Risk Management in Seaports

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Agenda

1	**Risk management in seaports – necessity and HAZARD project background**
2	Risk management process
3	Risk assessment - risk sources
4	Risk assessment - methods
5	HAZARD online toolbox
6	Conclusion and outlook

Seaports in global supply chains

- More than **80 percent** of global trade is forwarded by sea.
- Seaports possess different **hazard sources** and often are located near **residential areas.**
- Seaports need to follow an immense number of **regulations** and **standards.**
- Clear **roles** and **responsibilities** for the activities related to risk management are required.
- Inadequate **risk assessment** and **risk treatment** can lead to major **disasters**!

Nagi et al. (2017)

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Examples of Port Accidents and Risks

Port: Tianjin 2015
„ Analysis of Tianjin Port Explosion: Risk management is the key“
www. Swissre.com.de, 25.07.2016

Port: Beirut 2020
„Explosion of 2,750 tonnes of highly explosive ammonium nitrate“
www.arabnews.com, 07.08.2020

Port: Gdynia 2016
„Bulk carrier Olga Topic caught fire in cargo holds during cargo handling operations“
www.newsmaritime.com, *25.01.2016*

Port: Hamburg 2016
„ Hamburg Port: Caustic vapours emitted due to chemical accident“
www. spiegel.de, 21.03.2016

Port: Kiel 2009
„Severe explosion shocked Port of Kiel“
www.abendblatt.de, 13.06.2009

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Potential Consequences of Accidents and Incidents in Seaports

- Port closure
- Damage to people, property and the environment
- Service delays or disruption of supply chains
- Long term damage to country or regional reputation

The HAZARD Project

Research motivation and project objectives

- Risk management in ports is important for ensuring reliability, supply chain resilience, as well as transport safety and security.

- Risk analyses and assessments are vital to nearly all stakeholders of a port, such as logistics operators, rescue services, civil protection agencies.

- HAZARD aims at supporting project partners and their peers to better understand and apply risk management methods for a better mitigation of risks in seaports.

For detailed project information see Ojala, L., Whiteman, M., Malmsten, J. (2016) and/or http://blogit.utu.fi/hazard/

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The HAZARD Project

The HAZARD Project

In a Nutshell…

HAZARD helps to mitigate emergencies in major seaports and to improve related safety and security preparedness in the Baltic Sea Region (BSR).

Key Data:

- 3 year project period, Spring 2016 –Spring 2019
- Total budget EUR 4.4 million (approx. USD 4.96 million)
- Co-funded by EU Interreg Baltic Sea Region Program

Partners:

- Rescue services as national, regional or local authorities
- Major seaports in the BSR (TEN-T Core network ports)
- Related logistics service providers
- Universities as knowledge partners
- Associated organisations

http://blogit.utu.fi/hazard/

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The HAZARD Project Structure

WP1 Project Management and Administration
→ Lead Partner: University of Turku (FI)

WP2 Joint Exercises and Communication in Emergencies
→ WP Leader: Southwest Finland Emergency Services (FI)

WP3 Regulatory Framework on Safety & Security
→ WP Leader: University of Borås (SE)

WP4 Risk Assessment and Analysis
→ WP Leader: Hamburg University of Technology (DE)

WP5 Equipment Testing
→ WP Leader: Hamburger Hafen und Logistik AG, HHLA (DE)

Dissemination

Objectives and Research Questions of HAZARD Work Package 4

Objectives

- Determine the current state and level of knowledge regarding risk management among relevant seaport stakeholders
- Determine the target group-specific requirements for the application of risk management methods

Research Questions

- RQ1: *Which risks play a major role in seaports?*
- RQ2: *Which risk assessment and treatment methods are currently applied in seaports?*
- RQ2: *To which extend do seaport actors cooperate with respect to their risk management activities and how can the cooperation be improved?*

A comprehensive toolbox for risk management in seaports has been developed as one major result of the HAZARD work package 4

https://blogit.utu.fi/hazard/wp4-risk-assessment-and-analysis/

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HAZARD WP4 Core Contributors

- PP1: University of Turku
- PP2: Hamburg University of Technology
- PP4: Viimsi Municipality
- PP6: Vilnius Gediminas Technical University
- PP10: University of Borås
- PP15: Polish Safety and Reliability Association

We are grateful to our work package members for their **manifold contributions** as well as for the excellent **cooperation** with the other **partners** from all work packages in the **WP4 meetings and workshops**

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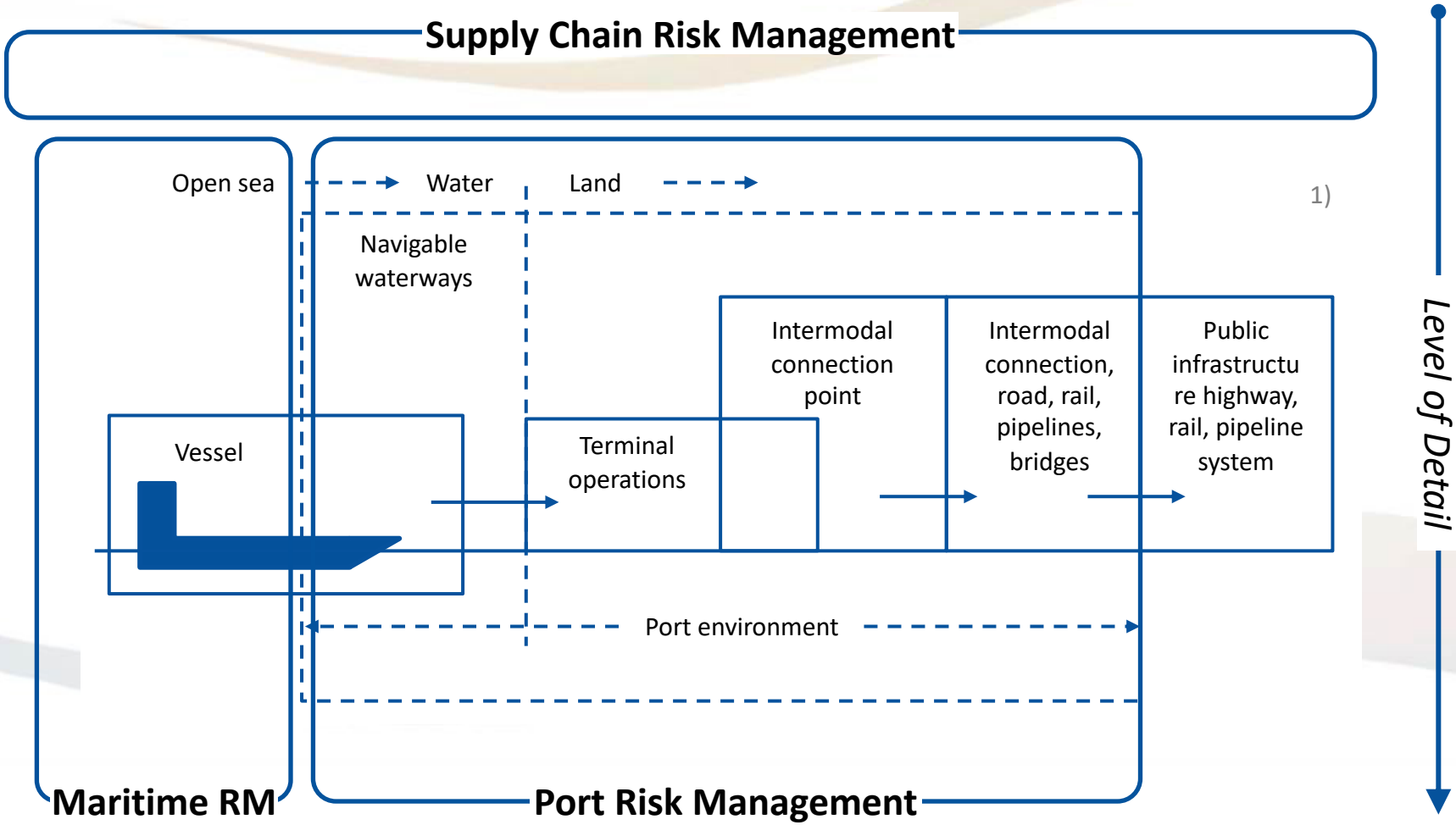
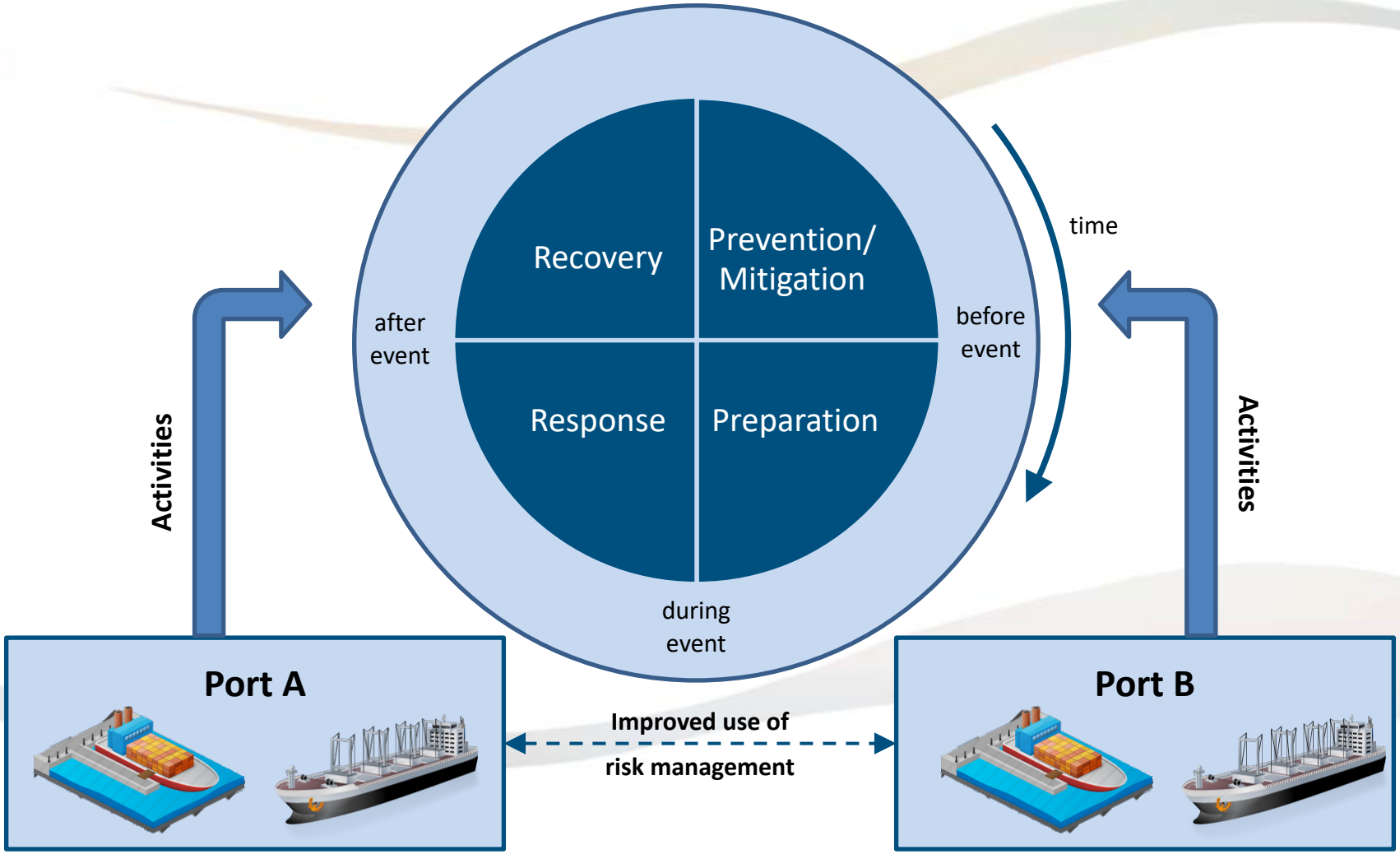
Context of Port Risk Management



1) John et al. (2016), p. 139

Risk management in seaports



modified from Jaques (2007), Morrision (2013), Waugh (1990), Laakso (2014)

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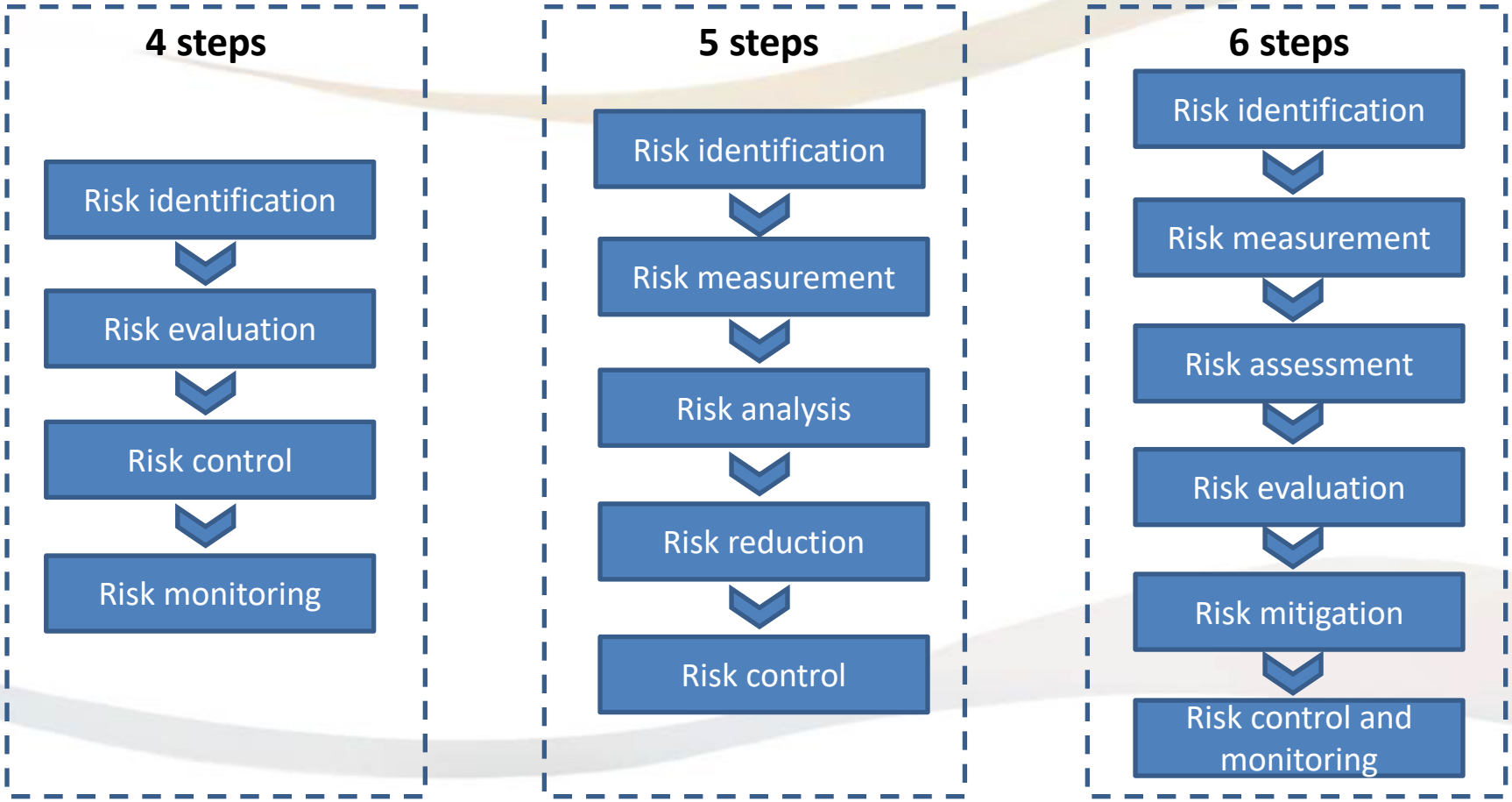
RM definitions in BSR seaports

*"**Risk management** is the **systematic identification** of risk factors and preventive activities with the **implementation** of measures to **limit** the effect of different risks."*	#POK1
*"**Risk management** is doing everything **economically** possible to **prevent** and **mitigate** possible risks."*	#POT1
*"[The] **risk group** consists of **couple of individuals**, organizing **risk mappings** for different units/divisions [that are] responsible for the summaries of the key risks going to the management group."*	#POF4
*"**Our operational risk management** is based in the **nautical headquarters**. That has five navigators who are all authorized to make decisions. We also have **instructions** for each situation and scenario."*	#POH14

Need for a **standard process**

Risk management process schemes



- **ISO 31000:2018** as a standard process scheme for **risk management**

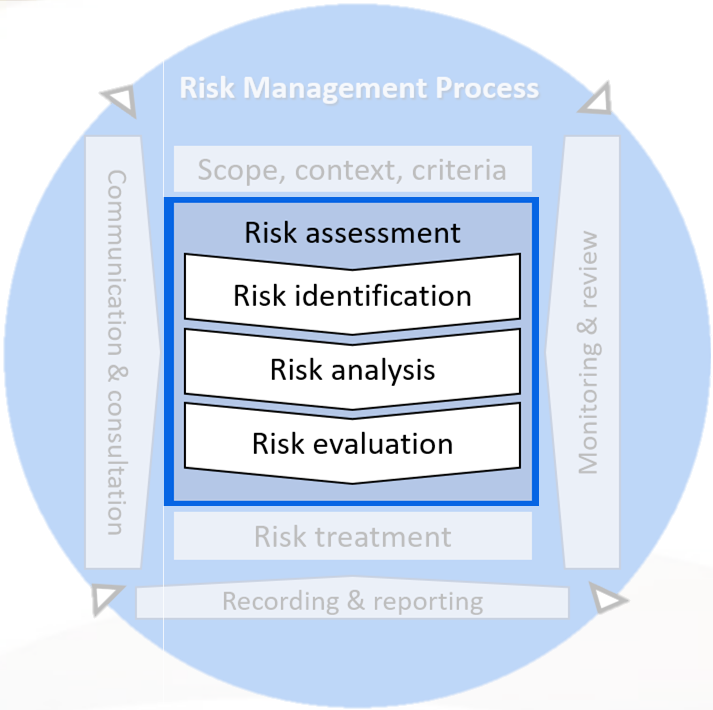
Cranfield (2003); Müssigmann (2006); Tummala and Schoenherr (2011)

ISO 31000:2018 development process

- International Organization for Standardization (ISO) is the world's largest developer and publisher of International Standards.
- ISO31000:2009 was published in November 2009 and it is the result of four years of consultation between risk and standards experts in 30 countries.
- It pulls together and replaces a number of similar international standards. AS/NZS 4360:2004, which was due for revision in 2009, formed the basis of ISO31000.
- Updated guidelines ISO31000:2018 introduced in 02.2018.

ISO 31000:2018 risk assessment process

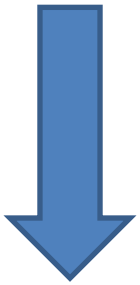
- **Risk identification**
  - Identify sources of risk, areas of impact and consequences
- **Risk analysis**
  - Estimate probability of event occurrence
  - Estimate severity of consequences in case of event occurrence
  - Combine probability and consequence in risk scale
- **Risk evaluation**
  - Compare the level of risk established in the previous stage with the risk tolerance criteria established



ISO 31000:2018
https://www.iso.org/obp/ui/#iso:std:iso:31000:ed-2:v1:en

ISO 31000:2018 characterstics

- ISO 31000:2018 is not intended for certification.
- It does not contain compulsory requirements.
- It is a collection of suggested best practices.



- Guide to help in developing specific processes
- Flexible application

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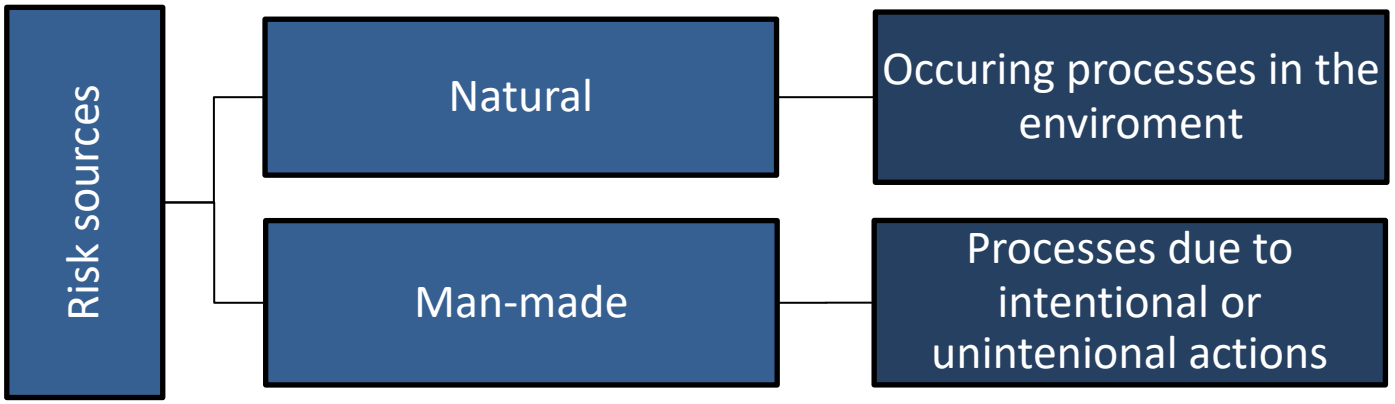
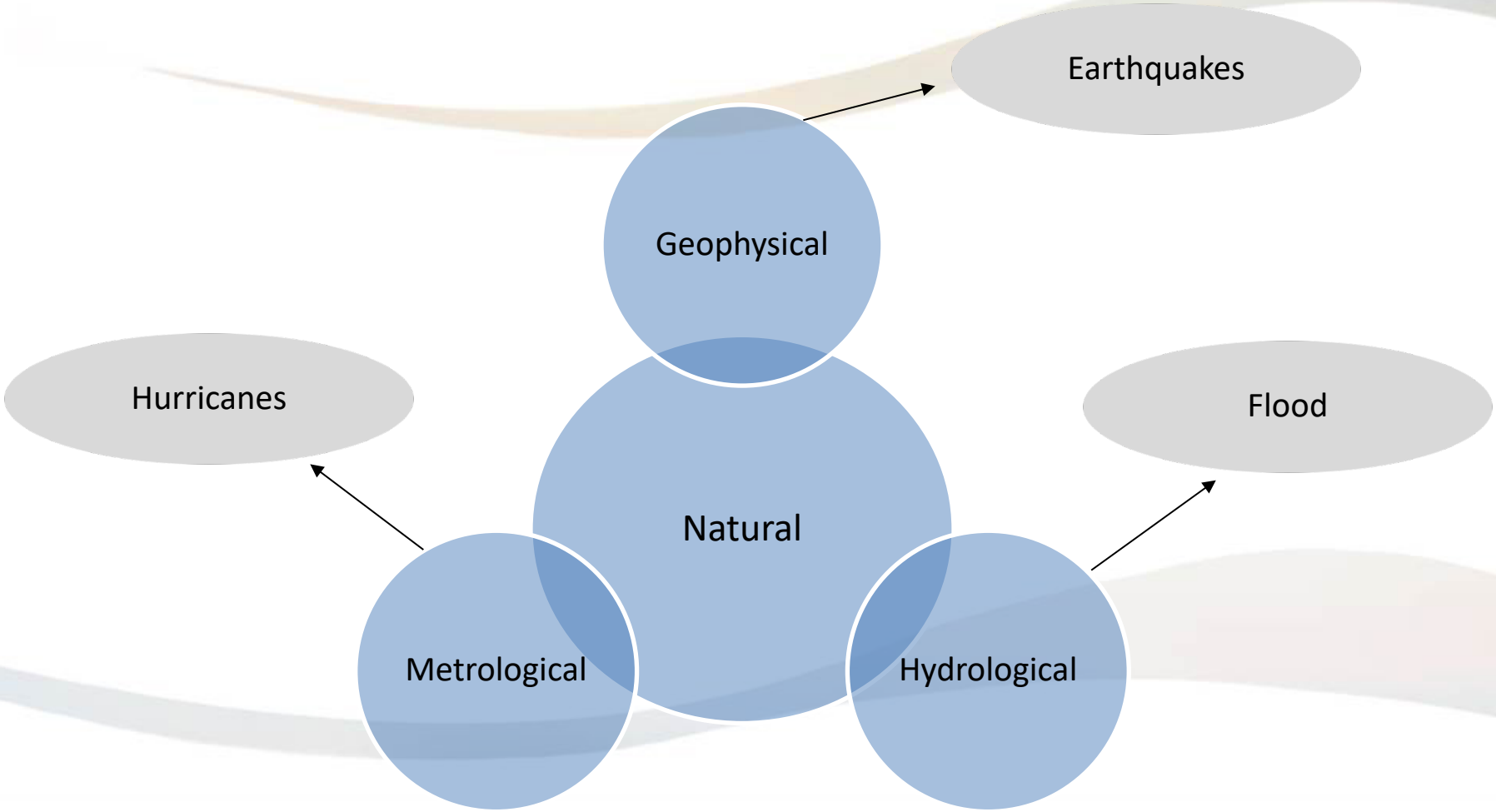
Groups of risk sources



John et al. (2016)

Breakdown of natural risks: examples



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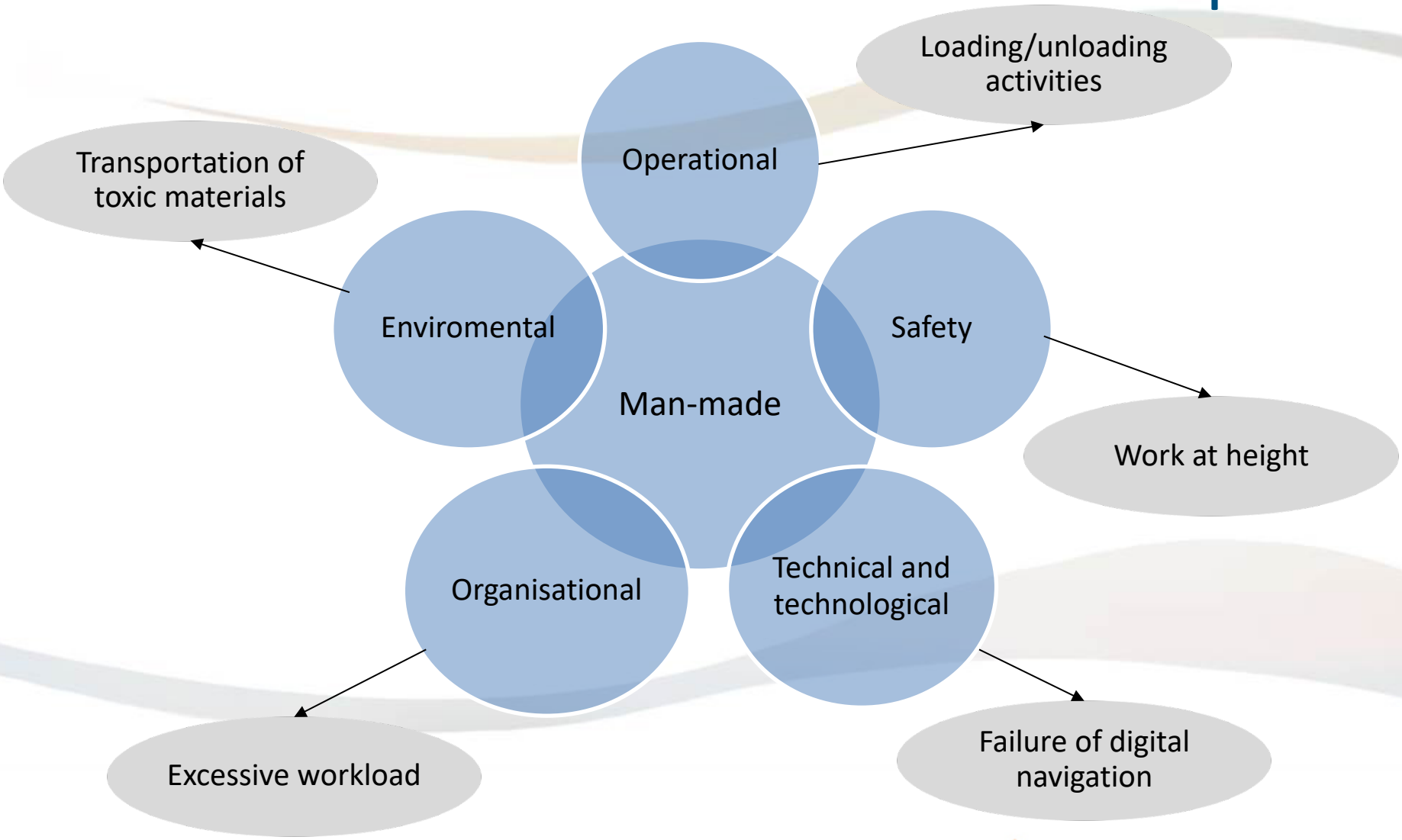
Breakdown of man-made risks: examples



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Risk assessment methods

1	2	3
Qualitative techniques	Quantitative techniques	Semi-quantitative techniques

John et al. (2016)

Risk assessment methods

1	2	3
Qualitative techniques	Quantitative techniques	Semi-quantitative techniques
• Is used whenever there is a lack of information, resources and/or time • **Subjective evaluation of the probability and severity**	• Is used in more complicated or high-technology industries • **probabilistic approach to rank and appraise risks**	• Combination of qualitative and quantitative techniques • **intermediary approach to judge risks**

Risk assessment methods in BSR (1):

Risk Identification (excerpt)

	Delphi method	Meetings within own organization	Meetings with other stakeholders	Offline software	Online solution
Sweden	0%	80%	70%	10%	10%
Estonia	0%	67%	78%	11%	22%
Finland	7%	93%	86%	7%	36%
Denmark	0%	75%	63%	13%	38%
Lithuania	12%	76%	71%	0%	0%
Germany	2%	63%	46%	12%	17%
Poland	11%	44%	56%	33%	0%

*Comparison of the risk **identification** methods as percentage of respondent by country (HAZARD survey: 108 responses)

Risk assessment methods in BSR (2):

Analysis and evaluation (excerpt)

	FMEA	Risk matrix	Checklists	Hazard diamond	Measuring devices
Sweden	20%	80%	80%	0%	30%
Estonia	11%	56%	44%	0%	33%
Finland	21%	64%	86%	21%	43%
Denmark	13%	50%	75%	0%	25%
Lithuania	12%	41%	47%	29%	41%
Germany	15%	51%	59%	7%	20%
Poland	33%	44%	22%	0%	22%

*Comparison of the risk **analysis** and **evaluation** methods as percentage of respondent by country (HAZARD survey: 108 responses)

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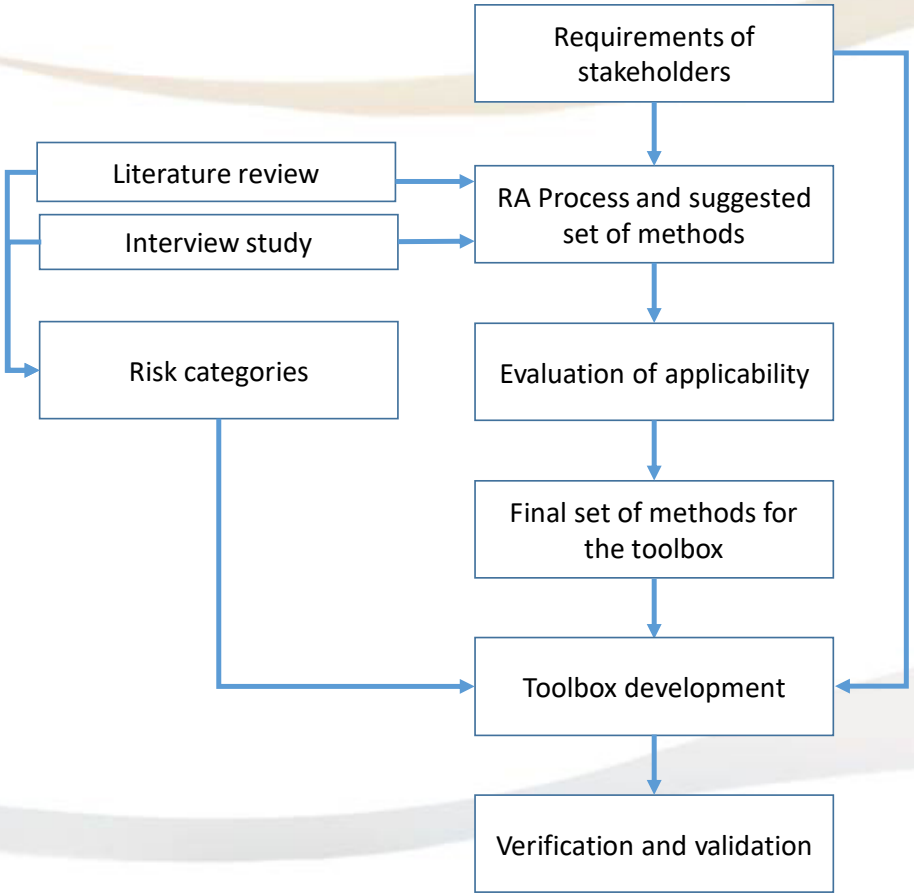
Input and development steps of the toolbox



Turun yliopisto
University of Turku

TUHH
Technische Universität Hamburg

VILNIUS GEDIMINAS
TECHNICAL UNIVERSITY

UNIVERSITY OF BORÅS

Vimsii Municipality

PSRA

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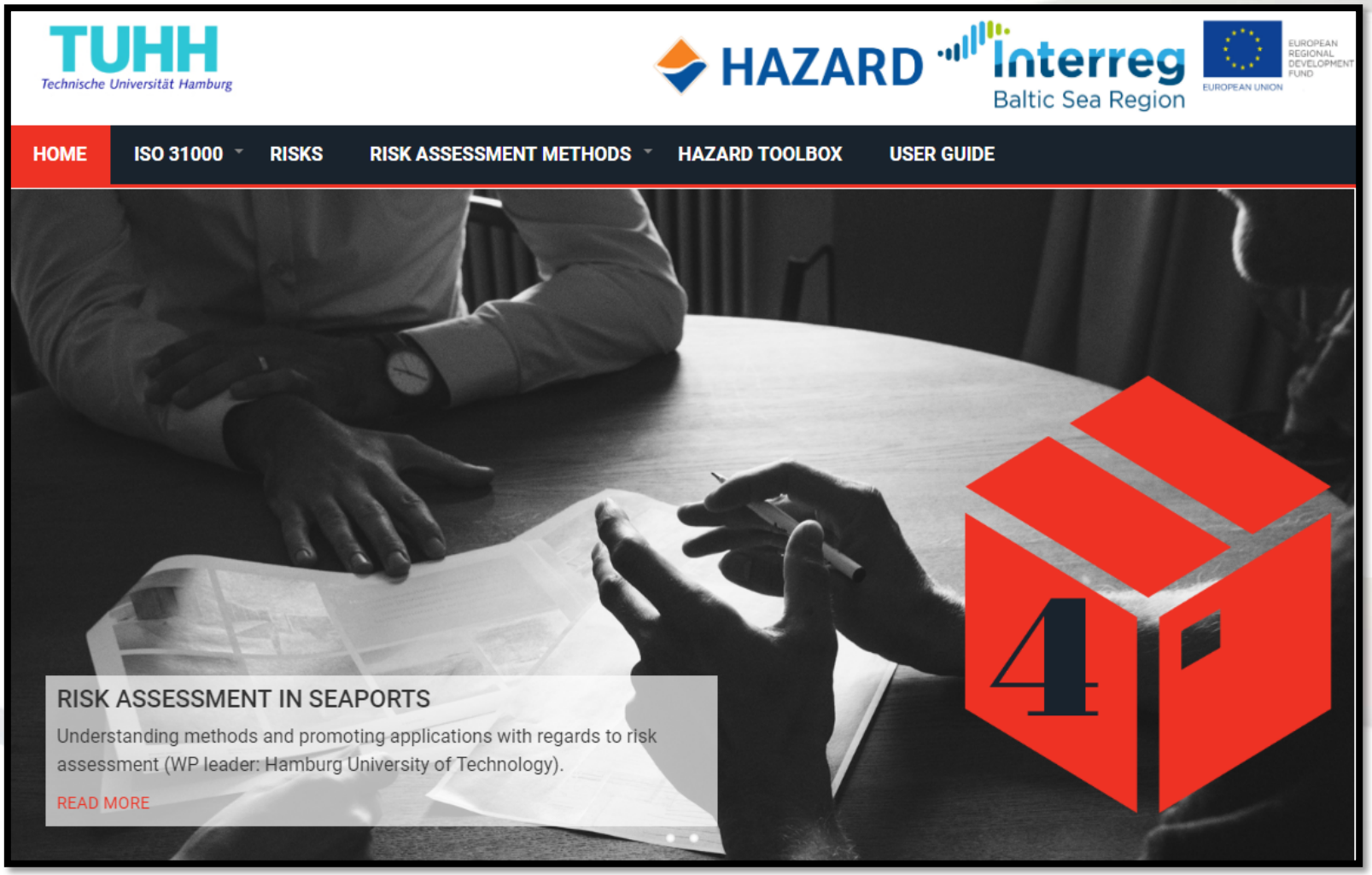
HAZARD risk assessment toolbox



https://hazard.logu.tuhh.de

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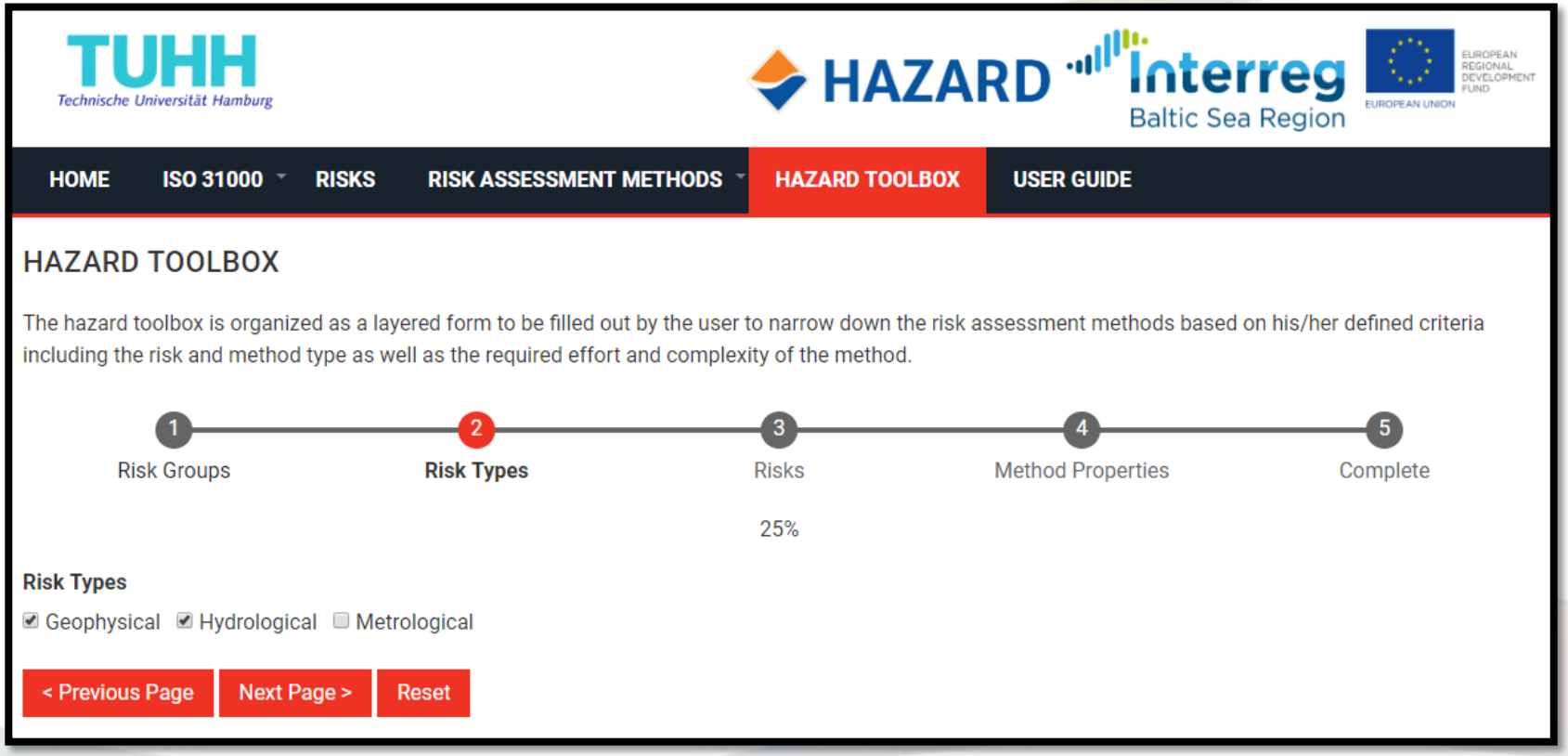
HAZARD risk assessment toolbox



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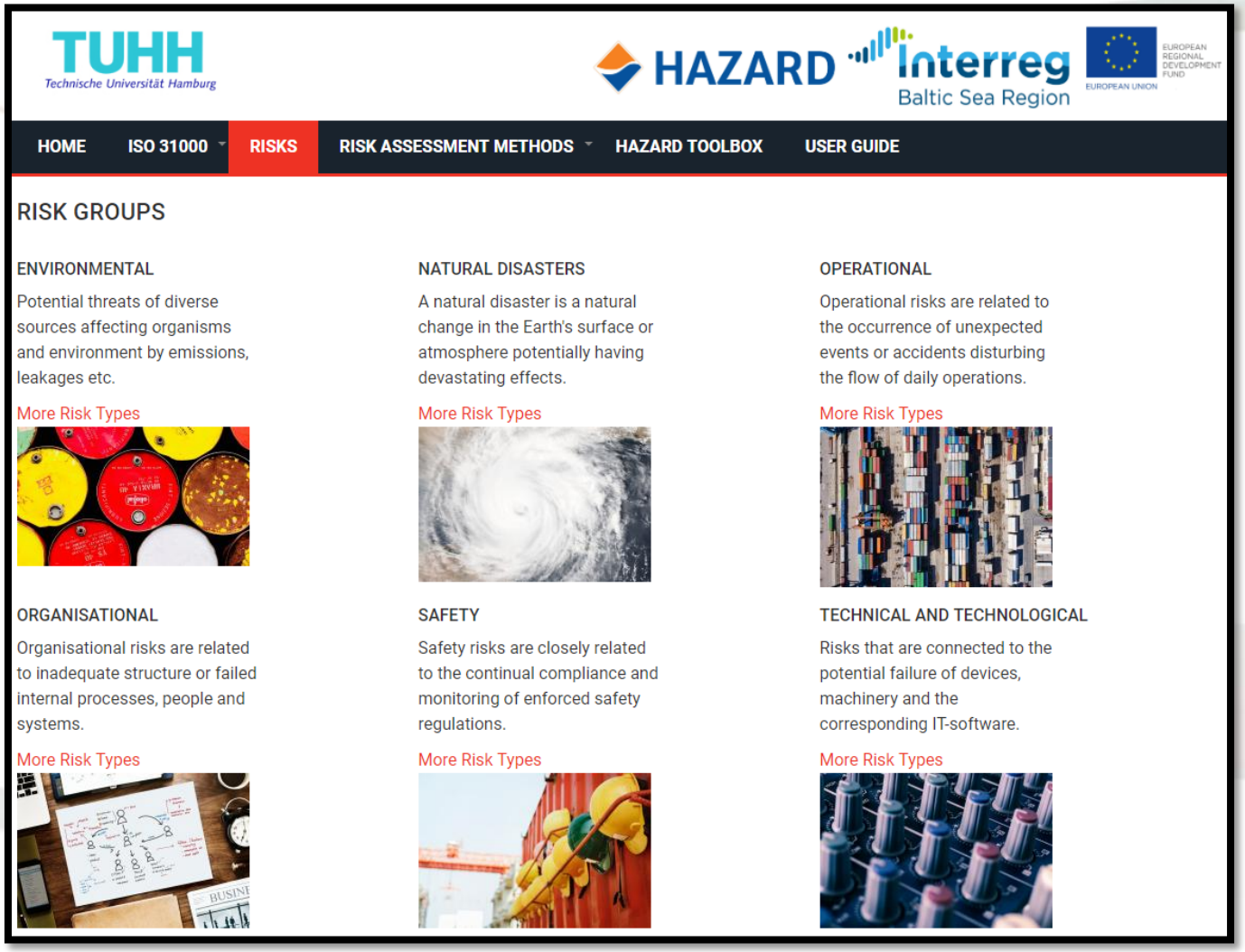
HAZARD risk assessment toolbox



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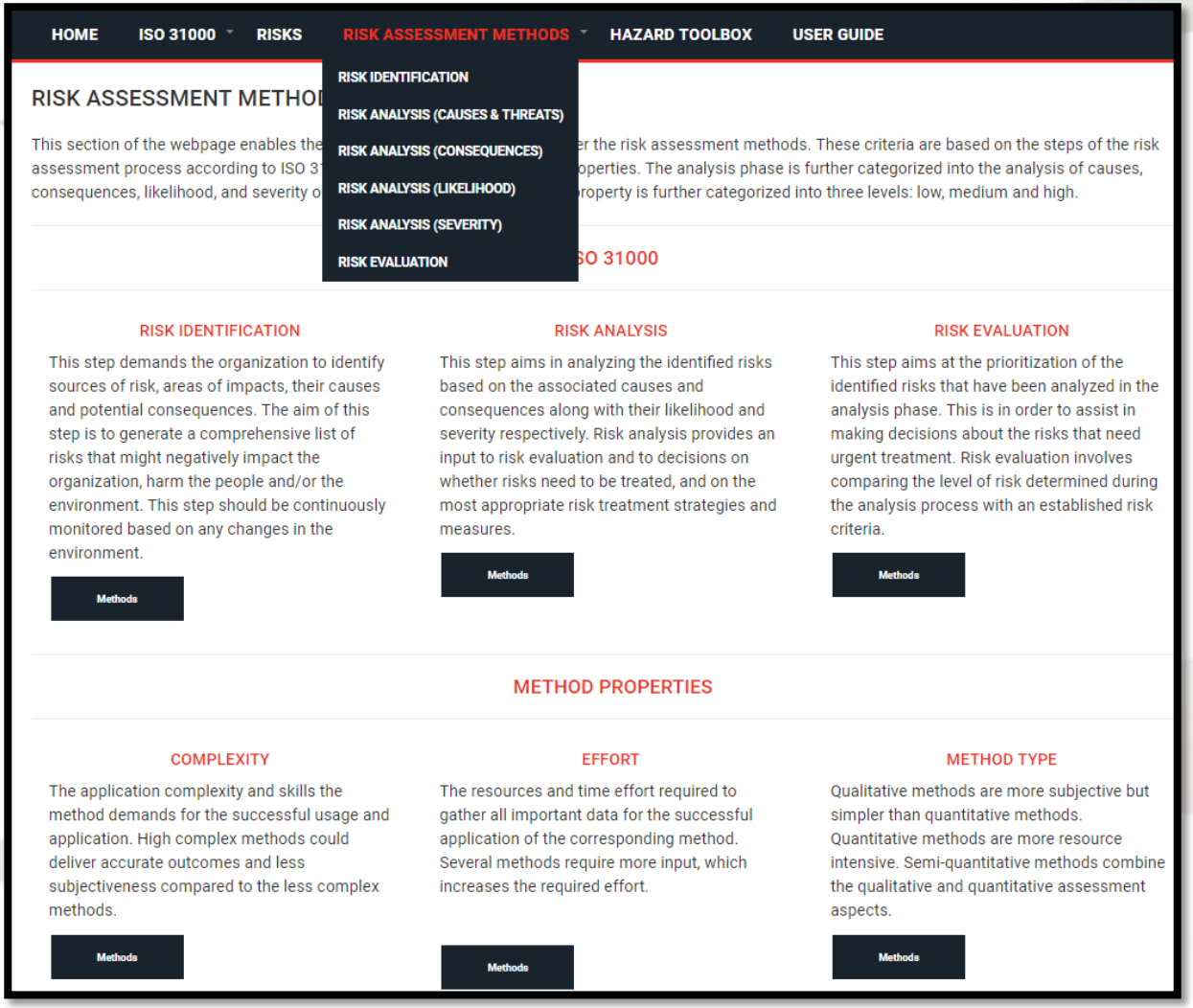
HAZARD risk assessment toolbox



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Conclusion and Outlook

- Risk management in seaports has a strong focus on safety issues, dangerous goods and natural disasters
- Checklists are frequently used in the phase of risk assessment across all type of organizations.
- Experience of individual employees and authorities plays a central role in the process of risk assessment.
- Complex stakeholder structure in seaports is a big challenge for an overall risk management approach

A comprehensive stakeholder map, clear assignment of risk and process owners and the use of advanced risk management methods (e.g. HAZARD risk assessment toolbox) can make a contribution to further improvement of risk management in seaports.

Final remark:
Many insights from the HAZARD project as well as from the HAZARD risk assessment toolbox are not only relevant for seaports but also for many companies with regard to **improving supply chain risk management in general**!

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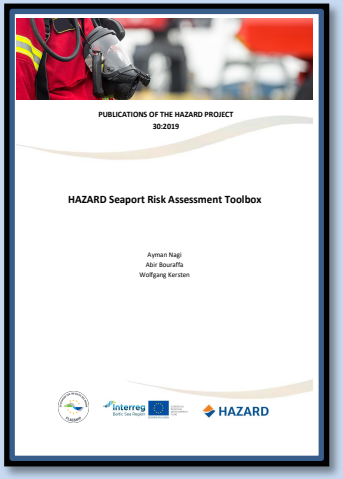
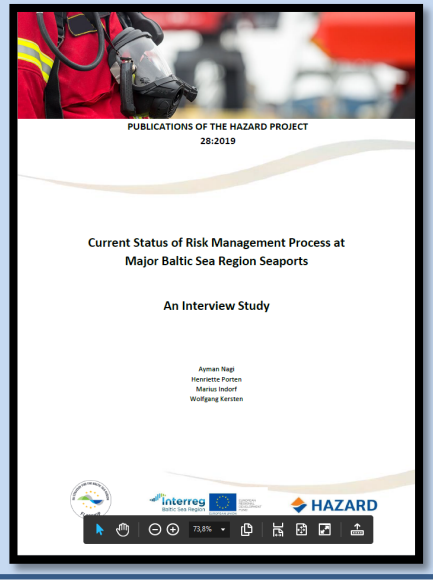
Further readings

Risk Assessment Methods in Seaports



HAZARD Seaport Risk Assessment Toolbox

Current Status of Risk Management Process at Major Baltic Sea region Seaports



These HAZARD reports and much more publications can be downloaded from https://blogit.utu.fi/hazard/publications/

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