dust storm] Extreme temperature: - <i>heatwave</i> - <i>coldwave</i> - <i>severe winter condition</i> [e.g. snow/ice, frost/freeze] ⁶ Fog | Drought Wild fire: - <i>land fire</i> [e.g. <i>brush, bush, pasture</i>] - <i>forest fire</i> Glacial lake outburst (flood) | Air-borne diseases Water-borne diseases Vector-borne diseases Foodborne outbreak ⁷ Insect infestation ⁴ - <i>Grasshopper</i> - <i>Locusts</i> Animal diseases Plant diseases Aeroallergen s Antimicrobial | Impact: - <i>airbust</i> Space weather - <i>energetic particles</i> - <i>geomagnetic storms</i> - <i>shockwave</i> | Industrial hazards: ⁸ - <i>chemical spill</i> - <i>gas leak</i> - <i>radiation</i> [contamination, nuclear incident] Structural collapse: - <i>building collapse</i> ^{8,9} - <i>dam/bridge failures</i> Transportation: ^{8,11} - <i>air, road, rail, water, space</i> Explosions Fires ⁸ Air pollution ⁹ - <i>haze</i> ¹⁰ Infrastructure disruption - <i>power outage</i> ¹¹ - <i>water supply</i> - <i>solid waste, waste water</i> - <i>telecommunication</i> Cybersecurity Hazardous materials in air, soil, water: ^{12,13} - <i>biological, chemical, radiological</i> | Acts of violence Armed conflicts: ¹⁴ - <i>international</i> - <i>non-international</i> / Civil unrest Terrorism Chemical, biological, radiological, nuclear, and explosives ^{15, 16} Financial crisis: - <i>hyperinflation</i> - <i>currency crisis</i> | Erosion Deforestation Salinization Sea level rise Desertification Wetland loss/degradation Glacier retreat/melting |

UNDRR/ISC Technical Working Group on the Sendai Hazard Terminology Review

TIMELINES

- May 2019: Launch of Hazard Terminology Review at the Science and Policy Forum of Global Platform 2019
- 1-2 July: Meeting at International Science Council, Paris
- 29 July – 1 August: Virginia Murray (Public Health England) Geneva to consult/collect data from UN agencies
- 22-24 October: Face to face meeting at WMO
- 4 November: Draft report for UNDRR/ISC for review by partners
- December: Final report for UNDRR/ISC

Proposed template - headings



- **Simple definition** (from the highest possible authority – preferably from the relevant UN Agency responsible)
- **More complex/scientific definition** that is measurable and modellable (highest possible authority)
- If available **Measurement** (briefly how the hazard is measured) and definition if universally agreed, if not then region specific links/references
- **Annotations:** information, e.g. secondary hazards, precursor hazards
- Sources of information and if possible link to **UN agency owner of definition**



Identifying Hazards – Applying a Series of Tests



- Does it fulfil the definition of a hazard as per the Sendai framework?
- Is it a cause or is it an effect?
- Is there internationally agreed UN agency definition? if no – is there a generally accepted scientific definition from an authoritative source?
- *Is the hazard measurable? Are there internationally agreed standards?*



Natural hazards

Technological hazards

Disease

Environmental hazards

Climatic hazards

Humanitarian hazards

Geopolitical and post conflict hazards

Violence and terrorism hazards

Externality, space weather and meteors

Trade Dispute hazards

Financial Shock hazards

Cyber hazards

Transport accident hazards

And what other hazards should be identified?



Further examples

Examples:

- UNDRR recognizes UNOOSA as the main source for definitions of space-based hazards like NEOs, through working with IAWN and SMPAG

The link to glossary of hazards: http://www.irdrinternational.org/wp-content/uploads/2014/04/IRDR_DATA-Project-Report-No.-1.pdf#page=15

This glossary of hazards already includes a class on “Extraterrestrial” Hazards

- **Sendai Framework** - the definition of a “natural hazard”, which has been defined already in the Hyogo framework : “A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards).
- **UN-SPIDER Knowledge Portal** uses as a source for definition of hazards the document entitled “**Peril Classification and Hazard Glossary**”, elaborated by the “Integrated Research on Disaster Risk” (IRDR). IRDR is part of the International Council for Science.



NEOs as a natural hazard - definitions

Examples:

- **NASA Policy Directive (NPD 8740.1, effect. Jan 2017)** : *Near-Earth Object (NEO): an asteroid or comet that has an orbit that brings it within 1.3 astronomical units (AU), approximately 120 million miles, of the Sun. They may also be referred to as either a Near-Earth Asteroid (NEA) or an Earth Approaching Comet (EAC) as appropriate. Potentially Hazardous Object (PHO): includes NEAs and EACs coming within 0.05 AU, about 5 million miles, of Earth. All comets are considered PHOs when coming this close to Earth because the size cannot be readily determined. Potentially Hazardous Asteroids (PHAs) are further discriminated as those of a size that could survive entry through Earth's atmosphere and could be expected to cause damage at Earth's surface (e.g., >50 meters in size).*
- **ESA SSA-NEO segment** website uses term “**threatening object**”, which is all objects that have a probability greater than 0 to impact our planet, independently of their sizes.
- **AT 14 final report (A/AC.105/C.1/L.330)**: *A near-Earth object (NEO) is an asteroid or comet whose trajectory brings it within 1.3 astronomical units of the Sun and hence within 0.3 astronomical units, or approximately 45 million kilometres, of the Earth's orbit. This includes objects that will come close to the Earth at some point in their future orbital evolution. NEOs generally result from objects that have experienced gravitational perturbations from nearby planets, moving them into orbits that allow them to come near to the Earth.*
- **IAU definition**

Food for thought - Proposed template - headings

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THANK YOU



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