2016 Water JPI Exploratory Workshop Report

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Disclaimer

Acknowledgments

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Contents

List of Abbreviations

AB:	Advisory Board
CSA:	Coordination & Support Action
EC:	European Commission
EIP:	European Innovation Partnership
EPA:	Environmental Protection Agency, Ireland
ETP:	European Technology Platform
EU:	European Union
FACCE JPI:	Agriculture, Food Security and Climate Change
FP7:	Seventh Framework Programme
GB:	Governing Board
H2020:	Horizon 2020
InnovFin:	EU Finance for Innovators
ISO:	International Organization for Standardisation
JPI:	Joint Programming Initiative
NGO:	Non-Governmental Organisation
NWRM:	Natural Water Retention Measure
MAR:	Managed Aquifer Recharge
RBMP:	River Basin Management Plan
RDI:	Research, Development and Innovation
RSFF:	Risk-Sharing Finance Facility
RTD:	Research, Technology and Development
SAG:	Stakeholders Advisory Group
SME:	Small and Medium Enterprise
SRIA:	Strategic Research and Innovation Agenda
STB:	Scientific and Technological Board
TAB:	Transdisciplinary Advisory Board
TRL:	Technology Readiness Level
WFD:	Water Framework Directive
WP:	Work Package
WssTP:	Water supply and sanitation Technology Platform

Executive Summary

The Water Joint Programming Initiative (JPI) (www.waterjpi.eu), entitled "Water Challenges for a Changing World", was launched in 2010 and later formally approved by the European Council in December 2011. The Water JPI membership comprises a total of 20 Member States and four observer countries, which collectively represent 88% of European public Research, Development and Innovation (RDI) investment in water resources. The Water JPI is dedicated to tackling the ambitious grand challenge of achieving "sustainable water systems for a sustainable economy in Europe and abroad".

This report contains the proceedings of the first Exploratory Workshop of the Water Joint Programming Initiative (JPI). The Exploratory Workshop took place in Dublin on the 14th November 2016. 62 people, members of the Governing Board, Water JPI partners and national experts, participated in this workshop in person, and by WebEx for four of the participants. This workshop provided the occasion for participants to discuss and identify knowledge gaps and Research Development and Innovation needs, with respect to Theme 5 of the Strategic Research and Innovation Agenda (SRIA) entitled Closing the Water Cycle Gap.

The workshop involved a morning and evening plenary session which included contributions from the European Commission, the Scientific Advisory Board (STB) and the Stakeholders Advisory Group (SAG), and representatives from FACCE, Climate and Water JPIs. The breakout sessions facilitated discussion on Theme 5 from all involved.

The organisation of this Exploratory Workshop represents one of the milestones of the Water JPI activities and it supports the participation of relevant stakeholders and experts in the scoping of the call.

The objectives of the 2016 Exploratory Workshop were to:

⇒ Gather relevant experts in the topic, which will present and discuss their findings to other experts and stakeholders (end-users, policy makers and industry).

⇒ Identify Knowledge Gaps and RDI Needs in that area (Emerging needs / Annual Updates, as required)

⇒ Further elaborate the SRIA RDI Needs

1. Introduction

1. 1. Water Joint Programming Initiative

The Water Joint Programming Initiative (JPI) (www.waterjpi.eu), entitled "Water Challenges for a Changing World", was launched in 2010 and later formally approved by the European Council in December 2011. The Water JPI membership comprises a total of 20 Member States and four observer countries, which collectively represent 88% of European public Research, Development and Innovation (RDI) investment in water resources. The Water JPI is dedicated to tackling the ambitious grand challenge of achieving "sustainable water systems for a sustainable economy in Europe and abroad".

The Water JPI provides an opportunity for broader cross-border cooperation, greater collaboration and a more unified focus on water RDI across Europe. It must be remembered that the European water sector has a wide diversity of stakeholders and is highly fragmented; water resources, water supply and wastewater have often been locally managed.

Among the RDI benefits of the Water JPI, five have a clear European dimension:

- Aligning the national RDI agendas, optimising their scope and the resulting funding efficiency; effectively covering the wide variety of European water environments.
- Increasing cooperation among European professionals.
- Designing, building and sharing large research and development facilities (e.g. experimental treatment plants).
- Creating, maintaining and co-operatively exploiting networks of open-field experiments and scientific observatory systems (e.g. experimental watersheds).
- Multiplying the scientific impact of European research, increasing its relevance and scientific leadership.

The Water JPI will produce science-based knowledge leading to the support of European policies; comprising the identification of problems, their quantification, and the development of feasible technical and managerial solutions. It will coordinate water RDI in the participating countries and provide a powerful tool for international cooperation in the water area.

For more information, please refer to the **Water JPI Key Achievements 2011-2016** document[1].

1. 2. Exploratory Workshops under the EC-funded ERAnet COFUND WaterWorks2014

WaterWorks2014 is an EC-funded ERAnet COFUND, supporting the implementation of the Water JPI. Under WaterWorks2014, three Exploratory Workshops were planned. The Exploratory Workshops are activities contributing to the implementation of the Water JPI during the five-year period of the ERA-NET COFUND. Emerging scientific and technological developments are the target of exploratory workshops. This workshop gathered relevant experts in the topic, where they had an opportunity to present and discuss their findings with other experts and stakeholders (end-users, policy makers and industry). The Exploratory Workshops are critical to the preparation of future research calls of the Water JPI in coordination with H2020. These workshops also allowed for the alignment with future Horizon 2020 Work Programmes to ensure synergies and avoid duplications. Future Water JPI Calls without EC COFUND will be delineated, and linkages with other initiatives (JPIs and International Programmes) will be actively sought to leverage additional funding.

The objectives of the Exploratory Workshops are to:

[1] http://www.waterjpi.eu/images/welcome/WATER_JPI_Key_Achievements%202011-2016.pdf

- Gather relevant experts in specific areas of the Water JPI Strategic Research & Innovation Agenda (SRIA), who will present their findings and discuss them with other experts and stakeholders (end-users, policy makers and industry).
- Identify Knowledge Gaps and RDI Needs in that area (Emerging needs / Flexible Fiches).
- Further elaborate the SRIA RDI Needs.

The outputs from the workshops will be used as a source of information to further focus and identify the RDI needs under the Water JPI SRIA, in preparation of future Water JPI Joint Calls.

1. 3. Aims of this Report

This document contains the Proceedings of the 2016 Water JPI Exploratory Workshop, which took place in Dublin on the 14th November 2016. All presentations, as well as the workshop documentation, are available from the Water JPI website (www.waterjpi.eu/index.php?option=com_content&view=article&id=528&Itemid=1063).

This report is organised as follows:

- **Section 2** provides an overview of the methodology in planning the workshop;
- **Section 3** provides the proceedings of the workshop;
- **Section 4** provides the key conclusions arising from the workshop; and
- **Section 5** provides a summary of the lessons learned.

This report was prepared based on the presentations and notes provided by the Chairs and Rapporteurs, as well as the feedback received from the attendees on the draft version of the document. A follow-up survey was also prepared to gather the feedback from all attendees regarding the organisation of the workshop.

2. Methodology

The 2016 Water JPI Exploratory Workshop was organised by the Environmental Protection Agency (Ireland), with the support of the WaterWorks2014 partners, as well as of the WaterWorks2014 and Water JPI Secretariats.

2. 1. Workshop Theme

The theme of the 2016 Water JPI Workshop was on the Water JPI SRIA Theme 5: Closing the Water Cycle Gap. This theme was selected based on the Water JPI proposed Joint Call on Theme 5, which is scheduled for 2018.

It was intended that the outputs of the workshop would inform the preparation of the WaterWorks2017 ERAnet COFUND proposal (due for submission to the EC Horizon 2020 Call in March 2017), which would result in the 2018 Water JPI cofunded call, if successful. The workshop outputs constitute one of several sources informing the preparation of the proposed call scope.

In many regions of Europe, it may be difficult to reconcile water supply and demand both in terms of quantity and quality. The aim of the RDI actions under this theme is, therefore, to bridge the gap in "supply–demand" by enabling the sustainable management of water resources. Innovative strategies and approaches will be developed where appropriate. Europe is not an arid continent but water scarcity has become a concern for millions of people. In quantitative terms, the availability of water for different uses is threatened by more frequent droughts. However, in many regions leakage in water supply infrastructures, greater demand on freshwater for agriculture and the lack of appropriate water-saving technologies will collectively increase pressure on limited water resources. At the same time, water consumption for public, industry and agricultural use is expected to increase by 16% by 2030. In qualitative terms, water pollution from nutrients, organic matter, heavy metals and other chemical by-products pose a serious threat to water availability. Likewise, water quality and infrastructures are at risk as a result of floods, which are also becoming more frequent.

Research needs to bring together our knowledge in ecology, social sciences, economics, geography, environmental sciences, geosciences and technology. Research is also required to better integrate water policy with other public policies (agricultural, industrial, domestic, urban, regional planning, transport, energy, biodiversity). In a context of rising tensions on water, tools for monitoring, forecasting, information and decisions are needed to anticipate and manage such tensions and avoid conflict. Required water RDI infrastructures include, for example: experimental catchments and field labs, test basis for new integrated hydrological models or for new sensors, remote observation systems, and also the related database and big data processing applications, etc.

Theme 5 (see **Annex 1**) is composed of:

- **Subtheme 5.1.** Enabling Sustainable Management of Water Resources;
- **Subtheme 5.2.** Strengthening Socio-economic Approaches to Water Management

To view the full description of Theme 5, please consult the **Water JPI SRIA 2.0**[2]**.**

[2] http://www.waterjpi.eu/images/documents/SRIA%202.0.pdf

2. 2. Workshop Attendees

The 2016 Water JPI Exploratory Workshop was open to all Water JPI Advisory Boards members, Water JPI Governing Board members, as well to the WaterWorks2014 partners and wider Water JPI community (i.e. organisations participating in EC-funded supporting projects which are not members of the Water JPI). WaterWorks2014 partners in collaboration with the Water JPI Governing Board members nominated national experts to be invited to attend the workshop.

There were four types of attendees:

- Water JPI Community: Water JPI Coordinator, Co-Chair, Secretariat, Water JPI Governing Board, Advisory Boards and WaterWorks2014 partners.
- Invited speakers: invited experts to present their research in a specific area under Theme 5.
- Roundtable panellists: invited panellists representing funding bodies, e.g. EC, other JPIs.
- Nominated national experts: Invited experts to attend the workshop and contribute to discussions.

Annex 2 provides the list of all attendees.

2. 3. Workshop Programme

The workshop included two plenary sessions, as well as three breakout sessions running in parallel. The WaterWorks2014 partners identified the topic of the three breakout sessions, as well as the questions for the Round table panel discussions. The WaterWorks2014 partners in collaboration with the Water JPI Governing Board and Advisory Boards members selected the experts to be invited as part of the breakout sessions. This selection was based on a review of all relevant European Union (EU) projects and initiatives. The Programme and short Biographies from the speakers are available in **Annexes 3 and 4**.

2.3.a. Plenary Session-1

The first plenary session provided a general introduction to the Water JPI objectives and the expected outcomes of the workshop. This introduction was followed by three presentations on the scientific, policy and End – Users / Economic perspectives on the Water JPI SRIA RDI needs within Theme 5. Presentations during the first plenary session were made by:

- Dominique Darmendrail (Agence Nationale de la Recherche, France)
- Alice Wemaere (Environmental Protection Agency, Ireland)
- Jaap Kwadijk (Deltares, The Netherlands)
- Dagmar Behrendt Kaljarikova (European Commission - DG ENV) via Video Link
- Antonio LoPorto (IRSA-CNR - Water Research Institute, Italy & Chair of Water JPI Stakeholder Advisory Group)

2.3.b. Breakout Sessions

The three breakout sessions were targeted to specific RDI needs within Theme 5, namely:

- Enabling Sustainable Management of Water Resources;
- Regional Perspectives; and
- Strengthening Socio-economic Approaches to Water Management.

Each session had one Chair and two Rapporteurs (see **Table 1**).

Table 1: Breakout Sessions and the Chair and Rapporteur assigned to each session.

No.	Breakout Session Name	Chair	Rapporteur
1	**Enabling Sustainable Management of Water Resources**	Kristina Laurell (FORMAS, Sweden)	Miguel Gilarranz (MINECO, Spain) & Alice Wemaere (EPA, Ireland)
2	**Regional Perspectives**	Diego Intrigliolo (CSIC-CEBAS, Spain)	Graham Leeks (NERC, United Kingdom) & Brian Donlon (EPA, Ireland)
3	**Strengthening Socio-economic Approaches to Water Management**	Daniel Hellström (The Swedish Water & Wastewater Association, Sweden)	Prisca Haemers (IenM, The Netherlands) & Áine Murphy (EPA, Ireland)

Two 20-minute presentations of a relevant EU project were presented in each breakout session. These presentations were followed by a group discussion aiming at:

- Identifying the key knowledge gaps in Theme 5,
- Identifying the top three gaps, and
- Completing the provided template for each of the identified top three gaps.

The expected outcomes of these breakout sessions were to get feedback on the three key knowledge gaps; in particular to identify:

- The Challenge and the Scope;
- Top 3 Objectives;
- Top 3 Expected Impacts;
- How the topic would answer End-Users needs;
- Policy Relevance;
- Geographical / Regional Relevance;
- How the topic would facilitate Knowledge Transfer?
- Type of Instrument used (Research project, Research & Innovation project, Coordination project, etc.);
- Type of Technology Readiness Levels (TRL) targeted (basic / applied / innovation).

The number of attendees per session was as follows; **28** in Session-1, **12** in Session-2 and **17** in Session-3.

2.3.c. Plenary Session-2

The beginning of plenary session-2 involved the rapporteurs of the breakout sessions each given five minutes to provide an overview of the discussions from their respective sessions and the resulting three knowledge gaps identified. This was followed by an active group discussion.

The aim of the following Roundtable discussion was to discuss how best to implement the Water JPI identified RDI needs in the area of Theme 5 Closing the Water Cycle Gap – Sustainable Water Management. This involved panellists representing:

- European Commission, DG Research & Belmont Forum: Panos Balabanis
- Water JPI: Dominique Darmendrail (ANR, FR)
- FACCE JPI: Richard Howell (DAFM, IE)
- Climate JPI: Torill Engen Skaugen (RCN, Norway)

Each panellist presented their perspective on the following key questions:

- Q1: How can you make calls more attractive to industry and bringing the research outputs to market?
- Q2: (a) What have previous collaborative research options found to be advantageous and what are the pitfalls of these collaborative actions?
  (b) Based on their past experience, what are the criteria in making a decision on whether your initiative would/could collaborate with the Water JPI (joint calls / activities)?
- Q3: How can you focus to avoid overlaps with other funding instruments?

Discussion and questions for the panellists were then welcomed from the audience.

2.3.d. Workshop Materials

A document compiling the short biographies of the speakers, template to be completed during the breakout sessions, as well as links to the Water JPI SRIA and the 2016 Introduction to the Water JPI SRIA 2.0 were circulated to all attendees in advance of the workshop. Speakers were provided with template slides to be used to prepare their presentations, while panellists were provided with the list of questions.

Along with the key knowledge gap template, each breakout session was provided with an excerpt of Theme 5 of the SRIA version 2.0, and copies of the 2016 Introduction to the SRIA version 2.0 document. Participants were asked to consider these documents (time permitting) during their discussion.

All presentations were made available on the Water JPI website via a dedicated webpage available from: http://www.waterjpi.eu/index.php?option=com_content&view=article&id=528&Itemid=1063

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2016 Water JPI Exploratory Workshop (14/11/2016 - Dublin)

Last Updated on Friday, 18 November 2016 10:04

The Water JPI held its first Exploratory Workshop on the 14th November 2016 in Dublin. The workshop was focussed on the Water JPI Strategic & Research innovation Agenda Theme 5 - ***Closing the Water Cycle Gap - Improving sustainable water resource management.*** There were 62 attendees during the event.

The objectives of the 2016 Exploratory Workshop were to:

- Gather relevant experts in the topic, which will present and discuss their findings to other experts and stakeholders (end-users, policy makers and industry)
- Identify Knowledge Gaps and RDI Needs in that area (Emerging needs / Flexible Fiches)
- Further elaborate the SRIA RDI Needs

View the 2016 Water JPI Exploratory Workshop Programme & Book of Biographies
View the Photo Gallery of our event
The Workshop Proceedings will be made available from this page once finalised.
The programme & presentations are available below.

Programme

9.30am: Welcome
Matt Crowe (Environmental Protection Agency (EPA))

Plenary Session 1 (view master presentation)
Chaired by: Brian Donlon (EPA, Ireland)

9.40am: General Introduction on the Water JPI & Strategic Research & Innovation Agenda
Dominique Darmendrail (Agence Nationale de la Recherche (ANR), France)

9.55am: Funding Instruments from the JPI
Alice Wemaere (EPA, Ireland)

10am: Water JPI Scientific & Technological Board - Scientific Perspective on the Water JPI SRIA RDI needs within Theme 5
Jaap Kwadijk (Deltares, The Netherlands)

10.20am: Policy Perspective on the Water JPI SRIA RDI needs within Theme 5
Dagmar Behrendt Kaljarikova (European Commission - DG ENV) **via Video Link**

10.40am: Water JPI Stakeholders Advisory Group End-Users/Economic Perspective on the Water JPI SRIA RDI needs within Theme 5
Antonio Lo Porto (IRSA-CNR - Water Research Institute, Italy)

11am: Questions & Answers

Breakout Session-1: Enabling Sustainable Management of Water Resources (view master presentation)
Chaired by: Kristina Laurell (FORMAS, Sweden)
Rapporteurs: Miguel Gilarranz (MINECO, Spain) & Alice Wemaere (EPA, Ireland)

11.45am: NETLAKE COST Action: Networking Lake Observatories in Europe
Eleanor Jennings (Dundalk Institute of Technology, Ireland)

12.05pm: Terrestrial Environmental Observatories (TERENO)

3. Workshop Proceedings

3.1. Plenary Session 1

The Exploratory Workshop was opened by ***Matt Crowe*** of the Irish Environmental Protection Agency (Irish representative on the Water JPI Governing Board). The first plenary session was chaired by Brian Donlon (EPA, Ireland).

The Water JPI Coordinator, ***Dominique Darmendrail***, provided a general introduction on the Water JPI and its SRIA. She highlighted, in particular that:

- The Water JPI aims to address economy, technical and societal water issues. This was highlighted as an ambitious challenge.
- The Water JPI members must align and work together to enable the research to have a much larger impact especially to increase the up-take of the research results.
- The focus of the day was on Theme 5 of the SRIA, and the output of this workshop would be informing the proposed call scope to be included in the Water JPI proposal in response to the EC Horizon 2020 ERAnet COFUND topic in March 2017.

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/MainPresentation_Web.pdf

Alice Wemaere, Water JPI partner, explained:

- The aims and objectives of the Exploratory Workshop.
- The breakout sessions, which were tasked with identifying knowledge gaps within each subtheme, identifying the three key gaps and completing the template provided.

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/MainPresentation_Web.pdf

Jaap Kwadijk, member of the Water JPI Scientific and Technological Advisory Board, presented the scientific perspective on the Water JPI SRIA needs within Theme 5. In particular, he highlighted:

- The stark contrasts between European countries in relation to water including issues such as droughts, floods etc.
- How the Water JPI promised and achieved results by identifying issues in the vision document, conducted calls and funded research in areas identified as knowledge gaps in the SRIA.
- **The areas not addressed and which require further thought, include connecting people and the economic view on water, measuring indicators for success, and cooperating by sharing laboratory facilities.**
- It may not always be a huge technological advance that is required instead it could be a simple tool with a big influence, but the Water JPI must recognise these opportunities as relevant also.
- Theme 5 “Closing the Water Cycle Gap” will aim to make the case for bridging the gap between supply and demand by enabling sustainable management of water resources.
- It will also aim to highlight the need for legislative measures, commitment from different parties and the production of understandable and meaningful results. Joint fact finding will lead to better commitment from water researchers. A larger involvement from Water JPI member countries will lead to the creation of great ideas and due to this, smaller countries may be encouraged by the progress and will join the Water JPI.
- The Water JPI is useful for dealing with joint problems of member countries and where the need for large scale cooperation is necessary. However, the design of the Water JPI may not allow for fast response/adaptation to respond to fast developments to tackle some water challenges.

Link to the presentation:

www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Jaap_Kwadijk.pdf

Dagmar Behrendt Kaljarikova, EC DG Environment, presented the policy perspective on the Water JPI SRIA needs within Theme 5, in particular:

- European Union Water Policy includes a number of policies that ultimately aimed to achieve Good water status by 2015. Shortfalls in the River Basin Management Plans (RBMP) were raised as an issue including choosing measures that were not ambitious enough and the fact that less than a 10% improvement in water body status was realised.
- Future developments will include the evaluation and review of water legislation from 2017 – 2019 including a public consultation on the Drinking Water Directive in 2017, and the introduction of a Major Implementation Support initiative. One of the next steps will be the preparation for the review involving country specific assessments to be issued for implementation shortly.
- The EC will be identifying gaps in regulations including enforcements and infringements.
- The preparation for the implementation support initiative will involve reviewing water reuse standards among other topics to be considered in the general overview of EU water policies.
- **A number of policy gaps under Theme 5 of the Water JPI SRIA were highlighted to be of importance to the EC:**
    - **Under Sub-theme 5.1 Enabling Sustainable Management of Water Resources, this included:**
        - **Integrating models of the entire water cycle to take into account water demand and predict the impact of climate change;**
        - **Implementing managed aquifer recharge (MAR) and natural water retention measures (NWRMs), and**
        - **Developing water reuse technologies and progressing the legal proposal on water reuse.**
    - **Under Sub-theme 5.2 Strengthening Socio-economic Approaches to Water Management, the gaps included:**
        - **Improving baseline economic information and communication tools and methodologies for local decision-makers, understanding the effectiveness of current economic instruments to promote sustainable water management and a circular and green economy;**
        - **Developing incentives for efficient water use, developing methodologies for valuation of and payment for ecosystem services; and**
        - **Improving baseline technology for water decision makers.**

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Dagmar_BEHRENDT_KALJARIKOVA.pdf

Antonio Lo Porto, member of the Water JPI Stakeholders Advisory Group, presented the End Users / Economic perspective on the Water JPI SRIA needs within Theme 5, including in particular:

- The Sustainable Water Resources Management European Union Council Conclusions 17th October 2016 are very applicable to the Water JPI. There are difficulties and obstacles in implementing the Water Framework Directive (WFD) including knowledge of how to go from “a good chemical status” to a “good ecological status”, having enforcement and monitoring of the measures**. A study on how to better link the WFD and other water directives all together would be useful**.
- **In order to deal with Water Management, ageing water infrastructure must be replaced or upgraded, sensor technologies must be used and water pricing is essential. Technology needs to be useful to individuals as well as on a broader scale.**
- **Various measures to enhance water quality and to adapt and mitigate for extreme hydrological events.**

- **The use of new technology to improve irrigation practice and further develop soil management practices to increase irrigation efficiency should be investigated.**

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Antonio_Lo Porto.pdf

3.2. Breakout Sessions

3.2.a. Session-1: Enabling Sustainable Management of Water Resources

This section is based on the presentations and notes provided by the Chair: Kristina Laurell (FORMAS, Sweden) and Rapporteurs: Miguel Gilarranz (MINECO, Spain) & Alice Wemaere (EPA, Ireland).

i. Presentations from EU relevant projects

Eleanor Jennings presented on the EU–project NETLAKE COST Action, explaining how the NETLAKE research involves applied research of high frequency monitoring to relate data with phenomena such as algal blooms, and address current and future water quality issues. The outcomes of the project will include generating a meta-database and methodologies (toolbox, guidelines for monitoring), involving citizens in collecting data useful for scientists and undertaking a critical review of the technology and the added value it can provide. Scientists have to work together through inter-discipline research projects and also work together with stakeholders by trans-discipline research. Clear synergies were identified with the Water JPI Theme 5.
In particular the identified gaps were:

- **The need to apply data, not only to use it for research, the added value of data for management and the need for standardisation of data across the research area is required if the value of data is to be maximised.**
- **The importance of involving citizens in water management.**
- **The need for applied research on High Frequency Monitoring.**

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Eleanor_Jennings.pdf

Steffen Zacharias presented on the German Project Terrestrial Environmental Observatories (TERENO) which is an initiative pursuing long-term observation to understand climate changes and impact in environment and different terrestrial processes. The need for integration (inter-discipline research in hydrology, ecology, etc.) was highlighted. The initiative is largely based on physical infrastructures (data collection, supercomputing for modeling, etc.) and methodologies that are applied in different sites. Certain sites have been defined as “intensive sites” for data catching and monitoring. In some of them there is interaction with the administration responsible for the management of resources. The speaker highlighted that the integration of research infrastructures and new strategies for their use is important at EU level to monitor certain processes. As an example, some extreme events are not well monitored because they can take place in places where there is no infrastructure and the infrastructure cannot be displaced fast enough. Water is the only commodity lacking centralised infrastructure at European scale.
In particular the identified gaps were:

- **To develop better connections and integration between different disciplines, (e.g. data collection, modeling, data bases, etc.) not only for water RDI, but also in other fields.**
- **To develop clusters of researchers (e.g. European Strategy Forum on Research Infrastructures project) to enable better collaboration and also facilitate the creation of a large network of different “data” collection sites.**
- **The creation of activities to enable the harmonisation and standardisation of hydrological monitoring.**
- **The requirement for the establishment of hydrological observatories in the Mediterranean (Spain, Italy, Greece, Israel).**

Link to the presentation:
http://www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Steffen_Zacharias.pdf

ii. Group Discussion: Identifying key knowledge gaps

Several issues were brought up during the group discussion:

- There is a lack of integrated monitoring of ground and surface water. More effort is needed for the integration and the involvement of multidisciplinary teams. The first challenge is to gather scientists and make them collaborate.
- Excess data and lack of adequate modelling is also an issue. The data collection and modelling should be driven by the purpose of the model, in this way the integration of different disciplines can be easier too. The Danubius and the Advance_eLTER initiatives are trying to face this kind of approach.
- The link to industry and society is important. Actions should turn into possibilities for society, which can make it easier to understand what can be done. Social science researchers can help with this.
- Integration of long-term observation and measures for adaptation is a challenge. In TERENO there are also different experimental approaches to observe the change in activities due to climate change, biodiversity, etc. The funding has been for hardware, however, more funding will be required to guarantee that experimental approach.

The group was divided into three sub-groups each with a different topic to discuss the research needs in the areas, as identified below:

Sub-Group A:

1. **How policy can tackle enforcement in the water arena.**
2. **Source allocation of pollutants, also designated as forensic enviro-science.**
3. **Experimental sites with societal aspects, to give both information and increase acceptability.**
4. **How to put a value on water? To continue business as usual is not an option.**
5. **Innovation in terms of industry's damage to water.**
6. **Addressing the fragmented picture (integration of disciplines).**
7. **Linking infrastructure to research, society and policy.**

Sub-Group B:

1. **Integrated monitoring of the whole water cycle.**
2. **Identifying public understanding to target research and education.**
3. **Large scale managed aquifer recharge.**
4. **Quality aspects for reuse and integration in water resources management.**

Sub-Group C:

1. **Big data.**
2. **Stakeholders' participation.**
3. **Process of connecting science to society.**
4. **Societal impact: "so what?" Do people understand the impact?**
5. **Interdisciplinary gaps in process and theory.**
6. **Natural capital and ecosystem services: provide a common language that enhances participation (related to the question "so what?").**

Following the presentation from each sub-group, the following discussion points were made:

- **Stakeholder involvement crucial for reaching impact of research results.**
- **Integration: Connection between scientists and citizens important to understand why the development of knowledge is needed.**
- **Common language: To reach citizens it would be valuable to create a common language, understood by all. One perspective that was suggested is to focus on the natural environment and**

its ecosystem, thus it is seen and experienced by everybody. The importance of the ecosystem services will be easily understood and could be discussed by scientists and citizens together.

- **Holistic perspective on water: A focus on the whole water cycle with different perspectives and a public understanding is needed for creating more knowledge.**

iii. Prioritisation of the research needs

The group discussed the 17 research needs identified separately by the three sub-groups. There was agreement that some of the needs listed in different sub-groups were similar or the same. As a general comment, the whole group agreed that **there is a need to address the research needs with more holistic approaches, integrating different disciplines, and not limited to small or local scale, but also try to demonstrate at large scale. Demonstration to society is important.**

The following three research needs were prioritised:

Key Research Need 1-1.	**Connecting science to society.** In two directions: on the one hand understanding social perception of water challenges and the value of water, on the other hand using show cases and experimental sites where the society can see what science and technology can provide. In any case a link to specific water challenges should be clearly made when addressing this research need.
Key Research Need 1-2.	**Integrated management and monitoring of the whole water cycle including water reuse and managed aquifer recharge**. The approach must consider groundwater, surface water, unsaturated zone, soil and sediments. Although integrated models are pursued, downscaling must be also possible to address local or regional cases.
Key Research Need 1-3.	**Extracting value for water integrated water resource management and for climate change adaptation from big data integrated infrastructure.** The approach should take advantage of existing information and communication technologies to better integrate data from different sources particularly for: i) up-scaling local data to the entire catchment level and ii) when combining determinations from different spatial and temporal resolution scales.

The completed templates for the top three research needs listed above are included in **Annex 5**.

3.2.b. Session-2: Regional Perspectives

This section is based on the presentations and notes provided by the Chair: Diego Intrigliolo (CSIC-CEBAS, Spain) and Rapporteurs: Graham Leeks (NERC, United Kingdom) & Brian Donlon (EPA, Ireland).

i. Presentations from EU relevant projects

Annemarie Van Wezel presented on the EU-project SOLUTIONS which was mainly related to the detection and analysis of emergent pollutants in water bodies and highlighted the need to consider water quality issues in surface water body analysis. Prioritisation of mitigation options, throughout the chemical's life cycle, in various sectors and at various sites in the water system, might trigger effective and innovative approaches. Solution-focused assessments connect the perspectives of the water cycle and the chemical life cycle, and can be supported by a mitigation database. Studies on mitigation allow a common perspective, coherent implementation of cost-effective mitigation options, and stimulate cross-sectoral learning.
Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Annemarie_van_Wezel.pdf

Ap Van Dongeren presented on the EU-project Resilience Increasing Strategies for Coasts – toolKIT (RISC-KIT) and elaborated on the need to closely study sea-inland water interactions with particular emphasis on the water salinity gradients. The project was based on the disaster management cycle with respect to coastal flood risk, where the cycle was split between response and recovery stages of which there were 5: Storm

Impact Database, Coastal Risk Assessment Framework, Web-based Management Guide, Hotspot tool and Multi-criteria Analysis Guide.
The key gap identified was:

- **Integrating process-based modelling from hazards to impacts: from marine and fluvial flooding to effects on groundwater, aquifers and water supply.**

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Ap_van_Dongeren.pdf

ii. Group Discussion: Identifying key knowledge gaps

The discussion was focused on attempting to prioritise three main research gaps, some remarks about these three research priorities are listed below:

- **Linking inland waters to coastal management: water quantity and quality -** This was devoted to defining how water uses and runoff water affects the coastal zones including inland and sea water bodies. The effects of runoff water on the quality of the receiving water bodies downstream must be studied. Water flows and efficient mitigation measures against contamination should be investigated.
- **Improved monitoring and modelling across salinity gradients under extreme hydrological events –** There was agreement that salinity aspects of the in-land and sea-water body interactions need to be studied better and in more detail. This topic is of relevance for both humid and dry water catchments where sea water intrusion is a factor affecting in-land water quality and its possible use by different users.
- **Assessing and mitigating the impacts of multiple anthropogenic stresses on water system services to society, economy and environment -** This highlighted the need to address multiple stress interactions related to soil-water use and management. This topic is also focused on investigating possible solutions to mitigate the impact of multiple stressors from different water users on soil-water quality**.**

iii. Prioritisation of the research needs

The following three research needs were prioritised:

Key Research Need 2-1.	**Linking inland waters to coastal management: water quantity and quality.**
Key Research Need 2-2.	**Improved monitoring and modelling across salinity gradients under extreme hydrological events.**
Key Research Need 2-3.	**Assessing and mitigating the impacts of multiple anthropogenic stressors on water system services to society, economy and environment.**

The completed templates for the top three research needs listed above are included in **Annex 6**.

3.2.c. Session-3: Strengthening Socio-economic Approaches to Water Management

This section is based on the presentations and notes provided by the Chair: Daniel Hellström (The Swedish Water & Wastewater Association, Sweden) and Rapporteurs: Prisca Haemers (IenM, The Netherlands) & Áine Murphy (EPA, Ireland).

i. Presentations from EU relevant projects

Terje Tvedt presented on the history of water-society relations, beginning with the rhetorical question; how do you get people to cooperate? Water is the same in nature as it is in society. **There is a need to bridge the gap between social scientists and natural scientists. The research programme should be concerned with conceptual issues, the actual hydrological and hydro-social water cycle and how to understand the relationships between water and society.**

Carlos Dionisio Pérez-Blanco presented on the EU-projects Evaluating Economic Policy Instruments for Sustainable Water Management in Europe (EPI-WATER) and Enhancing risk management partnerships for catastrophic natural disasters in Europe (ENHANCE). EPI-WATER's aims were to assess the effectiveness and the efficiency of Economic Policy Instruments in achieving water policy goals. ENHANCE aims to describe and test through case studies which concepts of economic instruments, including insurance and risk management policies, work for multi-stakeholder partnerships. The notion of having an effective solution to the relationship between water charges and water is unlikely to work as many policies are not applicable to all countries. Transaction costs (private but perhaps more important institutional transaction costs) are integral to the success of water charges implementation and therefore must be considered in parallel. Understanding the failure or success of many economic instruments needs careful and sound assessment of the transaction cost barrier. Participation (private incentives) and incentive compatibility (benefits to the general public) are a prerequisite for the development of successful economic instruments. Adaptability and flexibility is essential and Public Private Partnerships play a critical role in making economic instruments viable. In particular the identified gaps were:

- **Broader use of economic instruments is still necessary to complement conventional supply and regulatory policies.**
- **Investigating the Institutional setup – the peril of transaction costs**
- **Creating interdisciplinary knowledge that includes socio-economic impacts is necessary to identify a successful policy mix**

Link to the presentation:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Dionisio_Prez-Blanco.pdf

ii. Group Discussion: Identifying key knowledge gaps

Several issues were brought up during the discussions, including:

- All practitioners must believe in cooperation between each other. Define the optimal arenas for working. Do not disregard the natural sciences when talking about society.
- Leadership on how to proceed with water challenges is required. A code of conduct of how to run and manage water can be of help for this purpose.
- Should water have a monetary value? The water market is difficult to judge. The benefit of a fixed charge is debatable; the more preferable option would be to charge according to use by monitoring water usage using meters. Charging by water use may not work in an area where water is already scarce due to inelastic responses, or in places that are re-using water. Should there be a charge on the effect caused by removing water from water bodies in drought areas (incremental charge)? A mix of policy to deal with these water charging deviations in different countries is required. Desalination is still an option, but will not work without complementary economic instruments such as charges and subsidies (e.g. urban-rural cross subsidisation).
- Privatisation[3] will work differently depending on the situation in each country e.g. in Norway privatisation works however the same privatisation in Egypt would not be the recommended option for water management.

The sub-theme 5.2.1 was highlighted as very important specifically to develop incentives for efficient water use. The institutional transition from policy design to implementation to enforcement includes: i) institutional transition costs to describe, design and implement new arrangements aimed at reorganisation; and ii) static transaction costs to administer, monitor and enforce the new arrangements; where iii) our choices in both cases are constrained by prior institutional or technological lock-in costs. Engineering approaches may arguably comprise higher production (e.g. capital, operation and maintenance, abatement etc.) rather than transaction costs. But an increasing reliance on economic instruments requires significant

Additional comments received during the report review:

[3] *Privatisation of public services will only be successful where strict regulations are in place and also strict penalties where service level agreements are not required.*

transaction costs associated with policy, program and project development or management. Water pricing is the major economic instrument currently enforced in the EU but more is required, including better charges that take us to higher levels of cost recovery. There is a communication gap between the willingness to pay and research results in this area, is sustainability what the public want?).

How can investment be raised from private companies and pension funds when water is not considered an attractive investment? Investors cannot see the potential for profit creation from water. Research should be marketed attractively for industry by having a large-scale project which includes private companies' support in the consortium.

There are different forms of stakeholder involvement, all of which should be exploited. Citizens must be allowed to take part in the monitoring process and therefore give information back in a two-way conversation. Citizen monitoring is applicable if the information is adsorbed and it is seen in a socio-economic sense. Social reports must be monitored. The risk of using citizens to conduct monitoring and taking decisions from a society that does not have an education / knowledge of the area may create issues. Citizens should be educated on the topic before being trusted to do monitoring.

A major research gap identified was research on people and the economy[4] with respect to water, specifically highlighting that research is lacking in impactful socio-economic research. Integrated economic, social and environmental issues can arise in conflict situations such as the Danube Dam. The social and environmental aspects must be revisited, rather than making decisions purely from an economic point of view. For hydrology, the water body budget must be considered. If there is competition the price of water will be high. Should there be a social budget? It is easy to determine how much water is going in and how much is going out, but water scientists must interact with social scientists to understand the impact of different water practices. There should be a socio-economic assessment of extended cost effectiveness (i.e. including ancillary benefits/costs) with respect to water technologies and economic instruments. The cycles of time and cost, the sector (e.g. Agriculture tourism etc.) and the state (trans-boundary, different countries involved) must be considered. Hydro-economic models should include the social element. There should be a movement towards a circular economy, unless disproportionate costs arise.

It was suggested improvements must include;

- **The way science is provided to stakeholders (e.g. learning from initiatives such as Climate KIC)**
- **Developing concrete actions in large projects – play with the decisions and advance them**
- **Looking at the possibility of involving the population in technical decisions – underlining the need for high efficiency of involvement.**

The Chair and Rapporteurs compiled a list of 10 potential knowledge gaps based on the information discussed:

1. **Full transaction cost for different institutions: the cost of going from one system to another.**
2. **Willingness to Pay: Water Market, human rights, what is important in willingness to pay i.e. sustainability example; who is going to pay and who is benefiting from this**
3. **Stakeholder and Society Involvement: the need for reliable information**
4. **Hydrological and socio-economic cycle (how people use water)**
5. **Research on policy and legal aspects for water**
6. **Monitoring and anticipating social behaviour and response**
7. **Package deal: Research into the socio-economic effects of new technologies to incentivise investment**
8. **Water as an area of conflict and highlights the need for a river basin approach**
9. **Water importance for jobs and economic growth**
10. **Better information and communication of water issues to society**

Additional comments received during the report review:

[4] *New means of assessing the complexity of these systems are required in order to understand how socio-economic research can be impactful.*

iii. Prioritisation of the research needs

A vote was taken, with each person having three votes, to identify the three priority knowledge gaps, listed below:

Key Research Need 3-1. **Hydrological and socio-economic cycle (how people use the water)**

Key Research Need 3-2. **Research on policy and legal aspects for water**

Key Research Need 3-3. **Monitoring and anticipating social behaviour and response**

The completed templates for the top three research needs listed above are included in **Annex 7**.

3.3. Plenary Session-2

The second plenary session included two parts: feedback from the breakout sessions and group discussion, and a roundtable discussion. This session was chaired by the Water JPI co-chair: Padraic Larkin (Ireland).

3.3.a. Feedback from the Breakout Sessions

Feedback on each of the three breakout sessions were provided by the Rapporteurs:

- Session-1: Miguel Gilarranz (MINECO, Spain)
- Session-2: Graham Leeks (NERC, United Kingdom)
- Session-3: Prisca Haemers (IenM, The Netherlands).

The summaries were followed by a group discussion. Some of the points discussed included:

- In regard to science, society and big data, on what specific water topic should this be applied to? Science and society must be linked together, bringing the scientists to the society in a learning environment.
- In relation to breakout session-1's big data topic, the aim was to link data to a specific impact. An example used was how to affect behavioural change – this is an issue companies are concerned about - and it is important to understand why researchers are failing to achieve this. Big data can be assessed and analysed to create hydrological models, however, it is as important to learn from the data that already exists and improve the quality of this data.
- Non-Governmental Organisations (NGOs)[5] should be more involved in the process from a lobbying perspective to ensure their views are considered in the creation of legislation and policy.
- Transboundary agreements with respect to water are required. Freshwater and groundwater scientists must start talking to each other. It is extremely important to work with the social scientists to show how water functions in the environment and how this is reflected in society. Monitoring and anticipating social behaviour by educating society and following up on society's experience is required, thereby creating a full circle.
- The scope of the upcoming 2018 Water JPI Joint Call on Theme 5 will depend on the following;
    - Size of pot (funding committed by funders);
    - Opinion of the Water JPI's funders.
- It was noted that the next 2017 Water JPI Joint Call, developed within IC4Water CSA, will be on the United Nations (UN) Sustainable Development Goals and multiple pressures. In previous Water JPI calls, the science and society topic has yielded very few proposals. It must be mandatory to have all stakeholders included in certain projects, including policy makers, end-users, industry etc.
- In relation to high TRLs[6]:
    - There can be too few technologies available to deal with a particular issue; in this case research into new technologies must be facilitated.
    - There can be the right technology available but the correct solution in how to apply it may be lacking and therefore requires research into the application of these technologies, e.g. the idea that desalination is too costly, and also the knowledge that water reuse is more cost efficient but is not implemented due to the lack of societal acceptance.

3.3.b. Panel Discussion

This section is based on the notes provided by the panellists.

i. How can you make calls more attractive to industry and bring the research output to market?

JPI Climate

- The industry needs to understand what is in it for them. Representatives from the industry sector should be able to take initiative to develop calls and give advice on our interaction with

Additional comments received during the report review:

[5] *NGOs should be able to participate in research projects.*

[6] *More research in terms of environmental forensics like pollutant source allocation would be beneficial.*

the commission. They must understand that they have a say in the research proposals to the calls. They should take part in developing the objectives of the proposals. We need not only to communicate our funding opportunities to the research communities, but also to the industry sector. And we should find ways to operate so that the researchers and private sector are forced to collaborate. It might help to make an effort to describe in a separate paragraph in the call text why this proposal is relevant for the industry. This paragraph should be written in collaboration with representatives from the industry.

- Communication and outreach is therefore important and it is challenging. We haven't solved this yet, even though JPI Climate is on Instagram, on Twitter, and we have our own webpage. JPI Climate has over the years arranged workshops, or brokerage events, where representatives from social sciences, natural sciences and the stakeholders and industry meet. They are very good events and the participants enjoy them. We also did this before the large ERA-NET Cofund call for climate services that is now approaching the deadline for the second stage. However, there are challenges regarding the language barrier. It takes time for the different communities to understand each other. And these brokerage events only reached out to those that actually took part in the events.
- In the ERA4CS[7], it is mandatory for the proposals, at least for some topics, to obtain co-production between social scientists, natural scientists as well as the users. The users may come from the public sector but also from the private sector. So here we make an effort to bring the users in.
- JPI Climate has adopted their second SRIA. In this we have a new strategic mechanism which we think will lead to transdisciplinary approaches in which the private sector will play a stronger role. The aim is to have a Strategic Mechanism that will help JPI Climate to establish long term partnerships in knowledge creation together with relevant partners and stakeholders. The mechanism is called the SRIA Scoping Forum and will be organised every second year as a major exchange forum for researchers and stakeholders involved in all kinds of climate change knowledge. The Scoping Forum is the innovative component to implement the SRIA. The mechanism will be put in place to drive JPI Climate activities towards impact in tackling the societal challenge of climate change via enhancing connections and fostering inter- and trans-disciplines.
- In JPI Climate we also have the Transdisciplinary Advisory Board (TAB). The TAB gives advice to the Governing Board. They are composed of approximately 20 people with half of them coming from the business sector. They give advice especially on behalf of the private sector, on the matters that comes up.
- The timing issue is crucial for the private sector. Developing the ERA-NET Cofund as an instrument really requires very long processes, starting a long time before the call opens. These processes might be too long for the private sector.
- In the Research Council of Norway we have an opportunity for the business sector called business PhDs. The business company applies for a PhD for one of their employees that fulfil the requirements to be a PhD-student. The Research Council funds 50% of the grants; the company funds the other 50%. This is successful because the companies then must look ahead, to understand what their needs will be in 4 years. We now have the same possibility for public sector.

DG Research

In the context of past and on-going European Commission (EC) Research, Technology and Development (RTD) Framework Programmes several actions have been made at programme level:

- Dedicated industry-led stakeholder fora, the European Technology Platforms (ETPs), were created as key actors in driving innovation, knowledge transfer and European competitiveness. More particularly ETPs have developed industry-focused strategic research and innovation agendas including technology roadmaps and implementation plans that were considered in the

[7] www.jpi-climate.eu/ERA4CS

preparation of the various Seventh Framework Programme (FP7) and Horizon 2020 Work Programmes. They also encouraged industry participation in FP7 and Horizon 2020 and fostered networking opportunities with various partners along the value chain to address cross-sectoral challenges and promote the move towards more open models of innovation.

- In addition to the ETPs, high profile public-private partnerships are also promoted in key sectors of Europe's economy, such as, green cars, energy efficient buildings, cleaner manufacturing processes, sustainable process industries, photonics, robotics and high performance computing (HPC), to attract more industry involvement and funding, make Europe a more attractive location for international companies to invest and innovate and help to get innovative technologies faster to the market.
- In Horizon 2020, dedicated funding instruments, the so called 'innovation actions' have been introduced. These actions include 'demonstration or pilot' and 'market replication' projects. The first one are aiming to validate the technical and economic viability of a new or improved technology, product, process, service or solution in an operational (or near to operational) environment, while the latter are aiming to support the first application / deployment in the market of an innovation that has already been demonstrated but not yet applied / deployed in the market due to market failures/barriers to uptake, where introduced.
- A new generation of EU financial instruments (Risk-Sharing Finance Facility (RSFF) in FP7 and InnovFin in Horizon 2020) were designed to help innovative companies to access finances more easily (in cooperation with the European Investment Bank), as, well as dedicated instruments for Small Medium Enterprises (SME instrument and Fast Track to Innovation).
- Experts with industrial expertise were included in the evaluation process more systematically.

In addition, several actions at the project levels have been considered:

- The participation of industry, including SMEs west explicitly indicated in the description of the relevant topics, indicating also several times a specific percentage of the estimated EU contribution to be devoted to industrial partners.
- Impacts on industry have been explicitly included in the impact session of the various topics.
- Industrial partners were encouraged to take a lead role in exploitation and dissemination work packages of projects.
- Technology Readiness Levels (TRLs), as an indication of the degree of technical maturity, have been also introduced in the topic description of topics with relevance to industry.

FACCE-JPI

- FACCE-JPI is a public to public partnership that funds research related to agriculture, food security and climate change. Currently 22 countries are members of FACCE-JPI and they are represented by Ministries, research councils, funding agencies and research performing organisations. All FACCE-JPI calls are on a voluntary basis with variable geometry, meaning countries participate if the call theme is of interest to them and they do so using national rules. In some cases, national rules permit private entities to be financed but this is not always the case.
- Perhaps unlike JPIs operating in other sectors, "industry" in our case mainly comprises a big collection of individual farmers who can be hard to reach. Input from industry, therefore, comes primarily through the FACCE-JPI Stakeholder Advisory Board in which a number of European Technology Platforms are represented as well as "FoodDrinkEurope".
- FACCE-JPI has not had any calls targeting industry and does not foresee any in the near future, however we now have a communication and valorisation strategy which aims to get results from FACCE-funded projects to the end users and stakeholders. We also make extensive use of workshops, newsletters, brokerage events, etc. to convey the results of FACCE research to a broad range of stakeholders including industry.

Water JPI

The European Water economic sector composed of private and public enterprises is a world leader in water. The economic sector comprises enterprises from start-ups, Small Medium Enterprises to

worldwide companies. Working with this sector and providing effective innovative solutions are part of the main objectives of the Water JPI. To cope with their needs, the Water JPI is acting at different levels:

- The programme level, by developing a strategy for different targeted sectors within the economic sector (e.g. water utilities, waste water treatment operators, monitoring sensor developers, etc.) in order to define a long term partnership for co-producing solutions meeting their daily life needs.
- The project level, by supporting their involvement at the early stage in research, development and innovation projects. Their contribution as partners in RDI projects is highly regarded, especially for those leading mature technologies ready to be taken up by the market. The JPI also promotes the participation of the stakeholder advisory group (SAG) members from the economic sector in the evaluation and monitoring process for better match-making to stakeholders needs. Its contribution to the knowledge hub development will also strengthen the connection with the JPI activities.
- The funding instrument level, as the current funding mechanisms for enterprises' participation in RDI projects vary from one country to another, from one funding agency to another. At this stage, the framework conditions for an effective participation are not yet defined. To meet the economic sector needs in terms of timeframe (highly reactive sector – a project can be stopper after 3 – 6 months), a new funding mechanism should be explored.
- The communication level, with dedicated outreach events aiming at increasing the uptake of research results and newly developed knowledge.

ii. (a) What have previous collaborative research options found to be advantageous and what are the pitfalls of these collaborative actions? (b) Based on their past experience, what are the criteria in making a decision on whether your initiative would/could collaborate with the Water JPI (joint calls/activities)?

DG Research

- Previous collaborative actions were relatively weak in producing or demonstrating the "market" value of their results. This happened mainly due to the ability of research activities to contribute to innovation which was not properly monitored in advance. It is therefore necessary to advise project partners on these issues and help them to raise early enough, awareness about exploitable results and about the importance of considering dedicated strategies of intellectual property protection and use in their projects.

FACCE-JPI

- FACCE –JPI has collaborated with a number of other initiatives, including the Belmont Forum[8] – for a call on food security and land use, with the ERA-NET Biodiversa[9] – on "Promoting synergies and reducing trade-offs between food supply, biodiversity and ecosystem services", with countries of the Global Research Alliance on Agricultural Greenhouse Gas Research on GHG mitigation and with the JPI Water in the WaterWorks2015 ERA-NET on "Sustainable management of water resources in agriculture, forestry and freshwater aquaculture sectors".
- For the most part these collaborations have been very positive: they allow coordination and synergy between different research actions and may expand the community of researchers responding to the call. They also allow sharing of the costs and efforts of organising a call. The main criterion – and sometimes point of difficulty – is agreeing to the exact scope of the call / activity. This may require some compromises. In the future, FACCE would be very willing to collaborate with the JPI Water again if there is a topic which is of sufficient interest to the funders involved in FACCE-JPI.

[8] https://www.belmontforum.org/

[9] www.biodiversa.org/

JPI Climate

- There are many positives to collaboration. Learning to know and collaborate with European research councils is beneficial. The administrative workload pressure is less compared to national calls if we collaborate as intended. Obtaining international research projects is beneficial reputation wise. The collaborations help to fulfil the climate JPI's international strategies on national levels. Aligning the understanding of the social challenges, European and national strategies is important as is collaboration with Belmont Forum.
- Unfortunately there are drawbacks when it comes to collaboration also. The processes can be very long. The availability of national budgets and personal resources can be restricted. In-kind contribution is positive however, the organisations can come in too late in the process.
- There are three criteria the Climate JPI would use to make a decision on possible collaboration with the Water JPI, these include if the activities or calls fulfil the JPI Climate SRIA, if there are personal resources available and if there are national funds available.

Water JPI

- Since its creation, the Water JPI activities were thought of in terms of large collaborative actions in order to be able to achieve the global challenge of "sustainable water systems for a sustainable economy in Europe and abroad".
- The on-going WaterWorks2015 Eranet Cofund is a joint action with the FACCE JPI due to the importance of the challenge faced ("Sustainable management of water resources in agriculture, forestry and freshwater aquaculture sectors"). All upcoming call activities are planned in cooperation with other initiatives (JPIs, Biodiversa, and Belmont Forum).
- As for any collaborative actions there are Pros and Cons:

  Pros

  - You get a better return for the same spend of money by collaborating. This must be increased and collaboration must be active within the JPIs.
  - The impacts of the funding programme are greater, due to an increased critical mass and capacity across borders by building alliances with international partners, in order to provide science, knowledge and innovative solutions.
  - You are learning from the other countries' and initiatives' experiences.

  Cons

  - It is a lot of effort to define common actions, to convince partners to join and then coordinate them:
    - For example if five agencies are involved from outside of the network. The Water JPI can attract them but they must see a benefit for themselves and therefore must definitely have a successful project.
    - Moving from a single pilot action to a long term partnership is still a challenge.
  - Planning long term activities also depends on national RDI budgets which are decided annually, therefore having a shared common vision and a detailed implementation plan is fundamental.

iii. How can you focus to avoid overlaps with other funding instruments?

DG Research

- In our case, to avoid overlaps with the Water JPI and taking into consideration the fact that Water JPI activities are more focused on the generation of knowledge, basic / applied research and development of problem solving solutions, we supported activities focused more on demonstration / market replication projects of higher TRLs.

FACCE-JPI

- Indeed, the research landscape is very complex and it is important to be aware of what is going on to avoid overlaps. The question really isn't about funding instruments but about other research actions / initiatives that are in related fields – such as some cited above. FACCE-JPI has

made an effort to either work together with other initiatives – as in the examples cited above – or to "smart specialise" by leaving some things to others (for example, after discussion with the ERA-NET Core Organic, it was decided not to have a joint call, but to leave the organic agriculture research to this ERA-NET). FACCE also has the particularity that its scope is at the intersection of agriculture, food security and climate change, so the climate change "filter" reduces a lot of overlap with other actions.

- Now that most JPIs have well developed strategic research agendas it should be easier to avoid overlap and duplication by comparing these and focusing on where they intersect. Other things that help FACCE avoid overlap, is through active involvement of the Scientific Advisory Board and the Stakeholder Advisory Board whose members are in touch with what's happening in other areas. Finally, FACCE is fortunate in that it operates in an area where the Commission already operate a standing advisory committee (the Standing Committee on Agricultural Research – SCAR) which in turn has a number of collaborative and strategic working groups all of which keep a close eye on what's being done by those who across the full spectrum of agriculture, food security and climate change. Indeed many members of the FACCE Governing Board are also members of the SCAR committee which helps too.

JPI Climate

- The collaboration between JPI Climate and other relevant other JPIs like Water, Urban, Oceans, and FACCE are improving, and there is now a permanent dialogue through regular meetings. We try to build synergies, build critical mass and use opportunities jointly when it comes to responding to calls in H2020 work packages, developing joint calls for the BELMONT Forum and others.

Water JPI

- As mentioned by the previous speakers, the RDI landscape is complex and the needs so important. Several challenges are in front of us:
  - It's vital to complement the existing actions (e.g. the H2020 Work Programme, on different topics, different TRLs), to identify when possible synergies as it was done for WaterWorks2015 with the FACCE JPI.
    - The JPI will mainly focus on academic and applied research while H2020 is moving to more innovation driven actions (demonstration, replication).
  - The coordination between the different initiatives should be developed to maximise the impacts. This should be envisaged at the early stage of the programme setting.
    - Since 2 years, this is now effective between the 10 JPIS.
    - In this context, the JPI is launching discussions with other initiatives (e.g. COST, EIP Water).
  - Joint exploratory workshops are now implemented for defining the scope and objectives of these joint actions.
- The coordination with the national level is also important. Aligning the national priority agendas will also increase the impacts of the different programmes.
- In the future, the Water JPI will also need to increase its activities for supporting the implementation of the Water framework policy. Specific needs were identified (insufficient monitoring, deficient analysis of pressures, impact of cost recovery for water services, etc). This will also need cooperation with policy – makers and end-users at the national, European and international levels.

4. Conclusions

4.1. Networking

One of the aims of the Exploratory Workshop was to gather relevant experts in specific areas relevant to Theme 5 of the Water JPI Strategic Research & Innovation Agenda (SRIA), who would present and discuss their findings to other experts and stakeholders (end-users, policy makers and industry).

The 62 attendees provided a very good coverage of the Water JPI membership. Fifteen countries were represented and the EC also participated (**Figure 1**).. The attendees came from a mixed background including academics (c. 50%), funders (c. 25%), policy makers, and the economic and industry sectors.

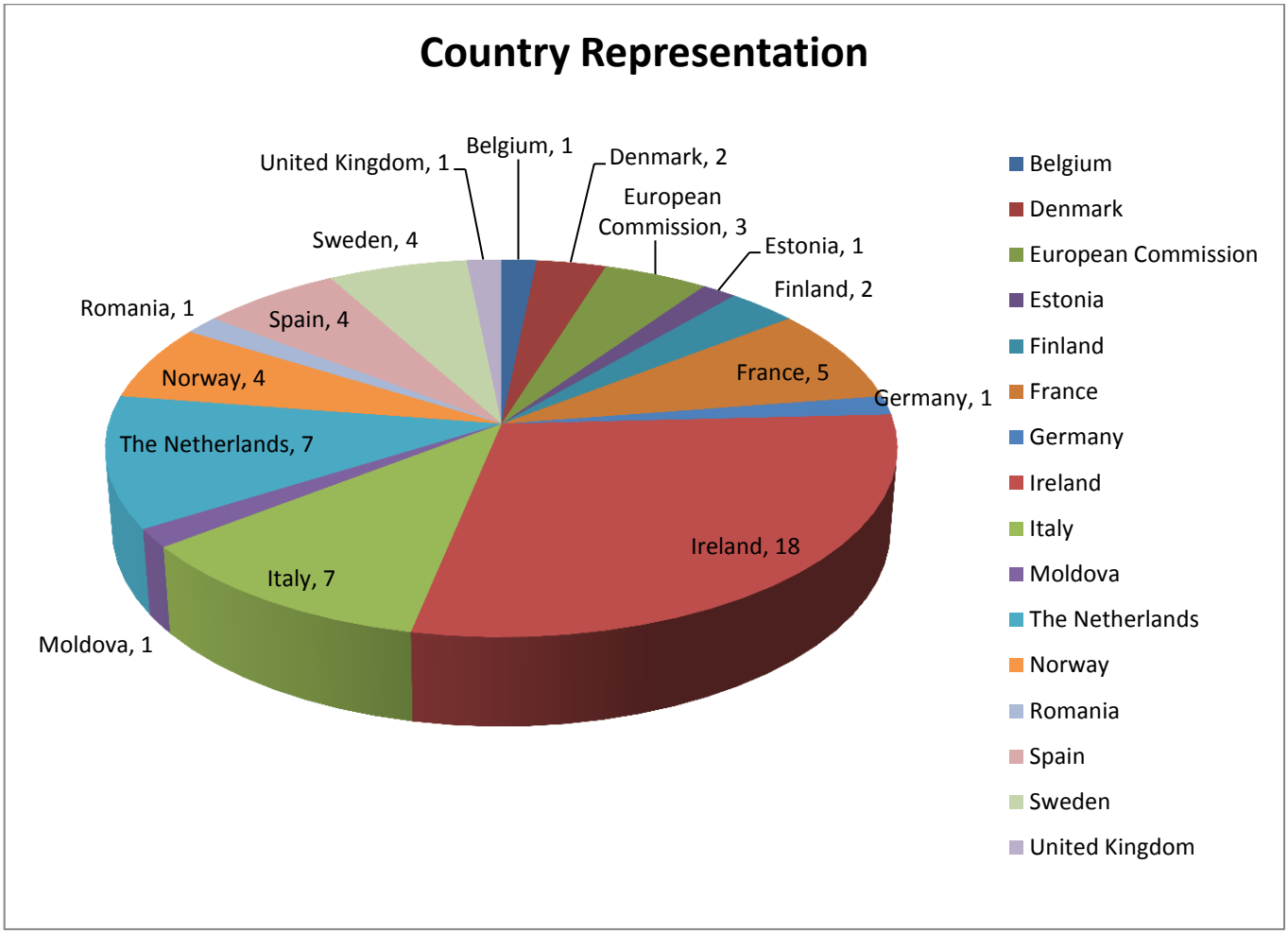

Figure 1: Pie chart illustrating the diverse representation from EU countries that participated in the workshop.

Key Conclusions:

The Exploratory Workshop was successful in achieving its objective to gather relevant experts in Theme 5 of the Water JPI SRIA, who presented and discussed proactively their findings to other experts and stakeholders. The event was well attended, and had a diverse mixture of representation from different countries and backgrounds. It was encouraging to see a good attendance from the Water JPI membership. The opportunity to network was capitalised on by those in attendance.

In order to build on this workshop, it would be useful to consider:

- Inviting a larger contingent from the economic and industrial sectors;
- Improve the recording of attendee backgrounds by asking more specific questions at the registration stage;
- Improve the representation of the Advisory Boards members, especially of the Stakeholders Advisory Group.

4.2. List of RDI needs identified during the workshop

The key knowledge gaps identified during the workshop as part of Plenary Session-1 presentations, presentations from the three breakout sessions, and outputs from the group discussions in the three breakout sessions, will be used to compliment the RDI sub-themes, needs and objectives of Theme 5 of the Water JPI SRIA and will be reviewed in the context of the SRIA flexible update. **Table 2** below provides a summary of the research gaps identified during the 2016 Water JPI Exploratory Workshop and their links to the Water JPI SRIA Theme 5 Research sub-themes, needs and objectives.

Table 2: Summary of the research gaps identified during the workshop (Research gaps highlighted by blue-shaded cells were prioritised as the top key knowledge gaps)

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
How policy can tackle enforcement in water arena	Breakout Session-1	5.1 & 5.2	5.1.1 & 5.2.1	5.1.1-j; 5.2.1-b, c, g.
Source allocation of pollutants, also designated as forensic enviro-science	Breakout Session-1	5.1	5.1.6	5.1.6-a, c.
Experimental sites with societal aspects, to give both information and increase acceptability	Breakout Session-1	5.1 & 5.2	5.1.1 - 5.1.4, 5.2.1 & 5.2.3	5.1.1-a, j; 5.1.2-b, d, e; 5.1.3-a, b; 5.1.4-b; 5.2.1-a; 5.2.3-a,d
How to put a value on water?	Breakout Session-1	5.2	5.2.1	5.2.1-a, c, d, e.
Innovation in terms of industry's damage to water	Breakout Session-1	5.1 & 5.2	5.1.4, 5.1.5, 5.2.1 & 5.2.2	5.1.4-a, b; 5.1.5-g; 5.2.1-d, e; 5.2.2-b.
Addressing the fragmented picture (integration of disciplines)	Breakout Session-1	5.1 & 5.2	5.1.2 – 5.1.7 & 5.2.1 – 5.2.3	5.1.2-d, e; 5.1.3-b; 5.1.4-b; 5.1.5-a, f, g; 5.1.6-a, b; 5.1.7-a; 5.2.1-a, b, c, f; 5.2.2-a, b; 5.2.3-a, b, c, d.
Linking infrastructure to research, society and policy	Breakout Session-1	5.1	5.1.1	5.1.1-a, b, c, d, e, f, g, h, i, j.

[10] Refer to Annex 1 for the referencing of the Water JPI RDI objectives

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
Integrated monitoring of the whole water cycle	Breakout Session-1	5.1	5.1.1 – 5.1.3 & 5.1.5	5.1.1-b, g, h, i, j; 5.1.2-e, 5.1.3-a, 5.1.5-a.
Integrated management and monitoring of the whole water cycle including water reuse and managed aquifer recharge	Breakout Session-1	5.1 & 5.2	5.1.1 - 5.1.5 & 5.2.3	5.1.1-b, e, f, g, h, i, j; 5.1.2-e; 5.1.3-a; 5.1.4-a, b; 5.1.5-a; 5.2.3-c, d.
Identify public understanding to target research and education	Breakout Session-1	5.2	5.2.3	5.2.3-b, c, d.
Large scale managed aquifer recharge	Breakout Session-1	5.1	5.1.3 & 5.1.5	5.1.3-a; 5.1.5-c.
Quality aspects for reuse and integration in water resources management	Breakout Session-1 Breakout Session-1	5.1 & 5.2	5.1.4 & 5.2.3	5.1.4-a, b; 5.2.3-d.
Big data	Breakout Session-1	5.1	5.1.1	5.1.1-e, f, g, h, i, j.
Extracting value for water integrated water resource management and for climate change adaptation from big data integrated infrastructure	Breakout Session-1	5.1 & 5.2	5.1.1, 5.1.2 & 5.2.3	5.1.1-a, b, c, d, e, f, g, h, i, j; 5.1.2-a, b, c, d, e; 5.2.3-b, c.
Stakeholders' participation	Breakout Session-1	5.2	5.2.1 & 5.2.3	5.2.1-a; 5.2.3-a, b, c.
Process of connecting science to society	Breakout Session-1	5.2	5.2.1 & 5.2.3	5.2.1-a; 5.2.3-a, b.
Societal impact: "so what?" Do people understand the impact?	Breakout Session-1	5.2	5.2.3	5.2.3-a, c.
Linking inland waters to coastal management: water quantity and quality	Breakout Session-2	5.1	5.1.5 & 5.1.6	5.1.5-a, d, e, f, g; 5.1.6-a
Improved monitoring and modelling across salinity gradients under extreme hydrological events	Breakout Session-2	5.1	5.1.1 & 5.1.5	5.1.1-d; 5.1.5-e, f.

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
Assessing and mitigating the impacts of multiple anthropogenic stresses on water system services to society, economy and environment	Breakout Session-2	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*
Full transaction cost for different institutions: the cost of the administration of the Politicians going from one system to another	Breakout Session-3	5.2	5.2.1 & 5.2.2	5.2.1-a, c, d, e, g; 5.2.2-a.
Willingness to Pay: Water Market, human rights, what is important in willingness to pay i.e. sustainability example; who is going to pay and who is benefiting from this	Breakout Session-3	5.2	5.2.1	5.2.1-c, d, e, f.
Stakeholder and Society Involvement: the need for reliable information	Breakout Session-3	5.1 & 5.2	5.1.1 & 5.2.3	5.1.1-e, f; 5.2.3-b, c.
Hydrological and socio-economic cycle (how people use the water)	Breakout Session-3	5.1 & 5.2	5.1.2, 5.2.1-5.2.3	5.1.2-e; 5.2.1-a, c, d; 5.2.2-a, b; 5.2.3-a, c.
Research on policy and legal aspects for water	Breakout Session-3	5.1 & 5.2	5.1.1 & 5.2.1	5.1.1-j; 5.2.1-b, c, g.
Monitoring and anticipating social behaviour and response	Breakout Session-3	5.2	5.2.1 – 5.2.3	5.2.1-b; 5.2.2-b; 5.2.3-a, d.
Package deal: Do research on socio-economic effects of new technologies to incentivise investment	Breakout Session-3	5.1	5.1.4	5.1.4-b
Water as an area of conflict and highlights the need for a river basin approach	Breakout Session-3	5.2	5.2.1	5.2.1-b, d.

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
Water importance for jobs and economic growth	Breakout Session-3	5.2 *Only partially covered in the SRIA Theme 5*	5.2.1 *Only partially covered in the SRIA Theme 5*	5.2.1-c. *Only partially covered in the SRIA Theme 5*
Better information and communication	Breakout Session-3	5.1 & 5.2	5.1.1, 5.2.1 & 5.2.3	5.1.1-f, i; 5.2.1-a, b; 5.2.3-a, c.
Connecting people and the economic view on water, measuring indicators for success, and cooperating by sharing laboratory facilities	Jaap Kwadijk	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*
Integrating models of the entire water cycle to take into account water demand and predict the impact of climate change	Dagmar Behrendt Kaljarikova	5.1 & 5.2	5.1.1, 5.1.2, 5.1.5 – 5.1.7 & 5.2.3	5.1.1-e, f, g, h, i; 5.1.2-a, b, c, d, e; 5.1.5-c, g; 5.1.6-b; 5.1.7-a; 5.2.3-b, c.
Implementing Managed aquifer recharge (MAR) and natural water retention measures (NWRMs)	Dagmar Behrendt Kaljarikova	5.1	5.1.3	5.1.3-a, b.
Developing water reuse technologies and progressing the legal proposal on water reuse	Dagmar Behrendt Kaljarikova	5.1 & 5.2 *Only partially covered in the SRIA Theme 5*	5.1.2 - 5.1.4 & 5.2.3-d *Only partially covered in the SRIA Theme 5*	5.1.2-e; 5.1.3-a; 5.1.4-a, b; 5.2.3-d. *Only partially covered in the SRIA Theme 5*
Improving baseline economic information and communication tools and methodologies for local decision-makers, understanding the effectiveness of current economic instruments to promote sustainable water management and a circular and green economy	Dagmar Behrendt Kaljarikova	5.2	5.2.1	5.2.1-a, c.

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
Developing incentives for efficient water use, developing methodologies for valuation of and payment for ecosystem services	Dagmar Behrendt Kaljarikova	5.2	5.2.1 & 5.2.2	5.2.1-d; 5.2.2-a.
Improving baseline technology for water decision makers	Dagmar Behrendt Kaljarikova	5.2	5.2.1	5.2.1
A study on how to better link the WFD and other water directives all together	Antonio Lo Porto	5.1 *Only partially covered in the SRIA Theme 5*	5.1.5 *Only partially covered in the SRIA Theme 5*	5.1.5-g. *Only partially covered in the SRIA Theme 5*
Ageing water infrastructure must be replaced or upgraded, sensor technologies must be used and water pricing is essential. Technology needs to be useful to individuals as well as on a broader scale	Antonio Lo Porto	5.1 & 5.2 *Only partially covered in the SRIA Theme 5*	5.1.1, 5.1.4 & 5.2.1 *Only partially covered in the SRIA Theme 5*	5.1.1-c; 5.1.4-b; 5.2.1-c, e. *Only partially covered in the SRIA Theme 5*
Measures to enhance water quality and to adapt and mitigate for extreme hydrological events	Antonio Lo Porto	5.1	5.1.2	5.1.2-a, b.
The use of new technology to improve irrigation practice and further develop soil management practices to increase irrigation efficiency	Antonio Lo Porto	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*
The need to apply data, not only to use it for research, the added value of data for management and the need for standardisation of data across the research area is required if the value of data is to be maximised	Eleanor Jennings	5.1	5.1.1	5.1.1-e, f, g, i.

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
The importance of involving citizens in water management	Eleanor Jennings	5.2	5.2.1 & 5.2.3	5.2.1-f; 5.2.3-a, b, c
The need for applied research on High Frequency Monitoring	Eleanor Jennings	5.1	5.1.1	5.1.1-e, f.
To develop better connections and integration between different disciplines is needed, (e.g. data collection, modeling, data bases, etc.) not only for water RDI, but also in other fields	Steffen Zacharias	5.1 & 5.2	5.1.2 – 5.1.7 & 5.2.1 – 5.2.3	5.1.2-d, e; 5.1.3-b; 5.1.4-b; 5.1.5-a, f, g; 5.1.6-a, b; 5.1.7-a; 5.2.1-a, b, c, f; 5.2.2-a, b; 5.2.3-a, b, c, d.
To develop clusters of researchers (e.g. European Strategy Forum on Research Infrastructures project) to enable better collaboration and also facilitate the creation of a large network of different “data” collection sites	Steffen Zacharias	5.1	5.1.1	5.1.1-a, e, i.
The creation of activities to enable the harmonisation and standardisation of hydrological monitoring	Steffen Zacharias	5.1	5.1.1	5.1.1-a, f, i.
The requirement for the establishment of hydrological observatories in the Mediterranean (Spain, Italy, Greece, Israel)	Steffen Zacharias	5.1	5.1.1	5.1.1-a, d.
Integrating process-based modelling from hazards to impacts: from marine and fluvial flooding to effects on groundwater, aquifers and water supply	Ap van Dongeren	5.1 & 5.2	5.1.5 & 5.2.1	5.1.5-a, b; 5.2.1-e, b.

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[10]
Bridge the gap between social scientists and natural scientists. The research programme should be concerned with conceptual issues, the actual hydrological and hydro-social water cycle and how to understand the relationships between water and society	Terje Tvedt	5.1 & 5.2	5.1.2 – 5.1.7 & 5.2.1 – 5.2.3	5.1.2-d, e; 5.1.3-b; 5.1.4-b; 5.1.5-0a. f. g; 5.1.6-a, b; 5.1.7-a, 5.2.1-a, b, c, f; 5.2.2-a, b; 5.2.3-a, b, c, d.
Using economic instruments which complement supply and regulatory policies.	C. Dionisio Pérez-Blanco	5.2	5.2.1 – 5.2.3	5.2.1-a, c, d, e, g; 5.2.2-b; 5.2.3-d.
Investigating the Institutional setup – the peril of transaction costs	C. Dionisio Pérez-Blanco	5.2	5.2.1	5.2.1-e
Getting an economic, societal and scientific policy mix.	C. Dionisio Pérez-Blanco	5.2	5.2.1 & 5.2.3	5.2.1-c, e; 5.2.3-a.

Key Conclusions:

All outputs from the workshops will be used a source of information to further focus and identify the RDI needs under the Water JPI SRIA, in preparation of future Water JPI Joint Calls.

A wealth of discussion is evident in the yield of proposed research gaps identified above, which considered the current and emerging needs. It is notable that most of the research gaps identified are relevant to one or several SRIA Theme 5 research objectives. The suggested integration of aspects of sub-themes 5.1 and 5.2., illustrates the belief that the technical aspects are intertwined with the societal, economic and governance aspects of closing the water cycle gap, and therefore must be treated in parallel rather than in isolation.

Some other identified research gaps are not, or only partially, currently represented appropriately in the current SRIA and can be reviewed when carrying out the SRIA Flexible Update.

4.3. Top key knowledge gaps prioritised during the workshop

The outputs from the workshops will be used a source of information to further focus and identify the RDI needs under the Water JPI SRIA, in the preparation of future Water JPI Joint Calls. In order to prepare the proposed 2018 Water JPI Joint Call, the following sources will be considered:

2018 Joint Call Source-1 The Horizon 2020 Work Programme 2017 for Societal Challenge 5 includes a topic dedicated to the Water JPI: **SC5-33-2017: Closing the water gap**

Specific Challenge: Growing water demands, mismanagement of water use and climate change are increasing the stress on water supply, water bodies, and associated ecosystems and existing infrastructures, and emphasise the need to close the water cycle gap, by reconciling water supply and demand in both quantitative and qualitative terms. Research needs to be deployed in a number of scientific fields to improve the knowledge base on water resources availability and use and must be systematically combined with a socio-economic approach investigating the questions of adaptation strategies, participation, behaviour and commitment of stakeholders. This challenge is of European interest and will require a concerted action. To be more effective and increase the added value of related investments, the efforts and strategic research agendas of the many funding networks and organisations existing in Europe need to be integrated to establish transnational and trans-disciplinary research and innovation actions.

Scope: The action will support delivering on priorities identified in the Strategic Research and Innovation Agenda of the Water Joint Programming Initiative (JPI), by pooling together the necessary financial resources from the participating national (or regional) research programmes with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding. The joint call should address research and innovation to support the implementation of EU water policy, in particular on the thematic area “Closing the Water Cycle Gap” of the Water JPI Strategic Research and Innovation Agenda, specifically the subthemes of Enabling Sustainable Management of Water Resources; and Strengthening Socioeconomic Approaches to Water Management. Water resources observation and modelling will be required to better understand hydrological processes and to analyse and forecast the effect of management options, in order to support improved decision-making to ensure the long-term viability of water resources and to enable the integrated management of water resources at the national, basin, and global scales. Observation and modelling should also help to mobilise investments into innovation water management and use solutions in line with the objective of creating a circular economy.
In line with the EU's strategy for international cooperation in research and innovation international cooperation with international partners is encouraged. Proposals should include other joint activities including additional joint call(s) without EU co-funding. The proposal should demonstrate that these co-funded other activities exclude any overlaps with related on-going actions co-funded by the EC. Cooperation and coordination with other ERA-NETs and/or JPIs to increase synergies on cross-cutting issues, where appropriate, is encouraged. Participation of legal entities from international partner countries and/or regions is encouraged in the joint call as well as in other joint activities including additional joint calls without EU co-funding. Participants from countries which are not automatically eligible for funding nonetheless request a Union contribution (on the basis of the ERA-NET unit cost) for the coordination costs of additional activities.
The Commission considers that proposals requesting a contribution from the EU in the range of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects are expected to lead to:

- Improved use of scarce human and financial resources in the area of water research and innovation;
- Reduced fragmentation of water research and innovation efforts across Europe;
- Improved synergy, coordination and coherence between national and EU funding in the relevant research fields through transnational collaboration;

- Improved implementation of research and innovation programmes in these fields through exchange of good practices;
- Strengthened international leadership of European research in this area making the Water JPI, in collaboration with the European Commission, a privileged and attractive partner for global cooperation in research and innovation, in the context of the Belmont Forum and other international alliances;
- Contribution to the implementation of the objectives of the JPI on Water;
- Contribution to the implementation of the Sustainable Development Goals (SDGs), in particular SDG 6 'Ensure availability and sustainable management of water and sanitation for all' and SDG 13 'Take urgent action to combat climate change and its impacts', as well as the conclusions of the COP21 Paris Agreement.

Type of Action: ERA-NET Cofund

2018 Joint Call Source-2 Theme 5 of the Water JPI SRIA (as detailed in **Annex 1**).

2018 Joint Call Source-3 Priorities from the Water JPI funders (taking part in the 2018 Joint Call).

2018 Joint Call Source-4 Outputs from the 2016 Water JPI Exploratory Workshop:
Nine key research gaps were identified as part of the breakout sessions. **Table 3** below provides a summary of the top key research gaps identified during the 2016 Water JPI Exploratory Workshop and their links to the Water JPI SRIA Theme 5 Research sub-themes, objectives and needs.

Table 3: Summary of the top key research gaps identified during the workshop.

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[11]
Process of connecting science to society	Breakout Session-1	5.2	5.2.1 & 5.2.3	**5.2.1**-a; **5.2.3**-a, b.
Integrated management and monitoring of the whole water cycle including water reuse and managed aquifer recharge	Breakout Session-1	5.1 & 5.2	5.1.1 - 5.1.5 & 5.2.3	**5.1.1**-b, e, f, g, h, i, j; **5.1.2**-e; **5.1.3**-a; **5.1.4**-a, b; **5.1.5**-a; **5.2.3**-c, d.
Extracting value for water integrated water resource management and for climate change adaptation from big data integrated infrastructure	Breakout Session-1	5.1 & 5.2	5.1.1, 5.1.2 & 5.2.3	**5.1.1**-a, b, c, d, e, f, g, h, I, j; **5.1.2**-a, b, c, d, e; **5.2.3**-b, c.
Linking inland waters to coastal management: water quantity and quality	Breakout Session-2	5.1	5.1.5 & 5.1.6	**5.1.5**-a, d, e, f, g; **5.1.6**-a

[11] Refer to Annex 1 for the referencing of the Water JPI RDI objectives

Research Gap Identified	Source	SRIA Sub-Theme	SRIA Research Needs	SRIA Research Objectives[11]
Improved monitoring and modelling across salinity gradients under extreme hydrological events	Breakout Session-2	5.1	5.1.1 & 5.1.5	**5.1.1**-d; **5.1.5**-e, f.
Assessing and mitigating the impacts of multiple anthropogenic stresses on water system services to society, economy and environment	Breakout Session-2	5.1 *Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*	*Not or Partially covered in the SRIA Theme 5*
Hydrological and socio-economic cycle (how people use the water)	Breakout Session-3	5.1 & 5.2	5.1.2, 5.2.1-5.2.3	**5.1.2**-e; **5.2.1**-a, c, d; **5.2.2**-a, b; **5.2.3**-a, c.
Research on policy and legal aspects for water	Breakout Session-3	5.1 & 5.2	5.1.1 & 5.2.1	**5.1.1**-j; **5.2.1**-b, c, g.
Monitoring and anticipating social behaviour and response	Breakout Session-3	5.2	5.2.1 – 5.2.3	**5.2.1**-b; **5.2.2**-b; **5.2.3**-a, d.

4.4. Feedback from the Follow-up Survey

Following the workshop, an online follow-up survey was circulated to collect the feedback from the workshop attendees. There were nine replies to the survey. The survey had a mix of questions regarding the quality of the event in general, the venue, the breakout sessions, and the organisation and information provided including suggestions for improvement.

Question 1: Overall, how did you find our event?

Of the nine answers received, seven responded "Very Good", while two responded "Good".

Question 2: Why did you attend our event?

The following responses were collated from the nine respondents:

- To exchange with the other participants on a key topic
- To present the relevant EU policy
- To represent water utilities and as a Swedish expert
- Invited as a national expert to participate
- To help in the preparation of a JPI proposal
- To participate in the coming WaterWorks2017 call
- Invited as a Speaker.

Question 3: Logistics

Table 4 provides a summary of the responses received to the Logistics question.

Table 4: Responses to the question related to the workshop logistics

How would you rate the following?	Very Good	Good	OK	No answer
Venue	3	5		1
Programme	5	4		
Speakers (Plenary Session)	4	5		
Speakers (Breakout Sessions)	3	5		1
Panel Discussion	3	5	1	
Split between Talks & Discussion	4	4		1
Information provided	7	1		1

The following additional feedback was also provided:

- Very good programme with a lot of possibilities to discuss .Good to have the opportunity to comment afterwards on topics in the other break-out sessions.
- Good technical discussion of issues and identification of priorities.
- Made some interesting personal contacts.
- It would have been good to have the speakers from Brussels present.
- Very good.
- Everything was well organised and prepared for the meeting in both technical and logistic terms.

Question 4: What could be improved?

The following responses were collated:

- Having to reduce to three key points was a bit constraining and led to the chosen points being broad and general rather than focused. I hope a record is kept of all the points raised.
- Project template evaluation

- Lunch to lunch meeting would be preferable
- Focus the talks more on the problems that you wanted to tackle
- More time needed for discussion and elaboration of templates

Question 5: Awareness of the Water JPI

Seven respondents indicated that they knew of the Water JPI before the workshop, while the other two responded that they did not.

The following suggestions were made regarding how to raise the awareness of the Water JPI:

- Continue with such events
- Closer cooperation with the EC DG ENV will help.
- Use EUREAU as a platform for communication with the water utilities.
- Improve co-operation with WssTP.
- Newspaper article - Write an International conference (or journal) paper on Research Gaps in Water Science and Management combining the results of this and other workshops.
- More links to relevant research centres in third level sector.
- The funding agencies need to work more with social media i.e. Twitter, Linked-In and Facebook.

Key Conclusions:

The survey illustrates that according to those that completed it, the event was successful in meeting its objectives. The logistics of the workshop were well organised. Responses suggest the need for improved communication by Water JPI partners to their country counterparts and better use of social media to improve the awareness of the Water JPI, its activities and calls.

There was a very low-level response (14%) to the follow-up survey. This will need to be improved in future workshops.

Annex 1: Water JPI Theme 5

The Water JPI SRIA Theme 5 comprises two sub-themes:

- Sub-theme 5.1. Enabling sustainable management of water resources, broken down into seven RDI needs and 34 research objectives
- Subtheme 5.2. Strengthening socio-economic approaches to water management, broken down into two RDI needs and 13 research objectives.

Sub-theme 5.1. Enabling sustainable management of water resources

5.1.1. Promoting water RDI infrastructures for a better understanding of hydrological processes on different scales - Supporting the establishment of a European research infrastructure combining:

⇨ **Physical infrastructures** (e.g. experimental catchments or field labs):

5.1.1-Objective.a. Establishing a network of experimental catchments and field labs in order to allow, among other benefits, the benchmarking of emerging analytical/sensing technologies and the validation of performance against standardised methods/equipment.

5.1.1-Objective.b. A suitable test basis for new integrated hydrological models that take into account mass and energy balances

5.1.1-Objective.c. A suitable test basis for new sensors for precipitation, surface and subsurface water stores.

5.1.1-Objective.d. Improving remote observation systems for coastal ecosystems.

⇨ **Big data, databases, exchange platforms (with long-term records):**

5.1.1-Objective.e. Improving monitoring and data capture.

5.1.1-Objective.f. Establishing comprehensive, easily accessible and interoperable databases.

5.1.1-Objective.g. Improving access to data and the assessment of uncertainties related to climate change mitigation, climate adaptation strategies and the monitoring of the global water cycle.

5.1.1-Objective.h. Gaining data for certain variables (e.g. extreme events, soil moisture, evaporation, surface wind speed, precipitable water over land, short-term heavy rainfall, amount/intensity and frequency of global precipitation, water quality).

5.1.1-Objective.i. Improving the free and open distribution of hydrological data.

5.1.1-Objective.j. Advancing the development of theories and tools for the upscaling of water flow (run-off and groundwater), reactive transport and ecosystems to the relevant scale in order to facilitate policy implementation and assist scientists worldwide.

5.1.2. Promoting adaptive water management for global change

5.1.2- Objective.a. Assessing the impacts and risks of extreme weather events and global change on the water cycle and uses.

5.1.2- Objective.b. Developing and testing improved plans and methodologies for adaptive water management in relation to global change.

5.1.2- Objective.c. Development of indicators of spatial vulnerability to global change.

5.1.2- Objective.d. Developing indicators to monitor adaptation strategies.

5.1.2- Objective.e. Developing, deepening and testing practical methods (e.g. water footprint) to assess the overall success of different water management schemes.

5.1.3. Implementing Managed Aquifer Recharge (MAR) and other Natural Water Retention Measures (NWRMs)

5.1.3- Objective.a. Developing MAR projects for the joint management of surface water, groundwater and recycled water resources to stretch limited water supplies, in order to protect, prolong, sustain and augment groundwater supplies. These would be based on the international state of the art, and the aim would be to set up demonstrators in various hydrogeological settings, considering surface and reclaimed water (treated and/or not), and developing economic and eco-technological operations and adequate monitoring of water transfer within the unsaturated zone to assess the efficiency of the operations and provide data for risk assessment.

5.1.3- Objective.b. Implementing NWRMs in a multidisciplinary way, including integrated analysis of environmental policies at the local scale and testing their efficiency in urban and rural areas, and providing quantified data, with robust and long-term monitoring. Systematic monitoring of NWRMs will bring additional knowledge on their effectiveness and on the multiple benefits they deliver. Performing more robust assessments of NWRMs that capture the various ecosystem services delivered, comparing, in particular, ecological engineering and grey engineering solutions or their best combinations.

5.1.4. Innovating on practical, low-cost technologies treating wastewater to produce resources that are safe for reuse

5.1.4- Objective.a. Removing emerging contaminants on a large scale during wastewater treatment.

5.1.4- Objective.b. Developing integrated approaches combining technological solutions with social acceptability.

5.1.5. Mitigating water stress in coastal zones

5.1.5- Objective.a. Developing a systemic approach to comprehensive coastal zone management based on monitoring and modelling. Integrating the different uses on coastal zones to prevent degradation of water quality and quantity. Demonstrating the feasibility of aquifer storage and recovery by using various sources of water. Evaluating inter-seasonal freshwater storage possibilities in existing aquifers.

5.1.5- Objective.b. Developing novel geophysical and hydrogeophysical models for the characterisation of water bodies on a finer scale. Models will include water supply and demand scenario builders and DSSs.

5.1.5- Objective.c. Monitoring and dynamic modelling of artificial recharge and natural infiltration.

5.1.5- Objective.d. Establishing management plans for the prevention of pollution in coastal and inland waters.

5.1.5- Objective.e. Measuring coastal and inland water quality.

5.1.5- Objective.f. Evaluating the effect of measures to deal with salt intrusion, eutrophication and land use change.

5.1.5- Objective.g. Achieving better coordination between the WFD and the Marine Strategy Framework Directive. To this end, a better understanding of sources and impacts of nutrient emissions discharged from the land to the sea will be required.

5.1.6. Securing freshwater in the Mediterranean and Baltic basins (Article 185)

5.1.6- Objective.a. Developing a systemic approach to studying, managing and protecting Mediterranean and Baltic catchments. There is a need to improve current knowledge on hydrological, hydrogeological and biogeochemical processes (water and nutrient flows and transfer of contaminants) and socio-economical drivers and responses. The balance between fresh and brackish water in coastal areas will also be targeted.

5.1.6- Objective.b. Specific needs for the Mediterranean catchment: assessing available water resources, developing scenario analyses (50–100 years) regarding the availability of water, and developing sustainable integrated management approaches covering landscapes and natural resources.

5.1.6- Objective.c. Specific needs for the Baltic catchment: developing new concepts for zoning different land uses such as urban, agriculture, forest and wetlands based on integrated modelling and long-term projections of land cover change as a way of improving our understanding of the flow of nutrients in the catchment.

5.1.7. Securing freshwater in the Danube (Danube Knowledge Cluster, Article 185)

5.1.7- Objective.a. Developing a systemic approach to protect water resources through an integrated approach to the management of water resources.

5.1.7- Objective.b. Managing sediment balance in the Danube river basin.

5.1.7- Objective.c. Investigating the occurrence of invasive alien species and developing type-specific methods for the evaluation of WFD elements of biological quality.

5.1.7- Objective.d. Planning and designing measures on downstream fish migration.

5.1.7- Objective.e. Developing a better understanding of the sources and occurrence of mercury in fish.

Sub-theme 5.2. Strengthening socio-economic approaches to water management

5.2.1. Integrating economic and social analyses into decision-making processes

5.2.1- Objective.a. Improving baseline economic information and communication tools and methodologies for local decision-makers.

5.2.1- Objective.b. Developing resilience and adapting to hydro-climatic extremes (droughts and floods); developing risk-based decision-making and planning tools including social sciences, economics, effective communication and conflict resolution

5.2.1- Objective.c. Understanding the effectiveness of current economic instruments, such as pricing policies and related policy instruments (e.g. subsidies), in order to promote sustainable water management and a circular and green economy.

5.2.1- Objective.d. Developing incentives for efficient water use.

5.2.1- Objective.e. Providing insight on the transaction costs resulting from the implementation of the WFD measures (cost-effective analysis of measures, assessing the disproportionality of costs to justify exemptions, water pricing and assessing the cost recovery level of water services, as well as the contradiction between fixed costs and declining water consumption).

5.2.1- Objective.f. Promoting integrated management of water resources and water rights in the development of sustainable water management plans.

5.2.1- Objective.g. Fostering trans-boundary cooperation on sound legal and institutional arrangements.

5.2.2. Connecting socio-economic and ecological issues

5.2.2- Objective.a. Developing methodologies for valuation of and payment for ecosystem services, including tangible and intangible services

5.2.2- Objective.b. Examining the impacts on water resources of the main types of consumption in Europe.

5.2.3. Promoting new governance and knowledge management approach

5.2.3- Objective.a. Developing new approaches and tools for water management aimed at setting up innovative alternatives suitable for decision-making. These approaches should be ideally based on (i) the broad participation of stakeholders; (ii) multidisciplinary research; and (iii) the development of scenarios to support decision-making in the short and long term.

5.2.3- Objective.b. Developing new water management approaches enabling stakeholders and citizens to carry out their own supplementary monitoring of water resources. Such approaches should allow stakeholders to assess how the information they provide is integrated by local authorities.

5.2.3- Objective.c. Envisaging education and communication initiatives, including e-learning, to raise social awareness of consumption habits and water scarcity (technical and behavioural approaches, including knowledge of the water cycle). Educational schemes should be expanded to include the use of water-monitoring techniques and the interpretation of environmental data.

5.2.3- Objective.d. Increasing the levels of social acceptance and use of recycled water.

Annex 2: List of Attendees

First Name	Last Name	Organisation	Country
Andrea	Rubini	WSSTP	Belgium
Bjørn	Kaare Jensen	GEUS	Denmark
Hans-Martin Friis	Moller	Kalkundborg Utility	Denmark
Elve	Lode	Talinn University	Estonia
Panos	Balabanis	European Commission	European Commission
Dagmar	Behrendt Kaljarikova	European Commission	European Commission
Guido	Schmidt	European Commission	European Commission
Harri	Hautala	Academy of Finland	Finland
Jussi	Kukkonen	University of Jyvaskyla	Finland
Stephane	Aymard	French Embassy in Ireland	France
Dominique	Darmendrail	ANR	France
Esther	Diez Cebollero	IRSTEA	France
Nathalie	Dörfliger	BRGM	France
Patrice	Garin	IRSTEA	France
Steffen	Zacharias	UFZ Helmholtz Centre for Environmental Research	Germany
Stephen	Barry	Dublin Institute of Technology	Ireland
Michael	Bruen	University College Dublin	Ireland
Matt	Crowe	Environmental Protection Agency	Ireland
Brian	Donlon	Environmental Protection Agency	Ireland
Ray	Earle	Dublin City University	Ireland
Jeremy	Gault	University College Cork	Ireland
Laurence	Gill	Trinity College Dublin	Ireland
Alan	Gilmer	Dublin Institute of Technology	Ireland
Micheael	Hartnett	National University of Ireland, Galway	Ireland
Richard	Howell	Department of Agriculture, Food and the Marine	Ireland
Eleanor	Jennings	Dundalk Institute of Technology	Ireland
Padraic	Larkin	Water JPI	Ireland
Liam	Morrison	National University of Ireland, Galway	Ireland
Áine	Murphy	Environmental Protection Agency	Ireland
Tim	O'Higgins	University College Cork	Ireland
Alec	Rolston	Dundalk Institute of Technology	Ireland
Ken	Stockil	Central Solutions & Large Water Users CoP	Ireland
Alice	Wemaere	Environmental Protection Agency	Ireland
Pierluigi	Claps	Politecnico di Torino	Italy
Antonio	Lo Porto	Water Research Institute IRSA-CNR	Italy
Giuseppina	Monacelli	ISPRA	Italy
Fernando	Nardi	Università per Stranieri di Perugia	Italy
C. Dionisio	Pérez-Blanco	FEEM & CMCC	Italy
Alfieri	Pollice	Water Research Institute IRSA-CNR	Italy

Michele	Vurro	Water Research Institute IRSA-CNR	Italy
Ion	Marin	Center of International Projects	Moldova
Jos	Brils	Deltares	Netherlands
Prisca	Haemers	IenM	Netherlands
Maria	Kennedy	UNESCO	Netherlands
Jaap	Kwadijk	Deltares	Netherlands
Liesbeth	Noor	Netherlands Organisation for Scientific Research	Netherlands
Ap	Van Dongeren	Deltares	Netherlands
Annemarie	Van Wezel	KWR Watercycle Research Institute	Netherlands
Per	Backe-Hansen	The Research Council of Norway	Norway
Øyvind	Kaste	Norwegian Institute for Water Research	Norway
Torill Engen	Skaugen	The Research Council of Norway	Norway
Terje	Tvedt	University of Bergen	Norway
Simona	Stoian	UEFISCDI	Romania
Carlos	Ayora	Spanish National Research Council	Spain
Estrella	Fernandez Garcia		Spain
Miguel Ángel	Gilarranz	MINECO	Spain
Diego	Intrigliolo	Spanish National Research Council	Spain
Berit	Balfors	KTH Royal Institute of Technology	Sweden
Staffan	Filipsson	IVL Swedish Environmental Research Institute	Sweden
Daniel	Hellström	Svenskt Vatten - the Swedish Water & Wastewater Association	Sweden
Kristina	Laurell	FORMAS	Sweden
Graham	Leeks	NERC CEH	United Kingdom

Annex 3: Programme

9.30am: **Welcome**

Matt Crowe (Environmental Protection Agency (EPA))

Plenary Session 1

Chaired by: Brian Donlon (EPA, Ireland) – **Swift Suite 1 & 2**

9.40am: **General Introduction on the Water JPI & Strategic Research & Innovation Agenda**

Dominique Darmendrail (Agence Nationale de la Recherche (ANR), France)

9.55am: **Funding Instruments from the JPI**

Alice Wemaere (EPA, Ireland)

10am: **Water JPI Scientific & Technological Board - Scientific Perspective on the Water JPI SRIA RDI needs within Theme 5**

Jaap Kwadijk (Deltares, The Netherlands)

10.20am: **Policy Perspective on the Water JPI SRIA RDI needs within Theme 5**

Dagmar Behrendt Kaljarikova (European Commission - DG ENV) **via Video Link**

10.40am: **Water JPI Stakeholders Advisory Group End-Users/Economic Perspective on the Water JPI SRIA RDI needs within Theme 5**

Antonio LoPorto (IRSA-CNR - Water Research Institute, Italy)

11am: **Questions & Answers**

Breakout Sessions

Session 1	Session 2	Session 3
Water JPI SRIA Subthemes 5.1.1 to 5.1.3	Water JPI SRIA Subthemes 5.1.5, 5.1.6 & 5.1.7	Water JPI SRIA Subthemes 5.2.1, 5.2.2 & 5.2.3
5.1.1. Promoting water RDI infrastructures for a better understanding of the water hydrological processes on different scales	5.1.5. Mitigating water stress in coastal zones	5.2.1. Integrating economic and social analyses into decision-making processes
5.1.2. Promoting adaptive water management for global change	5.1.6. Securing freshwater in the Mediterranean and Baltic basins	5.2.2. Connecting socio-economic and ecological issues
5.1.3. Implementing managed aquifer recharge and other natural water retention measures	5.1.7. Securing freshwater in the Danube	5.2.3. Promoting new governance and knowledge management approaches

Session Format:

- 20-minute presentation of a relevant EU-Project – Overview of research project -Assessment of gaps – How does this fit/complimentary to the Water JPI SRIA
- 20-minute presentation of a relevant EU-Project – Overview of research project -Assessment of gaps – How does this fit/complimentary to the Water JPI SRIA
- 10-minute Questions & Answers
- 40-minute group discussion moderated by the chair on key knowledge gaps in the area

Breakout Session-1: Enabling Sustainable Management of Water Resources[12]

Chaired by: Kristina Laurell (FORMAS, Sweden)
Rapporteurs: Miguel Gilarranz (MINECO, Spain) & Alice Wemaere (EPA, Ireland)

11.45am: **NETLAKE COST Action: Networking Lake Observatories in Europe**
Eleanor Jennings (Dundalk Institute of Technology, Ireland)

12.05pm: **Terrestrial Environmental Observatories (TERENO)**
Steffen Zacharias (Helmholtz Centre for Environmental Research GmbH – UFZ, Germany)

12.25pm: Questions & Answers

12.35pm: Group discussions moderated by the chair on key knowledge gaps in the area

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Breakout Session-2: Regional Perspectives[13]

Chaired by: Diego Intrigliolo (CSIC-CEBAS, Spain)
Rapporteurs: Graham Leeks (NERC, United Kingdom) & Brian Donlon (EPA, Ireland)

11.45am: **SOLUTIONS for present and future emerging pollutants in land and water resources management**
Annemarie van Wezel (KWR Water B.V., The Netherlands)

12.05pm: **RISC-KIT: Resilience-Increasing Strategies for Coasts - toolKIT**
Ap van Dongeren (Deltares, The Netherlands)

12.25pm: Questions & Answers

12.35pm: Group discussions moderated by the chair on key knowledge gaps in the area

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Breakout Session-3: Strengthening Socio-economic Approaches to Water Management[14]

Chaired by: Daniel Hellström (The Swedish Water & Wastewater Association, Sweden)
Rapporteurs: Prisca Haemers (IenM, The Netherlands) & Aine Murphy (EPA, Ireland)

11.45am: **History of water-society relations: A Presentation of lessons learned**
Terje Tvedt (University of Bergen, Norway)

12.05pm: **EPI-WATER: Evaluating Economic Policy Instruments for Sustainable Water Management in Europe & ENHANCE project: Enhancing risk management partnerships for catastrophic natural disasters in Europe**
Carlos Dionisio Pérez-Blanco (Fondazione Eni Enrico Mattei, IT)

12.25pm: Questions & Answers

12.35pm: Group discussions moderated by the chair on key knowledge gaps in the area

[12] Water JPI SRIA Subthemes 5.1.1 to 5.1.3
13 Water JPI SRIA Subthemes 5.1.5 to 5.1.7

[14] Water JPI SRIA Subthemes 5.2.1 to 5.2.3

2.15pm – 3.15pm: Breakout Sessions (ctd.)

- 60-minute group discussion moderated by the chair on key knowledge gaps in the area, preparing Overall Summary Fiche on the top 3 knowledge gaps identified, including: Impacts – Challenge – Scope – Relevance to Policy – How to facilitate Knowledge Transfer

Plenary Session 2

Chaired by: Padraic Larkin, Water JPI Co-chair

3.45pm – 4.30pm: Review of the Fiches Prepared

- 5-minute summary by the chairs of the breakout session
- 30-minute Group discussion

4.30pm – 5.30pm: Round Table Discussion

- Panellists include:
  - European Commission, DG Research & Belmont Forum: Panos Balabanis **via Video Link**
  - Water JPI: Dominique Darmendrail (ANR, FR)
  - FACCE JPI: Richard Howell (DAFM, IE)
  - JPI Ocean: Invited (awaiting nomination)
  - Climate JPI: Torill Engen Skaugen (RCN, Norway)

5.30pm: Close of the Workshop

Annex 4: Short Biographies

The short biographies are available on the Water JPI website at:
www.waterjpi.eu/images/documents/2016/Exploratory_Workshop_14112016/Documents/Final_Book_of_Biographies_Programme_AttendeeList.pdf

Annex 5: Enabling Sustainable Management of Water Resources - Templates

Key Research Need 1-1

Connecting science to society. In two directions: on the one hand understanding social perception of water challenges and the value of water, on the other hand using show cases and experimental sites where the society can see what science and technology can provide

Challenge, Scope & Key Objectives

Challenge:
Generating interest and framing information to engage and inform both science and the public to meet water challenges.
Scope:
Promote effective dialogue on all aspects of water management and incorporate public values.
Top 3 Objectives:

1. Understand perceptions to target interaction with the public
2. Develop and test methods to address targeted topics
3. Engage with national and local, and industry decision makers.

TOP 3 Expected Impacts

I. Understanding the value of water and embracing national water management decisions
II. Improved water quality, quantity and conservation to support sustainable growth
III. Better quality of life and environment.

This topic would answer the following End-Users Needs

Society

Policy Relevance:

Water Framework Directive, Marine Strategy Framework Directive, Urban Waste Water Treatment Directive, Sustainable Development Goals

Geographical/Regional Relevance:

Local, national, regional, global (all scales)

How to facilitate Knowledge Transfer?

This is part of the proposed research.

Type of Instrument (Research project, Research & Innovation project, Coordination project, etc.)

Applied research project – innovative models

Type of TRLs targeted (basic / applied / innovation)

Applied

Key Research Need 1-2

Integrated management and monitoring of the whole water cycle including water reuse and managed aquifer recharge.

Challenge, Scope & Key Objectives

Challenge:
Matching the water quality and quantity needs to society demand.
Making use of natural solutions for enhance water cycle.
Improve the techniques to monitor the whole cycle.
Integrate the different compartments (groundwater, surface water, unsaturated zone, soil and sediments) in the water management.
Although integrated models are pursued, downscaling must be also possible to address local or regional cases.

Scope:
Demonstrate that combined solutions including water reuse can fill the gaps in water cycle.

Top 3 Objectives:

1. Use of natural based solutions
2. Demonstrate efficiency of MAR for large scale restoration
3. Integrate the different compartments involved
4. Aim to have integrated models
5. At a high level must be able to downscale.

TOP 3 Expected Impacts

I. Achievement of EU water related policy goals and water related SDGs
II. Reducing water stress
III. Water fit for purpose (drinking, industry, agriculture, etc…).

This topic would answer the following End-Users Needs

Safe and enough water resources, maintaining ecosystem quality and sustainability, balancing people profit and planet interest.

Policy Relevance:

Water Framework Directive, Marine Strategy Framework Directive, Floods Directive, Biodiversity strategy, Drinking Water Directive, Nitrates Directive

End of feedback

Key Research Need 1-3

Extracting value for water integrated water resource management and for climate change adaptation from big data integrated infrastructure

Challenge, Scope & Key Objectives

Challenge:
Quality of outcome checks. Build or identify use first – difficult domain. Skills availability – linking to big data expertise and water expertise (ability to cross domains). Public sharing of data regulations.

Scope:
Extreme events – proxy for such events. Integrated Water Resource Management. Adapting to Climate Change.

Top 3 Objectives:

1. Helping to get disciplines talking examples
2. Harmonise linkages to other similar initiatives
3. Application of existing tools to current questions
4. Link to other data sources where necessary.

TOP 3 Expected Impacts

I. Building interdisciplinary skills
II. Increasing the number of researchers who can contribute
III. Demonstration as a building block.

This topic would answer the following End-Users Needs

For example Climate Change effects, improved visualisation and monitoring of the effectiveness of adoption strategies.

Type of TRLs targeted (basic / applied / innovation)

To be confirmed

End of feedback

Annex 6: Regional Perspectives - Templates
Key Research Need 2-1

Linking inland waters to coastal management: water quantity and water quality

Challenge, Scope & Key Objectives

Challenge:
Large investments have been made in water management with only modest improvements in the ecological status of water bodies. There is a need to take a wide view of European waters, linking science and stakeholder communities to achieve significant positive change.

Scope:
The research topic should develop a broad perspective connecting activities and systems, including catchments, rivers, rural and urban infrastructures and marine environments.

Top 3 Objectives:

1. To enhance knowledge of storm water runoff, both quantity and quality (including sediments)
2. To increase understanding of the influences and uses of inland water and land management upon coastal systems
3. To improve cohesion across research and user communities to address key coastal zone issues.

TOP 3 Expected Impacts

I. Improved urban planning and land use practices
II. Seamless working across disciplines, embracing open catchment to sea sub-environments, to provide new capabilities to develop integrated solutions
III. More harmonisation of data systems, including environmental, economic and social data types.

This topic would answer the following End-Users Needs

The need to reduce inefficiencies and provide more informed approaches to development of rural, urban and coastal policies.

Policy Relevance:

Water Framework Directive, Floods Directive, Bathing Waters Directive, Integrated Coastal Zone Management etc.

Geographical/Regional Relevance:

Pan-European at catchment scales (including Danube, Mediterranean and Baltic).

How to facilitate Knowledge Transfer?

Interaction with scientists, river basin authorities, local authorities and interest groups.

Type of Instrument (Research project, Research & Innovation project, Coordination project, etc.)

Research & Innovation project

Type of TRLs targeted (basic / applied / innovation)

Applied

Key Research Need 2-2

Improved monitoring and modelling across salinity gradients under extreme hydrological events

Challenge, Scope & Key Objectives

Challenge:

Ensuring appropriate and innovative strategic monitoring and modelling is in place to ensure freshwater security under a range of conditions including saline sea water intrusion, floods and droughts.

Scope:

Development and demonstration of effective monitoring and modelling tools to gather appropriate data and provide forecasting capabilities across the freshwater to marine salinity gradients. Monitoring and modelling at this costal interface including in estuaries and deltas presents a complex and very challenging environment for both measurements using field instrumentation and exceptionally complex physical chemical and biological conditions to model.

Top 3 Objectives:

1. To develop and demonstrate innovative sensor technologies
2. To explore optimal strategies for monitoring networks.
3. Improve process understanding across the fluvial/tidal interface.
4. To develop strategies to minimise negative externalities of fresh-water to sea water interactions.

TOP 3 Expected Impacts

I. Improved resilience/security for water resources (surface and groundwater) in coastal areas (e.g. 60% of world cities are in the coastal zone).
II. New sensor technologies and monitoring strategies.
III. New approaches to coastal water including river and estuary model development and operation

This topic would answer the following End-Users Needs

Lower parts of rivers, lagoons, estuaries and deltas are of considerable significance to local/ national government and communities. The quality of these environments is important e.g. to meet the needs of tourism, conservation, heavy industry and for power generation.

Policy Relevance:

Groundwater, Water Framework Directive, Bathing Water Directive, Floods Directives etc.

Geographical/Regional Relevance:

Pan European at international, national and regional levels

How to facilitate Knowledge Transfer?

In addition to usual dissemination routes, need to engage with industries and innovators (e.g. With SME's).

Type of Instrument (Research project, Research & Innovation project, Coordination project, etc.)

Research Projects

Type of TRLs targeted (basic / applied / innovation)

Basic / applied / innovation

Key Research Need 2-3

Assessing and mitigating the impacts of multiple anthropogenic stresses on water system services to society, economy and environment

Challenge, Scope & Key Objectives

Challenge:

To understand how environmental systems respond to multiple stresses taking into account resilience and capacities to adapt to global, including climate, changes.

Scope:

Covers both natural processes and human driven activities

Top 3 Objectives:

1. Analyse the causes, pathways and consequences of the multiple stresses.
2. Develop innovative tools
3. Promote a shift in policymaking so the combined impacts of the stresses are taken into account.

TOP 3 Expected Impacts

I. Better understanding of the consequences of land and water use plans
II. Greater awareness of these issues by society
III. More transparent decision making.

This topic would answer the following End-Users Needs

This would provide water managers with a more balanced view of the likely consequences of their actions and potential trade-offs. It would also provide useful information for wider water users, at individual and community levels.

Policy Relevance:

Of value for strategic planning, e.g. relevant to the Strategic Environmental Assessment Directive.

Geographical/Regional Relevance:

All over Europe and especially relevant to the Mediterranean basin.

How to facilitate Knowledge Transfer?

Opportunity to disseminate to both water managers and community levels (and also to receive "bottom-up" contributions).

Type of Instrument (Research project, Research & Innovation project, Coordination project, etc.)

Research & Innovation action

Type of TRLs targeted (basic / applied / innovation)

Applied and Innovative

Annex 7: Strengthening Socio-economic Approaches to Water Management - Templates

Key Research Need 3-1

Research on policy and legal aspects on the reuse of water

Challenge, Scope & Key Objectives

Challenge:
How to make sure that the reuse of wastewater in agriculture is safe.
Scope:
Increase the use of wastewater in crop growth.
Top 3 Objectives:

1. Create a European Union level playing field for water reuse
2. Facilitate the implementation of innovation.

TOP 3 Expected Impacts

I. More wastewater reused
II. Reduce the use of fresh water
III. Introduce a strong legal network for the socio-economic involvement in water
IV. Legal research network will connect to water technology.

This topic would answer the following End-Users Needs

Legal framework for the reliability of water and the liability in relation the reuse of wastewater for livestock and crop production.

Policy Relevance:

Water Framework Directive

Geographical/Regional Relevance:

All of the European Union

How to facilitate Knowledge Transfer?

Water Framework Directive

Type of Instrument (Research project, Research & Innovation project, Coordination project, etc.)

Research

Type of TRLs targeted (basic / applied / innovation)

N/A

Key Research Need 3-2

Monitoring and anticipating social behaviour and response

Challenge, Scope & Key Objectives

Challenge:

Impact analyses of water management plans mainly consider the economic and environmental consequences of policy measures and technology-based solutions (e.g. adoption of innovative irrigation systems). Experience shows that, in addition to economic and environmental impacts, social responses need to be well understood and assessed. Social responses refer here to the attitude – acceptance or disagreement- of individuals towards the implementation of a decision. They are shaped by experiences from previous decisions, history, education, and the current cultural, economic, natural, social and political environment. What is more, they are rather unpredictable being therefore difficult to determine the social acceptability of decisions before they are fully implemented.

If not properly considered, social responses may result in unintended and unexpected problems. Nevertheless, to be sustainable, water management decisions must be compatible with people's values, needs and beliefs. For this reason, social responses drive the ability of proposed policy measures and technological solutions to achieve society's water management objectives over time.

Several approaches have been proposed to better integrate society's views in decision making in order to reduce the impact of unpredictable social behaviour and to ensure that a solution is widely accepted by stakeholders. Examples of these approaches include social participation in decision making and adaptive policy based upon social learning. Despite the usefulness of these approaches, some key research questions still remain in order to gain insights and understanding of the coupled social and natural components of water resource systems.

Scope: To understand what factors shape stakeholders' responses to policy measures and technological solutions whilst taking into account their local context (attitude, social norms, cultural context, knowledge and perceptions)

Top 3 Objectives:

1. To enhance our knowledge on the adoption process of innovative technologies and solutions (i.e. how the decision to adopt comes about and what other implicit factors influence that decision)
2. To better understand how economic regulations contribute to shaping users' behaviour.
3. To offer analytical approaches that allow anticipating social behaviour in order to identify in advance any adverse unintended outcomes, to modify our decisions, or at least to be prepared to modify them if undesirable outcomes occur.

TOP 3 Expected Impacts

- Improved water policy efficiency through adaptation to the social context.
- Empowering water users through better targeted education and awareness campaigns.
- Long-term changes in water perceptions and consumer behaviour.

This topic would answer the following End-Users Needs

Actions on this area would respond to the needs of the following end-users:

1) Water managers:
- Identification of policy measures and solutions widely **acceptable** for the people living and working in a watershed, as well as **adaptive** and **robust** across a range of plausible futures, including changes in society and societal reactions to policies.

2) Stakeholders:
- Participation in the decision making process as social values, norms, behaviour, values and beliefs would be taken into account.

Policy Relevance:

The main hurdle to the implementation of many policy measures and technological solutions is often viewed as a lack of public willingness to adopt these alternative water behaviours. Despite the importance of such research, very little work has been undertaken in this area.

Geographical/Regional Relevance:

No particular geographical focus is given as reluctance to the adoption of policy measures and technological solutions might take place anywhere in Europe and outside Europe.

How to facilitate Knowledge Transfer?

Actions will look at three types of knowledge transfer activities:

1) Diffusion, aimed at promoting awareness across society via journals, newsletters, websites. Diffusion activities will not be directed towards a specific target but they will have the remit to inform society about the importance of cumulative impacts assessments in water management.
2) Dissemination will involve sharing research and innovation findings strategically with particular stakeholders, such as by mailing results to intended audiences (i.e. water management agencies) and holding workshops and conferences to share findings. The goal here is both to promote awareness and to favour behavioural change.
3) Implementation. The purpose of these activities will be to encourage users to change their behaviour in light of research findings through face-to-face contacts with experts and water managers.

Type of Instrument (Research project, Research & Innovation project, Coordination project, etc.)

Research and innovation. Innovation is expected in the development of analytical tools to better understand how decisions might lead to particular societal responses and actions. Such analytical tools will be able to identify decisions to be made in the short term, to assess the impact these decisions will have on the socio-hydrological system, and to single out future decisions that should be made in response to emerging conditions.

Type of TRLs targeted (basic / applied / innovation)

1-6

Additional Information: N/A

End of feedback

Key Research Need 3-3a

Hydrological and Socio-Economic cycle (how people use the water)

Challenge, Scope & Key Objectives

Challenge:
To predict better the requirements of people, society and economy in relation to water.
Scope:
Using time, scale and sector to better predict the requirements of socio-economic and water cycles.
Top 3 Objectives:

1. Design and implement a successful circular economy
2. Close the loop for society
3. Consider the instruments that must be used to get there.

TOP 3 Expected Impacts

I. Better prediction of what is required to meet socio-economic needs
II. Provide more sustainable cost efficient solutions that can be adapted to always be useful (no regrets)
III. Supporting resource based management.

This topic would answer the following End-Users Needs

Allow more control of the technical issues having an economic impact on water use.

Policy Relevance:

Improve the acceptance and implementation of the Water Framework Directive.

End of feedback

Key Research Need 3-3b

Hydrological and Socio-Economic cycle (how people use the water)

Challenge, Scope & Key Objectives

Challenge:
Design and implement a circular economy of water efficiency.
Scope:
Apply a circular economy of water efficiency on a river basin and urban scale.
Top 3 Objectives:

1. Design of tools that allow examination of water cycle elements
2. Introduce more stakeholders in the Water Framework Directive.

This topic would answer the following End-Users Needs

Allow more control of the technical issues having an economic impact on water use.

Policy Relevance:

Improve the acceptance and implementation of the Water Framework Directive.

End of feedback