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Horizon 2020

Call: H2020-MSCA-ITN-2019

(Marie Skłodowska-Curie Innovative Training Networks)

Topic: MSCA-ITN-2019

Type of action: MSCA-ITN-ETN

Proposal number: 857807

Proposal acronym: REVOLUTION

Deadline Id: H2020-MSCA-ITN-2019

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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 steps in the submission wizard.

1 - General information

Topic	MSCA-ITN-2019	Type of Action	MSCA-ITN-ETN
Call Identifier	H2020-MSCA-ITN-2019	Deadline Id	H2020-MSCA-ITN-2019

Acronym	REVOLUTION
Proposal title	A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs

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

Duration in months	*48*
Panel	ENV - Environmental and Geosciences (ENV)
Descriptor1	Natural hazards
Descriptor2	Hydrology, water management
Descriptor3	Scientific computing and data processing
Descriptor4	Human, economic and social geography
Free keywords	*Flood risk, drought risk, disaster risk reduction, socio-hydrology, hydrological extremes, new data sources, sustainable development goals, citizen science, participatory methods*

Abstract

Between 1995-2015, floods and droughts affected several billion people. Reducing these risks requires high quality flood and drought risk data and information. Currently, these data and information are either obtained through local-scale studies or from continental to global scale models. However, the time and expense of carrying out state-of-the-art local studies means that these are limited to only a few locations, whilst the coarseness of continental to global models means they cannot be used for designing sustainable disaster risk reduction (DRR) solutions locally or regionally. Recently, there has been an explosion of data and approaches that are spatially scalable and geographically transferable, which could help bridge the gap between local and global scales. Examples are: online media (e.g. Twitter) to monitor floods and droughts globally or provide warnings locally; and OpenStreetMap to improve global exposure datasets or to develop local flood evacuation plans. However, real-world applications of these data and approaches in DRR are limited.

Our aim is to REVOLUTIONise society's ability to reduce and monitor flood and drought risk by training a new generation of researchers for co-creating sustainable solutions using these innovative, scalable, and geographically transferable data and approaches. In doing so, we increase society's ability to achieve the targets of (international) agreements on sustainability and DRR.

Our unique consortium includes all types of organisations in the quadruple helix of social innovation: academic, private, non-governmental and (intra)governmental. We will use an innovative Living-Lab approach, in which training, research, dissemination and communication are carried out through a co-creative innovation development process with stakeholders in a real-world setting. Through transdisciplinary and intersectoral training and research, our Early Stage Researchers will be able to gain employment in a range of sectors and positions.

Remaining characters 0

Has this proposal (or a very similar one) been submitted to a previous ITN call in the last two years? ○ Yes ◉ No

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 http://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
The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed 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 purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in 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 Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the Privacy statement for the EDES Database.

2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	STICHTING VU	NL	
2	TURUN YLIOPISTO	FI	
3	TECHNISCHE UNIVERSITEIT DELFT	NL	
4	FUTUREWATER SL	ES	
5	STICHTING INTERNATIONAL RED CROSS RED CRESCENT CENTRE ON CLIMATE CHANGE AND DISASTER PREPAREDNESS	NL	
6	THE UNIVERSITY OF BIRMINGHAM	UK	
7	DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV	DE	
8	ARDHI UNIVERSITY	TZ	
9	UNIVERSITY OF PORTSMOUTH HIGHER EDUCATION CORPORATION	UK	

Information on partner organisations

Partner Organisation number	PIC Search PIC	Organisation legal name	Country	Academic Sector	Role of associated		
					Provide training	Host secondmends	
1	926929673	FloodTags	Netherlands	No	Yes	Yes	
2	905008740	Cloud to Street	United States	No	Yes	Yes	
3	953862693	Vaisala Oyj	Finland	No	Yes	Yes	
4	920970866	Humanitarian OpenStreetMap Team U	United States	Yes	Yes	Yes	
5	906446474	United Kingdom Research and Innova	United Kingdom	No	Yes	Yes	
6	999992304	JRC -Joint Research Centre- Europea	Belgium	Yes	Yes	Yes	
7	999520302	Stichting Deltares	Netherlands	Yes	Yes	Yes	
8	997769161	National Aeronautics and Space Admi	United States	Yes	Yes	Yes	
9	999655520	Barcelona Supercomputing Center - C	Spain	Yes	Yes	Yes	

10	950747344	Confederacion Hidrografica del Segura	Spain	No	Yes	Yes	
11	953076217	United Nations International Strategy f	Switzerland	No	Yes	No	

2 - Administrative data of participating organisations

Coordinator

PIC	***Legal name***
954530344	*STICHTING VU*

Short name: VUA

Address of the organisation

Street DE BOELELAAN 1105

Town AMSTERDAM

Postcode 1081 HV

Country Netherlands

Webpage www.vu.nl

Specific Legal Statuses

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 .....yes
Research organisation .....yes
Legal person .....yes
Academic Sector .....yes

Enterprise Data

SME self-declared status.....2015 - no
SME self-assessment ..... unknown
SME validation sme.....2013 - no

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

Department(s) carrying out the proposed work

Department 1

Department name: Institute for Environmental Studies (IVM) ☐ not applicable

☒ Same as proposing organisation's address

Street: DE BOELELAAN 1105

Town: AMSTERDAM

Postcode: 1081 HV

Country: Netherlands

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Philip**

Last name: **WARD**

E-Mail: **philip.ward@vu.nl**

Position in org.: Professor

Department: STICHTING VU ☒ Same as organisation name

☒ Same as proposing organisation's address

Street: DE BOELELAAN 1105

Town: AMSTERDAM

Post code: 1081 HV

Country: Netherlands

Website:

Phone: +31205986149

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Marleen	De Ruiter	m.c.de.ruiter@vu.nl	*+xxx xxxxxxxxx*
Ted	Veldkamp	ted.veldkamp@vu.nl	*+xxx xxxxxxxxx*
Jens	De Bruijn	jens.de.bruijn@vu.nl	*+xxx xxxxxxxxx*
Sadhana	Nirandjan	s.nirandjan@student.vu.nl	*+xxx xxxxxxxxx*
Maartje	De Snoo	subsidiedesk@vumc.nl	*+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
999903064	*TURUN YLIOPISTO*

Short name: UTU

Address of the organisation

Street YLIOPISTONMAKI

Town Turku

Postcode 20014

Country Finland

Webpage www.utu.fi

Specific Legal Statuses

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
Academic Sector .....yes

Enterprise Data

SME self-declared status.....2012 - no
SME self-assessment ..... 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.

Department(s) carrying out the proposed work

Department 1

Department name: Geography and Geology ☐ not applicable

☒ Same as proposing organisation's address

Street: YLIOPISTONMAKI

Town: Turku

Postcode: 20014

Country: Finland

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: ○ Male ◉ Female

First name: **Niina** Last name: **Käyhkö**

E-Mail: **niina.kayhko@utu.fi**

Position in org.: Associate Professor

Department: Geography and Geology ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: YLIOPISTONMAKI

Town: Turku Post code: 20014

Country: Finland

Website: www.utu.fi/en

Phone: +358400310427 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Tutkimus	Palvelut	tutkimuspalvelut@utu.fi	*+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
999977366	*TECHNISCHE UNIVERSITEIT DELFT*

Short name: DUT

Address of the organisation

Street STEVINWEG 1

Town DELFT

Postcode 2628 CN

Country Netherlands

Webpage www.tudelft.nl

Specific Legal Statuses

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

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2015 - no

SME self-assessment .....2015 - no

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.

Department(s) carrying out the proposed work

Department 1

Department name: Water Management ☐ not applicable

☒ Same as proposing organisation's address

Street: STEVINWEG 1

Town: DELFT

Postcode: 2628 CN

Country: Netherlands

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Hessel**

Last name: **Winsemius**

E-Mail: **h.c.winsemius@tudelft.nl**

Position in org.: Associate professor

Department: Water Management

☐ Same as organisation name

☒ Same as proposing organisation's address

Street: STEVINWEG 1

Town: DELFT

Post code: 2628 CN

Country: Netherlands

Website: https://www.tudelft.nl

Phone: +31 (0)15 27 85559

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Rolf	Hut	r.w.hut@tudelft.nl	*+xxx xxxxxxxxx*
Marie-Claire	ten Veldhuis	j.a.e.tenveldhuis@tudelft.nl	*+xxx xxxxxxxxx*
Christiaan	Tiberius	c.c.j.m.tiberius@tudelft.nl	*+xxx xxxxxxxxx*
Oswaldo	Morales	o.moralesnapoles@tudelft.nl	*+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
948139596	*FUTUREWATER SL*

Short name: FW

Address of the organisation

Street CALLE AZUCENA 23

Town CARTAGENA

Postcode 30205

Country Spain

Webpage www.futurewater.es

Specific Legal Statuses

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Academic Sector .....no

Enterprise Data

SME self-declared status.....2013 - yes

SME self-assessment .....2013 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Water, Food and Nature ☐ not applicable

☒ Same as proposing organisation's address

Street: CALLE AZUCENA 23

Town: CARTAGENA

Postcode: 30205

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Johannes**

Last name: **Hunink**

E-Mail: **j.hunink@futurewater.es**

Position in org.: Managing Director

Department: Water, Food and Nature

☐ Same as organisation name

☒ Same as proposing organisation's address

Street: CALLE AZUCENA 23

Town: CARTAGENA

Post code: 30205

Country: Spain

Website: www.futurewater.es

Phone: +34 968 209 834

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
974802471	*STICHTING INTERNATIONAL RED CROSS RED CRESCENT CENTRE ON CLIMATE CHANGE AND*

Short name: RC

Address of the organisation

Street LEEGHWATERPLEIN 27

Town DEN HAAG

Postcode 2502 KC

Country Netherlands

Webpage http://www.climatecentre.org

Specific Legal Statuses

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 .....no

Legal person .....yes

Academic Sector .....no

Enterprise Data

SME self-declared status.....2011 - no

SME self-assessment ..... 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.

Department(s) carrying out the proposed work

Department 1

Department name: Climate Science and Urban Teams ☐ not applicable

☒ Same as proposing organisation's address

Street: LEEGHWATERPLEIN 27

Town: DEN HAAG

Postcode: 2502 KC

Country: Netherlands

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: ○ Male ◉ Female

First name: **Erin**

Last name: **Coughlan de Perez**

E-Mail: **coughlan@climatecentre.org**

Position in org.: Manager, Climate Science

Department: STICHTING INTERNATIONAL RED CROSS RED CRESCENT CENTRE ON ☒ Same as organisation name

☒ Same as proposing organisation's address

Street: LEEGHWATERPLEIN 27

Town: DEN HAAG

Post code: 2502 KC

Country: Netherlands

Website: www.climatecentre.org

Phone: +16 467706788

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Maarten	van Aalst	vanaalst@climatecentre.org	*+xxx xxxxxxxxx*
Sanne	Hogesteeger	hogesteeger@climatecentre.org	*+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
999907526	*THE UNIVERSITY OF BIRMINGHAM*

Short name: UoB

Address of the organisation

Street Edgbaston

Town BIRMINGHAM

Postcode B15 2TT

Country United Kingdom

Webpage www.bham.ac.uk

Specific Legal Statuses

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 .....yes

Research organisation .....no

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2011 - no

SME self-assessment ..... unknown

SME validation sme.....2011 - no

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

Department(s) carrying out the proposed work

Department 1

Department name: School of Geography, Earth and Environmental Sciences ☐ not applicable

☒ Same as proposing organisation's address

Street: Edgbaston

Town: BIRMINGHAM

Postcode: B15 2TT

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: ○ Male ◉ Female

First name: **Anne**

Last name: **van Loon**

E-Mail: **a.f.vanloon@bham.ac.uk**

Position in org.: Senior Lecturer

Department: School of Geography, Earth and Environmental Sciences ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: Edgbaston

Town: BIRMINGHAM Post code: B15 2TT

Country: United Kingdom

Website: https://www.birmingham.ac.uk/index.aspx

Phone: +44 121 414 2243 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Rosie	Day	r.j.day@bham.ac.uk	*+xxx xxxxxxxxx*
Xavier	Rodde	h2020@contacts.bham.ac.uk	*+44(0)1214143880*

Participant

PIC	***Legal name***
999981731	*DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV*

Short name: DLR

Address of the organisation

Street Linder Hoehe

Town KOELN

Postcode 51147

Country Germany

Webpage www.dlr.de

Specific Legal Statuses

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

Academic Sector .....yes

Enterprise Data

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

SME self-assessment ..... 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.

Department(s) carrying out the proposed work

Department 1

Department name: Land Surface Dynamics ☐ not applicable

☐ Same as proposing organisation's address

Street: Muenchener Str. 20

Town: Wessling

Postcode: 82234

Country: Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Mattia** Last name: **Marconcini**

E-Mail: **mattia.marconcini@dlr.de**

Position in org.: Project Manager / Research Scientist

Department: Land Surface Dynamics Department ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Muenchener Str. 20

Town: Wessling Post code: 82234

Country: Germany

Website: https://www.dlr.de/eoc

Phone: +49 8153282138 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Sibel	Gür	sibel.guer@dlr.de	*+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
999605953	*ARDHI UNIVERSITY*

Short name: ARU

Address of the organisation

Street ARDHI UNIVERSITY

Town DAR ES SALAAM

Postcode -

Country Tanzania (United Republic of)

Webpage

Specific Legal Statuses

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 .....no

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... 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.

Department(s) carrying out the proposed work

Department 1

Department name: School of Spatial Planning and Social Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: University Road

Town: Dar es Salaam

Postcode: 00255

Country: Tanzania (United Republic of)

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Ally**

Last name: **Namangaya**

E-Mail: **namangaya@aru.ac.tz**

Position in org.: Dean of the School

Department: School of Spatial Planning and Social Sciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: University Road

Town: Dar es Salaam

Post code: 00255

Country: Tanzania (United Republic of)

Website: www.aru.ac.tz

Phone: +255 738357322

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Evaristo	Liwa	everistliwa@gmail.com	+xxx xxxxxxxxx
Joseph	Mayunga	mayungax@gmail.com	+xxx xxxxxxxxx
Job	Chaula	jobchaula@gmail.com	+xxx xxxxxxxxx

Participant

PIC	***Legal name***
999847871	*UNIVERSITY OF PORTSMOUTH HIGHER EDUCATION CORPORATION*

Short name: UoP

Address of the organisation

Street WINSTON CHURCHILL AVENUE UNIVERSITY

Town PORTSMOUTH

Postcode PO1 2UP

Country United Kingdom

Webpage www.port.ac.uk

Specific Legal Statuses

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

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2014 - no

SME self-assessment .....2014 - no

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.

Department(s) carrying out the proposed work

Department 1

Department name: Geography ☐ not applicable

☒ Same as proposing organisation's address

Street: WINSTON CHURCHILL AVENUE UNIVERSITY HOUS

Town: PORTSMOUTH

Postcode: PO1 2UP

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: ○ Male ◉ Female

First name: **Faith**

Last name: **Taylor**

E-Mail: **faith.taylor@port.ac.uk**

Position in org.: Lecturer in GIS

Department: Geography

☐ Same as organisation name

☒ Same as proposing organisation's address

Street: WINSTON CHURCHILL AVENUE UNIVERSITY HOUSE

Town: PORTSMOUTH

Post code: PO1 2UP

Country: United Kingdom

Website: http://www2.port.ac.uk/department-of-geography/

Phone: +44 (0)23 9284 2477

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Philip	Soar	philip.soar@port.ac.uk	+xxx xxxxxxxxx
Mel	Johnson	research-finance@port.ac.uk	+xxx xxxxxxxxx
Phoebe	Allman-Burt	phoebe.allman-burt@port.ac.uk	+xxx xxxxxxxxx
Mark	Carter	mark.carter@port.ac.uk	+xxx xxxxxxxxx

3 - Budget

Researcher Number	Recruiting Participant (short name)	Planned start month	Duration (months)
1	DUT	9	36
2	UoP	9	36
3	ARU	9	36
4	RC	9	36
5	UTU	9	36
6	UoB	9	36
7	UoB	9	36
8	FW	9	36
9	FW	9	36
10	VUA	9	36
11	VUA	9	36
12	DLR	9	36

Researcher Number	Recruiting Participant (short name)	Planned start month	Duration (months)
13	DUT	9	36
14	DLR	9	36
15	UTU	9	36
Total			540

Participant Number	Organisation Short Name	Country	IOEI	No of researchers	Number of person.months	Researcher Unit Cost			Institutional Unit Cost		TOTAL
						Living allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and overheads	
1	VUA	Netherlands	no	2	72	254039,76	43200,00	18000,00	129600,00	86400,00	531239,76
2	UTU	Finland	no	2	72	284411,52	43200,00	18000,00	129600,00	86400,00	561611,52
3	DUT	Netherlands	no	2	72	254039,76	43200,00	18000,00	129600,00	86400,00	531239,76
4	FW	Spain	no	2	72	224609,76	43200,00	18000,00	129600,00	86400,00	501809,76
5	RC	Netherlands	no	1	36	127019,88	21600,00	9000,00	64800,00	43200,00	265619,88
6	UoB	United Kingd	no	2	72	329145,12	43200,00	18000,00	129600,00	86400,00	606345,12
7	DLR	Germany	no	2	72	228376,80	43200,00	18000,00	129600,00	86400,00	505576,80

Participant Number	Organisation Short Name	Country	IOEI	No of researchers	Number of person.months	Researcher Unit Cost			Institutional Unit Cost		TOTAL
						Living allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and overheads	
8	ARU	Tanzania (U	no	1	36	76988,88	21600,00	9000,00	64800,00	43200,00	215588,88
9	UoP	United Kingd	no	1	36	164572,56	21600,00	9000,00	64800,00	43200,00	303172,56
Total				15	540	1943204,04	324000,00	135000,00	972000,00	648000,00	4022204,04

4 - Ethics

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	50
Are they volunteers for social or human sciences research?	◉ Yes ○ No	50
Are they persons unable to give informed consent?	○ Yes ◉ No	
Are they vulnerable individuals or groups?	○ Yes ◉ No	
Are they children/minors?	○ Yes ◉ No	
Are they patients?	○ Yes ◉ No	
Are they healthy volunteers for medical studies?	○ 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		**Page**
Does your research involve personal data collection and/or processing?	◉ Yes ○ No	51
Does it involve the collection and/or processing of sensitive personal data (e.g: health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	○ Yes ◉ No	
Does it involve processing of genetic information?	○ Yes ◉ No	
Does it involve tracking or observation of participants?	○ Yes ◉ No	
Does your research involve further processing of previously collected personal data (secondary use)?	○ Yes ◉ No	
5. ANIMALS		**Page**
Does your research involve animals?	○ Yes ◉ No	

6. THIRD COUNTRIES		Page
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	◉ Yes ○ No	51
Tanzania (beneficiary organisation) & United States of America (partner organisations)		
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.)?	○ Yes ◉ No	
Do you plan to import any material - including personal data - from non-EU countries into the EU?	○ Yes ◉ No	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	○ Yes ◉ No	
In case your research involves low and/or lower middle income countries, are any benefits-sharing actions planned?	○ 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		Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	○ 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?	○ Yes ◉ No	
8. DUAL USE		Page
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	○ Yes ◉ No	
9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS		Page
Could your research raise concerns regarding the exclusive focus on civil applications?	○ Yes ◉ No	
10. MISUSE		Page
Does your research have the potential for misuse of research results?	○ Yes ◉ No	
11. OTHER ETHICS ISSUES		Page
Are there any other ethics issues that should be taken into consideration? Please specify	○ Yes ◉ No	

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. [x]

How to Complete your Ethics Self-Assessment

5 - Call-specific questions

Extended Open Research Data Pilot in Horizon 2020

If selected, applicants will by default 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.

However, participation in the Pilot is flexible in the sense that it does not mean that all research data needs to be open. After the action has started, participants will formulate a Data Management Plan (DMP), which should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does not have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature). In this case, applicants must indicate a reason for this choice (see options below).

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.	○ Yes	◉ No

Further guidance on open access and research data management is available on the participant portal: http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm and in general annex L of the Work Programme.

[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.*

START PAGE

MARIE SKŁODOWSKA-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2019

PART B

REVOLUTION

A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs

This proposal is to be evaluated as:

ETN

Table of Contents

List of Participating Organisations

Consortium Member	Legal entity short name	Academic	Non-academic	Awards Doctoral Degree	Country	Dept. / division / laboratory	Scientist in charge	Role of partner organisation
Beneficiaries								
Stichting VU	VUA	X		X	The Netherlands	Institute for Environmental Studies	Philip Ward (M)	
Turun Yliopisto	UTU	X		X	Finland	Geography & Geology	Niina Käyhkö (F)	
Technische Universiteit Delft	DUT	X		X	The Netherlands	Water Management Department	Hessel Winsemius (M)	
FutureWater SL	FW		X		Spain	Water, Food and Nature	Johannes Hunink (M)	
Stichting International Red Cross Red Crescent Centre on Climate Change and Disaster Preparedness	RC		X		The Netherlands	Climate Science and Urban Teams	Erin Coughlan de Perez (F)	
The University of Birmingham	UoB	X		X	United Kingdom	Geography, Earth and Environmental Sciences	Anne van Loon (F)	
Deutsches Zentrum Fuer Luft- Und Raumfahrt EV	DLR	X			Germany	Land Surface Dynamics Department	Mattia Marconcini (M)	
Ardhi University	ARU	X		X	Tanzania	School of Spatial Planning and Social Sciences	Ally Namangaya (M)	
University of Portsmouth Higher Education Corporation	UoP	X		X	United Kingdom	Department of Geography	Faith Taylor (F)	
Partner Organisations								
FloodTags	FTags		X		The Netherlands		Jurjen Wagemaker (M)	ESR co-supervision, training, secondments
Cloud to Street	C2S		X		United States of America	Science	Beth Tellman (F)	ESR co-supervision, training, secondments
Vaisala Oyj	VAI		X		Finland	Weather and Environment, Europe	Markus Melander (M)	ESR co-supervision, training, secondments
Humanitarian OpenStreetMap Team US, Inc	HOT-OSM	X			United States of America		Tyler Radford (M)	ESR co-supervision, training, secondments
United Kingdom Research and Innovation	UKRI		X		United Kingdom	British Geological Survey	John Bloomfield (M)	ESR co-supervision, training, secondments
JRC -Joint Research Centre- European Commission	JRC	X			Belgium	Space, Security and Migration Directorate/Disaster Risk Management Unit	Paulo Barbosa (M)	ESR co-supervision, training, secondments
Stichting Deltares	DRES	X			The Netherlands		Hanneke van der Klis (F)	ESR co-supervision, training, secondments
National Aeronautics and Space Administration	NASA	X			United States of America	NASA Earth Science Division	Ana Prados (F)	ESR co-supervision, training, secondments

Barcelona Supercomputing Center - Centro Nacional de Supercomputacion	BSC-CNS	X			Spain	Earth Sciences Department	Francisco J. Doblas-Reyes (M)	ESR co-supervision, training, secondments
Confederacion Hidrografica del Segura	CHS		X		Spain	Hydrological Planning Office	Jaime Fraile Jiménez de Muñana (M)	ESR co-supervision, training, secondments
United Nations International Strategy for Disaster Reduction	UNISDR		X		Switzerland	Global Risk Analysis and Reporting Unit	Marc Gordon (M)	Training

Data for non-academic beneficiaries

Name	Location of research premises	Type of R&D activities	No. of fulltime employees	No. of employees in R&D	Website	Annual turnover (€)	Enterprise status	SME status
FW	Cartagena, Spain	Water resources decision support tools	3	3*	www.futurewater.es	202,500	Yes	Yes
RC	The Hague, Netherlands	Climate risk management and international policy	30	7	https://www.climatecentre.org/	3.8 million	No	No

* FW also has 11 employees in R&D in its office in the Netherlands and in sister offices.

Declarations

Name (institution / individual)	Nature of inter-relationship
Dr. Hessel Winsemius	0.8 fte position at DUT and 0.2 fte position at DRES

1 Excellence

Box 1.1: In a speech in June 2018, Kofi Annan discussed priorities for achieving the water-related Sustainable Development Goals (SDGs), including the need for a "*holistic, cross-sectoral approach rather than siloed action*"[1]. This requires a new generation of researchers and professionals, which REVOLUTION will train. In doing so, we address the European Commission's concern about the "*alarming shortage of data experts both globally and in the European Union*" and the lack of experts to bridge the chasm between innovative new data sources and approaches and scientific domain specialists"[2]. Thereby, REVOLUTION will "*…boost EU competitiveness, growth and jobs in the water sector…*", an aim of the Water Innovation focus area of the Societal Challenges of the H2020 Work Programme. **Therefore, the time to act is now**.

1.1 Quality, innovative aspects and credibility of the research programme

1.1.1 Introduction, objectives and overview of the research programme

Too much water (floods) or too little water (droughts) can have detrimental effects on the well-being of people and societies, and can negatively impact development. Between 1995-2015, floods and droughts affected several billion people, with billions more projected to be affected by 2100[3,4]. The corollary is that well-managed water systems can support development[5]. Hence, reducing flood and drought risk is at the core of agreements like the SDGs, Sendai Framework for Disaster Risk Reduction, as well as the EU Water Framework and Floods Directives. These agreements are at the heart of EU policy on sustainability and disaster risk reduction (DRR), and "*can act as a driver of innovation, growth and job creation...both inside and outside the EU*"[6].

Given the scale of flood and drought problems globally, many of these agreements have established concrete targets (Box 1.2). Reaching these targets requires sustainable DRR solutions and effective monitoring, based on high quality flood and drought risk data and information. A traditional way to gather these is to carry out expensive and time-consuming local-scale studies, in which field measurement campaigns are carried out, and their results used to develop state-of-the-art local models. However, time and cost means that these are limited to only a few locations, and are often absent in the most vulnerable regions. Hence, recent years have seen the development of global and EU-scale flood and drought risk models[4,7]. Whilst these are useful for identifying risk hotspots and high-level agenda setting, their lack of detail at finer spatial scale means they cannot be used for designing sustainable disaster risk reduction (DRR) solutions or monitoring progress locally or regionally[8]. Moreover, many traditional approaches have been developed in isolation from potential users, leading to a disconnect between user-needs and model capabilities.

Recently, there has been an explosion of data and approaches that are innovative because they are **spatially scalable** (*i.e. they can be used at different spatial scales*) and **geographically transferable** (*i.e. they can be easily transferred from one location to another*). Examples are: online media (e.g. Twitter), which could be used to monitor floods and droughts globally or provide warnings locally; Volunteered Geographical Information (e.g. OpenStreetMap), which could improve the representation of exposure in global models or be used to develop local flood evacuation plans; and drone observatories, which can fill the gap between ground observations and satellites.

These data and approaches have the potential to increase our ability to reach and monitor progress towards (international) agreements on sustainability and DRR, by bridging the gap between local and global studies. However, real-world applications are limited, as they are not per se designed for the purpose of understanding or managing floods and droughts. To make them useful for designing sustainable DRR solutions and effective monitoring, they should be co-created *with* potential users. These potential users include *any* organisation or person that benefits from their use, i.e. the *stakeholders* (e.g. water-managers, companies, non-governmental organisations, local communities, general public). For this, a **new generation of researchers and professionals** is required, who can: (1) co-create knowledge and solutions with a broad range of stakeholders; (2) handle and understand a wide range of datasets and approaches; and (3) effectively work in, and lead, transdisciplinary projects and teams.

Hence, our aim is to REVOLUTIONise society's ability to reduce and monitor flood and drought-risk by training a new generation of entrepreneurial researchers for co-creating sustainable solutions using innovative, scalable, and geographically transferable data and approaches. In doing so, we increase society's ability to achieve the targets of (international) agreements on sustainability and disaster risk reduction (DRR).

Publications of or with participation of consortium members are highlighted in bold.

1 Kofi Annan Foundation, 2018. No society can prosper without sustainable access to water, https://www.kofiannanfoundation.org/articles/sustainable-water/

2 EC, 2016. Realising the European Open Science Cloud. EC, Brussels, https://ec.europa.eu/research/openscience/index.cfm?pg=open-science-cloud

3 **Winsemius, H.C. et al., 2016. Global drivers of future river flood risk. Nat. Clim. Change, 6, 381-385**

4 **Veldkamp, T.I.E. et al., 2016. Towards a global water scarcity risk assessment framework. Environ. Res. Lett., 11, 024006**

5 Hallegatte, S. et al., 2016. Shock Waves. Managing the impacts of climate change on poverty. World Bank, Washington DC

6 EC, 2016. Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030. SWD(2016) 205 final/2. EC, Brussels

7 **Trigg, M.A. et al., 2016. The credibility challenge for global fluvial flood risk analysis. Environ. Res. Lett., 11, 094014**

8 **Ward, P.J. et al., 2015. Usefulness and limitations of global flood risk models. Nat. Clim. Change, 5, 712-715**

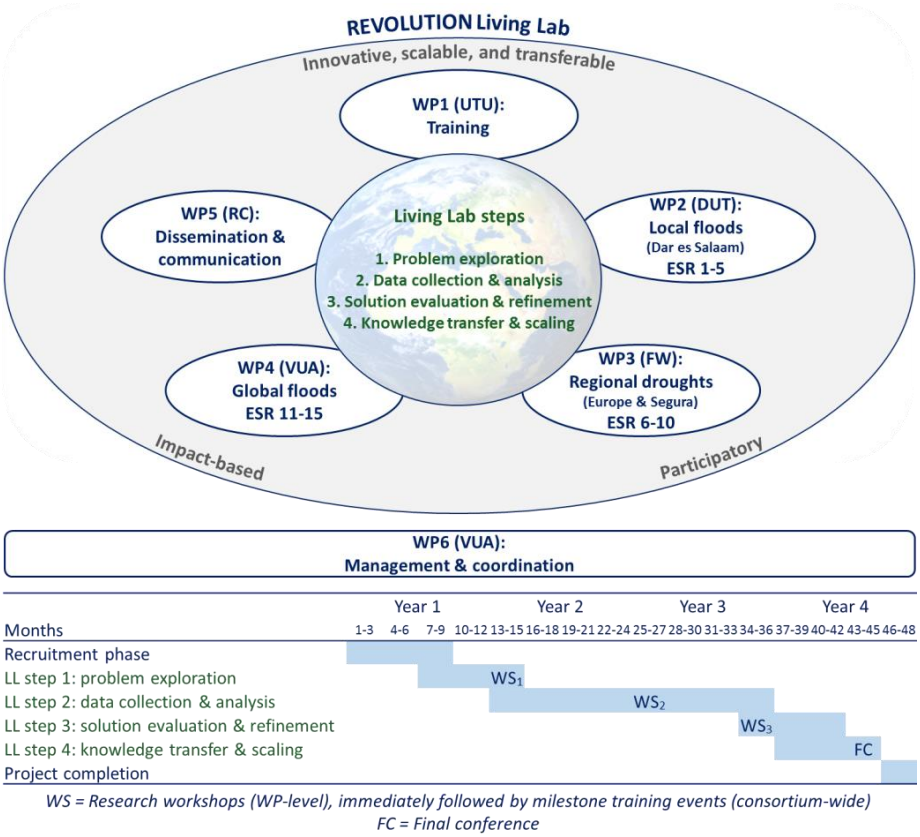
To achieve this aim, the objectives of REVOLUTION are to:

1. Develop an improved understanding of flood and drought risks, and DRR solutions, by co-creating scientific methods, tools, and information that are spatially scalable and geographically transferable (*Science objective*);
2. Train a new generation of researchers and professionals with need-driven knowledge and skills required to handle and understand a wide range of innovative, scalable, and transferable datasets and approaches; co-create knowledge and solutions with stakeholders; and lead transdisciplinary projects and teams (*Training objective*);
3. Improve career prospects of 15 Early Stage Researchers (ESRs) through a research-based training and networking programme, by actively mentoring ESRs in their search for leading positions (*Career objective*);
4. Bring together an ambitious transdisciplinary and cross-sectoral network of institutions at the cutting-edge of science and practice, and ensure impact and legacy (*Network objective*).

Box 1.2: Non-exhaustive list of selected targets of international agreements relevant to water-related risks

Sendai Framework*: (a) Substantially reduce global disaster mortality by 2030 […] compared to […] 2005-2015; (b) Substantially reduce the number of affected people globally by 2030 [...] compared to [...] 2005-2015; (c) Reduce direct disaster economic loss in relation to GDP by 2030.* ***SDGs****: (1.5) reduce exposure and vulnerability to climate-related extreme events; (3.d) strengthen the capacity of all countries [...] for early warning, risk reduction; (5.8) enhance the use of enabling technology [...]; (6.4) substantially reduce the number of people suffering from water scarcity; (11.5) reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters; (13.3) Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.*

The project is implemented in 6 Work Packages (WPs) (Fig. 1.1a). Coordination of training takes place in WP1. The research is carried out by 15 ESRs in 3 scientific WPs (WP2-4; 5 ESRs per WP) that cover different water-related hazards at local to global scales. WP2 focuses on flood preparedness and response at **local scale**, for Dar es Salaam in Tanzania. WP3 focuses on drought risk management at **regional scale**, namely Europe and the Segura river basin (Spain). WP4 focuses on improving **global scale** flood risk assessment and monitoring using globally scalable methods; it is embedded in the Global Risk Assessment Framework (a UN framework to support decision-makers to achieve the Sendai Framework targets). WP5 covers dissemination, exploitation, and communication, and overall management and coordination take place in WP6.



WS = Research workshops (WP-level), immediately followed by milestone training events (consortium-wide)
FC = Final conference

Figure 1.1a: Overview of the REVOLUTION project and Living Lab (LL) approach. Timing of the 4 main steps, research workshops, milestone training events, and final conference are shown in the simplified Gantt chart

A main novelty of REVOLUTION is the use of a novel Living Lab (LL)[9] approach (Fig. 1.1a). This means that the training, research, dissemination, and communication are carried out through a co-creative innovation development process together with our stakeholders in a real-world setting. This is put into practice by phasing the training, research, and communication (WP1-5) through the following steps (Fig. 1.1a): (1) problem exploration; (2) data collection and analysis; (3) solution evaluation and refinement; and (4) knowledge transfer and scaling. Each scientific WP (WP2-4) holds a series of *research workshops* (WS1-3 in Gantt Chart; Fig 1.1a) in which the first 3 steps of the LL-approach are carried out with our stakeholders in the real-world settings that form

9 Dell'Era, C. & Landoni, P., 2014. Living Lab: A methodology between user-centred design and participatory design. Creat. Innov. Manag., 23, 137-154

the core of the scientific WPs. These workshops are held at WP level (i.e. each scientific WP carries out its own research workshops); they are mainly *research-based* and are described in Section 1.1.2. Immediately following each round of research workshops, the entire consortium meets in 1 location for a network-wide *milestone training event* (Section 1.2.1), in which important scientific, transferable, and entrepreneurial skills required for the next step are learnt. A *final conference* (FC in Gantt Chart; Fig 1.1a) focuses on *knowledge transfer and scaling* (i.e. step 4), and will be combined with a *business innovation event*, organised with the Impact Hub Amsterdam. To increase efficiency and reduce travel, milestone training events and the final conference will be combined with general consortium meetings. A European Training Network is a natural fit to REVOLUTION's aim and LL-approach, and the ESRs will actually work together hands-on with stakeholders throughout the project. This creates an increased understanding of different perspectives between disciplines, cultures, types of organisations, and individuals.

To make REVOLUTION's LL-approach a success, we have a **unique consortium with all types of organisations in the so-called quadruple helix of social innovation, namely: academic, private sector, non-governmental and (intra)governmental**. From the academic sector, we include both universities and university-affiliated organisations (VUA, UTU, DUT, UoB, ARU, UoP, BSC-CNS), as well as non-university research institutions who also perform non-academic activities in the private/policy domain (NASA, DLR, UKRI, JRC, DRES). We include private sector companies (FW, FTags, C2S, VAI), non-governmental organisations (NGOs) (RC, HOT-OSM), and governmental agencies ranging from regional (CHS) to intragovernmental (UNISDR). The involvement of RC and HOT-OSM guarantees excellent access to local communities, volunteers, and the public. Given our focus on innovative sustainable solutions, **there is a strong possibility that our ESRs will continue their work in an entrepreneurial start-up, or by starting an own business**. Therefore, experience in entrepreneurship is included through FTags and C2S - 2 innovative companies that are revolutionising disaster risk monitoring technologies and have won **several innovation prizes**. To further enhance ESR's entrepreneurial skills, each ESR will become member of the local hub of the global *Impact Hub* network of more than 16,000 impact entrepreneurs and innovators in 100 cities worldwide.

To ensure a coherent philosophy across REVOLUTION, all training and research activities are carried out according to 3 **guiding principles**, namely they should be: **(1) Participatory:** involve scientists and non-scientists co-creating new methods, tools, and information. This includes beneficiaries, partners, and stakeholders outside the consortium (including general public). In doing so, each ESR crosses several disciplinary domains in a truly transdisciplinary manner; (**2) Innovative, scalable, and transferable:** all methods and tools developed use innovative data and platforms and must be scalable and/or transferable to other geographical regions and spatial scales; and **(3) Impact-based:** output must impact on society's ability to reach and monitor flood and drought-risk.

1.1.2 Research methodology and approach

The research is carried out in 3 real-world settings, which cover floods (WP2&4) and droughts (WP3), and the main geographical scales at which DRR efforts are taken, i.e. local (WP2; Dar es Salaam), regional (WP3, Europe and Segura river basin), and 'global' (WP4). By global, we refer to methods that have potential to be scaled globally. Each scientific WP contains 5 ESR projects and addresses a distinct set of international agreements (Table 3.1a). By grouping ESRs into 3 WPs that address 3 real-world cases, instead of 15 disparate projects, we increase the interaction between ESRs and the critical mass required to effectively interact with stakeholders. However, individual ESR projects are designed to avoid critical dependency. By designing REVOLUTION as a Living Lab (LL), with the same 3 guiding principles across scientific WPs, ESR projects, and the training WP, we ensure a consistent programme.

ESRs are employed for 36 months, starting in Month 9 (M9) (***NB: month numbers are given from start of overall project, not start of ESR project***). M1-8 are dedicated to project start-up and recruitment. Following the kick-off meeting, each ESR initialises her/his research planning at their host beneficiary and becomes comfortable and embedded within their new living and working environment. After that, each ESR follows the 4 steps of the LL-approach; the first 3 steps are accompanied by 3 *research workshops* at WP level, and the fourth step is accompanied by the final conference. The first workshops (M14; Gantt chart Fig.1.1a) focus on *problem exploration*. ESRs, beneficiaries, and partners work together with stakeholders from their WPs (e.g. government agencies, private companies, NGOs, representatives of the public) to refine the overall WP-level problem statement, ensuring that it is demand-driven and user-relevant. Each ESR is coupled to a stakeholder who will be involved throughout the project. The second workshops (M25) focus on *data collection and analysis*. Together with stakeholders from the first workshops (and stakeholders who have become interested through our dissemination and communication), ESRs present their initial data collection and analysis plans, ensuring that activities are still aligned to stakeholder needs. In M36, the third workshops focus on *evaluation and refinement* of methods and tools. *Knowledge transfer and scaling* are the theme of our final network-wide conference and business innovation event (M45), which will be attended by researchers, practitioners, and entrepreneurs from different disciplines, sectors, career stages, and cultural backgrounds. ESRs will be involved in organising these events, as part of their training. **Key information about each WP is listed in Table 1.1a. Summaries of scientific WPs (WP2-4) are given below, and specific aims, objectives, and tasks are described in Table 3.1a.**

Table 1.1a: Work Package (WP) list

Work package		Start Month	End Month	Activity Type	Lead Beneficiary		ESR involvement
No.	Title				No.	Short name	
1	Training	9	45	Training	2	UTU	ALL
2	Local floods: Scalable methods for designing local flood preparedness and response solutions	9	45	R&D	3	DUT	ESR1-ESR5
3	Regional droughts: Scalable methods for improving regional scale drought risk monitoring and forecasting	9	45	R&D	4	FW	ESR6-ESR10
4	Global floods: Scalable methods to improve global scale risk assessment and monitoring	9	45	R&D	1	VUA	ESR11-ESR15
5	Dissemination and communication	1	48	Dissemination	5	RC	ALL
6	Management and coordination	1	48	Management	1	VUA	-

WP2: Local floods (ESR1-5) - Developing local DRR solutions requires local, up-to-date information on hazard, exposure, and vulnerability. In unplanned and rapidly growing settlements, traditional methods to achieve this do not work well as they are costly and difficult to sustain. This places populations at high risk, especially the poor[5]. Specific challenges include: (1) generating accurate elevation data, which currently requires specialised and expensive surveys[10]; (2) constantly monitoring and mapping changes in conditions that can exacerbate flood risk, such as urbanisation and accumulation of solid waste, yet avoiding invasive and expensive monitoring equipment with low spatiotemporal coverage that are currently employed[11]; and (3) making risk forecasts that can be used by humanitarian agencies to request emergency funds *prior* to a flood, enabling better preparedness and response[12].

***To address this, WP 2 aims to co-create scalable and transferable methods for designing local flood preparedness and response solutions*.** Our target is to develop methods and tools that can be sustained and deployed by communities and embedded with local stakeholders. Dar es Salaam is used as case study for reasons stated in Table 3.1a. We will **enable communities to map elevation in their own neighbourhood**, using low-cost sensors, smartphones, and drones[13] (ESR1). Novel methods will be developed to **map and monitor changing conditions of flood risk** due to changes in drainage infrastructure, solid waste, and urbanisation, using community-mapped data[14] (ESR2) and video feeds and computer-vision techniques (ESR3). Data from online media and meteorological observations will be used to **provide real-time forecasts of flood impacts**[15] (ESR4). Finally, we will use focus groups, interviews, and other social science methods to **examine the long-term value of community-mapped data in DRR** (ESR5).

WP3: Regional droughts (ESR6-10) - Droughts are an increasing threat to the EU[16]. A challenge is to move from a reactive society, to a society pro-actively managing drought risk. To facilitate this, drought monitoring and forecasting systems have been developed in Europe at different scales, from river basin to continental (European Drought Observatory; ED). However, these systems face several challenges, including: (1) they usually lack information on groundwater resources[17]; (2) they focus on physical drought severity, and lack information on their socioeconomic impacts[4]; (3) their use in drought risk forecasting is limited due to lack of skill and co-creation with users[18]; and (4) there is a lack of understanding of how the behaviour of society can influence drought risk[19].

To address this, WP 3 aims to co-create scalable methods to improve drought monitoring and forecasting systems at regional scales. Our target is to develop innovative methods and tools that work at both continental and river basin scale. We will develop a **first European groundwater drought monitor**, by combining observations, satellite data and smart modelling approaches[20] (ESR6). A **tool for monitoring socioeconomic drought impacts** will be made using data from online media (ESR8). Socio-hydrological modelling approaches will be used to **assess how human behaviour influences groundwater** (ESR7) **and water availability** (ESR10), using citizen science techniques[21]. Finally, we will develop **user-oriented seasonal forecasts of drought risk** using machine learning methods to integrate observations with dynamic climate models[22] (ESR9). The methods will be co-created with stakeholders within the EDO and Segura river basin and applied at the regional and European scale.

10 Murphy et al. 2017. Stream network modelling using lidar and photogrammetric digital elevation models. Hydrol. Proc. 22(12), 1747-1754
11 **Van de Giesen et al., 2014. The Trans-African Hydro-Meteorological Observatory (TAHMO). Wiley Interdiscip. Rev. Water, 1(4)**
12 **Coughlan de Perez et al., 2014. Science to prevent disasters. Nat. Geoscience, 7, 78-79**
13 **Tauro et al., 2018. Measurements and Observations in the XXI century (MOXXI). Hydrol. Sci. J., 63(2), 169-196**
14 Gevaert et al., 2018. Evaluating the societal impact of using drones to support urban upgrading projects. ISPRS Int. J. Geo-Information, 7, 91
15 **De Bruijn, et al., 2018. TAGGS: Grouping Tweets to Improve Global Geoparsing for Disaster Response. J. Geovisualization Spat. Anal., 2, 2**
16 Poljansek et al., 2017. Science for Disaster Risk Management 2017: Knowing better and losing less. EU, Luxembourg
17 Van Lanen et al., 2016. Hydrology needed to manage droughts: the 2015 European case. Hydrol. Process., 30(17), 3097-3104
18 **Veldkamp et al., 2015. Sensitivity of water scarcity events to ENSO-driven climate variability. HESS, 19, 4081-4098**
19 **Van Loon et al., 2016. Drought in the Anthropocene. Nat. Geosci., 9, 89-91**
20 **Van Loon et al., 2017. Testing the use of standardised indices and GRACE satellite data. Hydrol. Earth Syst. Sc., 21, 1947–1971.**
21 **Borie et al., 2018. Mapping (for) resilience across scales: An opportunity to integrate data from local & city perspectives? Env. Sci. Pol., in review**
22 **Guimarães Nobre et al., 2018. Financing agricultural drought risk through ex-ante cash transfers. Sci. Total Environ., 653, 532-535**

WP4: Global floods (ESR11-15) - Global flood risk models have major limitations, including: large disagreement in modelled flood extent and depth between different models[7]; non-inclusion of human-made flood protection structures (e.g. dikes)[23]; and simplified representations of exposure and vulnerability[24]. Some argue for addressing these limitations with sophisticated local approaches[25], but the resources required to develop these for all locations are not available. At the same time, user-needs for global risk information are growing rapidly[8].

To address this, WP4 aims to co-create scalable methods to improve global scale risk assessments and monitoring. Our target is to develop methods and tools utilising datasets that are rich in local information, but can be scaled globally. We will develop methods to **improve the mapping of flood extents and depths**, by combining data from global models, satellites[26], radar (e.g. from drones[27]), and online media (e.g. Twitter and newspapers)[15] (ESR11 and 12). We will develop machine learning algorithms that can **automatically detect and map dikes and levees** from different remote sensing platforms[28] (ESR13). Building on new deep learning technique to extract data from various sources (e.g. Google Street View, drones, satellites) and combine them with local data[29], we will develop methods to **better map exposure and vulnerability, including individual buildings** (ESR14 and 15).

Results across WPs will be synthesised in several **high-level papers** (WP5). A commentary/perspective paper **detailing overarching advances of REVOLUTION** will be submitted to a high-impact journal such as *Nature Climate Change* (Milestone 9; Table 3.1c); several of the supervisors have extensive experience with this.

1.1.3 Originality and innovative aspects of the research programme

The innovative Learning Lab (LL)-approach ensures that training, research, dissemination, and communication are intricately linked. Moreover, REVOLUTION's **unique consortium of academic, private sector, non-governmental and (intra)governmental organisations, including entrepreneurial companies,** ensures that the ESRs can adopt important scientific, transferable, and entrepreneurial skills by working in real-world settings with stakeholders. In doing so, it enables the holistic, cross-sectoral approach required for effectively **reducing and monitoring flood and drought-risk** and **co-creating sustainable DRR solutions. Each ESR develops an innovative method** (as summarised above in Section 1.1.2 and detailed in Table 3.1d), and several overarching innovative elements are:

- Bridging the gap between local and global water-related risk studies by **developing innovative data and methods that are spatially scalable and geographically transferable**. In doing so, REVOLUTION allows us to make the best of both worlds, progressing beyond current state of the art in which most local studies use site-specific data that are expensive and time-consuming to collect, and global studies use coarse global datasets.
- The use of **innovative combinations of different kinds of data sources and approaches** to improve risk monitoring and assessment in practice. Whilst recent studies have shown potential uses of various novel data sources and approaches (e.g. online media, video-feeds, machine-learning, citizen science methods, participatory mapping) in water science, REVOLUTION advances beyond state of the art by demonstrating how different combinations of these approaches can lead to improved risk monitoring and assessment in practice.
- Developing tools and methods that support growing demands at local, EU, and global levels for **citizen science in flood and drought risk**. REVOLUTION progresses beyond state of the art by leveraging citizen science data collection initiatives to improve risk monitoring and assessment at all spatial scales and empowering communities to monitor their own environment, thus increasing ownership and sustainability of data collection.
- Many of the tools and methods focus specifically on socioeconomic impacts and the influence of human activities and management. In doing so, REVOLUTION **integrates the risk-based approach to natural hazards**[30] with two recent scientific developments: (1) the use of **large, new, datasets that were not intended to be used in hydrology**[31] but might have useful applications, such as data from satellites, online media, and citizen science; and (2) **socio-hydrology**[32], which studies interactions between hydrology and society. Few studies have integrated these concepts for improving and monitoring DRR. REVOLUTION will take this innovative step to bring the science of drought and flood risk to the next level.
- These new methods and tools will be **well embedded in user needs**. Flood and drought risk models are commonly designed in isolation from end-users. REVOLUTION progresses beyond state of the art by using a structured LL-approach in which participatory and impact-based research are central. This means that the methods and tools developed fit the context of the stakeholder's needs and resources.

23 **Ward et al., 2017. A global framework for future costs and benefits of river-flood protection in urban areas. Nat. Clim. Change, 7, 642-646**
24 **De Moel et al., 2015. Flood risk assessments at different spatial scales. Mitig. Adapt. Strat. Gl., 20, 865-890**
25 **Jonkman, 2013. Advanced flood risk analysis required. Nature Climate Change, 3, 1004 nclimate2031**
26 **Tellman et al., 2018. A Global Geospatial Database of 5000+ Historic Flood Event Extents. AGU Fall Meeting 2017, New Orleans**
27 **Cian et al., 2018. Flood depth estimation by means of high-resolution SAR images and lidar data. Nat. Hazard Earth Sys., 18, 3063-3084.**
28 **Donchyts et al., 2016. Earth's surface water change over the past 30 years, Nat. Clim. Chang., 6(9), 810–813**
29 Gebru et al., 2017. Using deep learning and Google Street View to estimate demographic makeup of neighborhoods across the US. PNAS, 114, 13108-13
30 **UNISDR, 2015. Global Assessment report 2015. UNISDR, Geneva**
31 Borgman, 2015. Big data, little data, no data. MIT, Cambridge MA
32 Sivapalan et al., 2012. Socio-hydrology: A new science of people and water. Hydrol. Process., 26, 1270-1276

1.2 *Quality and innovative aspects of the training programme*

1.2.1 Overview and content structure of the training

REVOLUTION will train a new generation of researchers and professionals with the needs-driven knowledge and skills (scientific, transferable, and entrepreneurial) required to handle and understand a wide range of innovative, scalable, and transferable datasets and approaches; co-create knowledge and solutions with stakeholders; and lead transdisciplinary projects and teams. **This will enable our ESRs to successfully gain employment in a large range of different sectors and positions**, as detailed in Section 2.1. **A major novelty lies in approaching flood and drought challenges through the LL-approach**. This means that research *and* training activities are intrinsically linked, and carried out in a participatory way with stakeholders in the real-world settings of WP2-4. The LL-approach ensures alignment between training objectives and activities, following the educational theory of constructive alignment[33]. The 15 ESRs work on **15 novel research topics** that address *both* scientific state of the art *and* demand-driven challenges. Recruitments per beneficiary are listed in Table 1.2a.

Table 1.2a: Recruitment deliverables per beneficiary

Researcher No.	Recruiting participant (short name)	PhD awarding entities	Planned start month 0-45	Duration (months) 3-36	Secondment at participant(s) (short name(s))
ESR1	DUT	DUT	9	36	ARU, HOT-OSM
ESR2	UoP	UoP	9	36	ARU, DRES
ESR3	ARU	ARU	9	36	VAI, UTU
ESR4	RC	DUT	9	36	DUT, JRC
ESR5	UTU	UTU	9	36	ARU, RC
ESR6	UoB	UoB	9	36	JRC, UKRI
ESR7	UoB	UoB	9	36	CHS, FW
ESR8	FW	VUA	9	36	FTags, VUA
ESR9	FW	VUA	9	36	VUA, BSC-CNS
ESR10	VUA	VUA	9	36	CHS, UoB
ESR11	VUA	VUA	9	36	FTags, C2S
ESR12	DLR	UTU	9	36	UTU, DUT
ESR13	DUT	DUT	9	36	DLR, DRES
ESR14	DLR	VUA	9	36	NASA, VUA
ESR15	UTU	UTU	9	36	NASA, UoP

The ESRs are at the heart of the LL-approach, and follow a structured training programme consisting of 6 training modalities (Fig. 1.2a). They are supported by a unique consortium of academic, private, NGOs, and (intra)-governmental organisations, as shown in Fig 1.2a and described in Sections 1.4 & 3.4. Each ESR will also become member of a local Impact Hub for further entrepreneurial skills exposure. Each ESR is supported by an ESR Supervisory Team (Section 1.3). **The content and modalities of the training programme are designed and structured around a set of career profiles per ESR** that we co-developed with potential employers from academia, the private sector, NGOs, and (intra)-governmental organisations. It thereby ensures necessary scientific and transferable skills to increase employment potential (Section 2.1). The 6 training modalities are described in the following paragraphs.

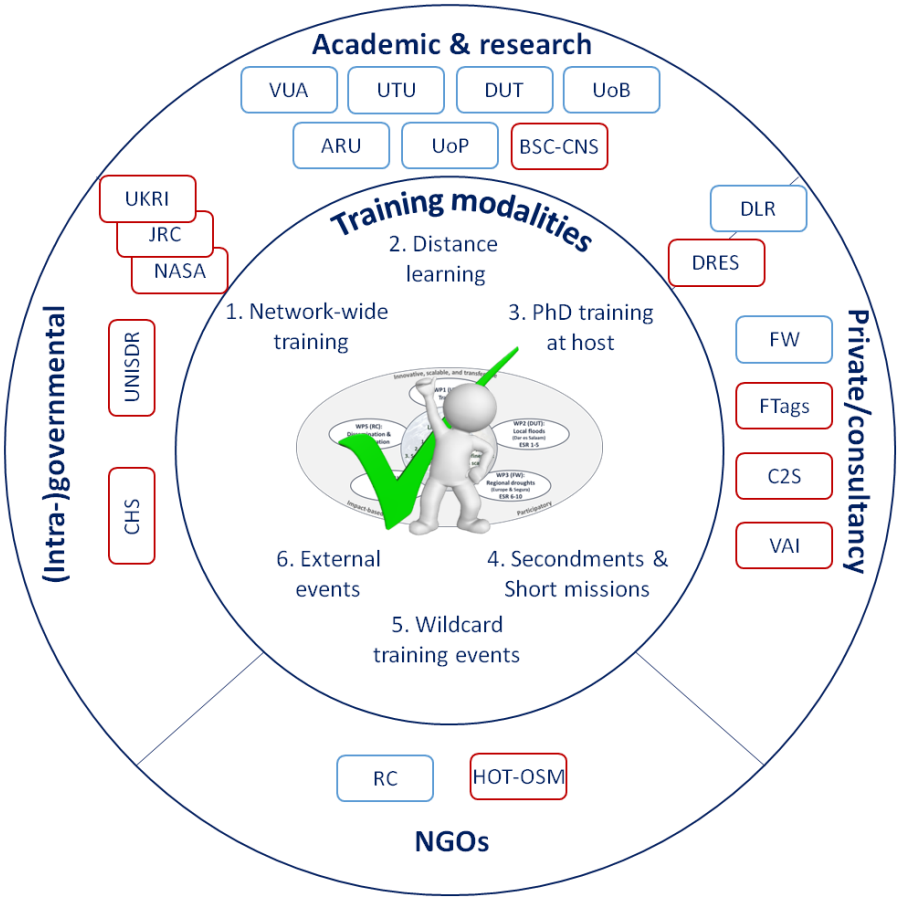


Figure 1.2a: Overview of REVOLUTION Living Lab approach for an individual ESR. Blue boxes = beneficiaries, red boxes = partners

33 Biggs, J., 1996. Enhancing teaching through constructive alignment. Higher Education, 32347-32364

(1) Network-wide training: We will gather 6 times for network-wide training events (Table 1.2b). This includes a start-up meeting (M2) before the ESRs have been recruited, which includes a **training of the trainers** element. Consequently, there are 5 network-wide training events that will be attended by all ESRs; each event focuses on scientific, transferable, and entrepreneurial skills. The core of our network-wide training is in three milestone training events (see below), which have a duration of 2 weeks each – **all beneficiaries and partners contribute to training during these events**. We have deliberately limited the number of network-wide events, and focused on longer events, for several reasons: (1) it allows us to implement the LL-approach through hands-on problem solving; (2) informal discussions with fellows of past and ongoing Marie Skłodowska-Curie ITN (and other) training programmes reveal a richer learning experience from longer events and disruption to workflow from a large number of shorter events; and (3) it allows us to save on costs, travel, and environmental damage. For the latter reason, we will hold consortium meetings during milestone training events. The different events are summarised in the following paragraphs.

Table 1.2b: Main network-wide training events, conferences and contribution of beneficiaries

	Main training events & conferences	ECTS	Lead institution	Action month (estimated)
1	**Start-up meeting** (***Theme: recruitment and programme planning***) (2 days)		VUA	2
	1.1 Training of the trainers: Implementing a LL in practice (UTU); sharing good practice on effective PhD supervision (VUA)			
2	**Kick-off meeting** (***Theme: Problem exploration***) (1 week)	1.5	VUA	9
	2.1. Scientific skills: Risk concepts & global DRR solutions (UNISDR); state of art risk assessment methods (VUA); gender aspects in disaster risk (UoP); research integrity (UoP); case study design (UoB) **2.2. Transferable & entrepreneurial skills**: PhD planning and time management (DUT); planning and holding a co-design workshop (UTU); media training for scientists & ethical and legal aspects of communication (external); serious games in DRR (RC); teamwork & creativity (FTags/C2S)			
3	**Milestone training event 1** (***Theme: Data collection***) (2 weeks)	4	TUD/ARU	14
	3.1 Scientific skills: Innovative data collection methods, incl. low-cost sensors (DUT), radar remote sensing (DLR), satellite data (NASA); community-based mapping (HOT-OSM), citizen science (UoP), social research (UoB), computer visioning (VAI), data-mining (C2S), hydrological data collection and quality checking (UKRI); designing and presenting scientific posters & making the most of conferences (UoB) **3.2 Transferable & entrepreneurial skills**: Entrepreneurial and innovation development skills (FTags); working with volunteers & local communities (ARU & RC); effective data management (FW); scientific paper writing and presentation skills (VUA); responsible research and innovation (FW)			
4	**Milestone training event 2** (***Theme: Data analysis***) (2 weeks)	4	VUA/JRC	25
	4.1 Scientific skills: Innovative data analysis methods, incl. machine learning techniques (DUT & VUA), High Performance Computing data analysis (BSC-CNS); Google Earth Engine (C2S); image processing (VAI); Copernicus Emergency Management Service (JRC) **4.2 Transferable & entrepreneurial skills**: IPR (FW); business development skills (FW, FTags, C2S); writing compelling proposals (DRES) (incl. workshop to write European Researchers' Night proposal); applied improvisation (RC); balancing time spent on research and applications (FTags)			
5	**Milestone training event 3** (***Theme: Evaluation and refinement; scaling up***) (2 weeks)	4	FW/CHS	36
	5.1 Scientific skills: Critical reflection & review (incl. hands-on workshop on writing a scientific peer-review) (UoB); climate and hydrological service provision (UKRI); risk management decision-making in practice - field-trip in the Segura river basin (CHS) **5.2 Transferable & entrepreneurial skills**: Starting up (at a) start-up & business plan development (C2S & FTags); communication for societal outreach and networking (UTU); organising scientific and professional events (external); knowledge transfer and international agreements (UNISDR)			
6	**Final conference & business innovation event** (***Theme: Knowledge transfer***) (2 days + 1 day meeting)	1	VUA	45

Start-up meeting: Takes place prior to ESR recruitment. Day 1 focuses on developing a shared understanding of how to implement the LL-approach in practice, and includes a 'train the trainer' event to share good practices in effective supervision of PhDs between (co)-supervisors. The other day focuses on management and recruitment.

Kick-off meeting: We bring together all recruited ESRs and (co-)supervisors. Day 1 focuses on getting to know each other, involving interactive, fun, yet educational serious games. Day 2 introduces ESRs to the LL-approach and state of the art knowledge on risk and risk management. Day 3 involves a field trip to explore risk management in the Netherlands in practice. Days 4 & 5 involve training of the remaining scientific, transferable, and entrepreneurial skills listed under event 2.1 & 2.2 (Table 1.2b).

Milestone training events: **These are the core of our network-wide training programme**. They are held in Dar es Salaam, the Segura river basin, and Ispra. Ispra (JRC headquarters) is selected to represent the global WP, as it allows ESRs to be exposed to the extensive global flood and drought assessment, monitoring, and forecasting facilities, teams, and networks of JRC. Each event lasts 2 weeks, and has a theme related to 1 or 2 of the steps in our LL-approach. **The themes and a brief synopsis of content can be found in Table 1.2b**. **In week 1, scientific and transferable skills (including entrepreneurial and business development skills) are taught** through a combination of traditional and modern pedagogical methods including lectures, discussions, practicals, serious games, and technology-enhanced learning. **In week 2, ESRs apply these new skills hands-on, to address a real-world transdisciplinary problem** faced by stakeholders in the location of the milestone training event. In doing so, they must demonstrate their ability to come up with sustainable solutions to real-world problems outside of their own research projects. The ESRs communicate their findings to stakeholders, the Supervisory Board, and Advisory Board (Section 3.2.1) during the general project meetings, which are held at the end of milestone training events. Wherever possible, we couple transferable skills training to ongoing ESR activities. For example: in event 3.2, training on paper writing is carried out through papers that the ESRs are actually working on; and in event 4.2, training on writing compelling proposals is facilitated by mentoring the ESRs to write an actual proposal for funding to organise a European Researchers' Night. This means that the training, research, and career development activities are synergetic, ensuring an efficient use of time and resources.

Final conference and business innovation event: We will organise a 1-day final conference followed by a 1-day business innovation event. In the *conference*, we present REVOLUTION results to a broad stakeholder network (including scientists and practitioners from private companies, NGOs, and governmental organisations), with a focus on research impacts and ESRs' future careers. The conference format will allow for maximum interaction between ESRs and attendees. Whilst we will have keynote and ESR presentations, this will be done using innovative methods, such as ignite talks, map-slams, live experiments, games, debates, and focus groups. The *business innovation event* will be designed by the ESRs in conjunction with experienced staff of Impact Hub Amsterdam; it will also be held at Impact Hub Amsterdam. Teams of innovation-oriented researchers, practitioners, and entrepreneurs will take up innovation challenges around the tools developed by the ESRs and continue refining them towards business solutions.

(2) Distance learning: We will also provide distance learning opportunities, mainly for scientific skills required by groups of ESRs or individual ESRs. Where available, we will use existing materials, such as the extensive online training resources of NASA for analysing satellite data. A catalogue of relevant materials will be developed in M1-8 and made available to the ESRs at the kick-off meeting. We will also develop new distance learning resources (e.g. MOOCs) on specific topics relevant to clusters of ESRs. Each ESR will include a plan of the distance learning courses to be followed as part of her/his Personal Career Development Plan. Our new distance learning resources will be made available for researchers outside REVOLUTION via our website and channels such as YouTube, thereby contributing to research training at European level. To maximise impact, we will encourage ESRs to publish online training materials of their projects (e.g. knowledge clips, web lectures; Sections 2.3 & 2.4).

(3) PhD training at host and degree-granting institutions: All of the host beneficiaries organise in-house courses on scientific and transferable skills that can be followed by the ESRs. Moreover, as ESRs are enrolled in PhD programmes (Table 1.2a), they can follow the wide range of PhD courses offered by their graduate schools.

(4) Secondments and short missions: Each ESR will carry out secondments at 2 other beneficiaries or partners (total: 7-10 months). **To stimulate cross-sectoral and transdisciplinary learning and knowledge exchange, all ESRs hosted at an academic beneficiary will carry out at least one secondment at a beneficiary/partner organisation working in the non-academic arena, and vice versa.** Secondments enable the professional development of methodological skills, but also strengthen competences in working in diverse and transdisciplinary environments. Secondments at universities mainly allow for increased scientific skills, and secondments at non-universities play a key role in linking ESRs to demand-driven and impact-based research. Secondments have been planned to maximise the time that ESRs spend visiting each other, thereby facilitating peer-to-peer learning. Next to secondments, short missions will be encouraged, depending on emerging synergies and requirements.

(5) Wildcard training events at ESR cluster level: In any successful co-creative process, (stakeholder) needs change over time, and hence our training programme must be flexible enough to respond to any changes in educational needs. Therefore, whilst we have developed a well-structured training programme, we leave room for new *wildcard training events*. These would be offered to clusters of ESRs requiring similar (scientific, transferable, or entrepreneurial) emerging skills, after prior approval by the Supervisory Board. In taking this approach, we seriously address the debate on the *flexibility agenda* currently taking place within Higher Education[34], in which there is growing recognition that training flexible graduates who are able to engage with the uncertainties, complexities, and demands of a rapidly changing world, requires that higher education programmes exhibit flexibility.

(6) External events: ESRs will actively participate in external academic and professional events (e.g. conferences, workshops, seminars, innovation challenges, summer schools), and present in at least 1 scientific conference per year. At these events, ESRs practice presentation and networking skills, and learn the most recent developments in science and practice. Examples of relevant events are: Understanding Risk, Adaptation Futures, European Geosciences Union (EGU), FOSS4G, and Google Earth Engine Summits. As several ESRs and supervisors will attend these events, we will arrange side meetings between those in attendance to discuss progress. ESRs will actively take part in innovation hackathons and mapathons organised by the EU Copernicus programme and local Innovation Hubs.

1.2.2 Role of non-academic sector in the training programme

Non-academic beneficiaries and partners are integral to the LL-approach, and are strongly involved in the training programme, by: (a) leading 2 WPs; (b) hosting and supervising 3 ESRs; (c) co-supervising 9 ESRs, including secondments and short missions; (d) organising and co-hosting milestone training events and research workshops; (e) providing lectures and courses; and (f) providing distance learning materials. Commitments of beneficiaries and partners classified by the EU as non-academic in hosting ESRs and providing secondments are summarised in Table 1.2a and detailed in Table 3.1d. Table 1.2c summarises minimum commitments to network-wide training activities.

Specific contributions of beneficiaries and partners officially classified as non-academic, and those who perform non-academic activities in the private/policy domain, are summarised in this paragraph. As the officially mandated

34 UK Higher Education Authority, 2014. Conditions of flexibility. Securing a more responsive higher education system. HEA, York

UN organisation for coordinating DRR internationally, the involvement of **UNISDR** provides ESRs with access to the DRR decision-making process and political agenda at the highest level. **JRC** provides direct input to research and policy of the European Commission, including the European Drought Observatory, to which our ESRs will add innovative new knowledge. **CHS**, as the governing authority of the Segura river basin, provide hands-on expertise and training on water management and project implementation. The involvement of 2 innovation-prize winning small companies that are revolutionising disaster risk monitoring technologies (**FTags, C2S**) ensures that ESRs acquire entrepreneurial skills; their founders will act as role models to the ESRs. Entrepreneurial skills are also fostered by having each ESR as member of a local *Impact Hub*. The SME **FW** brings a wealth of experience for training ESRs in fusing practical DRR solutions with scientific knowledge. FW has successfully coordinated WPs in several collaborative EU projects, playing an instrumental role as WP lead in the H2020 IMPREX and BRIGAID projects. **VAI** is a large company at the cutting edge of innovative measurement technologies, and provides ESRs with unrivalled experience on computer vision techniques. **DRES** is a world-leading knowledge water management institute, providing consultancy services on smart solutions and innovations to governments and businesses. Their participation offers ESRs access to an extensive suite of state-of-the-art modelling software. The involvement of **NASA** and **DLR** provides ESRs with access to the cutting-edge expertise in remote sensing and satellite data of these aeronautics and space agencies. Whilst DLR offers unparalleled expertise on using remote sensed data to map exposure and vulnerability, NASA provides access to its innovative Disaster Applications Program, in which advanced training is developed on using satellite data in disaster risk applications. The involvement of 2 NGOs, **RC** and **HOT-OSM** gives the ESRs unique access to local communities and expertise in on-the-ground humanitarian action. Through its global network, RC can provide access to local Red Cross institutions around the world – and their huge network of local volunteers - including Tanzania and Spain. HOT-OSM leads large scale community mapping initiatives in several cities, including Dar es Salaam, providing access to mapping volunteers. The **British Geological Survey** (the component body of **UKRI** involved in REVOLUTION) provides ESRs with a wealth of hydrological data, and experience on the interaction between science and the public.

Table 1.2c: Commitments of non-academic institutes to network-wide training events. NB: Table only contains organisations classed as non-academic in ECAS system, whilst many more also carry out non-academic activities

Institute	Sector	Commitments to network-wide training activities (shown in Table 1.2b)
FW	Consultancy (SME)	Effective data management, including data repositories and Copernicus data store (3.2); IPR, including open-source licensing of code and software, versus proprietary licensing (4.2)
RC	Non-governmental org.	Applied improvisation course (4.2); serious games in DRR (2.2)
FTags	Consultancy (SME)	Teamwork & creativity (2.2); entrepreneurial and innovation development skills (5.2); starting (at) a start-up (5.2); balancing time spent on research and applications (4.2)
C2S	Consultancy (SME)	Teamwork & creativity (2.2); starting (at) a start-up & business plan development (5.2); using Google Earth Engine in hydrological applications and remote sensing (4.1); satellite-based data-mining (3.1);
VAI	Technology & innovation	Computer vision techniques in environmental monitoring (3.1); image processing (4.1)
UKRI	Cross-sectoral partnership	Hydrological data collection and quality checking (3.1); provision of hydrological data services (5.1)
CHS	Governmental org.	Risk management decision-making in practice - field-trip in the Segura river basin (5.1)
UNISDR	Intergovernmental org.	Risk concepts & global DRR solutions (2.1); knowledge transfer in international agreements (5.2)

1.3 Quality of the supervision

Top-quality supervision is paramount to REVOLUTION's success. Supervision arrangements and monitoring are ensured through **tailored Personal Career Development Plans (PCDPs)**. These contain a supervision and training plan, PhD outline (problem statement, aims, methods, expected results, milestones, dissemination and exploitation plan). They are written by each ESR, together with her/his **ESR Supervisory Team** (Section 1.3) and submitted for internal review (to the Supervisory Board) in M12. The PCDP is used as a tool for planning, monitoring, and evaluation. They use a standard template developed by the Executive Board, led by the Training Development Officer, to ensure the same high supervision standards across the consortium; but are tailored to the needs of each ESR. PCDPs form the basis of the Formal Evaluation Meetings, and will be reviewed and, if necessary, revised during these meetings. For more detail on ESR project monitoring and evaluation see Section 3.2.4.

1.3.1 Qualifications and supervision experience of supervisors

ESRs benefit from the experience of the ESR Supervisory Teams in guiding young researchers in developing their careers. All beneficiaries have profound experience in supervising PhDs and young researchers, as well as executing research projects (Section 5). The supervisors at academic beneficiaries are all senior Principal Investigators (PI), have jointly supervised over 125 PhD students, and are established experts in their fields. The host supervisors at non-academic beneficiaries all supervise junior researchers and have previously been involved in (co-)supervision of PhD candidates. For example, RC hosts ESR4, whose PhD supervisor works at DUT – the organisations have many successful collaborations. ESRs hosted at non-university beneficiaries (ESR4,8,9,12,14) receive their PhD degree from one of the university beneficiaries (Table 1.2a). In these cases, one of the secondments will be carried out at this university, and the official degree-granting (Associate) Professor is part of the Supervisory Team.

1.3.2 Quality of the joint supervision arrangements

The overall **REVOLUTION supervision framework** is summarised in Fig. 1.3a. The ESR and her/his PCDP are central. Supervision is arranged within each ESR Supervisory Team, which consists of: **2 supervisors at the host beneficiary**; and **2 co-supervisors**, who are members of staff at the 2 partner/beneficiary organisations at which the ESR carries out her/his 2 secondments (Table 1.3a). The entire ESR Supervisory Team is involved throughout the project; in this way we have expressly designed the supervision structure to ensure that the beneficiaries and partners involved in each ESR project work as a team towards a shared goal throughout the project, rather than viewing secondments as isolated parts of the ESRs' development. The ESRs will be fully integrated into the wider teams at their host and secondment organisations, thereby gaining a wide range of interdisciplinary skills.

One of the host beneficiary supervisors is the formal **main supervisor -** this is a senior PI, who has overall responsibility for monitoring and reporting progress to the Supervisory Board. **For ESRs hosted at universities, the main supervisor is also the PhD-granting (Associate) Professor**. In keeping with the supervision structures of our beneficiaries, each ESR is also appointed a second host supervisor. Together, the host supervisors ensure that daily supervision is available throughout REVOLUTION. The second supervisor at the host beneficiary can be a more junior member of (tenured) staff, with extensive knowledge of the ESR's topic. This allows REVOLUTION to explicitly support the 'train the trainer' concept. The co-supervisors act as day-to-day supervisor during secondments. The ESR Supervisory Teams and their ESRs have bi-monthly telcons during the entire project.

To ensure optimal quality of supervision, the Supervisory Board (Section 3.2.2) includes a Training Development Officer, Dr. Niina Käyhko (UTU), who will ensure consistency in supervision across individual ESRs. The Training Development Officer will monitor supervision quality by conducting surveys among ESRs and ESR Supervisory Teams, and will provide (unsollicited) external advice to both. Members of the Supervisory Board will provide advice to all ESRs, based on their presentations during consortium meetings at the network-wide events.

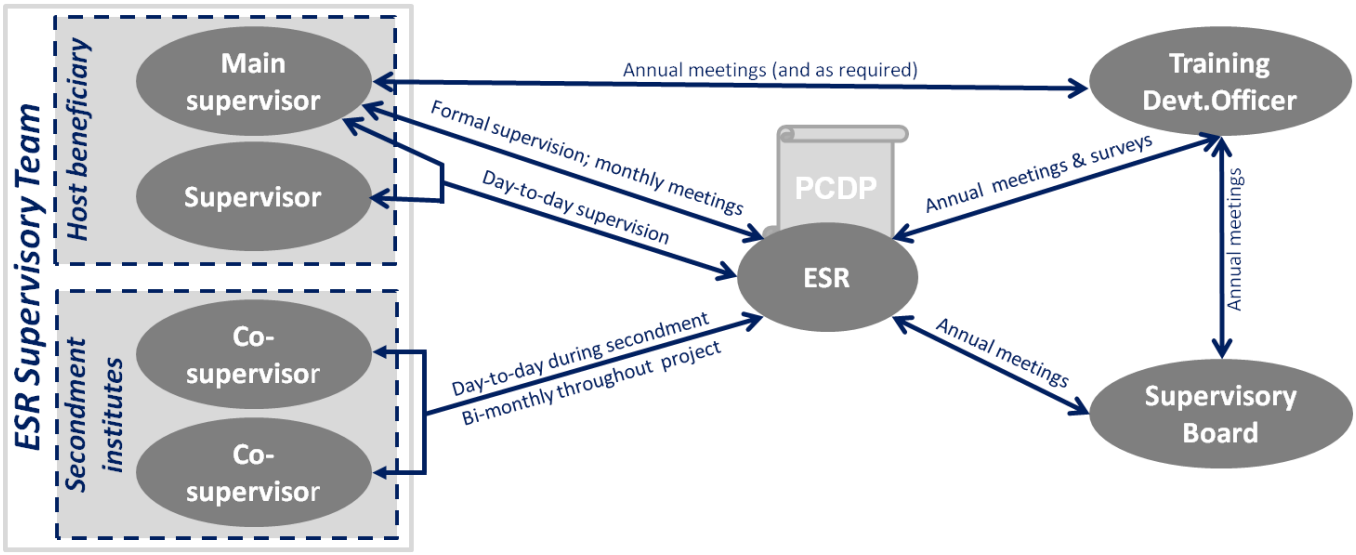


Figure 1.3a: Overview of supervision framework

Table 1.3a: Overview of supervisors and co-supervisors (F/M = Female/Male). ***PhD-granting (Associate) Professors shown in bold.***

ESR	Host beneficiary supervisors (main supervisor first)	Co-supervisors
1	**Dr. R. Hut** (M) & Dr. C. Tiberius (M) (DUT)	Mr. I. Gayton (M) (HOT-OSM) & Prof. E. Liwa (M) (ARU)
2	**Dr. P. Soar** (M) & Dr. F. Taylor, (F) (UoP)	Dr. G. Donchyts (M) (DRES) & Prof. E. Liwa (M) (ARU)
3	**Prof. A. Namangaya** (M) & Dr. J. Mayunga (M) (ARU)	Mr. P. Hienonen (M) (VAI) & Prof. P. Alho (M) (UTU)
4	Dr. M. van Aalst (M) & Dr. E. Coughlan de Perez (F) (RC)	**Dr. M.-C. ten Veldhuis** (F) (DUT) & Dr. P. Salamon (M) (JRC)
5	**Prof. N. Käyhkö** (F) & Dr. E. Kasvi (F) (UTU)	Prof. A. Namangaya (M) (ARU) & Dr. E. Coughlan de Perez (F) (RC)
6	**Dr. A. van Loon** (F) & Dr. R. Day (F) (UoB)	Dr. J. Bloomfield (M) (UKRI) & Dr. P. Barbosa (M) (JRC)
7	**Dr. R. Day** (F) & Dr. A. van Loon (F) (UoB)	Dr. J. Hunink (M) (FW) & Mr. J. Fraile Jiménez de Muñana (M) (CHS)
8	Dr. S. Contreras (M) & Dr. J. Hunink (M) (FW)	**Prof. J. Aerts** (M) (VUA) & Mr. J. Wagemaker (M) (FTags)
9	Dr. J. Hunink (M) & Dr. S. Contreras (M) (FW)	**Dr. D. Coumou** (M) (VUA) & Prof. F. Doblas-Reyes (M) (BSC-CNS)
10	**Prof. J. Aerts** (M) & Dr. T. Veldkamp (F) (VUA)	Mr. J. Fraile Jiménez de Muñana (M) (CHS) & Dr. A. van Loon (F) (UoB)
11	**Prof. P. Ward** (M) & Dr. H. de Moel (M) (VUA)	Dr. B. Tellman (F) (C2S) & Mr. J. Wagemaker (M) (FTags)
12	Dr. M. Marconcini (M) & Dr. A. Metz (F) (DLR)	**Prof. P. Alho (M)** (UTU) & Dr. H. Winsemius (M) (DUT)
13	**Dr. H. Winsemius** (M) & Dr. O. Morales Napoles (M) (DUT)	Dr. G. Donchyts (M) (DRES) & Dr. M. Marconcini (M) (DLR)
14	Dr. M. Marconcini (M) & Dr. A. Metz (F) (DLR)	**Prof. P. Ward** (M) (VUA) & Dr. D. Green (M) (NASA)
15	**Prof. N. Käyhkö (F)** & Dr. C. Gonzales Inca (M) (UTU)	Dr F. Taylor (F) (UoP) & Dr. A. Prados (F) (NASA)

1.4 Quality of the proposed interaction between the participating organisations

1.4.1 Contribution of all participating organisations to the research and training programme

REVOLUTION is composed of beneficiaries and partners with excellent reputations and a proven track record in training young scientists. The consortium has vast experience in joint organisation of research workshops and projects, symposia, international working groups, and training events. **All beneficiaries and partner organisations - including non-academic - will contribute to the REVOLUTION training programme through lectures, courses, and online training materials** (Tables 1.2b, 1.2c, Section 5). Beneficiaries will host 1-2 ESRs, and all beneficiaries and partners will host at least 1 secondment (Table 1.2a), except UNISDR whose role is in the research workshops and training. Each beneficiary is responsible for ensuring the full involvement of the ESRs in all network-wide and relevant training activities; this is anchored in the PCDP and evaluated by the Supervisory Board (SB).

1.4.2 Synergies between participating organisations

Research and training synergy are guaranteed by the high complementarity in expertise of the REVOLUTION organisations (Table 3.4a); and the different domains in which they work, i.e. academic, private sector and consultancy, non-governmental and (intra)governmental. Many of them have a long history of collaboration on research and training activities, and their synergies have proven valuable in past projects and joint PhD supervision. These include collaborations of FW and DUT in H2020 BRIGAID and TWIGA projects; joint supervision of PhD students by VUA, FTags, and RC in projects of the World Bank; joint collaboration of BSC-CNS, FW, and VUA (including PhD supervision) in the H2020 IMPREX project; institutional cooperation and an MoU in training and research between UTU and ARU; and training and hackathon events held between UoP, HOT-OSM, and RC.

Whilst all organisations have previously successfully collaborated with at least one of the other REVOLUTION organisations, this proposal brings them all together in a truly unique and synergetic new network. By bringing together internationally renowned institutes from the realms of water risks, with institutions more focused on the methodological aspects of novel data sources and approaches, we can develop new technologies that have not been achieved in past collaborations. For example, ESR1 will use HOT-OSM's expertise on community mapping to create hyper-resolution elevation data by working with DUT and ARU. ESR9 will combine BSC-CNS's experience with large data sources and machine learning, VUA's knowledge on climate dynamics, and FW's knowledge of the Segura, to develop a seasonal drought impact forecasting tool. Using NASA's data-fusion expertise, ESR15 will develop scalable methods to integrate local knowledge in vulnerability mapping using UTU and UoP's expertise in citizen science. The exploitation of organisations' complementarities is further described in Section 3.4.1.

1.4.3 Exposure of recruited researchers to different (research) environments, and the complementarity thereof

The ESRs will be exposed to a transdisciplinary and multisectoral environment through: (1) the LL-approach, in which a participatory, impact-based, multi-stakeholder engagement is central; (2) solving real-world transdisciplinary problems faced by actual stakeholders during milestone training events; (3) continued engagement with stakeholders through the research workshops and the coupling of each ESR to a stakeholder throughout the project; (4) joint supervision of ESRs by supervisors at organisations from different sectors; (5) secondments to beneficiaries/partners with complementary expertise; (6) interactions and collaborations with other ESRs in REVOLUTION; and (7) dissemination and communication through the means described in Sections 2.3 & 2.4.

2 Impact

2.1 Enhancing the career perspectives and employability of researchers and contribution to their skills development

An essential prerequisite for the "*holistic, cross-sectoral approach rather than siloed action*"[1] required to achieve the water-related targets of the SDGs (and similar agreements), is highly-skilled researchers and professionals with the disciplinary and transdisciplinary skills, as well as problem-solving, transferable, and entrepreneurial skills required to meet the challenges and opportunities relating to floods and droughts. REVOLUTION's LL-approach is designed to break down these siloes, ensuring that ESRs *must* take a holistic approach by: (1) having each ESR work closely with *at least* one stakeholder group throughout the project; (2) the series of WP level research workshops; (3) the milestone training events in which ESRs apply newly learnt transdisciplinary skills to solve real-world problems; (4) our focus on transdisciplinary, transferable, and entrepreneurial skills; and (5) having all ESRs carry out secondments at organisations in different sectors. Moreover, we train ESRs extensively in using innovative datasets, approaches, and platforms (including e-science, machine learning, citizen science, online media, satellites, etc.), specifically focusing on their application for designing DRR solutions. All ESRs are member of a local *Impact Hub*, where entrepreneurs work to bring innovative solutions to sustainability issues to market. In doing so, we respond to the "*alarming shortage of data experts both globally and in the EU*" and the "*the lack of core intermediary expertise* [which] *has created a chasm between e-infrastructure providers and scientific domain specialists*[2]".

A wide range of employers will benefit from REVOLUTION. In the short term, we train 15 highly skilled ESRs who will enter the job market, and in the longer term the new approach changes how we train future experts. **Our ESRs will be able to successfully gain employment in a large range of different sectors and positions**. In the following paragraph, we describe skills required by these organisations (based on interviews with them) that are currently lacking on the job markets; **all of these skills are learnt by the ESRs throughout the REVOLUTION programme, including during courses and lectures listed in the network-wide training events in Table 1.2b**.

Private sector employers or consultants developing novel location-based techniques and carrying out risk analyses (e.g. Google, FW, VAI, C2S, FTags, DRES, DLR) require researchers and engineers who master innovative methods, have profound scientific domain-specific knowledge, and can combine these skills with business innovation, entrepreneurship, and excellent communication skills. Employment of such professionals is forecast to increase by 13% in the next decade[35]. **Governmental agencies and regulatory bodies** (e.g. governments, municipalities, river basins authorities, NASA) require staff skilled in using novel data, instruments, and technologies, with a solid knowledge of flood and drought related decision-making processes. They seek experts who can translate agreements into actions, and who are skilled with participatory approaches and stakeholder communication. Such professionals are scarce in more than half of EU Member States[35]. **NGOs** (e.g. HOT-OSM and RC) require ICT professionals who can co-create low-threshold technology and data collection solutions and have talent working with volunteered professionals and local communities. Projected employment growth rate of ICT specialists in the EU is 13.1%, and our ESRs will also have a highly desired skill of being able to operate at local level and transfer solutions to other locations. **International development organisations, financing institutes, and think tanks** (e.g. UN, World Bank, EU World Resources Institute) require experts with strong science-based knowledge and skills, able to work at the boundary between science and humanitarian practice. This is evidenced by recent job solicitations from the START Network and UN Famine Early Action Mechanism. **Universities and research institutes** increasingly focus on knowledge valorisation. The modern scientist should be able to translate science into applications and tools and be able to establish links to policy and decision makers, through good communication. Given the reduction in core funding at universities throughout Europe, they require entrepreneurial researchers capable of securing funding from a wide range of sources.

Next to this, there is a **strong possibility that our ESRs will continue their work in an entrepreneurial start-up, or by starting an own business.** Therefore, experience in entrepreneurship is included in the consortium through FTags and C2S - two innovative companies that are revolutionising disaster risk science and have won several innovation prizes. They will provide experience and training on: balancing time spent on research and applications; business development; starting up (in a) start-up; teamwork; creativity; and gaining experience in how (when) to be persistent. Entrepreneurial skills are learnt in each of the network-wide training events (Table 1.2b) and through continued membership of a local entrepreneurial *Impact Hub*.

2.2 Contribution to structuring doctoral / early-stage research training at the European level and to strengthening European innovation capacity, including the potential for:

2.2.1 Contribution of partners, including the non-academic sector, to the research training

REVOLUTION leads to a step-change in cooperation in the field of applied flood and drought risk between academia, the private sector, NGOs, and (intra)governmental organisations (quadruple helix of social innovation). The 3 guiding principles ensure that all activities **must** be participatory and impact-based, as well as developing scientifically strong innovative, scalable, and transferable approaches. The actions that the ESRs take towards all of these principles will be clearly described in the PCDP and monitored by the ESR Supervisory Teams.

In REVOLUTION, non-academic organisations are involved at the highest level: **of the 5 institutes leading WPs, 2 are non-academic**. Moreover, 40% of our REVOLUTION organisations are classed as non-academic by the EC, and several others carry out the majority of their duties outside the academic sector (DLR, DRES, HOT-OSM, NASA). Next to leading 2 WPs, they will: host, supervise, and co-supervise ESRs; give secondments to ESRs; provide specific input to all training events (Table 1.2c); organise, co-organise, and/or host our research workshops and milestone training events; and lead and take part in our dissemination and communication activities.

2.2.2 Developing a sustainable research and training network

REVOLUTION has taken measures to guarantee a sustainable research and training network, and as such will have an impact beyond the life-time of the ITN. Examples are described below.

- REVOLUTION will be **embedded within existing programmes at the organisations involved,** thereby contributing to organisational missions that continue after the project. Examples include: VUA's Science for Sustainability Theme, UoP's Future and Emerging Technologies Cluster, and TUD's Delft Global Initiative.
- We **directly contribute to policy discussions from global to local level**, including EU policy (Section 2.2.3).

35 https://skillspanorama.cedefop.europa.eu/en

- The work is **fully embedded in the main practitioner and scientific networks** relevant for the field, including: UNISDR's Global Risk Assessment Framework, Tanzania Urban Resilience Programme (TURP), Ramani Huria, Understanding Risk, Panta Rhei, FOSS4G, Global Flood Partnership, FATHUM, and IAHS.
- We envisage a **large number of spin-off proposals** between the participating beneficiaries, partners, and stakeholders. The clear linkage to global, EU, and national policies (Section 2.2.3) means that large amounts of funding will become available in the coming years. Indeed, the new contacts made through the development of this proposal have led to several new grant bids and the joint supervision of MSc students on pilot projects.
- Our **distance learning resources** (Section 1.2.1) will be made available on our website and sites such as YouTube, to ensure that they can be used by the entire community beyond REVOLUTION's lifetime.
- We link our research to the EU's **Copernicus Emergency Management Service (CEMS)**. REVOLUTION contributes to improving and further developing CEMS by integrating research results into operational systems.
- We will place emphasis on "**training the trainer**". In this way, we ensure not only the development of highly skilled ESRs, but also the next generation of (Associate) Professors, directors, and so forth.
- In their final years of training, ESRs will be involved in - and receive training on - **writing research proposals**.
- ESRs develop a **long-term support network of peers** via involvement in REVOLUTION.

2.2.3 Strengthening European innovation capacity

REVOLUTION will significantly contribute to innovation and R&D in Europe:

- The EC[36] states that a "*1% increase of the rate of growth of the water industry in Europe could create between 10,000 & 20,000 new jobs*". By seizing on growth, **Europe can become a global market leader in innovation, R&D, technology and solutions to flood and drought problems**. We train ESRs to achieve this (Section 2.1). In particular, by involving several tech-savvy start-ups, and training on entrepreneurship and business innovation, there is a strong possibility that ESRs will start their own business. This is further encouraged by each ESR being a member of a local *Impact Hub*, and organising a business innovation event with *Impact Hub Amsterdam*.
- REVOLUTION addresses several **Societal Challenges of the H2020 Work Programme**, such as *Climate action, environment, resource efficiency and raw materials* and *Europe in a changing world*. By developing new methods and tools that are scalable and transferable, and entrepreneurial researchers who can develop these into products for market, we contribute to "*boosting EU competitiveness, growth and jobs in the water sector"*, an aim of H2020's Water Innovation focus area.
- As citizen science forms a key part of REVOLUTION, we respond to the **EC's Directorate-General for Research and Innovation's Open Science Policy Platform**, which states that[37] "*The engagement of citizens in research, policy making, and innovation should be encouraged at all levels...*", with the recommendation to "*...promote research on Citizen Science…*".
- We also contribute to two key R&D and innovation research activities of the EC, namely the **Copernicus Programme** and the **Copernicus Emergency Management Service**, which aim at providing information for emergency response in relation to different types of disasters. These are part of the EU's Copernicus Programme, aimed at developing information services based on satellite observation data.

REVOLUTION will significantly contribute to EU and Member State policy strategies:

- We co-create new methods and tools for monitoring progress related to the Sendai Framework, SDGs, and EU Water Framework Directive. Hence, the research is of **direct relevance to EU policy on DRR and sustainable development**. The Sendai Framework is at the heart of EU DRR policy, with the EU's Action Plan[38] stating that it "*...can act as a driver of innovation, growth and job creation...*". The EU and its Member States aim to be a frontrunner in implementing the SDGs, which are being fully integrated in Europe's policy framework[39].
- REVOLUTION will contribute to EU policies on Climate Change Adaptation, by: collecting exposure and vulnerability information in innovative ways, which can inform the **Disaster Loss and Damage Working Group** of the EC; and improving information on climate-related risks relevant to the **EU Adaptation Strategy**.
- WP2 supports the strategic priorities of the **Abidjan Declaration[40]** of the **Joint Africa-EU Strategy**, which stresses the importance of mobility of researchers for skills and knowledge development. This is achieved in REVOLUTION by: including a Tanzanian University (ARU) as beneficiary; including Tanzanian students and researchers in our field campaigns; and inviting Tanzanian students to our training events in Dar es Salaam.

36 EC, 2012. A Blueprint to Safeguard Europe's Water Resources. COM(2012) 673 final. EC, Brussels
37 EC, 2016. Recommendations of the OSPP on Citizen Science. EC, Brussels
38 EC, 2016. Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030. SWD(2016) 205 final/2. EC, Brussels
39 EC, 2016. Next steps for a sustainable European future. European action for sustainability, SWD(2016) 390 final. EC, Brussels
40 AU and EU, 2017. Investing in Youth for Accelerated Inclusive Growth and Sustainable Development. AU-EU/Decl.1(V). AU/EU, Abidjan

REVOLUTION will significantly contribute to policy strategies outside Europe, and hence business opportunities within Europe:

- The Sendai Framework and SDGs are the most important international agreements on DRR and sustainable development internationally. Therefore, REVOLUTION's policy relevance is also global, as the methods and tools are scalable and transferable for use anywhere on Earth. Specifically, REVOLUTION will contribute to the **Tanzania 2015 Disaster Management Act**, by making communities more resilient to floods.
- REVOLUTION has indirect impact on international migration policy. The **UN Global Compact for Safe, Orderly and Regular Migration**[41], calls to "*Minimize the adverse drivers...that compel people to leave their country of origin*". Specifically, it calls for programmes that accelerate fulfilment of the SDGs, including DRR.

2.3 Quality of the proposed measures to exploit and disseminate the results

Activities for effective exploitation, dissemination, and communication are brought together in WP5, and based on H2020 Guidelines[42]. All consortium members, including ESRs, will contribute actively to this during all phases of REVOLUTION. Our exploitation and dissemination activities focus on the practitioner and scientific community (Section 2.3) and our communication activities focus on the broader general public, including school children (Section 2.4). Specific tasks and deliverables are described in Tables 3.1a and b. To increase visibility and create a common basis, we will develop a REVOLUTION design, including logo and templates for presentations. We will also develop a dedicated project website, which will be regularly updated and will include at least: overall REVOLUTION storyline; recruitment information for ESRs; description of each ESR and her/his project; links to our distance learning resources; latest news from the project; ESR blogs and vlogs; agenda; publications repository; and information about beneficiaries, partners, and involved stakeholders.

2.3.1 Dissemination of the research results

Dissemination to the **practitioner community** will focus on the private sector, (intra)governmental agencies, NGOs, and international development organisations and financing institutes. Activities include:

- Engagement with specific stakeholders and user-groups within each of the scientific WPs, through the **research workshops** (3 per scientific WP) in M14, 25, and 36.
- **Business innovation event:** organised with *Impact Hub Amsterdam*. ESRs, practitioners and local entrepreneurs take up innovation challenges around the ESRs' tools to continue refining them towards business solutions.
- **Final conference**: ESRs present results of REVOLUTION to a broad stakeholder network (scientific and practitioner). ESRs take an active role in organising the conference as part of their training (see Table 1.2b).
- REVOLUTION **side events** at industry meetings to engage in participative discussions on results and implications, such as World Bank Understanding Risk fora and regional Ministerial Conferences on DRR.
- **Relevant networks of beneficiaries and partners:** consortium members are involved in the most important practitioner networks in their fields, such as GRAF, Tanzania Urban Resilience Programme, UNISDR PreventionWeb, and Understanding Risk. ESRs will be actively involved in these communities, and use their networking and dissemination tools and events (e.g. websites, newsletters, symposia) to disseminate results.
- **Policy briefs:** we will develop 3 policy briefs (aimed at audiences related to the 3 geographical scales of REVOLUTION, such as UN agencies, national, regional, and local governments, water authorities, business innovation hubs) that highlight key findings in an accessible format with concrete policy recommendations.
- Each ESR will be assigned a **practitioner mentor**. These mentors present the co-created research at local meetings to ensure dissemination and uptake in their community.
- Co-authored **publications** between scientists and practitioners, which can be both peer-reviewed publications as well as white papers aimed at a non-technical audience.

Dissemination to the **scientific community** will include:

- **Peer-reviewed publications**: we aim for at least 3 first-author papers per ESR in SCI/Scopus-listed journals. The ESRs are supported by (co-)supervisors and institutions with outstanding publication records. We will particularly encourage joint publications of ESRs, and where possible ESRs will be invited to contribute with specific inputs to other papers from their research groups as co-authors. We envisage several **high-level papers**, for example a commentary paper in a journal such as *Nature Climate Change* **detailing overarching advances of REVOLUTION** (Milestone 9; Table 3.1c); several of the supervisors have extensive experience with this.
- **Oral and poster presentations at (inter)-national scientific conferences:** each ESR will attend, and present at, at least 1 international scientific conference per year, such as EGU, AGU, Adaptation Futures, or FOSS4G.
- **Final conference**: see above, under dissemination to the practitioner community.
- **Model code**: open source model code will be made available via platforms such as GitHub.

41 UN, 2018. Global compact for safe, orderly and regular migration. Final Draft. United Nations, New York

42 http://ec.europa.eu/research/participants/docs/h2020-funding-guide/grants/grant-management/dissemination-of-results_en.htm

- **Relevant networks of beneficiaries and partners:** consortium members are involved in the most important scientific networks in their fields. ESRs will be actively involved in these communities to disseminate results.

Communication to the general public is described in Section 2.4.

Data management

REVOLUTION will participate in the open access to research data pilot of article 29.3 of the model Grant Agreement. This includes taking measures to make research data discoverable, accessible, assessable and intelligible, useable and interoperable. We use the "*as open as possible, as restricted as necessary*" principle in providing open access to research data. We will develop and continually update a Data Management Plan (DMP) as part of WP6. Further information on the DMP (open science) and data management processes can be found in Section 3.2.8.

2.3.2 Exploitation of results and intellectual property

To increase ESR awareness on exploitation and Intellectual Property Rights (IPR), specific training will be provided by FW. As an active role of ESRs in the exploitation of results is essential, each ESR and her/his Supervisory Team will develop an exploitation plan as part of the PCDP (Section 3.2.4). The plan will comprise an overview of expected results as well as potential markets and users of the tools. IPR will be regulated in the Consortium Agreement, based on the DESCA Model. More information on the implementation of dealing with IPR is provided in Section 3.2.6.

As the main science objective of REVOLUTION includes *new scientific methods, tools, and information that are spatially scalable and geographically transferable*, we expect large potential for exploitable results and IP. Whilst we strive to make all our results open, commercial parties can add value to their clients by using them to offer tailored solutions and advice for designing risk reduction solutions. For example, the methods and tools developed to improve the monitoring of local flood conditions in Dar es Salaam in WP2 (by various methods including satellites, video feeds, low-tech apps, and so forth) can be used by commercial parties to develop commercial monitoring systems in cities throughout the Global South facing similar flood issues. The algorithms developed to enable the use of online media in improving disaster risk knowledge can be used by specialist consultancies to provide tailored warning services for any location on Earth; indeed, FTags provides such consultancy services to its clients. The seasonal drought forecasting tool to be developed in WP3 can be used by insurers and/or buyers in the agricultural sector. For example, AgroSeguro, the main agricultural insurance company of Spain, has expressed interest and will be involved as stakeholder. The methods developed in WP4 can all be applied to improve the estimation of hazard, exposure, and vulnerability for any location on Earth. Therefore, they can be used by consultancies to offer improved flood and drought *risk* assessment and advice to clients for any location on Earth.

2.4 Quality of the proposed measures to communicate the activities to different target audiences

2.4.1 Communication and public engagement strategy

A ***participatory approach***, involving co-creation is one of the guiding principles of REVOLUTION. Moreover, our LL-approach inherently ensures that we are constantly involved in two-way interaction and communication with a broad range of target audiences, including the public (including school children and local residents in our case studies), scientists, and the practitioner groups mentioned in Section 2.3; key elements are the WP-level research workshops and network-wide milestone training events (Section 1.2). As **citizen science** methods form the core of several ESR projects (ESR1,2,5,7,8,10,11,15), the public are intrinsically involved in the research. This ensures that a transdisciplinary group (ESRs, beneficiaries, partners, stakeholders) have co-ownership of the work and that they will all participate in public communication and outreach. Throughout REVOLUTION, our **project website,** as described in Section 2.3, will play an important role in communication. **Each ESR will contribute *at least* 2 blogs/vlogs over the course of the project**. This allows us to post interesting, new, content monthly to the website, as well as develop the ESRs' communication skills. An active **social media** presence with a devoted Twitter hashtag will be developed for the consortium; examples of specific Twitter campaigns are described below. This is especially relevant to our proposal, since social media also form an integral part of several ESR research projects. **To make our communication and public engagement strategy as effective as possible, and intricately linked to the LL-approach, we will perform specific activities tailored to each of the 4 steps of our LL-approach.**

During the *problem exploration* phase, consortium members and ESRs will interact with the practitioner community and the public to identify critical needs that can shape the research. This will include:

- **A social media campaign** to gather ideas from the public. This includes inspirational tweets, followed by provocative questions, e.g. "What do you wish you'd done to prepare for [recent flood/drought] in your region?"
- The initial research workshops per WP and the hands-on, real-world problem solving in Dar es Salaam as part of milestone training event 1. The former involves a broad range of practitioners actively involved in flood and drought management in each scientific WP. The latter includes **participation of Tanzanian students from ARU**, and **serious gaming with Tanzanian school children and local communities**. We will invite **local media** (through ARU, RC, and World Bank) to attend part of the fieldwork and final presentations.

In the *data collection and analysis* phase, (co-)supervisors will support ESRs to gradually take on a lead communication role, representing the face of REVOLUTION and developing their skills. This will include:

- An **applied improvisation course** in training event 4.2 (Table 1.2b), specifically designed for the ESRs to support them in reacting *on their feet* with clear answers to live audiences or classrooms.
- Each ESR giving at least 1 presentation/class on their approach and results to a **local primary or secondary school**. Moreover, ESRs in WP2 will give **presentations/classes in schools in Dar es Salaam**.
- Active participation in the **EGU Geosciences for Teachers Programme** (https://www.egu.eu/education/gift/).
- Inviting **local media** to cover activities of 2nd and 3rd research workshops and milestone training events 2 & 3.
- Participation in **Euroscience Open Forum events** and **European Researchers' Nights,** and submitting a proposal to organise 1 Night. The ESRs will lead the proposal; this is facilitated by the course on writing proposals in training event 4.2 (Table 1.2b), where the proposal serves as a hands-on learning experience.

During the *solution evaluation and refinement* and *knowledge transfer and scaling* phases, activities include:

- Each ESR writing **1 popular science article**, to be submitted to (inter)national magazines, newspapers, etc.
- **Knowledge clips and web lectures** developed by ESRs and published via our website and YouTube.
- **Business innovation event** held with Impact Hub Amsterdam, connecting ESRs to businesses in the Netherlands working on sustainability issues, through innovation challenges.
- Making all REVOLUTION **online training resources** (see Section 1.2.1) available via project website.
- Linking all communication and dissemination to **existing knowledge management programmes**, including: Building Resilience and Adaptation for Climate Extremes and Disasters and Science for Humanitarian Emergencies and Resilience. These are led by RC, who can set up webinars and public articles.
- A **social media campaign** to gather ideas for further research, setting out potential spin-off proposals. This includes a series of inspirational water-related tweets, followed by provocative questions, e.g. "Why do you think that cleaning drains in Dar es Salaam will reduce flood risk more than building levees?"
- Final conference (see Section 2.3.1): we will invite **media** to attend, via the extensive network of VUA. It will be **promoted by the student-led Green Office of VUA** and featured in the **Amsterdam Science magazine.**

2.5 Steps needed to bring about impacts, risk and mitigation strategy

Progress towards impacts in Sections 2.1-2.4 will be evaluated and monitored according to the management structure and procedures in Section 3.2.1. In Table 2.5a, we list mitigation strategies to key potential risks specifically relating to the impact of REVOLUTION. Our mitigation strategy relating to project implementation is in Table 3.2a.

Table 2.5a: Risk and mitigation strategy related to achieving impacts

External factors	Mitigation strategy
Other research projects in similar fields may duplicate or fragment efforts	RC leads several knowledge management roles in R&D consortia, including BRACED and SHEAR, and will use these to ensure cooperation and avoid duplication. REVOLUTION is actively involved in key networks and communities. Hence, we can identify existing efforts to create synergy.
Results not implemented by external stakeholders	REVOLUTION is explicitly designed to avoid this risk, through its LL-approach and guiding principles. This ensures that research is tailored to stakeholder needs.
ESRs overwhelmed by coordinating with such a transdisciplinary team	Each ESR has a clearly designated ESR Supervisory Team, and supervisors experienced in transdisciplinary work. They ensure that ESRs are supported in knowing when to reach out to collaborators. Milestone training events include transferable skills that are applied in practice during the second week.
IPR conflict of interest between institutes	IPR has been discussed with all beneficiaries/partners during proposal writing and will be addressed in the Consortium Agreement (Section 3.2.6), therefore this is unlikely. Eventual conflict resolution takes place in the Supervisory Board, in collaboration with legal offices of involved partners where required.

3 Quality and Efficiency of the Implementation

3.1 Coherence and effectiveness of the work plan

3.1.1 Work Packages description

REVOLUTION is structured in 6 WPs. Training is coordinated in WP1, scientific activities are carried out in WP2-4, dissemination and communication are coordinated in WP5, and overall management and coordination are carried out in WP6 (Fig. 1.1a). **The LL-approach has been designed to ensure that REVOLUTION operates as a coherent whole**, with training, research, and communication following the same 4 steps. This requires an intricate linkage between activities, which will be achieved and monitored by regular (online and in-person) meetings of the Executive Board (Section 3.2.1). Activities of individual WPs are described in Table 3.1a.

Table 3.1a: Description of Work Packages

WP no.	1	Start month – End month	1-48
WP title	Training		
Lead Beneficiary	UTU (WP leader: Prof. Niina Käyhko)		
Objectives	(1) Coordinate training programme to be in line with overall training and career objectives (2) Develop PCDPs and coordinate their writing and approval (3) Develop and conduct the network-wide and wildcard training events (4) Develop distance learning resources		
Description of work		ESRs involved	ESR1-15
WP1 is concerned with overall coordination of the entire training programme, and as such is pivotal to the success of REVOLUTION. The activities are broken down into 4 main tasks, described below.			
T1.1	Develop online catalogue of online training resources	Lead partner (bold) and participants	**UTU**, all
In M2-8, an inventory of relevant distance training resources (from within and outside the consortium) that could be used by the ESRs will be made. This commences during the start-up meeting (M2) and is expanded by all consortium members until M8. The inventory is used to develop an online catalogue of distance training resources (D1.2), which will be shared with the ESRs during the kick-off.			
T1.2	PCDP development	Lead partner (bold) and participants	**UTU**, all beneficiaries
A PCDP template will be developed in M1 by the Executive Board, led by the Training Development Officer. It will be refined during the start-up meeting (M2). The template will be introduced to ESRs during the kick-off and completed by all ESRs by M12. WP1 coordinates the review and approval of PCDPs by the Supervisory Board (D1.4). After approval, PCDP implementation is the responsibility of ESR Supervisory Teams, monitored by the Executive Board.			
T1.3	Develop and conduct network-wide training events	Lead partner (bold) and participants	**UTU & training event leads**, all beneficiaries and partners
Overall development of network-wide training events is the responsibility of the Executive Board, coordinated by UTU. For each event, a lead beneficiary is assigned; they coordinate the development and conduction of the event. For the milestone training events, a local host is assigned to coordinate local logistics. Lead beneficiaries, local hosts, and content of each network-wide training event are shown in Table 1.2b.			
T1.4	Develop distance learning courses	Lead partner (bold) and participants	**UTU**, all beneficiaries and partners
Overall development of distance learning courses is the responsibility of the Executive Board, coordinated by UTU. For each course, a lead beneficiary or partner will be assigned, who reports to the Executive Board. Distance learning courses will be made available to RC, for inclusion on the website. By the end of REVOLUTION, all distance learning courses will be documented online.			

Deliverables		
No.	Short Description	Month
D1.1	Training course 1.1 (part of start-up meeting)	2
D1.2	Online catalogue of distance training events	8
D1.3	Training course 2.1 and 2.2 (part of kick-off meeting)	9
D1.4	All Personal Career Development Plans (PCDPs) approved by Supervisory Board	14
D1.5	Training course 3.1 and 3.2 (milestone training event 1)	14
D1.6	Training course 4.1 and 4.2 (milestone training event 2)	25
D1.7	Training course 5.1 and 5.2 (milestone training event 3)	36
D1.8	Distance learning course documentation	48

WP no.	2	Start month – End month	9-48
WP title	Local floods: Scalable methods for designing local flood preparedness and response solutions		
Lead Beneficiary	DUT (WP leader: Dr. Hessel Winsemius)		
Objectives	**Aim**: Co-create scalable and transferable methods for designing local flood preparedness and response solutions. In doing so, WP2 addresses Sendai Framework Priority 1 and targets a, b, c, d, g; and SDGs 5.8, 11.1, 11.5, 13.1, 13.3. **Objectives**: (1) Use a participatory process to co-create local-scale risk information using community-based approaches; (2) Co-create scientific methods and tools for collecting and monitoring local-scale data on flood hazard, exposure, and vulnerability; (3) Apply the methods and tools with stakeholders in Dar es Salaam to design sustainable solutions for flood preparedness and response.		
Description of work		ESRs involved	1-5
WP2 carries out the LL-approach with the city of Dar es Salaam (Tanzania) as case study. Dar es Salaam is used for several reasons. Firstly, it is highly flood-prone and facing rapid population growth and unplanned development. Secondly, it is an African hub for DRR innovation and data collection through projects such as *Ramani Huria*, a community mapping effort led by the World Bank, and the initiation of the *Resilience Academy*, in which two consortium members (UTU and ARU) are represented. Our activities will be embedded in these initiatives, ensuring stakeholder buy-in, societal impact, and longevity. The research workshops will be hosted by ARU as side-events of Tanzania Urban Resilience Programme Advisory Board meetings, and their content developed under the lead of DUT. **Our target is to develop methods and tools that can be sustained and deployed by communities and embedded with local stakeholders**. All methods and tools must be fit-for purpose within the context of available financial and human resources, should be spatially scalable, and have the potential to be transferred to other locations. Each ESR will work together with (at least) one of the stakeholders from the initial research workshop; together, they will apply the new methods and tools to design sustainable solutions for flood preparedness and response. The ESRs will employ a wide range of data, methods, tools, and platforms including: simple sensors that were originally designed for other purposes, e.g. smartphones, cameras, and videos; drone-based technology; online media; community-mapping and citizen science approaches; and machine learning techniques. Individual ESR projects are described in Table 3.1d. Several synergies (non-exhaustive) between ESR projects are summarised in this paragraph. ESR2&3 are highly complementary, as results of ESR3 (conditions monitored by videos) can be fed into ESR2's flood model. However, dependence is avoided as methods developed by ESR3 are of value to communities even without the model of ESR2, and ESR2's model can be run without results of ESR3. Community-mapping results from ESR1&2 can be used to verify ESR13's dike and levee detection method. Citizen science approaches employed by ESR2&5 have methodological synergies with ESR10, whilst the use of online media data provides methodological synergy between ESR4,8 and 11.		
T2.1	Community-based elevation and drainage data for neighbourhood scale flood modelling	Lead partner (bold) and participants	**DUT**, HOT-OSM, ARU
T2.2	Citizen science to understand dynamic changes of local conditions on flood risk	Lead partner (bold) and participants	**UoP**, DRES, ARU
T2.3	Mapping flow conditions and solid waste from image and video data using computer vision techniques	Lead partner (bold) and participants	**ARU**, VAI, UTU
T2.4	Real-time flood impact forecasting for forecast-based humanitarian action	Lead partner (bold) and participants	**RC**, DUT, JRC
T2.5	Assessing the long-term value of community mapping initiatives and data in improving risk-based decision-making	Lead partner (bold) and participants	**UTU**, ARU, RC

No.	Short Description	Month
D2.1	Report on research workshop 1, including minutes and refined research questions	15
D2.2	Interim report summarising progress on 5 ESR projects and minutes of research workshop 2	26
D2.3	Minutes of research workshop 3	37
D2.4-D2.8	Final reports on individual ESR projects	45
D2.9	White paper synthesising results across WP	48

WP no.	3	Start month – End month	9-48
WP title	Regional droughts: Scalable methods to improve drought monitoring and forecasting systems at regional scales		
Lead Beneficiary	FW (WP leader: Dr. Johannes Hunink)		
Objectives	**Aim**: Co-create scalable methods to improve drought monitoring and forecasting systems at regional scales. In doing so, WP3 addresses Sendai Framework Priority 1 and targets a, b, c, g; SDG targets 2.4, 3.d, 6.4, 11.5, 13.1, and 13.3; EU Water Framework Directive. **Objectives**: (1) Co-create scientific methods and tools for monitoring and forecasting drought risk at regional scales; (2) Use the methods and tools to develop information on drought risk at European scale, for inclusion in the European Drought Observatory system; (3) Apply the methods and tools with stakeholders in the Segura river basin to improve basin-scale monitoring and forecasting systems.		

Description of work	ESRs involved	6-10

WP3 will carry out the LL-approach at two regional scales: continental and river basin. We will develop our new methods and tools at the European scale and use these to generate information for the European Drought Observatory (EDO). We will then examine their scalability by applying them to the Segura river basin to improve monitoring and forecasting systems with stakeholders from the region. This is facilitated through our project partner CHS (Water Authority of the Segura), who will ensure that our work supports the Segura Drought Management Plan. The research workshops will be hosted by JRC as side-events of annual EDO stakeholder meetings, and CHS. Workshop content will be developed under the lead of FW. **Our target is to develop innovative methods and tools that work at both the continental and river basin scale**. Each ESR will work with (at least) one of the stakeholders from the Segura river basin; together, they will apply the new methods and tools to demonstrate their added value for drought risk monitoring and forecasting. The ESRs will employ a wide range of data, methods, tools, and platforms including: satellite data, online media (e.g. Twitter), socio-hydrological and agent-based modelling, citizen science approaches, and machine learning techniques.

Individual ESR projects are described in Table 3.1d. Several synergies (non-exhaustive) between ESR projects are summarised in this paragraph. ESR6&7 produce complementary methods that enable regional stakeholders to better monitor groundwater drought and understand its social and physical causes. The work of ESR8 on online media in drought monitoring provides synergy with ESR4&11. By developing machine learning algorithms to combine data from heterogeneous sources to improve mapping (of flood and drought impacts), we create synergy between ESR9&11. ESR10 has methodological synergies with ESR2&15 in obtaining data using citizen science approaches.

T3.1	Monitoring of European groundwater drought	Lead partner (bold) and participants	**UoB**, UKRI, JRC
T3.2	Socio-hydrological modelling of groundwater drought to improve regional scale management	Lead partner (bold) and participants	**UoB**, FW, CHS
T3.3	Detecting and monitoring droughts using data from online media	Lead partner (bold) and participants	**FW**, VUA, FTags
T3.4	Improving risk-based seasonal drought forecasts	Lead partner (bold) and participants	**FW**, VUA, BSC-CNS
T3.5	Understanding society's adaptive behaviour to droughts through citizen science and socio-hydrological modelling	Lead partner (bold) and participants	**VUA**, CHS, UoB

No.	Short Description	Month
D3.1	Report on research workshop 1, including minutes and refined research questions	15
D3.2	Interim report summarising progress on 5 ESR projects and minutes of research workshop 2	26
D3.3	Minutes of research workshop 3	37
D3.4-D3.8	Final reports on individual ESR projects	45
D3.9	White paper synthesising results across WP	48

WP no.	4	Start month – End month	9-48
WP title	Global floods: Scalable methods to improve global scale risk assessment and monitoring		
Lead Beneficiary	VUA (WP leader: Prof. Philip Ward)		
Objectives	**Aim**: Co-create scalable methods to improve global scale risk assessment and monitoring. In doing so, WP4 addresses Sendai Framework Priority Action 1 and targets a, b, c, d, and g; and SDG targets 3.d, 6.4, 11.5, 13.1, and 13.3. **Objectives**: (1) Co-create scientific methods and tools that can be applied at any location on Earth in order to improve the mapping of flood hazard, exposure, and vulnerability; (2) Embed the new methods and tools within UNISDR's Global Risk Assessment Framework; (3) Integrate the results of the new methods and tools into a global flood risk model (GLOFRIS) and demonstrate their contribution to improved global scale flood risk assessment and monitoring.		

Description of work	ESRs involved	11-15

WP4 will embed the LL-approach embedded in the Global Risk Assessment Framework (GRAF), a framework for supporting decision-makers to achieve the Sendai Framework targets. The research workshops will be hosted by UNISDR and JRC, as side-events of annual GRAF meetings and Global Flood Partnership conferences. Workshop content will be developed under the lead of VUA. **Our target is to develop methods and tools that utilise new datasets that are rich in information at the local scale but can be scaled globally**. The ESRs will employ a wide range of data, methods, tools, and platforms including: satellite and radar data, imagery from drones and Google Street View-like platforms, online media, global flood models, citizen science approaches, and machine learning.

Individual ESR projects are described in Table 3.1d. Several synergies (non-exhaustive) between ESR projects are summarised in this paragraph. Synergy between all WP4 ESR projects will be achieved by integrating results into the GLOFRIS global flood risk model. ESR11&12 are complementary as they both improve methods for mapping flood hazard (extent and depth respectively). Results of ESR13 (dikes and levee mapping) can be used by ESR11&12 to improve hazard mapping, whilst the community-mapping projects of ESR1&2 can be used to verify results of ESR13. ESR14 has methodological synergies with drone mapping (ESR1), camera and video feeds (ESR3), and satellite data combined with machine learning (ESR6&11). ESR15 has methodological synergies with ESR2&10 in using citizen science approaches.

T4.1	Comprehensive global flood mapping	Lead partner (bold) and participants	**VUA**, C2S, FTags
T4.2	Flood depth estimation from fusion of DEM and radar imagery	Lead partner (bold) and participants	**DLR**, UTU, DUT
T4.3	Detecting human-made flood protection structures through machine learning	Lead partner (bold) and participants	**DUT**, DRES, DLR
T4.4	Improved exposure characterisation of buildings using machine learning	Lead partner (bold) and participants	**DLR**, VUA, NASA

T4.5	Scalable methods to integrate local knowledge in flood vulnerability mapping	Lead partner (bold) and participants	**UTU**, UoP, NASA

No.	Short Description	Month
D4.1	Report on research workshop 1, including minutes and refined research questions	15
D4.2	Interim report summarising progress on 5 ESR projects and minutes of research workshop 2	26
D4.3	Minutes of research workshop 3	37
D4.4-D4.8	Final reports on individual ESR projects	45
D4.9	White paper synthesising results across WP	48

WP no.	5	Start month – End month	1-48
WP title	Dissemination and communication		
Lead Beneficiary	RC (WP leader: Dr. Erin Coughlan de Perez)		
Objectives	(1) To ensure effective dissemination of results to the scientific and practitioner community (2) To ensure effective two-way communication with stakeholders and general public (3) To ensure legacy of REVOLUTION results		

Description of work	ESRs involved	All
WP5 ensures effective and efficient dissemination and communication to the scientific and practitioner community, and general public. Our LL-approach ensures a constant two-way interaction with stakeholders. During the recruitment phase (M1-8), a REVOLUTION identity and design will be developed, as well as a detailed dissemination and communication plan (Task 5.1). The project website will also be setup, and regularly updated throughout the project (Task 5.2). Specific targeted dissemination and two-way communication activities are collected together under Task 5.3, including those activities specifically designed to ensure the legacy of REVOLUTION. Our final conference and business innovation event are organised and carried out in Task 5.4.		

T5.1	Develop REVOLUTION identify and design, and detailed dissemination and communication plan	Lead partner (bold) and participants	**RC**, all
The first activity is the development of our identity and design (D5.1), which includes: overall REVOLUTION storyline, logo, and templates for presentations and other media activities. For sustainability reasons, we choose **not** to develop physical project flyers for distribution at conferences - electronic resources will be used. During this phase, a detailed dissemination and communication plan will be developed (D5.2). This will be discussed at the start-up (M2) and finalised with input from all beneficiaries/partners by M5.			
T5.2	REVOLUTION website	Lead partner (bold) and participants	**RC,** content from all
A project website will be developed and will go live by M5 (D5.3). After launch, it will be regularly updated, with each beneficiary and partner being granted specific rights and responsibilities as set out in the dissemination and communication plan. As the ESRs form the heart of REVOLUTION, they play a central role in keeping the website up to date; this includes making at least 2 blogs/vlogs during the project.			
T5.3	Targeted dissemination and communication activities	Lead partner (bold) and participants	**RC**, all
This task concerns coordination of the specific dissemination and communication modalities (Section 2.3&2.4), including: side-events and scientific and practitioner meetings and conferences; practitioner mentors; scientific and practitioner-oriented papers (including high-level synthesis papers) and presentations; online media presence and targeted Twitter campaigns; serious gaming with local communities; teaching at local schools; participation in EGU Geosciences for Teachers Programme; local media; European Researcher's Nights. Links to all publications will be added to the website and checked annually (D5.4). To ensure legacy, we ensure that: our research is embedded in main scientific and practitioner networks; 3 policy briefs are published (D5.6); and distance learning resources are available online (D5.7).			
T5.4	Final conference and business innovation event	Lead partner (bold) and participants	**RC**, all
A final conference and business innovation event (1-day each) will be held in Amsterdam (D5.5). The focus is on the research impacts and ESR future careers. The ESRs will take an active role in organising the final conference in order to put learnt skills into action. The business innovation event will be organised by the ESRs together with Impact Hub Amsterdam, who will also invite relevant entrepreneurs and professionals from their national and global networks.			

Deliverables

No.	Short Description	Month
D5.1	REVOLUTION identity and design	3
D5.2	Detailed dissemination and communication plan	5
D5.3	REVOLUTION website launched	5
D5.4	Links to all scientific and practitioner papers and presentations**.** Updated and checked for completeness	12, 24, 36, 48
D5.5	Final conference and business innovation event	45
D5.6	Three policy briefs	48
D5.7	All distance training resources available online	48

WP no.	6	Start month – End month	1 – 48
WP title	Management and coordination		
Lead beneficiary	VUA (WP leader: Prof. Philip Ward)		
Objectives	(1) To efficiently manage REVOLUTION so that objectives in other WPs can be achieved (2) To establish a transparent recruitment procedure and recruit competitive ESRs (3) To communicate with and report to the European Commission		

Description of work	ESRs involved	n/a
WP6 concerns coordination and overall management and enables the work in all other WPs to run smoothly and coherently. Communication within the consortium as well as with the European Commission will also be coordinated in this WP.		

T6.1	Organise an efficient project structure	Lead partner (bold) and participants	**VUA**; all
Management and overall coordination by VUA will enable activities in all WPs to be performed timely, coherently, and efficiently. This will entail at least the following: (1) development of Consortium Agreement; (2) development and updating of Data Management Plan; (3) planning and organisation of project board meetings (for overview of boards, see Section 3.2.1); (4) active progress monitoring of objectives, deliverables, milestones, and alignment between WPs; (5) internal communication; and (6) overall ethical, legal, financial, and administrative management.			
T6.2	Coordination of ESR recruitment	Lead partner (bold) and participants	**VUA**; all beneficiaries
Establish the Recruitment Committee (RCie) and coordinate all RCie activities, i.e. announcement of positions, pre-selection of candidates, communication of final selected candidates to Supervisory Board for final approval, communication to rejected candidates.			
T6.3	Reporting to the European Commission (EC)	Lead partner (bold) and participants	**VUA**

VUA will act as liaison between the project consortium and the EC representatives. Activities include: (1) collecting and processing data from consortium members on activities in their WPs; (2) processing all technical, financial, and administrative information into project periodic and final reports compliant with EC criteria; and (3) sending interim reports as well as final report to the EC.		
Deliverables		
No.	Short Description	Month
D6.1	**Consortium Agreement:** Final version of the CA submitted to the REA	3
D6.2	**Data management plan:** Analysis of main elements of the data management policy	5
D6.3	**ESR recruitment completed:** All 15 individual ESR contracts are signed ESRs recruited	8
D6.4	**Mid-term progress report:** Interim report sent to EC describing progress in research, training, and impact	27
D6.5	**Final report:** Final report sent to the EC summarising all research, training, and impact	48

3.1.2 List of major deliverables

Table 3.1b: Deliverables list

Scientific Deliverables		WP no.	Lead beneficiary short name	Type[43]	Dissemination level[44]	Due date
No.	Title					
D2.1, 3.1, 4.1	Report on research workshop 1, including minutes and refined research questions	2,3,4	TUD (D2.1), FW (D3.1), VUA (D4.1)	R	PU	15
D2.2, 3.2, 4.2	Interim report summarising progress on 5 ESR projects and minutes of research workshop 2	2,3,4	TUD (D2.2), FW (D3.2), VUA (D4.2)	R	PU	26
D2.3, 3.3, 4.3	Minutes of research workshop 3	2,3,4	TUD (D2.3), FW (D3.4), VUA (D4.5)	R	PU	37
D2.4-2.8 D3.4-3.8 D4.4-4.8	Final reports on individual ESR projects	2,3,4	ESR Host Beneficiaries (Table 3.1d)	R	PU	45
D2.9, 3.9, 4.9	White paper synthesising results across WP	2,3,4	TUD (D2.9), FW (D3.9), VUA (D4.9)	PDE	PU	48
Management, Training, Recruitment, and Dissemination Deliverables		WP no.	Lead beneficiary short name	Type	Dissemination level	Due date (M)
No.	Title					
D1.1	Training course 1.1	1	VUA	OTHER	CO	2
D5.1	REVOLUTION identity and design	5	RC	ADM	CO	3
D6.1	Consortium Agreement	6	VUA	ADM	CO	3
D5.2	Detailed dissemination and communication plan	5	RC	R	CO	5
D5.3	REVOLUTION website launched	5	RC	ADM	PU	5
D6.2	Data management plan	6	VUA	PDE	CO	5
D1.2	Online catalogue of distance training events	1	UTU	OTHER	CO	8
D6.3	ESR recruitment completed	6	VUA	ADM	CO	8
D5.4	Links to all papers and presentations	5	RC	PDE	PU	12,24,36,48
D1.3	Training course 2.1 and 2.2	1	VUA	OTHER	CO	9
D1.4	All PCDPs approved by Supervisory Board	1	VUA	ADM		14
D1.5	Training course 3.1 and 3.2	1	TUD	OTHER	CO	14
D6.4	Mid-term progress report	6	VUA	R	PU	27
D1.6	Training course 4.1 and 4.2	1	VUA	OTHER	CO	25
D1.7	Training course 5.1 and 5.2	1	FW	OTHER	CO	36
D5.5	Final conference and business innovation event	5	RC	PDE	PU	45
D1.8	Distance learning course documentation	1	UTU	PDE	PU	48
D5.6	Three policy briefs	5	VUA	PDE	PU	48
D5.7	All distance training resources available online	5	RC	PDE	PU	48
D6.5	Final report	6	VUA	R	PU	48

3.1.3 List of major milestones

Table 3.1c: Milestones list

Milestones		Related WP(s)	Lead beneficiary short name	Due date	Means of verification
No.	Title				
MS1	Kick-off meeting completed	1	VUA	2	Meeting minutes
MS2	Website online	5	RC	5	Website online and available to public
MS3	All ESRs recruited	2	VUA (& all)	6	15 signed contracts
MS4	PCDPs approved	1	VUA	14	15 PCDPs by Supervisory Board
MS5	LL step 1 completed (Problem exploration)	1-5	All	25	RW1[45] completed (minutes); 15 ESR papers submitted; ESRs reported to SB/AB at MTE2[46]; 9 blogs
MS6	LL step 2 completed (Data collection and analysis)	1-5	All	36	RW2[45] completed (minutes); 30 ESR papers submitted; ESRs reported to SB/AB at MTE3[46]; 18 blogs
MS7	LL step 3 completed (Solution evaluation and refinement)	1-5	All	45	RW3[45] completed (minutes); 45 ESR papers submitted; ESRs reported to SB/AB at M45 meeting; 27 blogs
MS8	LL step 4 completed (Knowledge transfer and scaling)	1-5	All	48	Final conference (presentations on scaling and utilisation); 50 ESR papers & high-level commentary submitted; 30 blogs; distance learning resources online
MS9	High-impact commentary paper synthesising REVOLUTION	1-5	VUA	48	Paper submitted to high-impact journal

43 R = Report; ADM = Administrative; PDE = dissemination and/or exploitation of project results; OTHER = Other.
44 PU = Public, fully open; CO = Confidential, restricted under conditions set out in Model Grant Agreement; CI = Classified, information as referred to in Commission Decision 2001/844/EC.
45 RW = Research workshop
46 MTE = Milestone Training Event

3.1.4 Fellow's individual projects, including secondment plan

A description of individual ESR projects, including main approach, results, and secondment arrangements is provided in Table 3.1d. Several synergies between ESR projects are described in the WP descriptions (Table 3.1a).

Table 3.1d: Individual research projects

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 1	DUT	Y (DUT)	Month 9	36 months	D2.4
Project title	Community-based elevation and drainage data for neighbourhood scale flood modelling			Related to WP	WP2
Objectives: A major requirement for understanding local flood processes is high quality data on the elevation of flood conveying structures. Traditionally, these are collected from point clouds, based on Light Detection and Ranging (LIDAR) instruments, but such methods require professional surveys and expensive equipment, including an airplane. Hence, they are usually not available in cities like Dar es Salaam. **Therefore, ESR 1 will develop a method to enable community mapping teams to use drones, mobile phones with low-cost sensors, and open-source software platforms to generate highly accurate elevation data**. **This will be achieved by:** (1) using smartphone- and other low-cost sensors to establish ground control points through differential barometry and differential GPS; (2) using point cloud matching techniques to merge a Structure-from-Motion photogrammetry point cloud with ground control point clouds; (3) rigorous error analysis against benchmark datasets (e.g. LIDAR or RTK-enabled photogrammetry); (4) demonstration of use in flood modelling in a Dar es Salaam neighbourhood.					
Expected results: (1) Low-cost prototype smartphone enabled sensor setup to monitor elevation and fit-for-purpose in community mapping; (2) Neighbourhood scale high resolution elevation dataset with integrated sensor data; (3) Neighbourhood scale flood hazard models based on the new terrain mapping procedure and community-mapped drainage data; (4) 3-4 scientific papers and 1 PhD thesis.					
Planned secondment(s): (1) HOT-OSM (M16-20) to cover the human interfacing of the sensor method and data platform; (2) ARU (M13-14 & 34-36) transfer of method in community mapping practice					
Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 2	UoP	Y (UoP)	Month 9	36 months	D2.5
Project title	Citizen science to understand dynamic changes of local conditions on flood risk			Related to WP	WP2
Objectives: Flood impacts in informal settlements are caused by factors that are highly variable in space and time, including: poorly maintained drainage infrastructure; accumulation of solid waste in channels; urbanisation; and climate extremes. To design DRR solutions at neighbourhood scale, it is essential to understand how these causal factors contribute to overall risk, and to continually monitor changes. The *Ramani Huria* community mapping project collects data on these factors, with potential for replication across the Global South. **Therefore, ESR2 will develop a model that uses community mapped data to assess causal factors of flood risks at the neighbourhood scale. This will be achieved by:** (1) developing a flood model generation procedure and flood impact models based on existing Voluntary Geographical Information (VGI) data sources (e.g. OpenStreetMap); (2) using the model to assess the influence of local conditions in flood-causing factors on flood risk; and (3) developing automated procedures to generate seasonal flood risk maps accounting for community-mapped changes in local conditions.					
Expected results: (1) Urban flood risk model that includes changing states of drainage infrastructure, accumulation of solid waste, urbanisation, and climatic conditions; (2) Automated procedure to generate seasonal flood hazard maps; (3) Training resources to support transfer of model to other towns and cities; (4) 3-4 scientific papers and 1 PhD thesis.					
Planned secondment(s): (1) DRES (M17-21) to carry out hydraulic modelling; (2) ARU (M13-14 & 34-36): to embed model into practice					
Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 3	ARU	Y (ARU)	Month 9	36 months	D2.6
Project title	Mapping flow conditions and solid waste from image and video data using computer vision techniques			Related to WP	WP2
Objectives: Flow conditions and flood impacts are highly dynamic in space and time. Flood conditions concern flows, extent of water and accumulation of solid waste and damage to infrastructure. Sustainably monitoring these conditions dynamically and with enough spatial coverage requires novel and low-cost technologies combined with human and computer intelligence. **Therefore, ESR3 will develop methods that combine location-based mobile and stationary video and camera data (collected for example using mobile phones) with human intelligence and machine learning capacities. This will be achieved by:** (1) training computer vision techniques based on machine learning algorithms to convert image data into meaningful judgment of flooding conditions; (2) testing and comparing visual image/video interpretation and flow condition judgments with computer vision capacities; and (3) investigating the use of online shared media data from open-access platforms for operational flow condition mapping and response planning.					
Expected results: (1) Mobile and stationary flood condition mapping methods developed based on active and passive images/video data and machine learning methods; (2) Practical demonstration of the methods and assessment of their suitability for operational use in urban flooding; (3) Business-models established and tested for operational uses in Dar es Salaam; (4) 3-4 scientific papers and 1 PhD thesis.					
Planned secondment(s): (1) VAI (M15-20) to develop computer vision and machine learning methods with video feeds; (2) UTU (M33-36) to transfer the method in community mapping practice and to establish business models					
Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 4	RC	Y (DUT)	Month 9	36 months	D2.7
Project title	Real-time flood impact forecasting for forecast-based humanitarian action			Related to WP	WP2
Objectives: While most flood risk maps show long-term risk averaged over a long time period, this is not a good indicator of risk when a specific flood event is about to happen. For example, long-term risk might show that a certain neighbourhood in the northern part of the city experiences largest flood impacts on average, but a flood might be predicted for the southern part of the city in the coming days. Humanitarians need maps that are updated in real-time to show who is likely to be affected based on forecasts of imminent flooding. **Therefore, ESR 4 will work with Tanzania Meteorological Agency to develop a real-time forecast of potential flood impacts in Dar es Salaam. This will be achieved by:** (1) establishing which meteorological phenomena historically resulted in intense rainfall and flooding using data from satellites, stations, road camera, and online media; (2) developing a mapping tool that can ingest real-time collected data to produce short-term, stochastic forecasts of flood impacts; and (3) supporting Tanzania Red Cross to develop an Early Action Protocol to take action to prepare for flooding using this tool.					
Expected results: (1) Detailed flood vulnerability map for Dar es Salaam; (2) New methods and algorithms for combining data from flood maps, satellites, and crowd-sourced infrastructure information; (3) A real-time mapping tool that tells Tanzania Red Cross which are the most at-risk locations for a current flood forecast; (4) 3-4 scientific papers and 1 PhD thesis.					
Planned secondment(s): (1) DUT (M17-20) to carry out flood mapping and data integration; (2) JRC (M23-26) to develop warning thresholds & accuracy metrics. Given proximity of host (RC) to DUT (<30 min.), ESR can spend 1 day per week at DUT when necessary.					
Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 5	UTU	Y (UTU)	Month 9	36 months	D2.8
Project title	Assessing the long-term value of community mapping initiatives and data in improving risk-based decision-making			Related to WP	WP2
Objectives: In Dar es Salaam, citizens at the lowest administrative units (Mtaa) are organised in community mapping teams, who use simple geospatial technologies to collect up-to-date data relevant to flood risk. The resulting spatial data are collected in the OpenStreetMap platform and have potential to empower decision-making and the establishment of new businesses along the value chain of flood management (e.g. waste management services; improvement of infrastructure; protection of assets; urban planning). However, the (in)tangible values of community-mapped data to flood risk management and local					

bottom-up business innovations have never been systematically investigated and the incentives and thresholds to adopt and maintain community-mapping are poorly understood. **Therefore, ESR 5 will assess the long-term value of community mapping initiatives and data in improving risk-based decision-making and promoting local business innovations. This will be achieved by:** (1) assessing (in)tangible values of community-mapping with residents and potential clients using focus group discussion and interviews; (2) organising business innovation workshops to identify and study the co-creation potential of community-mapped data for businesses; (3) identifying potential champions from these workshops (SMEs, training institutions, community groups, NGOs, municipal actors) and engaging them in a co-design process where methods of action research are used in studying the solution design and their evolution; and (4) establishing an overall framework and good practices to assess the value of community-mapping processes and information globally.

Expected results: (1) Identification of (in)tangible values and incentives for sustainable community mapping in flood management value chain; (2) Enhancement of stakeholder cooperation and local business possibilities in flood risk solutions; (3) Establishment of good practices for boosting bottom-up business innovations from community data with suggestions for scalability and transfer; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): (1) RC (M16-18): to identify actors, establish business and community needs/opportunities and develop platforms and requisite applications; (2) ARU (M13-14 & 34-36): to develop community resilience online engagement strategy, experience or manual.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 6	UoB	Y (UoB)	Month 9	36 months	D3.4
Project title	Monitoring of European groundwater drought			Related to WP	WP3

Objectives: Groundwater is often used as a strategic reserve during drought periods, especially for irrigation, and the expectation is that reliance on groundwater reserves will increase with climate change. This is also the case in Europe, where operational drought monitoring systems do not currently monitor groundwater drought, due to a lack of scientific data, methods, and tools. Better monitoring would provide a better understanding of spatiotemporal aspects of groundwater drought. **Therefore, ESR 6 will develop groundwater drought monitoring methods using new satellite data sources and smart modelling approaches. This will be achieved by**: (1) complementing sparse groundwater level observations with satellite data (from GRACE) to obtain groundwater drought information at the European scale; (2) applying advanced statistical modelling (based on machine learning) to increase spatial resolution of areas with limited observations; (3) making this operational by including groundwater drought information in the European Drought Observatory (EDO); and (4) testing the use of this European scale groundwater drought monitor with stakeholders in the Segura river basin to demonstrate scalability and use in drought planning at regional scale.

Expected results: (1) New methods and algorithms for combining groundwater observations and satellite data; (2) European groundwater drought monitor available online in EDO; (3) Assessment of improved groundwater management options during droughts in Segura river basin; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): (1) UKRI (M16-20): to obtain groundwater observations of the European Groundwater Drought Initiative and develop modelling approach; (2) JRC (M13 & 24-27): to combine observations with satellite and to implement result in the EDO.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 7	UoB	Y (UoB)	Month 9	36 months	D3.5
Project title	Socio-hydrological modelling of groundwater drought to improve regional scale management			Related to WP	WP3

Objectives: Many groundwater bodies in Europe are currently in an extremely poor status (in terms of quantity and quality), putting the requirements of the Water Framework Directive for *good status* of groundwater bodies in 2027 at risk and compromising future food production. In many regions, groundwater is not managed in a coordinated way, which is partly due to poor understanding of feedbacks between drought and groundwater abstraction. **Therefore, ESR 7 will develop methods to improve regional scale groundwater management, by explicitly modelling feedbacks between water and society. This will be achieved by**: (1) obtaining information on groundwater policies and groundwater use behaviour through qualitative data collection and analysis (document analysis, interviews, focus groups); (2) combining these data with groundwater observations; (3) using these data to develop a socio-hydrological model to improve understanding of interlinkages and feedbacks between drought and groundwater use; and (4) designing better management of groundwater during droughts at the river basin scale (Segura).

Expected results: (1) Innovative method for integrating quantitative and qualitative data on groundwater and groundwater use; (2) New socio-hydrological model of the feedbacks between drought and groundwater use; (3) Management tool for groundwater abstraction during droughts to be included in River Basin Management Plans; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): FW (M15-19): to design hydrological modelling framework; CHS (M22-24 & 36-37): to obtain information on groundwater abstraction, restrictions, water use behaviour, and to implement the result in the River Basin Management Plan.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 8	FW	Y (VUA)	Month 9	36 months	D3.6
Project title	Detecting and monitoring droughts using data from online media			Related to WP	WP3

Objectives: Current drought monitoring systems tend to focus on physical aspects of droughts. Indicators of socioeconomic impacts and public perception of droughts are largely missing. Drought monitoring systems could gain added value from this kind of information. For example, monitoring the socioeconomic impacts of drought at the European scale could help the EU to estimate losses to various sectors and thereby design relief schemes, while at the river basin scale, water managers could use the information to prioritise management actions. Online media data are being used to monitor and map socioeconomic flood impacts at global scale, but have not yet been harnessed for drought monitoring. **Therefore, ESR 8 will develop methods to detect and monitor socioeconomic impacts of droughts from online media data. This will be achieved by:** (1) developing algorithms to extract and geolocate drought-related information from online media feeds (e.g. Twitter), building on the existing TAGGS algorithms developed by VUA and FTags for flood detection using Twitter data; (2) using the new algorithm to detect and map droughts at European scale, for inclusion in EDO; and (3) enhancing the method for basin scale drought monitoring, using the Segura river basin as case study, by including information from more regional hydrological drought monitoring systems based on satellite information (www.infosequia.eu).

Expected results: (1) New algorithms for deriving spatial drought indices from online media data; (2) European scale drought detection system using online media data; (3) System for assessing drought impacts for Segura river basin (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): VUA (M11-12 & 27-29): to develop indicators relevant to drought risk monitoring from online media data; FTags (M17-21): to develop online media-based drought detection algorithms.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 9	FW	Y (VUA)	Month 9	36 months	D3.7
Project title	Improving risk-based seasonal drought forecasts			Related to WP	WP3

Objectives: Seasonal forecasting of drought risk is still challenging, as traditional dynamical climate model-based forecasts fail to provide reliable and skilful predictions at this time-scale, especially in Europe. Empirical forecasting techniques based on large scale climate variability indicators have been explored but often suffer from overfitting problems and non-stationarity of predictands. Nevertheless, recent research has indicated long-lead predictability of the winter North Atlantic Oscillation (NAO), which primarily determines rainfall patterns over Europe. Therefore, hybrid forecasting strategies that combine the key strengths of dynamical and empirical forecasts are promising, and could potentially be used to forecast crop yield anomalies, water supply deficits, and economic indicators. **Therefore, ESR 9 will develop a method to improve seasonal risk-based drought forecasts, by using machine-learning approaches that combine empirical forecasts with dynamic climate model-based information. This will be achieved by:** (1) using machine learning methods to derive empirical seasonal-to-sub-seasonal forecast methods for NAO and European precipitation patterns; (2) combining these with seasonal forecasts from the new Copernicus climate service portal C3S and drought-impact related data (e.g. yield, groundwater overexploitation); (3) applying these methods at the basin-scale (Segura) and European scale; and (4) evaluating how these methods can be integrated into management decisions.

Expected results: (1) Improved drought forecasting method that is ready to be implemented in a drought early warning system; (2) Drought forecasts with impact indicators relevant for targeted stakeholders; (3) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): VUA (M11-12 & 27-29) to work on machine learning methods and analysis of results & BSC-CNS (M17-21) unite machine learning methods with operational seasonal forecast from Copernicus

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 10	VUA	Y (VUA)	Month 9	36 months	D3.8
Project title	Understanding society's adaptive behaviour to droughts through citizen science and socio-hydrological modelling			Related to WP	WP3

Objectives: Correct drought risk assessment is complicated because (un)planned actions taken by humans prior to, during, or after a drought, can (in)directly alter hazard, exposure, vulnerability, and consequently risk. Current drought risk models neglect these interactions and ignore how past and current drought experience may influence human adaptive behaviour through time. Hence, they do not provide a full representation of risk, and could misinform adaptation policy. **Therefore, ESR 10 will develop methods to better understand how human adaptive behaviour influences drought risk, by combining citizen science and socio-hydrological modelling. This will be achieved by:** (1) developing a flexible and scalable method using citizen science techniques (e.g. crowd-sourced data) to collect information on adaptive capacity and behavioural response of stakeholders (e.g. farmers, industry, households) affected by droughts; (2) applying the methodology to the Segura basin; (3) integrating the collected information in a socio-hydrological modelling framework; and (4) benchmarking results against historical drought events. The framework will be used with CHS to examine the effectiveness of a portfolio of drought risk reduction measures in the Segura basin.

Expected results: (1) New methods and algorithms for collecting and combining biophysical and socioeconomic data as well as crowd-sourced information on drought adaptive behaviour and response; (2) Basin-scale socio-hydrological model to evaluate (future) drought risk pathways and effectiveness and feedbacks of adaptation for use in River Basin Management Plans; (3) Updated drought risk estimates and recommendation for adaptation for the Segura river basin; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): CHS (M15-17 & 36-37): to obtain information on water abstractions, crowd-sourced information on water use behaviour, and drought adaptation strategies, to co-create the socio-hydrological model and management tool, and implement results in River Basin Management Plan; UoB (M29-32): to upscale developed socio-hydrological model into EU-wide frameworks.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 11	VUA	Y (VUA)	Month 9	36 months	D4.4
Project title	Comprehensive global flood mapping			Related to WP	WP4

Objectives: Flood hazard maps with global coverage are essential for assessing/monitoring global flood risk. Data on global floods are available from global flood models, satellites, or online media. Yet, each of these has limitations. For example, global flood models are imprecise, and due to their coarse resolution are limited in urban areas and small and upstream river catchments; satellite records have limited observations, can be obscured by clouds, and struggle to detect floods in urban areas; and online media data are bias towards populated areas, with little information in rural areas. **Therefore, ESR 11 will develop a comprehensive global flood map combining data produced by global flood models, satellites, and online media**. **This will be achieved by**: (1) developing a method that combines data from the global flood model GLOFRIS/Cama-Flood, satellite data, and online media by means of machine learning and other data assimilation methods; (2) applying the method to several case studies and benchmarking results against observed flood extents; and (3) scaling the approach to the globe. Once developed, the ESR will integrate the maps into GLOFRIS to assess the improvement and examine how this can be used in the design of sustainable solutions.

Expected results: (1) Comprehensive global flood maps; (2) New methods and algorithms for combining data from global flood models, satellite data, and online media; (3) New estimates of global flood risk for use in GRAF; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): (1) C2S (M15-18): to analyse satellite imagery and develop machine learning algorithms; (2) FTags (M21-24): to analyse online media content. Given proximity of host to FTags (~30 mins.), the ESR can spend 1 day per week at FTags as necessary.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 12	DLR	Y (UTU)	Month 9	36 months	D4.5
Project title	Flood depth estimation from fusion of DEM and radar imagery			Related to WP	WP4

Objectives: To properly estimate flood risk in urban areas, information on flood depth is essential. In global flood risk assessment, depth has so far mostly been estimated using hydrological models. However, these have large uncertainties and long processing times. To address this, recent studies have attempted to use satellite radar data together with height information from digital elevation models (DEMs). However, these also exhibit drawbacks. For example, they assume that floodplain dynamics do not condition the overflow and flooding downstream, and are complex to implement. **Therefore, ESR 12 will develop a flood depth estimation method, by fusing DEM and radar imagery data, which is highly accurate, quick, easy to use and scalable and transferable to any location**. **This will be achieved by**: (1) developing a method that combines radar imagery with precise DEMs from satellite (e.g. TanDEM-X), LiDAR, or drone data; (2) applying the method to several case studies and benchmarking the results against in situ measurements; and (3) comparing the results against those from hydrological models. Once developed, the ESR will integrate the maps into GLOFRIS to assess the improvement and examine how this can be used to design sustainable solutions.

Expected results: (1) Novel methodology for flood depth estimation; (2) Flood depth maps for several test cases; (3) Qualitative and quantitative accuracy assessment for different case studies; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): (1) UTU (M11-12 & 26-28): to develop and analyse hydrological models for benchmarking; (2) DUT (M17-20): to combine radar with terrain indicators such as HAND and perform local validation using in-situ ground and UAV observations.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 13	DUT	Y (DUT)	Month 9	36 months	D4.6
Project title	Detecting human-made flood protection structures through machine learning			Related to WP	WP4

Objectives: Flood extent and depth are strongly dependent on the presence of human-made flood protection structures, e.g. dikes and levees. However, large scale flood risk simulations typically lack information on these structures. The only global database with information on flood protection (FLOPROS) contains state-level estimates of protection standards, but no spatially explicit information on the location of structures, their properties, and their current (maintenance) condition. If such a database were to exist, it could be implemented in global flood models, revolutionising our ability to simulate floods globally. **Therefore, ESR 13 will develop a globally scalable and transferable method to detect human-made flood protection structures by using multi-platform, multi-sensor aerial imagery. This will be achieved by**: (1) developing a Bayesian network algorithm that estimates the presence of human-made structures through machine learning techniques (e.g. linear feature detection using convolutional neural networks) and proximity indicators (e.g. proximity to flat terrain, water bodies); (2) testing its applicability at different scales by performing Bayesian belief probability estimation; (3) establishing a height estimate using either radar interferometry or multi-temporal optical (photometric stereo); and (4) applying the algorithms on two diverse regions with different dike characteristics. Once developed, the ESR will integrate the data into GLOFRIS to assess the improvement and examine how this can be used in the design of sustainable solutions.

Expected results: (1) Globally scalable and transferable method to detect human-made flood protection; (2) Insight in usefulness of multi-sensors in detecting human-made structures; (3) Proof of concept in two case study areas; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): (1) DRES (M17-20): scaling of machine learning techniques on Google Earth Engine; (2) DLR (M24-28): application across several satellite platforms. Given proximity of the host to DRES (<5 mins.), the ESR can spend time at DRES as needed.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 14	DLR	Y (VUA)	Month 9	36 months	D4.7
Project title	Improved exposure characterisation of buildings using machine learning			Related to WP	WP4

Objectives: Large scale flood risk models represent exposure using aggregated datasets of land use and population. These do not provide data on the location of individual buildings or their characteristics (e.g., building type, use, height of first floor). The accuracy of large-scale flood risk estimates could be vastly improved by integrating information on such characteristics. So far, airborne and satellite remote sensing data have proven useful for generating such datasets, but are not automatic and require trained operators, thus strongly limiting their practical applicability. Novel sources of information, such as geotagged pictures

from 360° cameras (e.g. Google Street View or Mapillary) or drone imagery offer an opportunity to improve these methods. **Therefore, ESR 14 will develop innovative and globally scalable and transferable methods for accurately and reliably characterising building type, use, and height. This will be achieved by**: (1) developing a novel method that exploits very high spatial resolution (VHR) drone/satellite imagery to automatically estimate building height using machine learning algorithms; (2) developing a method that extracts building use and type from ground-based 360° camera imagery combined with VHR satellite/drone data using deep learning algorithms; and (3) applying the method to several case studies and benchmarking the results against in-situ information. Once developed, the ESR will integrate the new data into GLOFRIS to examine how this can be used in the design of sustainable solutions.

Expected results: (1) Novel methods to automatically extract building type, use, and height; (2) Maps of these building characteristics for several test cases; (3) Qualitative and quantitative accuracy assessment for the case studies; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s):(1) VUA (M11-12 & 26-28): to determine characteristics and indicators relevant to global risk analysis and integrate results in GLOFRIS; (2) NASA (M15-18): to develop machine learning algorithms for deriving characteristics from satellite imagery.

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR 15	UTU	Y (UTU)	Month 9	36 months	D4.8
Project title	Scalable methods to integrate local knowledge in flood vulnerability mapping			Related to WP	WP4

Objectives: Most large-scale flood risk models represent vulnerability in a highly simplified way, almost exclusively using generic 'depth-damage functions'. However, this approach lacks contextual information that would allow for more realistic mapping of different dimensions of vulnerability. Research is urgently needed to improve the integration between automated methods of vulnerability mapping and local knowledge. **Therefore, ESR 15 will develop integrated methods for mapping and upscaling flood vulnerability information using local knowledge, multi-resolution imagery, and deep learning algorithms**. **This will be achieved by**: (1) developing and testing scalable participatory (PGIS) and volunteered (VGIS) methods to collect contextual information related to flood vulnerability in built environments (training data, identification of contextual proxies); (2) developing integrated methods to link contextual data with multi-source and multi-resolution imagery and deep learning algorithms; (3) applying the methods and validating the results in several case studies; (4) scaling the approaches to national, regional and global levels. Once developed, the ESR will integrate the data into GLOFRIS to assess how this can be used to design sustainable solutions.

Expected results: (1) Flood vulnerability maps; (2) Integrated methods and algorithms for combining VGIS data, imagery, and machine learning algorithms; (3) New estimates of national to global flood vulnerability for use in GRAF; (4) 3-4 scientific papers and 1 PhD thesis.

Planned secondment(s): (1) UoP (M12-14): to design of VGIS/PGIS campaigns; (2) NASA (M15-18): to develop methods for the integration of contextual data with image data sets and deep learning methods.

3.2 Appropriateness of the management structures and procedures

3.2.1 Network organisation and management structure

The success of REVOLUTION will depend to a large extent on the management of the project and the structure and procedures to enable this. The Coordinator is Prof. Philip Ward, VUA. He has coordinated a large number (~30) of national and international collaborative research projects and/or work packages, including projects funded by scientific funding bodies (e.g. Netherlands Organisation for Scientific Research; H2020 – IMPREX; FP7 - Earth2Observe), industry, and non-industry institutions (e.g. World Bank, UN, Dutch Ministries, World Resources Institute). He is currently member of the Management Committee of EU COST Action DAMCOLES and is appointed by the United Nations as member of the Expert Group of UNISDR's Global Risk Assessment Framework. In 2019 he will receive the European Geosciences Union **Plinius Medal**, a prestigious award recognising **outstanding research achievements in fields related with natural hazards**, specifically with DRR applications.

VUA is highly experienced at coordinating and managing large EU training networks and research training projects, including Marie Skłodowska-Curie ITNs (Section 5.1) and summer schools, is member of the Climate-KIC training network, and hosts the director of the SENSE research school - a joint venture of Dutch universities for multidisciplinary PhD training on sustainability. VUA has an extensive set of structures and procedures in place to ensure the successful management and delivery of the training programme, scientific quality of the research, and effective dissemination and communication. Overall management and coordination are carried out in WP6. A schematic overview of the proposed management structure is presented in Fig. 3.2a. Three levels of management are distinguished: (1) day-to-day management; (2) decision making; and (3) advice and monitoring. Day-to-day management is the responsibility of the Project Office at the Coordinating Institute and the Executive Board at Consortium level. During ESR recruitment (M1-8), a Recruitment Committee will coordinate the ESR recruitment process (Section 3.2.3). The Supervisory Board (SB) is the decision-making body of REVOLUTION. Internal advice and monitoring are provided by the SB, whilst external advice and monitoring is provided by the Advisory Board.

Coordinating Institute and Project Office: VUA employs a dedicated Project Office (PO) consisting of the Coordinator, a dedicated Project Manager (PM) (financed via ETN, costs category 'management and overheads'), and a project support office. Under responsibility of the Coordinator, the PM will execute **all daily administrative, legal and financial issues** concerning the whole project and will be in direct contact with representatives of the European Commission (EC). The Coordinator and PM are assisted by the project support team, including a financial controller and secretary. The financial controller assists in monitoring the budget and financial reporting to the EC and is available to consortium partners for financial/budget questions. Together, the PO ensures financial management and distribution of budget as agreed in the Consortium Agreement. Furthermore, the PO has dedicated service units to provide expert legal, administrative, and financial advice and support, including: a Technology Transfer Office, the Grants Desk, and the Project Control and Administration Office.

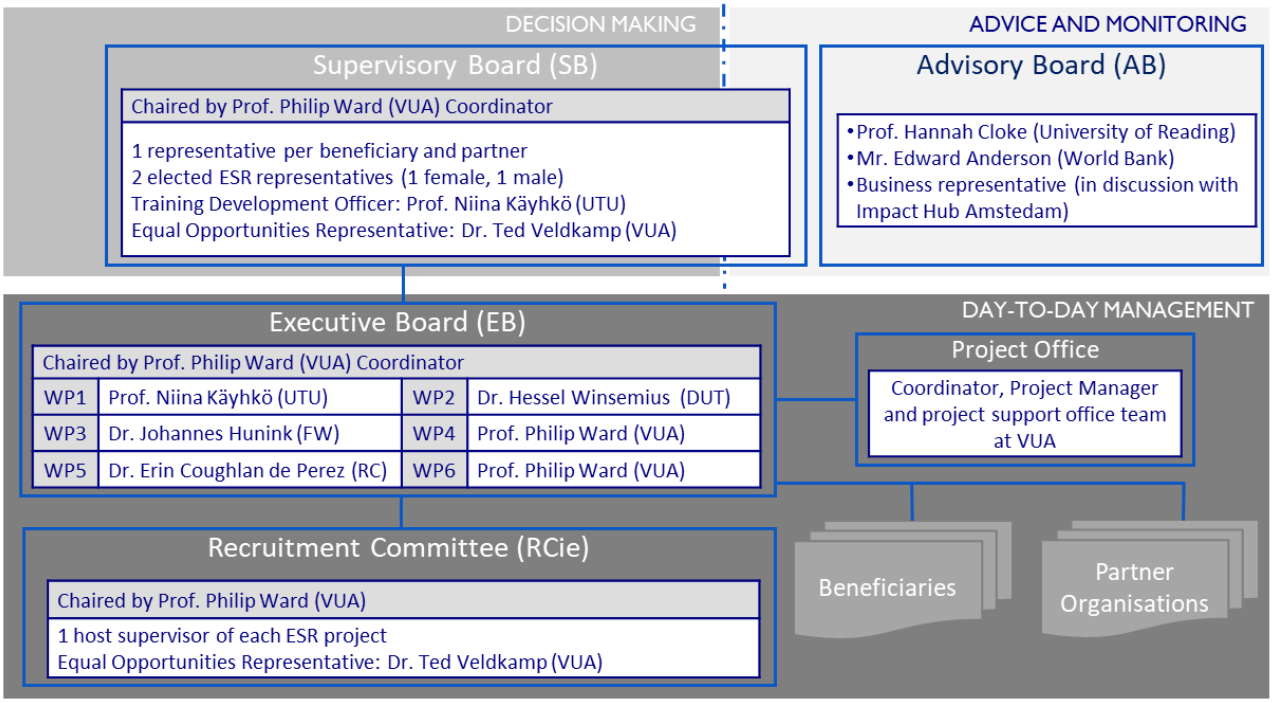


Figure 3.2a: Overview of management structure

Executive Board (EB): The EB consists of the WP leaders and is chaired by the Coordinator. Each WP leader coordinates the work performed in her/his WP, and reports to the Coordinator. The EB acts as the **central management team** of REVOLUTION. Specific tasks include: preparation and organisation of management meetings; drafting reports and associated documents and forms for the EC; monitoring inter-WP alignment; and progress of activities and deliverables, based on the defined milestones and means of verification. In case contingencies occur, the EB will advise the Supervisory Board (SB) on any corrective measures. The EB will meet at least bi-monthly. Most meetings will be telephone/video conferences, with in person meetings during the start-up and kick-off meetings, milestone training events, and final conference. The in-person meetings precede the in-person SB meetings. Additional meetings can be convened upon written request by any EB member to the chair.

Supervisory Board: see Section 3.2.2.

Advisory Board (AB): An AB will be appointed to provide regular **external expert advice** on the quality of the deliverables and suggest corrective measures if necessary. The AB has no formal decision power and the AB members are independent. The AB includes representatives from science, policy and decision-making, and business. The science member is **Prof. Hannah Cloke**, Professor of Hydrology at University of Reading. She has vast experience in research and PhD training related to flood and drought risk across scales, and holds the prestigious Plinius Medal for her outstanding interdisciplinary research in natural hazards. The policy and decision-making member is **Mr. Edward Anderson**, Senior Digital Development and Resilience Specialist at the World Bank. He has over 15 years of experience linking the application of new technologies to development practice. A **business representative** will be appointed in discussion with Impact Hub Amsterdam, if the proposal is retained for funding – several candidates have been identified already and expressed their willingness to participate.

Communication and project meetings: To be effective as a large collaborative network, sound internal communication is essential. The REVOLUTION website will include a collaborative working platform to provide the appropriate tools for exchanging and archiving information internally in an effective and user-friendly way. The network will meet periodically both face-to-face as well as through telephone/video conferencing, to discuss matters and exchange information in depth; these meetings are summarised below.

Table 3.2.1b: Overview of REVOLUTION meetings and their characteristics

Body	Frequency	Prep	Method and scope
Supervisory Board	M9,14,25,36,45	EB	Face-to-face; formal accord on progress reporting to EC, decisions affecting Consortium Agreement and/or EC contract, dissemination and exploitation, dispute resolution.
Executive Board	Bi-monthly	Coordinator	Face-to-face & teleconference; research and training coordination, overall progress of WPs towards objectives, inter-WP alignment, scientific discussions, reporting to SB.
All	M9,14,25,36,45	EB	Face-to-face meetings (during kick-off, milestone training events, and final conference); exchange of scientific data with focus on ESRs and sharing information between WPs.
WP Teams	Frequent	WP leaders	Face-to-face & teleconference; WP progress, intra-WP alignment.
Recruitment Committee	M1,2,3,5	RCie members	Teleconference; coordination of recruitment procedure; eligibility check during pre-screening of applications; approval of final ESR selection.

3.2.2 Supervisory board (SB)

The SB is chaired by the Coordinator and consists of 1 representative per beneficiary and partner organisation, 2 elected ESR representatives (1 female, 1 male), and the REVOLUTION Equal Opportunities Representative, Dr. Ted Veldkamp (F) (Section 3.2.7). A Training Development Officer, Dr. Niina Käyhko, will ensure consistency in supervision and monitor supervision quality. The SB will meet in-person at the kick-off meeting, milestone training events, and final conference. Video/teleconferencing facilities will be organised to allow participation of any SB member unable to attend in person. Extraordinary meetings can be convened upon written request by any SB member to the Coordinator. The primary responsibility of the SB is to **oversee the quality** of the programme and **review the progress** of all aspects of REVOLUTION.

The SB is the **internal advisory body** for contingencies, disruptions, or disputes, and is responsible for adjusting the work plan if necessary. The SB will formulate a strategy on **scientific misconduct**, detailing notification, confidentiality, and assessment of any allegation of misconduct as well as consequences for researchers and institutions. This will be discussed with ESRs during a research integrity course at the kick-off meeting (Table 1.2b).

In addition, the SB has specific **decision-making responsibilities** in the allocation of financial resources, formal accord on progress reporting to the EC, and any decisions affecting the Consortium Agreement and/or EC contract. In principle, decisions are made by consensus. If no consensus can be reached, decisions will be made by simple majority vote. Each SB member has one vote, and in case of split decisions the Coordinator has the casting vote.

3.2.3 Recruitment strategy

The recruitment strategy will strictly follow the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers. An initial recruitment round will aim to have all ESR contracts signed by M6 (MS3, Table 3.1c), thus leaving time for a second round if required (until M8; D6.3; Table 3.1b). This ensures that all ESRs can take part in the kick-off meeting (M9) and all training events. To ensure that the process guarantees global access and a fair, efficient, transparent and competitive selection of ESRs, and to assure gender equality, the process will be coordinated by a Recruitment Committee (RCie). The RCie includes one of the host supervisors of each ESR (including the Training Development Officer), plus the Equal Opportunities Representative. The RCie consists of members from both academic and non-academic sectors, and a variety of disciplines and countries. The RCie has a good gender balance, 6 females and 8 males. The recruitment process will be organised as follows:

Announcement of positions: Advertisements will be published in various recruitment databases of international scientific journals and organisations; internet portals including the EC jobs portal (http://ec.europa.eu/euraxess) and Academic Jobs EU portal (http://www.academicjobseu.com/); the REVOLUTION website; presentations and networking at relevant meetings and conferences (e.g. EGU); and REVOLUTION beneficiaries and partners own websites. For each ESR position, there will be a designated contact person at the host beneficiary. She/he responds to informal enquiries and is responsible for further promoting the post through appropriate professional networks.

Advertisements will include:

- A broad description of knowledge, skills, and competencies required, including the requirements of holding a Master's degree and evidence of competence in English. It will be made clear that candidates will work in transdisciplinary science, and that their research and training will be guided by our 3 guiding principles;
- Description of working conditions and entitlements - all ESRs receive employment contract and social coverage;
- Career development prospects related to the programme and its benefits to the researchers;
- A description of the recruitment process.

Pre-selection of candidates: Candidates will apply for a specific ESR project by submitting their CV, motivation letter, 2 letters of reference, and academic credentials. The RCie will check the eligibility of candidates using a standardised form with checklist developed by the RCie, with input from the Human Resources Department of VUA. All eligible applications will be made available to the ESR Supervisory Teams.

Final selection: After the pre-selection phase, interviews will be undertaken at the host beneficiaries. All interview appointments will be communicated to the RCie in advance. Interviews will be conducted by (at least) the ESR Supervisory Team and a PhD student / junior researcher at the host beneficiary. Interviews will include a presentation of recent research of the candidate and their vision/ideas for addressing the ESR project. Following the interviews, a ranking and shortlist will be forwarded to the SB, who will approve the selection of each ESR. This will allow for monitoring of a good overall gender balance. Candidates will be selected based on their scientific background and potential as indicated by their education, experience and Master's thesis; motivation and expected benefit to the project as described in the letter and interview; and in accordance to gender equality and minority rights. Special requirements for an acceptable work/family life balance will be taken into account.

3.2.4 Progress monitoring and evaluation of individual projects

To monitor and evaluate the progress of each ESR project, the following procedures will be in place:

Supervision welcome meeting: held in the first week of employment, between the ESR and her/his Supervisory Team. Objectives are to: make the ESR feel welcome and safe at the host beneficiary and part of the REVOLUTION team; explain the ESR expectations and relevant REVOLUTION formalities; decide upon the appropriate supervision approach; and introduce the ESR to the Personal Career Development Plan (PCDP).

PCDP: Each ESR will write a PCDP, which includes a detailed supervision plan, training plan, dissemination plan, and PhD outline (problem statement, aims and objectives, methods, expected results, milestones, dissemination and exploitation plan). A template will be developed by the EB, coordinated by the Training Development Officer. PCDPs will be submitted for internal review in M12. Each PCDP will be reviewed by 2 experienced researchers from beneficiaries/partner organisations not involved in the Supervisory Team of the ESR. Final versions of the PCDP will be approved by the SB in M14. The PCDP forms the basis for the monitoring and evaluation of progress.

Supervision meetings: Informal monthly progress meetings between ESR and ESR Supervisory Teams. These meetings take place at the host beneficiary, or at secondment institutions during secondment periods, with video conferencing facilities to ensure attendance of all members of the Supervisory Team. These meetings aim to provide scientific discussion and advice throughout the project, and to monitor progress on a regular basis to ensure that delays are minimised.

Formal evaluation meetings: Two formal evaluation meetings will be held per year between ESR and ESR Supervisory Teams. ESR progress will be appraised against the PCDP, and where appropriate this will be adapted. Based on these meetings, the main supervisor will submit a half-yearly written progress report to the EB. A standard format for these progress updates will be developed by the EB.

Progress monitoring at consortium level: At consortium level, progress on individual projects is monitored by the EB, using the half-yearly written progress reports described above. The ESRs will report in written form and in presentation form to the REVOLUTION community, the SB, and the AB, during the consortium meetings.

3.2.5 Risk management at consortium level

The consortium has profound experience in collaborative research and training projects, and all beneficiaries and partners have their own risk management procedures. Examples of types of risks specific to implementation of REVOLUTION are summarised in Table 3.2a, together with mitigation measures. Risks and mitigation measures specifically related to achieving the envisaged impacts (including exploitation) are described in Section 2.5. The management and monitoring procedures described in Sections 3.2.1, 3.2.2, and 3.2.4 ensure that problems can be identified early, and rectified at the appropriate level. In REVOLUTION, we take a bottom-up hierarchical approach to risk mitigation and eventual problem/conflict resolution, using the hierarchy of ESR Supervisory Team → WP → SB. The hierarchical level at which an emergent risk, problem, or conflict arises will have the responsibility to solve it. Only when this is not successful, will it be transferred to the next higher level.

Table 3.2a: Implementation risk

Risk No.	Description of risk	WP no.	Proposed mitigation measures
R1	ESR recruitment risks: e.g. delay in ESR recruitment or ESR terminates contract.	2-4, 6	A structured, efficient recruitment process managed by a dedicated Recruitment Committee (Section 3.2.3) reduces risk of delayed recruitment. Moreover, an initial and second round of recruitment are planned, ensuring adequate time to have all ESRs started by the kick-off (M9). RCie will begin developing advertisement texts and procedures prior to official project start date. ESR Supervisory Teams all experienced in mentoring young researchers, and structured supervision framework and monitoring allows us to detect problems early and offer remedial support, thereby reducing risk of contract termination. All ESR projects designed to avoid critical dependence between projects.
R2	Supervision risks: e.g. ESR supervisor terminates contract.	2-4	Each ESR has a Supervisory Team, including 2 supervisors at host beneficiary, so that supervision continues in the event of 1 supervisor leaving project. Moreover, beneficiaries and partners have experienced staff who can quickly take over supervisory roles in this eventuality.
R3	Consortium-composition changes and risks: e.g. WP lead terminates contract.	1-6	Key staff (e.g. WP leads) have been selected for expertise in specific elements and complementary skill-sets. Nevertheless, the consortium includes other expert staff members with similar skills who are willing to take over key roles. All beneficiaries and partners experienced in multi-year projects and have their own strategies in place to mitigate risks of staff changes.
R4	Scientific risks related to data, challenges with implementing research plan, etc.	2-4	The close supervision of ESRs in the Supervisory Teams allows for early identification of scientific risks. Experienced scientists and staff at all beneficiaries and partners will support problem solving and/or adjusting research plan. Our LL-approach, which includes local stakeholders, is designed to mitigate the risk of data availability.
R5	Scientific risks related to equipment, e.g. drone permits, or vandalism and theft.	2-3	We will collaborate with local stakeholders who already hold permits for specific equipment, e.g. drones. We mitigate the risk of vandalism and theft of instruments by using mobile equipment where possible, or installing permanent equipment on locations that are secure. Eventual replacement costs will be low as we aim to use low-cost materials and prototypes.
R6	Political risks related to Tanzania activities, e.g. civil unrest or other	1,2,5	Tanzania is known to be relatively politically stable, although there have been incidents of terrorism, particularly in Zanzibar. Local media and international government travel warnings will be monitored for any signs of unrest. In the unlikely event that travel is deemed unsafe, we will assess another location where

	safety issues prevent travelling.		community mapping is increasing to pilot our methods, particularly focusing on the open cities initiative of the World Bank.
R7	Training risks relating to programme not providing all skills required by ESRs.	1	Milestone training events cover main topics relevant to ESRs, as identified with stakeholders and potential employees. Still, some ESRs will require specific skills not covered in these events. To mitigate this: each ESR is linked to research school of her/his PhD-granting university, which offer specific courses; ESRs can follow courses at beneficiaries/partners outside her/his host institute; and we supply ESRs with catalogue of online training resources. Where emerging skills are required by clusters of ESRs, REVOLUTION includes option to develop Wildcard training events (Section 1.2.1).

3.2.6 Intellectual Property Rights (IPR)

Protection and exploitation of results receive high priority, supported by the experienced Innovation Exchange Amsterdam (IXA) at VUA. IPR will be on the agenda of all SB meetings. IPR and confidentiality issues (i.e. publications, licensing, patents, exploitation) will be addressed in the Consortium Agreement based on the DESCA Model. Prior to the start of REVOLUTION, all beneficiaries and partners will negotiate and sign the Consortium Agreement, which considers how to treat the Background (information held by the beneficiaries and partners prior to their accession to the Grant Agreement), the ownership of Foreground (results generated within the project) and access rights. To stimulate a smooth collaboration in the development of methods and tools between commercial and non-commercial beneficiaries and partners, the Consortium Agreement will include both research (e.g. publication and joint development) and commercial interests (staying ahead of competition, discouraging copying behaviour by commercial thirds). The consortium has much experience with this, especially through the private sector/consultancy participants (FW, FTags, C2S, VAI, DRES, DLR) and VUA's IXA, for example through: (1) using different licenses for different modules within the software; (2) releasing model code with a time-lapse (only upon actual publication of software); (3) updates of software (that are not published) released under a different license. A detailed dissemination and communication plan (D5.2) will be developed in WP5, under the obligations and agreements set out in the Consortium Agreement. **As the main science objective of REVOLUTION includes *new scientific methods, tools, and information that are spatially scalable and geographically transferable*, we expect large potential for exploitable results and IP; examples are described in Section 2.3.2.**

3.2.7 Gender aspects

In promoting equality between females and males in science, REVOLUTION will strictly operate according to Equal Opportunities. This will be supervised by the REVOLUTION **Equal Opportunities Representative**, Dr. Ted Veldkamp (F). She is Assistant Professor at VUA, and an extremely high potential early career researcher in the field of drought risk. She is highly involved in REVOLUTION, and supervisor of ESR10. Being an early career researcher in a competitive scientific field, Dr. Veldkamp is ideally placed to act as role model for the ESRs, and will check compliance with gender requirements. To lend credence to our efforts to increase equal opportunities, all beneficiaries have an active institutional equal opportunities policy and an excellent track record in this area. For example, several beneficiaries have been recognised with various accolades related to gender (Athena Swan Bronze) and LGBT (Stonewall Diversity Champion) issues in the workplace. ESR Supervisory Teams will provide specific mentoring on the issues faced by female researchers in an effort to reduce the loss of women from academic careers. Our Equal Opportunities Representative will support them in this, by ensuring that the ESR Supervisory Teams make female ESRs aware of local schemes available to support female researchers.

Involvement of female senior staff: Two out of five (40%) WP leaders are female (WP1, Niina Käyhko; WP5, Erin Coughlan de Perez), as are the Training Development Officer and Equal Opportunities Representative. The scientists in charge are female at 44% of beneficiaries, and 35% of host supervisors are female. The planned members of the SB are 40% female. Hence, the number of females in lead positions is around the target of 40% as declared in the Council Resolution on Science and Society. To further raise gender awareness, we will put emphasis on inviting female keynote speakers to all events. This substantial involvement of female scientists and professionals will encourage female ESRs to engage in the flood and drought risk research and application world, which has traditionally seen more male employees.

Level of recruitment: Decisions on ESR recruitment will be made on the basis of merit regardless of marital status, age, sexual preference, social class, race, religion or family circumstances. Language in advertisements will be carefully considered so as to not discriminate. All shortlisted ESR candidates will be discussed and selected by the RCie at a joint meeting, which allows monitoring of a good overall gender balance. Given the past experience of the beneficiaries in recruiting PhD candidates in fields related to REVOLUTION, we expect an equal balance between female and male ESRs to arise naturally. We aim to have **at least** 40% of female ESRs, and this will be overseen by the RCie, which includes our Equal Opportunities Representative.

Implementation: Disasters have been shown to differentially impact women and marginal groups for numerous reasons, such as level of education, caregiving responsibilities, and domestic violence. Thus, gender aspects must be considered throughout REVOLUTION research in terms of types and methods of data collection and design of solutions. Consideration of gender aspects in disasters will be delivered through a training course during the kick-off meeting (Table 1.2b).

3.2.8 Data Management Plan

REVOLUTION will participate in the open access to research data pilot. This includes taking measures to make research data FAIR (findable, accessible, interoperable, and re-usable). The consortium will ensure **free and open access** to all scientific publications relating to its results. At a minimum, they will be available by archiving in a repository at the time of publication ('green' model). A **Data Management Plan (DMP)** will be prepared by M5 (D6.2), and updated during the project by the EB, subject to approval by the SB. At least the following points will be addressed:

Data set description: We will at least collect/generate: **geographical data** as digital maps – these can be raw data that we collect or use from secondary sources (e.g. satellites, radar); processed data that we generate from the raw data (e.g. maps of levees, building heights, Digital Elevation Models) or output of models (e.g. flood and drought risk maps); **observations** of states of physical systems, such as river levels, groundwater levels; raw and processed data from **online media**; qualitative and quantitative data from **citizen science** approaches and **interviewing**.
Standards: to increase interoperability and re-use, the DMP will use existing standards for different datasets. For example, for computer simulations NetCDF files following CF conventions are preferred, since they are platform independent and meta-data are self-contained. For GIS analyses, GeoTIFFs with appropriate metadata are preferred for raster data, and geoJSON/Shapefiles for vector data. Version control and metadata standards will be described.
Data sharing: the leading principle of REVOLUTION in providing open access to research data is "*as open as possible, as restricted as necessary*". This will be facilitated by the use of Creative Commons licences. If access cannot be granted to specific parts of the research data, the DMP will clearly specify the reason.
Archiving and preservation: During the research, non-sensitive data will be archived within existing infrastructures of the consortium, for example all of the supercomputing facilities available to the consortium have dedicated archiving facilities. Where possible, open data will be published as an integral supplement of peer-reviewed papers. Where the journal does not have this option, open data will be stored in long term data archives, such as DANS (https://dans.knaw.nl/en), with an associated Digital Online Identifier (DOI). Sensitive anonymised data can be stored on secure servers with encryption, through use of University systems.

3.3 Appropriateness of the infrastructure of the participating organisations

VUA's Institute for Environmental Studies (IVM) is the oldest environmental research institute in The Netherlands and one of the world's leading institutes in sustainability science. The main infrastructural requirement of the project is access to state-of-the-art computer facilities, model code, and software. All of our academic organisations, plus several of our non-academic organisations, have access to in-house high performance computing facilities (HPC) (Section 5) and support teams. Moreover, the consortium includes a dedicated supercomputing centre (BSC-CNS) and 2 aeronautics and space agencies (DLR; NASA), with huge HPC facilities, support, and experience. Given the large spatial datasets to be used in REVOLUTION, we will also use Google Earth Engine computational resources (discussed already with Google). Several consortium members are highly experienced with this platform, are integral to the Google Earth Engine community, and will provide training to the ESRs (e.g. DUT, C2S, DRES).

Key data, model code, and software required for the ESRs are also developed and housed at our consortium organisations. Selected examples are GLOFRIS at VUA (ESR11-15); TAGGS at FTags (e.g. ESR4,8,11); OpenDataKit at HOT-OSM (e.g. ESR2,5,10,11,15); satellite data algorithms of FW, C2S, NASA, JRC, and DLR (e.g. ESR4,6,11,12,14); hydrological data at UKRI and CHS (e.g. ESR6,7,10); and hydraulic modelling software of DRES (e.g. ESR1,2,3). Our partnership with JRC gives unrivalled access to the European Drought Observatory, European Flood Awareness System, and Copernicus Emergency Management System. The success of the community mapping projects requires an active and extensive network of mappers and engagement from local communities. This is facilitated by collaboration with HOT-OSM, which maintains a permanent mapping team in Tanzania; and RC, who can mobilise communities at local level as well as local Red Cross institutions.

For training courses, appropriately equipped training labs are available, and the consortium is composed of organisations with an excellent reputation and successful experience with supervision of PhDs, proven by their previous involvement in various research and training programmes (Section 5). All organisations have support staff who can assist the ESRs with administrative and logistical issues.

3.4 Competences, experience and complementarity of the participating organisations and their commitment to the programme

3.4.1 Consortium composition and exploitation of participating organisations' complementarities

REVOLUTION includes all types of organisations in the so-called quadruple helix of social innovation, namely: academic, private sector, non-governmental and (intra)governmental. From the academic sector, we include both universities and university-affiliated organisations (VUA, UTU, DUT, UoB, ARU, UoP, BSC-CNS), as well as non-

university research institutions who perform a wide range of non-academic activities in the private/policy domain (DLR, UKRI, JRC, DRES, NASA). We also include private sector companies (FW, FTags, C2S, VAI), NGOs (RC, HOT-OSM), and governmental agencies ranging in scale from regional (CHS) to intragovernmental (UNISDR). The SMEs involved (FW, FTags, C2S) have extensive experience in research and training, and FW has successfully coordinated WPs in several H2020 projects (e.g. IMPREX & BRIGAID). Through collaborations with their sister offices in several countries, FW can provide the ESRs with an even broader network.

We also ensure high complementarity between different expertises. These are detailed in Section 5, and Table 3.4a gives an overview of some core expertises per organisation, showing the large spread across the consortium. Our ESR supervisors include staff who are experts in a wide range of fields, including: hydrology, risk science, physical and social geography, geoinformatics, economics, social science, citizen science, engineering, water resources management, computer science, statistics, mathematics, and many more.

Table 3.4a. Complementary expertise of the partners of the REVOLUTION consortium

Expertise	VUA	UTU	DUT	FW	RC	UoB	DLR	ARU	UoP	FTags	C2S	VAI	HOT-OSM	UKRI	JRC	DRES	NASA	BSC-CNS	CHS	UNISDR
Societal outreach					x		x		x	x	x		x	x	x	x	x		x	x
Entrepreneurship		x		x						x	x	x								
Participatory science		x			x			x	x	x			x							
Citizen science	x	x	x		x	x		x	x				x							
Socio-hydrology		x				x										x				
Water risk and resource management	x		x	x	x	x		x						x	x	x			x	x
Hydrological/risk modelling	x	x	x	x		x			x					x	x	x		x	x	
Geospatial data processing	x	x	x	x		x	x	x	x		x			x	x	x	x			
Machine learning	x		x				x			x	x	x					x	x		
Large, new datasets & processing	x		x	x			x			x	x	x		x	x	x	x	x		

All of the consortium organisations have **successfully collaborated in past research and training projects** with at least one of the other REVOLUTION organisations, including several joint PhD supervisions; prominent examples can be found in Section 1.4.2. However, REVOLUTION brings them all together in a truly unique and synergetic new network, which will facilitate the development of new technologies that could not been achieved in past collaborations – examples can be found in Section 1.4.2. The setup of REVOLUTION ensures that we can exploit these complementarities and synergies in an effective way. Examples include: (1) teams of ESRs and organisations working together on shared aims and objectives in WP2-4; (2) ensuring that all ESRs spend secondments (and short visits) in different sectors to their host beneficiary, and in organisations with different expertise; and (3) ESR Supervisory Teams comprised of supervisors with different expertise all involved in the supervision process from start to end, i.e. co-supervisors are an integral part of the team, and their input is explicitly not limited to the secondment period.

3.4.2 Commitment of beneficiaries and partner organisations to the programme

Beneficiaries will recruit either 1 or 2 ESRs and provide secondments to **at least** 1 ESR (Table 1.2a). In doing so, they provide 2 supervisors for each ESR that they host, and 1 co-supervisor for each secondment ESR (Table 3.1.4). All partners will provide secondments (and co-supervisors) to **at least** 1 ESR (Table 1.2a). The only exception is UNISDR, who are not involved in research, but play a secretariat role to the Sendai Framework. Hence, their involvement is in training and co-hosting research workshops for WP4. All beneficiaries and partners are able to offer the opportunity for short research visits to ESRs, where this is mutually beneficial to the ESR, organisation, and REVOLUTION. All beneficiaries **and** partners have designated a representative to the SB.

All beneficiaries and partner organisations will contribute actively to the network-wide training events (Table 1.2b). Moreover, they will all contribute to the research workshops in the WPs in which they are involved – host institutes of the research workshops are stated in Table 3.1a (descriptions of WP2-4). **The commitment of partner organisations is declared in Letters of Commitment** (Section 6) and is further guaranteed by the fact that we specifically co-create new methods and tools to address their needs, and develop innovative science to support and improve initiatives and frameworks that will exist after the lifetime of REVOLUTION, e.g. EDO and Copernicus Emergency Management Service (JRC), GRAF (UNISDR), and Ramani Huria (HOT-OSM).

4 EID specific requirements

Not applicable to ETN submission

5 Participating Organisations

5.1 Beneficiaries

Beneficiary 1: Stichting VU (VUA)	
General description	Academic research and education at VU Amsterdam (VUA) are characterised by a high level of ambition, and encourage free and open communication and ideas. In 2016, VUA hosted approximately 22,000 students and over 2,500 scientific staff. The total research output in 2016 translated to over 3,900 scientific publications, and 271 doctoral theses. The proposed research will be coordinated by the Department of Water and Climate Risk (WCR) of the Institute for Environmental Studies (IVM), which is part of VUA's Faculty of Science. IVM is a world-leader in large scale flood and drought risk research, and its staff have published ~15 papers in Nature or Science journals in the last 5 years on these issues. IVM is also a world-leader in sustainability science, with VUA being ranked fourth in the Environmental Studies section of the Centre for World University Rankings. Our focus is on solution-oriented research, in which we aim to work together with leading academic and non-academic partners to achieve solutions to environmental issues. We regularly collaborate with institutes including UNISDR, OECD, World Bank, FAO, Red Cross, Dutch Ministries, the Netherlands Environmental Assessment Agency, and companies including (re)insurance companies, FutureWater, FloodTags, and Cloud to Street. IVM is involved in education and training from Bachelors to PhD level, as well as professional training.
Role and commitment of key persons (incl supervisors)	**Prof. Philip Ward** (M) is Full Professor in Global Water Risk Dynamics and Head of IVM's Global Water and Climate Risk department. He is at the forefront of global flood and drought risk science and training. In 2019 he will be awarded the highly prestigious EGU Plinius Model for his outstanding multidisciplinary in the field of natural hazards research. He is visiting researcher at Deltares and Columbia University. He has been granted and led almost 30 research projects from national and international science agencies, (intra)government bodies, and private funding agencies. He is in the Management Committee of EU COST Action DAMOLCES (2018-2022) and has led WPs and tasks in several EU projects, such as IMPREX, eartH2Observe, and RISES-AM. He leads a 5-year VIDI project in the Netherlands on compound flood risk; this is one of the most prestigious grants of the Dutch national science funding agency (NWO). He is appointed by the United Nations as member of the Expert Group of UNISDR's Global Risk Assessment Framework. Prof. Ward is/has been supervisor to 17 PhDs. He is the principal REVOLUTION Coordinator, and leads WPs 4 and 6, is main supervisor of ESR11, and co-supervisor (and PhD-granting supervisor) of ESR14 (20% full time equivalent (fte) time involvement). **Prof. Jeroen Aerts** (M) is Full Professor in Risk and Water Management, and has managed projects exceeding €20 million. He is/has been supervisor to 37 PhDs. He is main supervisor of ESR10 and co-supervisor of ESR8 (10% fte). **Dr. Ted Veldkamp** (F) is an extremely high-potential young tenure-track Assistant Professor, pioneering the field of large-scale drought risk assessment. She is currently supervisor to 3 PhDs. She is supervisor of ESR10 and will act as REVOLUTION Equal Opportunities Representative (8% fte). **Dr. Dim Coumou** (M) is Associate Professor in extreme weather and climate variability. He is/has been supervisor to 10 PhDs, and has managed many international research projects. He is co-supervisor and PhD supervisor of ESR9 (5% fte). **Dr. Hans de Moel** is Assistant Professor in flood risk management and adaptation, and leads a Work Package in H2020's IMPREX project. He has extensive experience in education, and is/has been supervisor to 8 PhDs. He is supervisor of ESR11 (5% fte).
Key research facilities, infrastructures and equipment	VUA is member of the SENSE research school, meaning that ESRs will have access to the large range of courses across a large number of Dutch universities. Research infrastructure available includes state of the art computer equipment, including solutions for storing data, version management, and servers dedicated for research purposes. We collaborate with the national eScience centre and have access to the High Performing Computing facilities, expertise, and technical support of SURFsara, which is a collaborative ICT organisation for Dutch education and research.
Status of research premises	Research premises owned by VUA and independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	In FP7, VUA acquired close to 220 grants across all pillars and priorities, among which 70 as coordinator. A total of 54 Marie Skłodowska-Curie grants were obtained out of FP7, of which 27 training networks. IVM was coordinator of several FP7 projects relevant to this grant, including ENHANCE; and has played a major role in many relevant FP7 projects, including the GREENCYCLESII and GATEWAYS ITNs, as well research projects including RISES-AM, eartH2Observe, TURAS, CONHAZ, and ECONADAPT. Prof. Ward was granted the most prestigious early-career personal research grant in the Netherlands (VENI) by the Netherlands Organisation for Scientific Research (NWO) in 2010. He led an international project in Jakarta to train young scientists on flood risk assessment and management.
Current involvement in research and training programmes	In Horizon 2020, VUA has acquired approximately 130 grants across all pillars and priorities, among which around 45 as coordinator. A total of 37 Marie Skłodowska-Curie grants were obtained in 2014-2018, of which 15 ITNs, including COUPLED. IVM is currently involved in H2020 projects including IMPREX, which examines the use of forecasts in risk reduction. IVM has framework contracts related to climate change and sustainability with DG CLIMA and DG ENV (EU Water Policy), and Prof. Ward is part of the Management Committee of EU Cost Action DAMOCLES, which examines the impacts of compound extremes on society. Prof. Ward, Dr. Coumou, and Prof. Aerts have all been granted either the most prestigious mid-career (VIDI) or advanced (VICI) personal research grants in the Netherlands by (NWO). VUA's IVM is a core member of the SENSE research and graduate training school, and a member of the Climate-KIC Education programme.
Relevant publications and/or research / innovation products	• **Aerts, J.C.J.H.** et al., 2018. Integrating human behaviour dynamics into flood disaster risk assessment. *Nat. Clim. Change*, 8, 193-199 • De Bruijn, J.A., **De Moel, H.**, Jongman, B., **Wagemaker, J.**, **Aerts, J.C.J.H.**, 2018. TAGGS: Grouping Tweets to Improve Global Geoparsing. *J. Geovis. Spat. Anal.*, 2, 2; *and related www.globalfloodmonitor.org* • **Veldkamp, T.I.E., Aerts, J.C.J.H., Ward, P.J.**, et al., 2017. Water scarcity hotspots travel downstream due to human interventions in the 20th and 21st century. *Nat. Commun.*, 8, 1-12 • **Ward, P.J., Aerts, J.C.J.H.**, et al., 2017. A global framework for future costs and benefits of river-flood protection in urban areas. *Nat.Clim. Change*, 7, 642-646; *& Global Flood Analyzer (www.wri.org/floods)* • **Ward, P.J.**, **Coughlan de Perez, E.**, **Winsemius, H.C.** et al., 2015. Usefulness and limitations of global flood risk models. *Nat. Clim. Change*, 5, 712-715

Beneficiary 2: Turun Yliopisto (UTU)	
General description	The University of Turku (UTU) is an internationally competitive research-led university whose operation is based on high-level research. UTU offers study and research opportunities in seven faculties: Humanities, Science and Engineering, Medicine, Law, Social Science, Education, and Turku School of Economics; and in seven independent units: Brahea Centre of UTU, Centre of Language and Communication Studies, Finnish Centre for Astronomy with ESO, Research Unit for the Sociology of Education (RUSE), Turku Centre for Biotechnology, Turku Centre for Computing Science (TUCS), and Turku PET Centre. In the international QS ranking, UTU is among the top 300 universities in the world and is ranked third best university in Finland (QS Ranking 2018). UTU has almost 20,000 students and 3,271 staff members (59% female). External funding covers 37% of the total funding of 262 million euros. The total research output in 2017 was 5850 scientific publications, 170 doctoral theses, 1557 Masters and 1708 Bachelor theses.
Role and commitment of key persons (incl supervisors)	**Prof**. **Niina Käyhkö** (F) is Associate Professor in Digital Geospatial Research, Head of UTU Geospatial Resources and Head of UTU Tanzania Research Team. She is also Adjunct Professor in Landscape Geography. She is expert in geospatial land change analysis, participatory GIS methods and geospatial training. She has led around 20 research, education, business and development cooperation projects and has 15 years of research and geospatial competence development experience in Tanzania. Prof. Käyhkö is/has been supervisor to 7 PhDs. She leads WP1 and is main supervisor of ESR5 and 15, and is REVOLUTION's Training Development Officer (18% fte). **Prof. Petteri Alho (M)** is Professor in Floods and Fluvial Processes and Head of the Fluvial Research Group at UTU. He has had Adjunct Professorships in Hydrogeography and Remote Sensing Applications in Hydrology. He has project management responsibilities in >15 collaborative national and international research projects. He is/has been supervisor to 11 PhD/DrSc students. He has also been board member in national VALUE Doctoral Program. He is co-supervisor and PhD supervisor to ESR3 and 12 (10% fte). **Dr. Elina Kasvi** is an expert in fluvial geomorphology and riverine processes, close range remote sensing methods (Lidar, photogrammetry, acoustic methods), and computational modelling. She is/has been supervisor to 1 PhD. She is supervisor of ESR5 (5% fte). **Dr. Carlos Gonzales Inca** is an expert in environmental modelling, spatio-temporal analysis, image processing and machine learning algorithms. He is supervisor of ESR15 (5% fte).
Key research facilities, infrastructures and equipment	Geospatial research and education facilities at UTU consist of digital laboratories and units equipped with hardware and software, which are linked into centralised IT management and services. Our facilities provide the backbone for geospatial research and teaching, where the Department of Geography and Geology is the leading unit. At the department, we have a GIS teaching class with 34 workstations with most common GIS- and image processing software installed (both OS and most common proprietary software). We also have a geospatial modelling lab equipped with 6 powerful workstations, including double monitors and one planar stereo-monitor. Besides laboratories, we utilise a wide range of equipment ranging from RIEGEL VZ-400 Terrestrial Laser Scanner and Trimble TSC3 controller with R8 GNSS receiver to handheld GPS devices, field laptops, and drones. All of this equipment is owned by UTU and available for ESRs without any cost.
Status of research premises	All the above listed facilities and equipment are owned by UTU and available for ESRs without any cost. Research premises are owned by UTU and independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	In FP7, funding for UTU amounted to €31 million with 88 projects, of which UTU coordinated 10. Within FP6, UTU participated in 48 projects. A total of 10 grants were acquired from Marie Skłodowska-Curie funding, and 6 from the European Research Council. Prof. Käyhkö has been PI in multiple Research and Higher Education Capacity Development projects since 2003 in Tanzania with local universities, with funding from the Academy of Finland and Ministry for Foreign Affairs of Finland. She is a founding member and UTU representative in the Finnish University Network in Geoinformatics, where 7 universities cooperate on research and education. Prof. Alho has been PI of several flood modelling and risk related projects with national science and business funding since 2007 (e.g. FINFLOODS; FLOODAWARE; GIFLOOD; RivChange). He has also been a board member of the national flood related graduate programme VALUE.
Current involvement in research and training programmes	In H2020, UTU has secured 42 projects including 5 ERC projects and 11 Marie Skłodowska-Curie (3 IF, 6 ITN, and 1 NIGHT). UTU coordinates 3 consortiums and is partner in 22 consortia. UTU is a Copernicus Academy member, member of EARSeL and AGILE and Geo4All networks. Prof. Käyhkö is senior expert in a Finnish National Research Infrastructure (FIRI) funded project OGIIR, where open geospatial research infrastructure is being developed for Finland (2017-2019). She is PI of a large five university-wide Higher Education Capacity Development project GEO-ICT in Tanzania (2017-2020) and PI of a World Bank funded capacity development project (2018-2020) with the same universities (UDSM, ARU, SUZA, SUA). She is also a PI of three other research and business-related projects in Tanzania (ZAN-SDI, GESEC, SUSLAND), and a PI of Baltic Sat Apps Interreg-project (2018-2020), where Copernicus Satellite Data uptake and business innovations are promoted in the Baltic Sea Region. Prof. Alho is PI from UTU in a large strategic research funding consortium COMBAT, where disruptive technologies of 3D digitalisation, robotics, geospatial information and image processing are developed for a Point Cloud Ecosystem. He is also senior expert in Dam Safety Technology project (2017-18).
Relevant publications and/or research / innovation products	• Koskinen, J., Leinonen, U., Vollrath, A., Ortmann, A., Lindquist, E., d'Annunzio, R., Pekkarinen, A., **Käyhkö, N**., 2019. Participatory mapping of forest plantations with Open Foris and Google Earth Engine. *ISPRS J. Photogramm.*, 148, 63-74 • Kukkonen, M., Muhammad, M.J., **Käyhko, N**., Luoto, M., 2018. Urban expansion in Zanzibar City, Tanzania: Analyzing quantity, spatial patterns and effects of alternative planning approaches. *Land Use Policy*, 71, 554-565 • Calle, M., **Alho, P.**, Benito, G., 2017. Channel dynamics and geomorphic resilience in an ephemeral Mediterranean river affected by gravel mining. *Geomorphology*, 285, 333-346 • Flener, C., **Alho, P**. et al., 2013. Seamless mapping of river channels at high resolution using mobile LiDAR and UAV-photography. Remote Sensing, 5(12), 6382-6407. • Fagerholm, N. **Käyhko, N**., Ndumbaro, F., Khamis, M., 2012. Community stakeholders' knowledge in landscape assessments – mapping indicators for landscape services. Ecol. Indic., 18, 421-433.

Beneficiary 3: Technische Universiteit Delft (DUT)	
General description	Delft University of Technology (DUT) is a Global Top 100 research and training intensive university aiming to make a significant contribution towards a more sustainable society. DUT conducts ground-breaking scientific and technological research that is acknowledged as world-class, training academic staff with a genuine commitment to society, and helps to translate knowledge into technological innovations and activity with both economic and social value. With nearly 480 fte scientific staff members, 4,800 students, and a budget of over €66 million, the Faculty of Civil Engineering and Geosciences is one of the largest of the eight faculties at DUT. The Faculty comprises six related scientific departments which also contribute to its two Bachelors and four Masters programmes. These departments include: Geoscience & Engineering; Geoscience & Remote Sensing; Hydraulic Engineering; Structural Engineering; Transport & Planning; and Water Management.
Role and commitment of key persons (incl supervisors)	**Dr. ir. Hessel Winsemius** (M) is Associate Professor at the Chair of Water Resources Management (WRM), and works on global to local scale understanding of hydrological flood processes and socio-economic risks. He has a wide network in Dar es Salaam including the Tanzania Red Cross Society, World Bank, and Dutch Embassy. He is/has been supervisor to 5 PhDs. He leads WP2, is main supervisor of ESR13, and co-supervisor of ESR12 (13%). **Dr. ir. Rolf Hut** (M) is Assistant Professor at WRM. He is Principal Investigator on the eWaterCycle and eWaterCycle II projects. He works on the combination of global hydrological modelling and designing innovative sensors for hydrology. He is/has been supervisor to 3 PhDs. He is main supervisor of ESR1 (5% fte). **Dr. ir. Marie-Claire ten Veldhuis** (F) is Associate Professor at WRM, and works on urban flood risk analysis using blended observations and modelling for improving predictions and early-warning services for urban pluvial floods. She has extensive experience in European research and innovation projects, including IA, RIA and ETN. She is involved in H2020_Insurance, working on improved rainfall information to support micro-insurance for farmers in Tanzania. She is/has been supervisor to 6 PhDs. She is co-supervisor and PhD supervisor to ESR4 (5% fte). **Dr. ir. Christian Tiberius** (M) is an Associate Professor at the Department of Geoscience and Remote Sensing. He has been involved in GNSS positioning and navigation research since 1991, with emphasis on data quality control, precise point positioning and applications of precision positioning at large scale. He is/has been supervisor to 7 PhDs. He is supervisor to ESR1 (5% fte). **Dr. ir. Oswaldo Morales Napoles** (M) is Assistant Professor of probabilistic design within the section of Flood Risks and Hydraulic Structures. His research interests are in development of methods for characterising multivariate probability distributions, uncertainty analysis, structure expert judgments and their applications mostly in science and engineering. During his tenure at the Netherlands Organisation for Applied Scientific Research he led a group of scientists around these subjects. He has collaborated with different institutions around the world such as the Harvard School of Public Health and the Mexican Institute of Ecology and Climate Change. He is/has been supervisor to 4 PhD researchers. He is supervisor to ESR13 (5% fte).
Key research facilities, infrastructures and equipment	WRM currently hosts >20 PhDs, supervised by >10 academic staff. The group has a culture of staff supporting each other, and each other's PhDs. Staff and PhDs are supported by the graduate school of DUT to make sure that PhDs receive both the scientific as well as personal support needed to grow. Staff collaborate routinely on large projects. WRM shares a physical lab with the hydraulic and sanitary engineering groups, giving WRM access to research equipment such as flumes, a full-fledged chemical analyses lab (including isotopes and spectography), and copious open space to develop first principal tests of novel measurement methods. WRM has experience with and availability of UAV equipment. Dr. ir. Hut has used this lab for previous work on sensor design and will continue to do so in this project. Through eWaterCycle II, we have access to and experience with the eScience centre HPC facilities under the support of SURFsara, the collaborative ICT organisation for Dutch education and research.
Status of research premises	The lab at Delft University of Technology is fully owned by DUT and independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	In FP7, DUT coordinated 107, and partnered in 313, awarded grants. Of specific interest to this project is the involvement of DUT in the "Switch-ON, Open Data for Water Resources" FP7 project and the leading role in the H2020 BRIGAID (BRIdging the Gap for Innovations in Disaster resilience) projects. Furthermore, the "Water and Weather Monitoring Services for Ghana's Cocoa region: Innovative weather sensoring and information services for local farmers", funded by Netherlands Organisation for Scientific Research (NWO), highlights DUT's expertise in both sensor design and successfully implementing novel sensor solutions to the benefits of relevant local stakeholders.
Current involvement in research and training programmes	DUT has acquired 260 grants within the H2020 framework of which 75 are Marie Skłodowska Curie projects (of which 33 IFs and 33 ITNs). Especially relevant to this proposal is the work carried out in the TWIGA project (Transforming Water, Weather and Climate Information through In Situ Observations for Geo-Services in Africa), which is led by WRM's head, Prof. Dr. Ir Nick van de Giesen.
Relevant publications and/or research / innovation products	• **Winsemius, H.C.**, Jongman, B., **Veldkamp, T.I.E.**, Hallegatte, S., Bangalore, M., **Ward, P.J.**, 2018. Disaster risk, climate change, and poverty. *Environ. Dev. Econ.*, 23, 328-348 • **Donchyts, G.**, Baart, F., **Winsemius, H.C**, Gorelick, N., Kwadijk, J., **Van de Giesen, N. C.** et al., 2016: Earth's surface water change over the past 30 years. *Nat.Clim. Change*, 6(9), 810-813 • **Hut, R.**, Tyler, S., **Van Emmerik, T.**, 2016: Proof of concept: temperature-sensing waders for environmental sciences. *Geosci. Instrum. Method. Data Syst.*, 5, 45-51 • **Winsemius, H.C.**, **Aerts, J.C.J.H.**, **Ward, P.J.**, 2015. Global drivers of future river flood risk, *Nat. Clim.Change*, 6(4), 381-385; and related Aqueduct Global Flood Analyzer (www.wri.org/floods) • Van de Giesen, N.C., **Hut, R.** and Selker, J., 2014. The Trans-African Hydro-Meteorological Observatory (TAHMO). *WIREs Water*, 1, 341-348

Beneficiary 4: FutureWater SL (FW)	
General description	FutureWater (FW) offers high quality research and consulting services throughout the world to combine scientific research with practical solutions for water management. FW uses state-of-the-art, open-source quantitative methods for practical solutions in water resource assessments. The company was founded in 2002 and has offices in Spain and the Netherlands. FW is closely linked to leading universities and research institutes, ensuring the use of the latest and most advanced techniques and tools for data management, hydrological simulation models, Geographic Information Systems, hydro-informatics, and Remote Sensing. FW works at the global, regional, national, and local levels with partners on projects addressing water for food, energy, irrigation, water excess, water shortage, climate change, and river basin management. Analysis and information products are used to assess impacts related to floods, droughts, irrigation, hydropower, and food production. A wide range of models is used, each selected to fit the specific assignment at hand – from strategic to operational decision making, and from field scale to global scale. Commonly used tools include water resource models, water allocation models, and the spatially distributed hydrological model SPHY, developed in-house. FutureWater has extensive experience on data mining, data organisation, translating data to knowledge, and transferring its knowledge through training sessions and capacity building. FW's technical and managerial capabilities have been proven by numerous projects that were completed successfully. Technical capabilities are demonstrated by the large number of consulting projects on modelling, data analysis, remote sensing, and climate change that were also published in scientific literature and high-quality reports.
Role and commitment of key persons (incl supervisors)	**Dr. Johannes Hunink** (M) is Managing Director of FutureWater SL in Spain. He is a hydrologist with 14 years' experience in decision support studies for water resources management. He has advanced skills in the use of simulation models and remote sensing for the impact evaluation of water investment portfolios, flood and drought mitigation interventions, and water-related ecosystem-services assessments. He is skilled in integrating large datasets and numerical tools to solve complex spatial problems. He has been project manager and/or leading analyst in a wide range of research and consultancy projects all around the world, including professional training. He is/has been actively contributing to the supervision of 3 PhDs. He leads WP3, is main supervisor of ESR9, supervisor of ESR8, and co-supervisor of ESR7 (15% fte). **Dr. Sergio Contreras** (M) is an ecohydrologist and drought and remote sensing expert with more than 10 years of career as researcher and consultant in water resources assessment, hydrological and water allocation modelling, and geomatic technologies. He leads the InfoDrought pilot project focused on the development and testing of a fully-integrated Drought Monitoring-Management System, and the Work Package on "Drought and Innovations" of the EU-H2020 BRIGAID project. He has actively participated in many international and Spanish research projects and contracts. He is/has been actively contributing to the supervision of 3 PhDs. He is main supervisor to ESR8 and supervisor to ESR9 (8% fte).
Key research facilities, infrastructures and equipment	FW's office in Cartagena, Spain, has fast computer facilities and support staff available to the ESRs. It also has a second office in Wageningen-Netherlands, with further experience in topics related to the proposed action. FW houses the spatially distributed hydrological model SPHY, developed in-house, and provides and hosts operational online services related to this action, as for example the drought portal www.infosequia.es.
Status of research premises	FW rents an office, which is independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	The drought monitoring and assessment system www.infosequia.eu FW developed was co-funded by a Torres Quevedo Grant of the Ministry of Economy of Spain, which allows integrating postdoc researchers in SMEs. FW has conducted and managed a large number of water-focused projects in Europe, Africa, Asia, and South America. Important clients and collaborators include River Basin Organisations, the World Bank, African Development Bank, Asian Development Bank, and National and Local Governments. Most of their consultancy assignments include a capacity component, often on water resources modelling, remote sensing data analysis, and agro-hydrological simulation models for impact assessments. Specific training programmes on these topics were organized for experts working at governmental organisations in Armenia, Kenya, Mozambique, Nepal and Gabon, among other countries.
Current involvement in research and training programmes	FW is currently a beneficiary in the ongoing SYSTEM-RISK ITN, with 1 ESR currently enrolled and supervised by senior staff members (in the Netherlands office). FW is also currently involved in 3 related H2020 projects. In IMPREX, FW leads the work package on drought and agriculture and evaluating the use of seasonal forecasts for a use-case in agriculture. In BRIGAID, FW leads the work package on drought, with the goal of supporting a wide range of drought-related innovations in bridging the gap between prototype and market uptake. In TWIGA, on the use of citizen science and earth observations, FW is researching the use of drones for applications in agriculture and other sectors in Africa and has trained many local operators and local staff in data processing and data management.
Relevant publications and/or research / innovation products	• García-León, D., **Contreras, S., Hunink, J.E.**, 2018. A comparison of meteorological and satellite-based drought indices as yield predictors of Spanish winter cereals. *Agr. Water Manage.*, 213, 388-396. • **Hunink, J.E.**, Eekhout, J.P.C., Vente, J.D, **Contreras, S.**, Droogers, P., Baille, A., 2017. Hydrological modelling using satellite-based crop coefficients: a comparison of methods at the basin scale. *Remote Sensing*, 9, 174 • Van den Hurk, B.J.J.M., **Hunink, J.E.**, **Ward, P.J**. et al.,2016. Improving predictions and management of hydrological extremes through climate services. *Climate Services*, 1, 6-11 • **Hunink, J.E.**, **Contreras,** Soto-García, M., Martin-Gorriz, B., Martinez-Álvarez, V., Baille, A., 2015. Estimating groundwater use patterns of perennial and seasonal crops in a Mediterranean irrigation scheme, using remote sensing. *Agr. Water Manage.*, 162, 47-56 • **Contreras, S.**, **Hunink, J.E.**, 2015. Drought effects on rainfed agriculture using standardized indices: A case study in SE Spain. In Andreu et al. (eds.) Droughts: Research and Science-Policy Interfacing, 65-70. CRC Press (Taylor and Francis Group). London.

Beneficiary 5: Stichting International Red Cross Red Crescent Centre on Climate Change and Disaster Preparedness (RC)	
General description	The Red Cross Red Crescent Climate Centre (RC) supports the Red Cross and Red Crescent Movement and its partners in reducing the impacts of climate change and extreme weather events on vulnerable people. RC works at the interface of science, policy, and practice, shaping research and international policy discussions on climate risk management. On the ground, RC provides practical support to Red Cross Red Crescent Societies in 191 countries, collaborating with governments, multilaterals, universities, and civil society. RC is pioneering a climate risk management strategy called Forecast-based Financing, which ensures humanitarian funding is available when there is a weather or climate forecast of a potential disaster. RC has supported the launch of a new international fund for forecast-based action, and is developing programmes in more than 16 countries to automatically trigger humanitarian action when forecasts indicate high risk of extreme events. Positively received at the Third UN World Conference on Disaster Risk Reduction and multiple Conference of Parties to the United Nations Convention on Climate Change, the humanitarian sector pledged to rapidly scale up its work on Forecast-based Financing during the World Humanitarian Summit in 2016. RC also supports the humanitarian and development sectors to address long term climate risk management, holding international roles as knowledge manager, communication, and dissemination, in the Building Resilience for Climate Extremes and Disasters (BRACED) programme, and climate risk partner in the Partners for Resilience Programme.
Role and commitment of key persons (incl supervisors)	**Dr. Erin Coughlan de Perez** (F) is RC's Manager of Climate Science and liaison at the International Research Institute for Climate and Society at Columbia University in New York, delivering real-time decision-making support in response to climate-related questions from humanitarians. She also designs participatory games for capacity building and climate change awareness and manages several projects, including forecast-based financing in Uganda and Togo. A major aspect of her work is the communication and dissemination of knowledge between scientists and practitioners. She holds a PhD in forecast-based financing. She has supervised 6 Junior Researchers since 2011. She leads WP5, is supervisor of ESR4, and co-supervisor of ESR5 (13% fte). **Dr. Maarten van Aalst** (M) is Director of RC, and holds adjunct appointments at the International Research Institute for Climate and Society at Columbia University, the Department of Science, Technology, Engineering and Public Policy at University College London, and the Overseas Development Institute in London where he co-chairs the knowledge management group for the BRACED resilience programme. He also serves on the leadership team of the Partners for Resilience alliance, and on advisory boards of several major international research programmes on climate risk management. He is/has been supervisor to 2 PhDs. He is main supervisor of ESR4 (5% fte). **Sanne Hogesteeger** (F) is Technical Advisor at RC and is project coordinator for the Partners for Resilience programme. She has extensive communication and dissemination expertise and will provide technical support to WP5 (5% fte).
Key research facilities, infrastructures and equipment	RC has adequate facilities and infrastructure to host and support ESRs, including its own administrative staff and office with desks, meeting rooms, and phone booths. In addition, RC brings to the table its extensive network of Red Cross Red Crescent Societies in 191 countries. Partnerships can allow for staff or researchers to spend time in the office of a National Society, such as Tanzania Red Cross.
Status of research premises	RC rents an office, which is independent from other beneficiaries and/or partners
Previous involvement in research and training programmes	RC has hosted about 10 Junior Researchers per year since 2008, with more than 100 having passed through the programme in recent years. We have facilitated access to data in the humanitarian sector for the researchers to analyse data, and have enabled students to be hosted in practical settings around the world. Students have come from more than 40 universities around the world, and have continued on to work at the World Bank, universities, and governments, among other careers.
Current involvement in research and training programmes	RC is currently involved in several research and training programmes, including FATHUM and FRACTAL. This work includes the development of shock-responsive social protection systems, Reality of Resilience work around learning from climate extremes; a Climate and Weather Information Helpdesk; and facilitation of dialogue among scientists and disaster managers. RC works as part of the Knowledge Manager of the BRACED consortium and the SHEAR consortiums, leading dissemination and communication of research findings and brokering discussions with practitioners around the world. RC also holds a convening or leading role at several international conferences to disseminate and discuss research, including Understand Risk, Development and Climate Days at the UNFCCC COPs, and the FbF Dialogue Platforms.
Relevant publications and/or research / innovation products	• **Coughlan de Perez, E.**, Stephens, E., Bischiniotis, K., **Van Aalst, M.**, Van den Hurk, B., Mason, S., Nissan, H. and Pappenberger, F., 2017. Should seasonal rainfall forecasts be used for flood preparedness? *Hydrol. Earth. Syst. Sc.*, 21, 4517-4524. • Nissan H., Burkart K., **Coughlan de Perez E.**, **Van Aalst, M.**, Mason S., 2017. Defining and predicting heat waves in Bangladesh. *J. Appl. Meteorol. Climatol.*, 56, 2653-2670 • **Coughlan de Perez E.**, Van den Hurk B., **Van Aalst M.**, et al., 2016. Action-based flood forecasting for triggering humanitarian action. *Hydrol. Earth Syst. Sci.*, 20, 3549-3560 • **Coughlan de Perez, E.**, Monasso, F., **Van Aalst, M.**, Suarez, P., 2014. Science to Prevent Disasters. *Nat. Geosci.*, 7, 78-79**Coughlan de Perez E.**, Mason S., 2014. Climate Information for Humanitarian Agencies: Some Basic Principles. *Earth Perspectives*, 1, 11

Beneficiary 6: The University of Birmingham (UoB)	
General description	Founded in 1900, the University of Birmingham (UoB) is one of the leading research-based universities in the United Kingdom; the breadth of research expertise is a distinctive characteristic of the University. The last UK Research Excellence Framework in 2014 confirmed that 87% of the University's research has global reach, meaning it is recognised internationally in terms of its originality, significance, and rigour. Birmingham is 79th in the 2019 QS World University Rankings, cementing our position in the top 100 universities globally and placing us 14th out of the 24 Russell Group universities to feature in the ranking. UoB has extensive experience of EU collaboration and partnerships and in-depth expertise of Framework Programme matters including management, reporting, and auditing. The School of Geography, Earth and Environmental Sciences is internationally renowned for its research and teaching on all aspects of drought from hydro-climatological causing factors to hydrological responses, from ecological impacts to sustainable management. The newly established UNESCO Chair of Water Science at UoB aims to develop a transformative approach to tackle such 'wicked water problems'. The chair's focus is on research underpinning sustainable water management, especially of hydrological extremes such as floods and droughts. We collaborate with leading academic and non-academic partners including UNESCO, the Environment Agency, and NGOs in developing countries. UoB and the School of Geography, Earth and Environmental Sciences are actively involved in education and training from undergraduate to graduate level (see below).
Role and commitment of key persons (incl supervisors)	**Dr. Anne Van Loon** (F) is Senior Lecturer in Physical Geography (Water Science) and is at the forefront of international drought research and training. She leads the International Association of Hydrological Sciences Panta Rhei group on "Drought in the Anthropocene" and is an active member of European Drought Centre and EURO-FRIEND Low Flow and Drought group. She is/has been supervisor to 6 PhDs. She is main supervisor of ESR6, supervisor of ESR7, and co-supervisor of ESR10 (13% fte). **Dr. Rosie Day** (F) is a Senior Lecturer in Environmental Human Geography working across disciplinary boundaries. Her work focuses on public and community understanding of environmental change, risk perception, and using different forms of knowledge in environmental management. She is/has been supervisor to 11 PhDs. She is main supervisor of ESR7 and supervisor of ESR6 (8% fte).
Key research facilities, infrastructures and equipment	Infrastructure available at UoB includes state of the art computer equipment, including a High Performance Computing (HPC) cluster, powerful interactive virtual machines for compute or data intensive work, secure EU data law compliant dropbox-type facilities for collaboration both on and off campus, storage for 'work-in-progress' data, including a facility for groups with exceptionally large requirements to purchase extra capacity, a cost effective and energy efficient archive for the long-term retention of completed research data.
Status of research premises	Research premises are owned by UoB and are independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	UoB has been involved in 315 FP7 projects; it is ranked 18th for project participation amongst Universities in FP7, according to the Commission's final FP7 monitoring report (2015). Within this, UoB has been involved in 112 collaborative projects (24 as lead), 31 MSC ITN (19 as lead), 82 MSC Fellowships, 17 ERC (14 as lead), and 73 other projects. Dr. Van Loon has received a prestigious early-career grant for research on the feedbacks between drought and human activities by the Netherlands Organisation for Scientific Research (NWO Rubicon grant) in 2014. She led the GCRF Building Resilience project 'CreativeDrought' (2017-18), of which Dr. Day was Co-I, and is involved in the NERC-funded 'Groundwater Drought Initiative' (2018-21). She is the UK-PI of two Newton Fund projects on Supporting Effective Drought Risk Management in Vulnerable Catchments of Chile and Peru (2017-19). Dr. Van Loon has developed international training programmes on drought, water management, and hydrological modelling in Chile, Turkey, Kenya, Iceland.
Current involvement in research and training programmes	In H2020, UoB is involved in 199 projects so far (July 2018) including projects in negotiation. Within this, UoB is involved in 57 collaborative projects (13 as lead), 25 MSC ITN (13 as lead), 72 MSC Fellowships, 27 ERC (22 as lead), and 18 other projects (8 as lead). Projects relevant to the current proposal include the MSC ITNs INTERFACES (led by UoB) and HypoTRAIN and MSCA-RISE project HiFreq. UoB is a leading UK university for the training of doctoral researchers. The School of Geography, Earth and Environmental Sciences leads the multi-partner NERC doctoral training programme CENTA with in total about 120 PhD students spread over 5 cohorts and 5 HEI and 3 NERC research centre partners.
Relevant publications and/or research / innovation products	• Rangecroft, S., Birkinshaw, S., Rohse, M., **Day, R.**, McEwen, L., Makaya, E., **Van Loon, A.F.**, 2018. Hydrological modelling as a tool for interdisciplinary workshops on future drought. *Prog. Phys. Geog.*, 42, 237-256 • **Van Loon, A.F.**, et al., 2016. Drought in the Anthropocene. *Nat. Geosci*., 9, 89 • **Van Loon, A.F.**, Kumar, R., Mishra, V., 2017. Testing the use of standardised indices and GRACE satellite data to estimate the European 2015 groundwater drought in near-real time. *Hydrol. Earth Syst. Sc.*, 21, 1947-1971 • **Day, R.**, Walker, G., Simcock, N., 2016. Conceptualising energy use and energy poverty using a capabilities framework. *Energ. Policy*, 93, 255-264 • Kumar, R., Musuuza, J.L., **Van Loon, A.F.**, Teuling, A.J., Barthel, R., Ten Broek, J., Mai, J., Samaniego, L., Attinger, S., 2016. Multiscale evaluation of the Standardized Precipitation Index as a groundwater drought indicator. *Hydrol. Earth Syst. Sc.*, 20, 1117-1131

Beneficiary 7: Deutsches Zentrum Fuer Luft- Und Raumfahrt EV (DLR)	
General description	The German Aerospace Center (DLR) is Germany's national research centre for aeronautics and space. Its extensive research and development work in aeronautics, space, transportation and energy is integrated into national and international cooperative ventures. Approximately 8000 people work for DLR at 40 institutes and facilities at 20 locations in Germany. In DLR, this project will be held by the German Remote Sensing Data Center (DFD), Land Surface Dynamics (LAX) department, which is responsible for Earth Observation (EO) data reception, archiving and dissemination as well as the operation of thematic user services. Research and development at DFD covers all domains of remote sensing of the Earth and DFD is developing procedures and information systems to meet urgent challenges caused by global change and human impact. Among the 6 teams composing the DLR-DFD LAX department, the Smart Cities and Spatial Development team will be responsible for supporting REVOLUTION. In particular, the team: (1) is at the forefront of the research in urban remote sensing; (2) develops remote sensing methods and information products to support a sustainable management of urban areas and cultural landscapes; and (3) is involved in the definition and design of EO systems and missions as well as extensive R&D works for sustainable urban development, land management, physical urban structure analysis, vulnerability, energy, urban climate, and quality of life.
Role and commitment of key persons (incl supervisors)	**Dr. Eng. Mattia Marconcini** (M) is project manager and research scientist in the Smart Cities and Spatial Development team at DLR-DFD Land Surface Dynamics Department. He received B.S. and M.S. degrees in telecommunication and engineering, and a Ph.D. degree in information and communication technologies from the University of Trento, Italy, in 2002, 2004, and 2008, respectively. Between 2004 and 2008 he worked in the Remote Sensing Laboratory of the Department of Information Engineering and Computer Science at the University of Trento. From 2008 to 2012 he was Research Fellow and Technical Officer at the European Space Agency. He is/has been supervisor of 3 PhDs. He is the main supervisor of ESR12 and 14 and co-supervisor of ESR13 (13% fte). **Dr. Annekatrin Metz** is research scientist in the Smart Cities and Spatial Development team at DLR-DFD Land Surface Dynamics Department. She received the Diploma degree in geography at the Dresden University of Technology in 2009 and the PhD degree in Remote Sensing and Natural Science at the University of Osnabrueck in 2016. She has been involved in several FP6, FP7, H2020 and ESA projects and has vast experience in remote sensing. She has supervised many master students and is supervisor of ESR12 and 14 (5% fte).
Key research facilities, infrastructures and equipment	At DLR-DFD two large-scale infrastructures are available, namely a Calvalus cluster system and the "Geofarm". The DLR Calvalus Cluster consists of 50 compute nodes with 32 GB RAM each and 1 quad-core Intel Xeon 3.4 GHz CPU, and a distributed file system with 700 TB. The GeoFarm is a private cloud system dedicated to the specific needs of a development and processing environment for geo-scientific information products based on EO data in combination with terrestrial observations. Within the next 2 years the system will encompass 4300 cores, 33TB RAM, 1.9PB SATA, 100TB SAS and 8TB SSD. In addition, the setup also includes human resources for coordination, integration, configuration and virtualisation of the environment. DLR owns, among other things, licenses for the use of ERDAS Imagine, TRIMBLE eCognition Developer/Architect, the ArcGIS suite, Exelis ENVI and IDL.
Status of research premises	Research premises are owned by DLR and are independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	The Smart Cities and Spatial Development team at DLR has been involved in several national and international projects. Among these, the most relevant include: H2020 URBANFLUXES (2015-2018) aimed at the analysis of cities' warming by exploiting EO data; FP7 DECUMANUS (2013-2015) aimed at the provision of EO-based products to city managers in support to the implementation of climate change adaptation and mitigation strategies; FP7 geoland2 (2008-2012) aimed at the operational mapping of urban areas using TerraSAR-X (Euroland) and the Seasonal and Annual Change Monitoring (SATChMo); ERA.NET RUS GEOURBAN (2013-2014) aimed at Demonstrating the ability of EO systems to depict parameters of urban structure and environmental quality; OPUS GMES (2013-2017, funded by the Bavarian Ministry of Economic Affairs and Media, Energy and Technology) aimed at the development and demonstration of concepts for implementing high-performance access to Sentinel data streams; and DELIGHT (2012-2015, funded by the German Federal Ministry of Education and Research) aimed at the identification and development of strategies for sustainable development of urbanised areas in the Yellow River Delta (China).
Current involvement in research and training programmes	The Smart Cities and Spatial Development team at DLR is currently involved - among others - in the following key projects: H2020 ECoLaSS (2016-2019) aimed at developing several prototypes of new or enhanced Copernicus Land services making full use of dense time series of SAR and optical Sentinel EO data; ERA-NET Sen4Rus (2016 - 2019) aimed at developing a set of indicators by exploiting the Copernicus Sentinels in support of urban and peri-urban planning; ESA Urban Thematic Exploitation Platform (2015-2022) aimed at fostering the use of ICT technologies and services to bridge the gap between the technology-driven EO sector and the needs of urban and environmental science, planning, and policy.
Relevant publications and/or research / innovation products	• Cian, F., **Marconcini, M.**, Ceccato, P., Giupponi, C., 2018. Flood depth estimation by means of high-resolution SAR images and LiDAR data. *Nat. Haz. Earth Syst. Sci. Discus.*, doi:10.5194/nhess-2018-158 • Cian, F., **Marconcini, M.**, Ceccato, P., 2018. Normalized Difference Flood Index for rapid flood mapping: Taking advantage of EO big data. *Remote Sensing of Environment*, 209, 712-730 • Esch, T, **Metz, A.** et al., 2018. Digital world meets urban planet – new prospects for evidence-based urban studies arising from joint exploitation of big earth data, information technology and shared knowledge. *Int. J. Digit. Earth.*, online first doi:10.1080/17538947.2018.1548655. • Chrysoulakis, N., **Marconcini, M.** et al., 2014. A conceptual list of indicators for urban planning and management based on Earth observation. *ISPRS Int. Geo-Inf.*, 3, 980-1002 • **Marconcini, M.**, Marmanis, D., Esch, T., Felbier, A., 2014. A novel method for building height estimation using TanDEM-X data. *Proceedings of the 2014 IEEE International Geoscience and Remote Sensing*

Beneficiary 8: Ardhi University (ARU)	
General description	Ardhi University (ARU) is a Public University engaged in research and training at all levels. It is a multidisciplinary university that also has a nationally and regionally unique set of research and training programmes in spatial data, land administrations, and the built environment. It thus serves as a regional centre of excellence in these sciences. It was a constituent of the larger University of Dar es Salaam until 2006. ARU has a current enrolment of over 4000 students and over 400 academic staff. Since 2010 it has awarded 31 PhDs degrees ARU has ongoing collaboration and research funding from the Swedish government through the Sida support, the Word Bank through the Ministry of Education and Vocational Training, the Royal Government of Norway through its Royal Norwegian Embassy in Dar es Salaam and the European Commission under its various framework programmes. Others include the Australian Agency for International Development (AUSAID); the United States Agency for International Development (USAID); the National Environment Research Council (NERC) of United Kingdom and the Danish International Development Agency (DANIDA). For the past five years an average of over 70 peer reviews publications have been obtained annually, as well as 2 registered patents.
Role and commitment of key persons (incl supervisors)	**Prof. Ally Namangaya** (M) is a senior lecturer and Professor and Dean of the School of Spatial Planning and Social Sciences, which operates the Resilience Academy jointly with The World Bank. He is involved in citizen mapping sciences, alternative data capturing technologies, and community and wider others engagement in research. He is/has been supervisor of 4 PhDs. He is supervisor of ESR3 and co-supervisor of ESR5, and will locally coordinate the activities of the project in Tanzania (10% fte). **Prof. Evaristo Liwa** (M) is Associate Professor in Geodetic Sciences and a Vice Chancellor. He recently focuses on drone mapping technologies. He is/has been supervisor of 5 PhDs. He is co-supervisor of ESR1 and 2 (5% fte). **Dr. Joseph Mayunga** (M) is a disaster risk management specialist with high conversance with co-data creations, working with communities and institutionalising disaster risk management in research and practice. He is/has been supervisor of 5 PhDs. He is supervisor of ESR3 (5% fte).
Key research facilities, infrastructures and equipment	Infrastructure available at ARU includes state of the art computer equipment for data processing and a professional size drone. ARU has specialised geodetic laboratories in addition to environmental labs that serve also national research interests. Other facilities include survey equipment, ICT facilities, administrative support, and learning spaces.
Status of research premises	Research premises are owned by ARU and are independent from other beneficiaries and/or partners.
Previous involvement in research and training programmes	There are various recently completed research engagements in the area of resilience under Science, Technology and Higher Education Project (STHEP); Sida Research Support Programme; Climate Change, Impacts, Adaptation and Mitigation (CCIAM) programme; African Urban Risk Analysis Network and Water Resilient Green Cities in Africa (WGA).
Current involvement in research and training programmes	ARU operates the Resilience Academy, together with the World Bank, thereby offering excellent training required for addressing the pressing needs for 'future-ready' skill-sets of Africa's fast-changing disaster risks. In the area of resilience and disaster risks management the ongoing engagement include projects like Research and Innovation for Sustainable Land and Environmental Management for Inclusive Development" (STEM-ID); funded by SIDA, Governance and Planning of Resiliency Cities in East Africa (GOPLAREA): Funded by BMBF and DAAD, Germany Government; the Partners Enhancing Resilience to People Exposed to Risks – Universities (PERI PERI U); the European Commission supported projects (including Adapting to Climate Change in Coastal Dar es Salaam and Climate Change and Urban Vulnerability) and the World Bank Urban Resilience programme.
Relevant publications and/or research / innovation products	• **Käyhkö, N.**, William, C., **Mayunga, J.**, Makame, M.O., Mauya, E., Järvi, A., 2018. Building geospatial competences in Tanzanian Universities with open source solutions. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Science*, 42-44, W8. • **Kombe, W., Namangaya, A.**, 2016. Decentralisation and urban governance: trends and lessons from cities in Tanzania. In Gaesing, D.E., Inkoom, D., Kausel, T. (eds.) Decentralisation and regional development. Springer. • Mwakapuja, F., **Liwa, W.,** Kashaigili, J., 2013. Usage of indices for extraction of built-up areas and vegetation features from landsat TM image: a case of Dar es Salaam and Kisarawe peri-urban areas, Tanzania. *International Journal of Agriculture and Forestry*, 3, 273-283. • **Namangaya, A.**, Kiunsi R., Lupala, J., Malele R., 2012. Study on community initiatives in managing urbanization and risk accumulation processes: Lesson from Dar es Salaam, Tanzania. In Pelling, M., Wisner, B. (eds.) Disaster risk reduction: Cases from urban Africa. Routledge. • **Mayunga, J.S.**, 2009. Measuring the measure: A multi-dimensional scale model to measure community disaster resilience in the US Gulf Coast region. Texas A&M University.

Beneficiary 9: University of Portsmouth Higher Education Corporation (UoP)	
General description	The University of Portsmouth (UoP) gained university status in 1992 and is ranked highly for quality of teaching and student satisfaction, earning gold status in the UK Teaching Excellence Framework and ranked in the top 25 universities by the Guardian in 2019. UoP hosted approximately 24,000 students in 2018, of which 750 were postgraduate research students. There are approximately 1500 academic staff at UoP. The university has an ambitious research strategy focusing on creativity, innovation, cross-disciplinary themes, and benefits to society. Since 2017, UoP has generated over 2500 publications (journal articles, books, book chapters and conference proceedings). UoP also holds the European Commission Human Resources Excellence in Research Award and the Athena Swan Bronze Award; confirming our determination to identify and remove gender bias and ensure an inclusive culture that values all staff. There is a Research and Innovation Staff Development Programme that provides professional skills and career development workshops and events specially designed for staff undertaking research.
Role and commitment of key persons (incl supervisors)	**Dr. Faith Taylor** (F) is lecturer and researcher at UoP. She is lecturer in Geographic Information Systems and leader of the MSc unit in Applied GIS at UoP. Her research focuses on the themes of: (1) natural hazards; (2) geocomputational techniques; and (3) the Global South. She is particularly interested in developing methods to further our understanding of risk using low-cost techniques that are not data intensive. For example, developing simple spatial models of natural hazards using Free and Open Source Software (FOSS-GIS) and open, freely available data. She is also a co-founder of *Intrepid Explorers*, which is a platform to promote the value of field-based research in education and inspire others to do safe and impactful field research. She is/has been supervisor of 2 PhDs. She leads the UoP research team activities in REVOLUTION, is supervisor of ESR2, and co-supervisor of ESR15 (10% fte). **Dr. Philip Soar** (M) is a senior lecturer and Associate Head of Innovation at UoP's Department of Geography. He has extensive experience in teaching and training, having delivered training courses for the Environment Agency, Scottish Environment Protection Agency and the River Restoration Centre. He is/has been supervisor of 4 PhDs. He is main supervisor of ESR2 (5% fte).
Key research facilities, infrastructures and equipment	The Department of Geography within UoP (where the ESRs will be based) has the following relevant facilities: two dedicated computer laboratories with a suite of GIS software, a postgraduate research room, a laboratory and a suite of field equipment (e.g. UAV, surveying equipment, GPS etc.). There are three technicians in the department: one managing the laboratory, one managing the GIS software and one managing the field equipment and hardware.
Status of research premises	The UoP estate is approximately 0.14km^2 and is owned by the university and independent of other partners and beneficiaries.
Previous involvement in research and training programmes	UoP has been awarded 38 grants in FP7 and H2020, including 13 Marie Skłodowska-Curie Fellowships, 3 ITNs, 1 COFUND and 4 ERC grants. UoP is also involved in several Erasmus and Interreg projects. The following are those that are most relevant to this project. Firstly, the ESRC-DfiD funded Urban Africa Risk Knowledge (Urban ARK) (GBP£3 million, PI Mark Pelling, King's College London). On this grant, Dr. Faith Taylor lead two tasks and assisted with additional capacity-building activities with colleagues from NGOs and universities in Africa. Other relevant activities include: (1) training on DesInventar database establishment and data collection for Nairobi (Kenya) and Niamey (Niger); (2) training on free and open source GIS techniques for understanding urban infrastructure risk to multi-hazards - Training and capacity building was led by Dr. Faith Taylor and delivered to Save the Children Niamey; and (3) EGU funded (EUR 4000) workshop on teaching methods for natural hazards for high school teachers in Malawi. Also relevant is the GCRF funded "Why we Disagree about Resilience" project (WhyDAR) (GBP£200k, PI Mark Pelling, King's College London). This involved developing qualitative open source GIS techniques to capture coping strategies and resilience to flooding in informal settlements in Africa and Asia.
Current involvement in research and training programmes	UoP leads the UK's largest disaster response exercise SIMEX (http://simexseries.org/) to train first responders. UoP is coordinating a cross-disciplinary European consortium that has been awarded European funding for the Erasmus+ project: 3DTeLC: Bringing the 3D World into the Classroom: a New Approach to Teaching, Learning and Communicating the Science of Geohazards in the Terrestrial and Marine environments.
Relevant publications and/or research / innovation products	• Dodman, D., **Taylor, F.E**., et al., 2018. A Spectrum of methods for a spectrum of risk: generating evidence to understand and reduce urban risk in Sub-Saharan Africa, *Area*, online first, doi:10.1111/area.12510 • Borie, M., Ziervogel, G., **Taylor, F.E.,** Millington, J., Sitas, R., Pelling, M., 2018. Mapping (for) resilience across city scales: An opportunity to integrate data from the local and city perspectives? *In review* • **Taylor, F.E.**, Malamud, B.D., Freeborough, K. and Demeritt, D., 2015. Enriching Great Britain's national landslide database by searching newspaper archives. *Geomorphology*, 249, 52-68 • Minelli, A., Marchesini, I., **Taylor, F.E.**, De Rosa, P., Casagrande, L., Cenci, M., 2014. An open source GIS tool to quantify the visual impact of wind turbines and photovoltaic panels. *Environ. Impact Assess.*, 49, 70-78 • **Soar, P.J.**, Wallerstein, N.P., Thorne, C.R., 2017. Quantifying River Channel Stability at the Basin Scale. *Water*, 9, 133

5.2 Partner organisations

Partner 1: FloodTags (FTags)	
General description	FloodTags (FTags) analyses online media and user-generated content for water management and food security. Data sources include online news articles, blogs, forums, Twitter, Facebook public pages, and we connect to messengers such as WhatsApp and Telegram. We analyse these sources by using a mix of artificial intelligence, natural language processing, and combinations with external data sources, including satellite imagery. Applications comprise real-time and historic (trend) analysis for emergency flood response, water scarcity management, water conflict resolution, integrated water management, food security, and other water- and development related applications.
Key persons and expertise	**Jurjen Wagemaker** (M) is the founder and Director of FloodTags. He is an eentrepreneur with more than 15 years on-the-ground experience in water management in Bangladesh, Bolivia, Cambodia, China, Hungary, India, Indonesia, Mozambique, Netherlands, Nepal, Philippines, Tanzania, Thailand, Uganda, and the USA. His expertise includes project management, information systems, data business models, and international aid and collaboration. He has an MSc in Civil Engineering from DUT. He is co-supervisor of ESR8 and 11. He has large experience in supervising staff, and is currently involved in the joint supervision of PhD students with several universities in the Netherlands, including VUA. **Erkan Basar** (M) is a computer scientist with a focus on computational linguistics. He works on textual event information processing, mainly on event information extraction. He has experience with supervision of research (MSc students). **Tom Brouwer** (M) is an expert in geospatial and text data analysis, Python back-end development, and water management. Erkan and Tom will be involved in technical supervision of part of the ESR work.
Key research facilities, infrastructure and equipment	FTags has an office in the Hague, the Netherlands, where the ESRs can spend their secondments. The ESRs also have access to their cloud infrastructure, the existing databases of online media data (e.g. 100s of millions of flood-related tweets collected since 2014 and newspaper archives) and scripts for the analysis of this data.
Previous and current involvement in research and training programmes	FTags has been leading and participated in a wide range of projects and is continuously supporting various applications of its software around the world. Examples include real-time flood hazard monitoring with the Philippines and assisting the Tanzanian Red Cross with community mapping. For this, FTags organised workshops and training events to co-design and teach its users how to best use the platforms.
Relevant publications and/or research / innovation products	• Global Flood Monitor: www.globalfloodmonitor.org • De Bruijn, J.A., **De Moel, H.**, Jongman, B., **Wagemaker, J.**, **Aerts, J.C.J.H.**, 2018. TAGGS: Grouping Tweets to Improve Global Geoparsing. *J. Geovis. Spat. Anal.*, 2, 2 • **Brouwer, T.**, Eilander, D., Van Loenen, A, Booij, M.J., Wijnberg, K.M., Verkade, J.S., **Wagemaker, J.**, 2017. Probabilistic flood extent estimates from social media flood observations. *Nat. Hazards Earth Syst. Sci.*, 17, 735-747

Partner 2: Cloud to Street (C2S)	
General description	Cloud to Street (C2S) is the leading remote flood mapping and analytics system. Our technology is globally scalable and locally optimised for near real-time flood detection and analysing historic floods and flood patterns at a fraction of the time and cost of traditional methods. Founded by two female scientists in 2015 and designed specifically for scalable solutions, our research and systems have been used by national governments, the World Bank, German and French development agencies (GIZ and AFD), and others across 7 developing countries.
Key persons and expertise	**Dr. Beth Tellman** (F) is Chief Science Offer, and leads the science team and staff of C2S. She is a remote sensing scientist trained in hydrology and remote sensing of floods. She is co-supervisor of ESR11. She is experienced in supervising research staff, and currently oversees 5 full time science staff at C2S.
Key research facilities, infrastructure and equipment	C2S has office space in New York City, where the ESR can spend her/his secondment and gain access to data, code, and remote sensing platforms. This includes the world's largest database of historic flood events maps, and proprietary flood detection algorithms that leverage multiple optical and radar sensors with an average global accuracy of over 85%. A close team of scientists is employed for scientific discussions and so forth.
Previous and current involvement in research and training programmes	Development of the Global Flood Database (GFD), in a collaborative project with the Dartmouth Flood Observatory, funded by Google Earth. Projects to improve flood hazard mapping using scalable solutions in many locations on Earth (e.g. Senegal, India, Egypt, Argentina) in collaboration with agencies including the World Bank, Water Partnership Program, Autoridad del Agua, and Nile Basin Initiative. These include the preparation, conduction, and evaluation of co-design workshops and users training events.
Relevant publications and/or research / innovation products	• **Tellman, B.,** Sullivan, J.S., 2019. Global flood observation with multiple satellites. In Wu, H. et al., (eds.) Global Drought and Flood: Monitoring, Prediction, and Adaptation. Wiley (in press) • Schwarz, B., Pestre, G., **Tellman, B**., Sullivan, J., Kuhn, C., Mahtta, R., Pandey, B., Hammett, L., 2018. Mapping Floods and Assessing Flood Vulnerability for Disaster Decision-Making: A Case Study Remote Sensing Application in Senegal. In Mathieu, P.-P. & Aubrecht, C. (eds.) Earth Observation Open Science and Innovation. Springer • **Tellman, B.,** Bausch, J.C., Eakin, H., Anderies, J.M., Mazari-Hiriat, M., Manuel-Navarette, D., Redman, C.L., 2018. Adaptive pathways and coupled infrastructure: seven centuries of adaptation to water risk and the production of vulnerability in Mexico City. *Ecol. Soc.*, 23, 1, doi.org/10.5751/ES-09712-230101

Partner 3: Vaisala Oyj (VAI)	
General description	Vaisala´s (VAI's) products and services provide our customers with the means to influence and better understand their environment. We have two global business areas that develop, manufacture, and market innovative products and services for environmental and industrial measurement. The one participating to this project is Weather and Environment Business Area (WEA). WEA serves selected weather-dependent markets where accurate, real-time, uninterrupted, and reliable weather data are essential to run efficient operations or gain better situational awareness.
Key persons and expertise	**Mr. Markus Melander** (M) is Head of Business Development, computer vision R&D, and is the contact person and scientist in charge for the project and responsible for allocating resources for the training, supervision, and other resources. **Mr. Petri Hienonen** (M) will be the main VAI staff member involved in ESR supervision and training in this project. He has more than 6 years' experience in developing complicated computer vision solutions on operational level, and supervising junior staff. He will be co-supervisor to ESR3.
Key research facilities, infrastructure and equipment	VAI's computer vision R&D team consists of 9 persons. This development unit will host and provide needed help and support to accomplish set research targets. This includes the measurement equipment and data processing facilities required to fulfil the project of ESR3.
Previous and current involvement in research and training programmes	VAI has been involved in a large number of research and training projects, including projects funded by the European Commission. For example, they are partner in the ongoing DENSE project (aDverse wEather eNvironmental Sensing system), in which smart, reliable and cost-efficient sensing systems are being developed for assessing weather-conditions. They are also partner in the MIREGAS project, in which multi-wavelength sensors are being developed for gas sensing. VAI is partner observer in an ERA-LEARN Public-to-Public partnerships project on meteorology for humidity at high temperatures and transient conditions.
Relevant publications and/or research / innovation products	• **Hienonen, P.**, Lensu, L., **Melander, M.**, Kälviäinen, H., 2017. Framework for machine vision-based traffic sign inventory. *Image Analysis*, SCIA2017, 197-2018 • **Hienonen, P.**, Lensu, L., **Melander, M.**, Kälviäinen, H., 2017. Towards condition analysis for machine vision-based traffic sign inventory. In: Blanc-Talon, J. et al. (eds.) Advanced Concepts for Intelligent Vision Systems. *Proceedings of the 18th International Conference, ACIVS 2017, Antwerp, Belgium*, September 18-21, 2017, pp.212-224

Partner 4: Humanitarian OpenStreetMap Team US, Inc (HOT-OSM)	
General description	Humanitarian OpenStreetMap (HOT-OSM) is an international team dedicated to humanitarian action and community development through open mapping. We work together to provide map data which revolutionises disaster management, reduces risks, and contributes to achievement of the Sustainable Development Goals. HOT-OSM is involved locally, working in areas vulnerable to natural disaster, recovering after a disaster, or in economic transition. HOT-OSM tries to develop a local OpenStreetMap community and to create partnerships with local governments, researchers, and practitioners who can use and contribute to OpenStreetMap. These Initiatives on the ground include Dar es Salaam, Malawi, Togo, Senegal, Mongolia, Indonesia, and Haiti.
Key persons and expertise	**Mr. Tyler Radford** (M) is Executive Director of HOT-OSM, and also has oversight for the past 4 years on the implementation of the Ramani Huria flood-mapping and projections program, as part of the Tanzania Urban Resilience Project. As such, he plays an instrumental role in our engagement and co-design with stakeholders involved in community mapping in WP2. **Ivan Gayton** (M) is country manager for HOT-OSM Tanzania/Ramani Huria. He is a senior level humanitarian and technology professional with more than 15 years' experience in humanitarian and disaster contexts. He has ample experience in supervising staff, and will be co-supervisor to ESR1.
Key research facilities, infrastructure and equipment	HOT-OSM has served as the primary consultant for mapping for flood resilience in many countries and contexts and maintains a permanent team in Tanzania of 18 staff members, including graduates of ARU and University of Dar es Salaam.
Previous and current involvement in research and training programmes	HOT-OSM currently leads a large-scale initiative to conduct participatory mapping and data collection across Dar es Salaam. The mapping effort involves hundreds of local university students and partnerships with the Tanzania Red Cross to comprehensively map the entire flood-prone area of the city, capturing all key physical infrastructure. HOT-OSM collaborates on a USAID, Office of U.S. Foreign Disaster Assistance (OFDA) funded program together with other partners to support the Government of Indonesia's national disaster management agency. As part of the program, HOT-OSM designed and implemented an approach for comprehensively mapping key energy and drainage infrastructure as well as other facilities in Indonesia's two largest cities, Jakarta and Surabaya.
Relevant publications and/or research / innovation products	• Wagenaar, B.H., **Radford, T.**, et al., 2018. Developing a representative community health survey sampling frame using open-source remote satellite imagery in Mozambique. *Int. J. Health Geogr.*, 17, doi:10.1186/s12942-018-0158-4 • Ospina, A.V. (2018) Big Data for resilience storybook: Experiences integrating Big Data into resilience programming. Winnipeg: International Institute for Sustainable Development – *inputs from HOT-OSM* • Clark, C., Maron, M., Patel, D., **Radford, T.**, Soden, R., Uihol, P., 2016. Open Mapping for the Sustainable Development Goals. A practical guide to launching and growing open mapping initiatives at the national and local scales. Global Partnership for Sustainable Development Data, http://www.data4sdgs.org/resources/open-mapping-sdgs

Partner 5: United Kingdom Research and Innovation (UKRI)	
General description	The British Geological Survey (BGS) is a component body of the UKRI and is the UK's premier centre for earth science information and expertise. BGS is the component body that will be actively involved in REVOLUTION. It focuses on public-good science and research to understand earth and environmental processes. The Groundwater Science Directorate has 55 scientists working on hydrogeological monitoring, conceptualisation, risk assessment, environmental statistics, and climate impact science with a particular focus on groundwater extremes (droughts and floods).
Key persons and expertise	**Dr. John Paul Bloomfield** (M) is a Principal Hydrogeologist with more than 28 years' experience working on groundwater-related issues, in particular groundwater drought and environmental change. He has published over 50 peer-reviewed papers, and has large experience in collaborative projects with PhD students. For example, he is currently supervising 3 UKRI-funded PhD groundwater-related studentships. He is co-supervisor to ESR6. **Dr Laura Platt** (F) is BGS Science Grants and Studentships co-ordinator, and will provide practical and logistical support to the ESR prior to and during her/his secondment at UKRI.
Key research facilities, infrastructure and equipment	Access will be available to national groundwater level datasets and associated hydrogeological and geological metadata held by BGS (UKRI). The ESR will also have access to a range of groundwater modelling codes (both borehole and distributed modelling codes) and appropriate computing facilities to run the codes.
Previous and current involvement in research and training programmes	Dr. Bloomfield has led a number of work packages in the recently completed EC FP7-funded 'Managing aquatic ecosystems and resources under multiple stress' project (FP7 603378) and is currently co-ordinating BGS contributions to the RESOURCE EC-funded GeoERA ERA-net project (http://geoera.eu/projects/resource/).
Relevant publications and/or research / innovation products	• Marchant, B.P., **Bloomfield, J.P.**, 2018. Spatio-temporal modelling of the status of groundwater droughts. *J. Hydrol.*, 564, 397-413 • Lange, B., Holman, I., **Bloomfield, J.P.**, 2017. A framework for a joint hydro-meteorological-social analysis of drought. *Sci. Total Environ.*, 578, 297-306 • **Bloomfield, J.P.**, Marchant, B.P., Bricker, S.H., Morgan, R.B., 2015. Regional analysis of groundwater droughts using hydrograph classification. *Hydrol. Earth Syst. Sc.*, 19, 4327-4344

Partner 6: JRC -Joint Research Centre- European Commission (JRC)	
General description	The Disaster Risk Management Unit of the European Commission Joint Research Centre (JRC) has the mission to strengthen the EU's resilience to crises and disasters and to help implement the EU's aim to promote stability and peace through its research in crisis management technologies as well as in information mining and analysis. The Unit also focuses on integrated systems applied to a number of areas, e.g. risk analysis, situational awareness, early warning, collaborative decision-making in crisis room environments, media monitoring, and external aid spending and donor coordination. We work both on risk and prevention as well as preparedness and response, for floods and droughts. The 2 groups that will be directly involved in REVOLUTION develop flood and drought early warning systems contributing to the Copernicus Emergency Management System. In the framework of REVOLUTION, we are interested in developing real-time forecasting of flood impacts, global flood mapping, and monitoring of European groundwater droughts.
Key persons and expertise	**Dr. Paulo Barbosa** (M) is Team Leader for Climate Adaptation and Droughts at JRC and supervises a group of staff in the order of 10-15 people, having had extensive experience supervising PhD and Post-doc researchers at the JRC in the last 15 years. He will co-supervise ESR6. **Dr. Peter Salamon** (M) is the Team Leader for floods at JRC and supervises a group of staff in the order of 10-15 people. He has extensive experience supervising PhDs and Post-docs at JRC in the last 15 years. He will co-supervise ESR4.
Key research facilities, infrastructure and equipment	The Disaster Risk Management Unit is based in Ispra (Italy) at the main JRC site, where more than 2000 people are currently working on different research topics. The Unit has around 60 staff members and 60 IT consultants and can provide a suitable environment for training and transfer of knowledge to ESRs. JRC also has computing clusters and supercomputing facilities on site that will be available to the ESRs.
Previous and current involvement in research and training programmes	Being part of the EC, JRC currently has a selective participation in EU research and training projects but it has worked in several natural hazards research projects in different EU Framework Programmes (e.g. EuroGEOSS, DEWFORA, HELIX, ANYWHERE, I-REACT, KULTURISK, IMPREX).
Relevant publications and/or research / innovation products	• Data and decision-support platforms, such as: European Drought Observatory: http://edo.jrc.ec.eruopa.eu; Global Flood Awareness System: www.globalfloods.eu; Copernicus Emergency Management Service: http://emergency.copernicus.eu/ • Naumann, G., Carrão, H., **Barbosa, P.**, 2019. Indicators of social vulnerability to drought. In Iglesias, A. et al. (eds.) Drought: Science and Policy. John Wiley and Sons Ltd • Feyera, A., Hirpa, F., **Salamon, P.**, Beck, H.E., Lorini, V., Alfieri, L., Zsoter, W., Dadson, S.J., 2018. Calibration of the Global Flood Awareness System (GloFAS) using daily streamflow data, *J. Hydrol.*, 566, 595-606

Partner 7: Stichting Deltares (DRES)	
General description	Deltares (DRES) is an independent institute for applied research in the field of water, subsurface and infrastructure. Throughout the world, we work on smart solutions, innovations, and applications for people, environment, and society. Our main focus is on deltas, coastal regions, and river basins. Managing these densely populated and vulnerable areas is complex, which is why we work closely with governments, businesses, other research institutes, and universities at home and abroad. For DRES, the quality of our expertise and advice is foremost. Knowledge is our core business. DRES employs over 800 people and is based in Delft and Utrecht.
Key persons and expertise	The scientist in charge at DRES is **Dr. Hanneke van der Klis** (F). She is Director of Subsurface and Groundwater Systems and R&D Manager Enabling Technologies, under which the research activities in REVOLUTION will take place. **Dr. Gennadii Donchyts** (M) is an expert in in software engineering, integrated environmental modelling, and remote sensing. He is highly experienced in the use of Google Earth Engine and in providing training on its usage in data analysis. At DRES, he has experience in supervising junior research staff, also in collaborative projects with PhD students. He will be co-supervisor of ESR2 and 13.
Key research facilities, infrastructure and equipment	DRES is one of five Grand Technological Institutes in the Netherlands. It hosts physical research facilities and laboratories for testing and analysis, next to state-of-the-art software development and application facilities to support model development. It has extensive in-house facilities for supercomputing and works extensively with Google Earth Engine.
Previous and current involvement in research and training programmes	DRES is and has been involved extensively in various H2020 projects, mainly focussing on river management, soil management, coastal zones, and geo-engineering. The following is a small selection of recently started and negotiated projects. DRES is currently involved in the Marie Skłodowska-Curie ITN project SYSTEM-RISK, in which it supervises several ESRs and contributes to training events. It led the recently completed FP7 eartH2Observe project on remote sensing and water resource analysis. Other FP7/H2020 projects include: C-CASCADES, CREEP, GEOFLUID, RISES-AM. It has an extensive portfolio of research, training, and capacity building projects with international agencies ranging from governmental, NGOs, intergovernmental, and the private sector.
Relevant publications and/or research / innovation products	• Aqua Monitor (http://aqua-monitor.deltares.nl): web-based monitoring of Earth's surface water changes • **Donchyts, G.**, Baart, F., **Winsemius, H.**, Gorelick, N., Kwadijk, J., Van De Giesen, N., 2016. Earth's surface water change over the past 30 years. *Nat. Clim. Change*, *6*, 810 • **Donchyts, G.**, Schellekens, J., **Winsemius, H.**, Eisemann, E., Van de Giesen, N., 2016. A 30 m resolution surface water mask including estimation of positional and thematic differences using Landsat 8, SRTM and OpenStreetMap: a case study in the Murray-Darling Basin, Australia. Remote Sensing, 8, 386

Partner 8: National Aeronautics and Space Administration (NASA)	
General description	The National Aeronautics and Space Administration (NASA) Applied Sciences Program, which falls within NASA's Earth Science Division, funds projects that enable innovative uses of NASA Earth science data in organisations' policy, business, and management decisions. The project results and enhanced decision making improve the quality of life and strengthen the economy.
Key persons and expertise	**Dr. Ana Prados** (F) is the Program Manager for NASA's Applied Remote Sensing Training Program (ARSET), and has expertise in remote sensing research and applications, environmental policy, and program evaluation. She has extensive experience in international research-based training. She founded ARSET in 2008. Its mission is to provide freely available online (live and recorded) and in-person training. Each year ARSET trains over 6,500 individuals representing more than 2500 organisations. She also currently coordinates and conducts remote sensing training workshops for the NASA Applied Sciences Program. As a Research Assistant Professor, she also has ample experience in supervising PhD candidates. She will co-supervise ESR15. **Dr. David Green** (M) is the program manager for NASA's Disaster Applications Program. David and his team use space-based instruments and models to support decisions and actions, promote innovation, and build capacity in the use of Earth Science. He also serves on the Committee on Earth Observation Satellites (CEOS) and Group on Earth Observation (GEO) Disasters Working Groups. Dr. Green is a highly experienced supervisor of young researchers. He will co-supervise ESR14.
Key research facilities, infrastructure and equipment	NASA Goddard Space Flight Center is located near Washington D.C. The Earth Sciences Division develops and operates remote-sensing satellites and instruments. It also analyses observational data from these spacecrafts and makes it available to the world's scientists. Its missions are supported by hundreds of scientists.
Previous and current involvement in research and training programmes	The NASA Disasters Program promotes the use of Earth observations to improve the prediction of, preparation for, response to, and recovery from natural and technological disasters. By sponsoring application science, the Program advances the readiness of results to enable disaster management practices, advance damage reduction, and build resilience. Dr. Prados founded ARSET in 2008. Now, each year ARSET trains over 6500 individuals representing more than 2500 organisations. It also carries out a large amount of applied research related to disaster mapping and risk reduction, for example recent and ongoing projects include: Developing Global Building Exposure for Disaster Forecasting, Mitigation and Response, Enhancing Floodplain Management in the Lower Mekong River Basin Using NASA Vegetation and Water Cycle Satellite Observations; Mapping of Flood Extent and Flood Losses from Satellite-Based Data; and InSAR Volcano Monitoring.
Relevant publications and/or research / innovation products	• Advanced and introductory webinar series for researchers and professionals engaged in applied environmental management (https://arset.gsfc.nasa.gov/webinars) • Schumann, G.J.-P., Green, D. et al., 2016.Unlocking the full potential of Earth observation during the 2015 Texas flood disaster. *Water Resour. Res.*, 52, 3288-3293 • Rose, R.A., Prados, A. et al., 2015. Ten ways remote sensing can contribute to conservation. *Conserv. Biol.*, 29, 350-359

Partner 9: Barcelona Supercomputing Center - Centro Nacional de Supercomputacion (BSC-CNS)	
General description	Barcelona Supercomputing Center (BSC-CNS) combines high performance computing with research on computer, life, and Earth sciences, and computational applications, counting more than 486 researchers and students from more than 45 countries. BSC-CNS has been accredited as 1 of the first 8 Severo Ochoa Centres of Excellence, which recognises leading research centres in Spain that are internationally renowned. The Earth Sciences Department (BSC-ES) is a highly productive scientific entity that has published more than 180 articles in peer-reviewed journals over the last five years (2014-2018), some of them in prestigious high-impact journals. The Climate Prediction Group aims at developing a climate forecast system and performs regular assessments of the characteristics of this forecast system. BSC-CNS is one of the world leaders in the development of climate prediction and climate services.
Key persons and expertise	**Prof. Francisco J. Doblas-Reyes** (M) is director of BSC-ES. He is an expert in the development of seasonal-to-decadal climate prediction systems and has more than 20 years' experience in weather and climate modelling, climate prediction, and climate services. He serves on scientific panels of the World Climate Research Programme and World Weather Research Programme and has authored and co-authored more than 100 peer-reviewed papers. He is a member of the European Network for Earth System modelling HPC Task Force and has participated in numerous national and European FP4 and FP7 projects. He is involved in 4 H2020 Collaborative projects as Principal Investigator and has supervised or is currently supervising 4 Marie Skłodowska-Curie Individual Fellowships. He will co-supervise ESR9.
Key research facilities, infrastructure and equipment	BSC-CNS hosts and manages a range of high performance computing systems, including MareNostrum 4, with 148,176 cores and 13.7 PFlops capacity. Additionally, BSC-CNS manages Minotauro, a Sandy Bridge's cluster with NVIDIA GPUs, providing more than 100 TFlops.
Previous and current involvement in research and training programmes	BSC-CNS is a highly productive scientific body that has been granted 24 H2020 projects, 6 EU FP7 projects, 10 Copernicus contracts, 11 national projects, and 4 ESA projects in the last 5 years. The most relevant H2020 projects for this proposal are: PRIMAVERA, MEDSCOPE, IMPREX, ERA-Net ERA4CS project EUCP: European Climate Prediction system; and SPECS. BSC-CNS is also beneficiary of the Marie Skłodowska-Curie Action COFUND program for postdoctoral fellows (STARS; H2020-MSCA-COFUND).
Relevant publications and/or research / innovation products	• Turco, M., Jerez, S., **Doblas-Reyes, F.J.**, AghaKouchak, A., Carmen Llasat, M., Provenzale, A., 2018. Skilful forecasting of global fire activity using seasonal climate predictions. *Nat. Commun.*, 9, 2718. • Ceglar, A., Toreti, A., Prodhomme, C., Zampieri, M., Turco, M., **Doblas-Reyes, F.J.**, 2018. Land-surface initialisation improves seasonal climate prediction skill for maize yield forecast. *Scientific Reports*, 8, 1322 • Rodrigues, L.R.L., **Doblas-Reyes, F.J.**, Coelho, C.A.S., 2018. Calibration and combination of monthly near-surface temperature and precipitation predictions over Europe. *Clim. Dynam.*, doi:10.1007/s00382-018-4140-4

Partner 10: Confederacion Hidrografica del Segura (CHS)	
General description	The Confederación Hidrográfica del Segura (CHS) is the River Basin Authority of the Segura Basin. It is an autonomous organism of the State General Administration, assigned, for administrative effects, to the Ministry for Ecological Transition. It is an entity of public law with its own jurisdiction possessing the autonomy to govern and self-administer its interests; to acquire and to alienate the goods and rights that can constitute self-patrimony; to contract, oblige and to act in tribunals, all gender of actions, without further limitations than those imposed by the law. The acts and resolutions are the end point for the administrative road. The structure and functions as well as the economic and patrimonial regime are defined in the Royal Decree 1/2001 in which the Water Law is passed. As the River Basin Authority of the Segura Basin, one of its 4 units is the Hydrological Planning Office, which is the unit that will be involved in REVOLUTION. Its main purpose is the development, implementation, and monitoring the Water Plan in accordance with EU's Water Framework Directive.
Key persons and expertise	**Jaime Fraile Jiménez de Muñana** (M) works at the Hydrological Planning Office, and is involved in the development, implementation, and monitoring of its Water Plan. He is involved in several EU projects relating to drought management in the Segura Basin, including a study tour on drought risk management. He will co-supervise ESR10. **Jesús García Martínez** (M) is Head of the Hydrological Planning Office and leads the drafting and development of the District's Water Management Plan. As such he will provide expertise regarding hydrological modelling.
Key research facilities, infrastructure and equipment	CHS collects and houses hydrological data on the Segura River Basin, as well us data portals and tools, which will be available to the ESRs for the research. Its office has ample facilities to host the secondment, including administrative staff.
Previous and current involvement in research and training programmes	CHS is involved as stakeholder in the H2020 IMPREX project, in which tools are co-designed for improving seasonal hydrological predictions on the seasonal timescale. It is involved as partner in the H2020 Collaboration and Support Action EDUCEN, a European expert platform focusing on the role of culture in disaster management and risk. It has also been a partner in several LIFE+ projects, including Segura Riverlink and Riverphy.
Relevant publications and/or research / innovation products	• ASSET: Accounting System for the Segura river and Transfers (decision support tool developed with FW) • Aldaya, M.M. et al., 2017. Análisis académico del plan hidrológico de la demarcación hidrográfica el Segura 2015-2021 a la luz de modernos conceptos de la ciencia de los recursos del agua. Fundación Botin • Grindlaya, A.L., Zamorano, M., Rodríguez, M.I., Molero, E., Urrea, M.A., 2011 Implementation of the European Water Framework Directive. *Land Use Policy*, 28, 242-256

Partner 11: United Nations International Strategy for Disaster Reduction (UNISDR)	
General description	The United Nations International Strategy for Disaster Reduction (UNISDR) is mandated by United Nations (UN) General Assembly resolution 56/195 to serve as focal point in the UN system for the coordination of disaster reduction and to ensure synergies among the disaster reduction activities of the UN system and regional organisations and activities in socio-economic and humanitarian fields. UNISDR is the custodian agency of the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) and has been tasked by the UN General Assembly to support its implementation, follow-up, and review. It supports countries and other stakeholders in understanding and managing risk, and will track progress in implementing the 7 targets of the Sendai Framework as well as its related dimensions reflected in the Sustainable Development Goals 1, 11 and 13. UNISDR is involved in training and supporting governments to develop disaster loss databases and national loss accounting systems. It supports countries in further developing DRR Plans/strategies at national and local levels. The UNISDR Branch Supporting Analysis and Monitoring of Sendai Framework Implementation (SAMSFI) provides technical support on emerging knowledge on risk and its management, and is tasked with developing a new cadre of professionals in DRR and climate change adaptation.
Key persons and expertise	**Mr. Marc Gordon** (M) leads the Sendai Monitoring Unit. His work is focused on monitoring the implementation of the Sendai Framework. **Mr. Adam Fysh** (M) is Programme Management Officer Risk Analysis and Reporting. Both Mr. Gordon and Mr. Fysh are key staff on in the Global Risk Assessment Framework (GRAF), in which the activities of WP4 are embedded. They will ensure that the ESR projects are linked to the GRAF and contribute to organising WP4 research workshops. Moreover, they are responsible for the Global Assessment Report (GAR), to which the ESR's work can contribute. **Mr. Julio Serje** (M) is expert on Disaster Loss Databases and **Mr. Sanjaya Bhattia** (M) is experienced in education and training on DRR. They will contribute to the network-wide training events, as summarised in Table 1.2c.
Key research facilities, infrastructure and equipment	As a UN entity, UNISDR has access to the infrastructure and facilities managed by the United Nations System. In addition, UNISDR has a dedicated Global Education Training Institute, supported by the Ministry of the Interior and Safety (MOIS) of the Government of the Republic of Korea and the Incheon Metropolitan City.
Previous and current involvement in research and training programmes	UNISDR has been invloved in many research and training projects with EU and other partners, including: (1) UNISDR's biannual Global Assessment Reports (based on the inputs from a large body of original research by a wide range of independent scientific institutions, think tanks, UN agencies, governments, non-governmental organisations and businesses); (2) the Global Risk Assessment Framework (a scientific and social movement to transform how people around the world understand and act on risk and responsibility in order to meet the Sendai targets); (3) training of DRR stakeholders through its Global Education Training Institute in Incheon (to date UNISDR has trained more than 3000+ DRR stakeholders); (4) support and capacity building for the development of Disaster Loss Databases in 90+ countries; (5) many projects focused on capacity building, technical support, and research in the countries through its five regional, two sub-regional, and two liaison offices; (6) convening several networks, including the Science and Technology Advisory Group at global and regional levels as well as coordinating with other academic, scientific and technology research entities and networks.
Relevant publications and/or research / innovation products	• Global Risk Assessment Framework – to be launched in 2019 • UNISDR, 2015. Sendai Framework for Disaster Risk Reduction 2015-2030. UNISDR, Geneva • UNISDR, 2009, 2011, 2013, 2015. Global Assessment Report. UNISDR, Geneva

6 Ethical Issues

6.1 European and national legal and ethics requirements

As indicated in the Ethical Issues Table (part A) this project includes **research that involves human participants** and **research involving personal data collection and/or processing**. Specifically, it involves collection and processing of personal data from human participants (volunteers for social sciences research; adults). We are not aware of and do not expect any potentially critical ethical implications of the research results. However, the partners in the REVOLUTION consortium will comply with the European Legal Framework and will apply its ethical standards and guidelines. Furthermore, the consortium will comply to relevant EU legislation, including:

- The Declaration of Helsinki in its latest version;
- The Charter of Fundamental Rights of the EU (2000/C 364/01);
- The EU General Data Protection Regulation (GDPR) (2018);
- EU regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data.

Furthermore, the consortium will ensure continuing compliance and will take into account relevant revisions to the mentioned legislation and directives. **Each partner will be held responsible for fulfilment of all legal and ethical requirements in their country.**

The Executive Board will discuss any ethical issues arising from the project. If warranted by national legislation, protocols that are used in the network need to be submitted to and approved by local ethics review committees. All WP leaders need to deliver the approval to the Project Office to enable adequate registration and monitoring. All procedures at the very least comply with international guidelines and with current national legislations.

6.2 Specific ethics issues

6.2.1 Human beings

Human participants will be involved in some elements of the research. Participation will be voluntary at all times and our procedures will ensure that informed consent is recorded. The research will not involve any physical, financial, social, or legal risk to participants, and potential psychological risks will not exceed the daily life standard.

Study setup involving human participants

Many ESRs (1,2,4,5,6,7,10,15) will include some data collection with the direct participation of human participants. Methods include surveys, qualitative interviews, focus groups, workshops, participatory GIS, and observation. Some further projects also include the use of secondary data generated by people, e.g. volunteered GIS and social media; and discussions with stakeholders for the co-development of management interventions. Discussions with stakeholders (focus groups/workshops), will also take place within WPs 2-4 during the research workshops at WP level.

Recruitment

Only adult volunteers will be allowed to participate in the research. Recruitment may be by means of email, letter, or through personal recommendations and contacts, whilst complying with the GDPR regarding the use of personal information.

Informed consent

Potential participants will be provided with a written participant information sheet (translated where necessary) that, in layman's terms, fully explains the purpose of the project, the nature of their involvement, any potential discomforts, what happens to the data and their right to access it, procedures around confidentiality and anonymity, and gives contact details of researchers and supervisors. It will clearly state that participation is voluntary, and terms of their right to withdraw. Participants will be asked to sign a consent form which may include separate items for any specific consents relating to, for example, use of quotations, use of images, and agreement to anonymised data being open access. Ongoing verbal consent will be sought and recorded where written consent is not appropriate.

Withdrawal

Participants are free to withdraw at any point from this study. Details of withdrawal will be provided in the participant information sheet and mentioned in the consent form. They will also be reminded that there are no consequences for withdrawing from the study. Participants will not have to give a reason to withdraw from the study. If they have already participated with part of the data collection, they will also have the option to have this data removed from the study and destroyed. This extends to two weeks beyond each phase of data collection if any participant decides they would like to withdraw their data from the study.

6.2.2 Personal data

For the purpose of this project, it is necessary to work with personal information of human beings as described in Section 6.2.1. We will participate in the open access to research data pilot of article 29.3 of the model Grant Agreement and will facilitate access to anonymised and aggregated forms of data on request, consents allowing.

Data collection, processing and storage

For collection and processing of personal data, we will abide with EU legislation with regard to personal data. All partners involved in the collection and processing of personal data will be required to present their own data management plan before starting their data collection. Personal data will be stored on secure servers with encryption, through use of University systems. Data sharing will take place by means of secure interfaces of such systems. Where it is not possible to upload data immediately to a secure server, e.g. when collecting data in the field with no internet access, data will be stored on encrypted drives as a temporary measure. Names and contact details, where it is necessary to retain them, will be kept separately from data such as interview transcripts. Anonymisation will take place at the earliest appropriate stage of research. However, not all data can be truly anonymised in the sense of making it untraceable back to an individual (e.g. interview data). We will ensure however that individuals are not identifiable in outputs, or in any data archived for open access, unless explicit consent has been given for anonymity to be waived (e.g. in the case of highly specific stakeholders) and individuals are aware of any risks of non-anonymity. Appropriate measures will be taken to prevent unauthorised use of study information. For example, at the VUA we have a dedicated University Data Protection Officer, Mrs. Susanne Visscher, LL.M (s.a.n.visscher@vu.nl).

Informed consent (specific issues)

Informed consent for the collection and processing of personal data will be obtained from all participants taking part in research carried out in REVOLUTION (also see the section 6.2.1 on Human beings above).

6.2.3 Non-EU countries

REVOLUTION involves a beneficiary organisation from Tanzania and partner organisations from the United States of America. One of the research WPs (WP2) focuses on flood risk in Dar es Salaam (Tanzania). Inclusion of the Tanzanian University ARU as full beneficiary supports the strategic priorities of the **Abidjan Declaration**[47] of the **Joint Africa-EU Strategy,** in particular by encouraging mobility of researchers for skills and knowledge development.

Research activities in non-EU countries

Regardless of the country in which the research is carried out, ethical standards and guidelines of Horizon 2020 will be rigorously applied. The research conducted in Tanzania and the United States of America is compatible with European and international law. Ethical issues are addressed in the same way as described in Sections 6.2.1 and 6.2.2. Data collected will be stored on secure servers at the beneficiaries and partners in the EU.

Especially for the work in Tanzania, we will adhere carefully to the principles laid out in the Declaration of Helsinki and the Global Code of Conduct for Research in Resource-Poor Settings. The senior staff of REVOLUTION involved in this WP are accustomed to following these principles and have worked successfully with communities and stakeholders in developing countries in recent and ongoing research projects and in previous roles. We will also draw on the local knowledge of RC and local Red Cross offices, who have much experience working in development settings and have worked for a long time in the regions studied in the project. We are aware that **informed consent** might need to be organised differently in some development contexts if participants do not speak English and cannot read the consent form. Recorded verbal consent will be used in these cases and a research assistant speaking the local language will explain the project and conditions described above.

47 AU and EU, 2017. Investing in Youth for Accelerated Inclusive Growth and Sustainable Development. AU-EU/Decl.1(V). AU/EU, Abidjan

7 Letters of Commitment

FLOODTAGS
KvK Nr. 59502622
Binckhorstlaan 36
2516 BE Den Haag
Nederland
www.floodtags.com

Re: LETTER OF COMMITMENT REVOLUTION PROPOSAL

To whom it may concern,

Undersigned, legal representative of FloodTags, wishing to join the application for "REVOLUTION" (*A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*) for a Marie Skłodowska-Curie ETN network as Partner Organisation, hereby states its intention to actively participate in the project, should it be retained for funding. FloodTags' intended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of FloodTags, Jurjen Wagemaker (Director) will act as a contact person.

FloodTags highly values the knowledge development anticipated in the REVOLUTION proposal and anticipates (or hopes) that some of the trained researchers will enforce the company in a later stage.

With kind regards,

Jurjen Wagemaker
26 October 2018

Cloud to Street

Cloud to Street

+1-973-493-5647 Support@CloudtoStreet.info CloudtoStreet.info

Re: LETTER OF COMMITMENT REVOLUTION PROPOSAL

To whom it may concern,

Undersigned, legal representative of Cloud to Street, wishing to join the application for “REVOLUTION” (*A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*) for a Marie Skłodowska-Curie ETN network as Partner Organisation, hereby states its intention to actively participate in the project, should it be retained for funding. Cloud to Street’sintended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of Cloud to Street, Beth Tellman, Chief Science Officer, will act as a contact person.

We look forward to training the next generation of flood scientists in cutting edge methods in big data and remote sensing to tackle the toughest problems in flood vulnerability.

Kind regards,

Beth Tellman

October 23 2018

Beth Tellman

Beth & Besse Inc DBA Cloud to Street PBC 68 3rd St Brooklyn, NY 11231
+1-973-493-5647 Support@CloudtoStreet.info CloudtoStreet.info

Re: LETTER OF COMMITMENT REVOLUTION PROPOSAL

To whom it may concern,

Undersigned, legal representative of Vaisala Oyj, wishing to join the application for "REVOLUTION" (A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs) for a Marie Skłodowska-Curie ETN network as Partner Organisation, hereby states its intention to actively participate in the project, should it be retained for funding. Vaisala's intended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of Vaisala, Markus Melander, Head of Business Development, computer vision R&D will act as a contact person.

For Vaisala it is important to participate in projects that are scoped and focusing in solving global environmental challenges caused by weather. For Vaisala opportunity to support young scholars to do their study in close co-operation with our scientist is important part of our network creation and branding.

SIGNATURES

Place and date:

Vantaa, Finland- 26th October 2018

Vaisala Oyj

p.p.

.....

Name: MARJA HAPPONEN

Title: EVP, HR

.....

Name:

Title:

VAISALA OYJ VAISALA FINLAND

Humanitarian OpenStreetMap Team

1110 Vermont Avenue NW, Suite 500
Washington, DC 20005 USA
info@hotosm.org
www.hotosm.org

Re: LETTER OF COMMITMENT - REVOLUTION PROPOSAL

To whom it may concern,

Undersigned, legal representative of, Humanitarian OpenStreetMap Team United States, Inc, wishing to join the application for “REVOLUTION” (*A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*) for a Marie Skłodowska-Curie ETN network as Partner Organisation, hereby states its intention to actively participate in the project, should it be retained for funding. Humanitarian OpenStreetMap Team United State’s Inc.’s intended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of Humanitarian OpenStreetMap Team United States, Inc, Tyler Radford, Executive Director, will act as a contact person.

Through the proposed project, HOT anticipates hosting PhD researchers in our Tanzania or other country offices to examine questions such as: how does community mapping lead to changes in decision-making, awareness and sustainability targets at different levels in society and administration (including business), and what are the (dis)incentives at these levels to use and maintain the data? Anticipated research will also examine use of community mapping data for establishment of flood models, and low-cost technological innovations for capturing elevation.

We very much look forward to collaborating with Instituut voor Milieuvraagstukken (IVM) – Institute for Environmental Studies for this project.

Kind regards,

Tyler Radford

Executive Director

7 November, 2018

British Geological Survey
Expert | Impartial | Innovative

To whom it may concern

Keyworth
Environmental Science Centre
Keyworth
Nottingham
United Kingdom
NG12 5GG

Telephone +44(0)115 9363100
Direct Line +44(0)115 9363331
E-mail chto@bgs.ac.uk
Web www.bgs.ac.uk

22 October 2018

Dear Madam/Sirs,

Re: LETTER OF COMMITMENT REVOLUTION PROPOSAL

I, the undersigned, a legal representative of UK Research and Innovation (UKRI) and specifically its component institute British Geological Survey (BGS), which is the research centre involved in the proposed action, wish to join the application for "REVOLUTION" (A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs) for a Marie Skłodowska-Curie ETN network as Partner Organisation.

According, we hereby state our intention to actively participate in the above project, should it be retained for funding. UKRI's intended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. Dr. John Bloomfield will act as a contact person on behalf of UKRI.

We believe this is a vital opportunity to create a key researcher network and wish the coordinator the best of luck for the proposal.

Yours sincerely,

Christopher Luton
Head of Legal

EUROPEAN COMMISSION
JOINT RESEARCH CENTRE
Space, Security and Migration
The Director

Ispra,

To the Coordinator of the project proposal
"***REVOLUTION (A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs)***"

Philip Ward
Vrije Universiteit Amsterdam

Subject: Letter of Commitment for the project proposal '*REVOLUTION: A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*'

LETTER OF COMMITMENT

The Joint Research Centre of the European Commission (JRC) represented for the purpose of signing this Letter of Commitment by ***Dan Chirondojan*** – Director of the ***Space, Security and Migration*** Directorate of the Joint Research Centre, duly entitled to sign, hereby declares its support to the project proposal titled '***A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs***' (***REVOLUTION***) prepared in the framework of the Call for proposals ***2019 Marie Sklodowska-Curie Innovative Training Networks (H2020-MSCA-ITN-2019) organised by the Directorate-General for Research & Innovation.***

The JRC has received information about the proposal and is interested in supporting the project, provided that the proposal is successful in receiving funding. The JRC aims to participate as a ***Partner Organisation***. The role of JRC would be to:

1. Contribute to the project by hosting as unpaid visiting scientist Early Stage Researchers (ESRs) and being involved in their co-supervision, following the signature of a dedicated agreement.
2. Contribute to the training activities and stakeholder workshops.

In further discussions, the following person will act as the **JRC-Directorate E** contact:
Paulo Barbosa
European Commission
Joint Research Centre – ***Directorate*** **E**
Unit – E.1
TP 267
e-mail address: paulo.barbosa@ec.europa.eu

This Letter of Commitment does not create any financial and legal obligations on the part of the JRC. There will be no exchange of funds between the JRC and the consortium.

The JRC intends to discuss further details of its support with the ***REVOLUTION*** consortium partners and other services of the Commission, provided that the project is approved.

Yours sincerely,
Dan Chirondojan

Director of the ***Space, Security and Migration***
Directorate of the Joint Research Centre

29.10.2018

Deltares

Enabling Delta Life

To whom it may concern

Date	Our reference	Number of pages
November 5, 2018	18-11-0005	1
Contact person	**Direct number**	**E-mail**
Chris Bremmer	+31(0)88 335 7133	Chris.Bremmer@deltares.nl

Subject
Letter of Commitment Revolution Proposal

Dear Mr, Ms,,

Undersigned, legal representative of DELTARES, wishing to join the application for "REVOLUTION" (*A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*) for a Marie Skłodowska-Curie ETN network as Partner Organisation, hereby states its intention to actively participate in the project, should it be retained for funding. DELTARES's intended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of DELTARES, drs. C.N. Bremmer will act as a contact person.

Deltares is an independent institute for applied research in the field of water, subsurface and infrastructure. Throughout the world, we work on smart solutions, innovations and applications for people, environment and society. Our main focus is on deltas, coastal regions and river basins. REVOLUTION will bring us the opportunity to have dedicated research and development on big data and earth observation which can be directly applied to flood forecasting models. As such we think REVOLUTION will deliver an important contribution to our research and future academic work force.

With kind regards,

dr.ir. H. van der Klis
Director Subsurface and Groundwater Systems

P.O. Box 177, 2600 MH Delft, Boussinesqweg 1, 2629 HV Delft, The Netherlands, T 088-3358273 , F 088-3358582, www.deltares.nl
Deltares is registered with the trade register of the Chamber of Commerce Haaglanden with number 41146461, as Foundation 'Stichting Deltares'.

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

25 November 2018

Dr. Philip Ward
Associate Professor and Deputy Head Dept. of Water and Climate
Instituut voor Milieuvraagstukken (IVM) – Institute for Environmental Studies
Vrije Universiteit Amsterdam
De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands
T +31 (0)20 59 86149 philip.ward@vu.nl

Re: Letter of commitment REVOLUTION PROPOSAL

Dear Dr. Ward:

I am pleased to submit this letter regarding the REVOLUTION project proposal, "REVOLUTION: *A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*) for a Marie Sklodowska-Curie Innovative Training Networks (ITN) as part of European Union's *Horizon H2020-MSCA-ITN-2019* and led by the Instituut voor Milieuvraagstukken (IVM), part of the Vrije Universiteit Amsterdam (Stichting VU). I understand that you and your colleagues are applying to the European Union for funding, and I want to express my support for the project's proposed collaborative efforts.

As I understand, the proposed activities include a priority to train and develop a network of a new generation Early Stage Researchers (ESRs) to contribute to reaching and monitoring flood and drought-related targets of international agreements such as the Sendai Framework. This will be achievable by using innovative and geographically scalable data and approaches. NASA supports the collection, storage, dissemination, and use of free and open Earth observations, and applications for societal benefit consistent with the priorities of this proposal. I anticipate that REVOLUTION will increase decision-makers' access to and sharing of Earth observation products and will serve to support and enhance efforts to understand local, regional, national and global extreme water processes. The proposed emphasis on the ESRs complements NASA's experience with the Water Youth Network, Youth Mappers, Space Apps partners, Capacity Building hubs, Red Cross Climate Center and other non-traditional partners in establishing collaborative networks around flood and drought issues. In particular, these networks are consistent with the objectives we both work on through implementation of the Sendai targets through the Group on Earth Observation GEO Global Flood Risk Monitoring Community Activity and the UNISDR Sendai implementing efforts we support as Experts to the Global Risk Assessment Framework. As a Partner Organization in the Marie Sklodowskia-Curie ETN network, NASA's intention is to participate actively in the project on a best effort basis, should it be retained for funding.

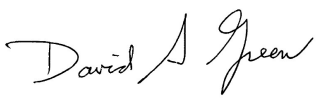
NASA's intended contribution to the project involves the provision of secondments to ESRs and their co-supervision (assuming they pass appropriate security measures and technical competencies consistent with NASA processes); and the provision of relevant training opportunities, including through our cooperative agreements with NASA researchers and associated investigators at universities or similar institutions. It is understood that the common objectives include use of observation data in research and analysis; its applications in communities and areas of high risk to water extremes; and enhanced uses of Earth observations to serve regional stakeholders effectively.

Within the NASA Earth Science Division, the Applied Sciences Program promotes activities to discover and demonstrate innovative uses and practical benefits of Earth observations. The training networks capacities around natural environment, disaster risk management, water resources, food system security, and health and air quality align strongly with the applications themes of the Applied Sciences Program. Thus, I am very interested in the activities, approaches, and results from the proposed REVOLUTION Network. In addition to new knowledge about our planet, such a project can expand the community of skilled people and organizations that can apply knowledge and data to improve decisions. Furthermore, the inclusion on an education component strongly supports the long-term development of a geospatial workforce familiar with the uses and benefits of Earth observations to continue expansion of capabilities across government and industry.

I endorse your proposal submitted to the EU's *Marie Sklodowska-Curie Innovative Training Networks (ITN) as part of European Union's Horizon H2020-MSCA-ITN-2019.* If it is selected for funding (and I strongly hope it is selected), I look forward to learning about the outputs of the new endeavor and how it can increase awareness and uses of Earth observations.

If you have questions about the Applied Sciences Program, please contact me at +1-202-358-0032.

Cordially,



David S. Green
Program Manager for Disaster Risk & Resilience

Lawrence A. Friedl
Associate Director for Applied Sciences

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

LETTER OF COMMITMENT REVOLUTION PROPOSAL

To whom it may concern,

Undersigned, legal representative of **Barcelona Supercomputing Center-Centro Nacional de Supercomputación**, wishing to join the application for "REVOLUTION" (*A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs*) for a Marie Skłodowska-Curie ETN network as Partner Organisation, hereby states its intention to actively participate in the project, should it be retained for funding. of **Barcelona Supercomputing Center-Centro Nacional de Supercomputación**'s intended contribution to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of **Barcelona Supercomputing Center-Centro Nacional de Supercomputación**, Prof. Franciso J. Doblas-Reyes will act as a contact person.

Kind regards,

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Prof. Mateo Valero Cortés

Director of *Barcelona Supercomputing Center-Centro Nacional de Supercomputación*

26th November 2018

Barcelona Supercomputing Center – Centro Nacional de Supercomputación
C/Jordi Girona, 29
Edificio Nexus II
08034 Barcelona (Spain)
Phone: +34 93 413 77 16

MINISTERIO
PARA LA TRANSICIÓN
ECOLÓGICA

CONFEDERACIÓN
HIDROGRÁFICA
DEL SEGURA

OFICINA DE PLANIFICACIÓN
HIDROLÓGICA

Murcia, 5th December, 2018

Ref.: ITN "REVOLUTION"– Call 2018.

Letter of Commitment by the Hydrological Planning Office of Segura River Basin Authority for the EU-funded ITN "REVOLUTION"

To whom it may concern,

I, Jesús García Martínez, as Head of the Hydrological Planning Office of the Segura River Basin Authority, wish to join the "REVOLUTION" (A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs) for a Marie Skłodowska-Curie ITN network as Partner Organisation, and state our intention to actively participate in the project, should it be retained for funding.

The intended contribution of the Hydrological Planning Office to the project includes the provision of secondments to Early Stage Researchers (ESRs), involvement in their co-supervision, and an active contribution to the training activities and stakeholder workshops. On behalf of "CONFEDERACIÓN HIDROGRÁFICA DEL SEGURA" (Segura River Basin Authority), Mr. Jesús García Martínez will act as a contact person.

This support doesn't mean, in any case, any financial or legal commitment from our side.

THE HEAD OF THE HYDROLOGICAL PLANNING OFFICE
(Authorized signatory)

Jesús García Martínez
Digital signature

Seen and agreed by
THE PRESIDENT OF THE SEGURA RIVER BASIN AUTHORITY

Mario Andrés Urrea Mallebrera
Digital Signature

Murcia, 5 de diciembre de 2018

Ref: ITN "REVOLUTION" –Convocatoria 2018

Carta de Compromiso de la Oficina de Planificación Hidrológica de la Confederación Hidrográfica del Segura para el proyecto ITN financiado por la UE " REVOLUTION"

A quien pueda concernir,

Yo, Jesús García Martínez, en calidad de Jefe de la Oficina de Planificación Hidrológica de la Confederación Hidrográfica del Segura, deseo unirme al proyecto "REVOLUTION" (Una nueva generación de investigadores para revolucionar las soluciones sostenibles de los riesgos de inundación y sequías), para la red Marie Sklodowska-Curie ITN como Organización Asociada, y manifiesto nuestra intención de participar activamente en el proyecto, en caso de que sea elegido para financiación.

La contribución de la Oficina de Planificación hidrológica al proyecto incluye proporcionar apoyo a Investigadores en fases iniciales, participando en su co-supervisión, y una contribución efectiva a las actividades de formación y a los talleres de interesados. En nombre de la Confederación Hidrográfica del Segura, Jesús García Martínez actuará como persona de contacto.

Este apoyo no supone, en ningún caso, ningún compromiso legal o financiero por nuestra parte.

EL JEFE DE LA OFICINA DE PLANIFICACIÓN HIDROLÓGICA
(Firmante Autorizado)

Jesús García Martínez
Firmado electrónicamente

Examinado y Conforme,
EL PRESIDENTE DE LA CONFEDERACIÓN HIDROGRÁFICA DEL SEGURA

Mario Andrés Urrea Mallebrera
Firmado electrónicamente

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FAX.: 968 21 46 05

CORREO ELECTRONICO
oficina.planificacion@chsegura.es

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OFFICE FOR DISASTER RISK REDUCTION • BUREAU POUR LA REDUCTION DES RISQUES DE CATASTROPHES

9-11 RUE DE VAREMBE, CH-1202 GENÈVE, FAX: +41-22-733-9531, TEL: +41-22-917-8907/8908

Ref. ISDR/OUT/2018/00598 21 November 2018

Dear Dr. Ward,

I hereby endorse the application for "REVOLUTION" (A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs) for the Marie Skłodowska-Curie ETN network, and confirm the support of the UN Office for Disaster Risk Reduction (UNISDR) as a Partner Organisation, should it be retained for funding.

The project's aim – *to train a new generation of researchers to contribute to monitoring and reaching the water-related targets of the 2030 Agenda for Sustainable Development inter alia by combining novel and traditional data sources that are geographically scalable and transferable* – is entirely consistent with the work required to support the realisation of the outcomes and goals of the Sendai Framework for Disaster Risk Reduction 2015 – 2030 and risk-informed sustainable development.

In support of the project, UNISDR may contribute to research on methods for improving global-scale flood risk assessment and potentially to training activities. Such activities are consistent with the Priorities for Action of the Sendai Framework, and are considered aligned with the vision of the Global Risk Assessment Framework. The UNISDR contact person for this project will be Mr. Adam Fysh (fysh@un.org).

UNISDR welcomes a positive consideration of this application and looks forward to working with other partners in supporting the achievement of the goals and targets of the Sendai Framework and the 2030 Agenda for Sustainable Development.

Yours sincerely,

Mami Mizutori

Mami Mizutori
Special Representative
of the Secretary-General for Disaster Risk Reduction

Dr. Philip Ward
Head of Global Water and Climate Risk – IVM
De Boelelaan 1087
1081 HV Amsterdam - Netherlands

END PAGE

MARIE SKŁODOWSKA-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2019

PART B

REVOLUTION

A new generation of REsearchers to reVOLUtionise sustainable flood and drought risk soluTIONs

This proposal is to be evaluated as:

ETN

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