

Photo:
B. Pálmason



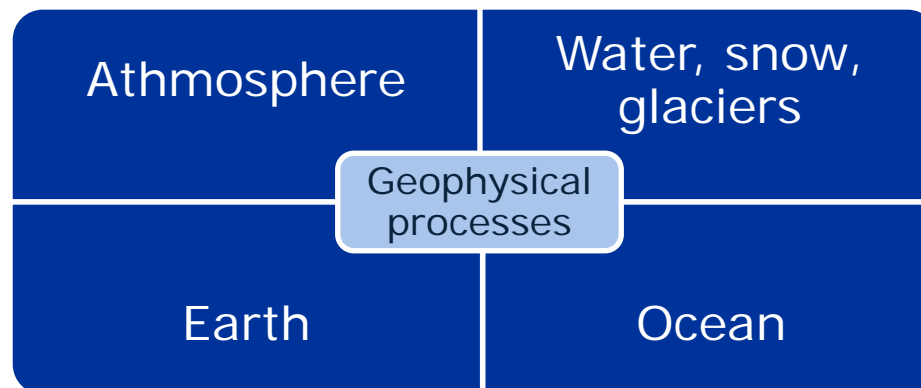
Volcanic Alert warnings to the public; experience from volcanic eruptions in Iceland

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Tasks of the Icelandic Meteorological Office



Responsibilities:

- ▶ Monitoring, forecasting and issuance of warnings in the field of
 - ▲ Meteorology
 - ▲ Seismology and volcanic activities
 - ▲ Glaciology
 - ▲ Hydrology
 - ▲ Risk assesment of natural hazards, e.g. floods and avalanches, etc.

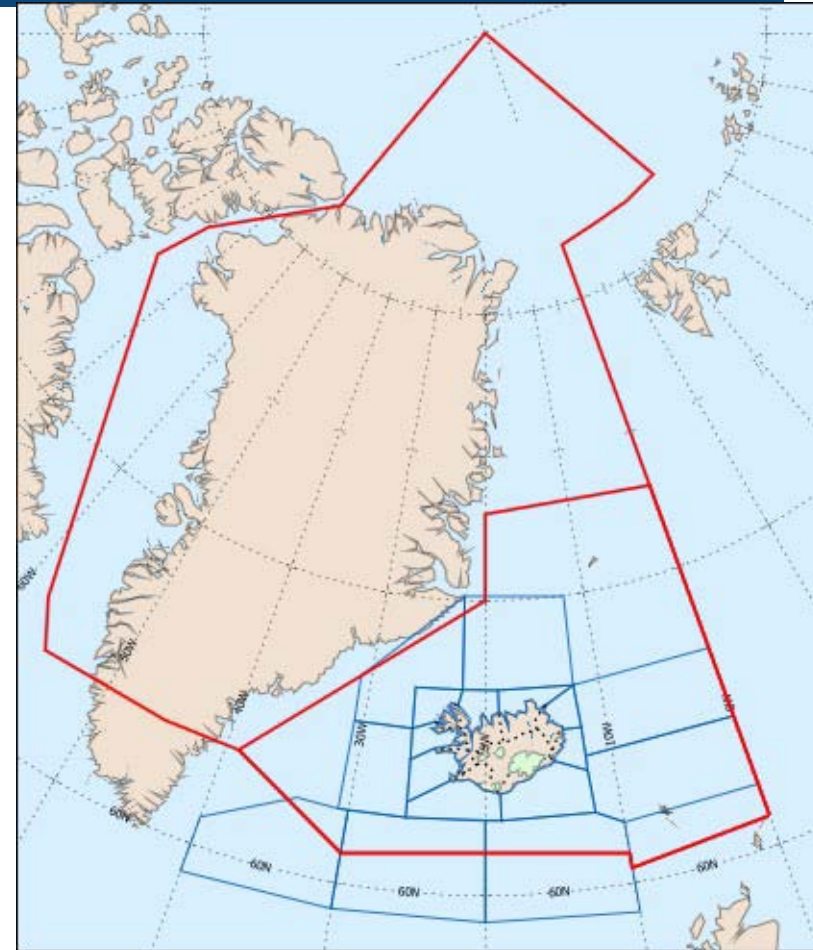
Natural Hazards - Topics

- ▶ Severe weather
 - ▲ storms, heavy precipitation
 - ▲ lightning
- ▶ Avalanches and land slide
- ▶ Floodings
 - ▲ river floods, flash floods, ice jams, glacier outburst
- ▶ Storm surge
- ▶ Sea Ice
- ▶ Earth quakes
- ▶ Volcanic eruptions
 - ▲ ash cloud detection – threat to aviation
 - ▲ ash dispersion – threat to live stock and human health.

Meteorological monitoring and forecast

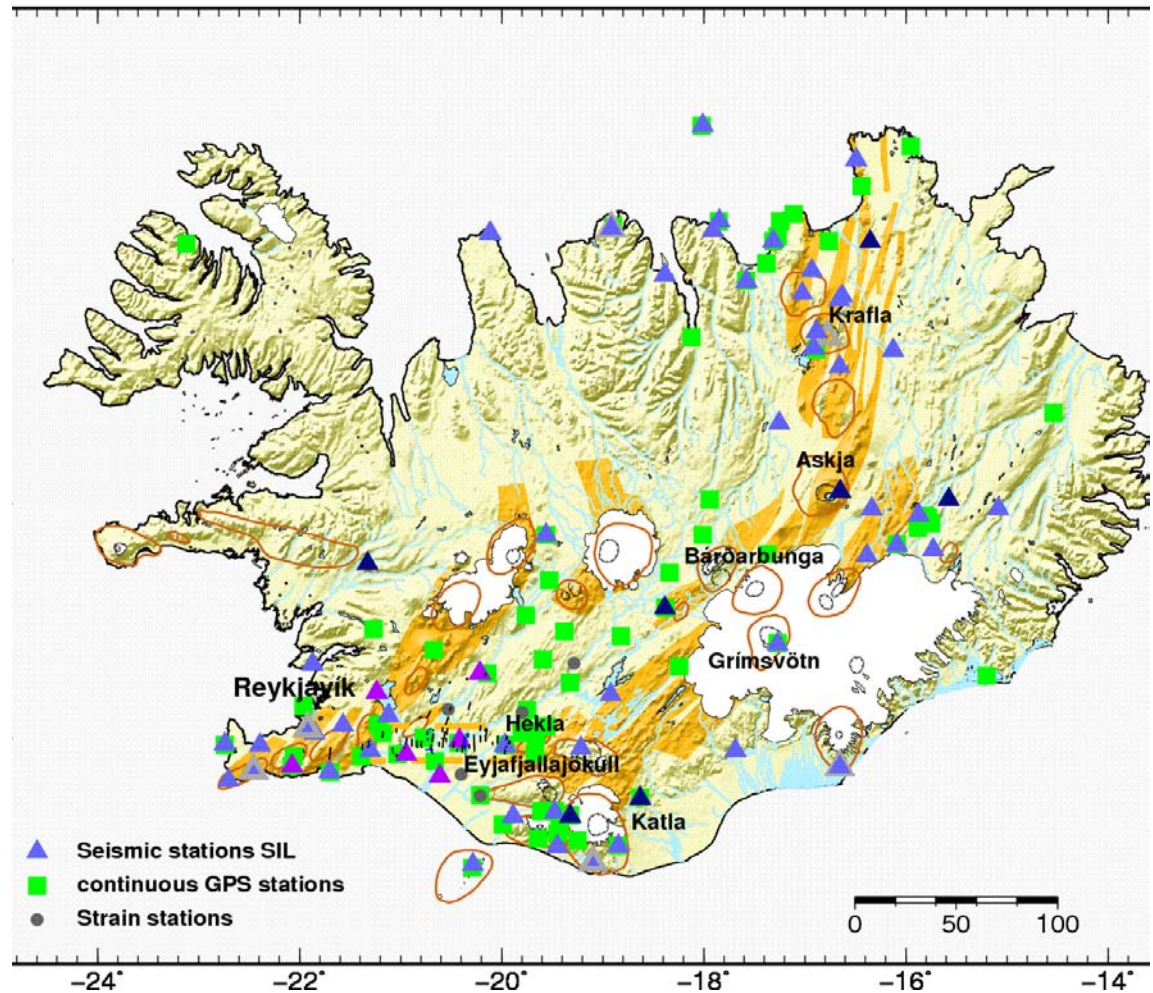
- ▶ IMO monitors and issues forecast for
 - ▲ land and sea
 - ▲ large airspace

- ▶ IMO is a State Volcano Observatory
 - ▲ Pre - eruption activity
 - ▲ Eruption monitoring
 - ▲ Airborne volcanic ash



Geophysical monitoring network

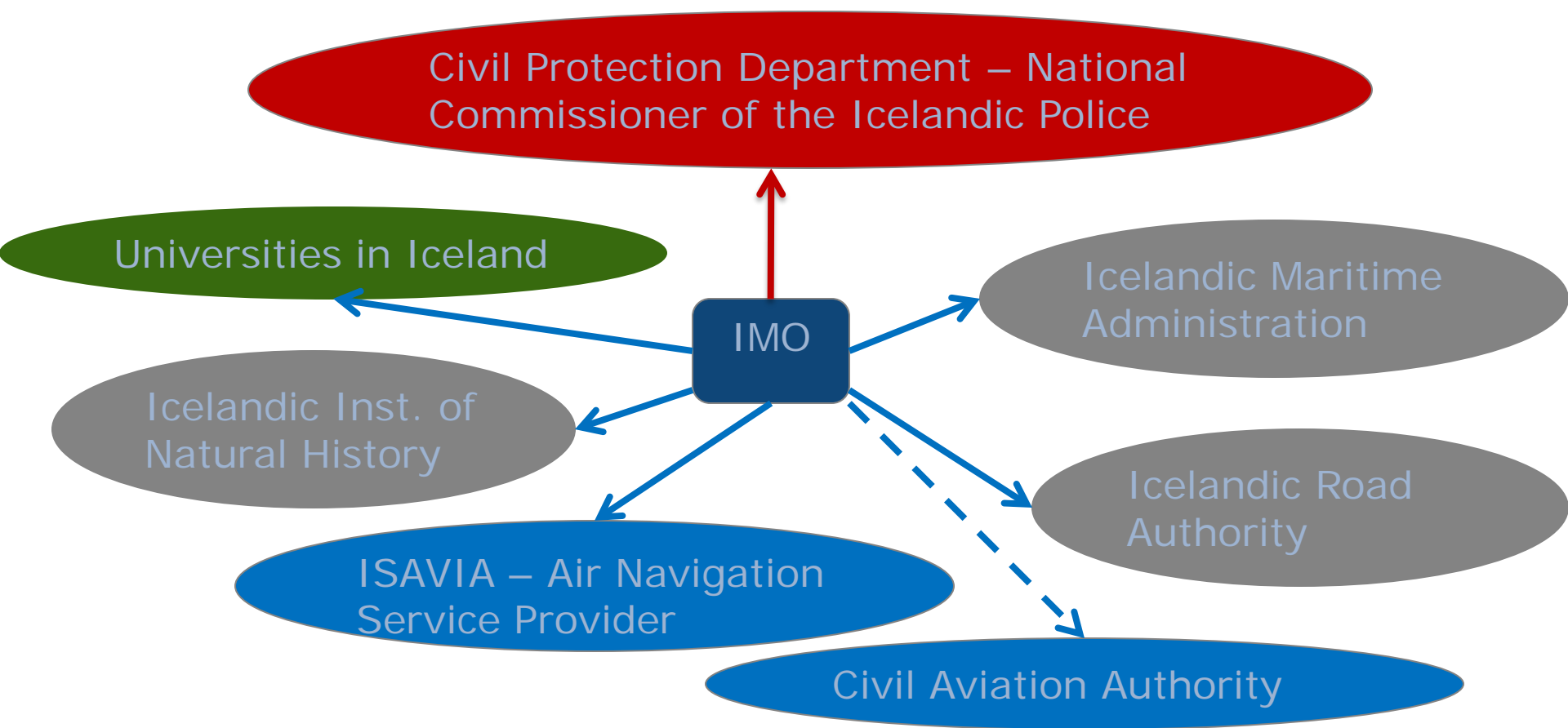
- ▶ 62 seismic stations
- ▶ ~70 GPS stations
 - ▲ ~25 ISGPS
 - ▲ ~45 other institutes
- ▶ 6 strainmeter stations
- ▶ ~160 water level gauges
- ▶ ~200 met stations
- ▶ other measurements



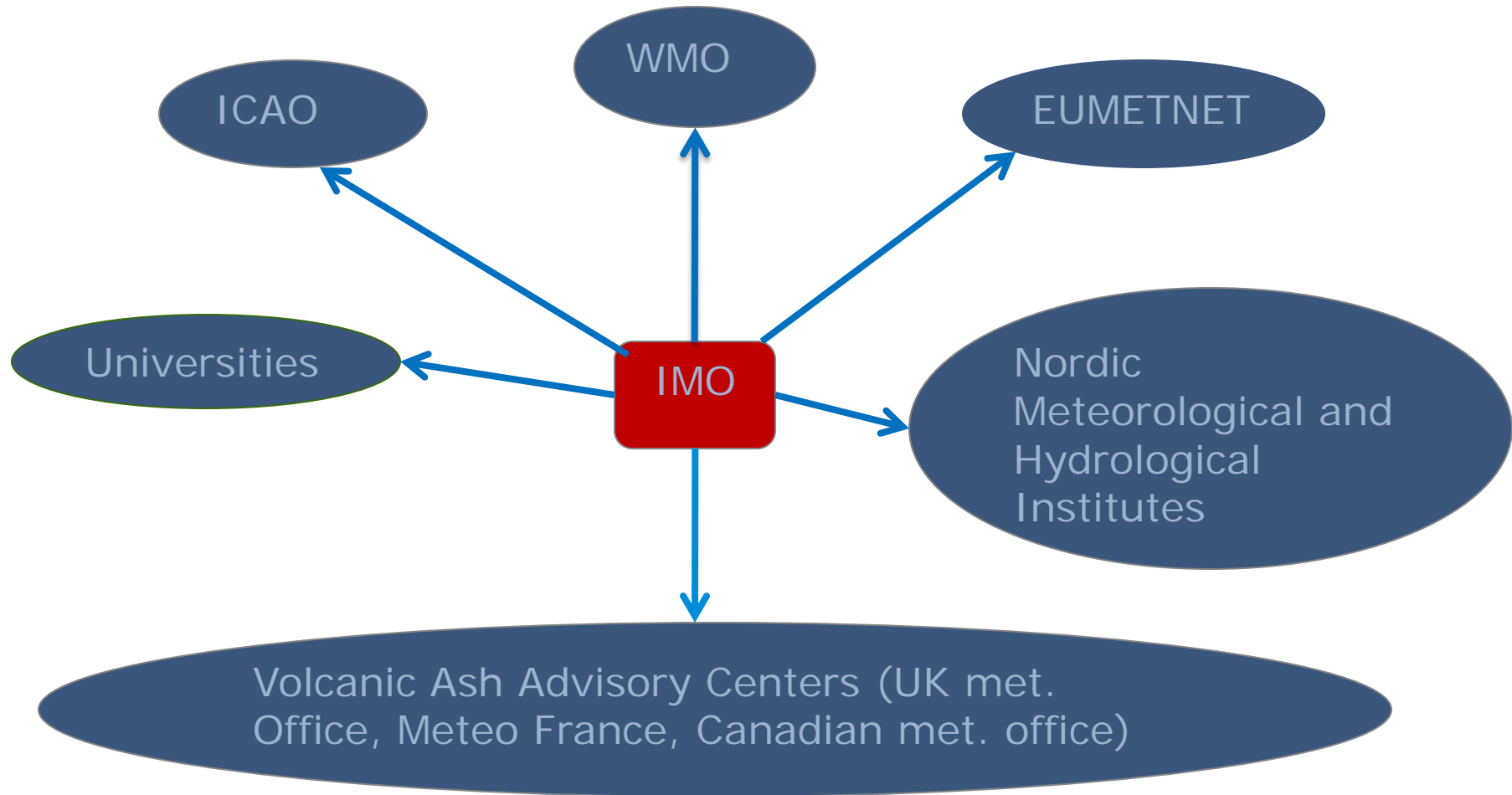
Volcanic eruptions main threat

- ▶ Subglacial eruptions
 - ▲ glacial outburst – jökulhlaup
 - ▲ can lead to loss of life and livestock
 - ▲ damage to road infrastructure, communication infrastructure, industry
- ▶ Ash fall
 - ▲ danger to livestock
 - ▲ fluerosis can lead to abnormal bone and teeth growth in animals → followed by death
 - ▲ intoxicated grass
- ▶ Ash dispersion in the free atmosphere
 - ▲ threat to aviation

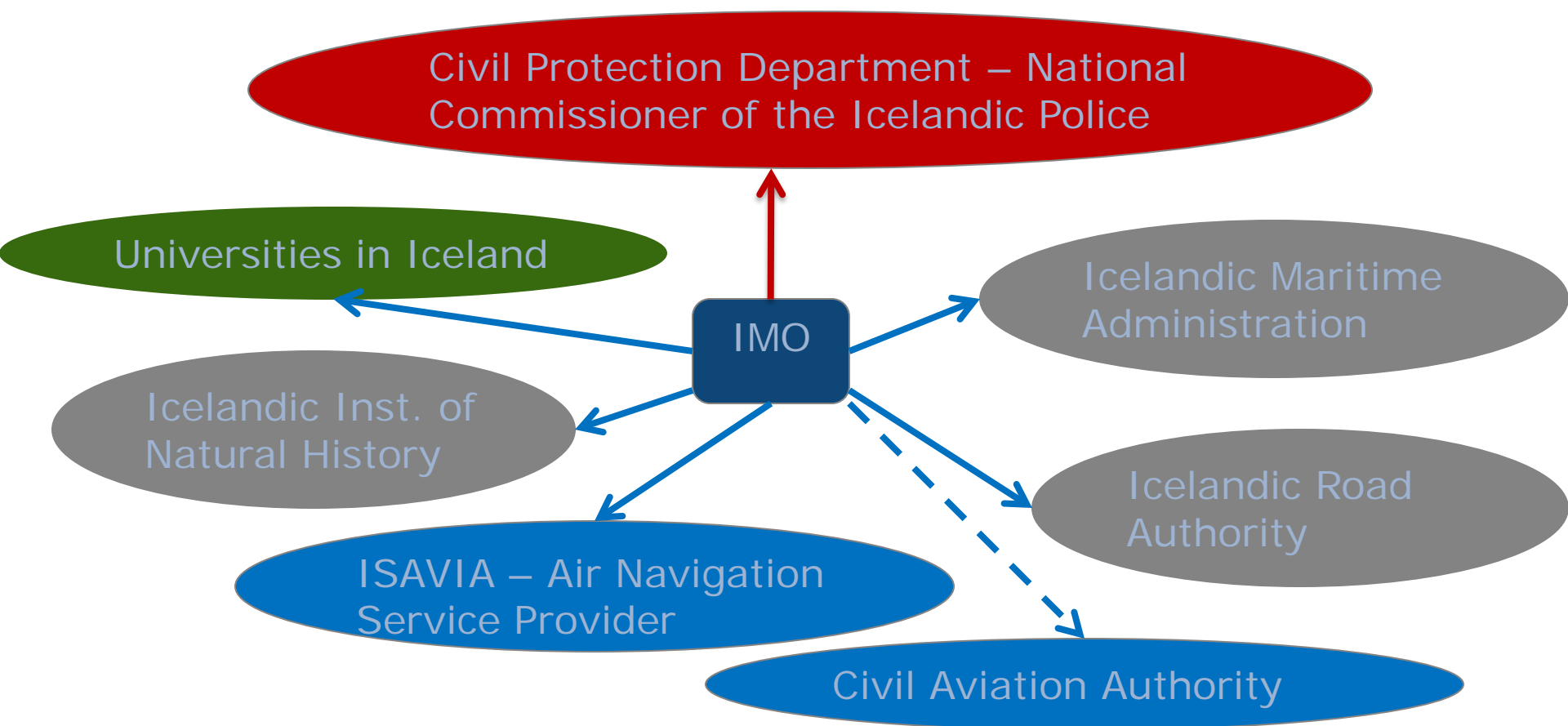
Natural Hazards – IMO's Domestic Collaboration



Natural Hazards – International Collaboration



Natural Hazards – IMO's Domestic Collaboration

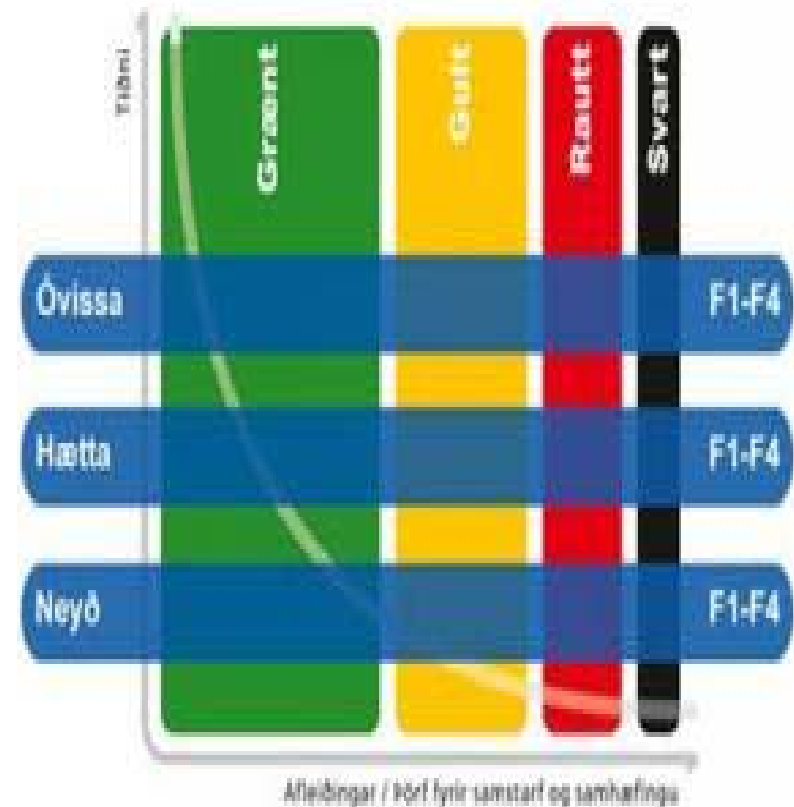


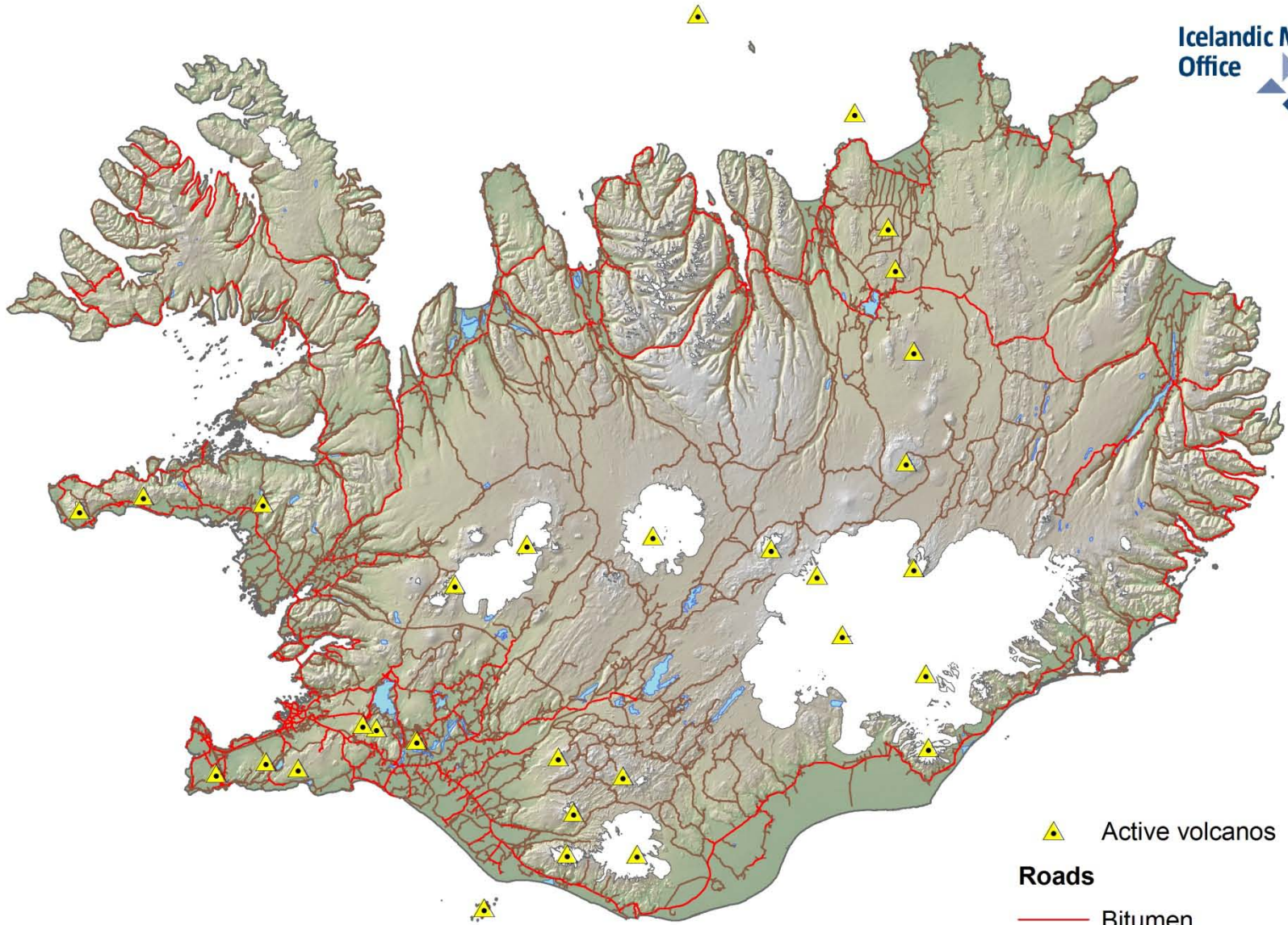
IMO and CPD collaboration on seismology and volcanic activity

- ▶ Meetings twice per year
 - ▲ status of seismic unrest in Iceland
 - ▲ status of possible volcanic eruptions in Iceland
- ▶ During increased activity meetings are held regularly
- ▶ IMO's contingency plans state that during increased seismic unrest that might lead to volcanic activity the CPD shall be contacted
 - ▲ CPD activates their contingency plan depending on the seriousness of the the hazard, e.g.:
 - ▲ evacuation of areas

CPD – Color code and danger phase

- ▶ 3 phases
 - ▲ Uncertainty phase (óvissa)
 - ▲ Alert phase (hætta)
 - ▲ Distress phase (neyð)
- ▶ 4 priority phases used to activate rescue teams
 - ▲ F1 – Highest priority
 - ▲ F2 – High priority
 - ▲ F3 – Low priority
 - ▲ F4 – No priority
- ▶ Colour code identifies the seriousness of the event/accident and the need for coordination of resources





0 50 100 200 Kilometers

- ▲ Active volcanos
- Roads**
- Bitumen
- Gravel

Flood areas during subglacial volcanic eruption and emergency information



Helstu leiðir jökulhlaupa úr Myrdalsjökli vegna eldsumbrota í Kötlu.

Flood areas during subglacial volcanic eruption and emergency information

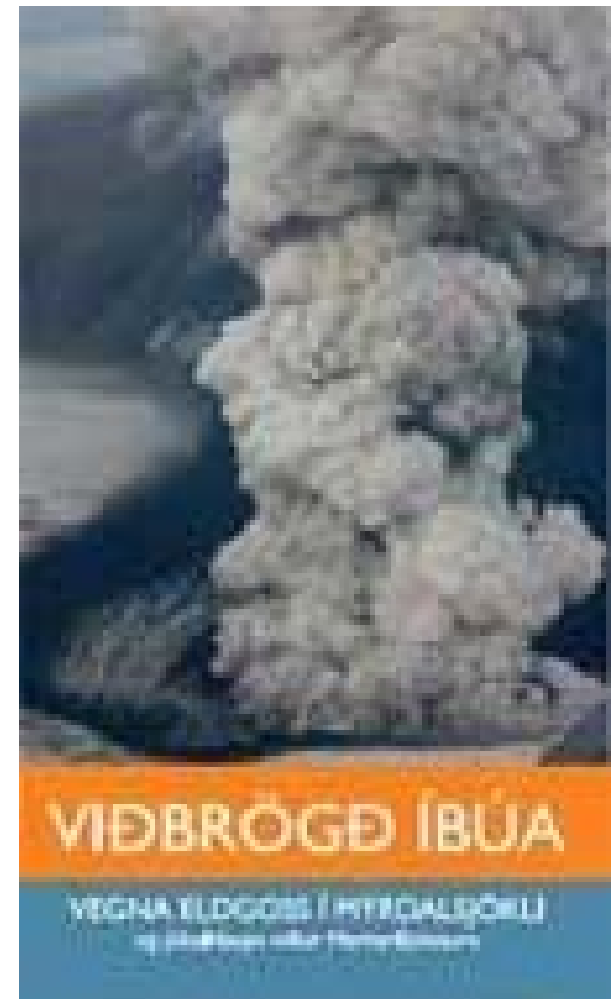


Information from CPD

- ▶ In 2002 a three year project started to investigate the threat of eruptions in Eyjafjallajökull and Katla and which consequences that could have – IMO and the University of Iceland
- ▶ A report was issued in 2005 with information on
 - ▲ historical events on volcanic activity and glacial outburst
 - ▲ floods (glacial outburst) that had occurred and could occur (modelled events)
 - ▲ flood channels/patterns → which areas are affected
 - ▲ flood discharge
 - ▲ speed of the flood → how fast does floods reach inhabited areas
- ▶ Probabilities of volcanic eruptions in the area
 - ▲ return period
 - ▲ is there a correlation between the strength of the eruption and return period

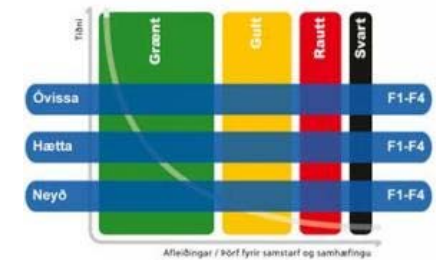
Information from CPD

- ▶ Information on preparedness issued to residents in the area
- ▶ Information to tourists in different languages
- ▶ Information posters at touristic sites
 - ▲ Hekla ...
- ▶ Exercises held
 - ▲ 2006 a two day exercise in the area of Eyjafjallajökull and Mýrdalsjökull was held. All institutes that are involved during real events participated and inhabitants were evacuated



IMO – CPD collaboration

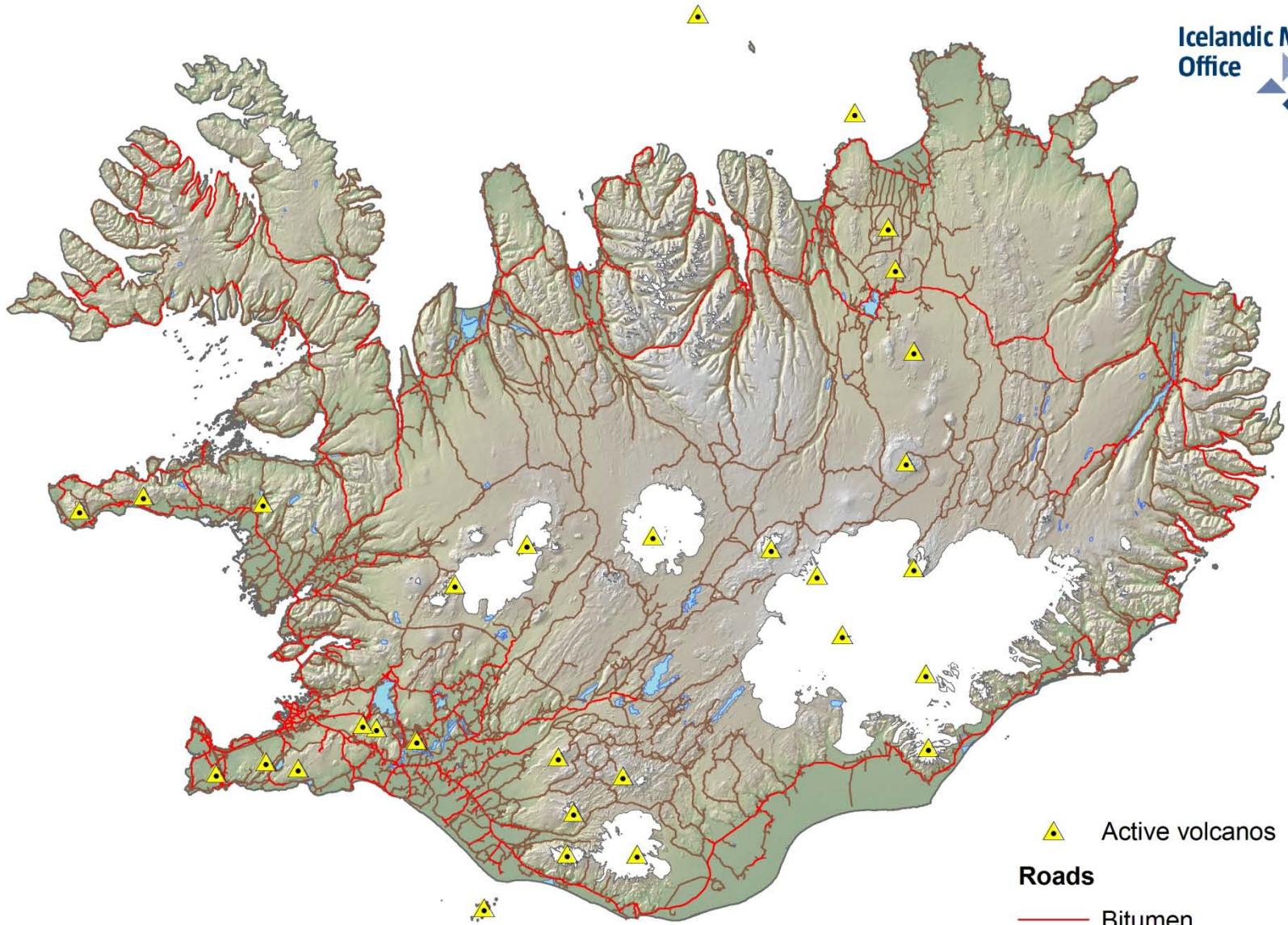
- ▶ IMO issues warnings and information on natural hazards to CPD
- ▶ CPD activates their contingency plan accordingly
- ▶ Information to public issued through
 - ▲ public radio and television
 - ▲ web
 - ▲ mobil web
 - ▲ text TV
 - ▲ Posters to residence
 - ▲ Posters at touristic sites
- ▶ Work ongoing on how to inform tourists at sites
 - ▲ popular walking path on Mt Hekla on the main eruption rift
 - ▲ pre eruption warning 1-2 hr!



Next steps

Risk analysis of volcanic activity in Iceland

- ▶ Re-analysis of volcanoes in Iceland – Catalogue
- ▶ Scenarios for each volcano
- ▶ Risk analysis for areas possibly affected by glacial outburst
- ▶ Risk analysis for volcanic eruptions close to populated areas and/or international airports



▲ Active volcanos

Roads

— Bitumen

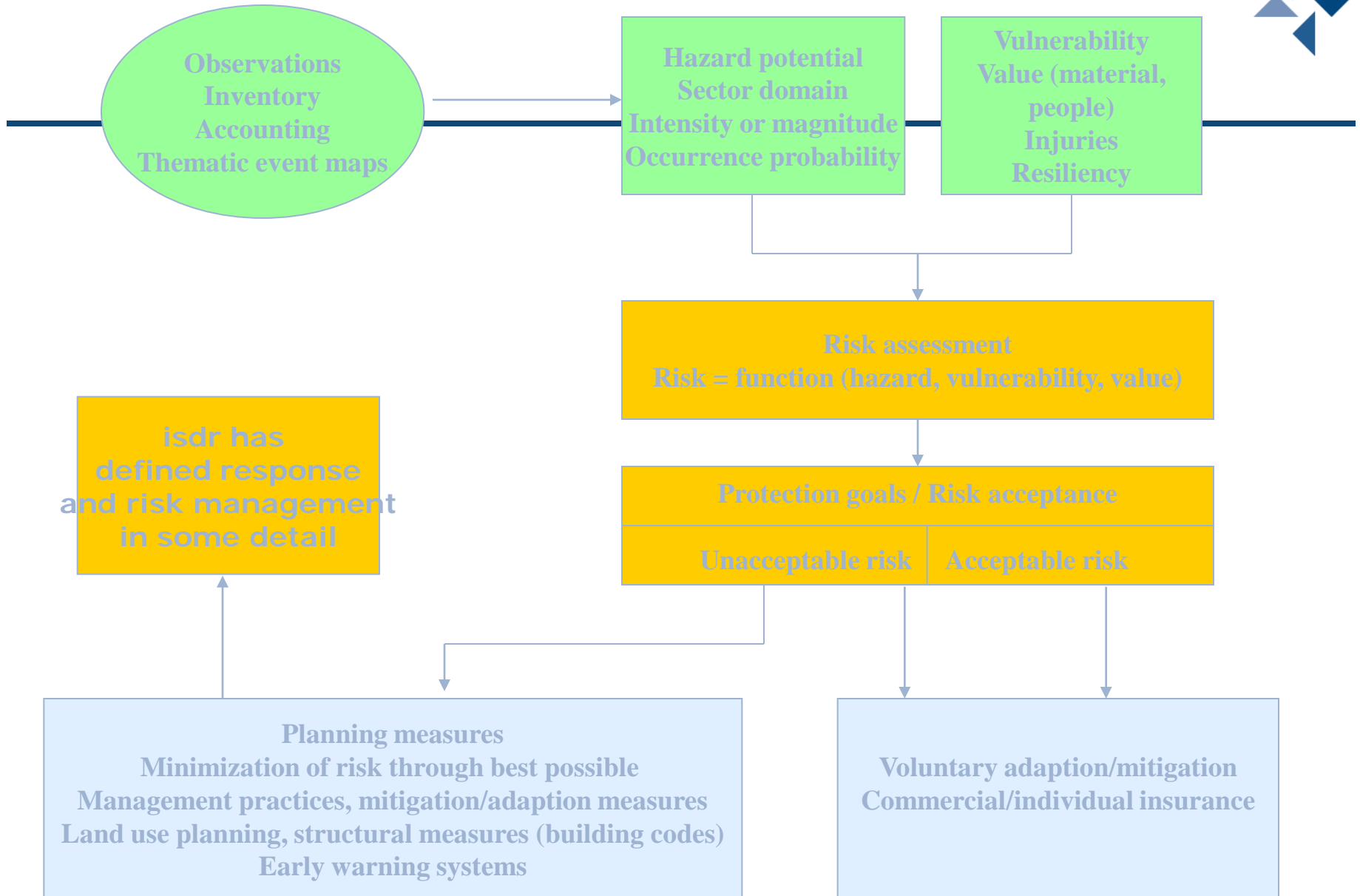
— Gravel

0 50 100 200 Kilometers

International Strategy for Disaster Reduction (www.unisdr.org)

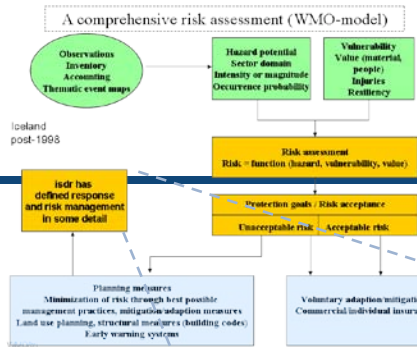
- ▶ WMO (1999) Comprehensive Risk Assessment for Natural Hazards WMO/TD No. 955, 92 p.
- ▶ Living with Risk: A global review of disaster reduction initiatives (2004)
- ▶ Global assessment report on disaster risk reduction (2009)
- ▶ Terminology
 - ▲ www.unisdr.org/eng/terminology/terminology-2009-eng.html
- ▶ Mitchell J.K. (ed. 1996): The long road to recovery: Community responses to industrial disasters. UN University Press, 307 p.
- ▶ Mitchell J.K. (ed. 1999): Crucibles of hazards: Mega-cities and disasters in transition. UN University Press, 535 p.

A comprehensive risk assessment (WMO - model)





Comprehensive risk assessment



Risk management / adaption (isdr)

<p>Knowledge building in the society education, instructions, research, information distribution</p>	<p>Social commitment clear role of institutions, law and regulations</p>
<p>Mitigation deployment environmental assessment zoning infrastructure strengthening economical framework insurance, mitigation structures e.t.c.</p>	<p>Warning and forecasting definition of response indicators, warnings, warning dissemination, definition of alert stages, scenarios e.t.c.</p>

Thank you

Photo: Þ.M. Pétursson

