Horizon 2020

Call: H2020-TWINN-2015

Topic: H2020-TWINN-2015

Type of action: CSA

Proposal number: 690900

Proposal acronym: DATA4WATER

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How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the previous steps in the submission wizard.

Proposal ID **690900** *Acronym* **DATA4WATER**

1 - General information

Topic H2020-TWINN-2015 Type of action CSA

Call identifier H2020-TWINN-2015 Acronym DATA4WATER

Proposal title* Excellence in Smart Data and Services for Supporting Water Management

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months *36*

Fixed keyword 1 *Cluster dynamics* Add

Free keywords *smart data, e-services, water management, hydroinformatics*

Abstract

The objective is to enhance the S&T abilities in the field of smart, data driven e-services in water management, with focus on the widening organization. The complexity of research related to water management is extremely high and requires deep expertise in several ICT-related research domains. The dynamics of water and the role of humans in the water cycle are not well understood largely because environmental and socio-economic analyses are still performed separately.
The specific objectives are: Enhance the science and technology capacity of the participating institutions; Raise staff's research profile as well as the one of the institutions involved; Contribute to the Smart Specialisation Strategy; Contribute to the development of a new, interdisciplinary research domain.
Main activities in the project are: organization of workshops, summer schools; exchange and training of researchers; develop a roadmap for the UPB, aligned with the partners' research agendas in the area of IT for water management; development of a knowledge transfer and remote training system, and inclusion of UTB team in an operational research network. The research quality system will be set up, based on the Composite indicator of Research Excellence. The project will also help to raise staff's research profile.
The scientific strategy of the UPB team will be oriented towards inter/trans-disciplinary and practical applicability, valorization and impact in water management, which also fits to the Smart Specialization Strategy of Romania. The main expected impact is the increase of publications number with high visibility, and the creation of an active network with relevant stakeholders.
The consortium was constituted so that it is representative for the research topic, that has a strong interdisciplinary character, with main focus on information technology. The project consortium consists of two leading research partners in the field of IT and a water management leading research partner.

Remaining characters 3

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under the 7th Framework Programme, Horizon 2020 or any other EU programme(s)? ○ Yes ◉ No

Proposal ID **690900** *Acronym* **DATA4WATER**

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	☒
2) The information contained in this proposal is correct and complete.	☒
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	☒

4) The coordinator confirms:

- to have carried out the self-check of the financial capacity of the organisation on https://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was "weak" or "insufficient", the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	◉
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	○
- as sole participant in the proposal is exempt from the financial capacity check.	○

5) The coordinator hereby declares that each applicant has confirmed:

- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	☒
- they have the financial and operational capacity to carry out the proposed action.	☒

The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

Your reply to the grant application will involve the recording and processing of personal data (such as your name, address and CV), which will be processed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the processing of your personal data are available on the privacy statement. Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Warning System (EWS) only or both in the EWS and Central Exclusion Database (CED) by the Accounting Officer of the Commission, should you be in one of the situations mentioned in:
-the Commission Decision 2008/969 of 16.12.2008 on the Early Warning System (for more information see the Privacy Statement), or
-the Commission Regulation 2008/1302 of 17.12.2008 on the Central Exclusion Database (for more information see the Privacy Statement) .

Proposal ID **690900** *Acronym* **DATA4WATER**

List of participants

#	Participant Legal Name	Country
1	UNIVERSITATEA POLITEHNICA DIN BUCURESTI	Romania
2	UNIVERSITA' DEGLI STUDI DI MILANO-BICOCCA	Italy
3	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	Germany
4	STICHTING IHE DELFT	Netherlands

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UPB**

2 - Administrative data of participating organisations

PIC	***Legal name***
999842342	*UNIVERSITATEA POLITEHNICA DIN BUCURESTI*

Short name: UPB

Address of the organisation

Street SPLAIUL INDEPENDENTEI 313

Town BUCURESTI

Postcode 060042

Country Romania

Webpage http://www.upb.ro

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... yes

Non-profit ..... yes

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... yes

Research organisation ..... yes

Legal person ..... yes

Enterprise Data

SME self-declared status ..... 2013 - no

SME self-assesment ..... unknown

SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 853 -

Proposal ID **690900**	*Acronym* **DATA4WATER**	*Short name* **UPB**

Department(s) carrying out the proposed work

Department 1

Department name	Department for Computers - NCIT
	☒ Same as organisation address
Street	SPLAIUL INDEPENDENTEI 313
Town	BUCURESTI
Postcode	060042
Country	Romania

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UPB**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: ○ Male ◉ Female

First name: **Mariana** Last name: **Mocanu**

E-Mail: **mariana.mocanu@cs.pub.ro**

Position in org.: department deputy director

Department: Department of Computers

☒ Same as organisation address

Street: SPLAIUL INDEPENDENTEI 313

Town: BUCURESTI Post code: 060042

Country: Romania

Website: https://cs.pub.ro/

Phone: +40214019646 Phone 2: +40723233699 Fax: +40213181014

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Valentin	Cristea	valentin.cristea@cs.pub.ro	+40745035879
Florin	Pop	florin.pop@cs.pub.ro	+40723243958

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UNIMIB**

PIC	***Legal name***
999923531	*UNIVERSITA' DEGLI STUDI DI MILANO-BICOCCA*

Short name: UNIMIB

Address of the organisation

Street PIAZZA DELL'ATENEO NUOVO 1

Town MILANO

Postcode IT-20126

Country Italy

Webpage www.unimib.it

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... yes

Non-profit ..... yes

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... yes

Research organisation ..... yes

Legal person ..... yes

Enterprise Data

SME self-declared status ..... unknown

SME self-assesment ..... unknown

SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 7220 -

Proposal ID **690900**	*Acronym* **DATA4WATER**	*Short name* **UNIMIB**

Department(s) carrying out the proposed work

Department 1

Department name	Department of Information, System and Communication
	☐ Same as organisation address
Street	viale Sarca 336
Town	Milan
Postcode	20126
Country	Italy

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UNIMIB**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mrs

Sex: ○ Male ◉ Female

First name: **Elena Gemma** Last name: **Brogi**

E-Mail: **elenagemma.brogi@unimib.it**

Position in org.: Grant Office

Department: Research Area

☒ Same as organisation address

Street: PIAZZA DELL'ATENEO NUOVO 1

Town: MILANO Post code: IT-20126

Country: Italy

Website: www.unimib.it

Phone: +390264486431 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Francesco	Archetti	francesco.archetti@unimib.it	

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **Fraunhofer**

PIC	***Legal name***
999984059	*FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV*

Short name: Fraunhofer

Address of the organisation

Street HANSASTRASSE 27C

Town MUENCHEN

Postcode 80686

Country Germany

Webpage www.fraunhofer.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... no

Non-profit ..... yes

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... no

Research organisation ..... yes

Legal person ..... yes

Enterprise Data

SME self-declared status ..... 2007 - no

SME self-assesment ..... unknown

SME validation sme ..... 2007 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code 721 -

Proposal ID **690900**	*Acronym* **DATA4WATER**	*Short name* **Fraunhofer**

Department(s) carrying out the proposed work

Department 1

Department name	Fraunhofer FOKUS
	☐ Same as organisation address
Street	Kaiserin-Augusta-Allee 31
Town	Berlin
Postcode	10589
Country	Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **Fraunhofer**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Klaus-Peter** Last name: **Eckert**

E-Mail: **klaus-peter.eckert@fokus.fraunhofer.de**

Position in org.: Senior Scientist

Department: Fraunhofer FOKUS

[ ] Same as organisation address

Street: Kaiserin-Augusta-Allee 31

Town: Berlin Post code: 10589

Country: Germany

Website: www.fokus.fraunhofer.de

Phone: +49 30 3463-7227 Phone 2: *+xxx xxxxxxxxx* Fax: +49 30 3463-997227

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Yury	Glikman	yury.glikman@fokus.fraunhofer.de	
Silke	Cuno	silke.cuno@fokus.fraunhofer.de	
Hannah	Wolff	hannah.wolff@izb.fraunhofer.de	+492241141968
Sabine	Mayer	sabine.mayer@zv.fraunhofer.de	+498912053195

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UNESCO-IHE**

PIC	***Legal name***
951080248	*STICHTING IHE DELFT*

Short name: UNESCO-IHE

Address of the organisation

Street WESTVEST 7

Town DELFT

Postcode 2611 AX

Country Netherlands

Webpage www.unesco-ihe.org

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... no

Non-profit ..... yes

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... no

Research organisation ..... yes

Legal person ..... yes

Enterprise Data

SME self-declared status ..... 2013 - no

SME self-assesment ..... unknown

SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

NACE code

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UNESCO-IHE**

Department(s) carrying out the proposed work

Department 1

Department name	Integrated Water Systems & Governance
	☒ Same as organisation address
Street	WESTVEST 7
Town	DELFT
Postcode	2611 AX
Country	Netherlands

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **690900** *Acronym* **DATA4WATER** *Short name* **UNESCO-IHE**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: ○ Male ◉ Female

First name: **Ioana** Last name: **Popescu**

E-Mail: **i.popescu@unesco-ihe.org**

Position in org.: Associate Professor of Hydroinformatics

Department: Integrated Water Systems & Governance

☒ Same as organisation address

Street: WESTVEST 7

Town: DELFT Post code: 2611 AX

Country: Netherlands

Website: www.unesco-ihe.org

Phone: +31 15 215 1895 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Carolien	Jaspers	c.jaspers@unesco-ihe.org	+31152151839

Proposal ID **690900** *Acronym* **DATA4WATER**

3 - Budget for the proposal

No	Participant short name	Country	(A) Direct personnel costs/€	(B) Other direct costs/€	(C) Direct costs of sub-contracting/€	(D) Direct costs of providing financial support to third parties/€	(E) Costs of inkind contributions not used on the beneficiary's premises/€	(F) Indirect Costs / € (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs / €	(H) Total estimated eligible costs / € (=A+B+C+D+F +G)	(I) Reimbursement rate (%)	(J) Max. grant / € (=H*I)	(K) Requested grant / €
1	Upb	RO	152 000	85 500	0	0	0	59375,00	0	296875,00	100	296875,00	296875,00
2	Unimib	IT	114 000	43 100	0	0	0	39275,00	0	196375,00	100	196375,00	196375,00
3	Fraunhofer	DE	162 825	47 500	0	0	0	52581,25	0	262906,25	100	262906,25	262906,25
4	Unesco-ihe	NL	151 970	42 700	0	0	0	48667,50	0	243337,50	100	243337,50	243337,50
	Total		580 795	218 800	0	0	0	199898,75	0	999493,75		999493,75	999493,75

Proposal ID **690900** *Acronym* **DATA4WATER**

4 - Ethics issues table

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve Human Embryonic Stem Cells (hESCs)?	○ Yes ◉ No	
Does your research involve the use of human embryos?	○ Yes ◉ No	
Does your research involve the use of human foetal tissues / cells?	○ Yes ◉ No	
2. HUMANS		**Page**
Does your research involve human participants?	○ Yes ◉ No	
Does your research involve physical interventions on the study participants?	○ Yes ◉ No	
3. HUMAN CELLS / TISSUES		**Page**
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	○ Yes ◉ No	
4. PERSONAL DATA (ii)		**Page**
Does your research involve personal data collection and/or processing?	○ Yes ◉ No	
Does your research involve further processing of previously collected personal data (secondary use)?	○ Yes ◉ No	
5. ANIMALS (iii)		**Page**
Does your research involve animals?	○ Yes ◉ No	

Proposal ID **690900** *Acronym* **DATA4WATER**

6. THIRD COUNTRIES		Page
Does your research involve non-EU countries?	◯ Yes ◉ No	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)? (v)	◯ Yes ◉ No	
Do you plan to import any material from non-EU countries into the EU? *For data imports, please fill in also section 4.* *For imports concerning human cells or tissues, fill in also section 3.*	◯ Yes ◉ No	
Do you plan to export any material from the EU to non-EU countries? *For data exports, please fill in also section 4.* *For exports concerning human cells or tissues, fill in also section 3.*	◯ Yes ◉ No	
If your research involves low and/or lower middle income countries, are benefits-sharing measures foreseen? (vii)	◯ Yes ◉ No	
Could the situation in the country put the individuals taking part in the research at risk?	◯ Yes ◉ No	
7. ENVIRONMENT & HEALTH and SAFETY See legal references at the end of the section. (vi)		Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants? *For research involving animal experiments, please fill in also section 5.*	◯ Yes ◉ No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	◯ Yes ◉ No	
Does your research involve the use of elements that may cause harm to humans, including research staff? *For research involving human participants, please fill in also section 2.*	◯ Yes ◉ No	
8. DUAL USE (vii)		Page
Does your research have the potential for military applications?	◯ Yes ◉ No	
9. MISUSE		Page
Does your research have the potential for malevolent/criminal/terrorist abuse?	◯ Yes ◉ No	
10. OTHER ETHICS ISSUES		Page
Are there any other ethics issues that should be taken into consideration? Please specify	◯ Yes ◉ No	

Proposal ID **690900** *Acronym* **DATA4WATER**

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents. ☒

How to Complete your Ethics Self-Assessment

Proposal ID **690900** *Acronym* **DATA4WATER**

5 - Call specific questions

Open Research Data Pilot in Horizon 2020

If selected, all applicants have the possibility to participate in the Pilot on Open Research Data in Horizon 2020[1], which aims to improve and maximise access to and re-use of research data generated by actions. Participating in the Pilot does not necessarily mean opening up all research data. Actions participating in the Pilot will be invited to formulate a Data Management Plan in which they will determine and explain which of the research data they generate will be made open.

We wish to participate in the Pilot on Open Research Data in Horizon 2020 on a voluntary basis	○ Yes	◉ No

Participation in this Pilot does not constitute part of the evaluation process. Proposals will not be evaluated favourably because they are part of the Pilot and will not be penalised for not participating.

[1] *According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.*

Data management activities

The use of a Data Management Plan (DMP) is required for projects participating in the Open Research Data Pilot in Horizon 2020, in the form of a deliverable in the first 6 months of the project.

All other projects may deliver a DMP on a voluntary basis, if relevant for their research.

Are data management activities relevant for your proposed project?	○ Yes	◉ No

Coordination and support actions

COVER PAGE

Title of Proposal

Excellence in Smart Data and Services for Water Management

List of participants

Participant No *	Participant organisation name	Country
1 (Coordinator)	University Politehnica from Bucharest (UPB)	Romania
2	University of Milano-Bicocca (UNIMIB)	Italy
3	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (FOKUS)	Germany
4	Stichting IHE Delft (UNESCO-IHE)	The Netherlands

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Abbreviations:

BERD - Total R&D expenditure as a share of GDP (%)
GDP - Gross domestic product
ICT - Information and communication technologies
PCT - Patent Cooperation Treaty
R&D - Research and development
S&T - Science and technology
SDWM - Smart data for Water Management
RQAS - Research Quality Assurance System

1. Excellence

1.1 Objectives

The **overall objective** of the project is **to strengthen research** in the field **of smart data driven e-services in water resources management, made available to international community and/or specific stakeholders such as companies, citizens, and authorities.** The complexity of research related to water resources management is extremely high and requires deep expertise in several ICT-related research domains such as: Big Data and Smart Data; semantic Internet of Things; context-aware and event-based systems; Cloud computing; Web services;, and social Web. The dynamics of water and the role of humans in the water cycle are not well understood largely because environmental and socio-economic analyses have traditionally been performed separately; and the methods, tools, and data needed for multidisciplinary work are not yet at the required level to satisfactory address problems posed in managing resources in aquatic environments. ICT can contribute to several areas of research such as better understanding of coupled human-natural system dynamics; finding risk mitigation measures for the unintended consequences and side effects like water scarcity, increased pollution, unreasonable use of water, flood, food prices; and can contribute to the development of strategies for efficient use of water resources.

The main goal of the project is to bring the Romanian level of excellence near the value of the other partner countries.

The specific objectives of the project are:

Objective 1: Enhance the science and technology (S&T) capacity of the participating institutions

Objective 2: Raise staff's research profile as well as the one of the institutions involved

Objective 3: Contribute to the overall Smart Specialisation Strategy

Objective 4: Contribute to the development of a new, interdisciplinary research domain.

Objective 5: Include the Romanian organization as an active member of the research networks of the internationally-leading research partner institutions

The project will ***enhance the science and technology (S&T) capacity of the participating institutions*** (Objective 1), by the following means:

- Establishment of a roadmap for the UPB research team, aligned with the partners' research agendas, in the areas of water management and supporting information and communication technologies;
- Development of a Research Quality Assurance Systems, based on the key research indicators
- Creating an e-Knowledge and Networking Environment - "Knowledge Lake", for the research field
- Organization of an international workshop on Cyberinfrastructure for Resource Management and of 3 project workshops;
- Organization of 6 training sessions;
- Organization of 3 summer schools;
- Exchange of researchers and PhD students;

An operational research network between the project partners and important stakeholders like leading research organizations, relevant economic agents, and public authorities will be set up. The research output of the UPB will be monitored, using a metric defined by indicators such as the number of publications, quotations and successful project proposals.

The project will ***raise staff's research profile as well as the one of the institutions involved*** (Objective 2) by

- Organization of an international conference;
- Organization of an international workshop on Cyberinfrastructure for Resource Management ;
- Organization of 3 information and networking events.
- Select and support the publication of scientific results in the field, at high ranked conferences, in peer-reviewed, high impact publication and on Knowledge lake
- Exchange of researchers.

The project will ***contribute to the overall Smart Specialisation Strategy*** (Objective 3), by

- Enhancing the research capacity in the specific field, compliant to the strategy
- Including topics related to the smart specialisation, in the training sessions

The project will ***contribute to the development of a new, interdisciplinary research domain*** (Objective 4), the Hydorinformatics, by

- Including the domain in the Roadmap;
- Including the topic in three of the 6 training sessions;
- Including the topic in the organized conference and workshops;
- Including research results in the field, on the e-Knowledge Environment - "Knowledge Lake"

The project will ***include the Romanian organization as an active member of the research networks of the internationally-leading research partner institutions*** (Objective 5), by the following means:

- Participation to the information events;
- Creating an e-Knowledge and Networking Environment - "Knowledge Lake", for the research field
- Organization of an international workshop on Cyberinfrastructure for Resource Management and of 3 project workshops;
- Exchange of researchers and PhD students;
- Participation to scientific events.

1.1.1 Performance in research and innovation (R&I) for Romania

UPB is an active part of the national higher education and research system of Romania and has important contributions to its overall performance. Nevertheless, UPB is influenced by the national research policy, strategy and capacity.

The Innovation Union Progress Report[1],[2] presents six types of indicators regarding the Research and Innovation (R&I) performance and provides detailed information on these types of indicators for each of the 28 EU countries. Romania is categorized as a modest investor. Compared to the other EU countries, it has the second lowest percentage of revenue invested in R&D. The revenue invested in R&D is measured by R&D intensity, one of the main six R&I performance indicators. Romania experienced a slow increase of this indicator from 0.37% in 2000 to 0.58% in 2008. However, after 2008, the Romanian R&D intensity had a downward trend, reaching 0.49% in 2012. Based on a new adopted strategy, the Romanian R&D intensity indicator is expected to grow in the next years, but it is still low compared with the 2% target for 2020.

The R&D intensity indicator reflects the number of Romanian participants in different European founding programmes, and the collaborations with other partners during these programmes. The EU statistic from 2014 shows that Romania is the 19th country regarding the attracted EU funds. Romania developed collaborations mainly with Germany, Italy, the United Kingdom, France and Spain.

The second type of indicators analyzed in the EU annual report regards *the Excellence in Science and Technology*. There are three major fields in which Romania has undergone significant growth in terms of this indicator: ITC, new production technologies, and energy. These three fields require further development to achieve excellence, but, as specified in the EU 2014 Report[1], they are “important candidates for a smart specialisation strategy.”

ICT is one of the major fields in which Romania has a high percentage of publications; however their cumulative impact is below the world overall level (see Figure 1.1).

[1] Innovation Union Progress 2014
[2] Innovation Union Progress 2013

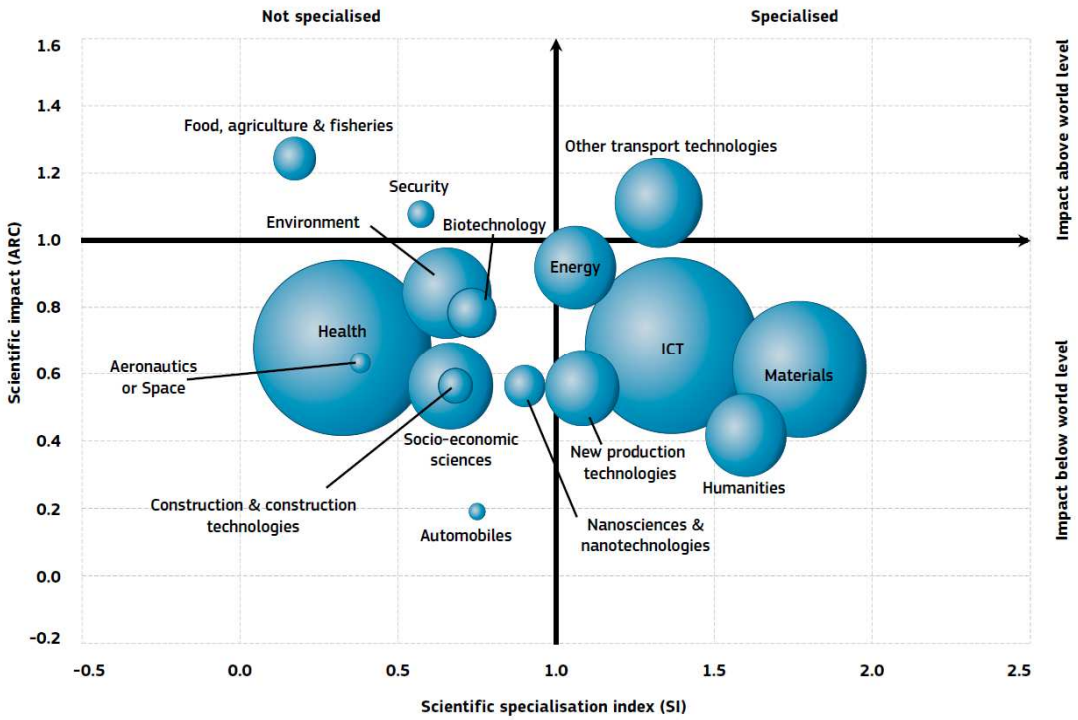

Figure 1.1 Romania – Positional analysis of publications in Scopus, 2000–2010[1]

In the statistics, water related research results are not presented. They may be included in more categories, like Environment, Energy, Food, Agriculture and Fishery, that are depending on water resources, or in ICT, that has significant impact on water management.

There are several Key indicators with high value for Romania, such as: "*Knowledge-intensive services exports as % total service exports*" - Romania ranks on the 7-th position within EU; "*Share of renewable energy in gross final energy consumption*" - rank 8 within EU; "*New doctoral graduates per thousand population*" and "*License and patent revenues from abroad*" rank 13 within EU. However, there are many key indicators where Romania ranks 20 or bellow (from the total 28 countries EU). A better national strategy and intensified participation in European programmes, on relevant topics, are required.
Annex A includes a list with the major key indicators that should be improved in Romania.

As part of the Romanian National Strategy for 2014-2020, the National Strategy on Digital Agenda for Romania[3] was published on September 2014.There are four major fields of actions presented in the new digital agenda:

Action I: "*eGovernment, Interoperability, Cyber security, Cloud Computing, Open Data, Big Data and Social Media*;
Action II: *ICT in Education, Health, Culture and eInclusion*;
Action III: *eCommerce, Research-Development and innovation in ICT*; and
Action IV: "*Broadband and digital services infrastructure*".

As a consequence, research fields and projects that are related to the above mentioned topics are more likely to be supported. Action I includes, among others, the fields Cloud Computing and Big Data, whose mechanisms and concepts will play an important role in the first stage of our proposed project, when a series of analysis and statistics will be carried out on large data sets concerning critical resources.

The importance of Cloud Computing is sustained by published evidence (according to **[3]**, the use of Cloud Computing in the EU public sector exceeded 64%) and actual trends in the domain development, which emerged as an important ICT solution within Europe, and is presently in the phase of intensive work on standardization issues.

[3] Digital Agenda Strategy for Romania

The Romanian Government is also investing in the development of a national Cloud infrastructure. According to the Romanian study from 2014[4], developing the Cloud infrastructure may bring several important benefits, especially in the area of services, such as quality improvement, faster processing, and cost reduction.

Other important issues for our proposed project, are related to Big Data, which deals with huge volumes of data that must be processed and transformed into knowledge. This is not a new research area. But the continuous increase of generated data volumes and the diversification of the prediction and risk analysis applications that consume them ask for new, high performance and efficient processing solutions. According to the EU market research analysts, in the future, the organizations that will be able to make real-time business decisions based on Big Data solutions will experience a rapid growth.

According to the National Strategy on Digital Agenda for Romania[3], the development of new solutions in the Big Data field will bring significant benefits at the EU level. They are:

- "transform Europe's service industries by generating a wide range of innovative information products and services;
- increase the productivity of all sectors of the economy through improved business intelligence;
- more adequately address many of the challenges that face our societies;
- improve research and speed up innovation;
- achieve cost reductions through more personalized services;
- increase efficiency in the public sector
- get insights from data that can prevent or deter fraud and abuse."

Comparing the Performance in R&I of the four partner countries in this project

The four partner countries in this project are: Romania, Germany, Italy and The Netherlands. The main goal of the project is to bring the Romanian level of excellence near the value of the other partner countries.

In terms of the overall R&D intensity factor, Romania ranks 27th in EU, whereas for the others partner parties the ranking is as follows: Germany - rank 4, The Netherlands - rank 10, and Italy - rank 18.

In choosing this partnership, it was taken into account the specialisation areas of each partner. A full list of the S&T specialisation areas of each partner country is found in Annexe B. Note that ICT is a major area in three of the partner countries, namely Italy; Germany and The Netherlands. Also the environment and the management of critical resources plays an important role in Germany and The Netherlands.

The aim of the project is the ***development of a framework for implementing the scientific strategy*** for stepping up and stimulating excellence and innovation capacity of the UPB team, towards inter/trans-disciplinary and practical applicability – valorisation and impact in "added value smart data e-services for water management", that also fits to the Smart Specialization Strategy of Romania. The implementation is based on using the potential of UPB and the opportunities given by the Twinning programme, and reducing the weaknesses, as resulted from an internal SWOT analysis of UPB.
According to the last ranking of Romanian higher education institution, done in 2011 by the Ministry of Education, UPB is one of the most active research units in the Romanian research landscape, as proven by the placement in the group of the 12 research intensive universities, from about 100 public and private evaluated universities in the country.

Also, SCIMAGO characterization of institutions, based on research, innovation and web visibility indicators[5] gives UPB a leading position in Romania. Anyway, at international level the positioning needs to be improved. Table 1.1 emphasizes that, while the values of the output, scientific pool, specialization and international collaboration indexes are high, the impact, quality and excellence have to be improved.

[4] http://www.idc.com/getdoc.jsp?containerId=ES32W
[5] http://www.scimagoir.com/institution.php?idp=6944

Table 1.1: Research and Innovation indicators for UPB[4]

Indicator	Description	Place in Ro	Place international
Output	Total number of documents published in scholarly journals indexed in Scopus	1	517
Scientific talent pool	Total number of authors from an institution in the total publication output of that institution during a particular period of time.	1	692
Specialization Index	The Specialization Index indicates the extent of thematic concentration /dispersion of an institution's scientific output. Values range between 0 and 1, indicating generalist vs. specialized institutions respectively.	5	2069
International Collaboration	Institution's output ratio produced in collaboration with foreign institutions. The values are computed by analyzing an institution's output whose affiliations include more than one country address	5	2122
Normalized Impact	Normalized Impact of led output is computed using the methodology established by the Karolinska Institutet in Sweden where it is named "Item oriented field normalized citation score average".	8	4839
Excellence with Leadership	Excellence with Leadership indicates the amount of documents in the Excellence rate in which the institution is the main contributor	9	996
Scientific Leadership	Leadership indicates the percentage of an institution's output as main contributor, that is, the amount of papers in which the corresponding author belongs to the institution	10	489
High Quality Publications	Ratio of publications that an institution publishes in the most influential scholarly journals of the world, those ranked in the first quartile (25%) in their categories as ordered by SCImago Journal Rank (SJRII) indicator	10	4539
Excellence Rate	Excellence rate indicates the amount (in %) of an institution's scientific output that is included into the set of the 10% of the most cited papers in their respective scientific fields. It is a measure of high quality output of research institutions	11	1890

University Politehnica of Bucharest is an advanced research and education university, consisting of 15 faculties. The "Department for Computers", applying for this Twinning call, is part of The Faculty of Automatic Control and Computers and manages the National Center of Information Technology (NCIT). NCIT includes several research and teaching laboratories in the fields of High Performance Computing; Distributed Systems and Applications; E-Business and E-Government; Artificial Intelligence; Decision Support Systems for Cyberinfrastructures based on Geo-Spatial Data. The research group has good results in

- Data processing, even for big data
- Distributed systems
- System integration
- Heterogeneous systems
- Cloud computing
- Interoperability
- Participation in interdisciplinary research projects

The weaknesses are in the field of

- applying the research results in the market
- participation as experts in research - academia – partnerships; and
- making ourselves known in the European research landscape.

A detailed description of UPB is given in section 4 of this proposal.

The three internationally-leading research intensive counterparts are:

1. Biccoca University, Milano, Italy: Department of Computer Science, Systems and Communication (UNIMIB)
2. Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. - Fraunhofer Institute FOKUS, Berlin, Germany (FOKUS)

3. Stichting IHE (UNESCO-IHE) Institute for Water Education, Delft, The Netherlands (UNESCO-IHE), Department of Integrated Water Systems and Governance,

The consortium was constituted so that it is representative both for the Twinning project and for the research topic, the partners having outstanding research outcomes. The related research field has a strong interdisciplinary character, with main focus on supporting information technology. The applicant is active in the field of IT, it has already results in the proposed research field. To strengthen UPB's research capacity, the project consortium consists of two leading research partners from the field of IT (FOKUS, UNIMIB) and one leading research partner from the field of water resources management (UNESCO-IHE).

The most important expected impact of the project is to develop and implement a suitable, stable and sustainable framework for the scientific strategy enforcement of our research strategy with effect, on short term in the increase of publications number with high impact and visibility; the submission of common project proposals; and, on medium and long term the active participation in research and technology networks in the fields of water resources management and supporting information technology disciplines.

1.1.2. The importance of the research field

The research field that is subject of strengthening through this project is that of **smart data driven e-services in water resource management, made available to communities and/or specific stakeholders such as companies, citizens, and authorities**. Although it is a research field of the ICT domain, it requires deep interdisciplinary approach and competences. Advanced, appropriate ICT systems, tools and methods are used to manage complex water related processes.

Water is an essential, limited and sensitive life resource, and it is in focus of various persons or groups, from simple citizens to decision persons at country/world level, and, of course, also of scientists from different research fields.

Water resource dynamic consequences exceed watersheds or water systems (Figure 1.2). Due to the support of new technologies, researches like People, Water, and Climate: Adaptation and resilience in agricultural watersheds[6], developed a better understanding of the processes that link global-scale climate and socioeconomic drivers to regional-scale responses in land use decision-making, water quality, and water quantity.

Research projects dealing with sustainable environment try to respond to complex questions like:
- What are the likely scenarios of climate and land use for a specific region over the next 70 years, and how do they affect projected water quantity and quality?
- What is the proper mix of urban infrastructure and land use required to produce a greater likelihood of a sustainable water future given the uncertainties in climate and land use (flood control structures, green vs. traditional grey infrastructure, and required aquifer recharge)?
- What are the socioeconomic and environmental trade-offs associated with choices in management of floodplains, aquifer recharge, and green infrastructure?
- How do we adapt to changes in climate and water resources and what economic incentives produce behaviors leading to desirable outcomes?

[6] http://iowacedarbasin.org/?page_id=940

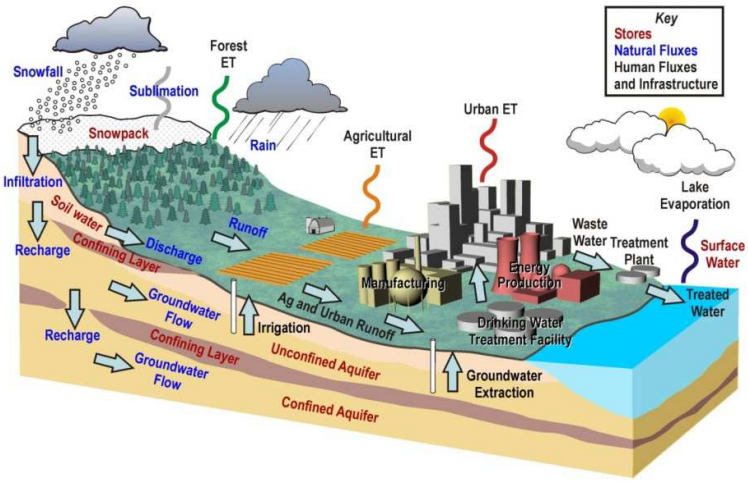

Figure 1.2 Schematic of the hydrologic cycle [13]

Understanding Water-Human Dynamics with Intelligent Digital Watersheds [11] introduces the new concept of Intelligent Digital Watershed, as a virtual environment that enables to:

- determine the time delay between socio-economic decisions in land management practices and the resulting water quality at multiple scales
- discover patterns, emergent behaviour, dynamic interactions and underlying principles from the integration of heterogeneous data collected or generated by multi-disciplinary simulation models
- develop computational intelligence to fill-in data gaps, improve model parameterization, and understanding of the connectivity among complex social-economic and biophysical systems
- determine needs (data transformation, knowledge extraction/representation, and visualization) for a real-time, multi-domain cyberinfrastructure system using distributed resources to engage a variety of users in watershed science & management (researchers, educators, students, farmers, managers, and the public)
- explore the portability of the algorithms, methods, and knowledge assembled in the IDW to other science domains.

Current research and innovation activities in the water management field are focused on the water-energy nexus by addressing both energy and water consumption reduction [6]
Reduction of energy consumed in relation to water processing is addressed by current researches, benefiting from IT support, dealing with several challenges like: energy recovery, demand forecasting [5] and management, leakage detection and localisation [3],[4], reuse and cascaded use of water.
Reduction of water consumption is a broad issue that includes improving the management of the water distribution network (asset management and leakage management) in order to reduce non-revenue water and reducing water consumed by customers (demand management), by taking into account several parameters: availability of water resources, changing demands, current state of the distribution network, energy consumption required. To achieve this, end-user awareness has to be increased and their behaviour has to be influenced (demand management) [10],[15] by ensuring near real-time metering of WDN (Water Distribution Network) and real-time metering of households as well as collection of contextual information. Although the emphasis, in this case, is focused on the energy consumption, all the issues can be addressed through the same solutions defined in the previous section. The main difference is related to the need to close into the loop other information and data related to energy consumption rather than water. While some of them are already managed by already available systems (e.g. energy consumption monitored through SCADA (supervisory control and data acquisition), some others have to be seamlessly integrated, such as energy price as well as the possibility to dynamically select the most convenient (i.e. cheap) energy supplier according to the demand forecasting for the day or a time period.

A report released by the European Commission[7] specifies that water management in Europe is not performed at maximum efficiency, and that better management would raise the water efficiency by 40%. This is a desirable result, as by 2030 it is estimated that the water consumption in Europe will increase by 16%.

Recently, water utilities and regulatory authorities became well aware of the need to "control" and publish to the community (keyword: Open Data) regional, sub regional and international water-data (streaming water, drinking water, waste water, floodwater etc) in terms of demand as well as in terms of water quantities and quality (in terms of daily composition and contamination values) and in terms of water infrastructure and measures for Quality Assurance. This goes along with promoting customers' citizens awareness and more sustainable water usage behaviours among stakeholders (industry, energy, communities) and citizens [14]. However, customers' awareness is still small and unsatisfactory as it is usually only driven by water prices. To implement effective water demand management, customers need to be provided with easy to understand and assimilate information about availability, withdrawal, treatment, distribution and waste of the water resource. Enabling effective water demand management implies several ICT and non-ICT issues. To affect consciousness and stimulate change in behaviour customers need to be presented in real-time with information of their current water consumption and actions they can take in order to improve. An increasing number of sensors is therefore needed to measure water volumes and quality consumed by every device drawing water (sinks, bath tubs, showers, washing machines, refrigerators, toilets, etc.) in order to report consumption in real time. The increased number of sensors will allow to design and develop innovative data analysis algorithms for performing customer behaviour analysis, detecting behavioural patterns and constantly promoting changes in water usage behaviour. Water-related gaming, social networking or adaptive pricing have been identified as effective solutions to promote sustainable water consumption as well as to reduce peak water consumption and related costs (of energy, of water distribution system maintenance that needs to accommodate variable operation conditions, etc.)

With these examples of water related research directions that need strong ICT support, we want to emphasize the variety and complexity of the research field, and the necessity of targeted, specialized research teams, able to deal with both perspectives, but with deep expertise in one of them.

1.1.3 Interdisciplinary aspects

Figure 1.3 summarizes the main systems adopted in the water management, that usually are not completely integrated and therefore showing that integration is a need for developing a comprehensive decision support system for better support the management of aquatic environments.

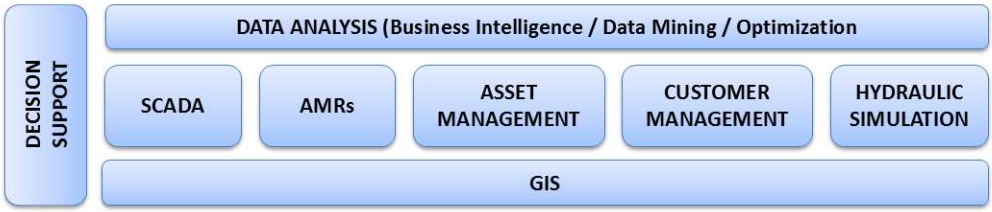

Figure 1.3 – Technological systems used in Water Management

The recent technological achievements in Water Management affects many of these systems and, in particular, the selection of suitable Data Analysis approaches [1],[2].

Figure 1.3 can be considered as an architectural blueprint for a data analytics system for the application domain "water management". It shows how IT expertise in data collecting, communication, provisioning, analysing and decision support can be applied to a specific application domain.

The first issue, related to SCADA - (supervisory control and data acquisition) and AMR - Automatic meter reading components, regards the increased frequency (near-real-time) of measurements, enabling a more

[7] http://europa.eu/rapid/press-release_IP-07-1276_en.htm?locale=en

accurate monitoring and modelling of network to improve management effectiveness. Then, increasing the number of sensors on the water distribution network permits to collect more information on water availability, withdrawal, quality etc. Moreover, increasing the number of sensors per household permits to acquire real-time measurements of water consumption and monitor user behaviour for provisioning contextual information on the measured data and increase user awareness and stimulate behaviour changes.

As subsequent issue, the increased amount of sensors and meters, as well as parameters and contextual information, have to be integrated according to the paradigm Internet of Things and Internet of Thing/Everything (IoT/IoE), in order to seamlessly share large amounts of data among the different systems and according to standards. Semantic Web of Things allows the user to search for real-world entities by their current digital representation. Often, such search requests refer not only to the output of sensors, but also to further machine-readable information that is available elsewhere in the Web (e.g., company maps, meeting schedules, calendars). The search engine needs to integrate these different static and dynamic data sources in a seamless way.

Additionally information about the available resources and our environment can be found in Open Data portals such as the German government Data portal referring to "Umwelt und Klima"[8] or the UK portal referring to "Environment"[9].

Another issue concerns efficient management of huge amount of data: secure storage, efficient processing, analysis and sharing. The platforms offering these services are usually large scale and distributed. Due to the high number of components, the platforms must respond to severe requirements concerning the scalability, fault tolerance, and data protection. In addition, they should include data validation, reconstruction and aggregation services, as well as unified and standardised metadata description and sharing in accordance with Open Research Data and GEOSS Data Sharing principles.

The final issue is the design and development of an integrated and comprehensive Decision Support Systems, that includes all the components illustrated in Figure 1.3 and is able to provide on-line and near-real-time information allowing for evaluation of various actions and control strategies. According to the integration issues, this DSS is able to work on the integrated sources of data/information, providing decision support based on data processing/analysis at different levels of the water distribution network management.

Figure 1.4 summarizes the steps to be achieved over time.

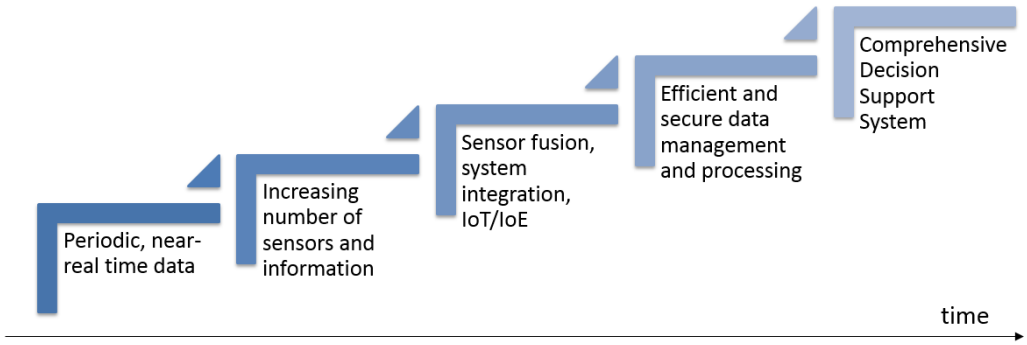

Figure 1.4 – Technological achievements over time[10]

Figure 1.4 is an example of the application of data analytics techniques and steps in the area of water management. It shows the close relationship between supporting ICT solutions and domain specific

[8] https://www.govdata.de/
[9] http://data.gov.uk
[10] Elaborated from "Emerging topics and technology roadmap for Information and Communication Technologies for Water Management - ICT for Water Management Roadmap", EUROPEAN COMMISSION, Directorate-General for Communications Networks, Content and Technology Smart Cities and Sustainability unit

prediction and decision processes. A corresponding architectural framework has been provided for example by the German Federal Ministry for Economic Affairs and Energy in their "Smart Service World" program.

As many different types of data and information are collected, shared and integrated, their analysis may produce different decisions. For instance, information on water availability and current/predicted consumption can be used in day-to-day management (*operational level*); however, when for medium or long term are considered, tactical or strategic plans can be defined.

The following Figure 5 summarizes the three different levels of planning (*operational*, *tactical* and *strategic*) in the water management and the relative time horizon to decide/act.

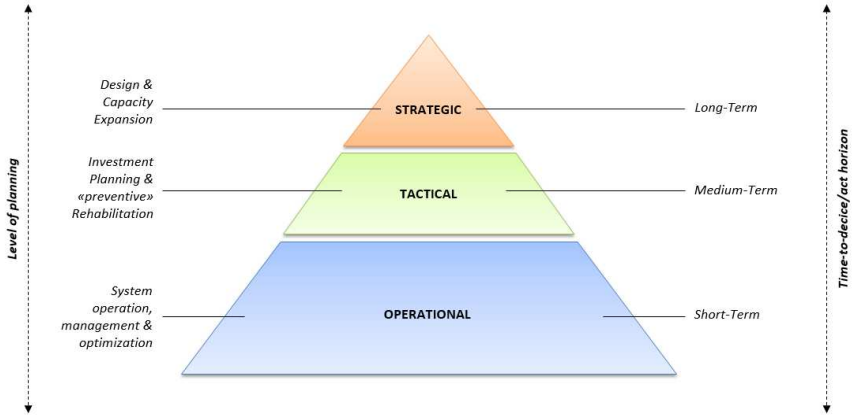

Figure 1.5 – Planning Levels and time-to-decide

ICT systems currently adopted by water utilities are usually fragmented and devoted to support decisions only for specific operation. This lack of integration requires to collect the same information any time a different system requires it for processing. The development of a coherent, comprehensive decision support system, sufficiently open to ensure interoperability with other systems, seamless exchange of data and possible future improvements, is therefore an important goal.

Taking into account that data may be missing, analytical capabilities have to be implemented in order to validate and reconstruct missing data before processing and decision support. This can be achieved by implementing data analysis algorithms based on historical data and/or other information.

Research activities are also focused on demand forecasting and demand management. Demand forecasting, in particular, can support water entities in forecasting future consumption and help to optimise water distribution systems accordingly, at very different time scales: in the short-term (24-48 hours) to optimize, for instance, pump scheduling to reduce energy costs, or in the medium-long term to plan possible expansions of the water distribution network. Both demand forecasting and demand management can help to save on energy bills, allow to prepare for changes in water availability and to influence and control the demand in order to reduce peak energy consumption while leading to a more balanced and sustainable water consumption. With respect to the demand forecasting, in particular for the short-term, not only innovative and efficient algorithms are needed but also near-real-time metering in order to identify patterns and variances at urban as well individual customer level.

The strong dependence of water researches and information technology is revealed by the appearance of a new engineering and research field. ***Hydroinformatics*** is the study of the flow of information and the generation of knowledge related to the dynamics of water in the real world through the integration of information and communication technology (ICT) systems for data acquisition, modelling and decision support, and the consequences for the aquatic environment and for the management of water based systems.

Hydroinformatics emphasizes the information cycle, including the acquisition, archiving and analysis of monitored data, the modelling real world water based systems to generate new knowledge whether for

planning and design or for operations, and the development and integration of information (or knowledge) systems in support of safe and reliable decision making at all levels of the management of such systems [9].

Data management focuses on techniques for acquiring data of the real world whether by remote sensing from satellites or airborne sensors or ground monitoring networks, archiving such data and associated results from modelling in databases, analyzing, processing and presenting the information through geographic information systems.

The modelling paradigms include: computational hydraulic modelling, which is based on a scientific understanding of the physics of the flow of water, the chemistry of the associated substances and the biology of the ecology in the aquatic environment; data driven modelling that seeks to establish particular, artificial intelligence relationships that exploit or connect different sets of data from the real world water based systems; and agent based modelling where each individual entity is modelled in respect of rules describing its relationship to every other entity and its (aquatic) environment.

The knowledge systems integrate the different aspects of the information cycle for better management of integrated water systems while making possible new ways of information provision to larger numbers of people and of support for decision making that is open, transparent and inclusive [8].

Hydroinformatics is deliberately focused on applications to all areas of integrated water management, and especially to river basins, aquifers, irrigation systems, urban water systems, estuaries, and coastal waters. It is as much concerned with the management of the environment (as an asset) from a planning and design perspective or from a real time forecasting and warning point of view, as it is with the simulation and analysis of extreme events: floods, surges, droughts, pollution and significant morphological and ecological changes. Hydroinformatics also addresses issues to do with providing advice using integrated data collection, modelling and decision support systems to different demand groups such as farmers and flood or drought prone communities as well as contractors or operators. It has significant implications for other topic areas such as integrated water resources management, capacity building, knowledge management, learning alliances, policy analysis, and so on.

As a consequence of the development in high-resolution monitoring and remote sensing technologies huge amounts of data are becoming available within water management systems.

While in software engineering data models are developed and data conforming to the models are produced, in data mining and machine learning, the data comes first and the challenge is to infer suitable data models. Therefore, in the “Smart Data” domain, the data sets are given and the existing (generic) system tries to construct a data model from that data. Big Data usually covers four aspects of data (called the 4Vs): Volume, Velocity, Variety and Veracity. However, the most important feature of Big Data is Value [12].The concept of Smart Data is realized by extracting value from a variety of data, and how Smart Data for growing variety (e.g., social, sensor/IoT, health care) of Big Data enable a much larger class of applications that can benefit not just large companies but each individual. More recently [7], it has been proposed to split the Big Data concept in two subsets: the Big Data *per se*– with a focus on solutions related to the management of huge and/or high-frequency data, usually in real-time – and the Smart Data – more focused on the efficient analysis of huge/stream data, even in this case (near) real-time. The merge of these two concept has been called “closed loop” [7]. Thus, Smart Data is a set of data (Big or not) valuable for the specific goals (e.g. business, environmental impact, management, etc.) which can reduce “time-to-decision” and “time-to-action”.

Thus, as a conclusion to this short overview, it results the growing complexity of the issues related to critical/water resource management, that vital dependence on smart data processing as well as the necessity of a holistic approach of all phenomena/processes related to resources management.

All research directions briefly described above have in common the intensive use of "smart data" by means of information technology in dealing with various aspects regarding water resources.

1.1.4 The importance of the research field in HORIZON 2020

The water resource management topic is addressed both independent and related to other topics Horizon 2020[11]. Its importance is revealed by the important number of calls under different sections of the work programs that addresses related topics.

We performed an analysis among both the opened and forthcoming H2020 project calls to, looking both for ICT topics like smart data, big data, critical resource management, Internet of things, data mining, and for water management topics. Following specific calls on the water topic have been issued in 2007-2013:

- 2010 - The EU Water Framework Directive
- 2012 - Blueprint for Europe's Waters
- 2012 - EIP Water
- 2012 - EIP Smart Cities and Communities
- 2013 - World Water Week - All about water by ERC projects
- 2013/2014 - Expert Consultations on ICT and Water Management

The internationally-leading research partners have participated in several projects, as presented in Part B section 4.

In the current H2020 opened calls, from a total of 57 main calls, 6 of them have topics strictly related to water management, and 11 of can be mapped on this subject.

A topic related to our project proposal is big data processing and analysis. To achieve effective water management, is also necessary to measure various parameters in real-time. Enlarging the measurement scope, the collected data, as well as the processing requirements will lead us, eventually, to big data approaches. Big data is a fairly common topic in the H2020 project proposals, and in general in European projects. In the project presentation page offered by CORDIS (the Community research and development information service), 261 funded European projects from the total of 100925 have as main topic, big data.

In H2020 there are also opened calls strictly on big data, such as "ICT-16-2015: Big data - research", which focuses on industry-validated and user-defined challenges.

To better organize future priorities, we also conducted an analysis of the forthcoming 2016-2017 Horizon 2020 Work Programme. The Work Programme is divided in 16 major categories, starting with "Future and Emerging Technologies (FET)" and ending with "Science with and for Society"[12]. Among these, two categories have topics on water management and seven on big data.

Topics related to smart data and Internet of Things are foreseen in the Work Programme "Nanotechnologies, Advanced Materials, Biotechnology, and Advanced Manufacturing and Processing" for the 2016-2017 period.

Subjects such as reduction and reuse of waste, green technologies and reducing water use will be under the INSPIRE initiative - The Sustainable Process Industries cPPP.

The second Work Programme that targets water management related topics is "Societal Challenge 'Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research, and Bioeconomy". Important topics for this Work Programme are: resource efficiency, trans-disciplinary research and innovation, cross-cutting marine and maritime research, and big data.

1.1.5 Alignment with the Smart Specialisation Strategy of Romania

Another important objective of the proposal is **strengthening the contribution** of the Romanian research organization **to the overall Smart Specialisation Strategy of the country**.

[11] http://ec.europa.eu/programmes/horizon2020/h2020-sections
[12] http://www.eurida-research.com/horizon-2020-news/news-16/index.html

In June 2014, representatives of the Romanian government presented, in Dublin, the RDI strategy of the country, for 2014 - 2020[13]. In the Background document it is stated: "In terms of the number of researchers, the Romanian RDI system is undersized by European standards, with the number of FTE researchers at a quarter of the EU average. The private part of this system is, comparatively speaking, even more underdeveloped, employing just one fifth of the country's researchers. After a consistent, threefold increase in public R&D financing in the years immediately preceding the economic crisis, the level of funding plummeted to around 0.3% of the GDP. Business expenditure has been decreasing as well, to less than half of its public counterpart."

In Romania, research is performed in around 260 public R&D entities covering a very large range of fields. An important contribution to the Romanian research comes from the around 90 Romanian universities, both public and private.

During the elaboration of the National Research Strategy 2014-2014, four major fields of Smart Specialisations were identified. These reflect the national priorities of the country, being also aligned to the European research strategy:

1. BIOECONOMY;
2. ICT;
3. ENERGY AND ENVIRONMENT; and
4. ECO-TECHNOLOGIES.

In Romania, an improved water resources management, assisted by information technology is necessary, because water is associated with high risks:

- there are several rivers that have high flooding potential, mainly in spring;
- there are two regions (Oltenia and Moldova) that present high risk of desertification, due to long periods without rain and with high temperatures, in summer;
- 70% of the drinking water is obtained from surface waters, that are exposed to natural or human caused pollution.

Water is also a valuable energy resource, about 25% of Romania's energy is hydropower.

All the particular fields of ICT, set as priorities by the Smart Specialisation Strategy are relevant and influenced by the development of the research field envisioned by this proposal:

- *Analysis, management and security of big data*
- *Future internet*
- *Software development technologies, instruments, and methods*
- *High performance computing and new computational models*

Three of the four particular fields of Energy and Environment, are also tackled by researches in smart, data driven services in water management:

- *Increasing end-use energy efficiency*
- *Optimizing the use of conventional and non-conventional water resources*
- *The intelligent city*

Being aware that research cannot be conducted with success by a "single player", the project aims to create a long term link between the project partners, **to include the Romanian organization as an active member of the research networks of the internationally-leading research partner institutions,** thus increasing the participation of UPB in European research landscape.

1.2 Relation to the work programme

The aim of this project is to create a pole of excellence in the University Politehnica from Bucharest, Department of Computers - National Research Center for Information Technology, with the assistance of the internationally-leading counterparts, University Biccoca University, Milano, Italy; Fraunhofer Institute

[13] http://www.research.ro/ro/articol/3343/strategia-nationala-de-cercetare-si-inovare-2014-2020

FOKUS, Berlin, Germany and Stichting IHE (UNESCO-IHE) Institute for Water Education, Delft, The Netherlands.

The four objectives of the project:

- Objective 1: Enhance the science and technology (S&T) capacity of the participating institutions
- Objective 2: Raise staff's research profile as well as the one of the institutions involved
- Objective 3: Contribute to the overall Smart Specialisation Strategy
- Objective 4: Contribute to the development of a new, interdisciplinary research domain,
- Objective 5: Include the Romanian organization as an active member of the research networks of the internationally-leading research partner institutions

respond to the specific challenge of the Twinning programme that is addressing the networking gaps and deficiencies between this research institution and the internationally-leading counterparts.

The smart, data driven e-services in water resource management research field will be significantly strengthened by activities specific to coordination and support actions: trainings, workshops, summer schools, staff exchanges and organization of scientific events. A link between the partner institutions will be created, that will help UPB to enter a stable research network with excellent research results.

The general expected impact is the measurable and significant improvement in the overall scientific and innovation capacity of UPB, and it is defined in term of increase of peer-reviewed publications, increased impact factors in terms of citations, increase of project proposals, etc, as described in §2.1. The competence for patenting will be enhanced, so an increase of the patents number is expected. The research team of UPB-NCIT will be visible and active in a new research field in Romania: the hydroinformatics.

1.3 Concept and approach, quality of the coordination and support measures

The concept is based on the creation of a research frame that aggregates the research efforts of the UPB team in the research field, by applying the best practices of the partners in common activities.

The **scientific strategy** of the UPB-NCIT research team is oriented towards intensifying researches that both help **solving acute problems** and are **aligned to the research efforts** of the European research community. **Inter/trans-disciplinary** and **practical applicability** – valorisation and impact in "smart, data based e-services for water management" are the red lines in the research approach.

The concept is based on two pillars: the development of scientific competences and the development of organizational skills, specific for the research activities (figure 1.6):

The first pillar, *Enhancement of scientific competences*, is realized through trainings on selected, advanced scientific topics, staff exchanges, summer schools, organization of scientific events, participation to conferences and workshops. The detailed description of each activity is given in §3.1. The expected result of these activities is the overall increase of scientific results, in terms of increased peer-reviewed publications, increased impact factors in terms of citations, increased number of submitted project proposals, increased number of patents.

The second pillar, *Enhancement of organizational capability* is realized through trainings and workshops on topics related to research methodology, quality assurance and assessment in the research activity, intellectual property, patent writing. Networking with relevant stakeholders from research, companies, public administration, or interested groups is a priority of this pillar. A Knowledge and Networking Environment, Knowledge Lake, will be developed, to ensure the access to scientific resources and general information, as well as a support for networking. The expected results of these activities are: a Roadmap for the scientific researches in the specific field, for the next 5-7 years; an implemented Research Quality Assurance System; and a stable, efficient and effective research environment.

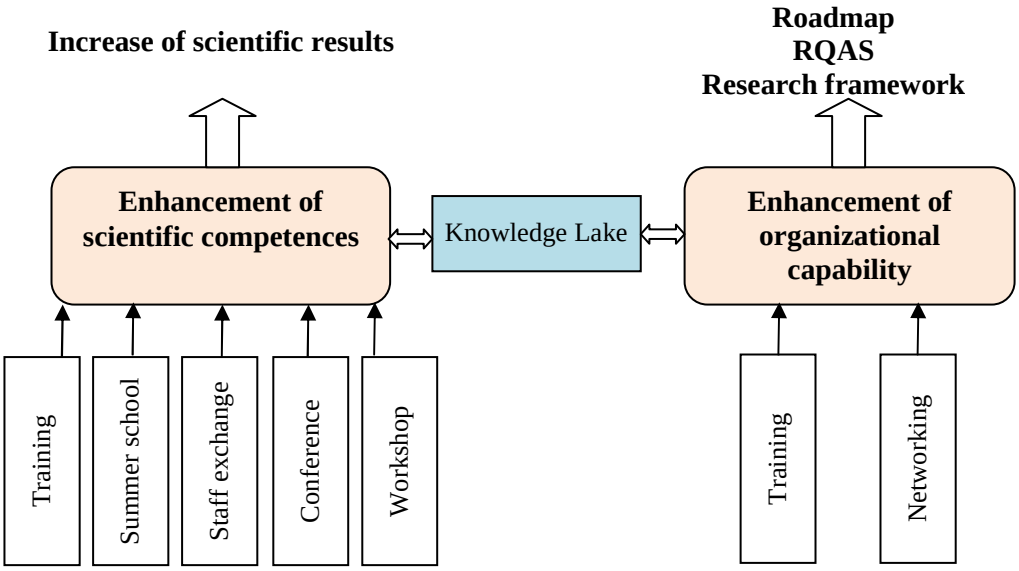

Figure 1.6 Project overview

In the first semester of the project, a detailed Technology survey: Prospective and challenges will be elaborated, and a gap analysis, to establish the target for the UPB team. The Roadmap for the future research activity will be discussed and validated together with the project partners. From his 5-7 years Roadmap, a detailed operational plan, for the duration of the project, will be extracted. Towards the end of the project, a quality assessment for the research activities will be carried out and the Roadmap will be revised. This will ensure the sustainability, over the end of the project.

In establishing the operational plan, the proper use of resources will be a target. To reduce travel costs, events will be combined: an expert coming to a workshop, will also deliver a training on a specific topic.

The Networking and Partnership dimension of the project will include face-to-face information events, and virtual meeting place, hosted by the Knowledge Lake. Participation to the Information events of the European Commission is also foreseen.
Joining national and/or European engineering and/or standardization bodies, related to the research topic and strengthening the cooperation with the companies, through joint research activities and technology transfer are also planned in the project.

The trainings fall into three big categories:

1. topics on specific research topics in the field of ICT that are relevant for the research field of value added data based e-services for water resource management;

2. trainings on specific research topics in the field of SDWM, presented by experienced experts. In order to optimize the project resources, the trainings will be organized in conjunction with other scientific event, like workshops, conferences, exchanges of experts. These are mainly addressed to young scientists, master and PhD students and post-doc researchers.

3. topics related to generally increasing professionalism in research, that are addressed both to experienced and young researchers

The summer schools are oriented towards learning to solve specific problems, related to the scientific field. Participants will solve tasks individually or in teams, under the guidance of experts from the excellence partners. One of the summer schools will include a contest. Participants will have to elaborate a concept for a solution to a water related problem, based on smart data.

The organization of scientific events is another dimension of the project. A series of high quality scientific events to facilitate knowledge transfer and raise the visibility of UPB at national and international level will

be organized. The events will reunite: experienced and young researchers from UPB, research staff from the partnering institutions, as well as invited researchers from other bodies (universities, companies) relevant to the development of the research field. The planned events fall into four categories:

a) Workshops that will be co-organized with the EU partners. Research policy documents, developed in WP1 will be discussed and validated during this workshops. Analysis of the KPIs performed by UPB will be also a workshop topic. Four such workshops are planned during the project.
b) Scientific events that are already organized on more or less regular basis by UPB will be planned and executed with extended scope, by increasing the level of participation of high profile researchers, young researchers and PhD students, and focused on topics specific to ICT in Water Management. An example is the organization of the CyRM workshop (Workshop on Cyber-infrastructures for Natural Resources Management), organized since 2013, co-located with the CSCS conference. The result will be the enhancement of the scientific visibility of the events, an increase of scientific quality standards and a higher level of participation from both home and abroad.
c) Organization of an international, co-located conference. Together with the project partners, the most suitable event will be identified and the necessary steps will be followed, in order to have a special section in the event, on the research topic of SDWM. This approach has the advantage of optimizing organizational efforts and, more important, making bridges between scientists working in different but related areas, giving thus the possibility of an integrated view of the research field.
d) Participation in other scientific events, like conferences, round tables, working groups, etc.

The researchers will be encouraged to participate at scientific events, to strengthen the research skills of the human resources, to give them the possibility not only to read scientific papers, but also to participate at scientific debates. In order to gain good visibility, strong participation, and higher paper acceptance rates at peer-reviewed workshops and conferences, we will focus on:

- an adequate planning
- preliminary dissemination of the events
- set up of prominent programme committees
- agreement for publication of events proceedings by well established editors such as Springer, IEEE CPS
- (Conference Publishing System) or other, so as to gain full visibility and to attract significant contributions
- publishing a special issue of IT for water resource management.

With the support of the partners, an international scientific event will be organized, as a co-located in a highly visible event, relevant for the research field.

Promotion and dissemination activities are essential lines of actions towards achieving the project objectives. The actions will encompass both dissemination activities of the project outcomes and results, and promotional activities of UPB excellence in research towards increasing UPB visibility at regional, European and international level. This will be done through electronic media, through a visual identity kit and through informal methods, at any contact with stakeholders.

The project results will be disseminated in EU publications, through project leaflet and project brochure, during the information events organized during the project, and through the Networking and Knowledge E-Environment, "Knowledge-lake", specially set up for the project stakeholder community. "Knowledge-lake" will support both networking activities and storing, promotion and search for information and knowledge relevant to the research topics in the field of SDWM.

Knowledge-lake will allow different access to information, from public to classified, based on a multi-level user account system. Knowledge-lake will facilitate the rapid access to most of the on-line resources related to networking and partnership opportunities from a central point. The network utility will be much broader than the scope of the project and UPB staff utilization; it will be accessed by scientists from Romania and Europe at large. The Knowledge-lake will host the federation of web sites of specific events, in order to make them accessible to the entire community of SDWM. It will ease the contact between persons and/or organizations, on specific topics. At the same time, it will allow every interested person to be informed about the latest results/achievements/events.

The project management will ensure the proper frame for the project rollout. For each task, we will take into account the following aspects:

- Problem identification
- Use of research resources
- Stakeholders involvement
- Proof of concepts
- Deployment
- Dissemination
- Identification of complementarity between partners, and of the UPB team short-comes.

The national or international research and innovation **activities which will be linked with the project**, are:

- Roll out of research projects in the research field (existing and new ones), on national/European level. The research team will discuss, present and disseminate the research result from national and European projects in the workshops and scientific events organized by the Twinning project.

- The Faculty of Automatic Control and Computers is the beneficiary of an infrastructure project, financed from structural fond, for the construction of a new building for its research centers (PRECIS-project[14]). The twinning team will be hosted in the centre and will be connected to the research activity of other research teams of the faculty.

- Involvement of doctoral and master students in research activities in the specific research field

- Intensify the cooperation with companies, through direct research and technological co-operations, through internships of students and through participation at common events organized by the professional associations (like The Romanian Association the Software and Electronics Industry)

- Participation at scientific events organized by the research community of the university and/or of other organizations

There are **no particular sex and/or gender issues**, related to the submitting organization, to the future project environment or to the partner organizations. In UPB, there is no discrimination regarding employment of female research and didactic staff, or taking leadership of units or projects. Thus, the President of the university, the Dean of the Faculty of Control Systems and Computers, hosting the proposers' research group, as well as the PI of this project proposal, are female.

2. Impact

2.1 Expected impacts

2.1.1 Project contribution to the expected impact

One of the important expected impacts of the project is to develop and implement a suitable, stable and sustainable framework for the scientific strategy enforcement of our research strategy. Such a strategy will have effect on both short and long term; on short term there will be an increase in the number of publications with high impact and visibility, submission of common project proposals; and, on medium and long term the active participation in research and technology networks in the fields of water resources management and corresponding supporting information technology disciplines.

The research team of UPB has identified the most important targets, related to the research and innovation indicators, that will be enhanced due to the project results:

- Increase of the number of publications. **Each staff member** of UPB involved in the project will submit **at least 2 peer-reviewed publications per year**.

[14] http://precis.acs.pub.ro/proiect/wp-content/uploads/2014/06/prezentare_centru_de_cercetare.pdf

- Increase of **High Quality Publications and Excellence rate**. The conferences/magazines/publishers will be carefully selected to ensure a increased impact factors in terms of citations. The Research Quality Assurance System set up in the project will contribute to a better paper writing and selection. The best papers will be also supported by **dissemination as open publications**.

- Increase of **Specialization Index**. The project is focused on a specific research field, that requires special competences, enhanced during the project. The research outputs will be more focused on solving concrete problems, rather than having a general, theoretical. approach

- Increase of submitted patents. Immediately **after the project ends, 1 patent** will be submitted, in the research field, with partners from network established during the project

- Set up of **permanent partners' network** in the research field. This will lead to a more active presence of the research team on national and international level

- Proposal submission. **At least 2 project proposals** in this research field, will be submitted during the project.

- Publish a **special issue of IT for water resource management**, in a review with impact factor over 1.

2.1.2 Barriers/obstacles and framework conditions

The general framework of the research system, In Romania, research is performed mainly in universities. There is also a small number of research institutes and very few companies that perform research on commercial bases. In universities, research is done mostly by teaching staff (not by permanent researchers), by overlapping of research and teaching activities. In order to achieve the expected results, a very good planning is necessary, still, it takes longer than in highly profiled research institutions. The involvement of PhD students, from their early study stage is also a way to increase the researchers participation.

If there are not enough research funds for the team, even if this project meets its goals, the increase of KPI could not be as expected. The solution is to intensify the application for projects national and international project, in order to ensure a stability for the researchers.

The confidence of the economic environment and of public administration, in Romanian research, is low, so the networking with these actors can be difficult. Romanian industry and service sectors more oriented towards products and services imported from abroad and sustain the local research in a limited manner. One of the project targets is to intensify contacts through information events and continuous information about the research goals and results, thus to strengthen the relation to the economic partners. An example is given by the " German Water Partnership"[15].

[15] http://www.germanwaterpartnership.de/

2.2 Measures to maximise impact

2.2.1 Dissemination and exploitation of results

Proposed project work package WP5, Dissemination and exploitation of results, is dedicated to a series of actions that will encompass both dissemination activities of the project outcomes and results, and promotional activities of UPB excellence in research towards increasing UPB visibility at regional, European and international level.

In the first 6 months of the project a ***Networking and Knowledge E-Environment, "Knowledge-lake"*** will be set up, to support both networking activities and storing, promotion and search for information and knowledge relevant to the research topics in the field of SDWM. It has a major impact on the dissemination of the project activities, as well as of related scientific events and research results in the research field.

This environment is the virtual meeting place of all members of the network, and supports intelligent information storage, search and retrieval of: research papers of staff and PhD students in the network, PhD thesis, relevant national, European and international projects, pointers to companies doing relevant research in the domain, targeted funding opportunities, plus pointers to: sites containing information on European projects; sites containing information on partner opportunities; gateways to science information and publications; sites that offer ratings and evaluations of universities, sites offering ratings of conferences and scientific events.

It will ease the contact between persons and/or organizations, on specific topics. At the same time, it will allow every interested person to be informed about the latest results/achievements/events.

A visual identity package will be designed: logo, project leaflet; etc the development, dissemination, promotion visual identity and logo, pin, flag, leaflet, flyer, presentations in Romanian and English, CD-ROM/DVD, and awareness package (DPA package). During the implementation of the dissemination plan, the visual identity elements will be used on all deliverables.

A special task is foreseen to promote all activities developed during the project lifetime. An important contribution to this is given by the Networking and Knowledge e-Environment (Knowledge-lake) and the networking activities. Another dissemination component results from the scientific publication activity. Specific promotion activities are:

- participation at Proposers' Day / Info Day, in order to increase visibility of the research results, as a direct consequence of the twinning project, organized by the Commission
- disseminate project results in EU publications, such as The Parliament Magazine, through project leaflet and project brochure, and Newsletter, transmitted to all EU partners and members of the information-sharing network;
- advertise and make inserts in promotion publications.
- organization of an Information day event, with participation of representatives of industry, government, policy makers in the field of SDRC has a strong dissemination component. The aim of this brokering event is to promote UPB as an active partner. During the information day, the project results will be disseminated among local academic and industry, towards local stakeholders and particularly SMEs to encourage engagement in innovative approaches and to enhance the leading role of UPB in the region, as well as to attract synergies between UPB, industry and official entities. The Information day events will follow one of the planned scientific events.
- Select papers to be published on Open science platforms (see https://ec.europa.eu/digital-agenda/en/open-science)

The results of all work packages will be posted on the Knowledge lake. The content and results of the workshops, the participation to scientific events, the organization of the co-located conference have also a dissemination component, that is strengthened by posting information about them, on the platform.

During the scientific activities carried on, a portfolio of research topics in which the team achieved excellence and related interested companies, public or private organizations interested to apply the research

results, will be set up. During the Information days (organized in WP2), contacts with relevant stakeholders will be established, and premises for future common work will be created.

The expected impact of the project is to enhance the research capacity of the widening partner, in terms of research indicators. By disseminating the project results and the activity of the partners, the partner will have contact to a larger research network, will be better known by the stakeholders and will be able to participate to joint research actions with excellence partners. The networking activities will bring UPB closer to strong research communities.

Table 2.1: Individual Dissemination Plan of Partners

Partner	Dissemination plan
UNIMIB	- UNIMIB will include the DATA4WATER results in related lectures, seminars, and projects. - UNIMIB will disseminate DATA4WATER at national and international scientific conferences. - Dissemination of DATA4WATER activities among UNIMIB's partners, both at national (Italian) and European level.
FOKUS	- FOKUS has chairs at various universities (Technical University of Berlin, Free University of Berlin, University of Potsdam) and will include the DATA4WATER results in related lectures, seminars, and projects. - Presentation of preliminary and final results at national and international scientific conferences and trade fairs, such as CeBIT, Mobile World Congress, or European Data Forum. - Through its German eGovernment newsletter with around 50.000 recipients regular updates on the DATA4WATER project development will be disseminated to science, public sector and industry stakeholders. - Presentation of DATA4WATERactivities and results in the workshops organized by Fraunhofer FOKUS and in the eGovernment laboratory and thus exhibition towards the more than 80 lab partners from industry, public administration and sciences. - Presentation of DATA4WATER activities and results in workshops of the Fraunhofer Big Data Alliance, especially in the segment "Energy and Environment".
UNESCO-IHE	- UNESCO-IHE alumni have access to and remain part of a global network, consisting of alumni, guest lecturers, experts and renowned centers of knowledge, together providing a vast source of expertise available to the sector. As such projects results will reach a very large research network throughout the world. - Presentation of preliminary and final results of results will be done at national and international scientific conferences, such as Hydroinformatics conference and IAHR congress

Table 2.2: Individual Exploitation Plan of Partners

Partner	Exploitation plan
UNIMIB	- As an academy, UNIMIB does not intend to make commercial profit out of the project results. Main exploitation activities are related to the possibility to enlarge research speculation as well as its cooperation network. - The DATA4WATER project will further strengthen the UNIMIB contacts and visibility in Romania as well as in the partner networks of FOKUS and UNESCO-IHE. It will enable to find new partners and topics for collaboration.
FOKUS	- As a research institute Fraunhofer FOKUS does not intend to make commercial profit out of the project results. Its research projects are based on the continuous scouting of forward-looking trends. - The DATA4WATER project will further strengthen the FOKUS contacts and visibility in Romania as well as in the partner networks of UNIMIB and UNESCO-IHE. It will enable to find new partners and topics for collaboration. - Among the 80 partners of the well-known FOKUS eGovernment lab, which acts as a bridge

	between industry and governmental institutions, are several ICT solution providers for (big) data management, annotation and analytics (e.g. SAS, IBM, Microsoft, Oracle, Cogia and others). FOKUS will include these companies in the DATA4WATER network as it is of outstanding interest for them to learn more about innovative research in the area of ICT-support for water management and to find partners for development of new products and services.
UNESCO-IHE	- As an educational institute UNESCO-IHE has a mission to do education and research all over the world without making commercial profit out of the project results. - By getting involved in big data projects, the models will be used and transferred to universities around the world.

2.2.2 The strategy for knowledge management and protection[16].

As a coordination and support project, DATA4WATER will host, through the Knowledge Lake, the research results specific for the research field.
A special care will be taken to protect intellectual property rights, as well as to respect the deontological norms.
In task T5.5, Valorisation and exploitation/sustainability of project results, of WP5 - Dissemination of project outcomes, relevant scientific papers, written by UPB, will be selected for open access publishing. In the project budget were foreseen financial means to cover the associated costs.

2.2.3 Communication activities

Communication in the project is organized according to the target groups:

1) Communication in project management related issues; This type of communication is detailed in T6.2 of the Project management work package. An important issue for achieving the aimed results is a proper communication system within the project teams, between the partners and with all the concerned national and European authorities. The communication channels, methods and rules include a wide range.

Regular meetings will take place at the consortium level, with the project managers representing the partners, during the project duration, to ensure the operative management of the project activities. In order to have a effective use of resources, the consortium meetings will be organized together with specific project activities. At the 1st Meeting (Kick - off Meeting), the detailed project planning and work allocation will be concluded. In all meetings the project's progress (financial & physical) will be assessed. Following each meeting a short report (meeting minutes) will be sent by the Coordinator to all participating project managers. Project meetings will also be organized in advance of project review meetings with the EC.

Face to face meetings will be complemented by regular e-mail correspondence, and bi-monthly written reports submitted by each department on work carried out and resources used. Every two months, each partner will provide the Coordinator with a consolidated short report to summarize progress and costs incurred in the previous reporting period. These inputs will be used to create the Periodic Progress Report and Final Progress Report submitted to the EC.

2) Communication with partners on scientific topics. This will follow the typical channels, exchange of information on electronic media, face to face discussions, participation to common activities (trainings, workshops, summer schools). The communication will benefit from the support of the platform, Knowledge lake.

3) Communication with other stakeholders. For communication to stakeholders, every available and appropriate channel will be used. Some of the communication processes will be planned, as those occasioned by project activities (Information events, workshops, summer schools, etc.). All communication results will

[16] Open access must be granted to all scientific publications resulting from Horizon 2020 actions. Further guidance on open access is available in the H2020 Online Manual on the Participant Portal.

be filed and will contribute to enrich the partners portfolio.

3. Implementation

3.1 Work plan – Work packages, deliverables and milestones

DATA4WATER is structured around the two main objectives of the project: O1 - Enhancement of the science and technology abilities of the participating institutions, and O2 - Raise the staff's research profile as well as the one of the institutions involved. The six work packages are related to each other, so that the results of one work package contributes to the successful completion of the others (Figure 3.1). The project adopts a step wise approach:

1. At the first step, the partners will evaluate the present situation and positioning of the research team of UPB, and will develop a Roadmap for the future 5-7 years. Based on these, a detailed operational plan for the three years project will be elaborated. Setting up a Research Quality Assurance System will ensure a level of capability and maturity of the widening organization.
2. Next, training activities will alternate with/accompany the organization of scientific events, to ensure the necessary competences of the researchers. The research filed is based on two pillars: ICT and Water Resource Management, where the scientific and technological advances, the understanding of processed as well as the requests from the side of society/users are in a permanent improvement and change. To be able to contribute to the development of the research field requires a constant and critical update of knowledge, methods, tools, experience exchange, debates on scientific approaches. To cover these, during the project several workshops will be organized. During the workshops, scientific papers/publications will be evaluated in order to be supported for presentation in conferences or submission in journals. Trainings
3. Networking is a permanent component, throughout the entire project, that allows an efficient know-how transfer and the possibility for UPB to take part in various specialized networks.

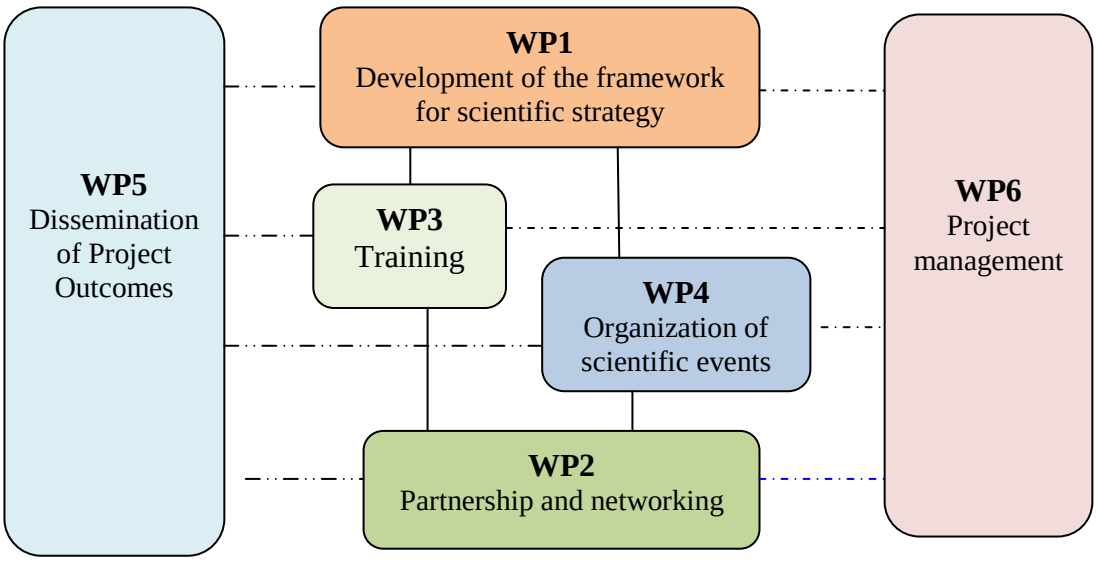

Figure 3.1: Overall structure of the work plan

The DATA4WATER project results will be delivered by means of work packages that constitute the support activities and coordination. Table 3.1 presents the correlation between work packages and targeted project objectives.

Table 3.1: Mapping among DATA4WATER objectives and WPs

Project objectives	Work packages addressing the objective
O1: Enhancement of the science and	WP1 - Development of the framework for scientific strategy

technology capacity of the participating institutions	enforcement, WP3 - Training,
O2: Raise the staff's research profile as well as the one of the institutions involved	WP2 - Partnership and networking WP4 - Organization of scientific events WP5 - Dissemination of Project Outcomes
O3: Contribute to the overall Smart Specialisation Strategy	WP1 - Development of the framework for scientific strategy enforcement, WP3 - Training, WP4 - Organization of scientific events
O4: Contribute to the development of a new, interdisciplinary research domain	WP1 - Development of the framework for scientific strategy enforcement, WP4 - Organization of scientific events WP5 - Dissemination of Project Outcomes
O5: Include the Romanian organization as an active member of the research networks	WP2: - Partnership and networking WP4 - Organization of scientific events

The timing of the different work packages and their components are presented in the Gantt chart in figure 3.2. A detailed project plan will be elaborated in the first month of the project, discussed and validated by the partners at the first common event, the kick-off meeting within the first workshop.

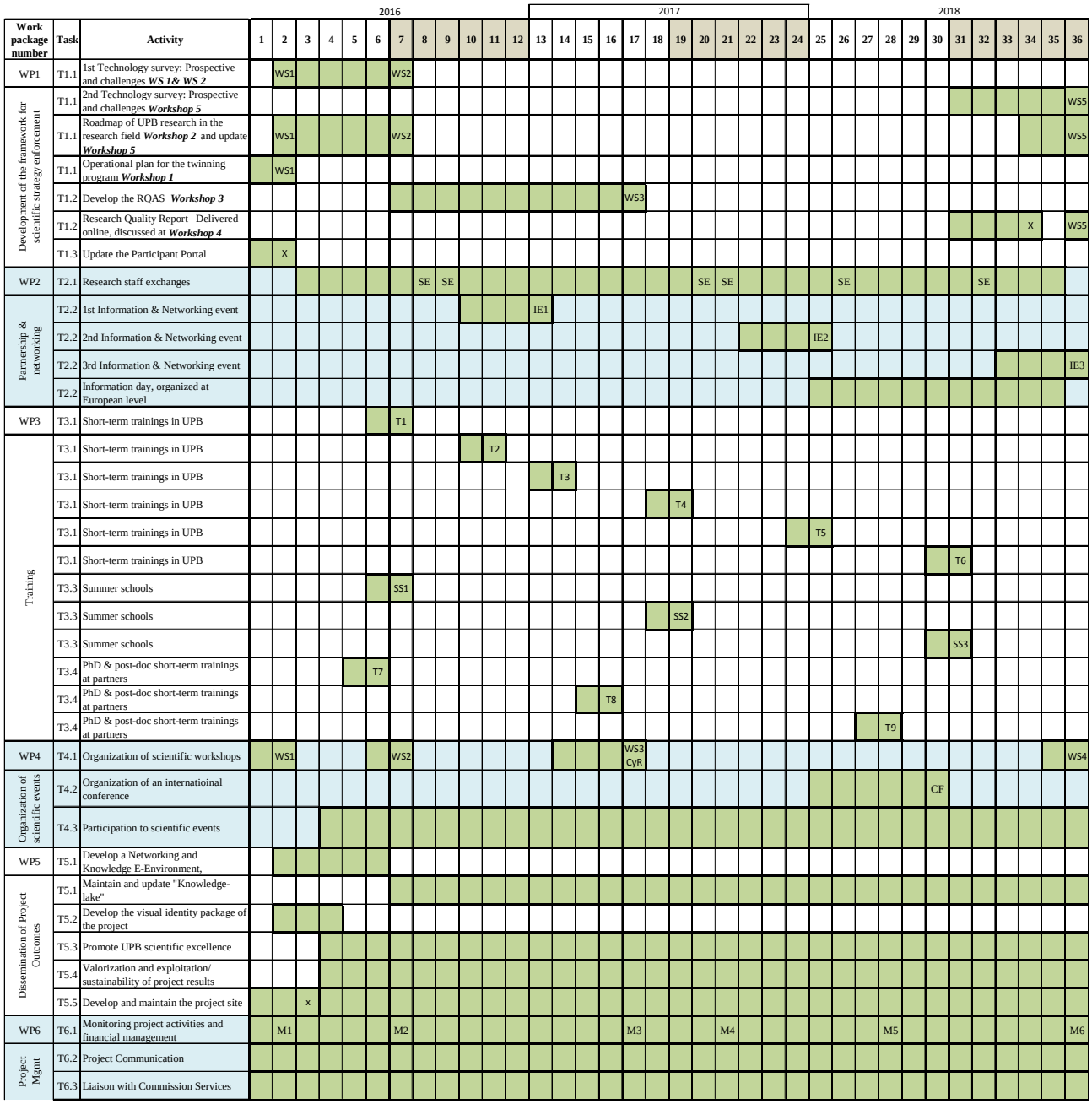

Figure 3.2: The Gantt Chart of the project

The detailed description of the work, structured in work packages, is given in Table 3.1a

Table 3.1a Work packages

Work package number	**1**	**Start Date or Starting Event**		**Month 1**
Work package title	**Development of the framework for scientific strategy enforcement**			
Participant number	1	2	3	4
Short name of participant	**UPB**	UNIMIB	FOKUS	UNESCO-IHE
Person/months per participant:	9,5	2	1	2

Objectives
Develop and implement a suitable, stable and sustainable framework for the scientific strategy enforcement in the research field of value added, data driven e-services in water management;
Develop a Research Quality Assurance System (RQAS) that will allow benchmarks' setup for increasing the Composite Research Indicator and monitor its evolution in time

Description of work The lead partner is the coordinator, UPB, assisted by all the partners in rolling out the activities and delivering the deliverable.

The tasks in this work package are oriented towards establishing the roadmap for the research, based on present situation in the field and on worldwide development tendencies, a system for evaluating the research quality and a set of procedures for research management. The work packages in the project will be interconnected to maximize the impact with an efficient use of resources.

T1.1 Develop a framework for implementing the scientific strategy (M1-M7); (M31-M36) for stepping up and stimulating excellence and innovation capacity in the field of Smart Data for Water Management (SDWM)

In the beginning of the project, a structure and a work method for elaboration of a ***technology survey*** in SDWM will be developed. Such a survey is meant to identify and refine the research directions, focused on the selected priority areas of HORIZON 2020 and will provide a comprehensive understanding of current state of the art, will identify key actors in the international research community with a view to developing relationships for project participation under HORIZON 2020 and other research calls. Such Technology survey will be elaborated at the beginning of the project, and updated in the last months of the project, in order to ensure the sustainability and continuity of the project. The survey will also identify the positioning of the research group, compared to that of internationally leading partners and/or other expert groups in the field and will emphasize the directions to follow in order to reduce the gaps.

Based on the research strategy and the technology survey a ***Roadmap for the research group*** will be elaborated, as a general, strategic plan for enhancing the research results in the field of SDWM. This involves a series of meetings with scientists from partnering institutions, of industry and government, in which the most promising and compelling research directions for the research group to pursue over the next 5 - 10 years, will be identified. The Roadmap must cover a duration beyond the duration of the project to achieve an optimal synergy between the project outcomes and other funding opportunities and will be used as guidelines for future research and innovation of the Smart Data for Water Management Group.

Further, the scientific activities, actions and events identified in the Roadmap, that will be rolled out in the twinning program, will be identified. A coordinated program plan, with a view to structured sharing of facilities, sharing of best practices, investigation and shaping of new project ideas, making consortia for future HORIZON 2020project proposals, planning and achieving joint coordination of PhDs will be developed by the project partners.

The activities in this task will strengthen the capacity of UPB staff in strategic and operational research planning, in identification of appropriate research activities and methods, and in analysis of opportunities and results.

T1.2 Develop the RQAS (M7-M17); (M31-M36)

Based on best practices, a Research Quality Assurance System will be defined and implemented. A metric for quality in research, focused on criteria used on European level KPI, as well as methods to collect, to store and to analyze information regarding research activities and results, will be set up. A RQA Handbook will be elaborated in order to implement and institutionalize the RQAS.
The quality assurance process enables the selection of tools and methods that will enhance the research group ability to meet the quality and research-performance objectives.
During the project, quality evaluation will be performed and a Research Quality analysis will be performed, and the results will be published in the RQA-report.

The activities in this task will lead to institutionalization of RQA culture in UPB and will help the research staff to keep track of the value of their activities.

T1.3 Update the Participant Portal (M1-M2)

The UPB team will introduce in the reporting tool on the Participant Portal by month 2 of the project all publications (in the particular field of research) of the coordinator during the three years preceding the start date of the project, as requested by the Commission to evaluate the impact of activities in Horizon 2020 Key Performance Indicators (KPI).

Deliverables

D1.1 Technology survey: Prospective and challenges: ***[Month 7];*** Responsible partner: **UPB**
D1.2 Roadmap of the research team in SDWM: ***[Month 7];*** Responsible partner: **UPB**
D1.3 Research QA Handbook ***[Month 17];*** (that will include a preliminary Research Quality Report) Responsible partner: **UPB**
D1.4 Research Quality report ***[Month 36];*** Responsible partner: **UPB**
D1.5 **Statement regarding the update of the Participant Portal** ***[Month 2];*** Responsible partner: **UPB**

Work package number	**2**	**Start Date or Starting Event**		**Month 3**
Work package title	**Partnership & networking**			
Participant number	1	2	3	4
Short name of participant	UPB	UNIMIB	**FOKUS**	UNESCO-IHE
Person/months per participant:	3	5	5	3,5

Objectives
WP2 aims to create a link between the Romanian research group in the field of SDWM and the internationally-leading research institutions, as well as to encourage and enhance the networking of the Romanian research group with other research intensive institutions in Europe, industry specialists, public authorities, and institutions that regulate critical resource management.

Description of work
The lead partner of the work package is FOKUS as it has an outstanding experience in networking with research organizations, with industry, public administration and other relevant stakeholder. All the partners will contribute to the different tasks of the work package, by participating at the events and including UPB in their networks.

The work package includes common work with researchers from partnering organizations during scientific exchanges and information events. Regular meetings with the Advisory Board and experts will be organized to discuss both scientific topics as well as the Roadmap progress, priority of research themes, and synthesis conclusions for future developments

This WP aims also to develop a network of excellence and partnerships in the research field, at both national and European level, and strengthen the UPB research connections and increase its visibility by interactions with experienced researchers from partnering institutions and other research leading organizations, but also industry specialists to exchange experience, good practices, important topics for future research, identify topics for joint doctoral research, and internship opportunities.

In order to valorise the experience and knowledge acquired during the scientific exchanges and networking, an e-environment will be developed.

T2.1Research staff exchanges (M3-M35)

This task implies the planning and the roll-out of research staff exchanges between UPB and the project partners, involving experienced researchers.

The short term visits to partners allow to the UPB researchers to experience a direct involvement in current activities in excellence research teams, thus enabling the improvement of methodological expertise and knowledge of good practice, as well as making consortiums for future research activities. An average of five staff exchanges per year is foreseen. Selected research themes/topics will be commonly discussed and developed with the partner institutions during the staff exchange visits.

The activities in this task will improve the overall scientific and innovation capacity of the initiating institution and strengthen the organizational abilities of UPB staff in organizing research activities.

T2.2 Develop a network of excellence and partnership in Smart Data for Water Management (M10-M36)

An important task of the project is focused on both strengthening the existing cooperation relationships and enlarging the network of partners in research of the UPB research group. Initially, this network will comprise the EU partners of the project and the Romanian universities with which UPB has a long tradition of cooperation. The network will be gradually enlarged with other Romanian, European universities, companies, Romanian stakeholders and policymakers towards building a strong community of research and innovation in the field, a pole of excellence in South Eastern Europe, having the centre UPB, and an information-sharing network of competencies, experience, and research results. Members of this enlarged network are future potential partners for both the development of common research projects, but also strategic partners to support regional socio-economic growth.

The contact with the network community will be ensured both through face to face meetings and by electronic media. High profile specialists will be invited at networking events, to present the latest research directions/results or trends in the field. In the project team a person will be responsible with updating the all contacts information. A newsletter will be periodically edited, to inform about ongoing activities. During the project, we will organize 3 Information & Networking events, where relevant stakeholders and partners will be invited. The network has an open character, which allows interested persons/organizations to join. All networking information will be available also on the *Networking and Knowledge E-Environment, "Knowledge-lake"* (See Task5.1).

During the project lifetime, in the networking activities, a special attention will be given to creation of a portfolio of possible future partners for research activities, as well as a portfolio of research topics in which the team achieved excellence and related interested companies, public or private organizations interested to apply the research results, will be set up.

The partners will also participate at two ICT Events, organized by the European Commission and will present the project results and its impact.

The activities in this task will strengthen the capacity of UPB staff to enlarge its scientific network and build consortia able to deal with specific research topics. It also enhances the ability to make visible the research results, in order to transfer the results to the end users.

Deliverables

D2.1 Report on staff exchanges (that includes the individual reports) ***[Months 36]*;** Responsible partner: **FOKUS**
D2.2 Report on the Information & Networking events ***[Month 36];*** Responsible partner: **FOKUS**

Work package number	**3**	**Start Date or Starting Event**	**Month 1**
Work package title	**Training**		

Participant number	1	2	3	4
Short name of participant	UPB	UNIMIB	FOKUS	**UNESCO-IHE**
Person/months per participant:	10,5	4	6,5	5,5

Objectives
The aim of this work-package is to organize trainings on topics related to excellence in research, that will be attended by target groups of the UPB.

Description of work

The lead partner for the work package is UNESCO-IHE, which will ensure a broad inter- and trans-disciplinary approach. The internationally leading partners will participate in trainings, according to their specializations.

For enhancing the knowledge level of the researchers to the highest level in the research field, short trainings, summer schools and PhD & post-doc short trainings at partners will be organized. The "Knowledge lake" (Task 5.1) will be also used for educational purposes, based on the published research results and knowledge content.
Training activities are organized for young researchers (Master and PhD students), for experienced researcher, as well as for people from industry/administration/scientific organizations. These can participate, both as learner or trainer, thus keeping the research group in direct contact with potential users of the research results and/or potential partners.

T 3.1 Short-term trainings (M6-M31)

Establish detailed plan and organization of short term trainings. Two training periods/year are foreseen. Trainings organized in this task address both to experienced researchers and to young scientists, at the beginning of their scientific carrier. The trainings fall into three big categories:

1. topics on specific research topics in the field of ICT that are relevant for the research field of value added data based e-services for water resource management:
- value added data services,
- smart and open data
- smart data models
- interoperability of platforms, services and data
- IoT solutions
- Decision Support Systems

2. trainings on specific research topics in the field of SDWM, presented by experienced experts. In order to optimize the project resources, the trainings will be organized in conjunction with other scientific event, like workshops, conferences, exchanges of experts. These are mainly addressed to young scientists, master and PhD students and post-doc researchers. The topics will include, but are not restricted to:
- topics related to Water Resources Modelling in support of Management (i.e. Flood modelling, Water Distribution Modelling, Optimisation, Reservoir operation, Computational Intelligence for Water Resources, etc.)
- specific regulations related to water management in Europe/on national level (Water Directives, INSPIRE, etc.)

3. topics related to generally increasing professionalism in research, that are addressed both to experienced and young researchers
- intellectual property issues,
- technical writing and technical communication,
- proposal writing,
- patenting process.
- standardization

The trainings will be open mainly to UPB staff and/or master or PhD students, involved in research activities and to staff and students from the other partners in the project.
The activities in this task will ensure that the young researchers have the basic required level of knowledge in the research field.

T 3.2 Summer schools (M6-M31)
The aim of summer schools is to provide researchers the competence to solve problems in the field of Smart Data for Water Resources Management. The participants will get theoretical input on research topics and will be assisted to solve specific problems, in small teams. At the end of the summer school, the participants will present their solutions. During the project, 3 summers schools will be organized. One summer school will include a competition for developing the best concept for a solution to a problem of management of a critical situation related to use of water resources.
Topics covered by the summer schools will include:

- IT solutions in water management
    - Modelling water flow processes
    - Defining added value data services
    - Modelling community/organizational/human reaction related to (water) resources management
    - Integration and interoperability of smart services
    - Decision Support Systems
- Open data
    - Portal, Pan European Portal
    - Data Formats / CKAN
    - Metadata
    - Semantic technologies
    - Public IT, Open Government
- Public Safety
    - Critical infrastructures
- Data analytics
    - Smart environment
    - Smart cities
    - IoT
    - Water management
- ICT infrastructures
    - Cloud infrastructure
    - Smart communication

To enhance the creative abilities of the participants, competitions will be organized within the summer schools. The winners will be awarded with access to scientific products or events. The organizational details will be set up for each workshop, by the organizing team.

T 3.3PhD short-term on-site training (M5-M28)
PhD students and post-doc researchers will be encouraged to participate to a short-term training at the partners to understand the specificity of PhD studies and/or research work, to connect to other researchers. The partners will also check the possibility to organize PhD studies in co-tutoring. The future PhD students will be selected through a competition. The selected PhD students can further apply for Erasmus scholarships for a longer PhD stage.
The detailed plan will be decided during the project, according to the specific PhD regulation of each partner. The activities in this task will enhance the PhD students' activity and will ensure the research staff continuity within the UPB.

All training materials developed for the scheduled trainings will provided by the lecturers will be made available in electronic format, and will be posted on the Knowledge lake.

Deliverables

D 3.1 Training needs assessment report (based on a training needs survey at UPB). ***[Month 5];*** Responsible partner: **UNESCO-IHE**
D 3.2 Status report on training courses and summer schools ***[Month 36];*** Responsible partner: **UNESCO-IHE**

Work package number	**4**	**Start Date or Starting Event**		**Month 4**
Work package title	**Organization of scientific events**			
Participant number	1	2	3	4
Short name of participant	UPB	**UNIMIB**	FOKUS	UNESCO-IHE
Person/months per participant:	7	6	6	4

Objectives
The aim of this work-package is to organize a series of high quality scientific events to facilitate knowledge transfer and raise the visibility of UPB at national and international level. The events will reunite: experienced and young researchers from UPB, research staff from the partnering institutions, as well as invited researchers from other bodies (universities, companies) relevant to the development of the research field.

Description of work

The lead partner of this work package is UNIMIB, which has very good experience in organizing scientific events and excellent results in the field of ICT for water management. All partners will be involved in these events, by preparing and presenting different topics for the events.

UPB has already a strong experience in organizing high quality scientific events. For example, for the last 20 years, UPB is organizing the bi-annual conference Control Systems and Computer Science, with a participation of around 250 accepted papers for the last edition of 2015.
Most of the events organized in the past are on topics from the larger domain of computer science. However, since 2013, co-located with the CSCS conference, the UPB team that develops the Twinning proposal, organizes an International Workshop on Cyber-infrastructures for Natural Resources Management (CyRM), that is close related to the field of Smart Data for Water Management.

Based on this experience, and in cooperation with the partners, we plan the organization of the scientific events described below.

The planned events fall into four categories:

e) Workshops that will be co-organized with the EU partners. Research policy documents, developed in WP1 will be discussed and validated during these workshops. Analysis of the KPIs performed by UPB will be also a workshop topic. Four such workshops are planned during the project.
f) Scientific events that are already organized on more or less regular basis by UPB will be planned and executed with extended scope, by increasing the level of participation of high profile researchers, young researchers and PhD students, and focused on topics specific to ICT in Water Management. An example is the organization of the CyRM workshop. The result will be the enhancement of the scientific visibility of the events, an increase of scientific quality standards and a higher level of participation from both home and abroad.
g) Organization of an international, co-located conference. Together with the project partners, the most suitable event will be identified and the necessary steps will be followed, in order to have a special section in the event, on the research topic of SDWM. This approach has the advantage of optimizing organizational efforts and, more important, making bridges between scientists working in different but related areas, giving thus the possibility of an integrated view of the research field.
h) Participation in other scientific events, like conferences, round tables, working groups, etc.

Workshops will be related with other events, like trainings, consortium meetings, in order to optimize the use of resources.

T4.1 Organization of workshops (M2-M36)
Four workshops are planned to be organized:
Workshop 1: organized at UPB
- sets up the basics for the elaboration of the Technology survey: prospective and challenges in SDWM
-sets up the basics for the Roadmap for UPB
- validation of the Operational Plan of the project activities

Workshop 2: organized at UNESCO-IHE
- discussion and validation of the 1st Technology survey
- discussion and validation of the Roadmap
- sets up the basics for the Research Quality Assurance System.

Workshop 3: organized at UPB
- Workshop on CyRM (within the 21st Control System and Computer Science Conference)
- validates the Research Quality Assurance System

Workshop 4: final event, organized at UPB
- discussion and validation of 2nd Technology survey: prospective and challenges in SDWM
- discussion and validation of the updated Roadmap
- analysis of the project results

T.4.2 Organization of a co-located conference (M25-M30)

Organization of an international scientific event, with the support of the partners, as a co-located in a highly visible event, relevant for the research field. Some of the possible events, that we will approached are:

- Water Berlin International March 2017 / Blue Planet
- German Water Partnership http://www.germanwaterpartnership.de/
    - http://rumaenien.ahk.de/
- European Water Conference http://ec.europa.eu/environment/water/2015conference/index_en.htm
- EIP Water Conference http://www.eip-water.eu/
- European Data Forumhttp://www.data-forum.eu/
- Fraunhofer Big Data Alliancehttp://www.bigdata.fraunhofer.de/
    - Energy and Environment
      http://www.bigdata.fraunhofer.de/de/geschaeftsfelder/energie_umwelt.html

The activities in this task will strengthen the capacity of UPB staff to organize scientific events based on peer-review evaluation of submitted papers.

T4.3 Participation to scientific events (M3-M36)

The researchers will be encouraged to participate at scientific events, to strengthen the research skills of the human resources, to give them the possibility not only to read scientific papers, but also to participate at scientific debates. The research staff will participate to specialized conferences and workshops in the selected topics like those mentioned in T4.2.

A special attention will be given to submission and presentation of accepted papers. Careful selection and planning of attendance to such events is necessary in order to optimally expose research results and exploit opportunities. On the average, we count with a participation of 8 persons / year.

The participation in Programme Committee or other national and international working groups/bodies will be encouraged.

Deliverables

D 4.1 Report on organization of scientific events (workshops and co-located conference) ***[Month 36];*** Responsible partner: **UNIMIB**
D 4.2 Report on participation at scientific events, relevant for the research field ***[Month 36];*** Responsible partner: **UPB**

Work package number	**5**	**Start Date or Starting Event**		**2**
Work package title	**Dissemination of Project Outcomes**			
Participant number	1	2	3	4
Short name of participant	**UPB**	UNIMIB	FOKUS	UNESCO-IHE
Person/months per participant:	5	-	-	-

Objectives
Promotion and dissemination activities are essential lines of actions towards achieving the project objectives. WP5 is dedicated to a series of actions that will encompass both dissemination activities of the project outcomes and results, and promotional activities of UPB excellence in research towards increasing UPB visibility at regional, European and international level.

Description of work

The lead partner is the UPB, as most of the related tasks will need local support. The participants mainly contribute with materials that will be published on the e-Knowledge environment.

Dissemination of the project results contributes significantly to the raise of the staff's research profile as well as the one of the institutions involved. Through the dissemination activities, we specifically target the SDRM network, including public administration, companies, professional bodies, the scientific audience and general public.

Generally, the project results will be promoted through the project web site, through links from the Home Pages of EU strategic partners involved, and through contacts with other major web sites dedicated to the research topics of interest of SDCRP.
The project results will be disseminated in EU publications, through project leaflet and project brochure, during the information events organized during the project (task 2.2 &2.3), and through the Networking and Knowledge E-Environment, "Knowledge-lake", specially set up for the project stakeholder community.

An adequate and detailed plan for dissemination of results will be set up at the beginning of the project. It will be periodically updated. The plan will include a dissemination strategy that will span both the project life and will be continue also after the end of the project.

T5.1 Develop a Networking and Knowledge E-Environment, "Knowledge-lake" (M2-M36) to support both networking activities and storing, promotion and search for information and knowledge relevant to the research topics in the field of SDWM. It has a major impact on the dissemination of the project activities, as well as of related scientific events and research results in the research field.

This environment is the virtual meeting place of all members of the network, that supports intelligent information storage, search and retrieval of: research papers of staff and PhD students in the network, PhD thesis, SDCR relevant national, European and international projects, pointers to companies doing relevant research in the domain, targeted funding opportunities, plus pointers to: sites containing information on European projects; sites containing information on partner opportunities; gateways to science information and publications; sites that offer ratings and evaluations of universities, sites offering ratings of conferences and scientific events.

It will ease the contact between persons and/or organizations, on specific topics. At the same time, it will allow every interested person to be informed about the latest results/achievements/events.

Knowledge-lake will allow different access to information, from public to classified, based on a multi-level

user account system. Knowledge-lake will facilitate the rapid access to most of the on-line resources related to networking and partnership opportunities from a central point. The network utility will be much broader than the scope of the project and UPB staff utilization; it will be accessed by scientists from Romania and Europe at large.
The Knowledge-lake will host the federation of web sites of specific events, in order to make them accessible to the entire community of SDWM.

The activities in this task will strengthen the both the scientific level of UPB staff, by permanent contact to the latest results in the field as, well as the direct contact to stakeholders, and the interlinking capacity, due to the dedicated networking e-environment.

T 5.2 Develop the visual identity package of the project (M1-M4)

Dissemination of the project and its' results is done in various media. A visual identity package will be designed: logo, project leaflet; etc the development, dissemination, promotion visual identity and logo, pin, flag, leaflet, flyer, presentations in Romanian and English, CD-ROM/DVD, and awareness package (DPA package):
During the implementation of the dissemination plan, the visual identity elements will be used on all deliverables.

T 5.3 Promote UPB scientific excellence (M4-M36)
All activities developed during the project lifetime have a dissemination component. An important contribution to this is given by the Networking and Knowledge e-Environment (Knowledge-lake) and the networking activities. Another dissemination component results from the scientific publication activity. Specific promotion activities are:

- participation at Proposers' Day / Info Day, in order to increase visibility of the research results, as a direct consequence of the twinning project, organized by the Commission
- disseminate project results in EU publications, such as The Parliament Magazine, through project leaflet and project brochure, and Newsletter, transmitted to all EU partners and members of the SDCRP information-sharing network;
- advertise and make inserts in promotion publications.
- keep permanent contact with NCP and the Ministry of Education and Research to make the project visible at national level;
- the organization of the Information day event, with participation of representatives of industry, government, policy makers in the field of SDRC has a strong dissemination component. The aim of this brokering event is to promote UPB as an active partner. During the information day, the project results will be disseminated among local academic and industry, towards local stakeholders and particularly SMEs to encourage engagement in innovative approaches and to enhance the leading role of UPB in the region, as well as to attract synergies between UPB, industry and official entities. The Information day events will follow one of the planned scientific events.
- Select papers to be published on Open science platforms (see https://ec.europa.eu/digital-agenda/en/open-science)

T 5.4 Valorisation and exploitation/sustainability of project results (M3-M36)
During the project lifetime, in the networking activities, a special attention will be given to creation of a portfolio of possible future partners for research activities.

During the scientific activities carried a portfolio of research topics in which the team achieved excellence and related interested companies, public or private organizations interested to apply the research results, will be set up. A detailed plan for project valorisation and exploitation of results will de elaborated, as part of the last RQA-review.

T5.5 Develop the project site (M1-M36)
A project web site will be implemented, to present the project, including links from the Home Pages of EU strategic partners involved, as well as a bidirectional connection with the "Knowledge lake".
The project site:

- contains information related to this project (objectives, participants, activities, events, etc).
- presents the progress of the project activities;
- hosts links to similar projects, disseminate projects concepts and outcomes.

The project site will be functional in Month 3, and constantly updated and maintained, to reflect the current status of the project activities and results.

Deliverables

D5.1 Knowledge-lake e-platform ***[Month 6];*** Responsible partner: **UPB**
D5.2 Report on Dissemination and valorisation activities ***[Month 36]*** Responsible partner: **UPB**
D5.3 Project site ***[Month 3];*** Responsible partner: **UPB**

Work package number	**6**	**Start Date or Starting Event**		**1**
Work package title	**Project management**			
Participant number	1	2	3	4
Short name of participant	**UPB**	UNIMIB	FOKUS	UNESCO-IHE
Person/months per participant:	5	2	1	1,7

Objectives

WP 6 is dedicated to overall co-ordination and management of the project, with the goal of ensuring overall project coherency, provide efficient management and decision making procedures, identify any problems encountered in achieving the stated project goals and put structures in place to take timely and appropriate corrective action, and finally, make a synthesis of the project results and findings. Goals will include:

- Ensuring effective coordination & collaboration among partners and monitoring progress
- Managing project implementation risks & putting necessary contingency plans in place
- Ensuring the fulfilment of overall project goals, within available time & budget constraints
- Ensuring overall quality assurance and the timely delivery of project deliverables
- Maintaining accurate records of cost and effort reports
- Maintaining regular and clear lines of communication with the Commission Services
- Ensuring effective coordination & collaboration between departments within the faculty, as well as with partnering institutions and monitoring progress
- Definition and supervision of project schedule, execution of the Action Plan and the achievement of the project goals on time and within budget
- Internal content management system for documents storing and flow, activity planning and reporting

Description of work (where appropriate, broken down into tasks), lead partner and role of participants

T 6.1: Monitoring project activities and financial management (M1-M36)

The Project Coordinator will prepare an overall plan of all activities during the project life, as well as detailed planes for each activity. These will be discussed and approved by the partners.
The Project Coordinator will oversee the general progress of the project and will ensure that the actual deliverables are appropriate for submission to the Commission Services.
A quality plan will be put in place early in the project to ensure a standardized approach to ensuring quality deliverables, through a process of internal review and revision by the responsible department(s) where necessary, prior to submission to the Commission Services.
Internal project reviews will take place at M12, M24, M36.
The Project Coordinator will be responsible for overall coordination of contacts and information exchanges between its team and the Partner Institutions, particularly in relation to coordinating staff exchanges, collaboration in relation to event organization, liaison in relation to managing new contacts to extend the network in the different focus thematic areas.

The Project Coordinator will be responsible for the overall financial management. EC and national regulations will be followed by each of the partners. Each partner will involve the required administrative

units within their organizations. External audit will be organized by partners, according to specific requirements in the partners' countries and according to H2020 requirements.

T 6.2: Project Communication (M1-M36)
An important issue for achieving the aimed results is a proper communication system within the project teams, between the partners and with all the concerned national and European authorities. The communication channels, methods and rules will be decided during the first consortium meeting.

Regular meetings will take place at the consortium level, with the project managers representing the partners, during the project duration, to ensure the operative management of the project activities. In order to have a effective use of resources, the consortium meetings will be organized together with specific project activities. At the 1st Meeting (Kick - off Meeting), the detailed project planning and work allocation will be concluded. In all meetings the project's progress (financial & physical) will be assessed. Following each meeting a short report (meeting minutes) will be sent by the Coordinator to all participating project managers. Project meetings will also be organized in advance of project review meetings with the EC.

Face to face meetings will be complemented by regular e-mail correspondence, and bi-monthly written reports submitted by each department on work carried out and resources used. Every two months, each partner will provide the Coordinator with a consolidated short report to summarize progress and costs incurred in the previous reporting period. These inputs will be used to create the Periodic Progress Report and Final Progress Report submitted to the EC.

T6.3 Liaison with Commission Services (M1-M36)
The Project Coordinator will be responsible for contact and information exchanges with the Commission Services, particularly in relation to preparing and submitting the Progress Reports and following up on information requests. The Coordinator will liaise with the Commission Services as required to keep them informed of project progress. The first reporting period to the EC will be of 24 months and the final report at month 36.

Deliverables
D6.1 Project Periodic Report Year 1 ***[Month 12];*** Responsible partner: **UPB**
D6.2 Project Periodic Report Year 2 ***[Month 24];*** Responsible partner: **UPB**
D6.3 Project Periodic Report Year 3 ***[Month 36];*** Responsible partner: **UPB**
D6.4 Project Final Report Year1 – Year 3 ***[Month 36];*** Responsible partner: **UPB**

The list of work packages is given in Table 3.1 b.

Table 3.1 b: List of work packages

Work package No	Work Package Title	Lead Participant No	Lead Participant Short Name	Person-Months	Start Month	End Month
WP 1	Development of the framework for scientific strategy enforcement	1	UPB	14,5	1	36
WP 2	Partnership & networking	3	FOKUS	16,50	3	36
WP 3	Training	4	UNESCO-IHE	26,5	6	31
WP 4	Organization of scientific events	2	UNIMIB	23	1	36
WP 5	Dissemination of Project Outcomes	1	UPB	5	1	36

WP 6	Project Management	1	UPB	9,7	1	36
				Total months 95,2		

The planned project results will be produced in tasks. The table 3.1c presents in which WP/tasks they will be produced and how they will deliver to the EC.

Table 3.1 c: List of Deliverables

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemi-nation level	Delivery date
D1.1	Technology survey: Prospective and challenges	WP1 T1.1	UPB	DEC	PU	M7;
D1.2	Roadmap of UPB research in the research field	WP1 T1.1	UPB	DEC	PU	M7;
D1.3	Research QA Handbook	WP1 T1.2	UPB	R	CO	M17
D1.4	Research Quality Report	WP1 T1.2	UPB	R	CO	M36
D1.5	Statement regarding the update of the Participant Portal	WP1 T1.3	UPB	R	CO	M2
D2.1	Report on staff exchanges (that includes the individual reports)	WP2 T2.1	FOKUS	R	CO	M36
D2.2	Report on Information & Networking events	WP2 T2.2	FOKUS	R	CO	M36;
D3.1	Training needs assessment report	WP3 T3.1; T3.2; T3.3	UNESCO-IHE	R	CO	M5
D3.2	Status report on training courses and summer schools	WP3 T3.1; T3.2; T3.3	UNESCO-IHE	R	CO	M36
D4.1	Report on organization of scientific events (workshops and co-located conference)	WP4 T4.1; T4.2	UNIMIB	R	CO	M36
D4.2	Report on participation at scientific events	WP4 T4.3	UPB	R	CO	M36
D5.1	Knowledge-lake e-platform	WP5 T5.1	UPB	OTHER	PU	M6;
D5.2	Report on Dissemination and valorisation activities	WP5 T5.2-T5.4	UPB	R	PU	M36
D5.3	Project site	WP5 T5.5	UPB	OTHER	PU	M3
D6.1	Project Periodic Report Year 1	WP6	UPB	R	CO	M12
D6.2	Project Periodic Report Year 2	WP6	UPB	R	CO	M24
D6.3	Project Periodic Report Year 3	WP6	UPB	R	CO	M36
D6.4	Project Final Report Year1 – Year 3	WP6	UPB	R	CO	M36

3.2 Management structure and procedures

In order to cover all internal and external challenges of the project, this coordination and support action project has following management structure fig. 3.3:

- The Project Manager and the Project Management Office
- The Project Management Board (PMB)
- The Executive Committee composed of the WP leaders

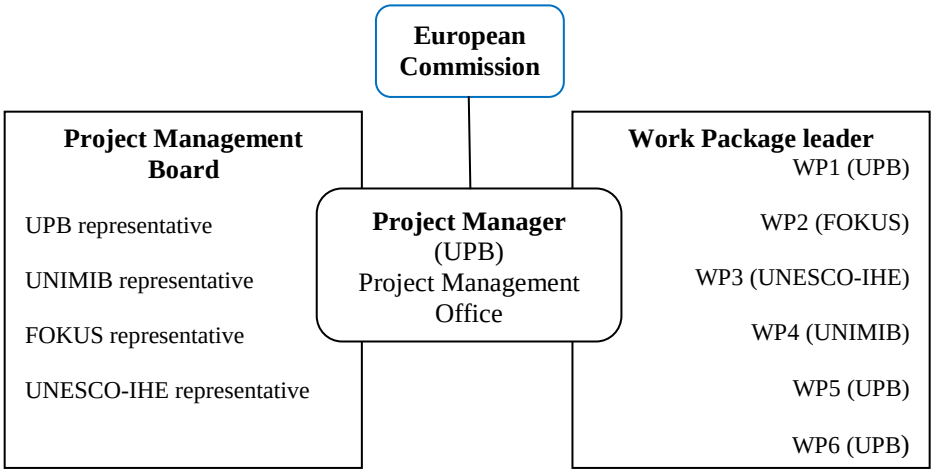

Figure 3.3 The Management Structure

The Project Management Board supervises activities in the project and takes the strategic decisions in the project. It is composed of one representative of each partner and the project manager. The PMB validates the project results and approves the deliverables that will be submitted to the European Commission (EC). One of the PMB will be in charge with the scientific aspects of the activities: selection of topics for trainings and scientific events, coordination of selection of papers for publication, contents on the Knowledge lake, etc. It has a decisive role in preparing the Roadmap for UPB and the Research Quality Assurance System concept, to be implemented in the UPB. It also overlooks the financial status of the project, and decides, in case of potential risks, the mitigating actions The Project Manager has the duty to inform the PMB regularly about the project status, to organize, at least, one face-to-face meeting per year and to consult the board regarding strategic decisions.

The Project Manager is responsible for the overall roll-out of the project. It is part of the widening country's team, UPB and is assisted by the project office and by the administrative units of the university. The project manager is in permanent contact with the WP leaders, with whom it ensures the day-to-day operations of the project. The PM is permanently in touch with the EC and the Project Officer. The PM monitors the roll-out of the project's activities and coordinates the development of the periodical an final reports. **The Project Management Office** is composed of an Project assistant, and a finance responsible. The team includes also a person in charge with dissemination and publicity activities. For legal and human resource related aspects, the PMO collaborates with the administrative offices of the university.

The WP leaders are responsible for the timely realization of the tasks, deliverables and milestones in their work package. That includes coordination of tasks and activities towards the WP objectives, coordination with other WP leaders, monitoring of tasks progress with respect to tasks goals, milestones and quality of results. WP leaders report the status and deviations of their WPs to the PM.

The WP leaders and the Project Manager are members of **the Executive Committee** that is in charge of monitoring the status of the project, coordinating the efforts of all work packages and handling all technical activities. The Executive Committee meets 2 times a month, via skype sessions. For organizing specific events, at the discussions can participate also other members of the project teams. Agendas, minutes and

action points of the meetings are kept in the project collaborative portal. The Executive Committee will organize work sessions every time partners join an event organized by a partner.

The decisions in the PMB and in the Executive Committee are taken unanimously. If members of the board/committee cannot come to a common decision then the decision will be taken accordingly the results of the voting procedure. The voting procedure, the decision making criteria and resolution of conflicts are defined in the Consortium Agreement.

Cooperation and communication between partners are organized using e-mail, fax, phone and conference calls. A Kick-off meeting will be organized in the second month of the project. Detailed operational plan, communication, work and reporting procedures will be institutionalized at this event.
Then *Regular* (every 12 months) PMB and (every 6 months) WP meetings will be organized. The meetings will be held together, related to other activities in the project, to minimize travel expenses, but in different sessions to avoid any mix of technical and management issues. At the meetings the current status, important issues and next steps will be discussed. The meeting agenda is proposed by the PM in advance and approved by partners. In case of a special need an *Extraordinary* meeting can be organized. It has to be proposed by one of the PMB members and approved by the PMB.
The consortium will hold *Reviews* upon EC requests and *Pre-review* meetings directly before the reviews for their preparation.

Quality Assurance is an important topic of the project. There is a special task in WP1, that deals with the set-up of a Research Quality Assurance Systems. The metrics and procedures developed in this task will be applied for the entire project. The **quality of the project results** will be under the permanent supervision of the Project Manager.
The internal review process will play the key role in assurance of quality for project deliverables. Work package leaders are responsible for quality of their WP deliverables. As such they have to review and approve all deliverables prepared in their work packages.
Documents and reports will be uploaded onto the consortium section of the "Knowledge Lake" collaborative portal.

Table 3.2 a: List of milestones

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
M1	Kick-off meeting	WP1; WP4; WP6	Month 2	Report; Operational plan
M2	Workshop 2	WP1; WP4; WP5	Month 7	Technology survey; Roadmap; Knowledge lake
M3	Information event	WP2;	Month 13	Report;
M4	Workshop 3	WP1; WP3; WP4;	Month 17	RQAS CyRM Workshop
M5	Conference	WP1; WP4	Month 30	Conference
M6	Workshop 4	WP1; WP4; WP6	Month 36	Final vent

Critical risks, relating to project implementation

International projects involving different types of partners from different countries are usually subject of some collaboration and coordination risks. Coordination and collaboration risks are minimized by previous relations and successful experience of collaborative work between the involved partners and even between mentioned in the description of work personalities.
The implementation risks in Data4Water are minimized by the detailed work package and task descriptions, by allocating resources per task, by defining and implementing the quality plan and the consortium agreement, by complementary expertise and roles of the project partners.

The PMB will continuously assess project risks based on input from the WP leaders and will maintain a Contingency Plan. Appropriate corrective actions will be decided and undertaken if necessary. Other identified risks are the following:

Table 3.2b: Critical risks for implementation

Description of risk	Work package(s) involved	Proposed risk-mitigation measures
Coordination and implementation risks	WP6	Management structure
(Institutional) cultural differences	WP1, WP6	Better understanding of (institutional) culture
Partner unable to perform an activity	WP2, WP3, WP4	Find external provider
Insufficient travel budget for workshops and trainings/ overlapping activities	WP2, WP3, WP4	Adjust activity, use IT teaching/communication methods; Co-locate activities, like workshops and trainings to reduce travel budget and time
Lack of correlation with the academic calendar	WP2, WP3, WP4	Update the schedules

3.3 Consortium as a whole

The applicant organization is University Politehnica from Bucharest, Department for Computers, that is a research active university. According to the last ranking of Romanian universities (2011), it was evaluated as one of the 12 research intensive universities of Romania, among about 100 higher education accredited institutions of the country. UPB participates in the project through its National Center for Information Technology (NCIT), within the Computer Science and Engineering Department. NCIT has 12 full professors and over 50 teaching assistants, researchers and Ph.D. students. NCIT has several laboratories dedicated to advanced and interdisciplinary research in the fields of distributed systems, high-performance computing, e-government, computer networks and other areas.

And the three internationally-leading research intensive counterparts are

1. Biccoca University, Milano, Department of Computer Science, Systems and Communication (DISCo)
2. Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Fraunhofer Institute FOKUS, Berlin, Germany (FOKUS)
3. UNESCO-IHE Institute for Water Education, The Netherlands, Delft, (UNESCO-IHE), Department of Integrated Water Systems and Governance

The consortium was constituted so that it is representative for the research topic, the experience of partners ensure the coverage of the large filed spectrum. The project topic has a strong interdisciplinary character, with main focus on information technology. The applicant is active in the field of IT, it has already results in the proposed research field. To strengthen its research capacity, the project consortium has two leading research partners from the field of IT (FOKUS, DISCo), and one leading research partner from the field of natural (water) resource management (UNESCO-IHE).

The leading research partners complement one another:
Fraunhofer FOKUS develops solutions for the communication infrastructure of the future. The research institute explores how communication networks will contribute to a more secure and convenient living. Thus, the institute addresses important challenges in the society and the smart cities of the future, including access to information, economic and sustainable use of resources, smart mobility and a modern governmental administration. In its projects, Fraunhofer FOKUS establishes useful ties between industry, governmental administration, users and the people. With more than 25 years of experience, FOKUS is one of the most important actors in the ICT research landscape both nationally and worldwide. As a member of important standardization bodies, the institute contributes to the definition of new standards in information and communication technologies.

The scientific portfolio of Fraunhofer FOKUS includes services such as planning and implementation of IT research and development projects and their demonstration, scientific advice, analysis and drafting policy recommendations, provision of test beds, laboratory and simulation environments, adaptation of systems to open standards and certification requirements, implementation of feasibility and proof-of-concept studies, monitoring the integration of communication technologies into existing and new infrastructures and/or applications.
UPB-NCIT has collaborated for a long time with FOKUS, on connected topics related to Electronic Government and Applications. Fraunhofer FOKUS together with UPB and another Romanian University founded a research Association, e-CAESAR that acts as a research place, as a consultancy centre, and a presentation centre, in the field of electronic governance.

DISCo is a department that performs both education and research, and has top results in the field of ICT for (water) resource management. It brings the experience of involving in research activities not only experienced researchers and teaching staff, but also master and PhD students, thus ensuring the sustainability of the research, through trained people. It has also strong links to the applied research, through the Consorzio Milano Ricerche. DISCo has a fruitful cooperation with UNESCO-IHE, being a good example of excellence in interdisciplinary researches.

UNESCO-IHE brings the excellence in defining, modelling, and applying advanced technologies in the field of water management. It is also a good example of combining research with education at the level of master and PhD. Through the specificity of the research field - water resource it has close contact also to policy and regulating aspects, and their

Though no institutional collaboration between UPB and UNESCO-IHE existed in the past, some punctual joint activities exist already (reviewing papers, contribution to the organization of CSCS20).

3.4 Resources to be committed

The DATA4WATER consortium will mobilize its financial, human and infrastructure resources to achieve the project goals.

The total EC contribution to the Twinning Action is € **999.493,75** including 25% of overheads. It is divided into the following categories:

Personnel costs: € **580.795,00** (without overheads), according to the distribution of person months identified for each WP, representing about 58% of the budget. The total of PM per project is 92,45. UPB, as widening country covers41,25 PM, representing 45%, that leads to 27% of the staff costs, due to the lower value of PM in Romania, compared to the partner countries.

Travel costs: € **201.800,00** represent 20% of the project costs. As networking and study visits are important components of the project, it was necessary to allocate more than 15% for travel. From them, € 70.000 (35%) are allocated to UPB and will cover also external experts costs (compensation for travelling), fees for participating to events and access to open/green publications; € 42600,00 for UNIMIB (20%), € 47000,00 for Fraunhofer FOKUS (24%) and € 42200,00 for UNESCO-IHE (22,2%) will be used to cover the travel costs related to trainings, summer schools and workshops, as well as to relevant scientific events for the research field, that help for networking.

Other costs: € **17.000,00** represent 2% of the project budget and will be used mainly by UPB, (€ 15500), each to for hosting meetings, for developing the visual identity package of the project and dissemination materialsand for consumables. The partners have 500 € each, for consumables.

The table showing number of person/months required is presented in table 3.4a.

Table 3.4a: Summary of staff effort

	WP	**WP**	**WP**	**WP**	**WP**	**WP**	**Total Person/**

	1	2	3	4	5	6	Months per Participant
1 / UPB	**9,5**	3	10,5	7	5	5	**40,00**
2 / UNIMIB	2	5	4	**6**	-	2	**19,00**
3 / FOKUS	1	**5**	6,5	6	-	1	**19,50**
4 / UNESCO IHE	2	3,5	**5,5**	4	-	1,7	**16,70**
Total Person/Months	14,5	16,5	26,5	23	5	9,7	**95,20**

Table 3.4b presents the 'other direct costs' for participants where those costs exceed 15% of the personnel costs (according to the table in section 3 of the administrative proposal forms).

Table 3.4b 'Other direct cost'

Participant 1/UPB	Cost (€)	Justification
Travel	70000	Networking, staff exchange, participation to scientific events,
Equipment	-	
Other goods and services	15500	Consumables, printing services, workshop organization services
Total	85500	

Participant 2/UNIMIB	Cost (€)	Justification
Travel	40600	Networking, staff exchange, participation to scientific events,
Equipment	-	
Other goods and services	500	consumables
Total	41100	

Participant 3/FOKUS	Cost (€)	Justification
Travel	47000	Networking, staff exchange, participation to scientific events,
Equipment	-	
Other goods and services	500	consumables
Total	47500	

Participant 4/UNESCO IHE	Cost (€)	Justification
Travel	42200	Networking, staff exchange, participation to scientific events,
Equipment	-	
Other goods and services	500	consumables
Total	42700	

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Annexe A:

List of key indicators where Romania ranks above 20 within European Union:

Key indicators for Romania	**Rank within EU**
Business enterprise expenditure on R&D (BERD)	26
Public expenditure on R&D (GOVERD + HER)	27
Composite indicator on research excellence	28
Scientific publications within the 10% most cited scientific publications worldwide	25
International scientific co-publications per million population	28
Public–private scientific co-publications per million population	25
PCT patent applications per billion GDP	28
Community trademark (CTM) applications	27
Community design (CD) applications per million population	27

Annexe B

Country	***Areas of marked S&T specialisations***
Romania	Automobiles, **ICT**, new production technologies, energy, nanosciences and nanotechnologies, and security
Germany	Automobiles, **environment**, energy, and key production technologies
Netherlands	Food, agriculture and fisheries, **ICT**, and to a lesser extent, biotechnology, other transport technologies, nanosciences & nanotechnologies, and **environment**
Italy	Automobiles, food and agriculture, **ICT**, biotechnology, and new production technologies

Section 4: Members of the consortium

4.1. Participants (applicants)

Organisation Name: University Politecnica of Bucharest (UPB)
Country: Romania
Website: www.upb.ro

Organisation's Profile

UPB is the largest and most prestigious technical university from Romania, classified, in the top 12 universities, as "University for advanced research and education" by the Ministry of Education Research Youth and Sports, at the last ranking of higher education institutions, in 2012. The scientific research is an essential component of the UPB activity, the value of the results obtained at national and international levels being unanimously recognized and strategically oriented towards high development areas (e.g.: information and communication technology, innovative products and processes). In FP6 and HORIZON 2020 EU programs, UPB was the most successful research entity from Romania. The R&D entities in UPB benefit of a strong R&D infrastructure (e.g. 74 exclusive R&D personnel, 45 Research Centres, approx. 150 Research Laboratories) in different fields.
UPB is the largest technical university in Romania (26,000 students, among which 1,500 are in the Computer Science and Engineering Department). UPB participates in the project through its National Center for Information Technology (NCIT), within the Computer Science and Engineering Department. NCIT has 12 full professors and over 50 teaching assistants, researchers and Ph.D. students. NCIT has several laboratories dedicated to advanced and interdisciplinary research in the fields of distributed systems, high-performance computing, e-government, computer networks, interoperable decision support systems and other areas.
The mission of the Center is to promote advanced and inter-disciplinary research, to develop a new paradigm for intimate collaboration among computer scientists, computational scientists and researchers from a diversity of domains, to develop human resources by postgraduate educational programs (MSc, Ph.D., long-life learning) and a local "culture" in advanced Information Technology, and to offer local and remote access to a shared powerful computer infrastructure for the Romanian academic and industry communities.
The Center is actively involved in international cooperation with similar centres, partnerships with IT companies and development of national and international projects.

Relevant Skills and Expertise

UPB brings expertise in optimization algorithms, mobile wireless networks and computing, pervasive services, context-awareness, people-centric and participatory computing. The entity has experience in mobile context-aware application and algorithm development, smart ad-hoc networks, smart sensors, and evaluation using modeling and simulation. In this sense, current research activities within the laboratory are focused on the research and development of applications of mobile and pervasive computing and sensing. The advent of new wireless sensor platforms in the hands of the masses (through recent miniaturization and subsequent introduction of sensors into commodity consumer electronics such as mobile phones, PDAs) makes possible a shift towards solving global-scale problems using public-sensing capabilities. Today we see a continuous push in this direction, and the advent of a new era of participatory (participatory sensing) or opportunistic (i.e. people-centric sensing) awareness. The team embraces the holistic vision of massive quantities of real-time information becoming access push rather than demand pull on a global case (e.g., tweets, sensing info, GPS data). In this way we believe future enterprises will be (a) context aware, (b) dynamically configurable, and (c) multi-identity oriented virtual entities that manifest themselves in many different ways and re-invent themselves over and over again.

Main tasks of involvement

UPB, as applicant and main beneficiary of this project, leads WP1, that aims to develop and implement a suitable, stable and sustainable framework for the scientific strategy enforcement in the research field of value added, data driven e-services in water management; and to develop a Research Quality Assurance System (RQAS) that will allow benchmarks' setup for increasing the Composite Research Indicator and monitor its evolution in time

It also leads WP6 - Project management, that is dedicated to overall co-ordination and management of the

project, with the goal of ensuring overall project coherency, provide efficient management and decision making procedures, identify any problems encountered in achieving the stated project goals and put structures in place to take timely and appropriate corrective action, and finally, make a synthesis of the project results and findings.

UPB is in charge of WP5, Dissemination of project outcomes, as most of the tasks will need local support. The participants mainly contribute with materials that will be published on the e-Knowledge environment.

CVs of principal people to be involved

Name: **Prof. Dr.-Ing. Mariana Mocanu**, Gender: **Female**, Position: **professor/member of the Computer Science and Engineering Department board**, Email: **mariana.mocanu@cs.pub.ro**
Mariana Mocanu, professor at the Computer Science at the University Politehnica from Bucharest (since 2004), graduated and PhD in the same university. She coordinates the team for Interoperable products and services for decision support, based on geospatial data, and has a long experience in developing information systems for industrial and economic processes, and in project management. She performs teaching for both undergraduate and master's degree in software engineering, systems integration, software services and logic design. At the University of Regensburg, as visiting professor, she thought Process Computers. She worked for ten years in a multidisciplinary research team for vehicles, being co-author of two patents. She participated in numerous research projects, implementing information systems for control / optimization of processes in various areas (transport, environment, medicine, natural resources management). Her results of research and teaching are reflected in articles published in journals, in papers presented at national and international conferences, and books. She has experience in project manager, as she conducted several national and international projects. She is a member of the University Senate, at the faculty she is responsible for quality assurance.

Name: **Prof. Dr.-Ing. Valentin Cristea**, Gender: **Male**, Position: **Researcher/Member of the NCIT board**, Email: **valentin.cristea@cs.pub.ro**
Valentin Cristea is a professor (since 1993) of the Computer Science and Engineering Department of University POLITEHNICA of Bucharest. He is Director of the NCIT of UPB and has a long history of experience in the development, management and/or coordination of international and national research projects. His main fields of expertise are large scale distributed systems, cloud computing, and e-services. Research contributions are focused on improving the availability and dependability of large-scale distributed systems by collecting, storing and processing monitoring data. He worked on advanced autonomic storage mechanisms for large data volumes (DataCloud@work project), smart technologies to assure the interoperability of e-government services (collaboration with Fraunhofer FOKUS), resource provisioning for elastic clouds (with VU Amsterdam), tasks and workflows adaptive management (PEGAF, MedioGRID projects), intelligent, context-aware middleware and applications for water resource management (CyberWater project), farms' management (CLUeFARM project), and city's vehicular traffic management (collaboration with Rutgers University). In 2003 and 2011, he received the IBM faculty award for research contributions in e-Service and Smart City domains. Prof. Cristea has published more than 300 specialist papers in international journals or peer-reviewed proceedings, and 45 books.

Name: **Prof. Dr.-Ing. Nicolae Ţăpuş**, Gender: **Male**, Position: **Director of Computer Science and Engineering Department and of NCIT / VicePresident of UPB** , Email: **nicolae.tapus@cs.pub.ro**
Nicolae Ţăpuş is a Professor of the Computer Science and Engineering Department, Head of Department and Vice President of Politehnica University. His main fields of expertise are Distributed Systems, Local Area Networks, Computer Architecture and Grid Computing. He published more than 200 articles and papers at international conferences, 7 books and 12 university textbooks. He is PhD supervisor. He was a visiting professor in European and US Universities. Prof. Tapus was advisor for student team's winners at IEEE Annual Computer Society International Design Competition (CSIDC): first place in the world in 2002. Romanian Academy-1975 and Education Ministry -1978 awarded his activities; He is Member of Romanian Technical Science Academy (2004) and Vice President of Information Technology and Communication Academy Section. Prof Tapus was involved in FP7 research activities as responsible of Romania team of SENSEI- Integrating the Physical with the Digital World of the Network of the Future, FP7-ICT-2007-1, P2P-Next Next Generation Peer-to-Peer Content Delivery Platform, FP7-ICT-2007-1, EU-NCIT leading to

EU IST Excellency, HP-SEE. He is a senior member of the IEEE and senior member of the ACM.

Name: **Assoc.prof. Dr.-Ing. Florin Pop**, Gender: **Male**, Position: **Assoc.prof.**, Email: **florin.pop@cs.pub.ro**
Florin Pop (Associate Professor) has early scientific and scholarly contributions since 2005 in the field of large scale distributed systems concerning scheduling and resource management (decentralized techniques, rescheduling), multi-criteria optimization methods, Grid middleware tools and applications development (satellite image processing an environmental data analysis), prediction methods, self-organizing systems, contextualized services in distributes systems. These contributions led to important results, demonstrating the Florin Pop's qualifications and potential to go significantly beyond the state of the art. For all scientific activity Florin Pop was awarded with "Magna cum laude" distinction from University Politehnica of Bucharest (at the end of his PhD studies), two Prizes for Excellence from IBM and Oracle, one IBM Faculty Award and three Best Paper Awards. He worked in several international (EGEE III, SEE-GRID-SCI, ERRIC) and national research projects in the distributed systems field as coordinator and member as well.

Name: **Assoc.prof. Dr.-Ing. Ciprian Dobre**, Gender: **Male**, Position: **Researcher**, Email: **ciprian.dobre@cs.pub.ro**
Ciprian Dobre, (Associate Professor, UPB) has scientific and scholarly contributions in the field of large scale distributed systems concerning mobile applications and smart technologies to reduce urban congestion and air pollution (TRANSYS), context-aware applications (CAPIM), opportunistic networks and mobile data offloading (SPRINT, SENSE), monitoring (MonALISA), high-speed networking (VINCI, FDT), Grid application development (EGEE, SEE-GRID), and evaluation using modeling and simulation (MONARC 2, VNSim). These contributions led to important results, demonstrating his qualifications and potential to go significantly beyond the state of the art. Ciprian Dobre was awarded a PhD scholarship from California Institute of Technology (Caltech, USA), and another one from Oracle. His results received one IBM Faculty Award, two CENIC Awards, and three Best Paper Awards (in 2013, 2012, and 2010). The results were published in 6 books, 10 chapters in edited books, 34 articles in major international peer-reviewed journal (19 as main author, cumulated impact factor of 13.24), over 100 articles in well-established international conferences and workshops (with over 200 citations).

Relevant Publications, Products, Services and other relevant achievements (up to five)

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2. Ciolofan, Sorin N.; Mocanu, Mariana *; Ionita, Anca: *Distributed Cyberinfrastructure for Decision Support in Risk Related Environments*, The 12th International Symposium on Parallel and Distributed Computing – ISPDC 2013, 27-30 June 2013, Bucharest, Romania, *http://ispdc.hpc.pub.ro/?page_id=57#*
3. Mariana Mocanu, Lucia Văcariu, Radu Drobot, Marian Muste: *Information-Centric Systems for Supporting Decision-Making in Watershed Resource Development*, International Workshop on Cyberinfrastructures for Natural Resources Management - CyRM din cadrul 19th International Conference on Control Systems and Computer Science (CSCS19), Bucuresti, 29 – 31 mai 2013, Universitatea Politehnica din Bucureşti,
4. Mariana Mocanu, Marian Muste, Vasile Lungu, Radu Drobot: *Composite Application for Water Resource Management*, chapter, Advances in Intelligent Control Systems and Computer Science 2013, Editors, Ioan Dumitrache, ISBN 9783642325489 • 9783642325472, DOI 10.1007/978-3-642-32548-9
5. *C. Dobre*, F. Xhafa, Intelligent Services for Big Data Science, in Future Generation Computer Systems (IF: 2.639), online August 2013, vol. 37, pp. 267-281, July 2014.

Relevant Past Projects

The Distributed Systems and Grids team, part of NCIT, develops research projects in large-scale distributed systems middleware and applications, in cooperation with similar international centres. Its projects include MonALISA monitoring platform and MONARC 2 simulator with Caltech and CERN; DataCloud@work advanced, and autonomic storage mechanisms for cloud services with INRIA; interoperability in egovernment services with Fraunhofer FOKUS; and provisioning of cloud services with VU Amsterdam. The team was or is active in several research projects: COOPER (FP6): model driven development, Web

technologies and platforms for teamwork management; SENSEI (FP7) has provided results in monitoring and evaluating heterogeneous wireless sensor and actuator networks; P2P-NEXT (FP7): content delivery P2P platform; EGEE, SEE-Grid /SCI, EGI-Inspire (FP6, FP7): Grid computing infrastructure, middleware and applications; DEPSYS: models, methods, and techniques for dependability in large-scale distributed systems; PEGAF: workflow management platform and workflow engine for distributed systems; MedioGRID: Parallel and distributed graphical processing on Grid structure of geographical and environmental data; CAPIM has developed a Context-Aware platform using Integrated Mobile Services and supports generic context-aware mobile applications; VNSim has developed a hybrid VANET simulator in cooperation with Rutgers DS lab; and TRANSYS has contributed to models and techniques for traffic optimization in urban environments.

Relevant Projects

The **COOPER** project (Collaborative Open Environment for Project-Centered Learning, FP6 STREP project) was dedicated to supporting long-distance cooperation of teams of students working on complex projects. **COOPER** developed and tested a model-driven, extensible environment that supports individual and collective competency building in virtual teams, whose members are geographically dispersed, have different backgrounds and competencies, working together in projects to solve complex problems. The project focused on and provided the following results: create a reference model for cooperative teamwork processes; create interoperable and validated pedagogical scenarios and assessment strategies; create and test tools to support knowledge co-construction, sharing and re-use; create a common COOPER software platform in which these models, scenarios, strategies and tools are integrated. Gather requirements as well as pilot results and evaluations in representative case studies. All results delivered by the project contribute to forming a protected, shared COOPER environment**,** that will be easily deployed over any University's or Company's Intranet. The COOPER environment features the use of advanced technology (e.g. voice over IP) provided by two small SMEs at the forefront of EU innovation edge. Relevant results include the development of components for *Rich User Profile* (including management of Knowledge level, Social abilities), *Collaborative activities using Adaptive Web services for team members collaboration*, and *Knowledge Sharing and Recommender Service*, *Social network analysis*, and others.

The **LTfLL** (Language Technologies for Lifelong Learning) project created next-generation support and advice services to enhance individual and collaborative building of competences and knowledge creation in educational and organizational settings. The project made extensive use of language technologies and cognitive models in the services. The research activities were enveloped by activities that ensure common ground in use cases and pedagogically sound scenarios that steer the design and development of the services and guide the validation; a technical infrastructure for the creation and integration of the services and a validation structure that ensures rigorous evaluation in realistic settings, with several languages supported. UPB was involved in the development of Natural Language Processing & *Social Network Analysis* (used to understand the interactions of students in chat and forum services), and the *Support and advice services enhance individual and collaborative building of competences and knowledge creation*.

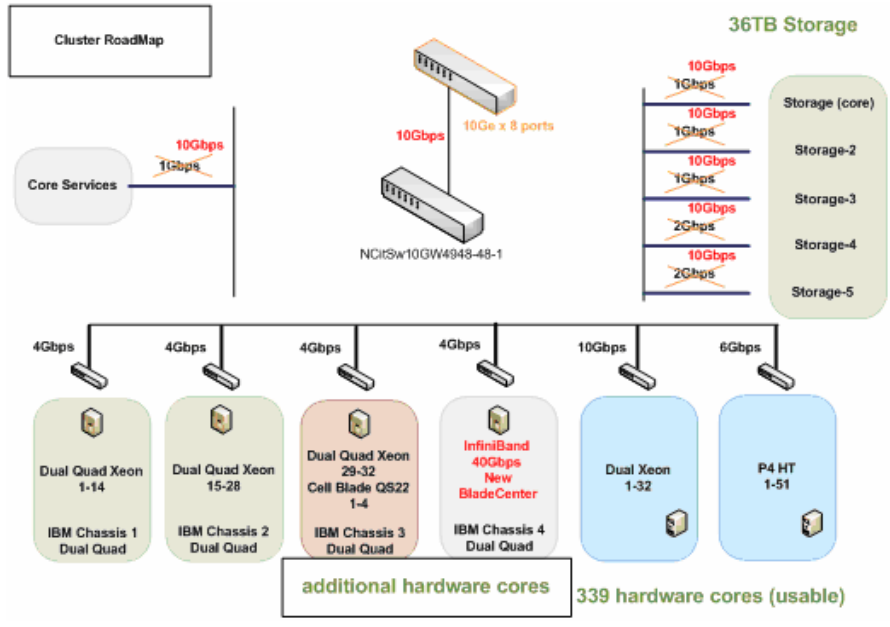
CyberWater (national-funded project, to end in 2016). The overarching goal of the proposal is to create a prototype platform using advanced computational and communications technology for implementation of new frameworks for managing water and land resources in a sustainable and integrative manner. The main focus of this effort will be on acquiring diverse data from various disciplines in a common digital platform that is subsequently used for routine decision making in normal conditions and for providing assistance in critical situations related to water, such as accidental pollution flooding.

CLUeFARM (national-funded project, to end in 2016) aims to create an intelligent, integrated, cloud services-based system, using advanced computer technology, automation and communications to increase product quality and business development in the area of farming. The specific objective is to create an integrated control system for controlling the process in greenhouse crop production, using the services available on mobile devices. The services also offer simple and cheap integration of the existing infrastructure in various types of companies involved in agriculture. The project goal is the development of an intelligent system based on the cutting-edge IT&C technologies to raise the quality of the products grown in green houses and also to uphold the businesses in the agricultural related fields. To achieve these goals it is necessary an integrated approach for handling all processes involved in the value chain. The web services based system will comprise services for the direct control of the farming production process, services for planning and configuration of plots to allow a strategic control of the business development, services for instructing and information about modern techniques, methods and materials recommended based on the

type of crops, information services related to the events or requirements of the local/central administration, alerting services in case of critical natural with a high risk (e.g. meteorological, hydrological), and *a collaborative environment to be used by all involved actors*.
Among other relevant projects and results we mention: CAPIM is a context-aware platform designed to assist mobile applications make smarter assisted decisions (react to situation, contextually understand their environment); the SPRINT protocol is among the most advanced today *social-based* opportunistic networking routing protocol (WoWMoM 2013 conference), SENSEI is a *collaborative selfish node detection and incentive mechanism for mobile networks* where collaboration among users is a most (IEEE/IFIP IM 2013 conference), HYCCUPS is a contextual platform designed to assist smartphones take intelligent decisions to collaborate towards minimizing their energy footprint (MSWim 2013 conference, selected by Elsevier among most promising research result of 2013), and other solutions where we combined social aspects of mobile devices with context information towards advanced wireless networking aspects (with results in AINA, ADHOC-NOW, top-ranked conferences, and high-IF journals).
N-WATCHDOG (http://proiecte.nipne.ro/pn2/155-proiecte.html) Early Warning Alert System and Decision Support , based on predicted evaluation of rapid dynamics of Vulnerabilities induced by Nuclear Facilities. National research project: PNII - 298 / 2014

Relevant Infrastructure

The research team has access to the research facilities of the faculty and university: laboratories, computing resources, high speed networking.
Simulation and mobile app infrastructure UPB has a collaborative laboratory for high performance computing with a cluster of over 200 nodes (with 36TB of storage), supporting collaborative virtual environments using high-performance resources and computer-supported cooperative work tools. UPB will provide at least 10 compute nodes to support large-scale simulation experiments to evaluate the solutions developed in this project. These nodes can both sustain physical and virtual machines (VMWare, KVM, Hyper-V R2), multiple types of interconnects raging from 10Gbps network links, low latency 40Gbps Infiniband connections and multiple Fibre channel connections and different types of storage devices. In addition, UPB will provide Android-operated mobile devices to be used for the second case study. UPB will also provide software tools for development on mobile handheld devices.
Network Infrastructure and other research facilities
The NCIT Cluster (Figure) is our main resource center regarding computing power. It provides access to a batch system, to Grid and Cloud computing and to a fast storage. The hardware specifications are divided into three parts: computing, networking, and data center specific (power and air, software). The current infrastructure provides access to 330 hardware cores and a total storage capacity of 36TB.



Computing power and networking. The second upgrade of the data center is the computing power and networking. NCIT cluster started in 2007 with about 250 hardware cores, with a technology of single and double cores. They are still in use but their performance is below the current level. In 2009, the cluster was updated to arrive at 339 hardware cores, and, later that year to 384, by using for the upgrade, the new technology quad core. Since the 1st of November, 2009, our cluster has executed around 150.000 jobs (Sun Grid Engine Accounting), not counting the Grid Computing jobs that run on dedicated systems. Most of our programs usually allocate all slots available on a processor, this meaning that the research department only has about 56 dedicated processors. Another reason for which we need to upgrade the computing center is the recent breakthrough in networking technologies. The first benchmarks we ran showed a sustained cluster performance of 700 GFlops on the Linpack test suite. After further fine tuning of the network infrastructure we managed to peak at 1TFlop. The reason for this was that the network design of a Blade Center H inherits the use of different I/O modules for communication that at the time of purchase were limited to only 2 x 4Gbps uplink between the Chassis and the main networking switch. Not counting the bottleneck in throughput which some of the simulations do hit, this means that our distributed jobs that happen to run on different servers in different chassis have a lot more latency when accessing the network. Given the current load of the cluster this usually happens and when running profiling algorithms you have to run the job again. Current Blade Center I/O modules have stacking capabilities, which means each blade acts as being connected in a single switch, instead of going through three. In the last couple of years, the infrastructure was upgraded to almost a double capacity, with an addition of 336 (2 x 6 x 28) hardware cores, based on six core (or eight core) technology. The advantage of having multi core CPUs is obviously the high speed of communication between parallel processes. Soon, the infrastructure is planned to reach a sustained installed capacity of 2 TFlops, which will allow us to support the proposed research themes, the current ongoing research projects as well as enable us to participate in future calls for R&D projects in this field together with our European partners from VUA, HLRS or IRIT.
At the end of 2015 a new building, specially destined for research activities will be in use for the research teams of the faculty.

Organisation Name: UNIVERSITA' DEGLI STUDI DI MILANO-BICOCCA
Country: Italy
Website: http://www.unimib.it

Organisation's Profile

University of Milano-Bicocca (UNIMIB) was officially funded in 1998 as an offspring of the University of Milano. One of the goals of UNIMIB is to offer an advanced educational and research environment with strong links to industry. UNIMIB has many Departments and Schools covering many research fields, from sociology and economy to technology, from health and human sciences to environment. In this proposal the **Department of Computer Science, Systems and Communication** (DISCo) is mainly involved. Its main research activity can be divided into 4 areas:

- Computer architecture and analysis, distributed systems, imaging and computer vision, robotics;
- Databases and information systems, artificial intelligence, knowledge engineering and management, cooperation technologies;
- Bioinformatics, complex systems and formal models of distributed systems;
- Information, finance and environment, computational networks and decision sciences

Relevant Skills and Expertise

With respect to the specific research topics addressed by the proposal, UNIMIB is active on the development of data analysis solutions for the water management. In the Italian project H2OLeak, UNIMIB developed, and deployed on a pilot, solutions for:

- supporting water manager in the network sectorization process – aimed to simplify the monitoring of the water distribution while reducing costs for monitoring sensors (i.e. flow meters)
- assessing and detecting leakages within a specific sector of the sectorized water distribution network – improving the effectiveness of the leakage management process.

In a more recently Italian project, SEGUICI (**S**mart t**E**cnologie per la **G**estione delle risorse idriche ad **U**so **I**rriguo e **C**ivile, "*Smart technologies for the management of water resource in the urban and agricultural sectors*") the research and innovation actions performed by UNIMIB are focused on developing and deploying software applications for the urban sector, in particular:

- time-series data analysis for performing reliable demand forecasting (in the short, medium and long term)
- machine learning approaches for analysing pressure and flow stream data and detect leakages while providing a limited set of pipelines probably leaky
- software applications based on hydraulic simulation in order to estimate the reduction in the quality of service induced by the failure/damage of some individual components

From a more general point of view, main competences, skills and research activities are related to Data Mining, Machine Learning, Advanced Analytics with application on Streaming Data, Big Data, Social Network Data, as well structured and unstructured.

Main tasks of involvement

UNIMIB leads WP4, Organization of Scientific events. The aim of this work-package is to organize a series of high quality scientific events to facilitate knowledge transfer and raise the visibility of UPB at national and international level. The events will reunite: experienced and young researchers from UPB, research staff from the partnering institutions, as well as invited researchers from other bodies (universities, companies) relevant to the development of the research field.

It is also involved in WP1, contributing to the development of the Roadmap for the research activities in the field, of UPB. UNIMIB participates in WP2 by supporting the creation of links and cooperation opportunities, in the field of Smart Data for Water Management, between the Romanian research group and Italian as well as European research groups and industrial companies.
Supporting, through the research staff exchange, a constant knowledge sharing between the organizations involved in the DATA4WATER initiative as well as at wider level (network of excellence and partnership in Smart Data for Water Management).

UNIMIB will also contribute to WP3, by covering some training and summer school topics, according to its expertise. The partner contributes with materials/information that will be published on the e-Knowledge environment (WP5).

CVs of principal people to be involved

Name**: Prof. Francesco Archetti**, Gender**: Male**, Position**: Full Professor**, email: **francesco.archetti@unimib.it**
Francesco Archetti is Full Professor of Computer Science at the Department of Informatics, Systems and Communication (DISCo), University of Milano-Bicocca. His research activities focus on Software Architecture, Data Analytics, Web Mining, Network Science, Probabilistic Modelling and Predictive Analytics, with application to security, water management, logistics and cyber physical systems. Francesco Archetti is also General Manager of Consorzio Milano Ricerche, a consortium of industrial companies and academies (including UNIMIB) whose activities are related to research and development of ICT solutions and potential technological transfer to the market.

Name**: Prof. Enza Messina**, Gender**: Female**, Position**: Full Professor**, email: **enza.messina@unimib.it**
Enza Messina is Full Professor of Operations Research at the Department of Informatics, Systems and Communication (DISCo), University of Milano-Bicocca. Her research activities focus on Data/Web/Text/Sentiment Mining, Social Network Analysis, Risk Management and Supply Chain, Reasoning under uncertainty.

Name**: Prof. Alberto Leporati**, Gender**: Male**, Position**: Associate Professor**, email: **alberto.leporati@unimib.it**
Alberto Leporati is Associate Professor in Computer Science at the Department of Informatics, Systems and Communication (DISCo), University of Milano-Bicocca. His research interests are mainly in the area of Membrane Computing and in Complexity Theory, in particular the computational power of several variants of membrane systems (also known as P systems), designing systems which are able to solve complete problems for some complexity classes (mainly, NP and PSPACE). Recently, research interest is moving

towards Cyber (Physical Systems) Security.

Name**: PhD Elisabetta Fersini**, Gender**: Female**, Position**: post-doc researcher**, email: **fersini@disco.unimib.it**

Elisabetta Fersini is a PhD in Computer Science and currently she is a post-doc at the Department of Informatics, Systems and Communication (DISCo), University of Milano-Bicocca. Her research activities are mainly focused on (Relational) Machine Learning for different application domains, both on structured and unstructured data.

Relevant Publications, Products, Services and other relevant achievements (up to five)

1. Candelieri, A., Archetti, F. "Smart water in urban distribution networks: Limited financial capacity and Big Data analytics" (2014) WIT Transactions on the Built Environment, 139, pp. 63-73.
2. Candelieri, A., Soldi, D., Conti, D., Archetti, F. "Analytical leakages localization in water distribution networks through spectral clustering and support vector MACHINES. The icewater approach" (2014) Procedia Engineering, 89 (C), pp. 1080-1088.
3. Candelieri, A., Archetti, F. "Identifying typical urban water demand patterns for a reliable short-term forecasting - The icewater project approach" (2014) Procedia Engineering, 89 (C), pp. 1004-1012.
4. Candelieri, A., Archetti, F., Messina, E. "Analytics for supporting urban water management" (2013) Environmental Engineering and Management Journal, 12 (5), pp. 875-881.
5. Candelieri, A., Archetti, F., Giordani, I., Arosio, G., Sormani, R. "Smart cities management by integrating sensors, models and user generated contents" (2014) WIT Transactions on Ecology and the Environment, 179 VOLUME 1, pp. 719-730.

Relevant Past Projects

- **LENVIS EU-FP7-ICT**(https://www.youtube.com/watch?v=D7R74FEGxs4) - Localised environmental and health information services, aimed at providing a network of services for citizens as well as local authorities. In particular, UNIMIB developed data analysis tool for predicting air quality and number of daily hospitalizations (due to respiratory and cardiovascular adverse events).
- **H2OLeak** (http://www.milanoricerche.org/?page_id=354) – national project aimed at providing a suitable clustering of the water distribution network into independent sub-sectors (i.e. District Meter Areas, DMA) in order to improve effectiveness of leakage assessment and detection. Input data will be acquired by a Supervisory Control & Data Acquisition system (SCADA) deployed for continuous online monitoring of key features (pressure and flow) at crucial points of the net (e.g., at the entry and exit of districts).
- **SEGUICI** (http://www.eucentre.it/progetto-seguici/) – national project addressing the management of water resources through new technological solutions aimed at optimizing the use of water irrigation and civil use. The project proposes a software platform, operating on local regional basis, able to collect, elaborate and share knowledge on different water systems related both to irrigation water for agriculture and distribution of drinking water in urban environments.

Furthermore, University of Milan-Bicocca has close cooperation contacts with the Consorzio Milano Ricerche (CMR), with staff from both organisations working together on many research topics. In particular, CMR is involved in the **EU-FP7-ICT project ICeWater** (**IC**T for **e**fficient **WATER** management, www.icewater-project.eu), by developing a set of computational modules devoted to the analysis of data coming from different technological systems and the provision of innovative functionalities for supporting a more efficient, effective and sustainable management of urban Water Distribution Networks (WDN).

Relevant Infrastructure

The Department of Informatics, Systems and Communication (DISCo) opened on January 1, 1999 with a teaching staff and technical administration staff who transferred from the Computer Science department of the University of Milano to the new University of Milano-Bicocca.
Since then, the department has grown and now has a teaching staff of more than 30 professors and more than 40 doctoral students and researchers.
The research topics of the department are strongly linked to the teaching activities. The teaching activity of each of the heads of the research labs is directly connected to the research of the individual labs. Internships and dissertations are part of the numerous projects which produce innovative and original research. Most of the Ph.D. students are actively involved in the research labs in addition for their doctoral thesis.

Research takes place inside the university, although there are numerous industrial and academic collaborations on the national and international level. Research is organized into four areas developed by the research labs.
The labs dedicated to education, separate from the research labs, are a strong point for the Department. They are managed using industrial techniques and offer the students an environment equal or better than what they could find in company IT labs.

Organisation Name: Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Fraunhofer Institute for Open Communication Systems (Fraunhofer FOKUS)
Country: Germany
Website: www.fokus.fraunhofer.de

Organisation's Profile

The FRAUNHOFER Society is one of the leading organisations of applied research and development in Europe. One of the main goals of the FRAUNHOFER Society is to link scientific work with industrial demands.
Fraunhofer Institute for Open Communication Systems (Fraunhofer FOKUS), based in Berlin, Germany, develops solutions for the communication infrastructure of the future. The research institute explores how information and communication will contribute to a more secure and convenient living. Thus, the institute addresses important challenges in the society and the smart cities of the future, including access to information, economic and sustainable use of resources, smart mobility and a modern governmental administration. In its projects, Fraunhofer FOKUS establishes useful ties between industry, governmental administration, users and the people. The institute has a well-known reputation in national and international research programs as well as in standardisation bodies such as DIN, ISO, ETSI, or OMG. For companies and governmental administration, FOKUS is a competent companion in realizing IT projects. Independent from specific manufacturers, products and technologies, the institute provides a neutral platform. With more than 25 years of experience, FOKUS is one of the most important actors in the ICT research landscape both nationally and worldwide. Fraunhofer FOKUS exploits its experience and IPR gathered in publicly funded projects to conduct high quality, cutting-edge research and development for its clients. Besides that, knowledge is distributed and multiplied via lessons held by Fraunhofer FOKUS employees at several universities.

Relevant Skills and Expertise

The Fraunhofer FOKUS eGovernment Competence Center has outstanding expertise in the Public Services domain. It specialises on the development of standardised eGovernment systems, architectures and infrastructures for secure and media mismatch free communication between autonomous, heterogeneous eGovernment systems in inter-municipal and cross border application areas.In its laboratory, application oriented research is complemented by feasibility and case studies, the design and development of prototype solutions and tests and demonstrations. The laboratory facilitates the collective development and integration of innovative concepts, applications and best practice solutions. This service is used for R&D work in cooperation with partners from research and business.
Together with the City of Berlin Fraunhofer FOKUS designed and launched the first German Open Data portal: daten.berlin.de. FOKUS has also implemented and still operates the official national German Open Data portal for the Federal Ministry of the Interior (govdata.de), which currently provides unified access to more than 5000 datasets from various public bodies. On the European level FOKUS is involved in several Open Data and Smart City centric projects, such as Open Cities (Amsterdam, Barcelona, Helsinki, Paris, Rome, Bologna), Engage (www.engage-project.eu), iCity, Share-PSI and the development of the new Pan-European Open Data Portal of the European Commission.

Main tasks of involvement

FOKUS will lead WP2, that aims to create a link between the Romanian research group in the field of SDWM and the internationally-leading research institutions, as well as to encourage and enhance the networking of the Romanian research group with other research intensive institutions in Europe, industry

specialists, public authorities, and institutions that regulate critical resource management.

It is involved in WP1, contributing to the development of the Technology Survey and the Roadmap for the research activities in the field, of UPB. FOKUS will contribute to WP3 - Training, by covering some ICT related topics. In WP4, the partner will contribute by participating to organization of common research activities, mainly to the organization of a co-located conference. FOKUS will contribute with materials/information that will be published on the e-Knowledge environment (WP5).

CVs of principal people to be involved

Name: **Prof. Dr.-Ing. Ina Schieferdecker**, Gender: **Female**, Position: **Institute Director**, Email: **ina.schieferdecker@fokus.fraunhofer.de**
Ina Schieferdecker studied Mathematical Computer Science at the Humboldt University Berlin and did her PhD at the Technical University Berlin. She coordinates the ICT for Smart Cities initiative at Fraunhofer Institute for Open Communication Systems (FOKUS) in Berlin. She is member of the Fraunhofer Morgenstadt initiative, member of the City of the Future initiative by the German National Academy of Science and Engineering, and member of the DKE/IEC initiative on Smart Cities standardization. Prof. Schieferdecker chairs the section "Model-based Development and Quality Assurance of Software-based Systems" at Freie Universität Berlin.

Name: **Dr. Klaus-Peter Eckert**, Gender: **Male**, Position: **Researcher/Group Leader**, Email: **klaus-peter.eckert@fokus.fraunhofer.de**
Klaus-Peter Eckert received his M.Sc. in applied mathematics and informatics (1977) and his Ph.D. in informatics (1994) from the Technical University Berlin (TUB). From 1977 to 1988 he works as a researcher and programmer in the areas of numerical mathematics, computer graphics, physical bulk data evaluation, programming languages, and distributed systems in the department of mathematics and computer science at the Hahn-Meitner-Institute (currently Helmholtz-Zentrum Berlin für Materialien und Energie). Afterwards he joined GMD FOKUS (currently Fraunhofer FOKUS) where he is working in the Competence Centre for Electronic Government and Applications (ELAN) with a focus on topics such as Cloud Computing, Big Data, Service Oriented Architecture, European Services Directive, eGovernment, Open Government, and Open Document Formats.
Klaus-Peter Eckert has joined and led several national and international projects concerning research, development, and operational aspects in the areas of distributed systems, telecommunications, and eGovernment. He has published several related papers and gave lectures in the areas of distributed operating systems, object oriented languages, CORBA, TINA, component technology, SOA and document formats at the TUB since 1988. He is a member of ISO/IEC JTC1 SC34 and JTC1 WG9.

Name: **Dr. Yury Glikman**, Gender: **Male**, Position: **Researcher/Group Leader**, Email: **yury.glikman@fokus.fraunhofer.de**
Dr. Yury Glikman is a project manager and since January 2014 a co-Head of the Open Service Engineering group at eGovernment Competence Center at Fraunhofer FOKUS. His technical and research background covers SOA, model driven software engineering, design, prototyping and testing of distributed systems. Yury Glickman was/is actively contributing and was leading technical activities in numerous international (TT-Medal, VISP, SWEB, QualiPSo, ALADDIN, ENGAGE, iCity, OCEAN) and national research projects (KING, TWIN), and in research projects in collaboration with Japanese industry (Hitachi, NTT Data). Now, Yury is the coordinator of the FP7 Policy Compass project aiming to enable citizens and policy makers better understand the impacts of policies based on available Open Data. Yury is leading the Fraunhofer's team responsible for development of the core part of the new Pan-European Open Data Portal of the European Commission. Yury is an active member of the Open Source community and the current Board Chairman and President of OW2 Consortium (www.ow2.org) – a global Open Source community including 60 commercial, public and academic organizations, and over 1600 individual members.

Name: **Jens Klessmann**, Gender: **Male**, Position: **Researcher/Group Leader**, Email: **jens.klessmann@fokus.fraunhofer.de**
Jens Klessmann has received his M.Sc. (Dipl.Ing.) at TU Dortmund and since January 2014 is a co-Head of Open Service Engineering Unit at eGovernment Competence Center at Fraunhofer FOKUS. He works as a

researcher since 2006 with focus on electronic government and governance. He is a Ph.D. student at the German University of Administrative Sciences Speyer, focusing on collaborative governance in implementing Open Government Data. At Fraunhofer FOKUS he works on projects about public sector information provisioning as well as collaborative eGovernance. He has led national and international Open Government Data projects, among others the implementation of the National German Open Data Portal. Before joining Fraunhofer in 2008 he was a project manager at the information office d-NRW.

Relevant Publications, Products, Services and other relevant achievements (up to five)

1. Schieferdecker, Ina; Mattauch, Walter:ICT for smart cities : innovative solutions in the public space, Zander, Justyna (Ed.) et al.: Computation for Humanity : Information Technology to Advance Society. Boca Raton, Fla. [u.a.]: CRC Press, 2013. (Computational analysis, synthesis, and design of dynamic systems), pp. 127-151
2. Eckert, Klaus-Peter; Popescu-Zeletin, Radu:Smart Data als Motor für Smart Cities (Eng: Smart Data as Motor for Smart Cities) Informatik-Spektrum, Vol.37 (2014), 2, 120-126
3. M. Mühlhäuser, J. Encarnação, I. Schieferdecker et al: Integrative ICT for the City of the Future, acatech, April 2014.
4. Schieferdecker, Ina; Mattauch, Walter: ICT for smart cities : innovative solutions in the public space. In: Zander, Justyna (Ed.) u.a.: Computation for Humanity : Information Technologyw to Advance Society. Boca Raton, Fla. [u.a.] : CRC Press, 2013, S. 127-151 (Computational analysis, synthesis, and design of dynamic systems).
5. Jens Klessmann, Philipp Denker, Ina Schieferdecker, Sönke E. Schulz, "Open Government Data Germany: Short Version of the Study on Open Government in Germany", published by Federal Ministry of the Interior in Germany, Aug. 2012, online available: http://www.bmi.bund.de/SharedDocs/Downloads/DE/Themen/OED_Verwaltung/ModerneVerwaltung/opengovernment_kurzfassung_en.pdf, as of date 26.04.2014

Relevant Past Projects

- **OpenCities** (http://opencities.net/) – European project on how to approach Open & User Driven Innovation methodologies to the Public Sector in a scenario of Future Internet Services for Smart Cities.
- **OutSmart** (http://www.fi-ppp-outsmart.eu) – European project establishing the foundations of a Future Internet enabled ecosystem, supporting the creation of innovative services and applications with real value to European economy and citizens in the five example areas water and sewage, waste management, transport and street lightening most critical to our society.
- **Streetlife** (http://www.streetlife-project.eu) - European project on a multimodal urban mobility information system. The goal of the project is toreduce traffic and related emissions in favor of a low-carbon economy and resource-efficient urban mobility.
- **iCity** (http://www.icityproject.com/) – European project on opening-up public infrastructures in urban spaces promoting the co-creation of services of public interest.
- **Engage** (http://www.engagedata.eu/) – European project on the development and use of a data infrastructure, incorporating distributed and diverse public sector information (PSI) resources, capable of supporting scientific collaboration and research, particularly for the Social Science and Humanities (SSH) scientific communities, while also empowering the deployment of open governmental data towards citizens.
- **GovData** (https://govdata.de/) – Open Government Data portal for Germany spanning all federation levels in Germany and including different data domains such as geo data, environmental data, energy data or transport data
- **Netzdaten** (http://netzdaten-berlin.de/) – Industrial project on providing energy distribution data to the public to enable transparency and new innovative data-based businesses in the energy domain.
- **Webinos** (http://www.webinos.org/) – European project on an open source application platform that provides simple discovery and secure usage of services on remote devices.
- **GeMo** (http://www.gemo.fraunhofer.de/en.html) – Fraunhofer project on collaborative eMobility in urban areas of the future including the design and development of a Mobility Data Cloud.
- **CloudforEurope**(http://www.cloudforeurope.eu/) – European project to support public sector cloud use as collaboration between public authorities and industry. The project identifies obstacles, finds innovative solutions and builds trust in European cloud computing.
- **Policy Compass** (http://policycompass.eu/) – European project developing methods and tools that

facilitate more factual, evidence-based, transparent and accountable policy evaluation and analysis based on available data.

- **Pan-European Open Data Portal** (SMART 2014/1072) - Fraunhofer FOKUS is the key technical contributor to the new Pan-European Open Data Portal of the European Commission.

Relevant Infrastructure

With other 40 well-equipped meeting and presentation rooms, including a conference room for 350 people, Fraunhofer FOKUS has a good infrastructure for organizing workshops and conferences.

Organisation Name: Stichting IHE Delft (UNESCO-IHE)
Country: Netherlands
Website: www.unesco-ihe.org

UNESCO-IHE
Institute for Water Education

Organisation's Profile

UNESCO-IHE is the largest international graduate water education facility in the world and is based in Delft, the Netherlands. The Institute confers fully accredited MSc degrees, and PhD degrees in collaboration with partners in the Netherlands.
Since 1957 the Institute has provided graduate education to more than 14,500 water professionals from over 160 countries, the vast majority from the developing world.
UNESCO-IHE carries out educational, research and capacity development activities that complement and reinforce each other in the broad fields of water engineering, water management, environment, sanitation, and governance. Numerous research and capacity development projects are carried out throughout the world. The Institute offers a unique combination of applied, scientific and participatory research in water engineering combined with natural sciences and management sciences. The institute has vast experience in research projects and led EU FP6 project SWITCH (Sustainable city of the future), FP7 project KULTURisk and the recently started PEARL (Preparing for Extreme and Rare Events in Coastal Regions). UNESCO-IHE is partner in many other projects like FP7 WeSenseIt and Waternomics.

Relevant Skills and Expertise

UNESCO-IHE Hydroinformatics group emphasizes the information cycle, including the acquisition, archiving and analysis of monitored data, the modelling real world water based systems to generate new knowledge whether for planning and design or for operations, and the development and integration of information (or knowledge) systems in support of safe and reliable decision making at all levels of the management of such systems.

Main tasks of involvement

UNESCO-IHE leads WP3 - Training. The aim of this work-package is to organize trainings on topics related to excellence in research, that will be attended by target groups of the UPB. UNESCO-IHE will be involved in describing and using models that deals with big and smart data, and covering topics related to water management and hydroinformatics.

It is also involved in WP1, contributing to the development of the Technical Survey and the Roadmap for the research activities in the field, of UPB. The contribution to WP2, Networking and Partnership is to bring to the networking activities, experts from the field of water management and hydroinformatics. UNESCO-IHE will participate at scientific events organized in WP4, in particular it will host an event.
The partner contributes with materials/information that will be published on the e-Knowledge environment (WP5).

CVs of principal people to be involved

Ioana **Popescu** (FEMALE) is Associate Professor of Hydroinformatics at UNESCO-IHE Institute for Water Education in Delft, The Netherlands. Her research focuses on computational methods, aspects of flood modeling and vulnerability related to floods, lake and reservoir modeling and water supply systems modeling and optimisation. She is particularly interested in integrating mathematical models into decision support systems.
Andreja **Jonoski** (MALE) is an Associate Professor of Hydroinformatics within the Hydroinformatics Chair Group at UNESCO-IHE Institute for water education, with teaching and research responsibilities in

hydroinformatics, groundwater modelling, hydrological and hydraulic modelling, coupling of simulation models with optimisation models, decision support systems and Internet- and mobile phone-based distributed applications.

Dimitri **Solomatine** (MALE) is the head of the Hydroinformatics Chair group at UNESCO-IHE since 2006. His research interests include hydroinformatics, integration of models and remote sensing data, optimization, systems engineering, analysis of models uncertainty, computational intelligence, internet-based computing and decision support. He participated in a number of large-scale research and educational projects, has published over 170 papers, chapters in books and conference proceedings, co-edited several special issues of journals, a book, regularly organizes special sessions on hydroinformatics. He is the co-founder and chairman of the sub-division on Hydroinformatics of the European Geosciences Union.

Relevant Publications, Products, Services and other relevant achievements (up to five)

1. **Popescu, I.**, Cioaca, E., Pan, Q., **Jonoski, A**., Hanganu, J.(2014), Use of hydrodynamic models for the management of the Danube Delta wetlands: The case study of Sontea-Fortuna ecosystem, *Environmental Science and Policy*, (Article in Press)
2. **Jonoski A.** and Evers M. (2013) Sociotechnical Framework for Participatory Flood Risk Management via Collaborative Modeling, *International Journal of Information Systems and Social Change*, 4(2), 1-16, April-June 2013, DOI: 10.4018/jissc.2013040101
3. Almoradie, A., **Jonoski, A**., Stoica, F., Solomatine, D., **Popescu, I.** (2013), Web-based flood information system: case study of Somesul-Mare, Romania, *Journal of Environmental Engineering and Management*, 12(5), 1065-1070
4. **Popescu, I.**, **Jonoski, A.,** Bociort, L. (2012), Decision Support Systems for flood management in the Timis-Bega catchement, *J. of Environmental Engineering and Management*, 11(12), 2305-2311
5. **Jonoski, A.**, **Popescu, I.**, (2012), Distance Learning in Support of Water Resources Management: An Online Course on Decision Support Systems in River Basin Management, *Water Resources Management*, **26**(5), 1287-1305 (doi: 10.1007/s11269-011-9959-y)

Relevant Past Projects

- 2012-2016: partner and WP leader in FP7 **WeSenseIT** Community (Based Earth Observatory of Water). Overall theme: developing a citizen-based observatory of water using innovative sensor devices and the exploitation of collective intelligence, allowing citizens to take on a new role in the information chain.

- 2012-2015: partner in FP7 **ICeWater** (ICT Solutions for Efficient Water Resources Management). Overall theme: improving water and energy efficiency in water distribution networks using novel sensor network technologies and simulation, optimisation and decision support components.

- 2011-2013: coordinator of FP7 **KULTURISK** (Knowledge-based approach to develop a prevention culture of water Risk). The KULTURisk project aimed at developing a European culture of risk prevention by means of a knowledge-based approach, whereby the socio-economic benefits of risk prevention techniques are assessed and that knowledge transferred to policymakers and practitioners.

- 2009-2013: partner in FP7 **ENVIROGRIDS** (Gridded Management System on Environmental Sustainability and Vulnerability). Overall theme: development of Black Sea Catchment Observation and Assessment System supporting sustainable development. Specific research on integration of environmental models into decision support and impact assessment systems for stakeholders and citizens' involvement.

- 2013-2015: partner in FP7 **DANCERS** (DANube macroregion: Capacity building and Excellence in River Systems). The aim of this project proposal is develop new instruments and tools that will enhance environmental research and promote innovation in Danube Region, including the Danube Delta and the Black Sea. Importantly, the new instruments and tools do not start ab initio but will build on existing projects covering multiple source of funding (public, private or PPP), whether national, regional or European which will be identified and clustered.

Relevant Infrastructure

DATA4WATER

UNESCO-IHE alumni have access to and remain part of a global network, consisting of alumni, guest lecturers, experts and renowned centres of knowledge, together providing a vast source of expertise available to the sector.

4.2. Third parties involved in the project (including use of third party resources)

Please complete, for each participant, the following table (or simply state "No third parties involved", if applicable):

Does the participant plan to subcontract certain tasks (please note that core tasks of the action should not be sub-contracted)	*No third parties involved*
If yes, please describe and justify the tasks to be subcontracted Organization of workshops Development of image template and dissemination materials	
Does the participant envisage that part of its work is performed by linked third parties[1]	*No third parties involved*
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the foreseen tasks to be performed by the third party	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	*No third parties involved*
If yes, please describe the third party and their contributions	

Section 5: Ethics and security

5.1 Ethics

There are no ethics issues in the ethical issue table.

5.2 Security[2]

Please indicate if your project will involve:

- activities or results raising security issues: **NO**
- 'EU-classified information' as background or results: **NO**

[1] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action (Article 14 of the Model Grant Agreement).

[2] Article 37.1 of the Model Grant Agreement: *Before disclosing results of activities raising security issues to a third party (including affiliated entities), a beneficiary must inform the coordinator — which must request written approval from the Commission/Agency.* Article 37.2: *Activities related to 'classified deliverables' must comply with the 'security requirements' until they are declassified. Action tasks related to classified deliverables may not be subcontracted without prior explicit written approval from the Commission/Agency. The beneficiaries must inform the coordinator — which must immediately inform the Commission/Agency — of any changes in the security context and — if necessary —request for Annex 1 to be amended (see Article 55).*

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