

3rd ES1206 Workshop GNSS4SWEC - Advanced Global Navigation Satellite Systems tropospheric products for monitoring severe weather events and climate

Bridge SMS

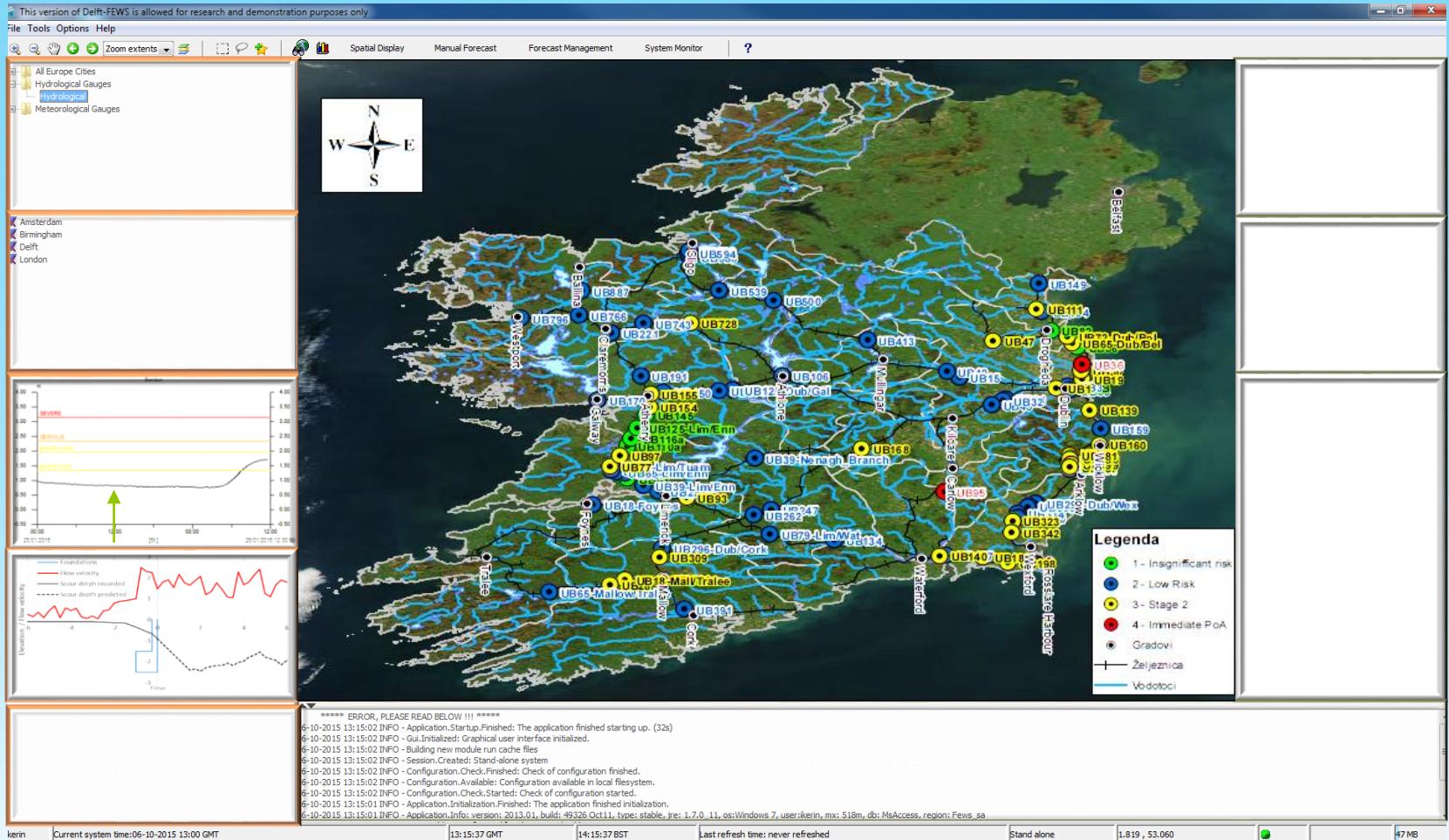
www.bridgesms.eu

Reykjavik, 28th Jan 2016

Dr. Eamon McKeogh
Igor Kerin



Bridge SMS software interface



2 Summary of Bridge SMS

Bridge SMS

DSS 1 – Bridge Scour

DSS 1.1
Static data

DSS 1.2
Dynamic data

DSS 1 Decision and recommendation

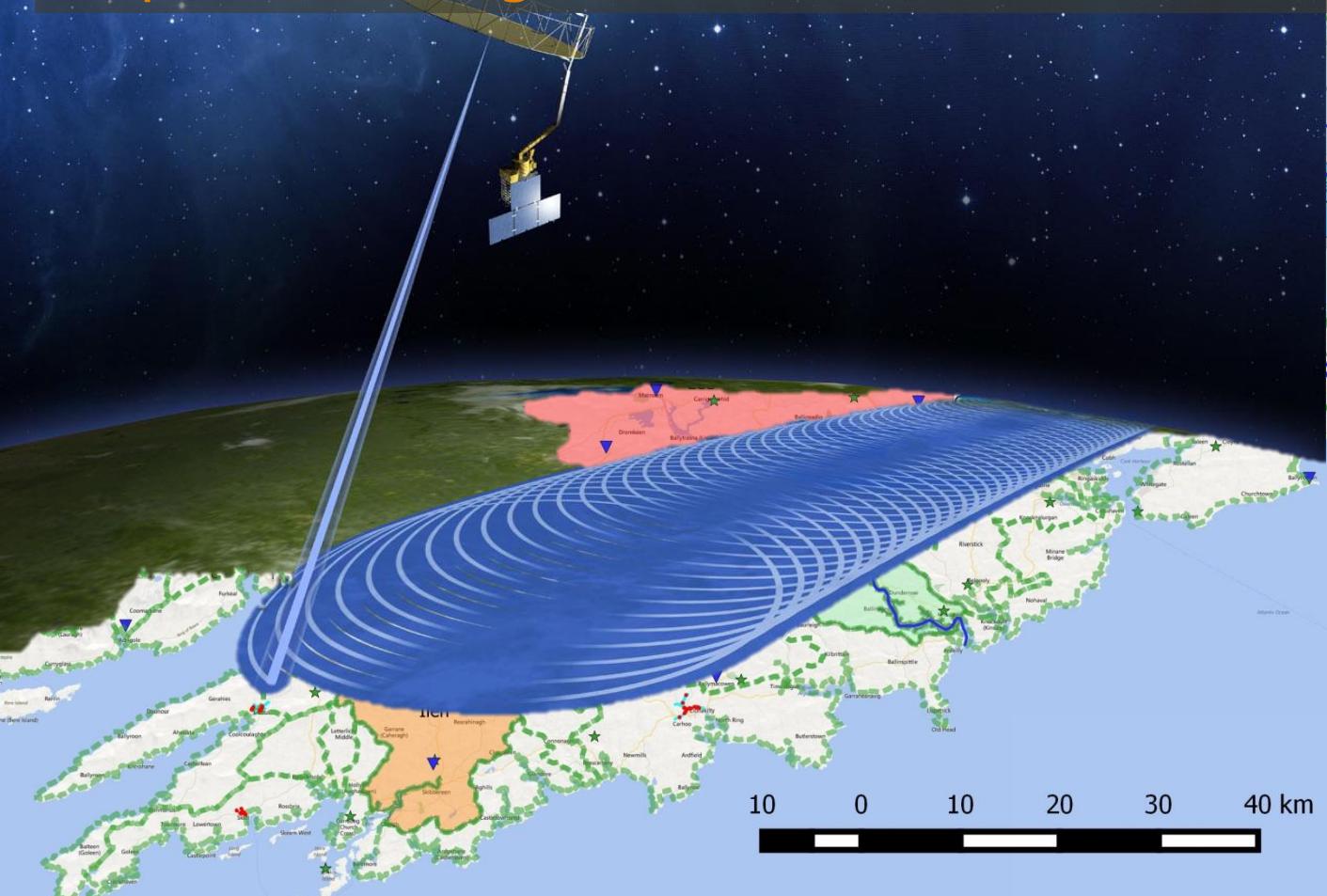
DSS 2 Decision and recommendation

Final Decision and recommendation

Bridge SMS



SMAP L2 Radiometer Half-Orbit 36 km EASE-Grid Soil Moisture
<http://nsidc.org/>



- Legend**
- OPW Bridges
 - OPW survey HPW
 - OPW survey mpw
 - RiverBasin
 - ▼ Hydrogauges-recorded_Active
 - ★ MetEireanGauges
 - Lee Catchment
 - Ilen Catchment
 - Bandon Catchment
 - Blackwater Catchment
 - Bride Catchment
 - Owenacurra Catchment
 - Counties

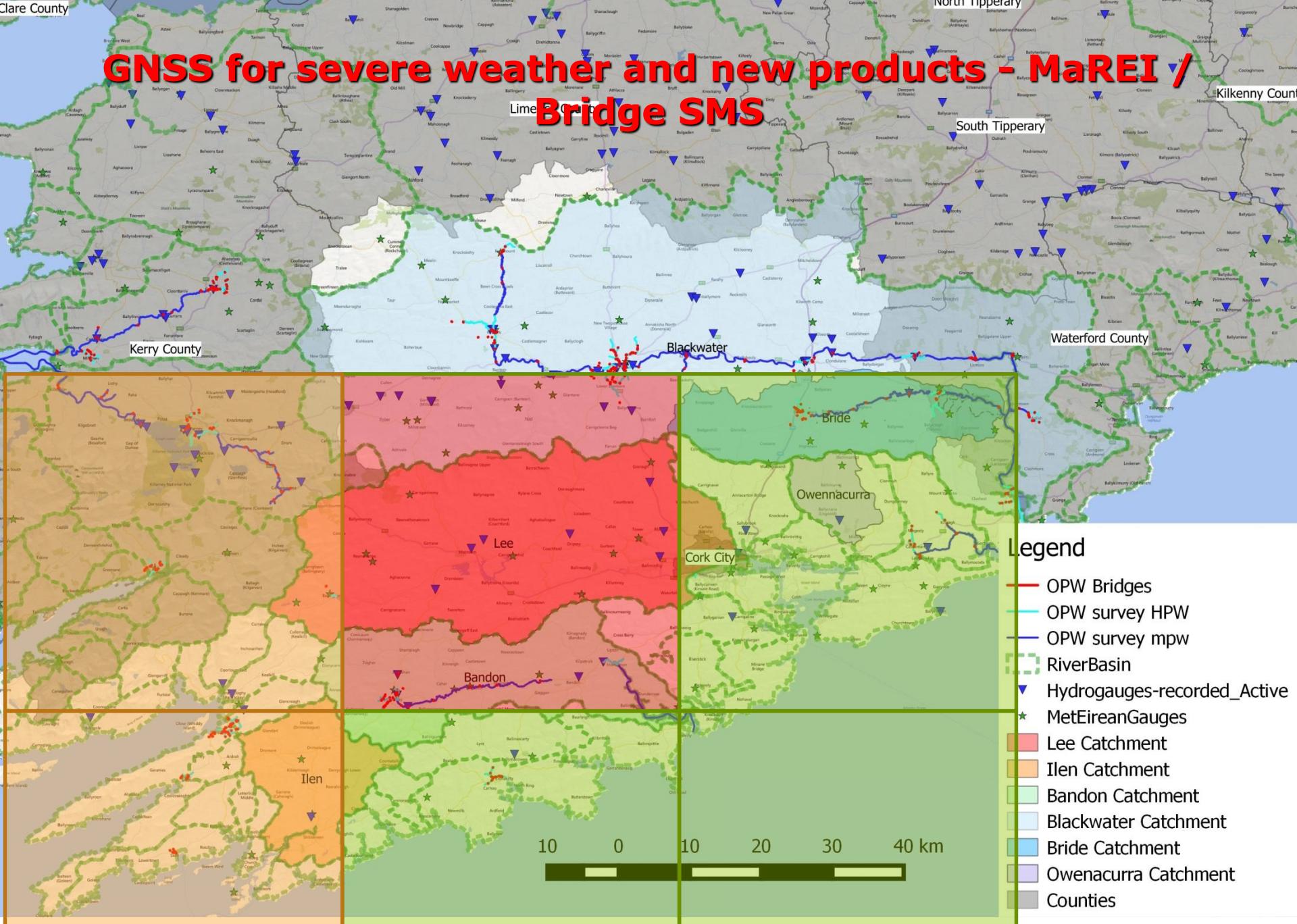


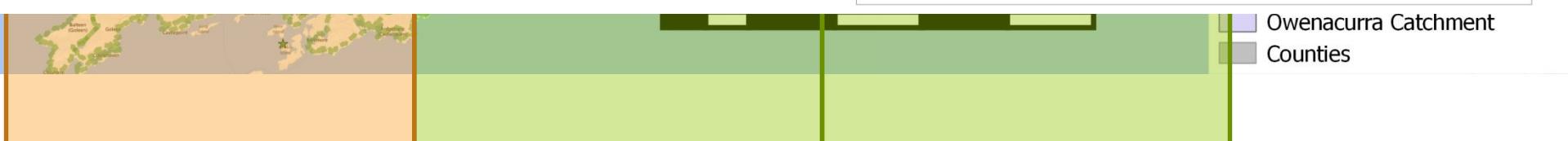
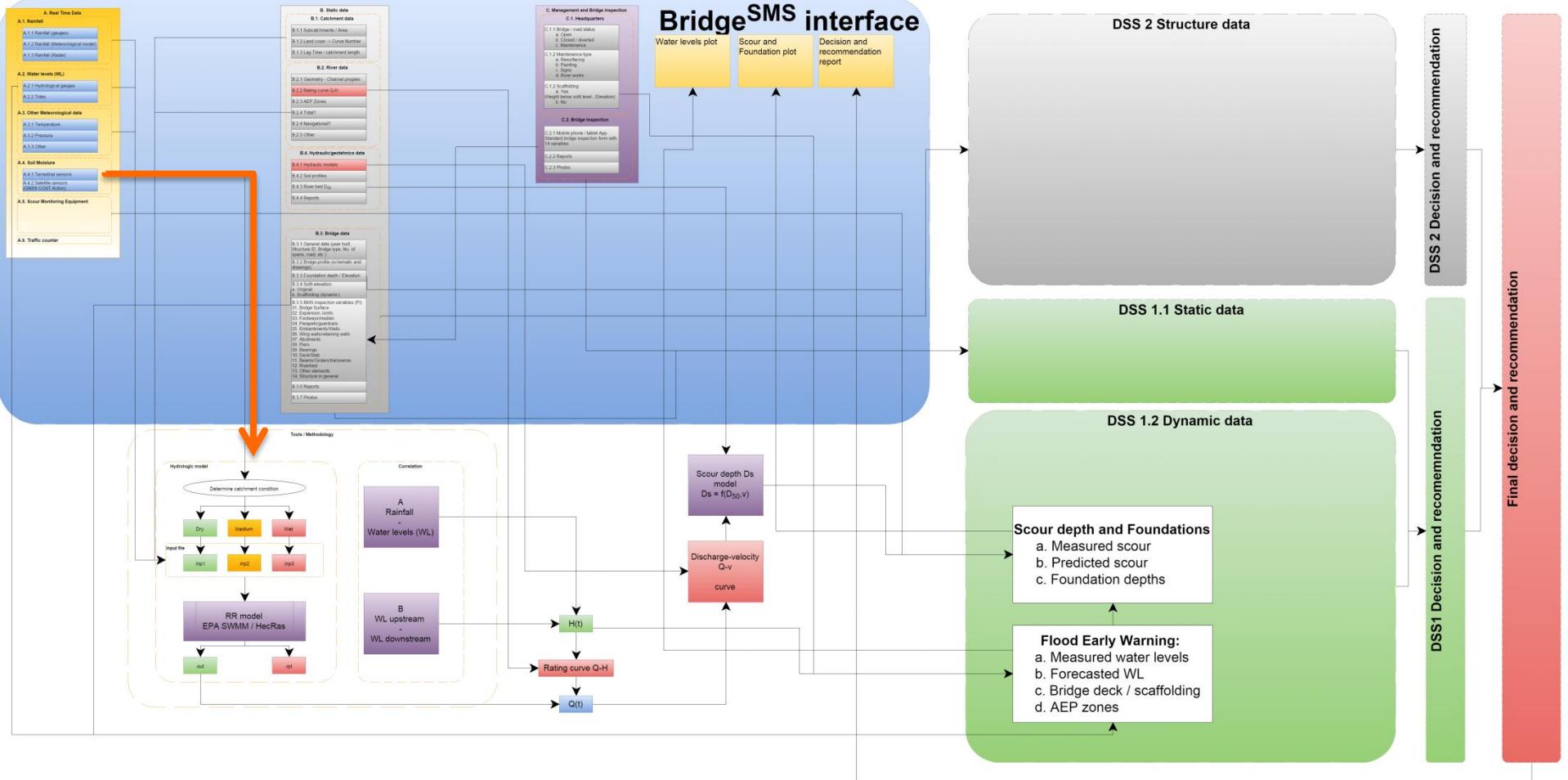
Waterford County

Legend

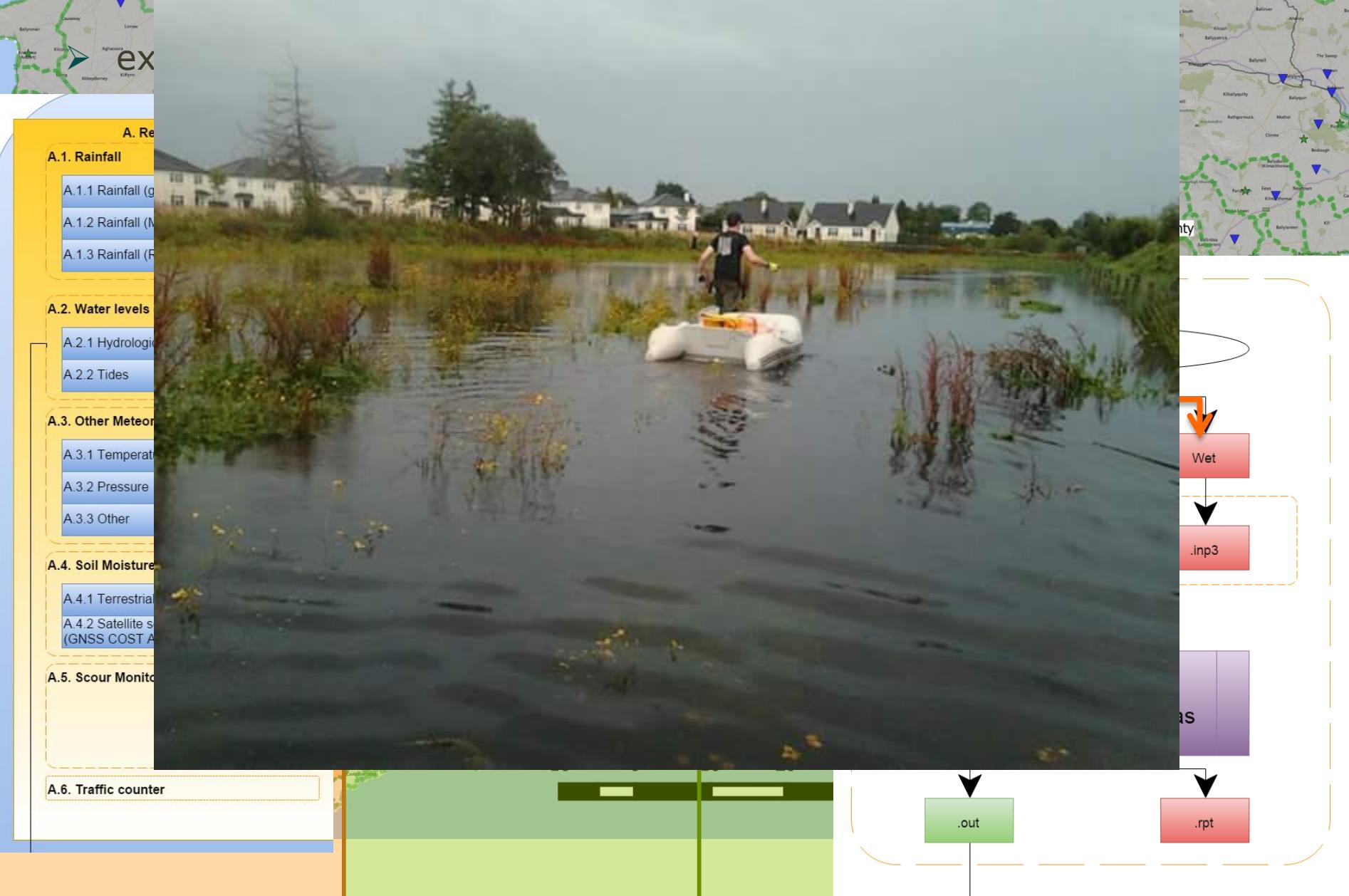
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GNSS for severe weather and new products - MaREI / Bridge SMS





GNSS for severe weather and new products - MaREI / Bridae SMS

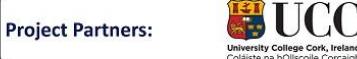


Thank you for your attention!!!

MaREI **bridge^{sms}**
Intelligent Bridge Assessment Maintenance and Management System

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SEVENTH FRAMEWORK
PROGRAMME
MARIE CURIE ACTIONS
EU



Introduction

Government agencies, the public and private sectors and professional engineering sectors across Europe need to come together and proactively meet the challenge of creating a climate resilient infrastructure system [1]. The continual inspection, assessment and maintenance of bridges requires a multidisciplinary approach. Bridge inspection systems must have a knowledge and appreciation of structural engineering, geotechnics, hydraulics, hydrology, materials and transport management. BRIDGE-SMS will couple state-of-the-art scientific knowledge in hydrology, river and structural engineering with industrial knowledge in infrastructure management and web based bridge management systems to develop an open source cloud based intelligent decision support system for the assessment and management bridges structural and hydraulic vulnerability of bridges over water, and also vulnerability for other effects [2,3,4,5]. Overview of existing BMS is shown in [6].



Project Objectives

1. Document the structure history (status, problems, maintenance, construction works)
2. Developing a new methodology and approach which will use innovative ICT technologies, computer models and monitoring equipment.
3. Conceptualisation, creation and optimisation of a decision support system (software)
4. Provide appropriate information for management, decision making, maintenance and mitigation in one place and at any time and any place.

BRIDGE SMS Key goals

BRIDGE SMS is a software application that empowers engineers and key personnel to predict, identify and prepare for potentially destructive flood events. It is robust and efficient tool designed to lower maintenance/planning costs and to provide more secured bridge management/operation. BRIDGE SMS key goals:

1. To develop standardised methods for bridge scour inspection.
2. To develop normative documents for bridge assessment and management.
3. To estimate the risk of and manage the potential effects of flood events.
4. To develop a database framework which is designed for intuitive use, encouraging participation by personnel at all levels within management authorities.
5. To develop a system that
 - Supports, integrates and processes real-time data at regular intervals from weather and hydrologic sources, meters and gauges, and other sensing devices.
 - will rapidly notify based on built-in intelligence and decision-making processes, relevant personnel of possible maintenance and failure issues.
 - will advise in relation to current Scour Risk at bridge structures and prompt an appropriate Plan of Action (POA) which may involve various levels of maintenance and repair.
 - which will prioritize and optimize the operational and maintenance budget spend for infrastructure companies.
6. Maximum use of new Information and Communications Technology (ICT) hardware such as tablets and cloud-based systems for on-site rapid communications, etc.

Future work

Future work is covered in five Work Packages. Technical work research, data collection, development of bridge management system, application design, etc will be part of WP 1 & 5. 3.Tok is part of WP4. Project management and dissemination are part of WP 1 & 5.

WP	Work package title
WP 1	Management
WP 2	Technical Research
WP 3	Development of Bridge Scour Management System
WP 4	Knowledge Transfer and Training
WP 5	Dissemination and Commercialisation

Research Methodology and Approach

- Development of Standardised Methods for Bridge Scour Inspection (WP2)
- Develop normative documents for bridge assessment and management (WP2, WP4)
- Incorporate a system that calculates the risk of and manages the potential effects of hydraulic events
- Develop a database framework which is designed for intuitive use, encouraging participation by personnel at all levels within management authorities (WP3)

- Develop system which rapidly notifies relevant personnel of possible maintenance and failure issues (WP4)
- Set-up operational system for selected pilot study/es. This requires:

Basic data gathering: Compile the data available for the selected bridges, parameters such as identifiers and location co-ordinates, historic reports and photographs, structural data.

Detailed data gathering: Identify all elements associated with each bridge structure and the hydraulic behaviour of the associated waterway. The elements will include bridge structures, waterways, catchments, gauges and radar stations. Hydrological-hydraulic study will calculate threshold values for water flow volumes and heights. This may require detailed hydraulic surveys of bridge sites (Figure 2).

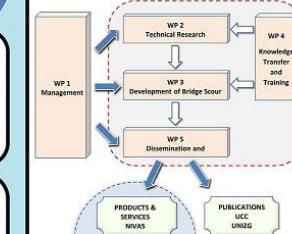


Figure 1. Work package structure

References & Acknowledgment

BRIDGE SMS is a Marie Curie FP7 Project funded under the IAPP call. Grant No. 612517

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- [5] Pakrashi V., Koenig A., and Gheorghe S. (2013). "Optimal Prioritisation of Bridge Rehabilitation Comparing Road User Cost", Transportation Research Board Annual Meeting, 2013.
- [6] Klatter, et al., "The IABMAS bridge management committee overview of existing bridge management systems", 2010.

Supporting institutions:



