

# CHy Activities for Flood Forecasting



WMO OMM

World Meteorological Organization  
Organisation météorologique mondiale

# Overview of Presentation

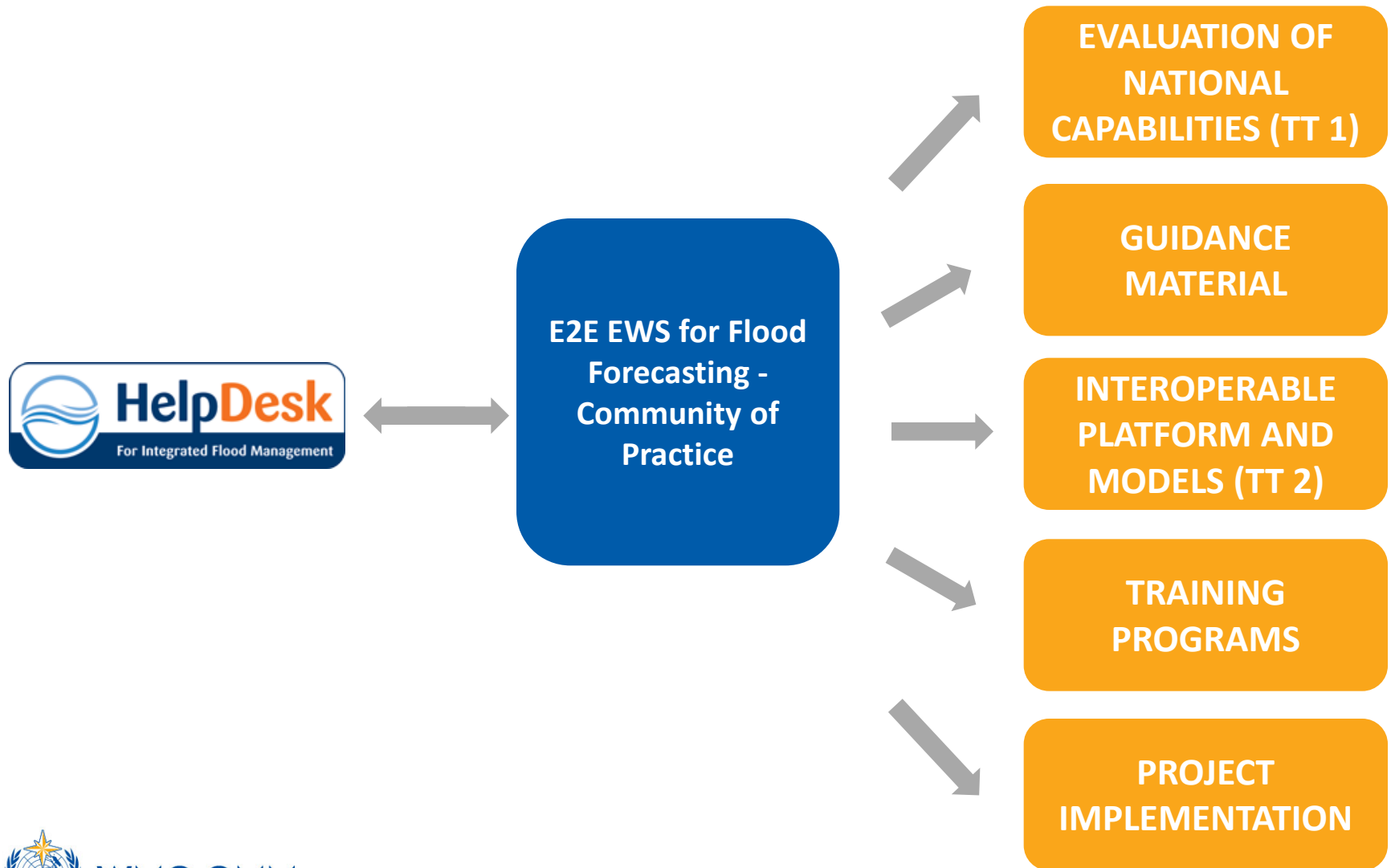
- Introduction to CHy-15 activities on flood forecasting
- Overview of CHy Task Team 1 for developing **assessment guidelines** for evaluating national capabilities for End-to-End Early Warning Systems (E2E EWS) for Flood Forecasting
- Overview of CHy Task Team 2 on **interoperable technologies** to advance flood forecasting

# Commission for Hydrology - 15

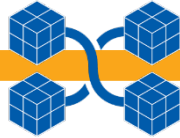
- (E) Implementation Strategy for the End-to-End Early Warning Systems (E2E EWS) for flood forecasting (using the Community of Practice approach): **develop assessment guidelines for NHSs to evaluate their E2E EWS for flood forecasting, furthering the earlier work on “Efficiency of flood forecasting services” (including testing developed procedures) possibly through the establishment of a Task Team/Working Group, consistent with the FFI-AG Work Plan of 2016-2019**, develop access to the interoperable technologies including platforms and models for use in flood forecasting; provide access to training and guidance material, in conjunction with item 1.4(g) below, on the aforementioned items; and assist in the development of projects;



# End-to-End Early Warning System (E2E EWS) for Flood Forecasting



# End-to-End Early Warning System (E2E EWS) for Flood Forecasting



## REAL-TIME DATA COLLECTION

## MODELLING & FORECASTING

## EARLY WARNING DISSEMINATION

## DECISION SUPPORT

## RESPONSE TO WARNING

Global Hydrometry Service Facility (HydroHub)  
Meteorological, Climatological and Hydrological (MCH) Database Management System  
WHYCOS

Flash Flood Guidance System (FFGS)  
Coastal Inundation Forecasting Demonstration Project (CIFDP)  
Severe Weather Forecasting Demonstration Project (SWFDP)

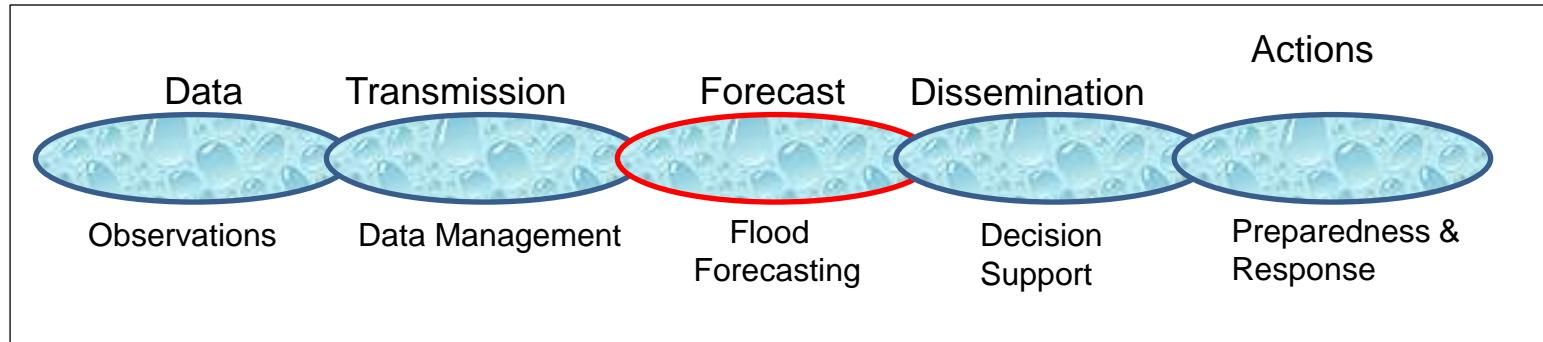
DEWETRA Platform

**APFM in support of the functions of National Meteorological and Hydrological Services**



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# “Links in the Chain”



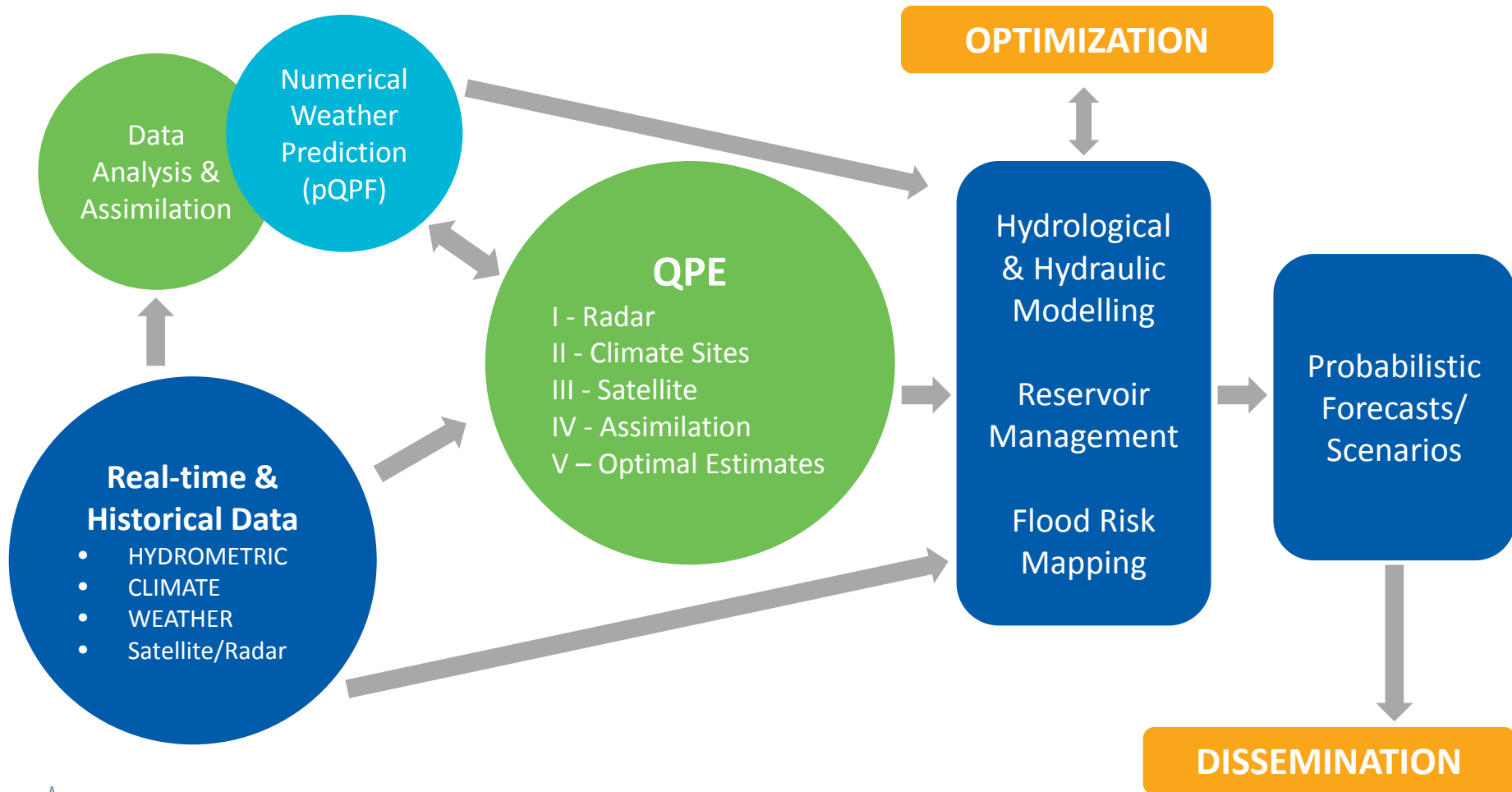
## Blocks of the E2E EWS for FF:

1. Observations
2. Data Management
3. Meteorological forecasts
4. Hydrological forecasts
5. Final products dissemination
6. Dissemination/Decision support
7. Actions



- 1) Task Team 1: Assessment Guidelines
- 2) Task Team 2: Interoperable Technologies

# E2E Ews for Flood Forecasting: Key Components



# Task Team 1: Assessment Guidelines

## - Composition of the Task Team

- Yuri Simonov – Roshydromet, Russian Federation (Lead)
- Reggina Cabrera – NOAA/National Weather Service, USA
- John Fenwick – NIWA, New Zealand
- Leandro Giordano – Instituto Nacional del Agua, Argentina
- Paolo Reggiani – University of Siegen, Germany

### *Additional experts:*

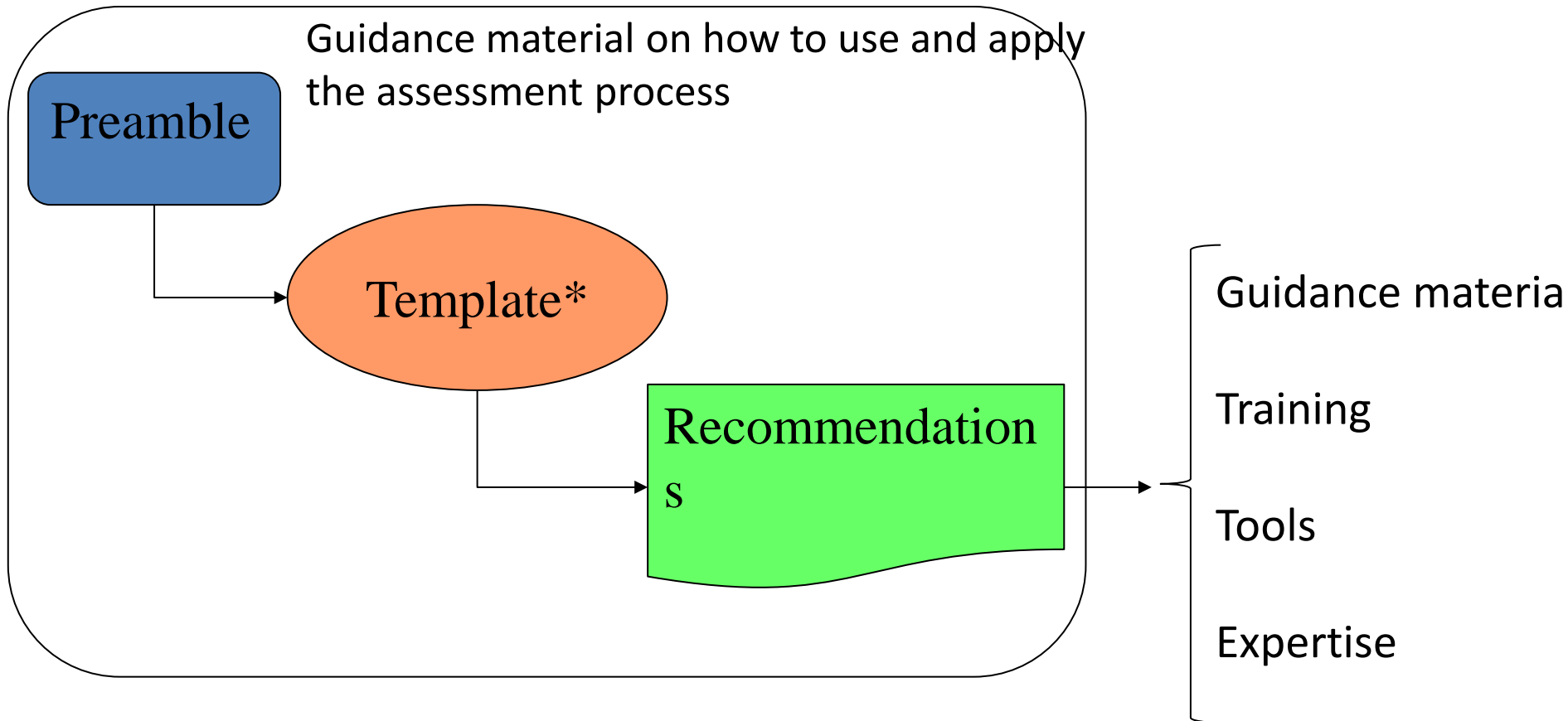
- Jeff Perkins – Bureau of Meteorology, Australia
- William Scharffenberg – U.S. Army Corps of Engineers



# Goals of the Assessment Guidelines

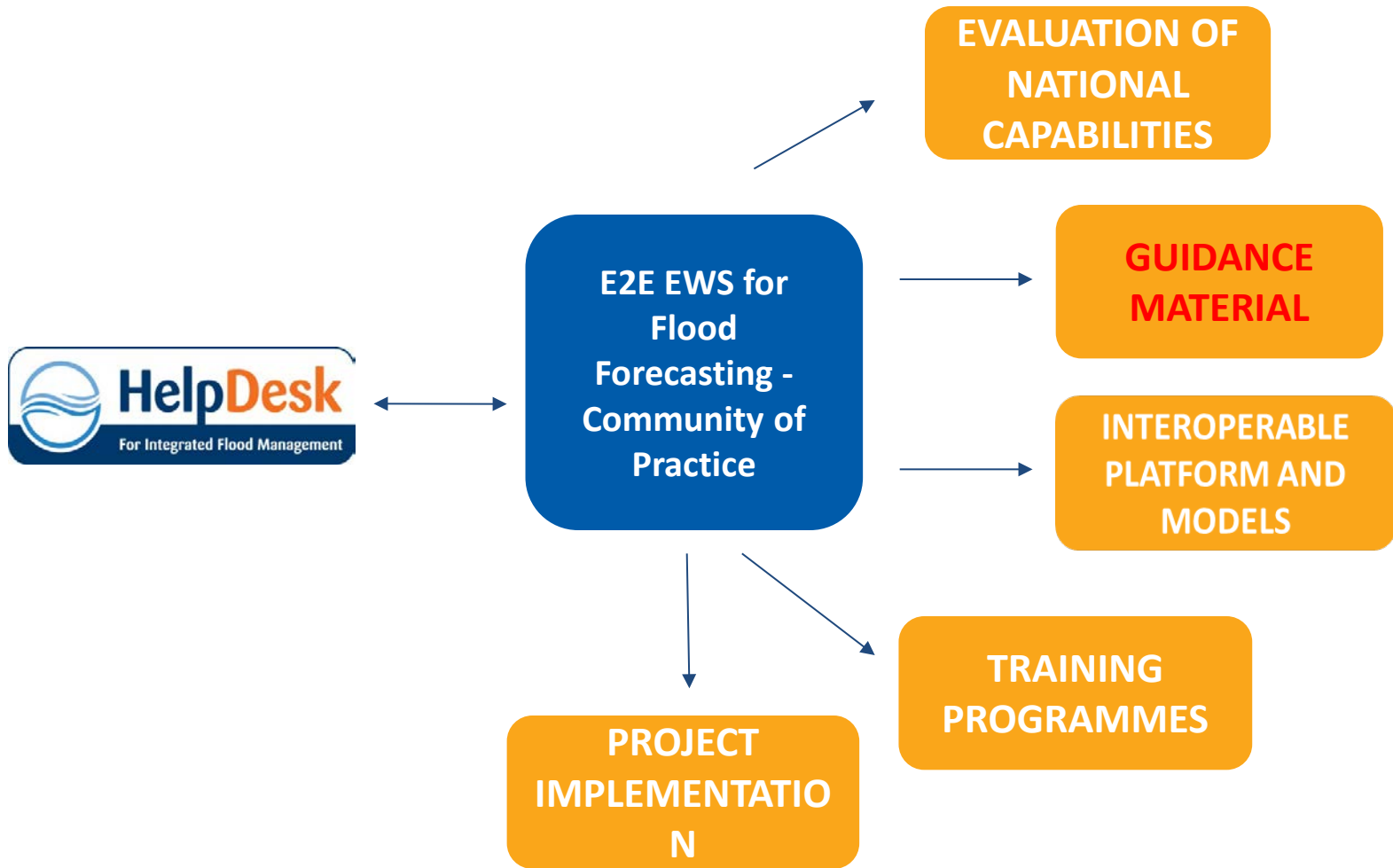
- build a full picture of a region/NHS/basin capabilities to implement/develop E2E EWS for Flood Forecasting;
  - almost any type of a flood
  - various mechanisms involved (snowmelt, rainfall)
  - any domain (region – transboundary/national/basin/subbasin scale)
- reveal deficiencies (objective approach – independent of the evaluators' experience);
- recommend/point to possible ways of overcoming deficiencies:
  - **guidance material**
  - **training material**
  - expertise within the Community of Practice

# Components of the Assessment



\* The Assessment Guidelines Template plus SWOT analysis

# Assessment Guidelines within CHy F/Forecasting



# Building on Previous Efforts



## EXPERT MEETING: IMPROVING THE EFFICIENCY OF FLOOD FORECASTING SERVICES

Development of a Framework for the Assessment of Service Delivery Capabilities of Hydrological Services

A contribution to the WMO Flood Forecasting Initiative

*2011, 2013: Expert Meetings: Improving the efficiency of Flood Forecasting Services*

## Outcomes:

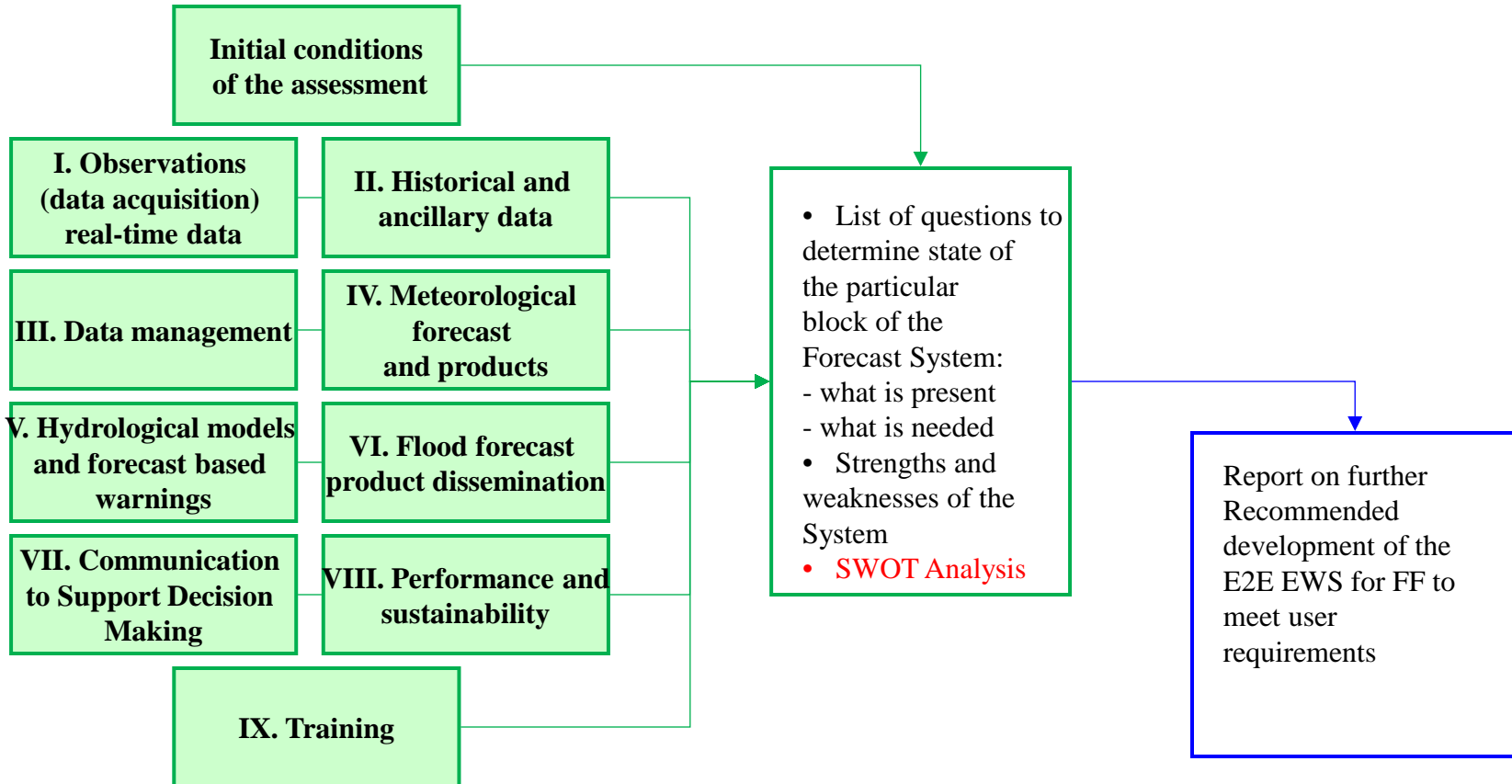
- Guidance Material
- Structure of the Framework
- Grading scheme

## Inputs to present study:

- some items are used as the basis for the new Assessment Guidelines

# Structure of the Assessment Guidelines

Components of the Assessment Template reflects structure (each link) of the E2E EWS for Flood Forecasting



# Structure of the template

Item No	Item	Guidance for evaluator	Answer	Grade (1-3-5)	Evaluator comments	Recommended improvements	Links to resources



# Users of the Assessment Guidelines

- External evaluators + NHS' experts
  - NHS's experts
    - informational part of the template plus SWOT entries
  - External evaluator(s)
    - Preferably more than 1 (possibly covering different areas of E2E EWS for FF links in chain)
    - Cross-checking NHS' capabilities (informational section plus NHS input)
    - Outcomes and Recommendation sections
- NHS' specialists
  - under consideration
    - depends on a NHS's level of development

# Application of the Assessment Guidelines

1. Preliminary assessment of the domain (off-line)
  - filling preamble of the Assessment Guidelines (AG)
    - physiographic features ...
    - flood triggers
    - types of floods
2. Defining subdomain for every type of a flood within main domain
3. Filling the AG matrix for every type of a flood and its subdomain
  - Specific items (questions) for every type of a flood
4. Evaluating results of the assessment
  - Grading scheme (1-3-5)
  - Expertise required on this step!
5. Linking result of the assessment with SWOT Analysis





# Steps of the Assessment

- Preliminary step
  - Offline, before going to a country
  - Establishing contacts with a country's agencies
- Main step
  - Interviewing of NHS, NMS, NDMA, other agencies involved in E2E EWS for FF
  - Completing the Template
  - SWOT Analysis
- Evaluation
  - Analysis and Report including recommendations



# Further Steps

- Item classification
  - According to different flood types and mechanisms
- Identifying missing items and refine template
  - e.g., Infrastructure, legal aspects, developing guidance comments
- Test drive the Assessment Guidelines by:
  - Task Team members
  - CHy experts (various countries/basins)
- Refine and adopt grading scheme (1-3-5)
  - Based on the implementation of the AG in practice

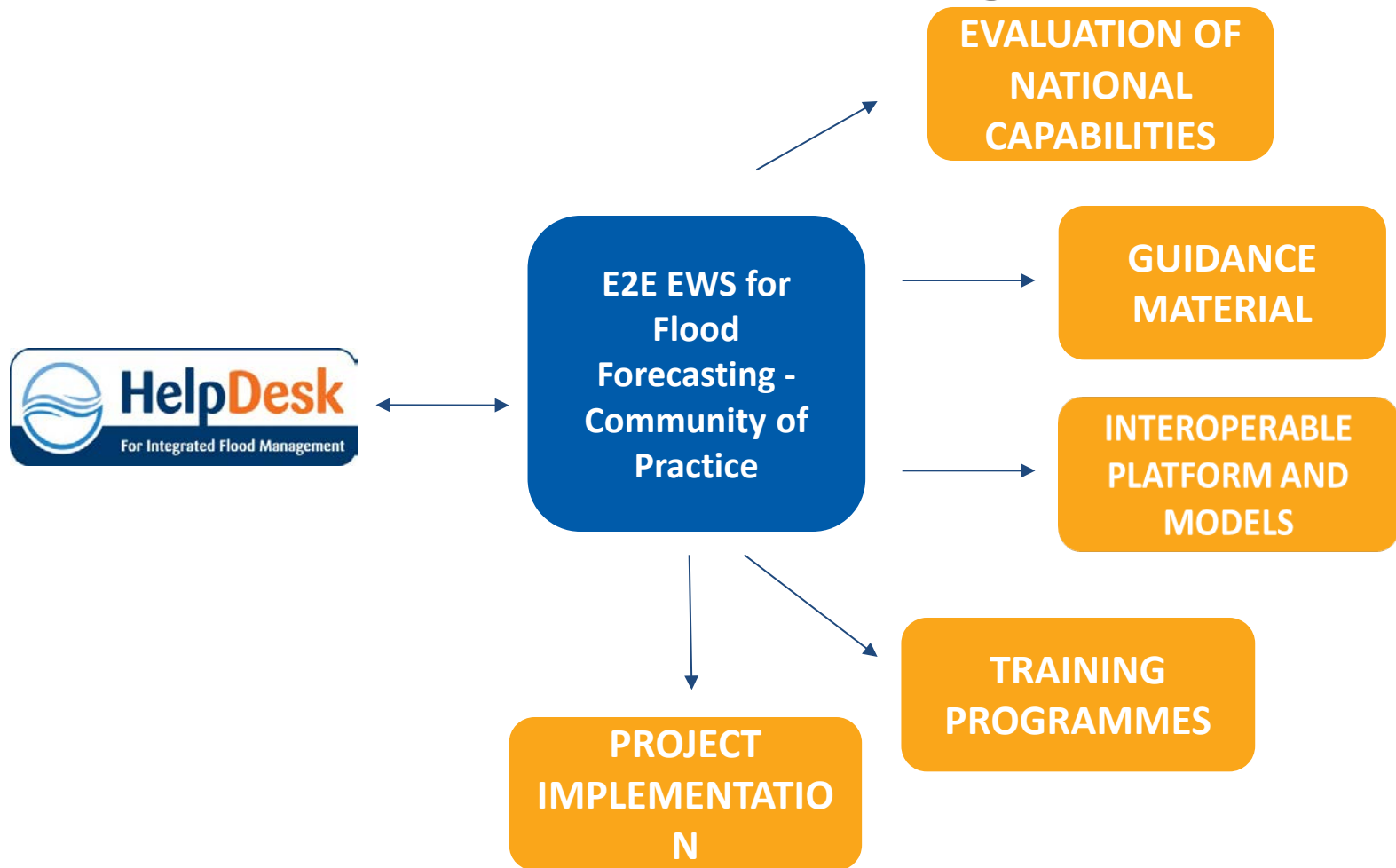


# Commission for Hydrology - 15

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# Interoperable Technologies within CHy F/Forecasting



# Task Team 2: Interoperable Technologies

## -Composition of the Task Team

- Hwirin Kim – MLIT, Republic of Korea (Lead)
- Yeshewatesfa Hirpa – SMHI, Sweden
- Etienne Le Pape – SHAPI, France
- Jeff Perkins – Bureau of Meteorology, Australia
- William Scharffenberg – U.S. Army Corps of Engineers

# Definitions

**Interoperability:** the ability of modelling systems or software to automatically exchange and make use of information from one to another. In the context of the flood forecasting domain, this can also mean interoperability between models made by different individuals or groups, such that they can easily interface with a **platform**

Platform: software able to provide interoperability of modelling systems that do not possess this capability. It may also allow input of data with different formats and may provide output in a multiple of ways (graphs, tables).



# Criteria for assessment

Develop initial list of review assessment criteria

- **Must**: Strongly to be required
- **Should**: Important components
- **Could**: Less important but good to have

Develop initial draft short-list of existing hydrologic models and platforms

- ✓ Models: HEC-HMS, HYPE, URBS, HBV aka HBV96, GRM
- ✓ Platforms: HEC-RTS, AEGIR + HYFO, Delft FEWS, K-EWS



# Additional Criteria

- **Criteria for “data format” for models:** To promote interoperability, the hydrological, hydraulic or reservoir model’s *data structure (input/output) should be documented with the programming Application Programming Interface (API) being made freely available*
- **Criteria for “data format” for platforms:** To promote interoperability, *the platform must allow multiple input formats (documented), should support at least one WMO format, and should document its output format with the programming Application Programming Interface (API) being made freely available.*
- **Open versus closed systems:** open systems can easily incorporate a variety of hydrological, hydraulic and reservoir models, while closed systems are built for specific models and cannot easily add other models without undertaking complex coding





# Criteria

- **Must:** Strongly to be required
- **Should:** Important components
- **Could:** Less important but good to have

Criteria	Model X	Platform Y designed for X software
<b>Operationally used (must) model and platform</b>		
<b>Freely available</b>		
<b>Hardware requirements (low end)</b>		
<b>Availability of training material</b>		
<b>Institutional Support</b>		
<b>Languages training and software</b>		
<b>Sustainability - longevity</b>		
<b>Peer review or Case studies (modelling only)</b>		

# Criteria

Criteria	Model X	Platform Y designed for X software
Open source or source is available (should) model and platform		
Updating (modelling only)		
Simplicity – calibration, parsimony (modelling only)		
Simplicity – usability (m & p)		
Pre-existing CoP (m & p) could		
Data Format (model) could		
Data Format (platform) must/should		
Visualization (platform)		
Data QA/QC (platform)		
Open/closed platforms		
Internet-based system (platforms)		
Redundancy capability (platforms)		

Gracias  
Merci  
Obrigado  
Thank you



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