PRÜF- UND ENTWICKLUNGSINSTITUT FÜR ABWASSERTECHNIK
AN DER RWTH AACHEN E.V.
Development and Assessment Institute in Waste Water Technology
at RWTH Aachen University

"Best Practice Guidance for the handling of waste water in ports"

PA Ship – 9th International Steering Committee Meeting

Gdansk, Poland, 07 November 2017

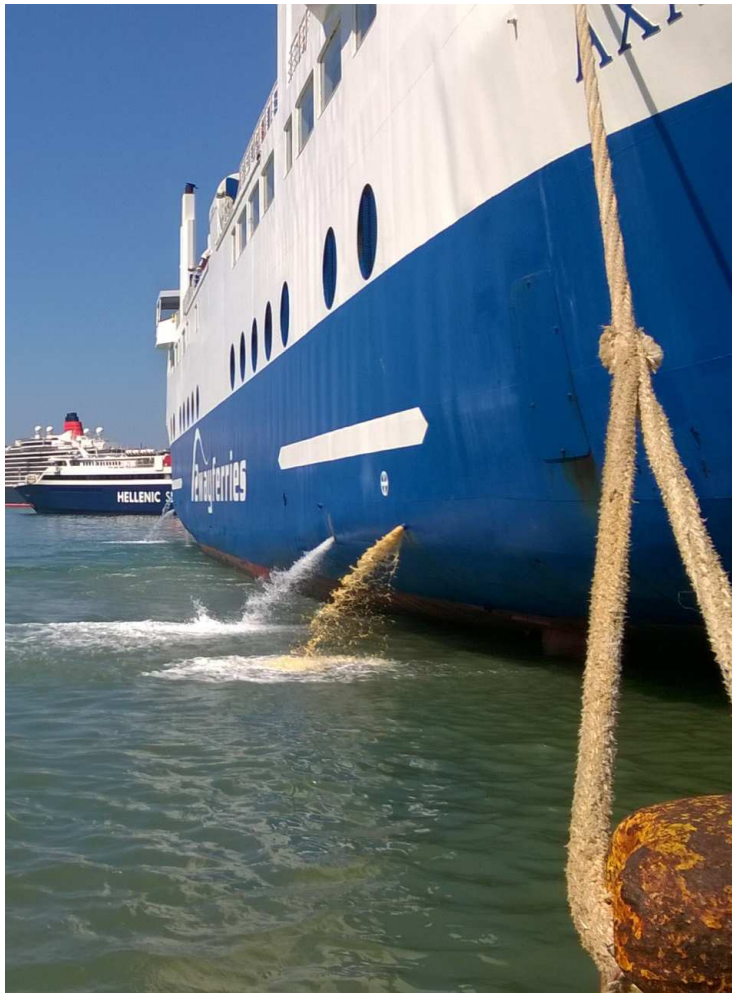
Background

MARPOL Annex IV - Prevention of Pollution by Sewage

- Treatment of sewage for discharge within 12nm
- Special Area requirements for passenger ships
  - New ships 01.06.2019
  - Existing ships 01.06.2021
  - Ships directly to St. Petersburg 01.06.2023
- Treatment or discharge to port reception facilities (PRF)

		MEPC.2(VI)	MEPC.159(55)	MEPC.227(64)
		since 2003	since 2010	since 2016
BOD_5	[mg/l]	50	25	25
COD	[mg/l]	-	125	125
TSS	[mg/l]	100*	35	35
coliforms	[cfu/100ml]	250	100	100
residual chlorine	[mg/l]	-	0,5	0,5
pH	[-]	-	6,0 – 8,5	6,0 – 8,5
N_{total}	[mg/l]	-	-	20*** (or 70% reduction)
P_{total}	[mg/l]	-	-	1*** (or 80% reduction)

* 100 mg/l when tested onboard, 50 mg/l when tested ashore
** no visible floating solids
*** for passenger ships operating in special areas



Background

International Workshop in Kiel, 30th May – 1st June 2016

- Practical technical solutions for dealing with sewage in ports and effective waste water management
- Exchange of information on quantities and qualities of wastewater, as well as capacities of PRF
- Continuous dialogue on technologies, lessons learnt and best practices

"A best practice guidance would be helpful!"

Helcom Cooperation Platform on Special Area According to MARPOL Annex IV (CP PRF 6-2016)

- collection and exchange of information + best practices on sewage composition and treatment, as well as technical issues
- revision/update of HELCOM Overview, including **best practices** for port and on board sewage management

HELCOM Maritime Group

- Took note of the Outcome of the Cooperation Platform and adopted its Work Plan

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

BSH Initiative

- Development of a "Best Practice Guidance for the handling of waste water in ports"
- R&D Project carried out by consultant
- Submission to HELCOM Maritime to be included in revised HELCOM Overview as a new chapter, if accepted
- Support of HELCOM Secretariat and Chair of HELCOM Maritime

Company Profile

Prüf- und Entwicklungsinstitut für Abwassertechnik an der RWTH Aachen e.V.

Development and Assessment Institute in Waste Water Technology at RWTH Aachen University

Prüfinstitut für Abwassertechnik GmbH

Testing Institute for Waste Water Technology

Marine Department

Sewage Treatment Plants

- **Type Approval**
  - IMO - MEPC.227(64)
  - U.S. Coast Guard - 33 CFR Part 159
  - EU Inland - Directive 2006/87/EC
- **Compliance Testing**
  - U.S. Coast Guard - 33 CFR Part 159
  - EU Inland - Directive 2006/87/EC
- **Performance Evaluation**
- **Training**

Scrubber

- **Scrubber Wash Water Testing**

Dienststelle Schiffssicherheit
BG Verkehr

United States Coast Guard
U.S. Department of Homeland Security

WSV.de
Wasser- und Schifffahrtsverwaltung des Bundes

Best Practice Guidance

PRÜF- UND ENTWICKLUNGSINSTITUT FÜR ABWASSERTECHNIK AN DER RWTH AACHEN E.V.

DEVELOPMENT AND ASSESSMENT INSTITUTE IN WASTE WATER TECHNOLOGY AT RWTH AACHEN UNIVERSITY

Project:

Development of a "Best Practice Guidance" for the handling of wastewater in Ports for the Special Area Baltic Sea

on behalf of:

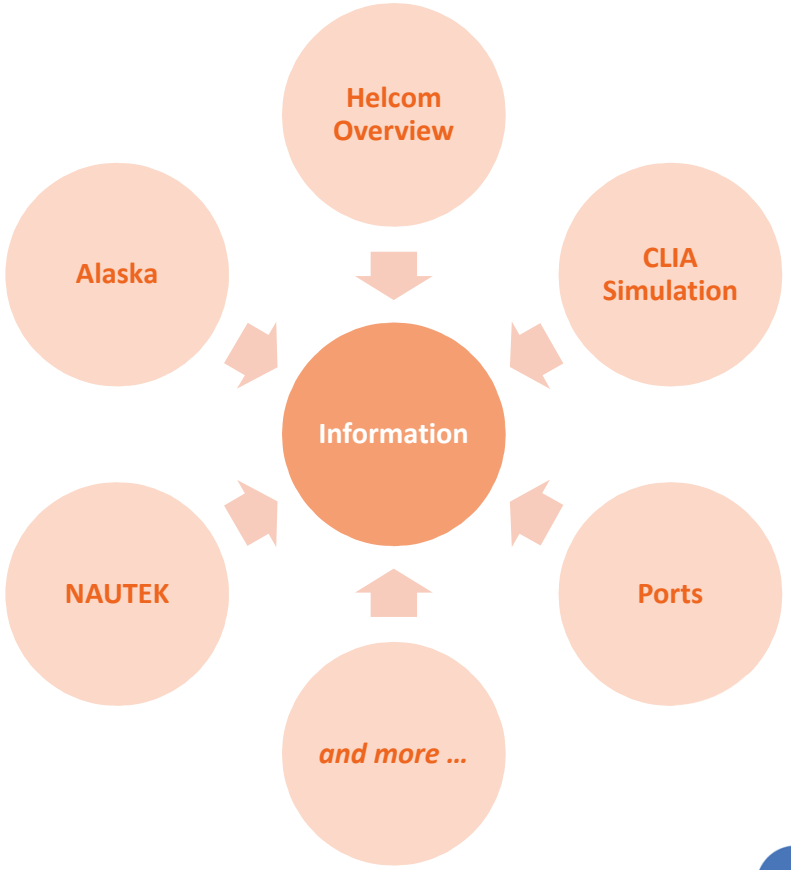
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Federal Republic of Germany,
represented by the Bundesministerium für Verkehr und digitale Infrastruktur (Federal Ministry of Transport and Digital Infrastructure),
itself represented by the Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency),
represented by the President,
Bernhard-Nocht-Straße 78, 20359 Hamburg, Germany

(Order number 10037877)

Prüf- und Entwicklungsinstitut für Abwassertechnik an der RWTH Aachen e.V.
Mies-van-der-Rohe-Str. 1, 52074 Aachen, Germany

Chapter 1: Information



Chapter 1: Information

- Definitions
- Regulations
  - Marine regulations
  - Land based regulations
- Wastewater treatment
  - On-board treatment
  - Landbased treatment
- Studies / input data
  - HELCOM overview
  - CLIA Europe Baltic Sewage Exercise
  - VTT Estimated nutrient load from waste waters originating from ships in the Baltic Sea area – Updated 2009
  - Alaska
  - NAUTEK
  - **PIA questionnaire**
- Wastewater characteristics
- PRF
  - Types of PRF
  - Availability
    - HELCOM overview
    - **PIA questionnaire**

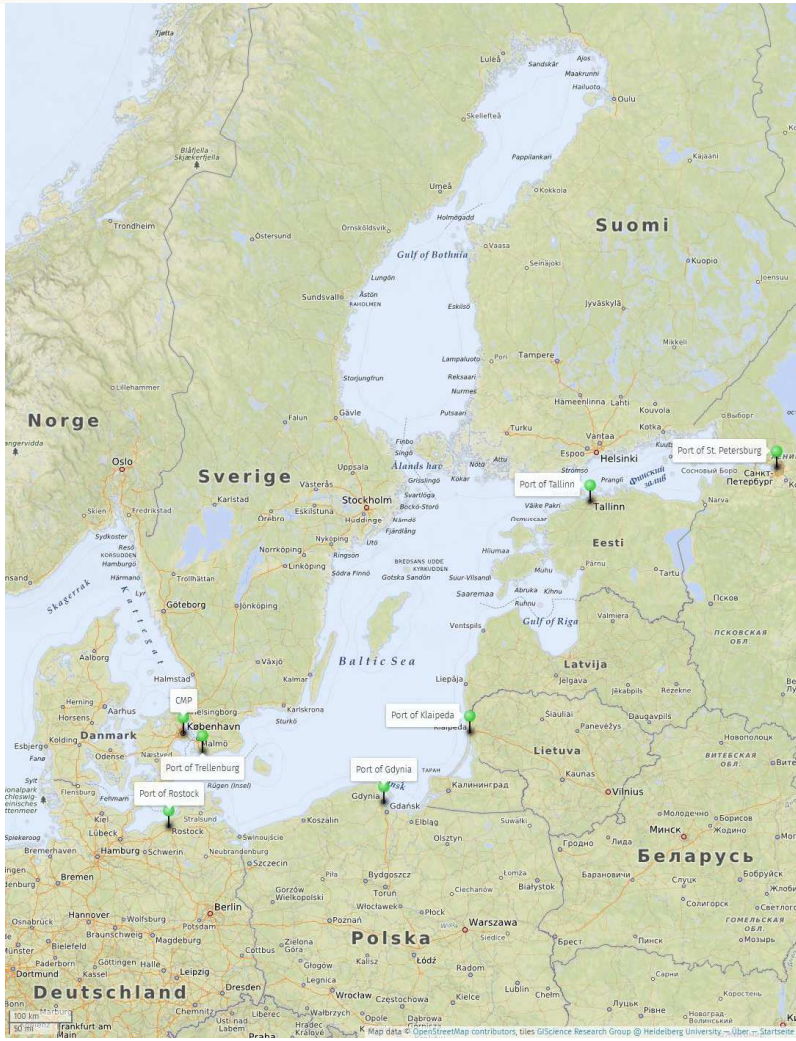
Information - *Questionnaire*

Categories of the survey

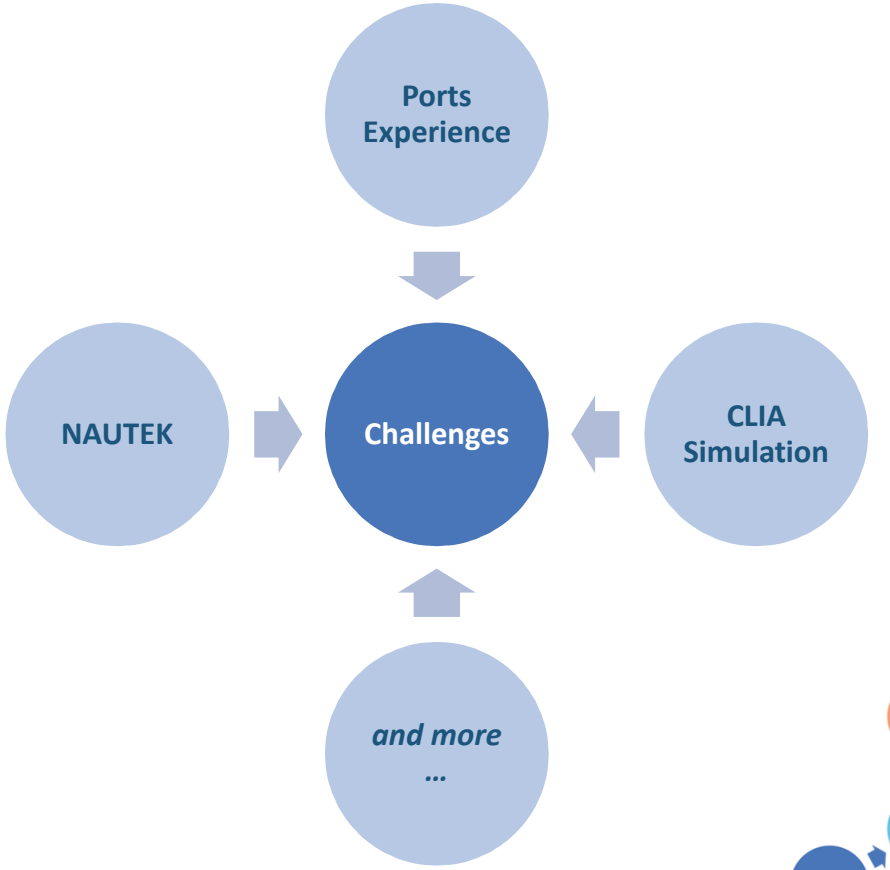
- General Information
- Infrastructure Information
- Ship and wastewater Information
- Problems with Port Reception Facilities handling

Received answers of ports [7/47]

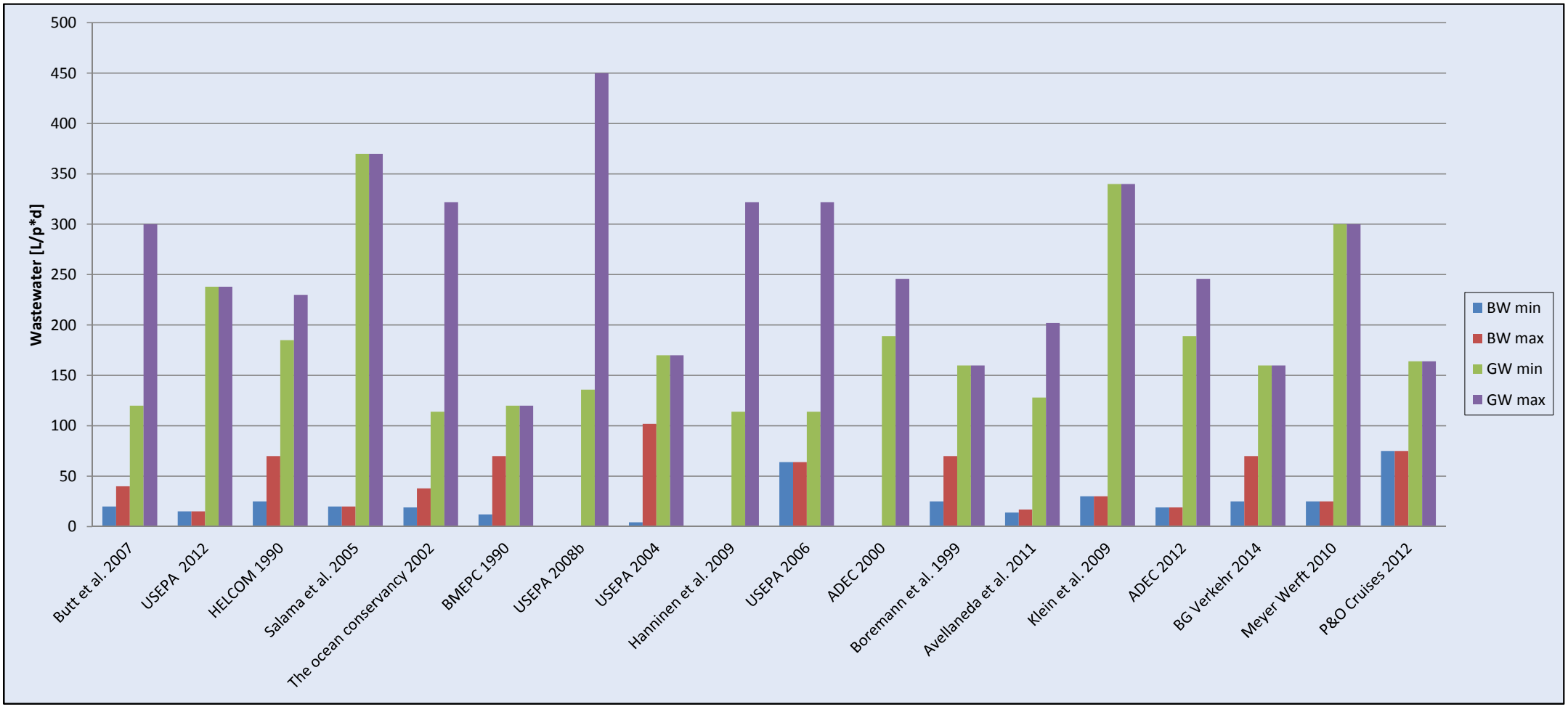
- Port of Copenhagen
- Port of Gdynia
- Port of Klaipeda
- Port of Rostock
- Port of Tallinn
- Port of Trelleborg
- Port of St. Petersburg



Chapter 2: Challenges



Quantities of Black and Grey Water Quantities



Comparison of Black and Grey Water Concentrations

Source: Köster et al. 2016

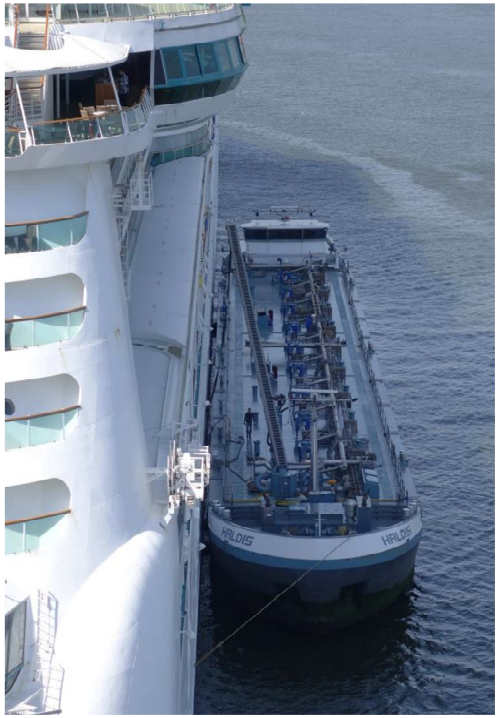
Comparison of Raw Sewage Concentrations

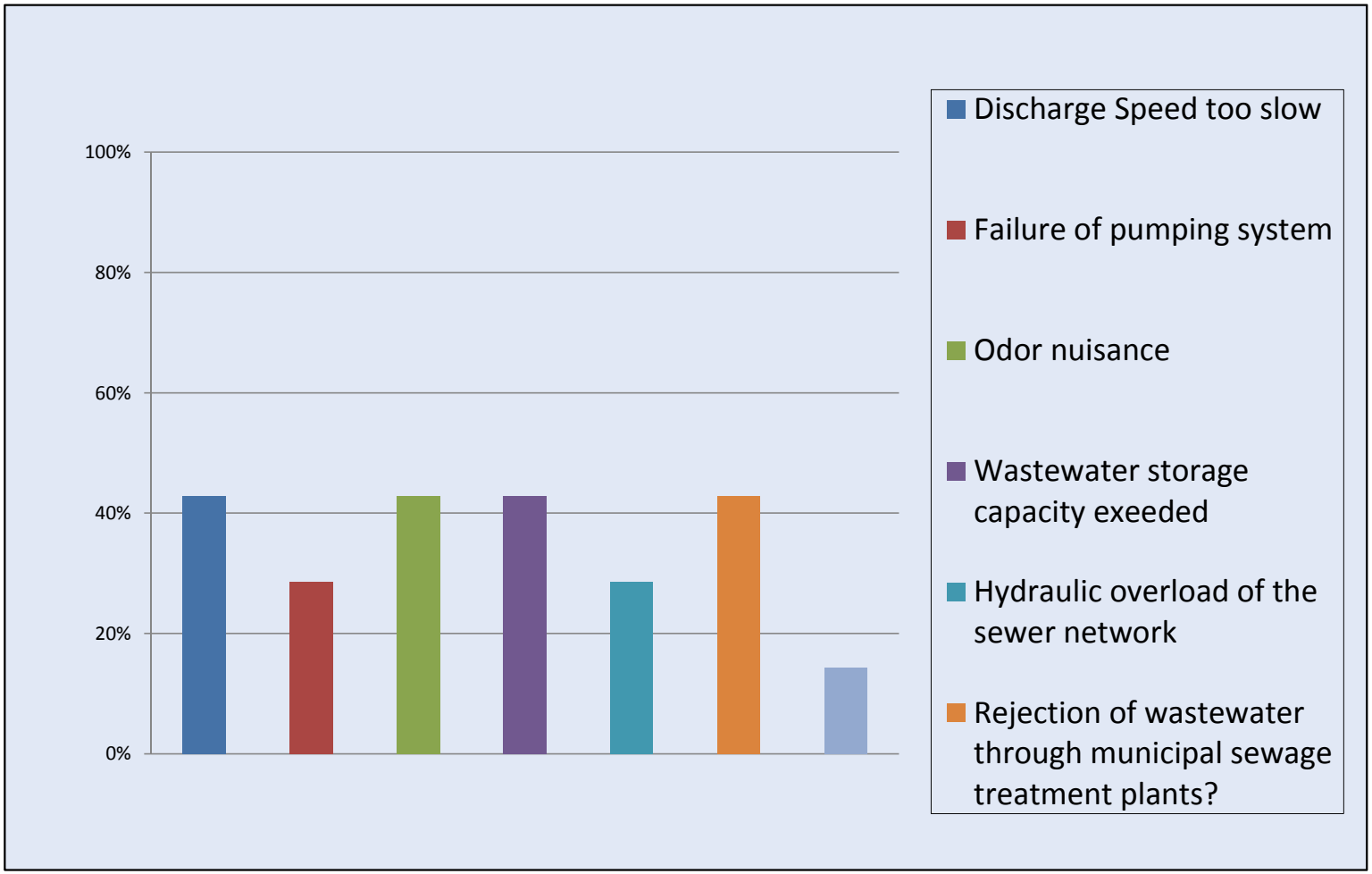
Source: Köster et al. 2016

Challenges

PIA Questionnaire

- Received answers of ports [7/47]
- Experienced challenges





Challenges

Challenges related to waste water quality

- Rejection of waste water by municipal waste water treatment operator
- Differences in water quality and quantity
- Hydrogen sulphide (H_2S)
  - Odor (rotten egg smell)
  - Harmful to humans (high concentration)
  - Corrosion of pipes and manholes

Formation of hydrogen sulphide

Under anaerobic conditions (absence of oxygen) biological activity produces (among others) hydrogen sulphide gas which is the most prevalent odor source associated with sewage.

Impact of corrosion

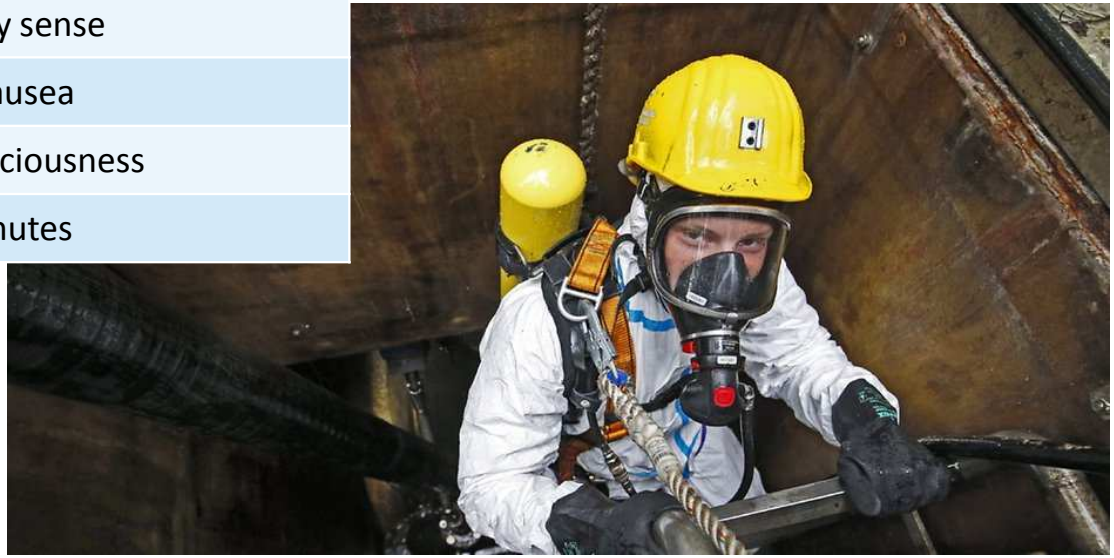
Biogenic corrosion of sewers represents a cost of about 10% of total sewage treatment cost. (Zhang et al. 2008)

Source: schwefelwasserstoff.de

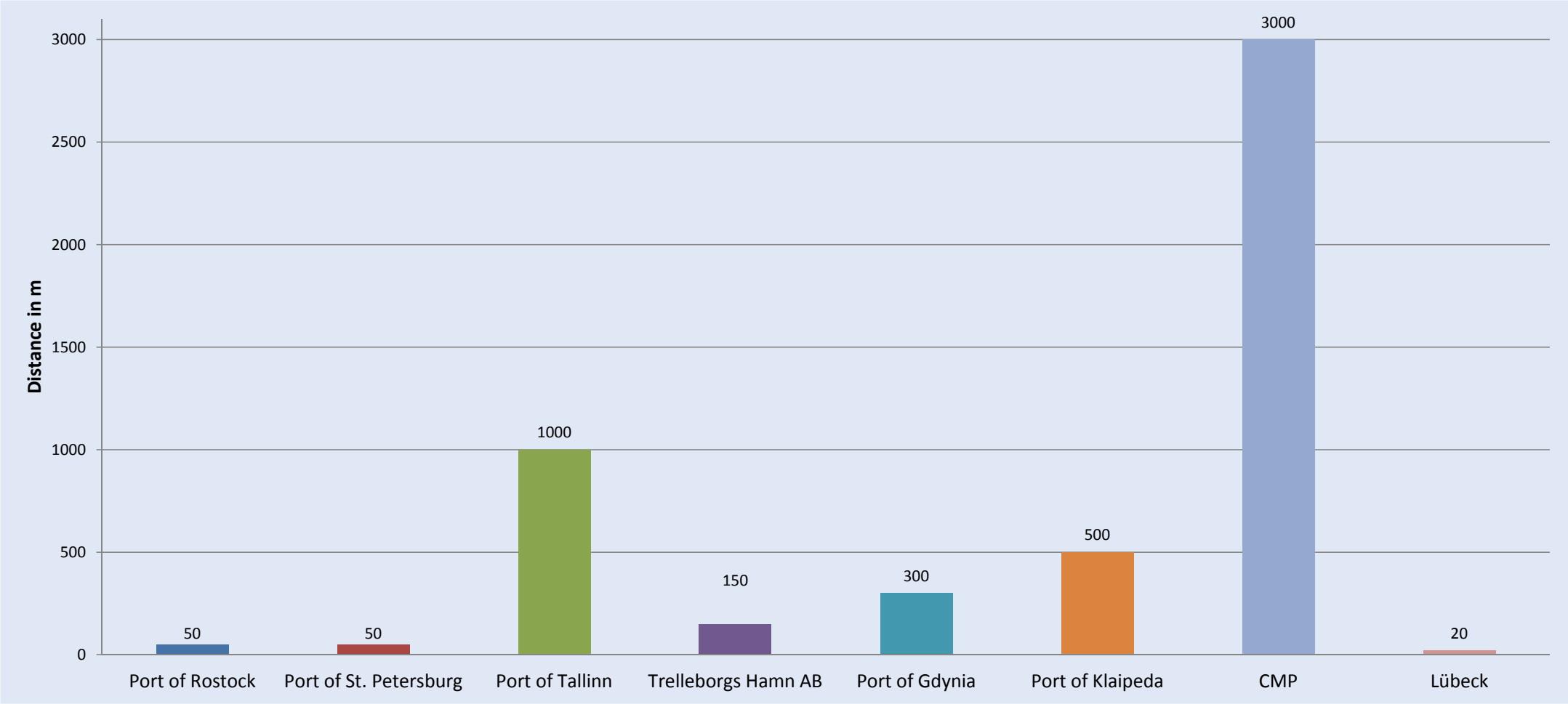
Hydrogen Sulphide

H_2S-concentration in the air [ppm]	impact
0,003 – 0,02	olfactory perceptibility
3-10	considerable smell
5	maximum permissible value at the workplace
20 - 30	strong rotten egg smell
50 - 100	irritation of the respiratory tract
100 - 200	loss of olfactory sense
250 - 500	headache, nausea
>500	cramping, unconsciousness
500 - 1000	deadly in minutes

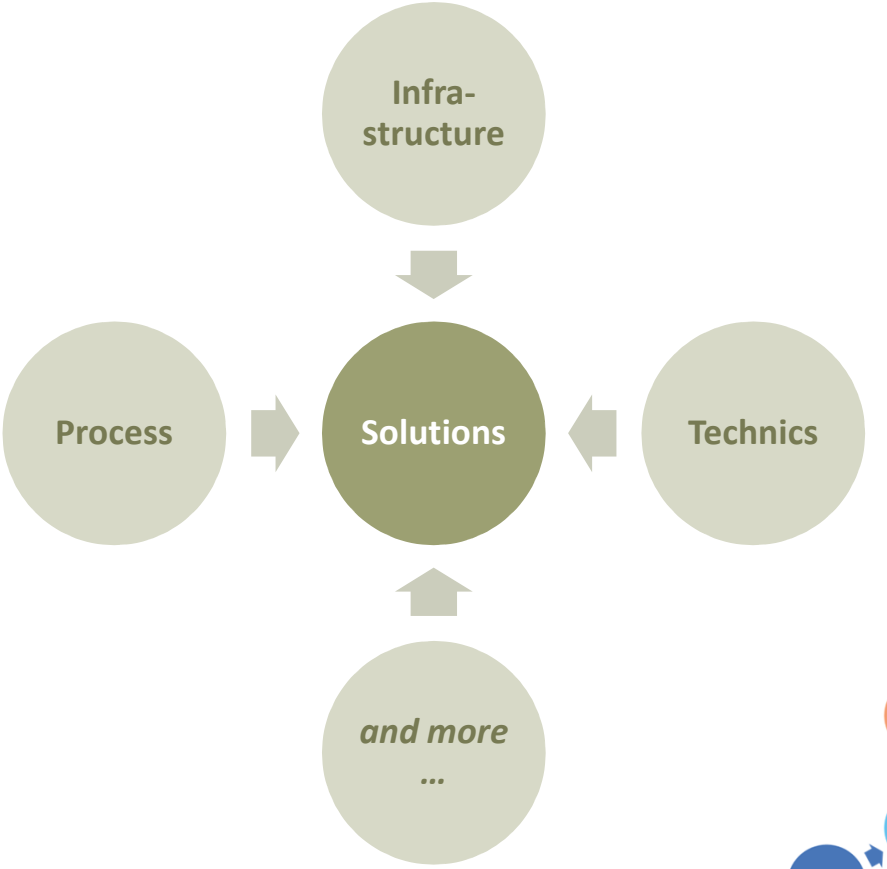
Source: Florian Quandt; mopo.de



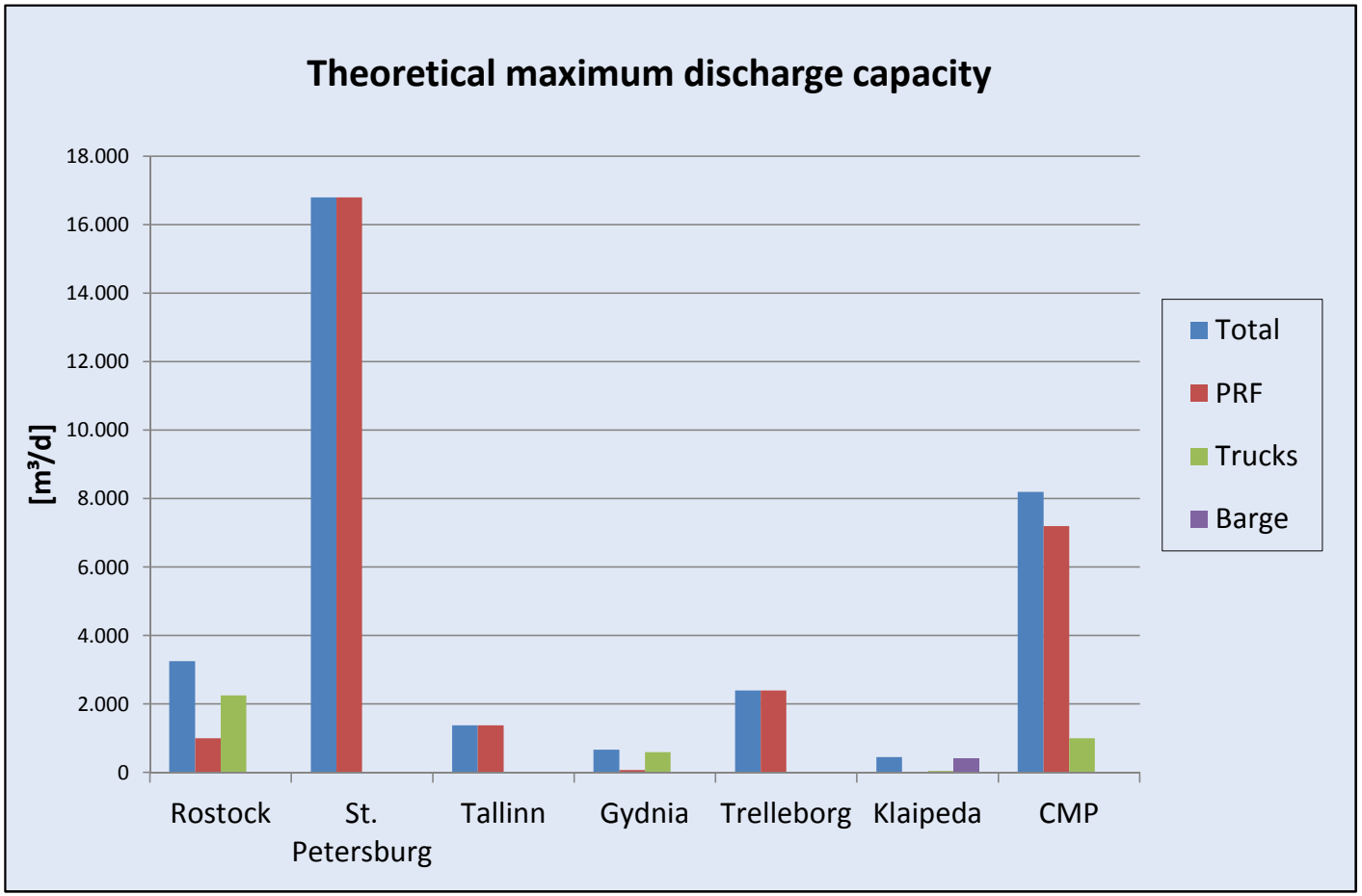
Distance of PRF to Residential Areas



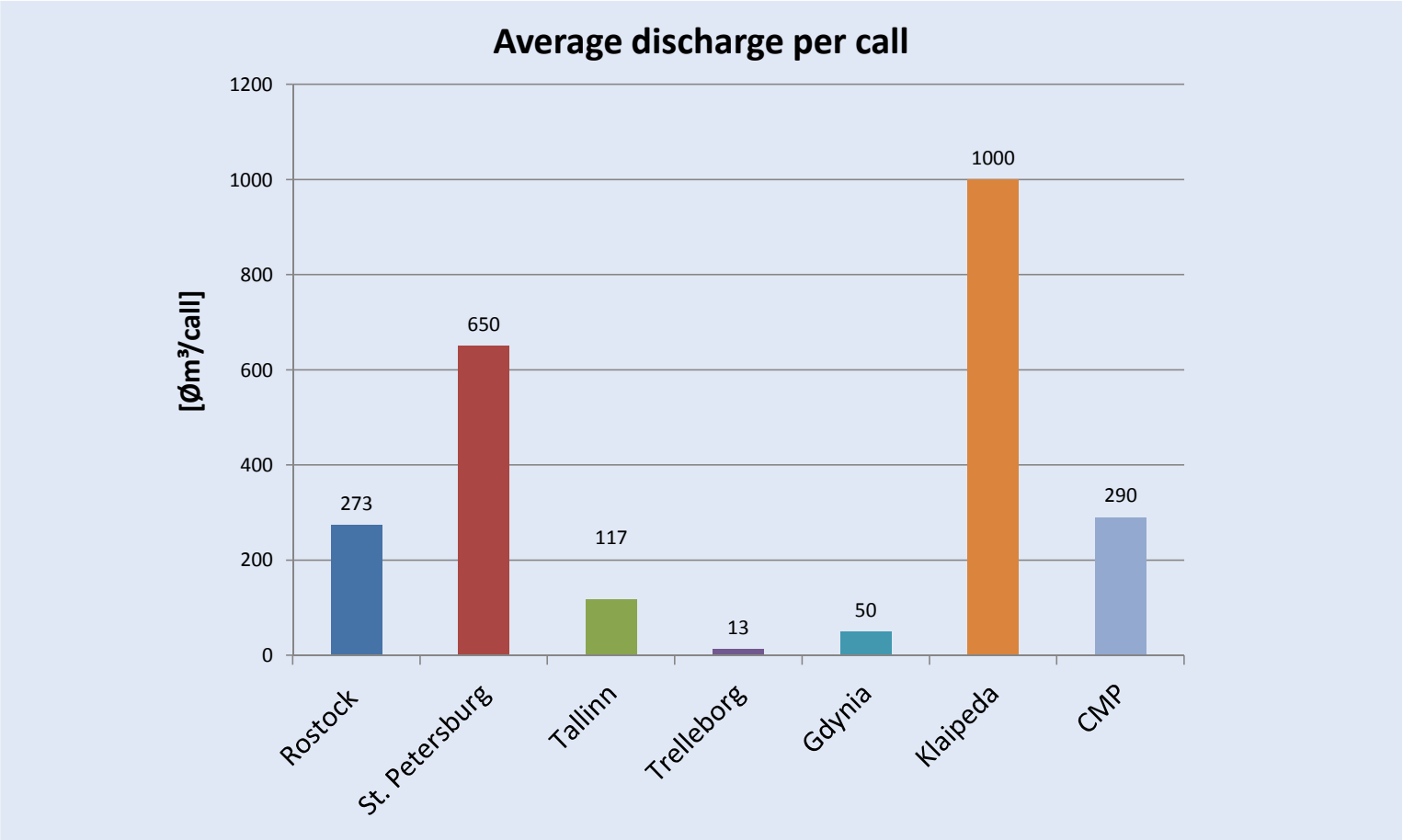
Chapter 3: Solutions



Questionnaire – first results



Questionnaire – first results



Timeline

July 2017
table of content

October 2017
Helcom Maritime

June 2018
Draft

October 2018
Helcom Maritime

Thank you!

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