Coping with extreme events Lessons learned from the 2021 flood event in Germany

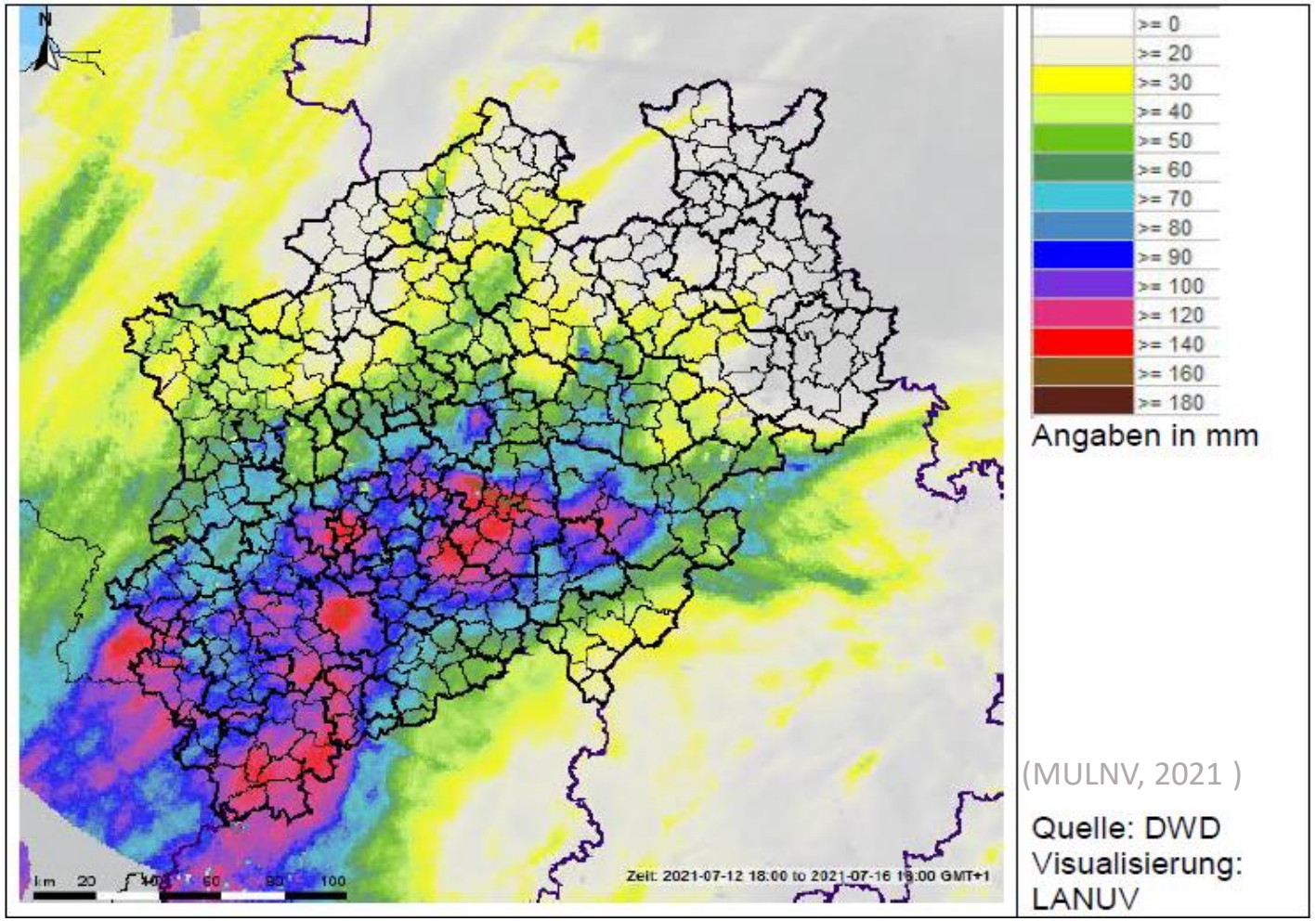
5th Dutch-German workshop
From Flood Forecasts to effective Emergency Response Measures

Dr.-Ing. Hellen Hammoudi, Prof. Dr. Robert Jüpner
Hydraulic Engineering and Water Management

Contents

- Flood event 2021 in Germany
- Emergency Flood Management
- Improving the emergency flood management

Flood Event 2021



Accumulated precipitation in NRW, 12.-16.July.2021

Experience in emergency flood management

June 2013- Elbe Flood
Location: Magdeburg, Police Office

July 2021- Ahrtal Flood
Location: Ahrtal, krisenstab

BMBF-Project **KAHR** for Rhineland-Palatinate and North Rhine-Westphalia
Climate Adaptation, Flooding and Resilience

- **Project duration:** November 2021 – October 2024
- **Project partners:** 13 Partners

KLIMA
ANPASSUNG
HOCHWASSER
RESILIENZ

Subproject: Improvement of emergency flood management

- Analysis of the disaster management system for coping with flood and heavy rain events
- Analysis of the effectiveness of the systems in the flood disaster of 2021
- Recommendations to improve the emergency flood management

Contents

- Flood event 2021 in Germany
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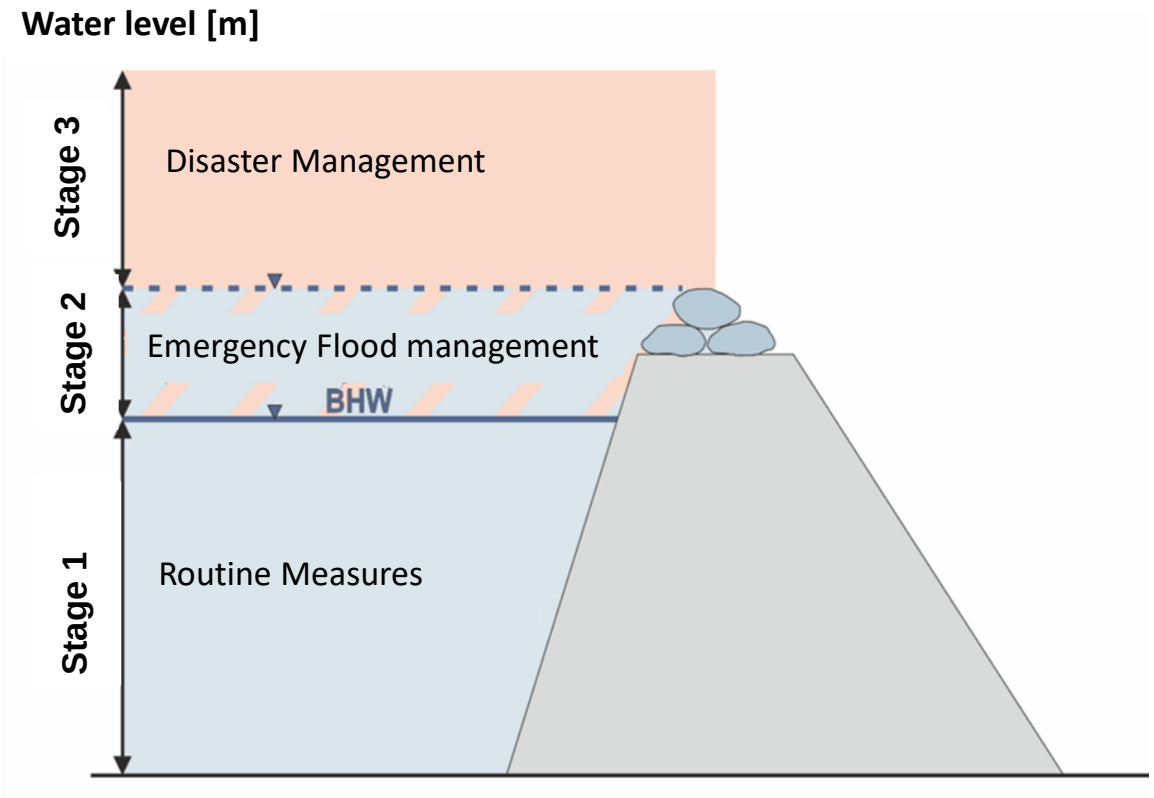
Emergency flood management

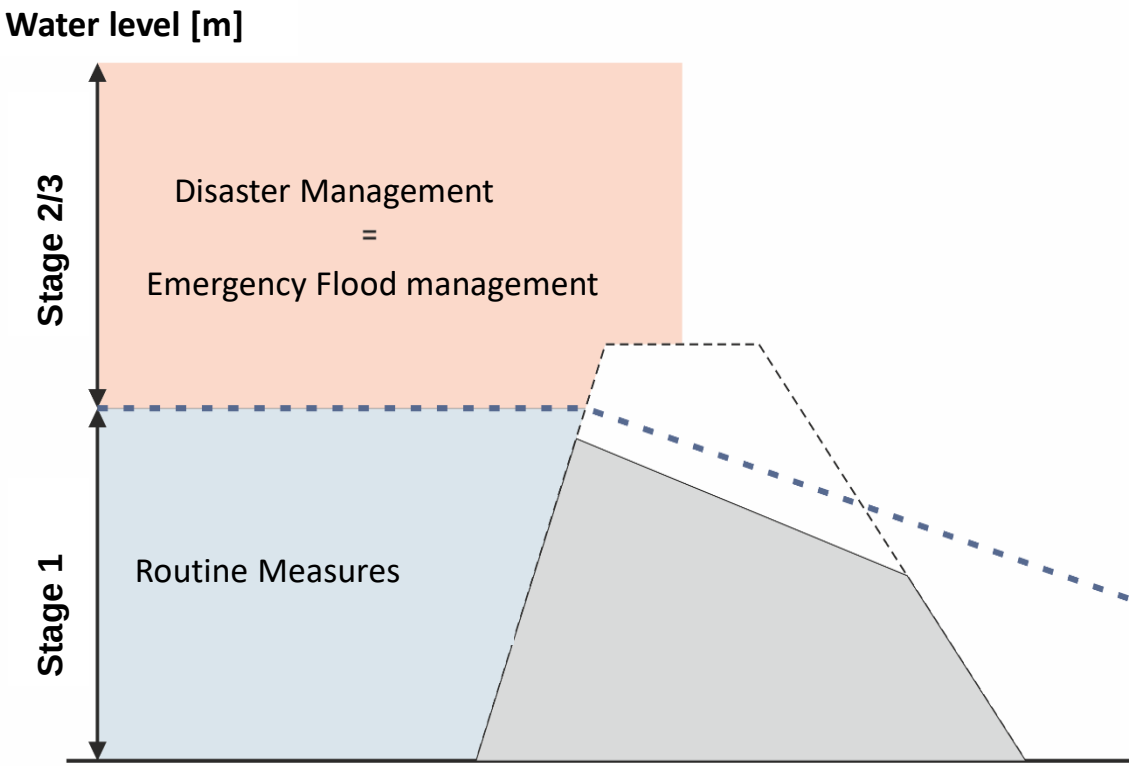
- The emergency flood management covers all measures and operations at the interface between disaster management and flood risk management.

- The overall aim is to save lives and reduce damages.

Emergency flood management

Collaboration between flood risk management and disaster management





(Jüpner, 2022)

Emergency flood management

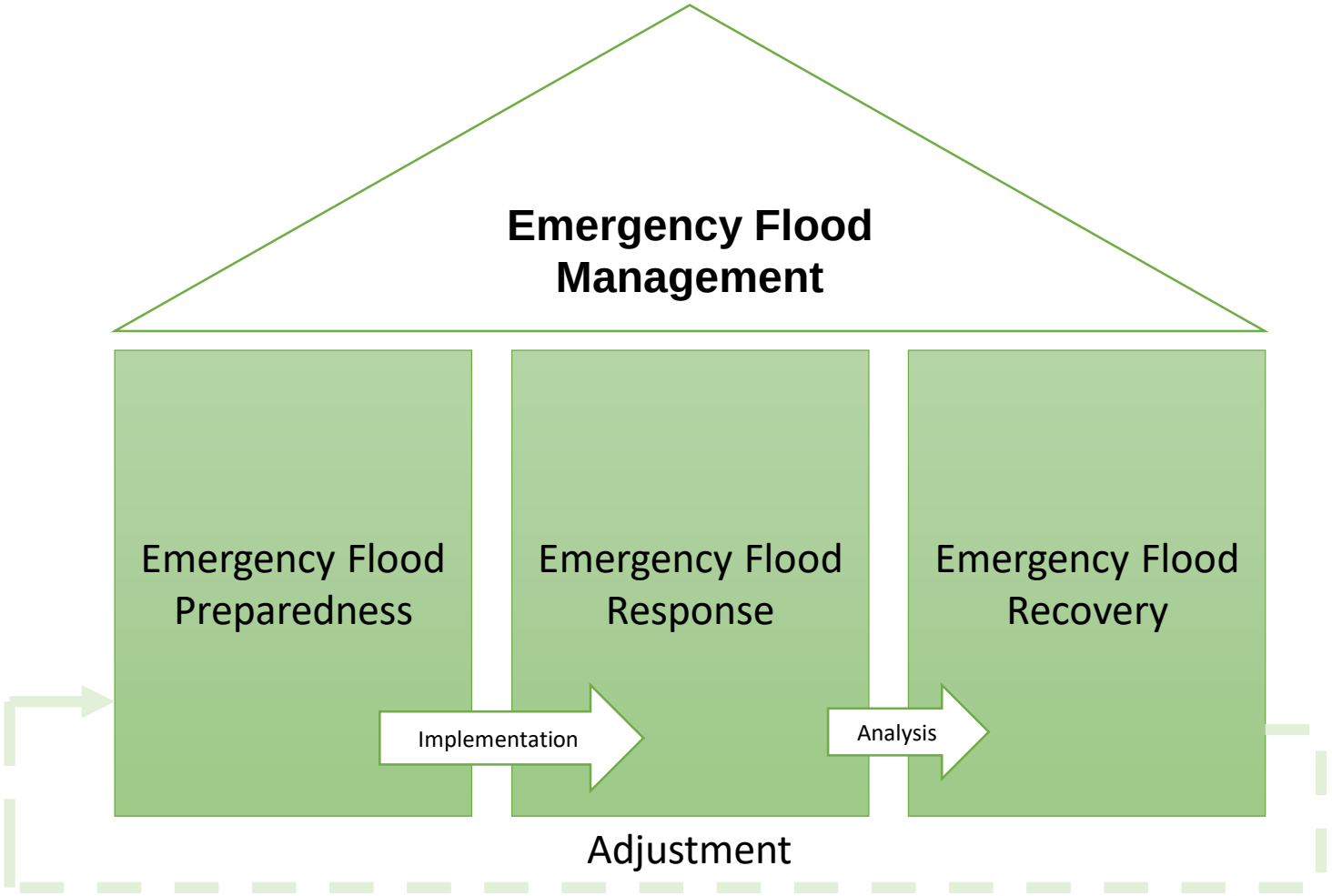
Flood Risk Management

- Modeling of flood scenarios
- Flood forecasts rely on water gauges
- Flood awareness relies on Flood hazard maps of pre-simulated scenarios.
- Operation of technical flood protection systems (e.g. Flood retention basins)
- Limited knowledge of disaster management system.

Disaster Management

- Flood is a disaster among many others
- Response only in case of emergency
- Flexible response
- Limited flood-specific planning tools
- Limited understanding of flood risk management systems.

Systematic approach

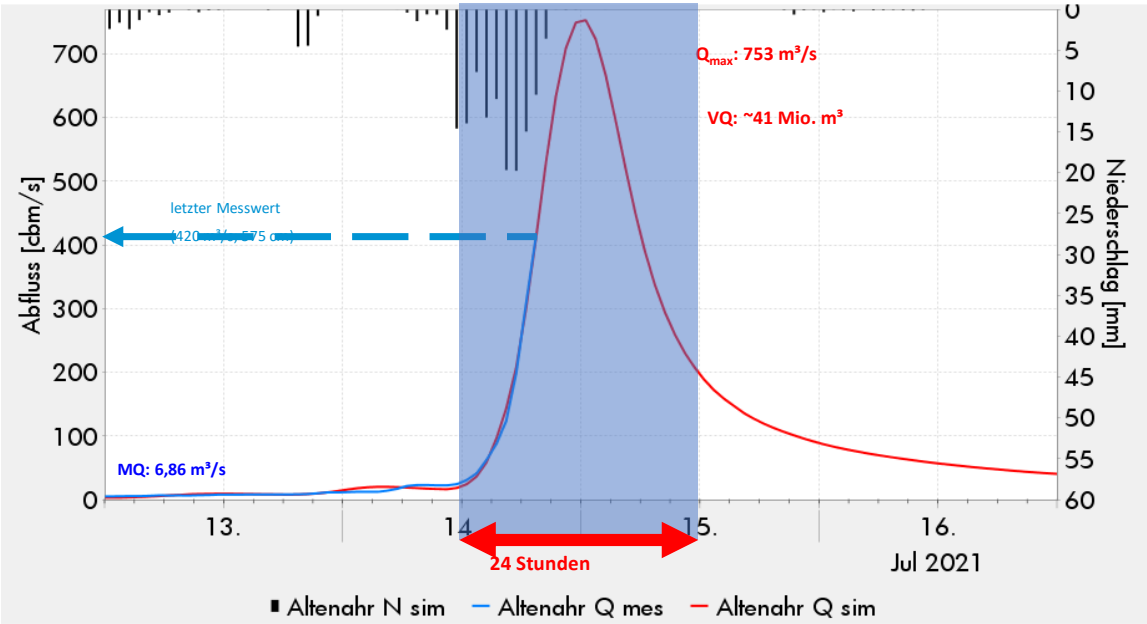


(Schüller, Jüpner 2021)

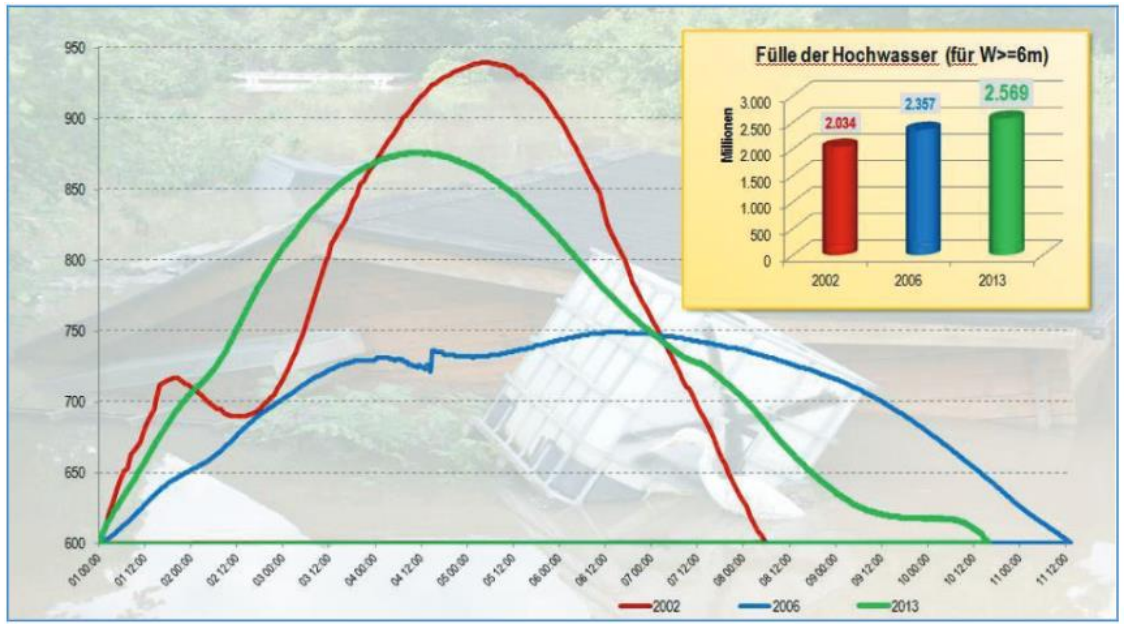
Challenges in emergency flood management

Flood characteristics

Event duration of two different river flood events



Flood Hydrograph at Altenahr-guage (13.7-16.07.2021) (MKUEM 2021)



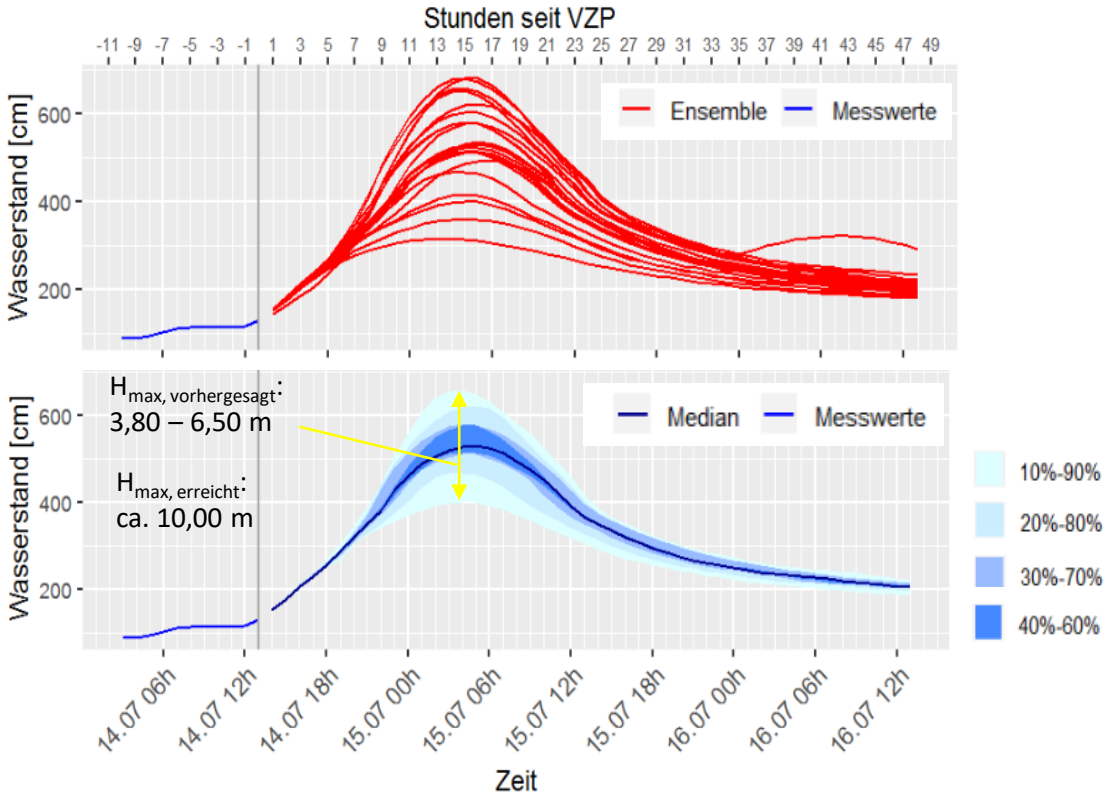
Water level Hydrographs- Elbe floods at Dresden-guage (Stadt Dresden, 2014)

Challenges in emergency flood management

Uncertainty in water level forecasts

- The forecast enables the disaster managementent and the public to undertake measures at an early stage. (HWRM-RL,2007)

- Uncertainities in:
  - Meterological input data
  - Hydrological model



(©LfU-RLP 2022) (Bettmann, 2022)

Challenges in emergency flood management

“Translation” for disaster management

- Sandbags-Calculator for flood defence

https://www.thw-hamburg-nord.de/sandsackberechnung/

Challenges in emergency flood management

Uncertainty in flood hazard maps

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Improvement of emergency flood management

Knowledge

Literature + Experience + Updates and gained Knowledge

Educational and Training Programs

- Basic educational programs
- Advanced training
- Special training

Approaches to improve emergency flood management

Basic Education Program

BiWaWehr-Course

„Coping with pluvial and fluvial flood events“

- Online course for firefighters (in German), since 2019
- Contents:
  - Basics in flood risk management
  - Responsibilities of the Firefighters in a flood event
  - Coordination of operations and involved organizations
  - Instruments and methods for hazard and risk assessments.

Improvement of emergency flood management

Knowledge

Literature + Experience + Updates and gained Knowledge

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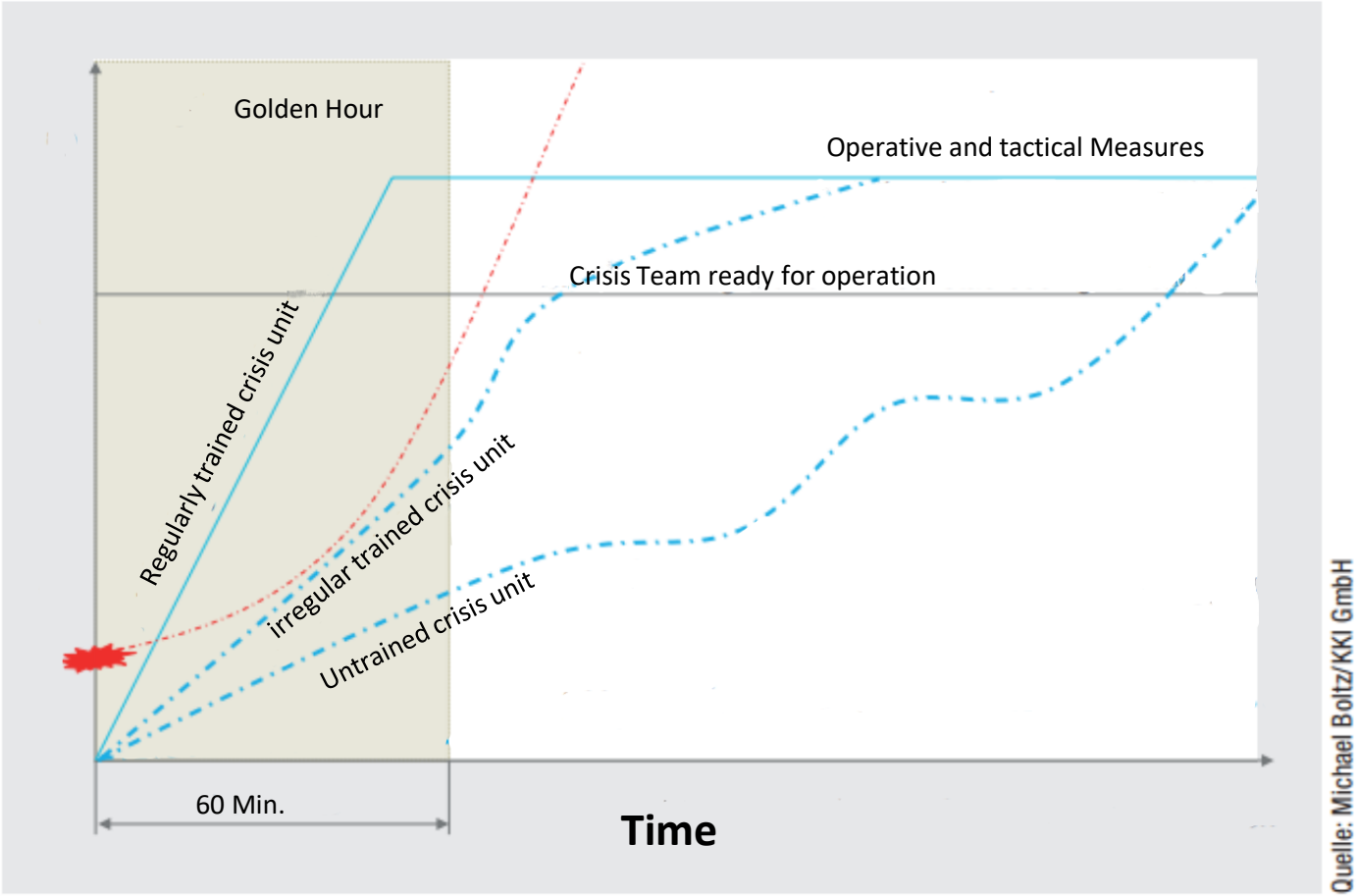
Approaches to improve emergency flood management

Special training program



Quelle: Michael Boltz/KKI GmbH

The golden hour- event-related constitution of trained and untrained crisis teams

Approaches to improve emergency flood management

Special training program

- Interactive workshop on October 2022
- Partners:

  Emschergenossenschaft

  the city of Gelsenkirchen

  TU Kaiserslautern
- The workshop concentrate on :
  - The appropriate response of the actors
  - The communication between the actors

Learning from the Dutch Experience?

Thank you for your attention!

Prof. Dr. Robert Jüpner
Dr.-Ing. Hellen Hammoudi

Technische Universität Kaiserslautern
Fachbereich Bauingineurwesen
Fachgebiet Wasserbau und Wasserwirtschaft
E-mail: **robert.juepner(at)bauing.uni-kl.de**
E-mail: **hellen.hammoudi(at)bauing.uni-kl.de**

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