

# Findings and results from EWENT project

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# EWENT

## Goal and research strategy

The goal of EWENT project is **to assess the impacts of extreme weather events on EU transport system. These impacts are monetised.** EWENT will also evaluate the efficiency, applicability and finance needs for adaptation and mitigation measures which will dampen and reduce the costs of weather impacts. The methodological approach is based on generic risk management framework that follows a standardised process from identification of hazardous phenomena (extreme weather), followed by impact assessment and closed by mitigation and risk control measures.

EWENT will start this **by identifying the hazardous phenomena, their probability and consequences** and proceed to **assessing the expected economic losses** caused by extreme weather when it impacts the European transport system, taking also into account the present and expected future quality of weather forecasting and warning services within Europe.

EWENT will apply **the IEC 60300-3-9 risk management standard framework** all the way through its research process and the project's work breakdown also follows the standard structure.

Definition of the object

WP1: Identification

WP2:  
Probabilities

WP3:  
Consequences

WP4: Cost estimation

WP5: Risk assessment

WP6: Mitigation strategies

WP8: Management

WP7: Dissemination

**OBJECTIVE:** Risk management strategy for the EU transport system to prepare for and mitigate the impacts and costs of extreme weather phenomena

WP1: Extreme weather phenomena that have potential internal and external cost impacts on EU transport system; the threshold criteria for weather parameters

WP2: The probability of extreme weather and scenarios for increased probabilities and intensity

WP3: Impact mechanisms for system failures or disturbances (mobility meltdown, reduced safety and security) and operational failures (predictable mobility of passengers and goods); impacts on selected transport system performance indicators

WP4: Estimation of expected costs of extreme weather on time axis, based on identified impacts and scenarios: infrastructure (material damages), operations and traffic (accidents, time delays)

WP5: Evaluation of likely scenarios and most relevant costs; listing of prospective mitigation and adaptive strategies; risk panorama for EU transportation system



Source: DLR/Frank Rehm



By courtesy of Chirs Baker



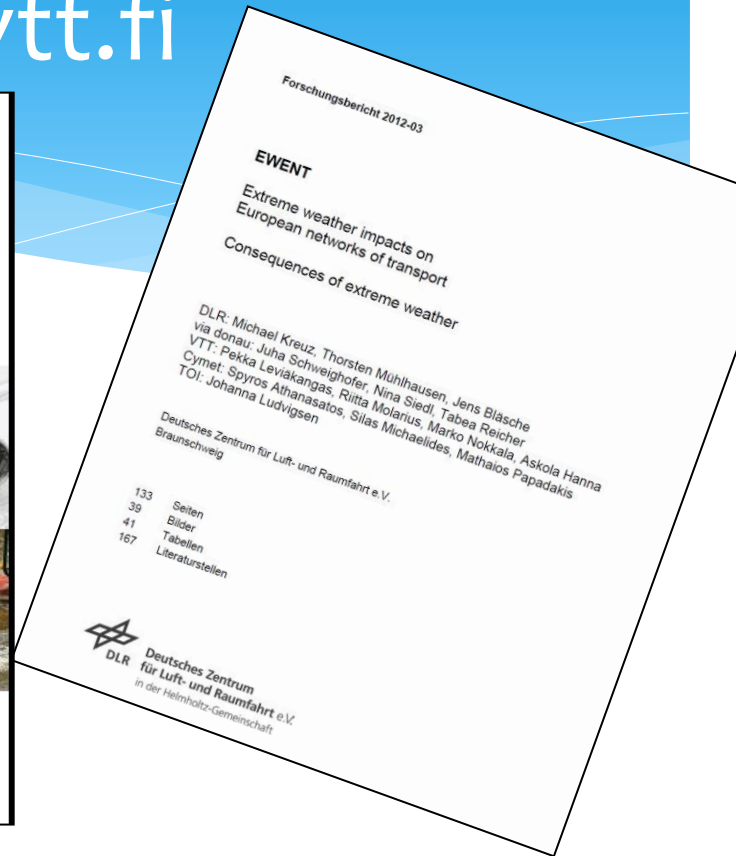
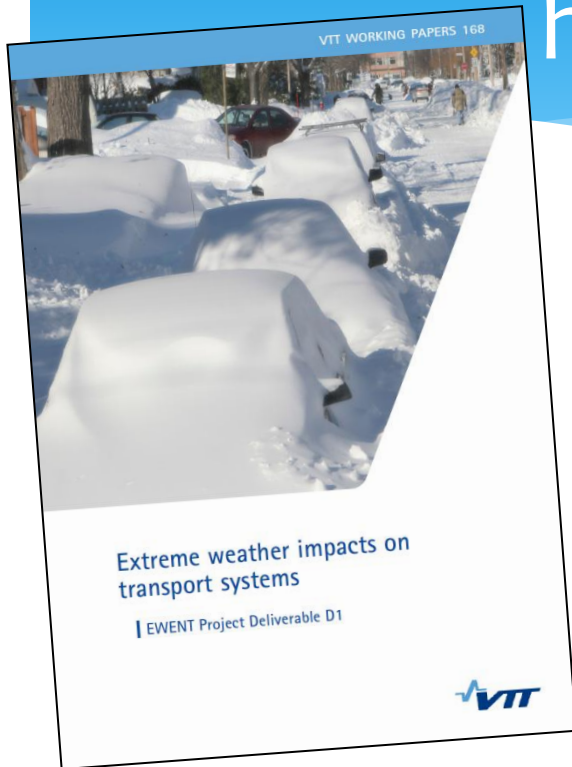
Source: Aker Arctic

Depth of analysis	Aviation		Land transport				Marine & waterways			
	Passenger	Freight	Road		Rail		Light	Ocean	Short sea /coastal	Inland ww Freight
			Passenger	Freight	Passenger	Freight				
Detailed	X	X	X	X	X	X				X
Brief							X		X	
Excluded								X		

The transport system is viewed from three angles:

- **infrastructure**; these are direct material damages or deterioration of physical infrastructures
- **operations**; these are harmful impacts on traffic safety and transport reliability (both freight and passenger)
- **indirect impacts to third parties**, e.g. supply chain customers and industrial actors.

# IWT results to be found in <http://ewent.vtt.fi>



**Impacts of CC and extreme weather events on inland waterway transport in Europe – recent research results** by Juha Schweighofer in Smart Rivers Conference of World Association for Waterborne Transport Infrastructure (PIANC)

**The impact of extreme weather and climate change on inland waterway transport** by Juha Schweighofer et al. in Natural Hazards – accepted, forthcoming

# Weather impacts on navigation

- \* High/low water levels
  - Suspension of navigation
  - Usually limited only to a few days (high levels)
- \* Ice
  - Suspension of navigation
  - Once it occurs it might take several days or weeks, depending on region
- \* Wind, storms
  - Increased requirements on maneuverability and course stability
  - Main cause for accidents
- \* Reduced visibility
  - Reduced speed or interruption of navigation

# Changes in visibility and wind gusts

- \* Reduced visibility clearly decreasing for some airports in Europe
- \* Indication for better visibility conditions in IWT
- \* Wind gusts till 2050: almost no change in the Rhine-Main-Danube corridor

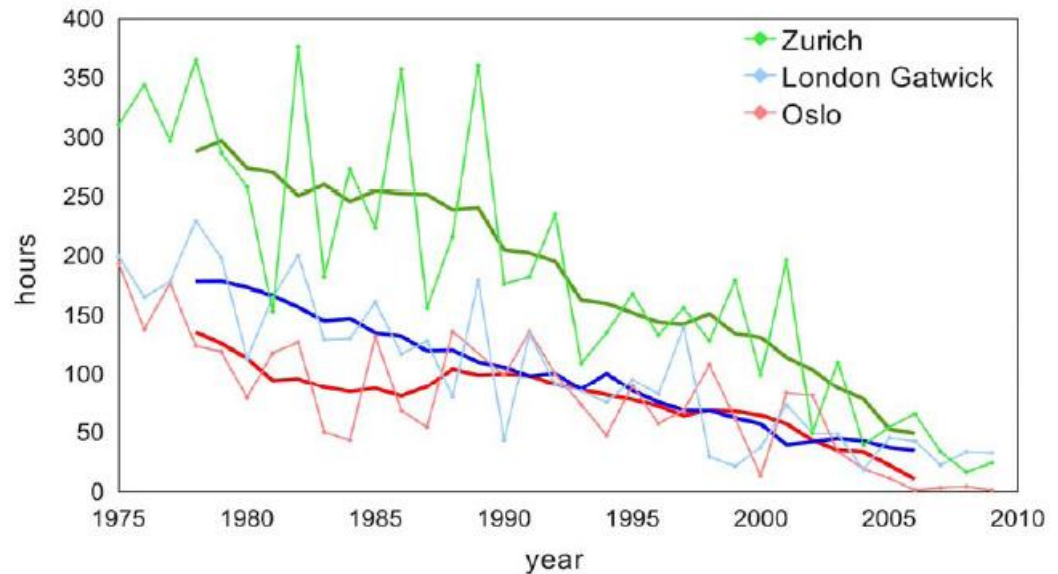


Figure 2.19. Annual numbers of hours with visibility less than 200 m at the airports of Zurich (green), London Gatwick (blue) and Oslo (red). The thin lines are the actual observed values; the thick lines are 7-year moving averages.

Sources:

ESSL- European Severe Storms Laboratory  
(Pieter Groenemeijer), EWENT Deliverable 2.1

Nina Siedl / via donau

# Most relevant phenomena – rain & heat?

probability (P): > 0,1 (I); 0,01 – 0,1 (II); 0,001 – 0,01 (III); 0,0001 – 0,001 (IV); < 0,0001 (V)

Climate Region	Northern		Temperate Central European		Temperate Eastern European		Oceanic		Mediterranean		Mountainous	
	P	Tr-mode	P	Tr-mode	P	Tr-mode	P	Tr-mode	P	Tr-mode	P	Tr-mode
Wind gusts 17 m/s	II	Ro, Ra, Av	II	Ro, Ra, Ss, Av	II	Ro, Ra, Av	I	Ro, Ra, Ss, Av	II	Ro, Ra, Ss, Av	II	Ro, Ss, Av
Wind gusts 25 m/s	II	Ro, Ra, Av	III		III		II	Ro, Ra, Ss, Av	II	Ro, Ra, Ss, Av	III	
Wind gusts 32 m/s	V		V		V		III		V		V	
Snowfall 1 cm/d	I	Av	II	Ss, Av	II	Ss, Av	II	Ro, Ra, Av	II	Ro, Ra, Av	I	Ss, Av
Snowfall 10 cm/d	II	Ro, Av	II	Ro, Ra, Ss, Av	II	Ro, Ss, Av	III	Ro, Ra, Av	V		II	Ro, Ra
Snowfall 20 cm/d	II	Ro, Av	III		III		III	Ro, Ra, Av	V		II	Ro, Ra
Blizzard	III		IV		III		IV		V		III	
Heavy precipitation 30 mm/d	II	Ro, Ra	II	Ro, Ra, Ss, lwt	II	Ro, Ra, lwt	II	Ro, Ra, Ss	II	Ro, Ra, Ss	II	Ro, Ra, lwt
Heavy precipitation 100 mm/d	V		V		V		V		IV		III	
Heavy precipitation 150 mm/d	V		V		V		V		V		IV	
Heat waves ≥ 25 °C	II	Ro, Ra	I	Ro, Ra, Ss, lwt	I	Ro, Ra, lwt	I	Ro, Ra, Ss	I	Ro, Ra, Ss	II	Ro, Ra
Heat waves ≥ 32 °C	II	Ro, Ra	II	Ro, Ra, Ss, lwt	II	Ro, Ra, lwt	II	Ro, Ra, Ss	I	Ro, Ra, Ss	V	
Heat waves ≥ 43 °C	V		V		IV		V		III		V	
Cold waves ≤ 0 °C	I	Ra, Ss	I	Ro, Ra, Ss	I	Ro, Ra, Ss, Av, lwt	I	Ro, Ra, Ss, Av	II	Ro, Ra, Ss, Av	I	Ro, Ra, Ss
Cold waves ≤ -7 °C	I	Ro, Ra, Ss	II	Ro, Ra, Ss	II	Ro, Ra, Ss, Av, lwt	II	Ro, Ra, Ss, Av	IV	Ro, Ra, Ss, Av	I	Ro, Ra, Ss
Cold waves ≤ -20 °C	II		V		III		V		V		V	



# Costs induced by extreme weather

Present costs due to extreme weather, including all phenomena (ca. 2010)

	Accidents	Time costs	Infrastructure		Freight & logistics
			Physical infra	Maintenance	
<b>Road</b>	>10 bill.	0.5-1.0 bill.	ca. 1 bill.	ca. 0.2 bill.	1 – 6 bill.
<b>Rail</b>	>0.1 bill.	>10 mill.		>0.1 bill.	5 – 24 mill.
<b>IWT</b>	<b>ca. 2 mill.</b>	<b>na</b>	<b>na</b>	<b>na</b>	<b>0.1 - 0.3 mill.</b>
<b>Short sea</b>	>10 mill.	na	na	na	0.2 - 1 mill.
<b>Aviation</b>	na	>0.6 bill.	na	na	0.5 – 2.3 mill.
<b>Light traffic</b>	>2 bill.	-	na	na	-
<b>TOTAL</b>	>12 bill.	>1 bill.	ca. 1 bill.	>0.3 bill.	1-6 bill.

The EU-27 grand total more than 15 bill. € p.a.

# Risk analysis

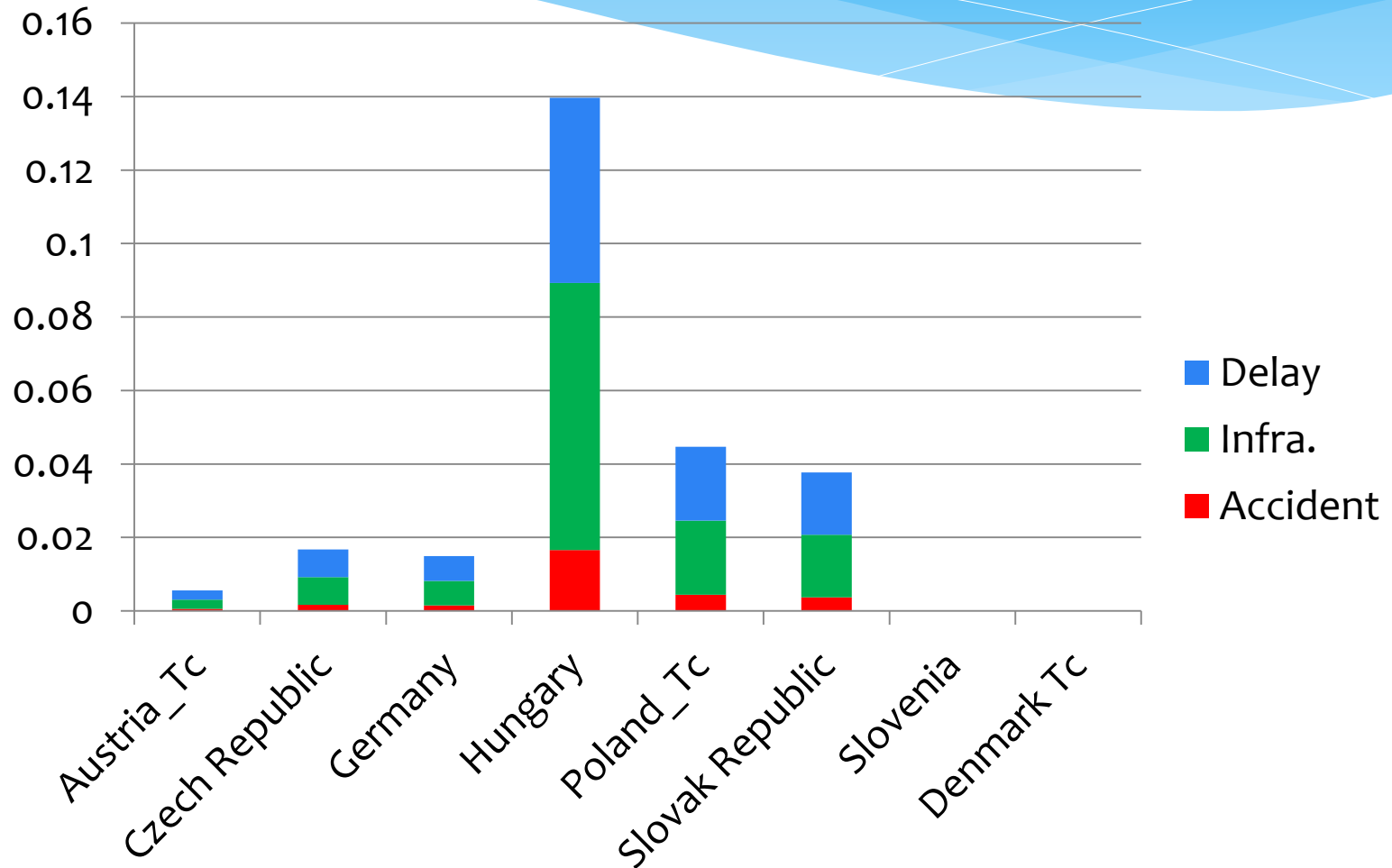


Probability of extreme weather  
and harmful consequences

Economic and transport related indicators

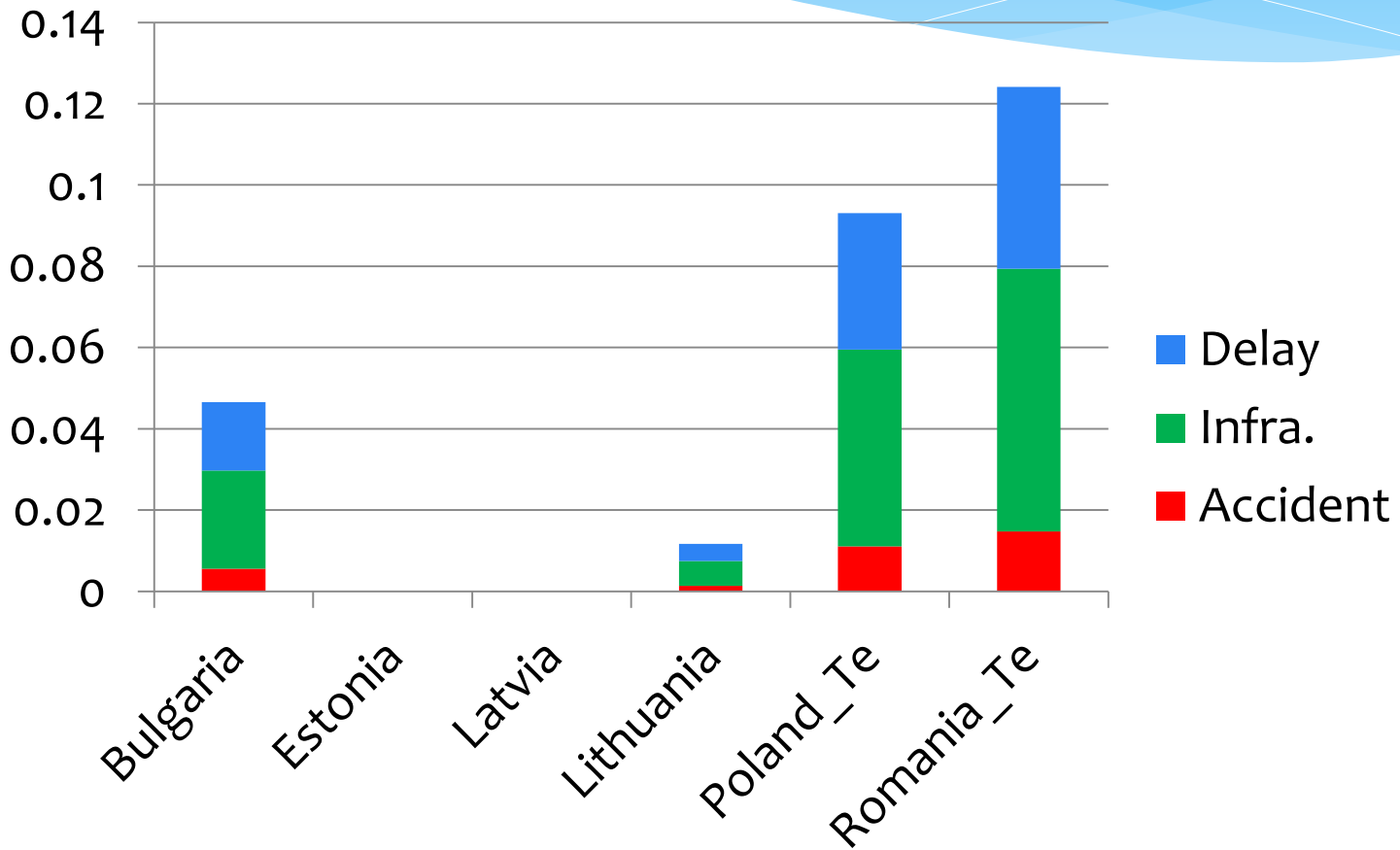
# Risk analysis

## Temperate Central IWT (freight volumes based)



# Risk analysis

## Temperate Eastern IWT (freight based)



# Are stakeholders prepared?

- \* Business actors: aware of the risks of extreme weather but not on their priority list
- \* Public sector actors: aware of the risks but unsure of exact measures that are expected
- \* Contractors and service suppliers (to public sector): unwilling to assume the risks through more comprehensive contracts, unless clear compensation is guaranteed
- \* Financiers and insurers: clearly aware of the risks

# Adaptation relevant to IWT

- \* Floods and high water often excluded as short lasting event
- \* Focus: Low water occurrence
- \* Measures:
  - \* Transport systems (fleet, operations, logistic chains)
  - \* Infrastructure
  - \* Prediction methods seasonal forecast
  - \* Production processes and store keeping

# Thank you!



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