European Commission

Analysis of Risks Europe is facing

An analysis of current and emerging risks

Azzurra Lentini,
Scientific Officer
(Disaster Risk Management, Unit JRC E.1)
azzurra.LENTINI@ec.europa.eu

JRC Disaster Risk Management Unit

Mission

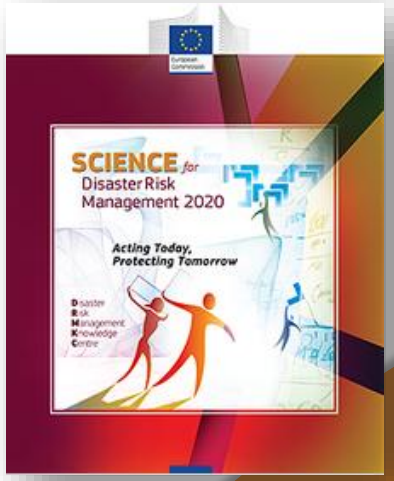
To strengthen EU's resilience to crises and disasters (both natural and man made) through scientific research and innovative technologies and following the EU Policies and supporting policy makers needs

Using integrated systems for risk analysis, situational awareness, early warning

To improve the crises monitoring, evaluation, anticipation and communication of the impacts

Some Guidances

Recommendations for National Risk Assessment for Member States (v0 and v1)



Science for DRM Books

Proposal for an approach for monitoring Disaster Resilience Goals

Report on cross border and emerging risks

Analysis of Risks in Europe

European Commission

JRC Action-Oriented: From Scientific Evidence to Policy Implementation

Niinistö report
Nov 2024

Union Preparedness Strategy
26 March 2025

European Union Civil Protection: Response Capacity Progress report
June 2025

Dec 2026

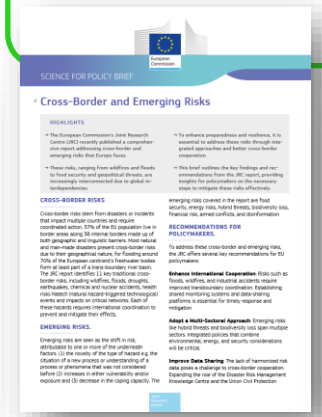
Workshops on Earth Tipping Points and Emerging Risks (JRC with policy DGs) – Report on Mid-Term Early Warning

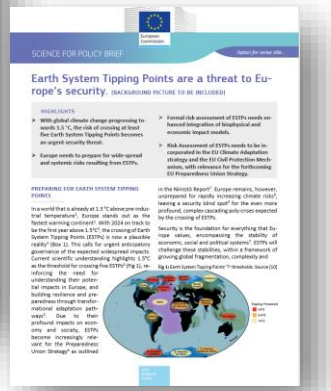
Policy Briefs on Cross-Border and Emerging Risks

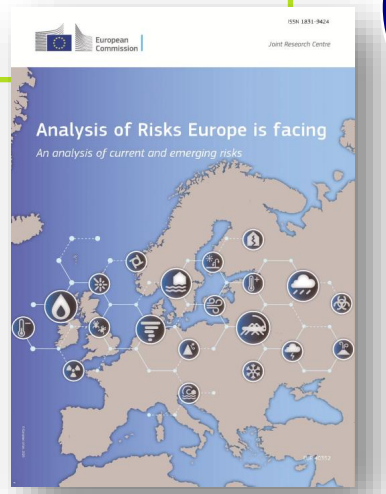
Earth System Tipping Points

Analysis of Risks – JRC report

Towards an EU Comprehensive Risk Assessment







European Commission

Risks Covered in Our Analysis

RISK CATEGORIES	RISK	Cross-border	Emerging	Climate scenario	HILP
Cyber threats	Artificial Intelligence	●	●	●	●
	Cyber incidents in healthcare	●	●	●	●
	Cybersecurity	●	●	●	●
	Disinformation	●	●	●	●
Meterological & Climatological	Heatwave	●	●	●	●
	Cold wave	●	●	●	●
	Convective storm	●	●	●	●
	Tropical cyclone	●	●	●	●
	Drought	●	●	●	●
	Wildfires	●	●	●	●
Hydrological	Floods	●	●	●	●
	Coastal Floods	●	●	●	●
Geophysical	Earthquake	●	●	●	●
	Tsunami	●	●	●	●
	Volcanoes	●	●	●	●
Biological	Pathogens (epidemic concern)	●	●	●	●
	Antimicrobial Resistance (AMR)	●	●	●	●
	Pollution-Driven Non-Communicable Diseases				
	Adverse Health Effects	●	●	●	●
	Illicit Drug Abuse, Trafficking, and Public Health	●	●	●	●
Environmental	Air pollution	●	●	●	●
	Eutrophication	●	●	●	●
	Marine pollution by oil & chemicals	●	●	●	●
	Marine macrolitter	●	●	●	●
	Marine microlitter	●	●	●	●
	Biodiveristy loss	●	●	●	●
Technological	Nuclear/Radiological	●	●	●	●
	Disruption of essential services	●	●	●	●
	Natech	●	●	●	●
	Hydrogen fuel risks	●	●	●	●
	Ammonia for Hydrogen Fuel Production and Transport	●	●	●	●
	Renewable Energy material sourcing and processing	●	●	●	●
	Battery energy including storage	●	●	●	●
	Carbon Capture Storage and Distribution	●	●	●	●
Geopolitical and societal	Armed conflicts	●	●	●	●
	Hybrid threats	●	●	●	●
	Illicit trafficking of nuclear/radiological material	●	●	●	●
	Terrorism	●	●	●	●
	Food insecurity in Europe	●	●	●	●
	Unexpected Migration Flow	●	●	●	●
Extra-terrestrial	Damage from solar storms	●	●	●	●
	Major meteorite impact	●	●	●	●
	Space debris	●	●	●	●
	Kessler syndrome	●	●	●	●
	Uncontrolled reentry or launch	●	●	●	●
	Attacks on satellites	●	●	●	●
	Attacks on space-related ground infra	●	●	●	●
	Technological over-dependence	●	●	●	●

47 risks; **9** risk categories ***(not exhaustive list of risks in Europe)***

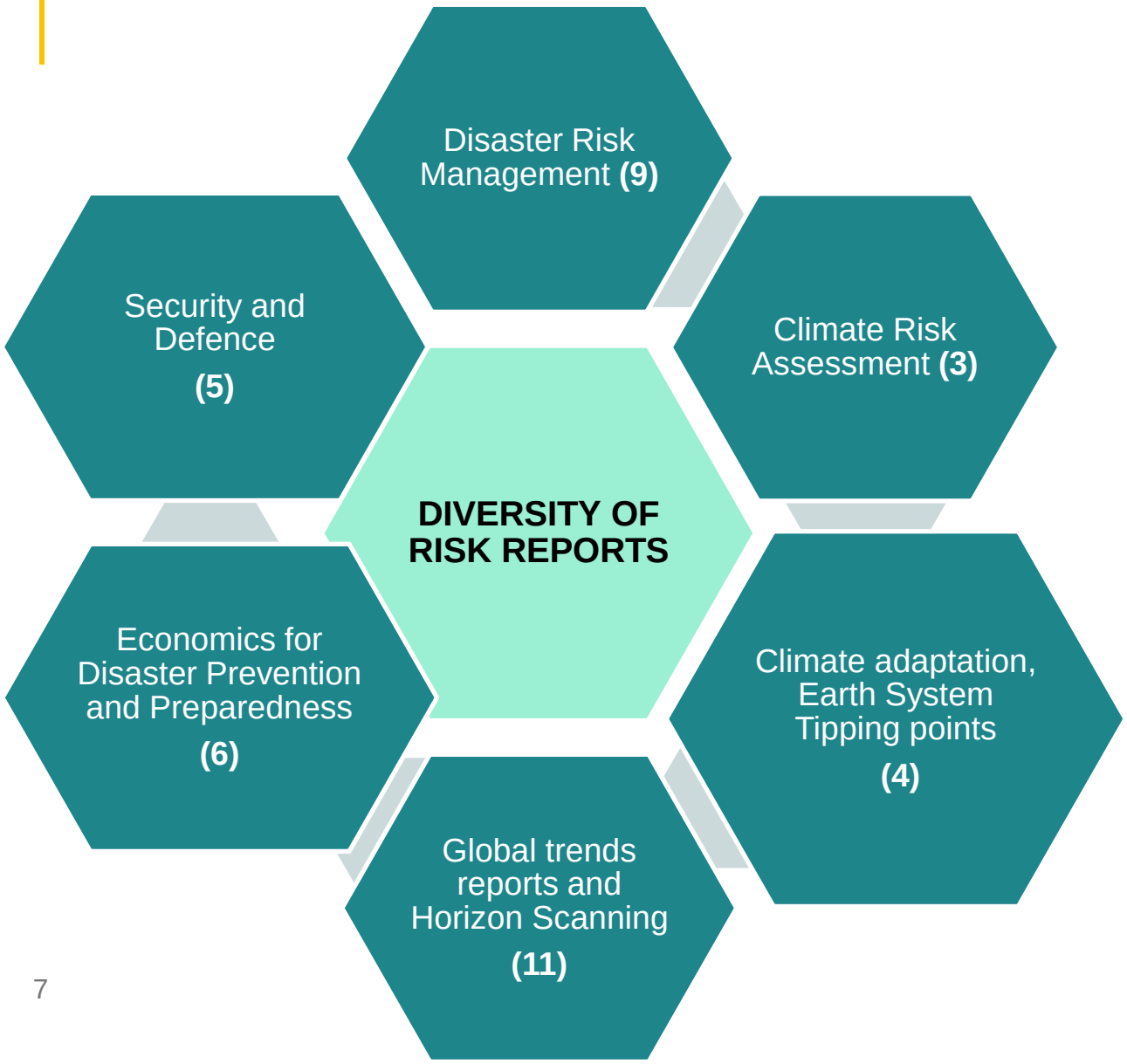
- **Risks' classification** UNDRR's Hazard Information Profiles (HIPs), (*Murray et al., 2021 with some modifications*)
- **Terminology** based on Article 6 UCPM reporting guidelines and the EU Overview of Risks at the Knowledge Network, enabling cross-comparison and synergies with MS/PS National Risk Assessment reports
- **Characterisation of risks** by JRC experts. (The red dots mean YES, and the blue dots mean NO

European Commission

What JRC experts analysed for each risk?

- Risk Characteristics
- Drivers and Impacts
- Past Loss, damages and potential future impacts
- Gaps and needs (research, operational, policy)
- Policy references
- Mitigation and Adaptation measures (in place and advised)

Analysis of 38 EU institutional reports produced over the last 5



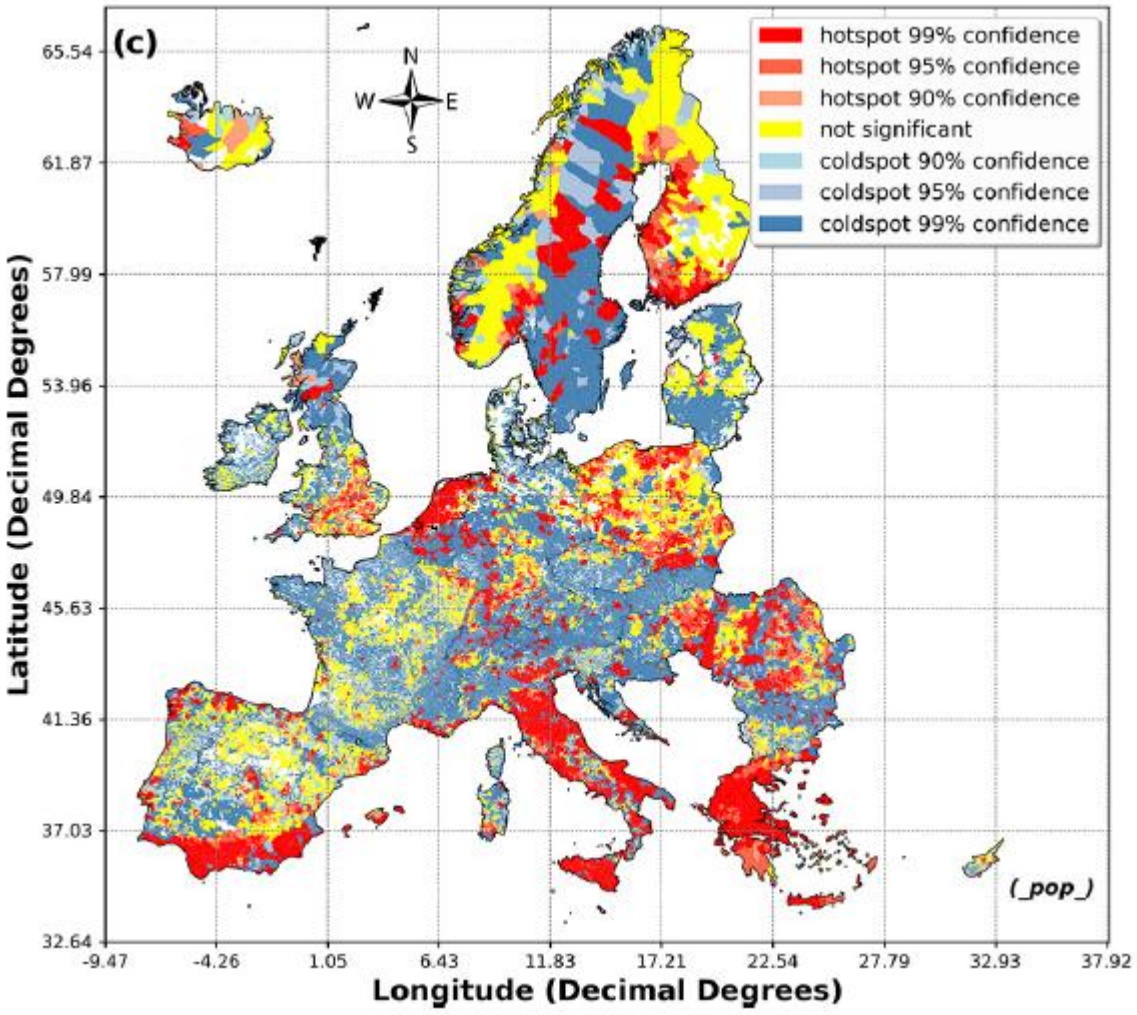
Fragmented but Rich Risk Landscape:

Europe has a **wealth of risk information**, but with **diverse methodologies, definitions and siloed data**

Rather than seeking uniformity, the objective should be to promote interoperability—respecting the diversity of existing approaches

European Commission

Multi-hazard hotspots: Absolute population exposure



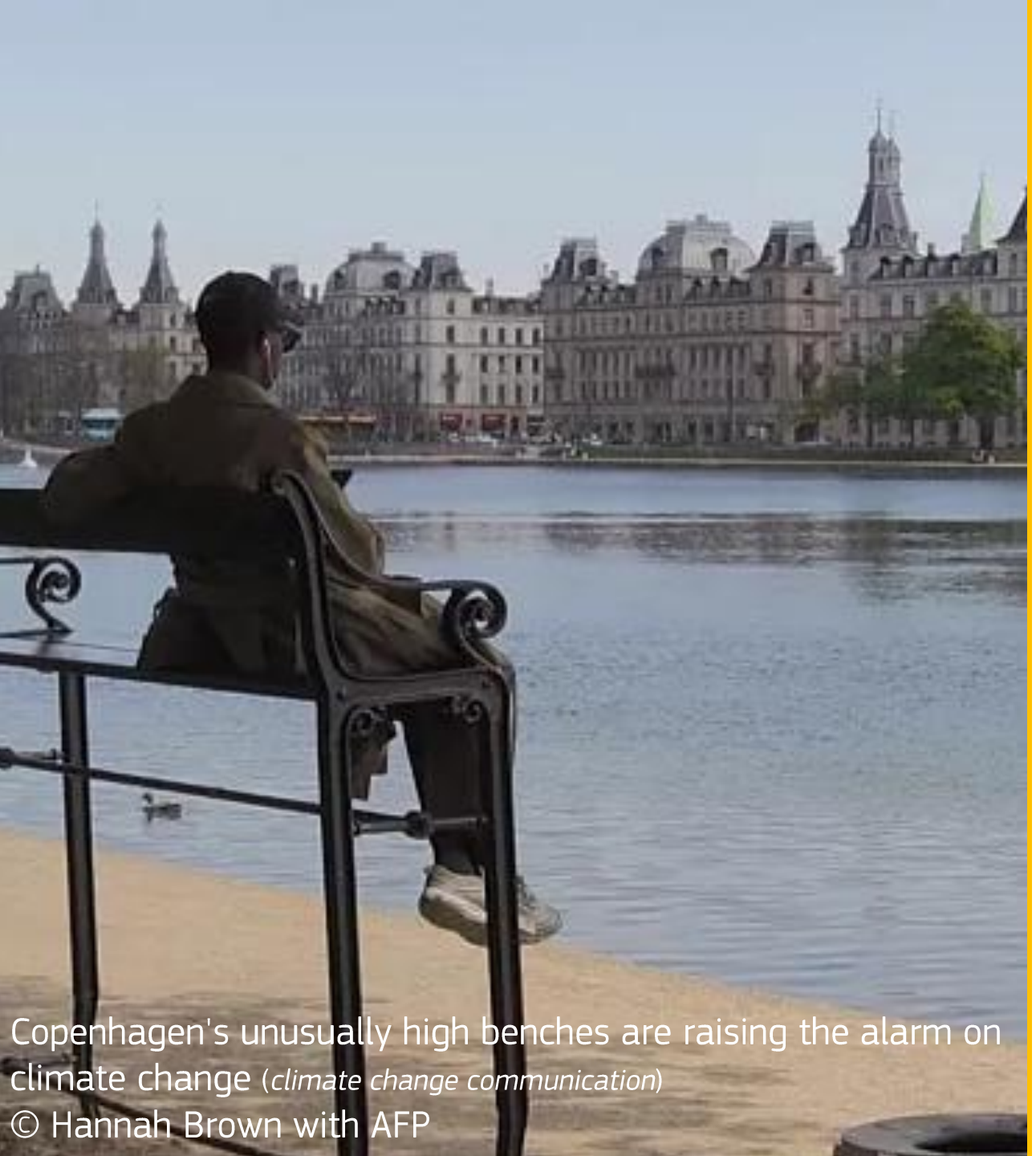
Nat. Hazards Earth Syst. Sci., 25, 287–304, 2025v
Source: https://nhess.copernicus.org/articles/25/287/2025/

Exposure to multiple hazards

River Floods, Landslide, Coastal Inundation, Earthquake, Subsidence, Wildfires

- *Around 20 % of Europe's population is exposed to multiple natural hazards: 87 million people affected*
- *Nearly half of these affected is exposed to 3 or more hazards simultaneously*
- *- About 36% of the municipalities exposed to multi-hazards are located in low-income regions*

European Commission



Copenhagen's unusually high benches are raising the alarm on climate change (*climate change communication*)
© Hannah Brown with AFP

Drivers and Impacts

From Isolated to Interconnected

- Risks rarely occur in isolation - they trigger cascades of consequences

Example: *Climate change → sea level rise → coastal flooding → damage infrastructures → disrupt essential services (such as water supply and transport) → health crises →economic disruption etc.*

Climate change (among others…) is a cross-cutting risk driver, amplifying many risks and necessitating integrated ***adaptation*** *and* ***mitigation/prevention strategies***

European Commission

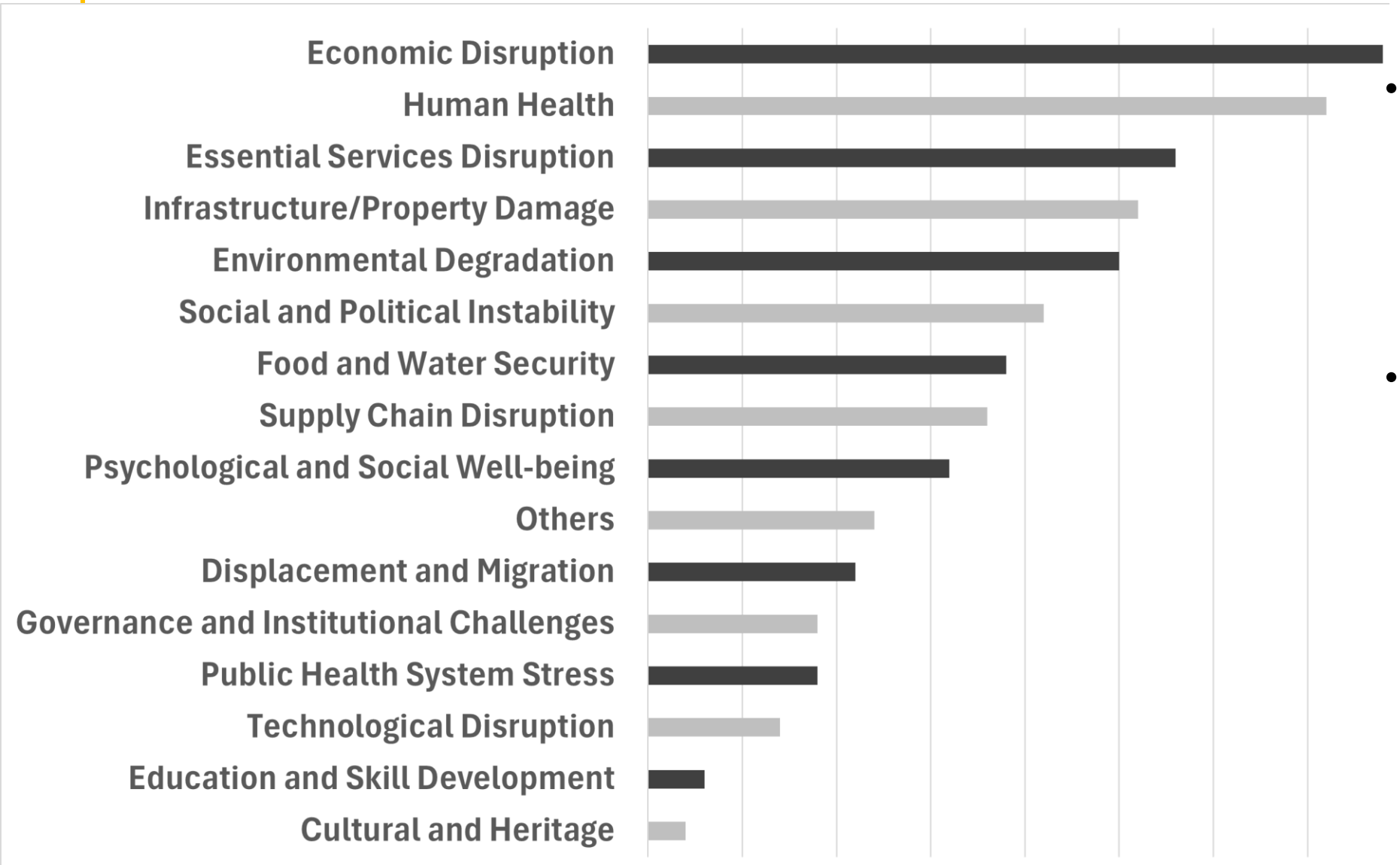
Most frequent risk drivers

- **Geopolitical instability**: Connected to nearly **half of all hazards** analysed
- **Weak governance**: Amplifies **19 different risks**
- **Climate change**: Underlying factor in **17 risks**
- **Urbanisation**: Increases exposure across **17 risk categories**
- **Environmental degradation**: Compounds **14 different risks**
- **Technological development**: Creates vulnerabilities in **10 areas**

Addressing these risk drivers provides a leverage that means tackling the ROOT CAUSES

European Commission

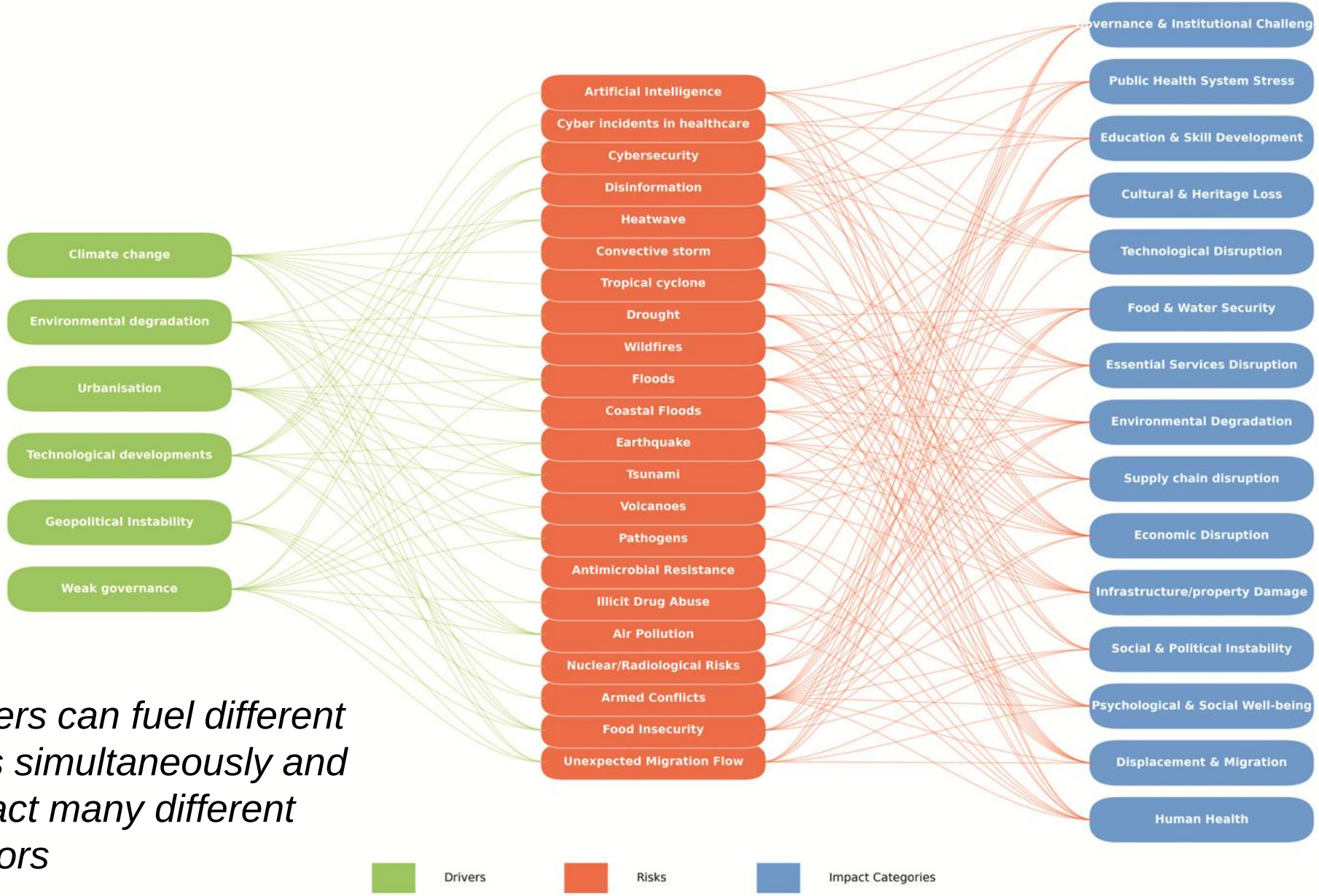
Most commonly mentioned impacted sectors (as identified by JRC experts)



- The most common impacted sectors demonstrates that different risks can lead to similar destructions
- Economic Disruption followed by Human Health can disrupt supply chains, damage industries, create geopolitical tensions and undermine livelihoods

European Commission

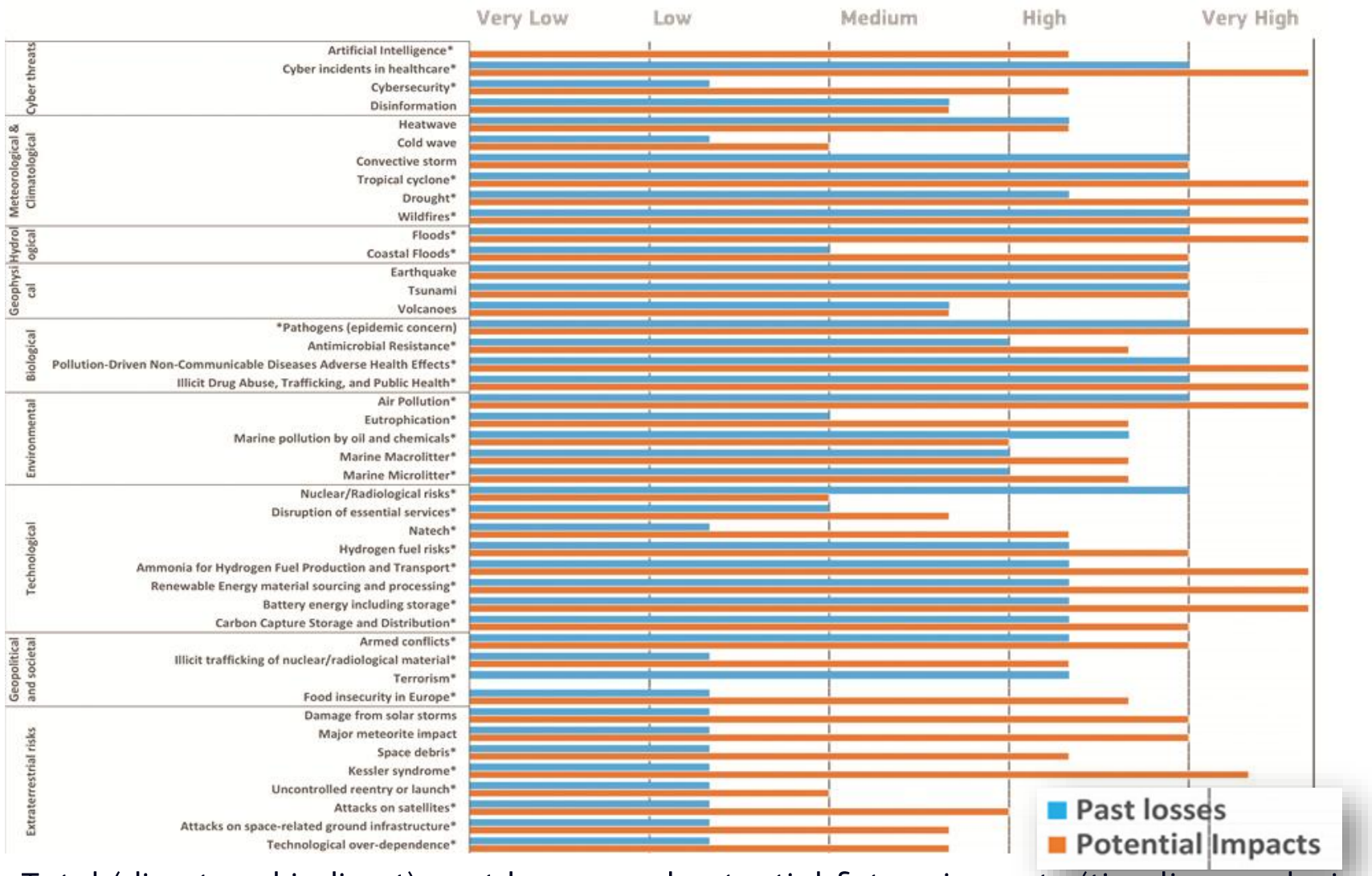
Interactions between main driving factors risks and the impacted sectors as identified by JRC experts



Drivers can fuel different risks simultaneously and impact many different sectors

European Commission

Losses are expected to increase for majority of hazards



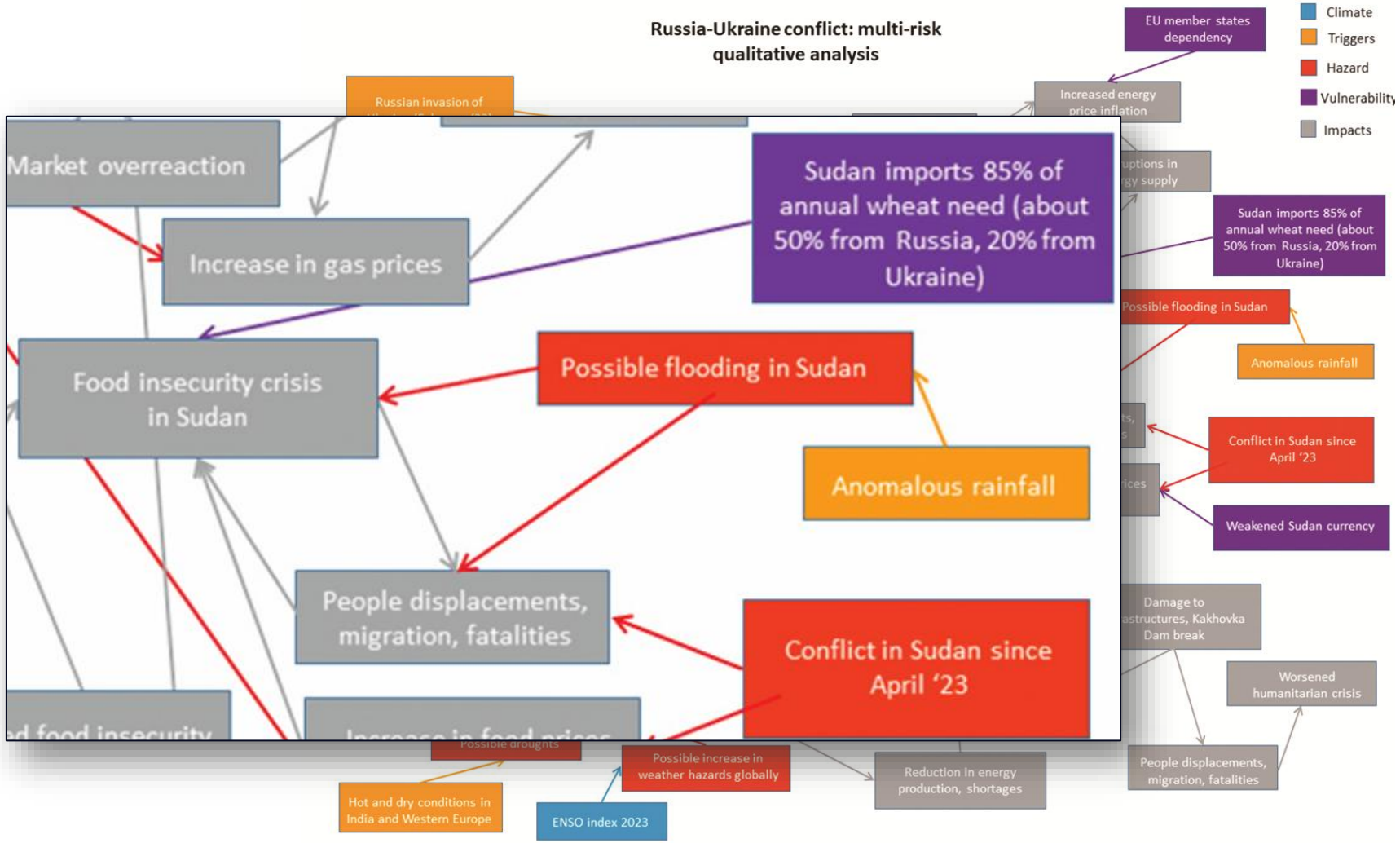
Total (direct and indirect) past losses and potential future impacts (timeline analysis spans a 10-year period, looking both backward and forward)

- **Losses are increasing** due to climate change, urbanisation, and digital dependency.
- **Indirect** business disruptions and long-term social effects often exceed immediate physical damage
- Risk governance models need to address **systemic and intangible risks**

European Commission

Vulnerabilities: key to interconnected risks

Case Study - Causal loop diagram of the Russian invasion of Ukraine in February 2022



A single shock can interact with existing vulnerabilities *(COVID-19 and EU energy dependency)*, to create ripple effects across multiple systems.
This can exacerbate other ongoing crises (e.g. conflict in Sudan), highlighting the need for a ***comprehensive approach to risk management***

European Commission

CYBER THREATS

Artifical Intelligence

- Insufficient understanding of AI impacts on society and environment
- Lack of specific standards and codes of practice
- Widespread adoption of trustworthy AI practices across industries is needed

Cyber incidents in healthcare

- Incident characterisation in health settings; Long-term effects on patients
- Standardised reporting requirements; Cybersecurity resource allocation
- Staff awareness and training; Incident response planning and coordination

Cybersecurity

- Political willingness to invest; Lack of standardised methodologies implementation
- Correct implementation of existing methodologies and good practices

Disinformation

- Analysis of trends in climate change, migration, public health
- Lack of legal mandate to profile accounts that spread misinformation
- Lack of access to data from social media platforms

METEOROLOGICAL AND CLIMATOLOGICAL

Heatwave

- Comprehensive epidemiology of heatwaves is needed
- National guidelines lacking; Adaptation strategies for vulnerable people not in place
- Dedicated sectoral reporting schemes; Unified methodologies for risk assessments

Gaps identified for each risk

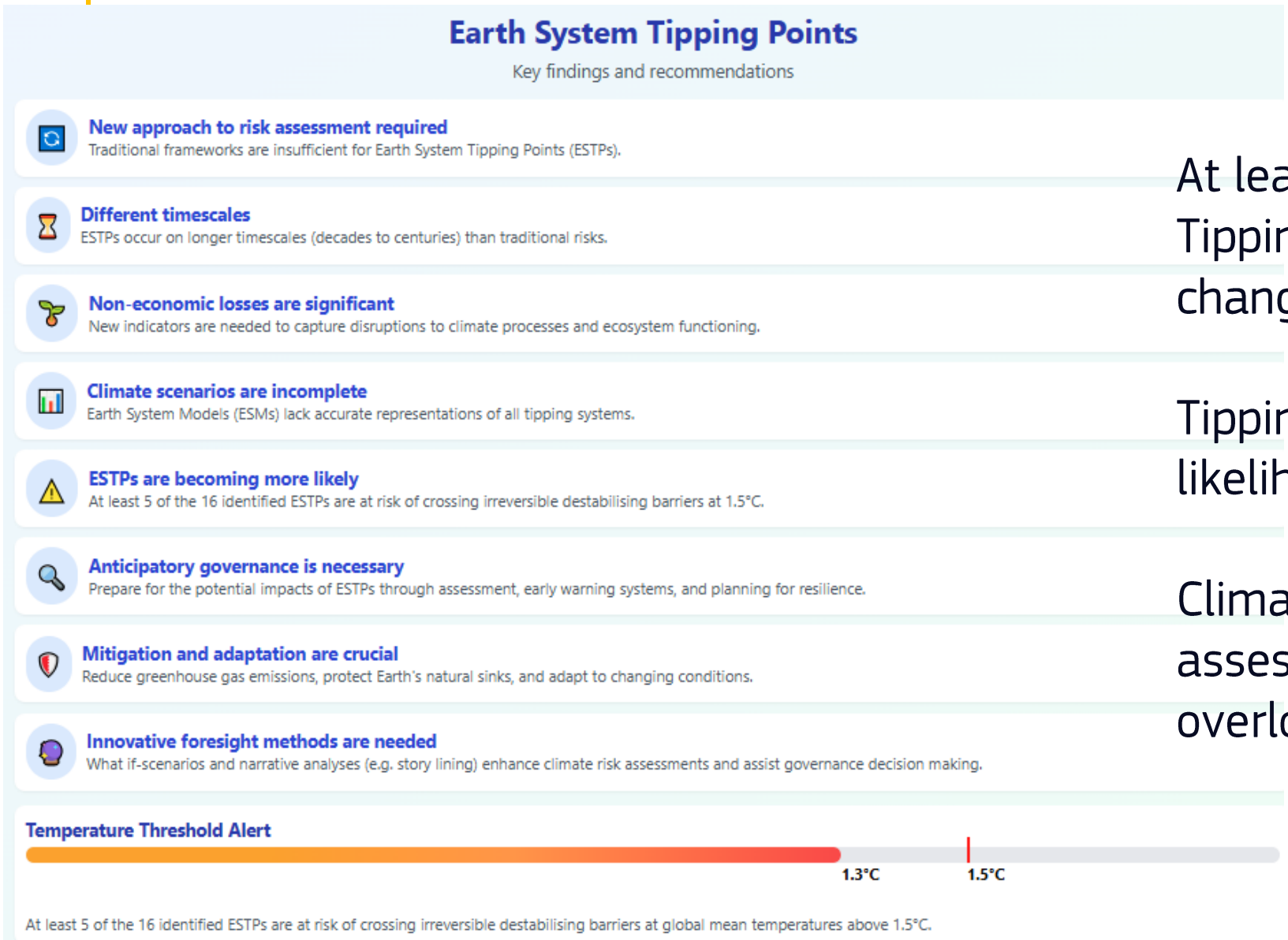
Research Gaps Policy Gaps Operational Gaps

These distinctions are important because they highlight the different types of actions needed to address the challenges

Adaptation and mitigation/prevention measures (in place and advised)

CYBER THREATS	
Artificial Intelligence	
Mitigation: various mitigation categories and requirements, such as AI risk management, data quality and governance, human oversight, accuracy, robustness, AI cybersecurity.	
Cyber Incidents in Healthcare	
Adaptation: Focus on improving resilience through better characterisation and understanding of cyber incidents.	**Mitigation**: Establishment of a Centre for Excellence on Cybersecurity in health settings to provide training, advice, and awareness and Industry Engagement, Developing a systematic framework to identify and document common vulnerabilities in healthcare settings.

Earth System Tipping Points



At least 5 of 16 Earth System Tipping Points at risk of irreversible change above 1.5°C warming;

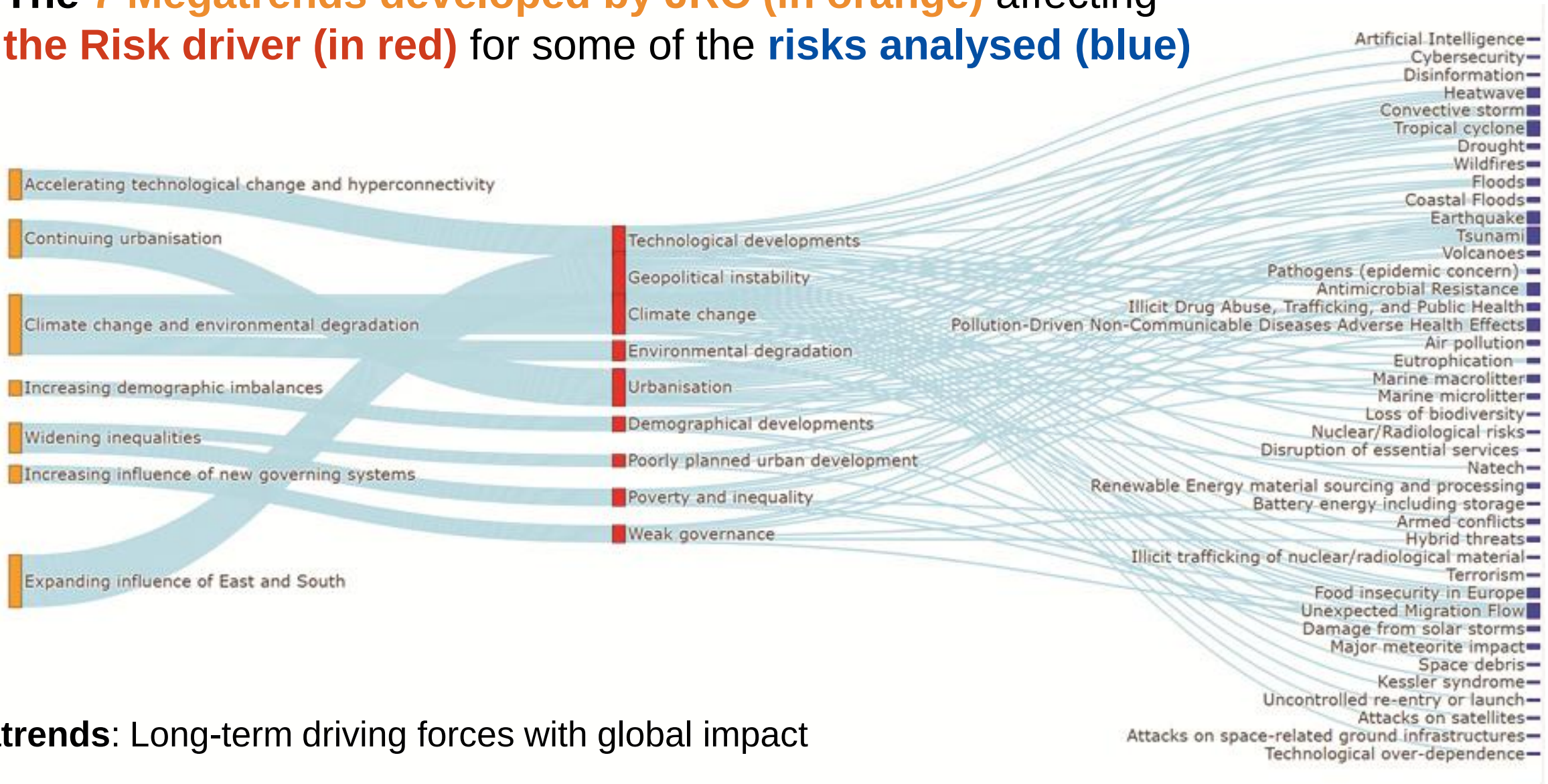
Tipping points shifted from low-likelihood to high-likelihood events;

Climate scenarios used in risk assessment for Tipping points often overlook key tipping systems

European Commission

Foresight for emerging risks

The 7 Megatrends developed by JRC (in orange) affecting the Risk driver (in red) for some of the risks analysed (blue)



Megatrends: Long-term driving forces with global impact

Thank you!

EU **Science** for
Preparedness Conference

4-6 Nov 2025
Turin, Italy