THEME [ENV.2012.6.1-1]
[Seasonal-to-decadal climate predictions towards climate services]

Grant agreement for: Collaborative project*

Annex I - "Description of Work"

Project acronym: EUPORIAS

Project full title: " EUropean Provision Of Regional Impact Assessment on a Seasonal-to-decadal timescale "

Grant agreement no: 308291

Version date: 2012-05-23

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Part A

Workplan Tables

A1:
Project summary

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per project

General information			
Project title [3]	EUropean Provision Of Regional Impact Assessment on a Seasonal-to-decadal timescale		
Starting date [4]	01/11/2012		
Duration in months [5]	51		
Call (part) identifier [6]	FP7-ENV-2012-two-stage		
Activity code(s) most relevant to your topic [7]	ENV.2012.6.1-1: Seasonal-to-decadal climate predictions towards climate services		

Abstract [9]

Recent advances in our understanding and forecasting of climate and climate change have brought us to the point where skilful and useful predictions are being made. These forecasts hold the potential for being of great value for a wide range of decision-makers who are affected by the vagaries of the climate and who would benefit from understanding and better managing climate-related risks. However, such climate information is currently under-used, mis-used, or not used at all. Therefore there exists the opportunity to develop new technologies to properly exploit emerging capability from the climate community, and more importantly, to engage with the users of such technologies to develop useful and useable tools. The EUPORIAS project will develop and deliver reliable predictions of the impacts of future climatic conditions on a number of key sectors (to include water, energy, health, transport, agriculture and tourism), on timescales from seasons to years ahead. The project will do this through a strong engagement with the forecast providers and the users/decision-makers, who are both represented within the project. EUPORIAS will develop climate services and tools targeted to the needs of the users, and will share knowledge to promote the technologies created within the project. EUPORIAS will also improve the users' understanding of their vulnerability to varying climatic conditions as well as better prepare them to utilise climate forecasts, thereby reducing risks and costs associated with responding to varying climatic conditions. As a result businesses, governments, NGOs, and society in general will be able to better manage risks and opportunities associated with varying climatic conditions, thus becoming more resilient to the variability of the climate. The project will provide the basis for developing a strong climate service market within Europe, offering the opportunity for businesses to capitalise on improved management of weather and climate risks.

A2:
List of Beneficiaries

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

List of Beneficiaries

No	Name	Short name	Country	Project entry month[10]	Project exit month
-13	UNIVERSIDADE DE LISBOA	UL - IDL	Portugal	1	9
1	MET OFFICE	Met Office	United Kingdom	1	51
2	TOURISME TERRITOIRES TRANSPORTS ENVIRONNEMENT CONSEIL	TEC	France	1	51
3	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE,L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE	ENEA	Italy	1	51
4	EIDGENOESSISCHES DEPARTEMENT DES INNERN	MeteoSwiss	Switzerland	1	51
5	UNIVERSIDAD DE CANTABRIA	UC	Spain	1	51
6	PREDICTIA INTELLIGENT DATA SOLUTIONS SL	Predictia	Spain	1	51
7	AGENCIA ESTATAL DE METEOROLOGIA	AEMET	Spain	1	51
8	DHI	DHI	Denmark	1	51
9	WAGENINGEN UNIVERSITY	WU	Netherlands	1	51
10	DEUTSCHER WETTERDIENST	DWD	Germany	1	51
11	FUNDACIO INSTITUT CATALA DE CIENCIES DEL CLIMA	IC3	Spain	1	51
12	KONINKLIJK NEDERLANDS METEOROLOGISCH INSTITUUT-KNMI	KNMI	Netherlands	1	51
13	UNIVERSIDADE DE LISBOA	UL	Portugal	9	21
14	UNIVERSITY OF LEEDS	UNIVLEEDS	United Kingdom	1	51
15	SVERIGES METEOROLOGISKA OCH HYDROLOGISKA INSTITUT	SMHI	Sweden	1	51
16	LUNDS UNIVERSITET	ULUND	Sweden	1	51
17	METEO-FRANCE	METEO-France	France	1	51
18	CETAQUA, CENTRO TECNOLOGICO DEL AGUA, FUNDACIÓN PRIVADA	CETaqua	Spain	1	51
19	INSTITUTO PORTUGUES DO MAR E DA ATMOSFERA IP	IPMA	Portugal	1	51
20	WORLD FOOD PROGRAMME	WFP	Italy	1	51
21	WORLD HEALTH ORGANIZATION	WHO	Switzerland	1	51

A2:
List of Beneficiaries

No	Name	Short name	Country	Project entry month[10]	Project exit month
22	FUTUREEVERYTHING CIC	FutureEverything	United Kingdom	1	51
23	ELECTRICITE DE FRANCE S.A.	EDF	France	1	51
24	ADMINISTRATIA NATIONALA DE METEOROLOGIE R.A.	Meteo-RO	Romania	1	51
25	FACULDADE DE CIENCIAS DA UNIVERSIDADE DE LISBOA	FCUL	Portugal	22	51
26	BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	BSC	Spain	37	51

A3:
Budget Breakdown

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One Form per Project

Participant number in this project [11]	Participant short name	Fund. % [12]	Ind. costs [13]	Estimated eligible costs (whole duration of the project)					Requested EU contribution
				RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D	
-13 (UTRO)	UL - IDL	75.0	F	0.00	0.00	0.00	0.00	0.00	0.00
1	Met Office	50.0	A	757,564.00	297,719.00	343,287.00	285,923.00	1,684,493.00	1,156,851.50
2	TEC	75.0	T	356,240.00	55,200.00	0.00	0.00	411,440.00	294,780.00
3	ENEA	75.0	A	387,000.00	129,000.00	0.00	16,268.00	532,268.00	371,018.00
4	MeteoSwiss	75.0	T	606,275.20	37,660.80	0.00	0.00	643,936.00	473,536.80
5	UC	75.0	T	359,200.00	90,000.00	0.00	40,000.00	489,200.00	354,400.00
6	Predictia	75.0	T	274,916.80	159,963.20	0.00	0.00	434,880.00	286,169.20
7	AEMET	75.0	T	245,120.00	72,960.00	0.00	0.00	318,080.00	21,000.00
8	DHI	75.0	A	377,049.00	38,742.00	0.00	0.00	415,791.00	302,157.75
9	WU	75.0	A	701,852.00	75,790.00	2,500.00	0.00	780,142.00	566,784.00
10	DWD	75.0	S	700,376.00	91,861.00	0.00	0.00	792,237.00	571,212.50
11	IC3	75.0	S	628,162.93	137,881.22	6,000.00	0.00	772,044.15	546,062.81
12	KNMI	75.0	A	646,024.00	174,964.00	0.00	0.00	820,988.00	572,000.00
13 (UTRO)	UL	75.0	T	452,270.40	0.00	0.00	0.00	452,270.40	254,402.10
14	UNIVLEEDS	75.0	T	1,042,737.60	0.00	2,546.00	0.00	1,045,283.60	784,599.20
15	SMHI	75.0	A	851,000.00	198,000.00	1,500.00	0.00	1,050,500.00	738,750.00
16	ULUND	75.0	T	215,632.00	0.00	0.00	0.00	215,632.00	161,724.00
17	METEO-France	75.0	F	352,260.00	222,840.00	0.00	0.00	575,100.00	375,615.00
18	CETaqua	75.0	F	207,278.40	26,438.40	0.00	0.00	233,716.80	168,678.00
19	IPMA	75.0	T	121,286.40	26,627.20	0.00	0.00	147,913.60	104,277.00
20	WFP	75.0	F	211,099.20	13,200.00	0.00	0.00	224,299.20	164,924.40

A3:
Budget Breakdown

Participant number in this project [11]	Participant short name	Fund. %[12]	Ind. costs[13]	Estimated eligible costs (whole duration of the project)					Requested EU contribution
				RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D	
21	WHO	75.0	F	440,040.00	0.00	0.00	0.00	440,040.00	330,030.00
22	FutureEverything	75.0	T	190,000.00	188,000.00	0.00	0.00	378,000.00	148,000.00
23	EDF	50.0	S	81,038.00	37,165.00	0.00	0.00	118,203.00	59,101.00
24	Meteo-RO	75.0	A	25,000.00	0.00	0.00	0.00	25,000.00	18,750.00
25	FCUL	75.0	T	0.00	0.00	0.00	0.00	0.00	0.00
26	BSC	75.0	A	109,217.64	128,953.57	5,510.00	0.00	243,681.21	151,900.02
Total				10,338,639.57	2,202,965.39	361,343.00	342,191.00	13,245,138.96	8,976,723.28

Note that the budget mentioned in this table is the total budget requested by the Beneficiary and linked Third Parties.

*** The following funding schemes are distinguished**

Collaborative Project (if a distinction is made in the call please state which type of Collaborative project is referred to: (i) Small of medium-scale focused research project, (ii) Large-scale integrating project, (iii) Project targeted to special groups such as SMEs and other smaller actors), Network of Excellence, Coordination Action, Support Action.

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project, and it cannot be changed. The project number **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

2. Project acronym

Use the project acronym as indicated in the submitted proposal. It cannot be changed, unless agreed during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry info force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a detailed justification on a separate note.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Activity code

Select the activity code from the drop-down menu.

8. Free keywords

Use the free keywords from your original proposal; changes and additions are possible.

9. Abstract

10. The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

11. The number allocated by the Consortium to the participant for this project.

12. Include the funding % for RTD/Innovation – either 50% or 75%

13. Indirect cost model

A: Actual Costs
S: Actual Costs Simplified Method
T: Transitional Flat rate
F :Flat Rate

Workplan Tables

Project number

308291

Project title

EUPORIAS—EUropean Provision Of Regional Impact Assessment on a Seasonal-to-decadal timescale

Call (part) identifier

FP7-ENV-2012-two-stage

Funding scheme

Collaborative project

WT1
List of work packages

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

LIST OF WORK PACKAGES (WP)

WP Number [53]	WP Title	Type of activity [54]	Lead beneficiary number [55]	Person-months [56]	Start month [57]	End month [58]
WP 1	Management of EUPORIAS	MGT	1	50.00	1	51
WP 2	Coordination across EUPORIAS, NACLIM and SPECS projects	OTHER	1	13.00	1	51
WP 3	Scientific coordination of EUPORIAS	RTD	1	8.00	1	51
WP 4	Dissemination and outreach	OTHER	1	24.00	1	51
WP 11	Assess sector-specific vulnerability	RTD	3	71.50	1	36
WP 12	Assessment of users' needs	RTD	14	95.50	1	24
WP 21	Calibration and downscaling	RTD	15	194.50	1	48
WP 22	Impact relevant climate information indices	RTD	4	186.50	3	48
WP 23	Impact models for impact predictions	RTD	1	128.50	3	38
WP 31	Quantifying uncertainty in impact models	RTD	9	90.00	10	45
WP 32	Uncertainty framework	RTD	5	76.00	10	45
WP 33	Communicating levels of confidence	RTD	8	59.50	3	48
WP 41	Climate Information and Decision Making Processes	RTD	17	99.50	25	48
WP 42	Climate services prototypes	DEM	1	173.00	15	48
WP 43	Stakeholder engagement	DEM	6	85.00	1	48
WP 44	Delivery tools	RTD	12	89.00	21	48
WP 45	Climate services as a business opportunity	RTD	18	51.50	36	48
			Total	1,495.00		

WT2:
List of Deliverables

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

List of Deliverables - to be submitted for review to EC

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	Internal project website	1	1	2.00	O	CO	2
D2.1	Report of recommended priorities for Horizon 2020	2	1	2.00	R	PU	5
D2.2	Summary report of ECOMS Board meetings	2	1	2.00	R	PU	29
D2.3	Conference and proceedings showcasing projects' outcomes	2	1	1.00	R	PU	51
D4.1	Project Information Pack	4	1	1.00	O	PU	3
D4.2	Updated Dissemination Plan	4	1	1.00	R	PP	2
D4.3	External project website	4	1	3.00	O	PU	3
D4.4	Organise and deliver first summer school for junior scientists	4	3	3.00	R	PU	34
D4.5	Organise and deliver second summer school for junior scientists	4	3	3.00	R	PU	46
D11.1	Outlook of sector specific vulnerabilities for Europe S2D horizon	11	3	15.50	R	PU	12
D11.2	White paper on sector specific vulnerabilities	11	10	26.00	R	PU	36
D11.3	Online European Climate User Interface Platform	11	1	30.00	P	PU	36

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D12.1	Literature review of the use of S2D predictions across all sectors	12	14	9.55	R	PU	3
D12.2	Report on findings on S2D users' needs from workshop with meteorological organisations	12	14	19.10	R	PU	6
D12.3	Report summarising users' needs for S2D predictions	12	14	47.75	R	PU	23
D12.4	Report on findings from workshop with S2D climate prediction developers	12	14	19.10	R	PU	24
D21.1	Report on the skill of downscaled seasonal hindcasts	21	10	61.00	R	PU	42
D21.2	Report on the added value of dynamical and statistically downscaled data	21	15	91.00	R	PU	42
D21.3	Report comparing climate information indices (CIIs)	21	4	24.50	R	PU	48
D21.4	Report on utility of data in the WFP LEAP	21	3	18.00	R	PU	48
D22.1	Maps of preliminary CIIs of seasonal forecasts and hindcasts	22	4	40.00	P	RE	24
D22.2	Provide methodology to	22	4	88.00	R	RE	36

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
	calculate CIIs and their skill						
D22.3	Report on validation of CIIs	22	4	40.00	R	PU	48
D23.1	Workshop on initialisation of impacts models for seasonal predictions	23	1	5.00	O	RE	9
D23.2	Report of the workshop on initialisation of impacts models for seasonal predictions	23	9	2.00	R	PU	10
D23.3	Report on initialisation of impacts models for seasonal predictions	23	1	23.00	R	PU	15
D23.4	Report summarising predictability of impact parameters for water sector	23	9	29.00	R	PU	30
D23.5	Report summarising predictability of impact parameters for agriculture sector	23	1	29.00	R	PU	30
D23.6	Report summarising predictability of impact parameters for forestry sector	23	16	29.00	R	PU	30
D31.1	One report summarising and integrating sectoral S2D model results	31	9	85.00	R	PU	36
D32.1	Report on assessment and combination of S2D predictions	32	5	36.00	R	PU	18

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D32.2	Report on uncertainty framework for seasonal impact predictions	32	13	36.00	R	PU	36
D33.1	Report on survey of end-user needs for improved confidence level information	33	14	11.70	R	PU	12
D33.2	Report summarising review of existing approaches for communicating confidence levels	33	14	11.70	R	PU	18
D33.3	Report describing formulation of strategies for communicating confidence levels for S2D forecasts	33	14	17.20	R	PU	30
D33.4	Report summarising results from Decision Laboratory experiments	33	14	10.70	R	PU	36
D33.5	Report describing strategy on communicating level of confidnce	33	14	8.20	R	PU	42
D41.1	Review of the climate information products of the WMO RA VI RCC-network useful to the decision maker	41	10	10.00	R	PU	36
D41.2	Preliminary Guidance	41	17	24.00	R	PU	40

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
	Document on the evaluation of the value of DMP						
D41.3	Report on the evaluation of the value of the DMP	41	14	18.50	R	PU	46
D41.4	Report on the impact of, and risk related to, climate forecasts on DMPs	41	20	24.00	R	RE	48
D41.5	Paper presenting the evaluation, skill and values of the decision making chains	41	11	23.00	R	PU	48
D42.1	Report summarising usefulness of each prototype	42	17	55.00	R	PU	24
D42.2	Report assessing the benefit of this climate service prototype using historical events and hindcasts	42	11	55.00	R	PU	36
D42.3	Release impact forecast for the prototype services and produce analysis of its impacts	42	1	55.00	D	PU	42
D43.1	Workshop reports including objectives, comparison of data supply and demand, feedback and conclusion	43	6	28.00	R	PU	42
D43.2	Produce a sector-specific publication demonstrating how a climate	43	6	21.50	O	PU	48

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
	service can be developed						
D43.3	Produce at least two videos summarising optimal use of S2D data in everyday decisions	43	22	14.00	D	PU	48
D43.4	Develop a mobile application to help access information produced by climate prototypes	43	6	21.50	D	PU	48
D44.1	Provide an inventory of existing climate data portals and their requirements	44	12	16.50	R	RE	30
D44.2	Plan to integrate prototypes into existing architecture and dissemination protocols	44	8	17.00	R	RE	36
D44.3	Report on usage of easy accessible media for dissemination project results to end users	44	22	11.00	R	PU	46
D44.4	Service status and usage report	44	6	22.00	R	RE	48
D44.5	Report on Web interface for end users of climate service prototypes	44	6	22.50	R	PU	48
D45.1	Report on methodology to assess business opportunities	45	18	51.50	R	PU	48
			Total	1,371.00			

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP1	Type of activity [54]	MGT
Work package title	Management of EUPORIAS		
Start month	1		
End month	51		
Lead beneficiary number [55]	1		

Objectives

The main aims are:
To run a well managed project, involving stakeholders, and
Achieve the maximum benefit to the users, wider community and European Commission through delivery of results and agreed deliverables on time and in full.
Primary objectives within this work package are:
• Provide top level management of the project to ensure aims of the project are efficiently and effectively met, on time and with the resources budgeted;
• Provide effective reporting and communication between the consortium and the European Commission;
• Ensure the appropriate level of consultation with the advisory board of independent experts;
• Coordinate and facilitate effective communication within the project, between partners and stakeholders; including information associated with all project management aspects.

Description of work and role of partners

The management of EUPORIAS is described in detail in Section B.2.1 (Management Structure and Procedures), but can be summarised in the following tasks:

Task 1.1: Manage the project using effective management procedures based on PRINCE2 (Projects IN Controlled Environments) formal methodology. PRINCE2 is de facto standard for project management used extensively by the UK Government and widely used in the UK and internationally. Managing the project includes the following (non exhaustive) activities:
Maintenance of the Consortium Agreement; Overall legal, financial, administrative management and reporting; Handling of legal issues, IPR and other issues under the responsibility of the Special Interests Management Group (dispute/complaints resolution); Handling of project correspondence and day-to-day requests from partners and external bodies; adaptation of project and management structure after changes in the workplan and the consortium; Implementation of competitive calls for the participation of new beneficiaries/partners; Organisation of meetings relating to the management of the project.

Task 1.2: Provide regular and comprehensive communication with the European Commission in Brussels. The conduit for this will be the EUPORIAS Coordinator. This task will ensure the appropriate follow-up of project obligations from the EC contract (scientific, reporting (of science results and finances), project reviews (as agreed under Special Clause 5 of the Grant Agreement), communication, and management. The EUPORIAS Coordinator will ensure that the appropriate EC representative is invited to the Management Board meetings. If there are any major problems within the project that cannot be solved through the appropriate management structure, the Coordinator will liaise with the EC in order to seek advice and a solution.

Task 1.3: Ensure the appropriate level of consultation with the Advisory Board. It is essential that the project receives independent advice and feedback from the Advisory Board, especially in relation to the direction of the scientific research and application through to prototype climate services. This task will be undertaken by the EUPORIAS Coordinator (with help from the EUPORIAS Administrator) to ensure that the consultations with the Advisory Board are organised and co-ordinated in an efficient and effective manner, and that advice given is reviewed and acted on as appropriate; Also the appropriate level of project information needs to be provided to the Advisory Board.

WT3:
Work package description

Task 1.4: Coordinate internal communication of the project. Share knowledge as widely as possible across the project. The project office will ensure optimal internal information exchange through a dedicated internal project website (that will be password protected). This will also host templates, documents and tools that the project office has developed that will aid the management and reporting of the project.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	50.00
	Total	50.00

List of deliverables

Deliverable Number [61]	Deliverable Title	Lead beneficiary number	Estimated indicative person-months	Nature [62]	Dissemination level [63]	Delivery date [64]
D1.1	Internal project website	1	2.00	O	CO	2
		Total	2.00			

Description of deliverables

D1.1) Internal project website: Development of internal project website. This will be used to facilitate the effective communication between partners within the project. It will be the tool for the legal, financial and administrative management of the project. [month 2]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP2	Type of activity [54]	OTHER
Work package title	Coordination across EUPORIAS, NACLIM and SPECS projects		
Start month	1		
End month	51		
Lead beneficiary number [55]	1		

Objectives

This Work Package is common to all three of EUPORIAS, NACLIM and SPECS to ensure their close coordination. Note that these three projects additionally have their own Management Work Package with specific objectives related to the successful running and delivery of that project's deliverables. The objectives of this common Work Package are to:
• Ensure close coordination between projects and activities in Europe in the area of seasonal to decadal climate predictions towards climate services;
• Provide thought leadership to the European Commission on future priorities in the area of seasonal to decadal climate predictions towards climate services.

Description of work and role of partners

Task 2.1 (led by Met O, at least initially): The three concurrently running projects (EUPORIAS, NACLIM and SPECS) will benefit from close coordination and cooperation to improve the activities undertaken in each of the projects and to help the European Commission achieve its wider aims in the area of seasonal to decadal climate predictions towards climate services. This task will involve the following activities:
• Representation from each of EUPORIAS, NACLIM and SPECS on each of the other project's management boards, as an observer at meetings without voting rights;
• Organisation of a joint kick-off meeting;
• Organisation of a joint final conference and proceedings;
• Joint dissemination and communication activities (for example, joint newsletters, an umbrella website for overarching coordination and dissemination activities).

Task 2.2 (led by Met O, at least initially): There are other European projects (for example ECLISE, CLIMRUN, COMBINE, EMBRACE, EUCLIPSE and IS-ENES2) and European activities already underway which it would be of mutual benefit to ensure close coordination with, as well as global activities affecting Europe such as the Global Framework for Climate Services. This task will involve the following activities:
• Coordinate a European climate observations, modelling and services initiative (ECOMS);
• Create a "Think Tank" to make recommendations to the European Commission for priorities for European activities relating to observations, modelling and services to be aligned with the Global Framework for Climate Services. It is anticipated that the European Commission will use these recommendations in their planning for Horizon2020;
• Convene ECOMS Board meetings to discuss priorities for European activities relating to climate observations, modelling and services for seasonal to decadal timescales.

The ECOMS Board will be formed as follows:
1. Coordination Team comprised of the three concurrent project coordinators: Chris Hewitt (Chair), Francisco Doblas-Reyes, Detlef Quadfasel;
2. Independent Advisors comprised of the following people:
• Coordinators of existing FP7 climate modelling and climate service-related projects
• Representative of the European Commission
• Representative of the Global Framework for Climate Services
• Representative of the International Climate Services Partnership
• Representatives of other relevant initiatives.

WT3:
Work package description

Three working groups (WG) will be established for coordinating the discussion:
WG1 on the broad topic of observations and monitoring, led by NACLIM
WG2 on the broad topic of modeling and infrastructure, led by SPECS
WG3 on the broad topic of user/stakeholder engagement, led by EUPORIAS

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	13.00
	Total	13.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D2.1	Report of recommended priorities for Horizon 2020	1	2.00	R	PU	5
D2.2	Summary report of ECOMS Board meetings	1	2.00	R	PU	29
D2.3	Conference and proceedings showcasing projects' outcomes	1	1.00	R	PU	51
		Total	5.00			

Description of deliverables

D2.1) Report of recommended priorities for Horizon 2020: Short report of recommended priorities for Horizon 2020 to consider for European activities relating to observations, modelling and services for seasonal to decadal timescales [month 5]

D2.2) Summary report of ECOMS Board meetings: Short report arising from ECOMS Board meetings summarising coordination progress and plans [month 29]

D2.3) Conference and proceedings showcasing projects' outcomes: Conference (with summary report and minutes) and proceedings showcasing the outcomes of EUPORIAS, NACLIM and SPECS and the co-ordination [month 51]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS1	ECOMS Board first meeting to discuss priorities for European S2D climate service activities	1	4	ECOMS Board in place. First meeting held. MS1 is co-ordinated by EUPORIAS and SPECS

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP3	Type of activity [54]	RTD
Work package title	Scientific coordination of EUPORIAS		
Start month	1		
End month	51		
Lead beneficiary number [55]	1		

Objectives

To establish and maintain the scientific coordination in order to meet the scientific objectives of the project.

Description of work and role of partners

The tasks below will primarily be the responsibility of the EUPORIAS Science Coordinator who provides the scientific leadership for the project.

Task 3.1: Carry out the scientific coordination and monitoring of the research themes, work packages, work package leaders and project progress milestones. This task includes verifying the quality, consistency and timeliness of the work and deliverables. It also includes preparing the scientific element of the reports and deliverables to be submitted to the EC.

Task 3.2: Co-ordinate the interdisciplinary activities and cross-cutting activities. This task is necessary in order to make maximum use of the scientific and innovative research within the project, ensure it meets the needs of the identified users and policy makers, and avoids duplication of effort. The Science Coordinator will organise meetings (utilising electronic remote methods wherever possible) with all the work package leaders to facilitate this task.

Task 3.3: Management of scientific risk. This will include resolving any conflict relating to technical issues. It will mean acting on unforeseen events and adapting work packages as required.

Task 3.4: Another major task here is case studies coordination. This will be led by the Science Coordinator, but heavily involve the work package leaders and stakeholders.

Task 3.5: Actively participate in scientific decision making bodies such as scientific advisory boards and panels, and executive and steering committees. This will be to provide specialist advice and to promote the project, its methodologies and results.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	8.00
	Total	8.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
		Total	0.00			

WT3:
Work package description

Description of deliverables

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS2	Selection of prototype case studies	1	16	Selection by General Assembly, and shared with WP 42

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP4	Type of activity [54]	OTHER
Work package title	Dissemination and outreach		
Start month	1		
End month	51		
Lead beneficiary number [55]	1		

Objectives

Primary objectives within this work package are:
• Encourage and facilitate communication, promotion and dissemination of project progress, results and achievements;
• Oversight and management of the stakeholders within the project and ensure optimum exchange of information between stakeholders and the project;
• Ensure that all the data used within the project are available in a predefined format and in a common location.

Description of work and role of partners

The activities within this Work Package will closely interact with the individual dissemination activities of the other work packages in the project. Section B.3.2 describes that plans for the dissemination and exploitation of the project results. The overall responsibility for these plans will lie within this Work Package.

Task 4.1 (Lead Met O): Preparation of a project information-pack containing a one-page project summary, a press release and graphical material. This preparation will begin during the kick-off meeting.

Task 4.2 (Lead Met O): Dissemination plan. This will be developed at the start of the project, including discussions with partners during the kick off meeting. The plan will contain the project specific guidelines that all participants will have to follow when providing information and results from the project.
Opportunities will be actively sought out to present the project at external conferences such as the AGU and EGU general assemblies, or WCRP workshops. Specific seminars will also be organised with the aim of networking with other projects and experts in the same field.

Task 4.3 (Lead Met O): Public facing website will be designed, tested and released as soon as possible after the start of the project. This will contain the basic information about the project.

Task 4.4 (Lead Met O): Oversee the coordination of the stakeholder participation. Involving the selected stakeholders is key to defining the user requirements for this project and building upon their expertise. This will occur in WP 11. This task has been specifically set up to ensure that the stakeholders are fully involved and integrated into the project so that they can promptly benefit from any results EUPORIAS will generate. The Science Coordinator will work with other partners to establish the stakeholder group very early on in the project and will represent the stakeholders on the Management Board and at the General Assembly.

Task 4.5 (Lead ENEA): Organise two summer schools for junior researchers in the area of climate science and stakeholder application. These summer schools will be open to junior researchers within and beyond the project, in order to educate and train them in the arena of climate science and stakeholder engagement. This will develop and train new research expertise to interface between seasonal to decadal science and stakeholder application. Each summer school will cover fundamental climate and predictability issues and specific applications issues related to the EUPORIAS sectors. The central section of each workshop will be focused on a variety of ‘cross-over’ themes essential for the delivery of climate services. These will include, for example, the correct interpretation of ‘seasonal forecasts’ and associated uncertainties, presentation issues, decision processes, and transfer methods. Extensive practical and lab sessions will be organised as part of these summer schools, for the junior researchers to practise methods in which to engage stakeholders in the risk assessment evaluation based on seasonal to decadal information.

Task 4.6 (Lead UC): Data Flow Management. All data information will be electronically documented into a web application on the project website. A comprehensive and well defined set of metadata will help users to find and to retrieve the different information. Training and advice on data sources, data formats and metadata will be provided for users within the project.
This Task will also manage the flow of data from external sources into the project (such as from GPCs and other projects funded under this FP7 call). This data will be gathered, appropriately formatted, catalogued and made available for use by EUPORIAS.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	13.00
3	ENEA	3.00
5	UC	8.00
	Total	24.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D4.1	Project Information Pack	1	1.00	O	PU	3
D4.2	Updated Dissemination Plan	1	1.00	R	PP	2
D4.3	External project website	1	3.00	O	PU	3
D4.4	Organise and deliver first summer school for junior scientists	3	3.00	R	PU	34
D4.5	Organise and deliver second summer school for junior scientists	3	3.00	R	PU	46
		Total	11.00			

Description of deliverables

D4.1) Project Information Pack: A project pack will be put together to provide information about the project to both colleagues and the media so that it can be distributed by project partners. [month 3]

D4.2) Updated Dissemination Plan: Update the dissemination plan. The plan will ensure the optimal dissemination and use/exploitation of project results. The description will cover the consortium strategy for dissemination and measures regarding the use of results and the dissemination of foreground during the lifetime of the project and afterwards. The plan will be prepared in cooperation with EUPORIAS and SPECS, to make sure that common activities planned under WP2 "Coordination across EUPORIAS, NACLIM and SPECS projects" are included and harmonised. [month 2]

D4.3) External project website: Development of a public facing project website, and URL released. Project factsheet will be produced and placed on the website. This website will be continually maintained and updated to provide EUPORIAS information to audiences worldwide. [month 3]

D4.4) Organise and deliver first summer school for junior scientists: Summer school will be open to junior researchers to train them in the arena of climate science and stakeholder engagement. Summary report will be available on project website. [month 34]

D4.5) Organise and deliver second summer school for junior scientists: Second summer school will be open to junior researchers to train them in the arena of climate science and stakeholder engagement. Summary report will be available on project website. [month 46]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP11	Type of activity [54]	RTD
Work package title	Assess sector-specific vulnerability		
Start month	1		
End month	36		
Lead beneficiary number [55]	3		

Objectives

Main Objectives:
This WP will elaborate on vulnerabilities in the key sectors (energy, water, health, food security, infrastructure, forestry and tourism) and will design a bottom-up approach for identifying relevant vulnerability information for main European economic sectors. The WP will focus on the identification and analysis of sector-specific vulnerabilities based on an effective dialogue with stakeholders started early in the process and sustained throughout the project. It will contribute to (1) the identification of the relevant vulnerabilities (objective 2) for the case studies; and (2) support the advancement of the science underpinning the delivery of climate information for the most vulnerable economic sectors in Europe (objective 5).

Specific Objectives:
• To raise awareness of seasonal and decadal predictions and their limitations through a close interaction with a number or stakeholders (Task 11.1);
• To identify critical sector specific vulnerabilities operating on seasonal to decadal time scale (Task 11.1 and Task 11.2);
• To contribute to a prototype component of the CUIP (Climate User Interface Platform) within the GFCS (Global Framework for Climate Services) in terms of targeted vulnerability information and tailored data-flow in relevant European economic sectors for seasonal to decadal time scales (Task 11.3).

Description of work and role of partners

This work package will help EUPORIAS rapidly develop a first order product which directly addresses the users' needs and interests using the sector specific terminology. Such a preliminary product will help trigger further interests from business and decision makers at an early stage. This work package will help EUPORIAS rapidly develop a first order product which directly addresses the users' needs and interests using the sector specific terminology. Such a preliminary product will help trigger further interests from business and decision makers at an early stage.

Task 11.1: European Stakeholder Climate Services Conference (E2SC). This conference will be the start-up of the EUPORIAS process. The E2SC will initiate a dialogue between experienced climate information providers and those who currently use or wish to use such information, specifically on seasonal and decadal time scales. The objective of the E2SC is to ultimately establish a climate services network at European level, by piloting the service delivery in key sectors (energy, tourism, water, forestry, health, transport, agriculture and European support for developing countries). The E2SC will allow EUPORIAS to develop a stakeholder board and a first collection of information on vulnerabilities. The E2SC conference will be organised by Met O and ENEA, during the EUPORIAS kick off meeting, to facilitate the participation of a large number of stakeholders. The partners will ensure the link with key stakeholders: health (IC3), energy (EDF, ENEA), tourism (TEC), water (CETaqua, UL-IDL), food security (WFP), forestry (ULUND, UL-IDL), and transport (SMHI). The conference will provide an overview of the skills and limits of seasonal-to-decadal predictions. Stakeholders will present their business model and their perception of the importance of seasonal-to-decadal information for decision-making in different sectors.

Task 11.2: Assess sector-specific vulnerabilities.
This task will include:

i) A review of stakeholder identification and engagement. Based on the E2SC results, this task will develop a first information table where sector-specific vulnerabilities will be detailed in terms of climate information, time horizon, uncertainty level, economic impact.
ii) Continuously monitoring the stakeholders' awareness through questionnaires, surveys, targeted workshops during the entire project. Sustained two-way interactions will allow stakeholders to further detail the vulnerabilities during the project development. Sector-specific vulnerabilities will be identified through a number of workshops and follow-up discussions with the members of the stakeholder group. The organization of stakeholder's workshops or site-events along the project will be coordinated with WP 12 which will focus on specific user's needs and WP 42 on pilot projects. Given that some sectors will be more prepared than others to the use of seasonal and decadal information (e.g. gas price depends on the prediction for the coming winter; increased wind-throw damage due to wetter and non-frozen soils during the winter storm season, add to that the possibility of increased storm intensity) the workshops will provide an effective opportunity for a two-way interaction between scientists and decision makers.
iii) Based on workshop results, this work package will also provide a preliminary assessment of the adaptive capacity of each sector as this is a fundamental component of the climate risk on seasonal to decadal time scales.

Weather services will support the organisation of these workshops (IPMA, Met O, Meteo-RO, and DWD) in order to ensure a good connection with their stakeholders and to link to the CUIP of WMO. The partners will ensure the link with key targeted stakeholders: health (IC3), energy (EDF, ENEA), tourism (TEC), water (CETaqua, UL-IDL), food security (WFP), forestry (ULUND, UL-IDL), and transport (SMHI).

Task 11.3: Contribution to GFCS CUIP. WP 11 will integrate the information gathered in Tasks 11.1 and 11.2, and the information from WP 12 (Task 12.3), to prepare stakeholder's tailored data to be inserted in a prototype component of the CUIP of GFCS. The EUPORIAS CUIP will be linked to the WMO-Climate Services User Interface, specific effort will be provided by weather services (IPMA, Met O, Meteo-RO, and DWD). Functional analysis of stakeholder's needs (WP12) will be used to introduce targeted seasonal-to-decadal data into the CUIP together with targeted vulnerabilities information in different sectors: health (IC3), energy (EDF, ENEA), tourism (TEC), water (CETaqua, UL-IDL), food security (WFP), forestry (ULUND, UL-IDL), and transport (SMHI). This CUIP will integrate information from the climate watch system which has been set up by WMO and national meteorological and hydrological services (NMHSs) to improve the risk management capacity of nations facing climate extremes. WMO climate watch systems are early warning systems, which are designed to provide advice and statements to inform their users, particularly those involved in natural hazards preparedness, mitigation and response, about evolving climate anomalies at the regional and national levels, thus allowing them to make informed decisions (http://www.wmo.int/pages/themes/climate/climate_watch.php).
Mainly based on DWD activities and on other NMHSs, the climate watch system will connect information on present and future climate by integrating seasonal-to-decadal forecasts and climate monitoring. One of the tasks of the WMO RA VI Regional Climate Centre on Climate Monitoring (RCC-CM), hosted by DWD (Deutscher Wetterdienst) is to set up a climate watch system for the RA VI Region (Europe and Middle East) which has been fixed in the RCC Implementation Plan (http://www.wmo.int/pages/prog/dra/eur/RAVI_RCC_Network.php) on sector-specific vulnerability.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	3.00
2	TEC	8.00
3	ENEA	14.00
10	DWD	15.00
11	IC3	4.00
13	UL	7.00
15	SMHI	5.00
16	ULUND	3.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
18	CETaqua	5.00
19	IPMA	3.00
20	WFP	2.00
23	EDF	0.50
24	Meteo-RO	2.00
	Total	71.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D11.1	Outlook of sector specific vulnerabilities for Europe S2D horizon	3	15.50	R	PU	12
D11.2	White paper on sector specific vulnerabilities	10	26.00	R	PU	36
D11.3	Online European Climate User Interface Platform	1	30.00	P	PU	36
		Total	71.50			

Description of deliverables

D11.1) Outlook of sector specific vulnerabilities for Europe S2D horizon: Results partly based on European Stakeholder Climate Services Conference [month 12]

D11.2) White paper on sector specific vulnerabilities: Sectors to be focussed on are Energy, Tourism, Water, Forestry, Health, Transport, Food Security and Agriculture, East Africa Disaster Risk Reduction, and European Support to Developing Countries [month 36]

D11.3) Online European Climate User Interface Platform: Online prototype European Climate User Interface Platform (linked with WMO-Climate Services User Interface) tailored for Energy, Tourism, Water, Forestry, Health, Transport, Food Security and Agriculture, East Africa Disaster Risk Reduction, and European Support to Developing Countries [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS3	Establishment of Stakeholder Board	3	4	Jointly led with Met O, and an outcome of European Stakeholder Climate Services Conference

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS4	Preliminary report on sector specific vulnerabilities	10	9	Preliminary Report
MS5	Climate User Interface Platform prototype component	1	24	Will be available to input into WP 12

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP12	Type of activity [54]	RTD
Work package title	Assessment of users' needs		
Start month	1		
End month	24		
Lead beneficiary number [55]	14		

Objectives

Assessment of S2D climate prediction user needs across European society.

Description of work and role of partners

Building upon the experience of previous projects such as CLIMRUN, ECLISE, CIRCLE and IS-ENES, and through direct engagement with stakeholders across Europe, the WP aims to improve our understanding of S2D user information needs across European society. Effective decision support begins with the identification of information or knowledge which decision-makers need (and when and how) and what is feasible for science to deliver (NRC 2009). If S2D climate predictions and associated scientific knowledge is to become more useful and directly usable by decision makers a deeper understanding of user needs, than is currently available in the literature, is vital.

Task 12.1 (all participants): Systematic literature review of the use of S2D prediction across all sectors.

Task 12.2 (all participants, lead UNIVLEEDS): Workshop with NMHSs and other stakeholders. While there is little academic literature on S2D user needs, national meteorological organisations and others involved in S2D prediction have reasonable in-house knowledge of user needs through their engagements with stakeholders. This workshop aims to elicit this in-house knowledge.

Task 12.3: Expert interviews with key stakeholders (lead UNIVLEEDS; TEC targets tourism sector; IC3 renewable-energy and health; MeteoSwiss reinsurance industry; Predictia road weather forecasting; CETaqua water resources; AEMET water, forest fires and tourism; ENEA electric grid managers; UL-IDL energy, water resources, forestry and agriculture; ULUND forestry; UC agriculture, energy or transportation; WHO/Europe health; EDF energy). A semi-structured interview protocol of around two hours (depending on the size and jurisdiction of the organisation) will be developed and implemented with around 100 stakeholders. The protocol will include questions on: context (e.g. regulatory environment, business model); climate information currently used in decision-making; non-climatic information currently used in decision-making; uncertainty tolerability; and expectations of science. In order to assess current knowledge systems, we will assess whether users find existing climate (and climate impacts) information credible, legitimate, actionable and salient (Jones, Fischhoff et al. 1999; Cash, Clark et al. 2003; Meinke, Nelson et al. 2006).

Task 12.4 (all participants, lead UNIVLEEDS): Database of users and their needs. Through Tasks 12.1 and 12.2 we will build a database of current and potential users of S2D climate prediction.

Task 12.5 (all participants, lead UNIVLEEDS): Surveys of users' needs. Task 12.2 will only achieve partial coverage of the 'user space' because interviews and stakeholder engagement are time consuming activities. In order to gather more representative samples of user needs across society, surveys will be conducted at the national and sectoral level targeting the users identified in Task 12.4 and excluding those approached in Task 12.3.

Task 12.6 (all participants, lead UNIVLEEDS): Workshop with S2D climate prediction developers. This workshop will link directly to the community developing the new generation of S2D climate prediction models to promote two-way to inform of the existing gaps existing between current needs and available services. Such a feedback

mechanism will either work through the project SPECS or through the direct link existing within the WMO GPCs which are partners in this project.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	3.00
2	TEC	9.00
3	ENEA	8.00
4	MeteoSwiss	2.00
5	UC	6.00
6	Predictia	6.00
7	AEMET	1.00
11	IC3	9.00
13	UL	4.00
14	UNIVLEEDS	29.00
16	ULUND	2.00
18	CETaqua	4.00
19	IPMA	4.00
21	WHO	7.00
23	EDF	0.50
24	Meteo-RO	1.00
	Total	95.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D12.1	Literature review of the use of S2D predictions across all sectors	14	9.55	R	PU	3
D12.2	Report on findings on S2D users' needs from workshop with meteorological organisations	14	19.10	R	PU	6
D12.3	Report summarising users' needs for S2D predictions	14	47.75	R	PU	23
D12.4	Report on findings from workshop with S2D climate prediction developers	14	19.10	R	PU	24
		Total	95.50			

Description of deliverables

WT3:
Work package description

D12.1) Literature review of the use of S2D predictions across all sectors: Literature review of the use of S2D predictions across all sectors [month 3]

D12.2) Report on findings on S2D users' needs from workshop with meteorological organisations: Report on findings on S2D users' needs from workshop with national meteorological organisations and other stakeholders [month 6]

D12.3) Report summarising users' needs for S2D predictions: Report summarising users' needs for S2D predictions, post expert interviews with key stakeholders from targeted sectors [month 23]

D12.4) Report on findings from workshop with S2D climate prediction developers: Report on findings from workshop with S2D climate prediction developers [month 24]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS6	Workshop with national meteorological organisations and other stakeholders	14	3	Workshop minutes released
MS7	Preliminary report on user needs	14	12	Report released
MS8	Preliminary report on surveys of users' needs	14	18	Report Released
MS9	Workshop with S2D climate prediction developers	14	23	Workshop minutes released

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP21	Type of activity [54]	RTD
Work package title	Calibration and downscaling		
Start month	1		
End month	48		
Lead beneficiary number [55]	15		

Objectives

• To develop and apply a set of bias-correction and downscaling methods for use with seasonal to decadal forecasts;
• To downscale standard climate variables and advanced climate indices for use in the EUPORIAS case studies;
• To assess the uncertainty associated with the downscaling methods in collaboration with WP 33;
• To make available, through the EUPORIAS web portal, downscaled data, along with a number of calibrated methodologies.

Description of work and role of partners

Seasonal to decadal forecasts are generally available as an ensemble of multi-GCM output, presently made at GCM resolutions of ~100-200km, with reliable forecast information at the ~500-1000km2 scale. Climate service applications often require information at significantly finer spatial scales. To bring GCM data to such scales some form of downscaling is required. Furthermore, seasonal to decadal forecasts are generally inaccurate when compared to observed climate outcomes. Such systematic biases must be corrected for successful use of forecast data. In particular we aim to correct climatological, systematic biases as a function of the annual cycle. For all the remaining sources of 'errors' such as, for example, the poor representation of ENSO teleconnections into the Indian ocean and their impact on prediction skill/accuracy, or the poor representation of local soil moisture response to anomalous large scale circulation anomalies, the WP will critically evaluate hindcast accuracy of both the GCMs (on larger scales; atmosphere and SSTs) and the RCMs (local to the region) against suitable observations. This will be done in collaboration with e.g. SPECS, Africa-CORDEX, and CSRP initiative. While it is out of the scope of this project to develop the next generation of models, EUPORIAS is expected to play an important role in the identification of the model errors most relevant to impact prediction. These errors will then be communicated to the S2D models' developers (e.g. SPECS) through the specific workshop organised in WP 2.

This WP addresses the provision of downscaled and bias-corrected seasonal-to-decadal forecasts for use in EUPORIAS impact (WP 23) and climate service (WP 41) applications. The primary timescale addressed is ~one season to one year, with a limited investigation of ~two to 10 year timescale. The focus area is Europe, with a second focus being East Africa, with particular reference to food security and agriculture.

Task 21.1: Statistical Downscaling and Bias correction of GCM forecasts over Europe.
Over Europe, where high-quality observations exist, statistical downscaling (SD) will be the main approach. Existing methods will be further improved using new observations and reanalysis data and applied to seasonal-decadal hindcasts available from ENSEMBLES, EUROSIP and CMIP5. Work will be coordinated with the EU COST-action, VALUE, the WCRP CORDEX project and the WMO Global Framework for Climate Services. Bias-correction and SD will be applied to the full multi-GCM ensemble set, with an emphasis on extending the downscaled data beyond standard climate parameters, to derive indices of direct use in impact models. The definition of such parameters, along with the optimum spatial and temporal scale for the final products will be decided in dialogue with stakeholders. WP 23 will assess the added value of this downscaled data compared to simpler climate information indices (CII), derived directly from GCM data. During the second half of the project, a number of the more successful SD methods will be applied to operational forecasts either from the EUROSIP data set or from the UK Met Office Glosea5 seasonal prediction system to aid in the transit from research use to quasi-operational applications linked to one or more prototype climate services in WP

42. The accuracy of the GCM hindcasts on the larger scales used to drive ESD downscaling will be critically compared to observations and errors identified communicated to the model development teams and SPECS.

UC: Extend the MeteoLab statistical toolbox (http://www.meteo.unican.es/ensembles), to provide calibrated and downscaled derived climate indices, as defined by stakeholder groups and required as input to a range of impact assessment models.
MeteoSwiss: Lead an assessment of the added-value of advanced SD data compared to simpler CIIs derived from GCM forecasts, emphasizing services in the insurance sector.
KNMI: Downscale GCM forecasts for predicting variability in Rhine river discharge, link discharge extremes to specific precipitation indices and snow conditions over the Rhine catchment and compare discharge forecasts against observed estimates.
SMHI: Provide data to the hydropower industry and European flood risk estimation using the E-HYPE model. Bias correction and SD using a modified version of the Distribution Based Scaling Method (Yang et al. 2010), while SD methods will downscale multi-GCM forecast circulation patterns to basin-scale seasonal discharge for use in hydropower applications.
EDF: Adapt analogue method for downscaling temperature and precipitation from seasonal hindcasts and compare results to observations in mountainous regions of France. Downscaled data will be used in EDF hydrological models and the resulting run-off compared to current methods. Downscaling targeted to the hydropower sector will be inter-compared across contributing partners.
MF: Apply two SD methods, a physically-based climatological correction procedure and a weather-type conditional sampling tool, to downscale GCM ensemble forecasts of temperature and precipitation to ~10km scale for France. This data will be used in WP 23 to drive a SVAT model and river-routing system to produce seasonal soil water and river forecasts over France.

Task 21.2: Combined Statistical and Dynamical Downscaling over East Africa.
Precipitation and temperature exhibit better predictability at seasonal timescales over East Africa than regions in the extra-tropics, potentially allowing forecast data to be applied in sectors such as: food security, drought early-warning and human health. This will assess the utility of dynamical downscaling (DD), combined with statistical methods (SD), to provide seasonal forecast data for impact models over the region. In particular, the World Food Programme (WFP) will assess the utility of downscaled data in their drought early-warning system (LEAP, http://www.wfp.org/disaster-risk-reduction/leap), concentrating on seasonal hindcasts from a number of case study years.

Due to the lack of observations, producing robust SD climate data for East Africa is a challenge. This task will therefore investigate the ability of Regional Climate Models (RCMs) to downscale global seasonal hindcasts over East Africa, assessing the level of added-value compared to the driving GCM and to SD applied to the same GCM hindcasts. This assessment will be in terms of both forecast accuracy and as input data to the LEAP system. The SD methods developed in Task 21.1 for Europe will be optimized for East Africa, to the extent possible based on regional observations. This will be applied to GCM hindcasts to generate statistical relationships between simulated large-scale circulation features and regional surface temperature and precipitation. Due to the need to downscale numerous years and ensemble members to establish hindcast accuracy, this task addresses the basic feasibility of dynamically downscaling GCM forecasts and the utility of the resulting data in targeted applications. The RCMs will downscale anomaly-initialized (ANI) hindcasts made by the latest version of the EC-Earth coupled GCM (Hazeleger et al. 2010).
DD will be used in combination with ANI GCM hindcasts to avoid potential problems which may arise when an RCM is forced by GCM forecast data that includes a drift term during the forecast period. The use of anomaly initialised approach for the driving GCM will limit the systematic bias & potential drift in the GCM fields.
Two outcomes of the WP will therefore be, an evaluation of the added value of DD over the driving GCM and an assessment of the feasibility of a GCM-RCM seasonal prediction system using anomaly-initialization. These findings will be compared to a similar activity, external to EUPORIAS, pursued by the UK Met Office (CSRP), where HadRM3 will downscale, for East Africa, hindcasts made with the Glosea5 global prediction system employing full-field initialization. Coordination of study years between EUPORIAS and CSRP will allow a comparison of findings, helping direct future efforts to produce regionally-detailed seasonal forecasts in data-poor regions such as East Africa.
A limited number of years will be chosen for dynamical downscaling, identified through a combination of high societal importance, availability of verification data and the existence of large-scale climate anomalies over the region. Where possible, years will be selected that exhibit opposite signed large-scale anomalies, to aid in determining if DD adds local value to large-scale anomalies amenable to simulation by a GCM. For the selected years an ensemble of GCM hindcasts will drive four high-resolution RCMs on a common domain. The domain

and resolution, as well as the years studied, will be decided in consultation with WFP and other stakeholders in the region. The GCM-RCM combined hindcasts will be compared to SD data derived from the same GCMs runs. The task will also try to use the GCM-RCM simulations as a surrogate for observations to optimize SD methods developed for the region. Any RCM-specific problems over Africa, will be communicated to model development teams and through the cross-project WP 2.

Model level data is available from a CMIP5 historical simulation with EC-Earth to drive the four RCMs over 1979-2010, providing individual GCM-RCM climatologies for the region. Six month EC-Earth ANI hindcasts will be made for the selected years, employing an ensemble of ~25 members, for DD by the four RCMs. Combining the respective EC-Earth-RCM hindcasts with the equivalent EC-Earth-RCM 1979-2010 climatology, high-resolution forecast anomalies will be derived for the RCM domain. These will be used as input to EUPORIAS impact models, such as the WFP LEAP. SD will also be applied to hindcast data available from operational EUROSIP GCMs, all using full-field initialization, providing an opportunity to compare SD data from bias-corrected full-field initialized GCM hindcasts to the DD and SD data from the ANI GCM runs.
DD of all GCM members is computationally expensive. An operational GCM-DD system would require a form of pre-selection to reduce the number of forecasts to downscale (we consider a reduction from ~25 to ~10). Such a process should be weighted towards the consensus forecast, while also sampling the spread of GCM output. Such a process ideally would use a large GCM-RCM hindcast set. Unfortunately, such a dataset does not exist. Here we evaluate a simpler approach; For each start date, a median GCM hindcast will be selected, based on suitable indices. The remaining GCM members to downscale will be chosen to be part clustered within +/- 2/3 of the median, with a limited number from the upper and lower 1/3 of the range. This reduced GCM set will force the four RCMs for 6-month hindcasts. Two of the RCMs (RCA4 and COSMO-CLM) will downscale all 25 GCM members. Comparison of the full and reduced GCM-RCM sets from these two RCMs will indicate the loss of information resulting from pre-selecting a subset of GCMs.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	12.00
3	ENEA	10.00
4	MeteoSwiss	10.00
5	UC	32.00
9	WU	4.00
10	DWD	38.00
12	KNMI	12.00
13	UL	21.00
15	SMHI	34.00
17	METEO-France	9.00
19	IPMA	11.00
23	EDF	1.50
	Total	194.50

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D21.1	Report on the skill of downscaled seasonal hindcasts	10	61.00	R	PU	42
D21.2	Report on the added value of dynamical and statistically downscaled data	15	91.00	R	PU	42
D21.3	Report comparing climate information indices (CIIs)	4	24.50	R	PU	48
D21.4	Report on utility of data in the WFP LEAP	3	18.00	R	PU	48
		Total	194.50			

Description of deliverables

D21.1) Report on the skill of downscaled seasonal hindcasts: Report on the skill of downscaled seasonal hindcasts as input to impact models and case studies over Europe [month 42]

D21.2) Report on the added value of dynamical and statistically downscaled data: Report on the added value of dynamical and statistically downscaled data based on anomaly-initialized GCM hindcasts compared to basic seasonal GCM hindcasts [month 42]

D21.3) Report comparing climate information indices (CIIs): Report comparing climate information indices (CIIs) from advanced statistical downscaling with CIIs derived directly from GCM output [month 48]

D21.4) Report on utility of data in the WFP LEAP: Report on the utility of using dynamically and/or statistically downscaled GCM forecast data in the WFP LEAP (drought early-warning system) [month 48]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS10	RCM historical climate simulations driven by EC-Earth completed	15	15	Data saved
MS11	EC-Earth ANI hindcast runs for selected case-study years completed	15	15	Model level data saved and quality checked, and made available for downscaling
MS12	Provision of bias-corrected, downscaled data	10	24	Data made available for use in hydrology asssessment and impact models in WP 23
MS13	Provision of downscaled data	15	24	Data made available to support hydropower case studies and models

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS14	Provision of statistically downscaled surface climate data	5	27	Data from EC-Earth ANI hindcasts made available and quality checked
MS15	Provision of statistically downscaled surface climate data	5	30	Data from selected EUROSIP hindcasts made available and quality checked
MS16	Provision of derived climate indices using the meteo toolbox	5	30	Data made available to support case studies and selected climate service prototypes in RT4
MS17	Provision of dynamically downscaled data from ANI GCM hindcasts	15	32	Data made available as imput to WFP LEAP and other impact models
MS18	Provision of CIIs based on downscaled data	4	36	Data made available to case studies and climate service prototypes

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP22	Type of activity [54]	RTD
Work package title	Impact relevant climate information indices		
Start month	3		
End month	48		
Lead beneficiary number [55]	4		

Objectives

• To generate a user-targeted collection of climate information indices (CII) to provide the best and reliable estimate of the current and upcoming climate. As such, they provide an easy to use alternative to sophisticated, application specific impact models. The CIIs are selected in order to target applications defined by the case studies and user needs identified in WP 12;
• To evaluate, implement and assess methods to calculate the CII. The methods will be based on CII specific, computationally efficient algorithms combining the S2D data with specific climatological observational data sets available to the users. The quality and value of the CII will be assessed from an end-user perspective;
• To provide CII hindcasts and validation results to the case studies;
• To make available to partners the methods and evaluation results so that they can be integrated in the prototype climate services;
• To contribute to the optimal design and form of climate information for users and building the climate services envisaged in WP 42.

Description of work and role of partners

Task 22.1 (MeteoSwiss, IC3, KNMI, UL-IDL, IPMA, Met Office): set of preliminary CIIs.
A preliminary set of basic CII is selected from the existing definitions from the CII/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). The aim is to have available at least one CII for each case study covering the climate condition relevant for an important impact phenomena (Milestone 19). The probabilistic CIIs are calculated based on simple bias correction techniques and will be provided for the E-OBS gridded data set together with prediction skill estimates (Deliverable 22.1).

Task 22.2 (all participants of WP): Decision on a set of specialised CIIs.
Based on the outcome of WP 12, a broader, more complex and more specialized collection of CIIs will be decided on. Some CIIs will be local such as heating degree days or soil moisture, other CII will be based on spatio-temporal aggregations such as probability for tropical cyclones in a basin, European storminess, river discharge, or probability of a continental scale heat wave. Additionally, a set of corresponding reference series such as a set of station series of the ECA&D data set will be agreed upon as a common benchmark data set. Also, a basic set of validation measures will be agreed on to support comparability and inform the future users on the potential socio-economic value (Milestone 20).

Task 22.3 (all participants of WP): Implementation and calibration of CIIs.
Evaluate and select CII specific calculation methods, implement the corresponding tools and calibrate the methods using hindcast S2D data sets and global reanalysis data, gridded observations and station time series (ECMWF reanalyses, EURO4M, E-OBS, and ECA&D). The methods aim to take best into account model specific biases as assessed in WP 21, sample uncertainty and the probabilistic nature of the multi-model ensemble S2D data sets. Some methods for local CII must be calibrated separately for different observational data sets (e.g. gridded observations vs. stations series). Also, the calibration can depend on the resolution of the S2D data. The CII and corresponding methods are provided to the other WPs and users. Based on the validation measures chosen in Task 22.2, estimates of the prediction skill and uncertainties will complement the deliverable (Deliverable 22.2).

Task 22.4 (MeteoSwiss, IC3, KNMI, UL-IDL, IPMA, Met O): Validation of CIIs.

Validation strategies will be chosen that can cope with the probabilistic nature of the prediction, the sample size, time scale, the frequency of the events and take into account the user specific needs. It will be quantified how uncertainties of the multi-model ensemble S2D data sets translates into uncertainties in the resulting CIIs (Weigel et al., 2008, 2009). Also, trends due to anthropogenic climate change or long term climate variability in parameters such as temperature will be evaluated as an alternative source of predictability (Scherrer et al., 2005). Of special interest are windows of opportunity, i.e. the predictability of the skill in particular years or regions. Further, uncertainties from the observations will be taken into account, such as the small sample size in contrast to the much better sampling of the climate by the ensembles and the limited representativity of gridded observations or reanalysis data for local impact phenomena.
The WP will analyse if these additional sources of information and uncertainty are in the same order as the predictive power of the S2D forecasts and might contribute (or even be the dominant cause) of deterioration in the forecast skill and hence the reliable estimate of the climate to be expected for the current climate, upcoming year or decade. The results will make the CII forecasts as reliable as possible and contribute further to the suggested climate services prototypes (Deliverable 22.3).

Based on their respective expertise, participants will focus on specific families of CII:

MeteoSwiss will work on a set of CIIs relevant for the insurance sector.
This includes a selection of local ETCCDI indices and spatially aggregated indices over Europe that can be linked to hazardous events. Of particular interest are large scale wind storms (Della-Marta et al., 2009, 2010), heavy precipitation events, droughts and heat waves (Schaer et al., 2004). Such events will be investigated in terms of their spatial extent and temporal duration to quantify their relevance for the societal and insurance relevant total damage. Additionally, the severity relative to the local climate can help to estimate the societal vulnerability and resilience to specific events. Complimentary, the severity in absolute terms is related to fixed insurance-related thresholds.
A further interest of MeteoSwiss is validation measures taking into account the probabilistic nature and limited sample size (Weigel et al., 2007). At the same time, such quality information must be comparable and interpretable so that users are capable to properly inform their action strategies.

WHO/Europe will work on a set of CIIs relevant for the health sector.
WHO/Europe will update the WHO/Europe climate change and health outcome indicators tool. This tool contains six health and climate events relevant indicators. In particular WHO/Europe will provide information on the simple indices for heat-waves, floods, coldwaves and droughts relevant to human health and an indication on how they could be used in model parametization. A particular view will be on the usefulness for the health community to enable seasonal preparedness and response. So far a major difficulty has been the provision of relevant, sensitive and specific climate information. Therefore the tool will be revised building on the input of the variety of institutions involved in this project. These indicators can then be used to model and assess the success of any seasonal or decadal health relevant prediction. This work is very important for the implementation of the EU Adaptation Clearing House and the WHO/Eurore health information platform.
WHO/Europe will work on health relevant climate information indices together with the NMHSs. Many of these indices have not been tested within the health community, nor has their health sensitivity and specificity been assessed. A systematic review of these indices and their usefulness is required and where necessary a couple of epidemiological case studies might need to be prompted. Whilst some knowledge is available on which indices might be useful to monitor trends over time, little knowledge is available on which seasonal indices are relevant, with lowest ranges of uncertainty, to prompt health sector action.

IC3 UDIC (36PM) will work on a set of CIIs relevant for the health sector.
IC3 will participate in the assessment and refinement of health relevant climate indices and other relevant post-processing of the climate information derived in other WPs in EUPORIAS and that from other databases (ECA&D, ENSEMBLES, etc). This is needed to issue skilful S2D predictions of temperature-related mortality in the 54 (187) regions of Europe where the Case Studies will be implemented. IC3 will contribute to the climate services prototype for the health case study. This contribution will include contributions by two subcontractors who will be required to contribute a unique database of human mortality. The two sub-contrators will work in association with a part-time scientist funded by the project for one year in the update and calibration of the data. Information on age, sex, health status, demography, and societal adaptation capacity will be incorporated to the database by the subcontractors.

IC3 CFU (6PM) will work on a CII relevant for the energy sector.
A Climate Information Index will be developed for renewable energy production with a focus on the upper wind speed threshold for wind turbine operation. This wind speed threshold is approximately 60km/hr (depending

upon turbine specifications), above which a turbine breaking system is applied to slow down or stop it from spinning, to protect mechanical equipment from damage. The same CII can also be applied to the solar photovoltaic tracking systems, which have to move to a low energy yield, 'defensive' position, in high winds. The Index would be based on the number of days above this wind speed threshold, over one season, one year or several years.

KNMI will work on a set of CIIs relevant for the water sector.
KNMI will contribute to this WP with the ECA&D and EOBS data and tools to generate, evaluate and calibrate other user-oriented indices. The services that are developed will relate the forecasted values of the indices to the values in the past (mean, variability and trends). Different lead times and model configurations will be investigated.
KNMI will give special attention to meteorological indices which are directly relevant for high and low Rhine river discharges. The predictive skill will be assessed after applying the necessary bias corrections (see also WP21), based on a comparison of hindcasts and observations using relevant meteorological indices for high and low river discharges. In KLIWAS (2009) and Rheinblick2050 (Görgen et al., 2010), a methodology was generated to select the “representative models” based on an ensemble of hydrological model output. For hydrological summer low-flows the seven-day lowest mean discharge turned out to be the relevant parameter. The results obtained from the KLIWAS project will be utilized here to provide an overview of which climate model projections generate extreme flow conditions that mainly affect inland waterway transport for the Rhine. Here, the parameter “lowest seven-day mean discharge (NM7Q)”, as determined by a hydrological impact model, will describe extreme low-flows.

UL-IDL and IPMA will work on a set of CIIs relevant for the agriculture, forest, energy and water sectors. UL-IDL and IPMA intends to generate and evaluate CIIs to calibrate models tailored to our stakeholders needs. The predictive skill of agriculture relevant indices (influence of drought, precipitation, growing season length and temperature) will be assessed in the Douro demarcated region. The refinement of indices targeting water availability and temperature will aid the development of sustainable viticulture practices and operation planning and support phytosanitary measures. In conjunction with the national agriculture advisory services the ability of climate indices to provide an estimate of the crop vulnerability to pests will be evaluated. Temperature and precipitation indices will also be determined for forest fire prevention and growth. For energy and water resources tailored indices will be developed to aid for the management of supply and demand.

MeteoFrance and EDF will work on a set of CIIs relevant for the energy and water sectors.
The CIIs will be developed using new products elaborated over France in WP 21. In close collaboration with different stakeholders, the services will be tailored to the different DMP with operational provision perspectives. These climate indices will target both national and more local scales, especially selected river catchments where the predictability has been demonstrated (Céron et al. 2010) ; e.g. the Seine river (large river catchment associated with important stakes), the Durance river (small mountainous river catchment associated with strategically stakes for hydropower), the Garonne river (large river catchment partly from a mountainous area, snow influence and important stakes related to fresh water and agriculture). For the energy domain the winter and summer seasons will be especially targeted. For water management domain, spring and summer stakes will be carefully addressed. Depending on the outcomes of the EURO4M project, the methods could be extended to Europe using one of the EURO4M deliverable which is a fine mesh near-real time near surface parameter analysis.

Met Office will work on a set of CIIs relevant for the energy, infrastructure and insurance sectors.
The contribution will have two main areas: variables related to energy transmission and distribution networks, and tropical cyclones. Met Office will complement the activities in this WP with the data management to ensure that the variables from GloSea5, ENSEMBLES and EUROSIP hindcasts are available in a standard format in a predefined location to all partners. This standardisation will serve the efficiency of the whole project.

ENEA will work on a set of CIIs relevant for the energy sector.
ENEA will develop electricity demand forecasts, due to its marked relationship with weather variables (especially air temperature). The statistical model to be used is based on a neural network and auto-regressive processes. The application of seasonal forecasts will be investigated with a particular focus on the periods where demand/supply management is more critical, e.g. summer period in warm areas of Italy. This study will be performed applying statistical tools such as time-series models and neural networks with a validation considering the data provided by TERNA, the Italian transmission grid operator.

UC will work on a set of CIIs relevant for the fires, health and energy sectors.

UC will incorporate basic daily weather derived indexes for fires, health and energy sectors as target variables for the downscaling process and evaluate them to be incorporated as additional outcome linked with WP 42 and WP 44.

Meteo-RO will work on a set of CIIs relevant for the water sector.
Meteo-RO will focus primarily on the Danube catchment to contribute to the case study and potential climate services and knowledge transfer to local stakeholders.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	12.00
3	ENEA	9.00
4	MeteoSwiss	30.00
5	UC	6.00
11	IC3	42.00
12	KNMI	25.00
13	UL	21.00
17	METEO-France	13.00
19	IPMA	12.00
21	WHO	12.00
23	EDF	1.50
24	Meteo-RO	3.00
	Total	186.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D22.1	Maps of preliminary CIIs of seasonal forecasts and hindcasts	4	40.00	P	RE	24
D22.2	Provide methodology to calculate CIIs and their skill	4	88.00	R	RE	36
D22.3	Report on validation of CIIs	4	40.00	R	PU	48
		Total	168.00			

Description of deliverables

D22.1) Maps of preliminary CIIs of seasonal forecasts and hindcasts: CIIs based on simple post-processing techniques on E-OBS grid. [month 24]

D22.2) Provide methodology to calculate CIIs and their skill: Methodology to calculate CIIs will be provided, plus their skill for the selected climate service prototypes. [month 36]

D22.3) Report on validation of CIIs: Report will document the results of the WP and in particular the validation of the CIIs. [month 48]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS19	Agreement on preliminary set of CIIs	4	6	Set agreed on by WP partners
MS20	Agreement on specialised set of CIIs	4	12	Set agreed on by WP partners

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP23	Type of activity [54]	RTD
Work package title	Impact models for impact predictions		
Start month	3		
End month	38		
Lead beneficiary number [55]	1		

Objectives

To further develop the complex impact models able to address the users' needs and inform the case studies and the prototypes:
• To develop a prototype operational workflow to use these models in S2D forecast mode;
• To assess and improve their predictive skill by analysing hind casts of low- and high-end impact events (hi/lo discharge, crop yields, etc);
• To develop optimal geographical forecasting units, as a function of model physics and stakeholder needs.

Description of work and role of partners

THIS WP IS JOINTLY LED BY WU and Met O.
One of the main tasks of this work package is the development of the underpinning impacts models that will be used within the sector specific products. Their development will be informed by the results of RT1 and will be based on the existing impact models available within the consortium. We will utilise impacts models for a range of sectors including water, food security and forestry. The skill of the models will be assessed with respect to their accuracy for key sector specific variables e.g. high/low river-flow events.

While the work-package is solidly based on model development that is currently ongoing in some of the partner institution it is our intention to keep some level of flexibility in the project so that ad-hoc development driven by user needs can occur within the project.

Seasonal and decadal hindcasts will be evaluated with respect to their accuracy for key sector specific variables as to be defined in WP 12. These assessments will be based on the comparison between hindcast simulations and observed impact and will focus on a number of case-studies.

More specifically the WP will analyse and assess in detail for specific CC-IAV combinations the predictive skill on seasonal to interannual time scales for water resources, agricultural productivity and forestry productivity. The specific factors limiting or enhancing the skill in the model chain, i.e. non linear error propagation, will be assessed at space and time scales relevant for the stakeholders. For each sector more than one model will be used and comparison of skills between related models will reveal respective weaknesses and strengths, systemic uncertainties, and possibly provide guidance for skill weighted multi models forecast ensembles.

The off-line impact models will be configured to be driven by S2D ensemble forecasts to generate ensembles of high-resolution surface data required by a range of sectors. As much as possible common climate input and output data-streams will be developed for models addressing the same sectors (e.g. for all hydrological models, for all crop models). This is to ease the burden on WP 21 and to provide sectoral stakeholders with consistent outputs from multiple models, thus providing multi model ensemble based estimates and associated uncertainties (WP 31).

We will define a limited set of common cases to be analysed by each contributing partner in addition to specific cases that will be addressed individually. Outputs and experiences will be made available to RT4 and case studies for developing dedicated services.

Tasks:

Task 23.1: Data flow.

Each impacts model will require different forcing data from the seasonal model. It is essential that data is transferred in a timely fashion, in a common format with standard ancillaries, and through a single web portal, in order for the complex impacts models to be run.

Task 23.2: Model Initialisation.
Correct initialisation of impacts models on the seasonal timescale may improve the predictive skill of the impacts model (e.g. crop sowing dates). The standard approach will be to initialise from spin-up using reanalysis products (e.g. ERA-Interim), or from climatology. Sensitivity experiments will be performed with a view to advise on how impact models should be initialised.

Task 23.3 (lead partner WUR; SMHI, Met O): Impact models for the water sector.
The predictive skill of river runoff for a number of European catchments using river routing will be assessed on seasonal timescales. This will be based on the comparison between hindcast simulations and high- resolution observations. Both high flow (i.e. flood) events and low flow periods will be analysed. Verification points will be chosen to represent various climatologies, soil-types, land uses, altitudes and catchment scales within Europe. In particular the model's ability to capture flood and drought indices that are of interest to the stakeholder will be assessed. The value of the predictions will be assessed using the tools (such as tercile probability, outer quintile, reliability diagrams, ROC scores commonly used by GPCs) that have been developed by the meteorological community to assess the skill of ensemble prediction systems.

The task starts with selecting a least two common events (above/below average flows) for one or more large basins for hindcast evaluation by all participating models/partners.

A cluster analysis of model output may reveal regions where the hydrological responses are comparable with one another. For these functionally similar areas, the physical/climatological factors that are responsible for the variations in skill observed in the different regions will be analysed and where possible model improvements will be suggested.

Whenever possible the WP will consider inter-sectoral interactions in impacts; e.g. domestic and industrial water demands versus agriculture and the impact of irrigation supply and demand vs. other functions of e.g. reservoirs.

Furthermore, a number of sector-specific variables will be internally simulated in the climate model. Output from these simulations will be compared to high-resolution surface observations, or results obtained by impact models.

In terms of observations we expect to use:
• river flows data available through the European Water Archive (EWA) (www.grdc.bafg.de/ewa) (Stahl et al. 2010);
• GRDC (Available online at http://www.bafg.de/GRDC/EN/Home/ (Falloon et al. 2011)).

Task 23.4 (lead partner Met O; UNIVLEEDS, WU): Impact models for the agricultural sector.
In this task, three specific crop models will be used, the global LPJmL and the regional GLAM and CGMS systems as well as the crop models and more general plant productivity models that are part of the complex land surface schemes (JULES-impacts). The former have specific crop calendars, crop distribution maps and various crop specific growth parameters (e.g. WUE).The predictability of extremes of crop productivity will be assessed for Europe and selected other parts of the globe (e.g. Africa), by using the climate model output to drive these process-based crop models. Both crop failures and anomalously high-yielding years will be investigated.
The task starts with selecting a least two common events (crop failure vs. high yield) for hind cast evaluation by all participating models/partners.
We will develop both the statistical methods for prediction of low-yielding years, as well as work assessing the seasonal predictability of crop failures using relative operating characteristics and reliability assessments. The value of the predictions will be assessed using the tools (such as tercile probability, outer quintile, reliability diagrams, ROC scores) that have been developed by the meteorological community to assess the skill of ensemble prediction systems and they are commonly used by the GPCs and the other NMHSs which are partners in the project.

For European agricultural annual statistics since the early nineties we intend to rely also on EUSTAT, which are already coupled to the crop forecast system CGMS (see also http://mars.jrc.ec.europa.eu/mars/Projects/CGMS). For other parts of the globe we will rely on FAOSTAT (parts of which are already ingested also in CGMS) (see http://www.agu.org/pubs/crossref/2008/2007GB002947.shtml).

Other datasets will also be used. For example see Monfreda (2008); Defra Economics and Statistics Cereal and Oilseed Production Survey 2010 (http://www.defra.gov.uk/evidence/statistics/foodfarm/food/cereals/cerealsoilseed.htm), (Cho et al 2012 and Supit el al 2010).

Task 23.5 (lead partner ULUND): Impacts models for the forestry sector.
The forestry sector would benefit from seasonal prognosis to improve planning of the timing of management activities such as harvesting, thinning, and planting of seedlings and countermeasures to reduce the risk for attacks by pests and pathogens. Impacts predictions will be made using the LHSEL model for the following activities:
Planning harvesting activities and conditions – Prognosis of risk of wind-throw damage and storm felling with early harvests dates recommended if risks are high. Harvesting conditions can be related to temperature and precipitation with soil conditions also being important for transport of timber products.
Optimizing the timing of reforestation activities – Prognosis of frost damage, spring and autumn temperature and precipitation and tree drought stress help determine seedling planting dates.
Reducing pest damage – Prognosis on the risk of attacks by insects and pathogens including species specific assessments can be used to optimize the timing for counter measures such as trapping and felling of diseased trees. As for the other tasks the value of the predictions will be assessed using the tools (such as tercile probability, outer quintile, reliability diagrams, ROC scores) that have been developed by the meteorological community to assess the skill of ensemble prediction systems.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	40.00
6	Predictia	10.00
9	WU	18.00
11	IC3	2.00
14	UNIVLEEDS	13.00
15	SMHI	24.00
16	ULUND	10.00
17	METEO-France	6.00
18	CETaqua	5.00
23	EDF	0.50
	Total	128.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D23.1	Workshop on initialisation of impacts models for seasonal predictions	1	5.00	O	RE	9
D23.2	Report of the workshop on initialisation of impacts models for seasonal predictions	9	2.00	R	PU	10

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D23.3	Report on initialisation of impacts models for seasonal predictions	1	23.00	R	PU	15
D23.4	Report summarising predictability of impact parameters for water sector	9	29.00	R	PU	30
D23.5	Report summarising predictability of impact parameters for agriculture sector	1	29.00	R	PU	30
D23.6	Report summarising predictability of impact parameters for forestry sector	16	29.00	R	PU	30
		Total	117.00			

Description of deliverables

D23.1) Workshop on initialisation of impacts models for seasonal predictions: Workshop will be held on the initialisation of impacts models for seasonal predictions (cross-cutting with SPECS project) [month 9]

D23.2) Report of the workshop on initialisation of impacts models for seasonal predictions: Report will be based on the findings from the workshop held on the initialisation of impacts models for seasonal predictions (cross-cutting with SPECS project) [month 10]

D23.3) Report on initialisation of impacts models for seasonal predictions: Outcomes from workshop in Month 9 will be used to inform this report [month 15]

D23.4) Report summarising predictability of impact parameters for water sector: Relevant impact parameters will be chosen [month 30]

D23.5) Report summarising predictability of impact parameters for agriculture sector: Relevant impact parameters will be chosen [month 30]

D23.6) Report summarising predictability of impact parameters for forestry sector: Relevant impact parameters will be chosen [month 30]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS21	Define common flow conditions for hydrological skill analysis	9	3	Commom cases of high and low flow conditions defined. Reported back to Board
MS22	Define common yield conditions for agriculatural skill analysis	1	3	Commom cases of high and low yield conditions defined. Reported back to Board
MS23	Initial simulations for common cases ready	9	15	Simulations started

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS24	Model improvements, based on initial assessments, implemented, and reruns initiated	9	21	Model improvements implemented and simulations started
MS25	Assessment of impacts model skill, focussing on water, agriculture and forestry sectors	1	30	Assessments based on common comparison between hindcast predictions and observations. Report available

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP31	Type of activity [54]	RTD
Work package title	Quantifying uncertainty in impact models		
Start month	10		
End month	45		
Lead beneficiary number [55]	9		

Objectives

To fully characterise the level of confidence we can associate to specific impact models. Multi model, multi driver and perturbed physics parameters ensembles will be used for this purpose.

Description of work and role of partners

Over the last decade the international climate community has put a great effort in assessing how the inherent uncertainty in the way prediction models are formulated affects the overall uncertainty of climate projections. This resulted in the development of probabilistic climate scenarios (e.g. climateprediction.net, UKCP09). The climate change impact community is now starting to do the same (e.g. WATCH WaterMIP), as this is seen as an essential step to fully characterise the level of confidence we can associated to specific impact predictions. This work package aims to assess the inherent uncertainty existing in impact models when applied in a S2D prediction context. Multi-impact model and multi driver ensembles are tools that will be used for this purpose. Also the effects of initialisation and parameter uncertainties will be assessed for these impact models.

Several classes of sectoral impact models will be investigated in this way (see table in appendix 3 for details), most notably hydrologic and/or river basin models, addressing water quantity and quality (temperature) VIC, EHYPE, JULES, LPJmL (WU, SMHI, Met O). Both flood risks (water safety issues) and low flow risks (irrigation, hydropower, navigation) will be investigated, as well as high water temperature risks related to power plant cooling water requirements.
Agricultural production models, using the CGMS, LPJmL and GLAM (WU, UL-IDL, UC). Both crop failures and anomalously high-yielding years will be investigated.
Forestry model LSHEL (ULUND, SMHI). Storm -, frost - and pest damage will be investigated.
Renewable energy using the PVSYST, HOMER, SAM, WAsP, LASKER and KERES models (IC3, SMHI)
Potential power generation will investigated to anticipate optimal energy mixes.

Impact models of relevance to agriculture and forestry commonly include accumulation of temperature sums, non-linear relationships between ambient temperature and response magnitude, as well as responses induced on crossing sharp temperature thresholds. This type of non-linear or even non-continuous (threshold) behaviour in such models increases the risk of amplifying otherwise modest biases in climate. Assessing these biases represents an important component of any model evaluation.

Tasks:
Task 31.1 (all participating teams, lead WU): Development of common uncertainty assessment protocol for impact models.
One or more (sector specific) case studies will be selected in consultation with Case Studies, including both ‘strategic forecasting regions’ (SFR) and representative events. A common set of S2D climate scenarios will be selected and prepared (bias corrected, reformatted as needed, etc), combining results from S2D hindcasts and/or reanalysis for a number of past events, as well as selected forecasts in collaboration with WP 21. These (ensembles of) scenarios will serve as input for the impact models. Common sensitivity experiments will be defined to assess effects of initial conditions (where relevant) and most important parameters. Common post-processing steps, relevant indicators and output formats will be defined. An analysis framework will be developed with WP 32. One or more workshops are foreseen to complete this task.

Task 31.2 (all participating teams, lead WU-water, UC-agriculture): Producing S2D impact scenarios.

Based on the protocol developed in Task 31.1. The impact models will be integrated for the agreed region and time period. Outputs will be post-processed and delivered in common format to coordinator, and will be stored on ftp server accessible to all participants. For each sector one team will serve as coordinator who is responsible for timely delivery of impact model results and subsequent multi model analysis.

Task 31.3 (all participating teams, lead UC): Analyse respective contribution of forcing, initial conditions and parameter uncertainties on various impact indices.
From delivered impact ensemble datasets, appropriate statistics will be computed allowing de-convolution of total spread/uncertainty into components caused by systemic uncertainty (impact model choice), impact model parameter uncertainty, impact model initialisation (if applicable) and also GCM/RCM forcing uncertainty. This will occur through a close collaboration with WP 22. As relative uncertainty contributions from each of these sources may differ geographically this will be done for different SFR's.

Task 31.4 (all participating teams, lead SMHI): Evaluate the evolution of forecast uncertainty through the forecast period.
We will perform a full analysis of forecast skill and uncertainty (characterised by the ensemble spread) as a function of the various lead times in the S2D continuum. Develop sector specific skill indices for the different SFRs that can be used to estimate the expected skill of the forecasts for each lead time considered, analyse the spread-skill relationships.

Task 31.5 (all participating teams, lead UL-IDL): Develop Impact S2D service prototype.
Together with WP 32 and WP 33 we will develop and converge to a set of well-developed information products on S2D Impacts and define appropriate workflows for timely delivery.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	6.00
5	UC	6.00
9	WU	18.00
11	IC3	19.00
13	UL	9.00
14	UNIVLEEDS	10.00
15	SMHI	10.00
16	ULUND	3.00
19	IPMA	9.00
	Total	90.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D31.1	One report summarising and integrating sectoral S2D model results	9	85.00	R	PU	36
		Total	85.00			

Description of deliverables

D31.1) One report summarising and integrating sectoral S2D model results: One report will be produced. This report will describe sectoral, cross model results, and discuss implications for operational services [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS26	Internal report on S2D uncertainty assessment protocol for impact models	5	10	Protocol made available to partners
MS27	Deliver impact model S2D scenarios to central database/ftp server	9	18	Impact models scenarios on the server
MS28	One or more reports on model and case specific results with recommendations to reduce uncertainties	15	36	Give recommendations to reduce or cope with uncertainties. Papers/reports released

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP32	Type of activity [54]	RTD
Work package title	Uncertainty framework		
Start month	10		
End month	45		
Lead beneficiary number [55]	5		

Objectives

This WP will look at the best way of combining the main sources of uncertainty in seasonal impact predictions (i.e. uncertainty from the climate predictions and uncertainty in the impact model formulation) in a single coherent assessment.

Description of work and role of partners

The state-of-the-art multi-model multi-member seasonal forecasting framework poses a computational burden to many impact studies, since hundreds of "equiprobable" predictions should be considered to deal with the prediction uncertainty. This uncertainty has to be combined with the uncertainty introduced by the particular impact model used. Therefore, an appropriate probabilistic framework for uncertainty analysis is needed to assess the contribution of the different sources to the uncertainty chain and to integrate them in the final predictions of the impact model. As recent initiatives such as the UK Climate Projections (UKCP) (http://ukclimateprojections.defra.gov.uk/) demonstrated Bayesian technique are becoming a common tool to address uncertainty in model predictions. This WP will use probabilistic aggregation techniques based on Bayesian statistics to develop to assess the overall uncertainty in seasonal impact prediction.

Task 32.1 (AEMET, Met O, MeteoFrance; lead UC): Assessment and combination of climate predictions.
This task will apply existing methods for seasonal climate prediction evaluation and uncertainty (spread) estimation to provide an appropriate robust framework for model weighting and/or combination, avoiding known sources of variability such as systematic biases (based on the results of WP2 1, Task 21.1). Special emphasis will be paid to Bayesian models, which have been successfully applied in the EUROBRISA experience (Coelho et al. 2003 and Coelho et al. 2004). Moreover, uncertainty quantification metrics will be considered, based on interval statistics developed to assess the associated model uncertainties (see, e.g. Sordo et al. 2008). This Task will also asses the uncertainty propagation to downscaled data (see Zappa et al. 2010) based on the results of WP 21. The whole analysis will be preformed at a multi-model multi-member framework, exploring the suitability of aggregation/combination methods keeping the total uncertainty (e.g. intervals of confidence for monthly values). Moreover, this Task will also investigate the relative improvement coming from improved modelling (e.g. GCM –see SPECS project). The goal of the WP will provide the framework for analysing the different sources of uncertainty (from the global model to the downscaling method) to be used in other project tasks: WP 31, Task 31.3 and WP 32, Task 32.2.

Task 32.2 (all partners; lead UL-IDL): Uncertainty framework for seasonal impact predictions.
The interactions between climatic conditions and the impacts are likely to be non-linearly interlinked and consequently covariance terms could potentially be important. Thus, to fully assess the final confidence we can have in our impact predictions it is essential to develop an appropriate statistical framework to best combine the seasonal prediction and its inherent uncertainty with the impact predictions and its own uncertainty. This analysis will build on the findings of WP 31 and Task 32.1 in WP 32, leading to an integrated uncertainty framework for impact studies. For instance, DHI will develop and examine the value of rapid uncertainty methods such as quantile regression for forecasting in the water sector against the Bayesian and other methods developed in this WP and more traditional extended stream flow predictions which have wide application in reservoir, irrigation and water resources management. UL-IDL will assess uncertainty in the statistical downscaling applied to wine quality/production, forest fires and phytosanitary measures, energy distribution and water quality and availability.

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	3.00
5	UC	12.00
7	AEMET	20.00
8	DHI	3.00
9	WU	6.00
13	UL	12.00
14	UNIVLEEDS	3.00
17	METEO-France	6.00
19	IPMA	10.00
21	WHO	1.00
	Total	76.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D32.1	Report on assessment and combination of S2D predictions	5	36.00	R	PU	18
D32.2	Report on uncertainty framework for seasonal impact predictions	13	36.00	R	PU	36
		Total	72.00			

Description of deliverables

D32.1) Report on assessment and combination of S2D predictions: Results presented in this report will be based on results from WP 21. Work carried out under this deliverable will be coordinated with Task 31.2. [month 18]

D32.2) Report on uncertainty framework for seasonal impact predictions: Report on the development of an integrated uncertainty framework for impact studies. Report will focus on case studies used, in coordination with WP 31. [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS29	Deliver protocol guide for uncertainty analysis in climate predictions	5	24	Guide delivered to the Management Board

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP33	Type of activity [54]	RTD
Work package title	Communicating levels of confidence		
Start month	3		
End month	48		
Lead beneficiary number [55]	8		

Objectives

Test the effectiveness of different approaches of communicating the confidence and uncertainty associated with S2D predictions and its impacts.

Description of work and role of partners

THIS WP IS JOINTLY LED BY DHI and UNIVLEEDS.

S2D climate and impact predictions are fraught with uncertainties. Such underlying uncertainties – from incomplete or disputed knowledge – remain a particular challenge to communicate (Spiegelhalter et al. 2011). Past research has focused on the understanding of uncertainty in weather forecasting (e.g. Roulston et al 2006; Roulston and Kaplan 2008) and the challenges of communicating hydro-meteorological forecasts (Demeritt et al., 2010; Ramos et al. 2010). This WP will test the effectiveness of different approaches of communicating the confidence and uncertainty associated with S2D predictions and its impacts amongst its potential users. The proposed activities will form the basis of a PhD study addressing this topic. At least one of the partners in this WP is represented in the related WPs 12, 31, 32 and 41 to ensure effective coordination.

Task 33.1 (TEC, AEMET, DHI, MF, WHO/Europe; lead UNIVLEEDS): Survey of end-user requirements from EUPORIAS stakeholders and partners. This task will be closely co-ordinated with WP 12, but will focus particularly on how EUPORIAS stakeholders understand and deal with uncertainty and levels of confidence in their current organisations and their needs for improved information.

Task 33.2 (Met O, TEC, AEMET, MF, EDF; lead UNIVLEEDS): Review of existing approaches of communicating confidence levels. This review will be based on existing literature and the experience of the EUPORIAS partners and stakeholders.

Task 33.3 (Met O, TEC, DHI, MF; lead UNIVLEEDS): Formulation of strategies for communicating confidence levels for S2D forecasts. This task will liaise closely with Tasks 33.1 and 33.2 to provide a sample of visualisations that match the potential use by stakeholders of existing and new approaches for visualising confidence levels.

Task 33.4 (Met O, TEC, DHI, MF, WHO/Europe; lead UNIVLEEDS): Decision Lab with relevant stakeholders. This task will test the salience, effectiveness and usability of the confidence level visualisations amongst EUPORIAS stakeholders in a decision lab. There will be a strong collaboration between this task and WP 41 examining the impacts and value of S2D forecasts on the Decision Making Process.

T33.5 (DHI, MF; lead UNIVLEEDS): Dissemination and publication of the strategies developed. In collaboration with WP 41 a clear communication strategy will be developed here. This will then be used in WPs 42, 43 and 44.

(Note: Tasks 33.1 and 33.4 both require the gathering of data from individuals from the Stakeholder Group. As part of the rigour of the research it may be necessary to gather information of a personal nature, e.g. age, gender, name, employment. As a result, this has been noted in the B.4.4 Declaration of any Ethics Issues, and has been referred to the University of Leeds Ethics Committee. The University of Leeds Ethics Committee has approved the project.

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	3.00
2	TEC	7.00
7	AEMET	2.00
8	DHI	4.00
14	UNIVLEEDS	36.00
17	METEO-France	6.00
21	WHO	1.00
23	EDF	0.50
	Total	59.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D33.1	Report on survey of end-user needs for improved confidence level information	14	11.70	R	PU	12
D33.2	Report summarising review of existing approaches for communicating confidence levels	14	11.70	R	PU	18
D33.3	Report describing formulation of strategies for communicating confidence levels for S2D forecasts	14	17.20	R	PU	30
D33.4	Report summarising results from Decision Laboratory experiments	14	10.70	R	PU	36
D33.5	Report describing strategy on communicating level of confidnce	14	8.20	R	PU	42
		Total	59.50			

Description of deliverables

D33.1) Report on survey of end-user needs for improved confidence level information: Report will summarise the findings of stakeholder and partner survey on how stakeholders/partners understand and deal with uncertainty, and their needs for improved levels of confidence. All relevant sectors to be included. [month 12]

D33.2) Report summarising review of existing approaches for communicating confidence levels: Findings in this report will include the experience of project stakeholders and partners. [month 18]

D33.3) Report describing formulation of strategies for communicating confidence levels for S2D forecasts: Report will provide a sample of visualisations of existing and new approaches for visualising confidence levels. This sample will match the potential use by stakeholders of S2D forecasts [month 30]

D33.4) Report summarising results from Decision Laboratory experiments: Report will describe the approach taken to test the effectiveness and usability of the confidence level visualisations, by using stakeholders in Decision Lab. experiments. Report will consolidate results from these experiments. [month 36]

D33.5) Report describing strategy on communicating level of confidnce: This strategy will be developed in collaboration with WP 41. Target audience for these communications will be stakeholders, end-users and decision-makers. [month 42]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP41	Type of activity [54]	RTD
Work package title	Climate Information and Decision Making Processes		
Start month	25		
End month	48		
Lead beneficiary number [55]	17		

Objectives

To assess the climate and non-climate-related options available to decision makers; To assess the value of Climate Information within the Decision Making Processes; To assess the impact of S2D forecasts developed in RT2 onto Decision Making Processes.

Description of work and role of partners

THIS WP IS JOINTLY LED BY METEO-France and IC3.

Background
In the new framework of the development of Climate Services and the use of the Climate Information for objective decision making, their potential value and its impact on the evaluation of the Decision Making Process (DMP) becomes a crucial topic, especially for demonstrating the quality, the interest and the value of the new Climate Services. These assessments are also the core material to address the potential for developing business opportunities (see WP 45), based on the Climate Services prepared through the different WPs.
Using the S2D forecasts developed in the RT2, uncertainty evaluation in CCT3, other information gathered through the Case Studies and in close liaison with stakeholders group, an assessment of the role and effect of this new information on existing, alternative or new DMP's will be provided for selected case studies. In addition, a key contribution to Climate Services will be to understand how best to integrate the climate information, in particular the impacts and uncertainty, into a downstream, operational Decision Support System (DSS) (via action plans, extension/improvement of decision support tools or frameworks etc.).

Building upon existing/past projects, the outcomes of RT1 (analyses of users' needs and sector specific vulnerabilities) and working closely with the stakeholders this WP will ensure that decision makers can take advantage of the climate information provided, by understanding its effect on stakeholders' decision, strategies and eventual business scenarios.

The different domains addressed in this WP will be identified through RT1 and case studies outcomes. Prior to the RT1 outcomes, several domains are already proposed by the different partners for investigation:
the renewable energy sector (especially wind power and solar energy) (IC3), energy (MF & EDF), forestry, hydropower, urban hydrology (SMHI), water resources (management, especially high and low flows, urban and agriculture) (MF, CETaqua, DHI), health (WHO/Europe) or food security (WFP).

Logical steps:
- An assessment of the all possible options available to the decision maker which includes a thorough cost/benefit analysis of each strategy and the corresponding outcomes (taking on board the results of RT1).
- A sector-specific review of the way different forms of risk (climate and non-climate) are currently handled by that sector, as mirroring the way uncertainty is dealt with throughout a DMP, and to possibly redefine the way climate information should be provided.
- An in-depth analysis of the link between the DMP and existing (climate-related) DSS.
- A tailoring of certain products developed in RT2, for their use by the corresponding stakeholders from different sectors especially those selected within the Case Studies.

Methodology:

This WP will work closely with a selected number of stakeholders to investigate how S2D climate information can best be provided and utilised to facilitate decisions within the organisation. Climate forecast uncertainties will be treated in a risk-based framework as the basis for objective decision-making. This will inform the development of prototypes of sector-specific DSS (e.g. database centred decision support system that includes different climate resources models, time series and spatial presentation tools -e.g. like GIS) and will allow an initial qualitative and quantitative assessment of the benefits of using climate information with a primary focus on seasonal scales that already exist for operational forecasting suites (it is crucial to start the provision of a routine Climate Service), trying also to include extreme weather events when relevant. The ability to either re-evaluate such suites or to propose alternative management strategies that can respond dynamically to better exploit climate information over a season to a year, will also be investigated.

- A review of the DMPs and associated stakes on season, year or several years will be initiated for the selected domains. This will include the management of current risks (climate and non-climate related) in order to define how to include and manage different types of information and uncertainty along the DSPs.
- Furthermore, an assessment of the impact-related climate information prepared in RT2 and likely further climate background information from other already existing projects (e.g. RA VI RCC-Climate Monitoring Node), and how it is used within the DMPs will be undertaken. This will help to evaluate the role of climate information, as well as its benefits and limitations to key DMP for selected sectors.
- This evaluation will use two and complementary approaches. The first one will translate the quality of the decision issued by the DMP in quantitative terms via an analysis of the economic cost of climate variation within the sectors, and the associated effect of climate uncertainty on the outcome of key decisions. The second approach will use qualitative evaluations (via Interview, survey, …) so that the evaluation will not only be based on economic criteria but also on knowledge systems which is of particular importance when targeting the adaptation of societies to climate variability and change. In both approaches, the relative weight of the tailored climate information with respect to information coming from non-climate related factors will be assessed.
- Using tailored S2D forecasts developed in RT2 and the uncertainty information developed in CCT3 the WP will also assess their impact on the same key decisions, and DMP. Where viable, proposals will be made to extend existing planning capabilities to exploit seasonal to decadal climate information.
- All of the above information will then be fed into the design and operational methodology of a proposed climate service protocol (see WP 42) for the different sectors within case studies and will contribute to the selection of case studies.

Tasks:
T41.1 (All): Choose the decision making chains to be evaluated and the corresponding reference strategies. Choose the economic model(s) and knowledge systems relevant to the selected decision making chain(s).Understand the inherent risks (climate and non climate) of the decision processes identified.

T41.2 (All): Assess the different impacts and risk management strategies throughout the DMPs over S2D timescales, especially (but not exclusively) their possible use as an adaptive strategy, and with respect to the updates of information over time.

T41.3 (All) : Define a methodology to evaluate the DMPs that are affected by climate for key stakeholders in specific sectors.

T41.4 (All): Evaluate the relative weight of climate information in the relevant DMP.

T41.5 (UNIVLEEDS, IC3, MF, WHO/Europe, and WFP): Define standardised protocol(s) for evaluating DMP and prepare a (preliminary) guidance document.

T41.6 (DWD, MF, WHO/Europe, and WFP): Review the WMO RA VI RCC (Regional Climate Centre)-network information and its relevance to the DMP of various stakeholders. Especially, the climate knowledge data base of hazards (already built up within the RA VI RCC) will be used and the Climate Watch system (early warning of upcoming climate events – in development within the RA VI RCC network) as well. The information input will be taken from WP 11, Task 11.3.

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	3.00
8	DHI	2.00
9	WU	2.00
10	DWD	10.00
11	IC3	18.00
14	UNIVLEEDS	26.00
17	METEO-France	10.00
18	CETaqua	4.00
20	WFP	10.00
21	WHO	12.00
23	EDF	0.50
24	Meteo-RO	2.00
	Total	99.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D41.1	Review of the climate information products of the WMO RA VI RCC-network useful to the decision maker	10	10.00	R	PU	36
D41.2	Preliminary Guidance Document on the evaluation of the value of DMP	17	24.00	R	PU	40
D41.3	Report on the evaluation of the value of the DMP	14	18.50	R	PU	46
D41.4	Report on the impact of, and risk related to, climate forecasts on DMPs	20	24.00	R	RE	48
D41.5	Paper presenting the evaluation, skill and values of the decision making chains	11	23.00	R	PU	48
		Total	99.50			

Description of deliverables

D41.1) Review of the climate information products of the WMO RA VI RCC-network useful to the decision maker: The relevance of the WMO RA VI RCC network to the Decision Making Process of various stakeholders. Input will be taken from WP 11. [month 36]

D41.2) Preliminary Guidance Document on the evaluation of the value of DMP: This guidance document will be based on a methodology defined to evaluate the qualitative and quantitative value of the DMPs for key stakeholders in specific sectors. [month 40]

D41.3) Report on the evaluation of the value of the DMP: Report will summarise the evaluation of the qualitative and quantitative value of the DMPs for key stakeholders in specific sectors. [month 46]

D41.4) Report on the impact of, and risk related to, climate forecasts on DMPs: This report will be based on the climate forecasts developed in Research Theme 2 (RT2), and use the project case studies and Decision Support Systems (DSSs) selected within the case studies. [month 48]

D41.5) Paper presenting the evaluation, skill and values of the decision making chains: Aim is that this paper (or maybe papers) will be fully published. [month 48]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS30	Review of management strategies to deal with impacts, uncertainty and risk within a DMP	17	38	Completion of first phase stakeholder meetings, research and review of DMPs and strategies within different sectors
MS31	Assessment of the quantitative and qualitative value of DMPs	14	38	Completion of second phase stakeholder meetings, research and analysis of information skill and value, within different sectors
MS32	Assessment of the impact of, and risk related to, climate information on the DMPs and DSSs	11	43	Completion of second phase stakeholder meetings, research and analysis of climate impacts within different sectors

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP42	Type of activity [54]	DEM
Work package title	Climate services prototypes		
Start month	15		
End month	48		
Lead beneficiary number [55]	1		

Objectives

To develop an experimental operational prototype of a climate impact prediction system for a subset of the case-studies/sectors selected.

Description of work and role of partners

Task 42.1 (all partners;, lead Met O): Identify and agree a clear set of criteria that the case studies need to meet to be developed into climate service prototypes. These criteria will be developed by involving all project partners and by close interaction with the stakeholder group.

Task 42.2 (all partners; lead Met O): Design a prototype for a climate watch (an early warning system on upcoming climate events) in collaboration with the WMO European Regional Climate Centre for Climate Monitoring (RCC-CM, hosted by DWD) and the corresponding stakeholders, based on the review for decision making carried out in WP 41, Task 41.6. While Met O will lead this development, all partners will contribute to it.

Task 42.3 (SMHI): Investigate the feasibility of implementing a new operational Hydropower Climate Service Prototype. Identify the logistical and cost implications of running new operational forecast. In close cooperation with stakeholders prepare a detailed requirement specification of forecast visualisation, distribution and format in the service. Select a case study basin/region to test the prototype multi-model forecast system under operational conditions. Test in operational conditions together with stakeholders.

Task 42.4 (all partners): Collect all the background information that will inform the selection by the GA of two or three service prototypes. These will be selected among the case studies using the criteria agreed in the Task 42.1 above. This sub-set of case studies will be used throughout the rest of this Work Package.

Task 42.5 (all partners): All the development in the impact models prediction that has occurred in WP 23 and the climate watch prototype will be used to address the case study specific needs. At the same time and starting from the results of WP 33 and WP 41 a stakeholder-specific communication strategy will be developed and implemented. This will be implemented through a close collaboration with WP 43 and with WP 33 and will include a way for assessing the quality of real-time forecasts using a combination of objective metrics developed within the S2D community and user-defined metrics.

Task 42.6 (all partners): The prototypes will be run in hindcast mode to see how the system would have worked had this information been available at the time.

Task 42.7 (all partners): The prototypes will be run in forecast mode to make a forecast for a year ahead.

Task 42.8: (AEMET) The usefulness and limitations of the prototypes will be assessed.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	30.00
2	TEC	3.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
3	ENEA	7.00
4	MeteoSwiss	3.00
5	UC	18.00
7	AEMET	4.00
8	DHI	2.00
10	DWD	8.00
11	IC3	36.00
12	KNMI	13.00
15	SMHI	12.00
17	METEO-France	25.00
18	CETaqua	2.00
19	IPMA	7.00
20	WFP	2.00
23	EDF	1.00
	Total	173.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D42.1	Report summarising usefulness of each prototype	17	55.00	R	PU	24
D42.2	Report assessing the benefit of this climate service prototype using historical events and hindcasts	11	55.00	R	PU	36
D42.3	Release impact forecast for the prototype services and produce analysis of its impacts	1	55.00	D	PU	42
		Total	165.00			

Description of deliverables

D42.1) Report summarising usefulness of each prototype: This report will summarise the expected usefulness of each prototype, the communication strategy, and the strategy to manage the flow of information from data producers to decision makers. [month 24]

D42.2) Report assessing the benefit of this climate service prototype using historical events and hindcasts: The benefit of this prototype technology will be assessed using hindcasts and historical events to see how this system would have performed had all the required information been available at the time. [month 36]

D42.3) Release impact forecast for the prototype services and produce analysis of its impacts: The prototypes will be run in forecast mode to make a forecast for a year ahead. A preliminary analysis will be produced of its impacts. [month 42]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS33	Identify and agree a set of criteria for selecting case studies	1	15	Set of criteria agreed and reported back to the Management Board
MS34	Choose final list of case studies, and the 2 to 3 case studies for use in rest of WP 42 activities	1	16	Shared with WP 3 (MS2)

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP43	Type of activity [54]	DEM
Work package title	Stakeholder engagement		
Start month	1		
End month	48		
Lead beneficiary number [55]	6		

Objectives

• To engage with EU citizens about the use of S2D data in everyday decisions;
• To demonstrate ways in which a climate service can be developed to address specific users' needs;
• To facilitate clear communication and exchange of information with stakeholder groups;
• To empowering SMEs, and allow them to develop their own climate services.

Description of work and role of partners

Workshops and meetings will be conducted with organisations and stakeholders groups. There will be at least three sector-specific local workshops and also a high visibility general stakeholder engagement event at the end of the project. The operational service prototypes developed in WP 42 will be used as an example to show stakeholders the way in which a climate service can be developed to address specific users' needs. Workshops will include practical training sessions to teach users on how to deal with the new sort of data generated. These training sessions will be complemented with e-learning activities.

In order to facilitate the use of the generated products by stakeholders, a mobile phone application associated to one of the prototypes will be developed to bring the information generated directly to smartphones.

A short publication describing the steps that need to be followed in order to take advantage of the seasonal impact prediction as well as the decadal outlooks will be produced. Feedback mechanism from stakeholder to forecast producers will be developed here.

The WP will capitalise on the experience of FutureEverything and their innovative approach to communication and will be responsible for the development of the podcasts, the project tweets, and the YouTube videos that will be made available throughout the course of the project. The generated multimedia content will focus on how the seasonal prediction systems work how the information is transformed (e.g. calibration, downscaling and impact modelling) before it reaches the users the uncertainty and the usefulness of the products the case studies. This work will be linked to Task 44.5 in WP 44.

Task 43.1: Run workshops and meetings with key sectors stakeholders to present the service prototypes developed in WP 42. Participants will provide their experience in stakeholder engagement in the different sectors: energy (IC3, MetO, EDF), agriculture (WU), water (MetO, CETaqua), infrastructure (Met O) and transport (Predictia).

Task 43.2 (Predictia, FutureEverything, CETaqua, IC3, EDF, Met O): Run a high visibility general workshop at the end of the project to disseminate the relevant results to stakeholders.

Task 43.3 (Predictia, FutureEverything): Establish an active communication channel with stakeholder groups to inform them of the project news and achievements. Social media tools like twitter and podcasts will be used.

Task 43.4 (FutureEverything, Predictia): To ensure EUPORIAS can communicate factors such as uncertainty and confidence in an imaginative and tangible way, methods from art and design will be drawn on during the development of the prototype.

Task 43.5 (Predictia, FutureEverything, CETaqua, IC3, EDF, Met O): Develop feedback mechanisms from stakeholder to forecast producers.

Task 43.6 (FutureEverything, Predictia, Met O): Develop a mobile phone application associated to one of the prototypes developed in WP 43 to bring the information generated directly to the smartphone.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	12.00
2	TEC	2.00
3	ENEA	6.00
6	Predictia	29.00
9	WU	5.00
11	IC3	6.00
18	CETaqua	2.00
19	IPMA	2.00
22	FutureEverything	20.00
23	EDF	1.00
	Total	85.00

List of deliverables

Deliverable Number [61]	Deliverable Title	Lead beneficiary number	Estimated indicative person-months	Nature [62]	Dissemination level [63]	Delivery date [64]
D43.1	Workshop reports including objectives, comparison of data supply and demand, feedback and conclusion	6	28.00	R	PU	42
D43.2	Produce a sector-specific publication demonstrating how a climate service can be developed	6	21.50	O	PU	48
D43.3	Produce at least two videos summarising optimal use of S2D data in everyday decisions	22	14.00	D	PU	48
D43.4	Develop a mobile application to help access information produced by climate prototypes	6	21.50	D	PU	48
		Total	85.00			

Description of deliverables

D43.1) Workshop reports including objectives, comparison of data supply and demand, feedback and conclusion: Reports will summarise the sector-specific workshops and stakeholder meetings held to present the service prototypes developed in WP 42. Reports will also include experiences and feedback from stakeholders. [month 42]

D43.2) Produce a sector-specific publication demonstrating how a climate service can be developed: At least one sector-specific publication will be produced describing the steps needing to be followed in order to take advantage of S2D impact predictions (as well as the decadal outlooks). [month 48]

D43.3) Produce at least two videos summarising optimal use of S2D data in everyday decisions: At least two videos will be produced. These will summarise how seasonal prediction systems work; how the information is transformed (e.g. calibration, downscaling and impact modelling) before it reaches the users; the uncertainty and the usefulness of the products and the case studies. These will be aimed at non-technical, non-specialist audiences. Videos will be made available on the internet and linked through the EUPORIAS website. [month 48]

D43.4) Develop a mobile application to help access information produced by climate prototypes: Develop a mobile phone application to help stakeholders in accessing useful information produced by the climate service prototypes. [month 48]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS35	Run sector specific workshops and present the service prototypes developed in WP 42	6	42	Workshops completed, and reports completed
MS36	Run a high visibility workshop at end of this WP	22	48	Workshop run and documented (report, movie etc.)

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP44	Type of activity [54]	RTD
Work package title	Delivery tools		
Start month	21		
End month	48		
Lead beneficiary number [55]	12		

Objectives

To identify, develop, and maintain an interface which will allow an effective delivery of the climate services developed in WP 42 to both the general public and the relevant decision-makers. In this manner, EUPORIAS goes beyond merely improving the reliability of the underlying prediction systems to enhancing the usability of these forecast in practical applications.

Description of work and role of partners

Starting from the existing tools and portals (e.g., European Environment Agency (EEA), World Bank climate portal, UKCIP, IS-ENES, ENSEMBLES, CIRCE, CIRCLE 2, EURO4M, CLIM-RUN, CORDEX...) this WP aims to identify the most effective way of delivering the services to the general public and to the relevant decision-makers. Independently from the medium the interface will be flexible enough to allow different users to access the different information they need efficiently. Give the importance the information developed within EUPORIAS will have in promoting climate change adaptation a flows of relevant data from EUPORIAS to the existing climate adaptation portals such as Clearing House on Adaptation - web portal (CHA), UKCP09 or IS-ENES will be ensured. Whenever possible links with the Open Platform Consortium will be sought. The Open Platform is a web-based marketplace for buying, creating and selling standards-compliant data, applications, models and value-added services.

The work package will develop a services architecture which the above mentioned existing climate adaptation portals can use. These services will be created, operated and tested with a selection of adaptation portals. In addition, to address the need not only to prepare for climate-related risks but also to manage these risks these services must be interfaced to impact management tools. Finally, the services architecture will also be used to create a user-friendly web-based interface for end-users (e.g., ENSEMBLE Downscaling Portal) and the WP will use social media, for instance podcasts and you tube videos, to reach a larger audience

Task 44.1 (KNMI, Met O, WU, TEC): Inventory of existing climate data portals and tools.
The project will build on existing tools and portals (e.g., EEA, World Bank climate portal, UKCIP, and EU projects IS-ENES, ENSEMBLES, CIRCE, CIRCLE 2, EURO4M, CLIM-RUN and CORDEX) and the operational global seaonal forecast centres (e.g. IRI) and relevant regional seasonal forecast centres to create a flexible interface that allows different users to access the different information they need. Where appropriate the WP will work with the existing UK Open Platform Consortium (“Climate Services on a cloud”). This task will make an inventory of these existing initiatives, tools available and gather interface requirements on how the EUPORIAS climate services can be integrated in these existing portals. Besides existing portals, emerging initiatives such as the DHI Decision Support Platform for the water sector will provide interface requirements. As requirements will change over time, the inventory will be yearly updated using the Elaboration phases in the development.

Task 44.2 (KNMI, Predictia, UC, DHI): Climate Service Architecture development and improvements.
This task will use the results from Task 44.1 above to develop a Climate Service Architecture, based on existing tools and developing tools where gaps are to be filled, to deliver the EUPORIAS service prototypes to end users and to existing climate adaptation portals according their requirements. Impact management tools will extend these services to operational management tools, developing downstream decision support capabilities for operational decision-makers. This will be protoyped against a water sector management tool, in part because the water sector is linked to almost all of other key sectors; energy, transport, agriculture, tourism and in part

because this is a more mature sector for managing based on S2D forecasts. The climate service architecture will be built in three iterations, consisting of an Elaboration, Construction, and Transition phase.

Task 44.3 (Predictia, UC, IC3): Service delivery and operation.
This task will enable a flow of relevant data from EUPORIAS to existing climate adaptation portals such as Clearing House on Adaptation (CHA), UKCP09 or IS-ENES. At each Transition phase of Task 44.2 in this WP the services in operation will be updated. Feedback will be gathered and provided to Task 44.2 in each of the Elaboration phases. Activities will include the construction in conjunction with WP 42 of a flexible interface, integration with management tools or health-impacts web-portal to acheive this.

Task 44.4 (DHI, Predictia, ENEA, KNMI, Met O): Web interface for end users of the EUPORIAS service prototyopes.
Besides providing the EUPORIAS results to other climate adaptation portals, EUPORIAS will develop a user friendly web interface for general public and relevant decision makers. This activity will be developed in close collaboration to WP 42 and in particular to Deliverable 42.3 which will define the communication strategy for each prototype. The site will be used to demonstrate the developed services, also in the construction phase of Task 44.2. A GIS framework will be used developing tiers for different sectors.

T44.5 (Predicita, FutureEverything, WU, TEC): Generation and dissemination of easy accessible services.
This will include podcasts, YouTube videos, and other means to reach a large audience of non-specialists. This task involves selecting the relevant project results and services, translating these to easy accessible formats, and the production and publication of the messages. This task will be conducted in close cooperation with Task 43.1 in WP 43 “Run workshops and meetings with stakeholders to present the service prototypes developed in WP 42”.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	6.00
2	TEC	5.00
3	ENEA	2.00
5	UC	6.00
6	Predictia	25.00
8	DHI	10.00
9	WU	5.00
11	IC3	4.00
12	KNMI	11.00
22	FutureEverything	15.00
	Total	89.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D44.1	Provide an inventory of existing climate data portals and their requirements	12	16.50	R	RE	30

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D44.2	Plan to integrate prototypes into existing architecture and dissemination protocols	8	17.00	R	RE	36
D44.3	Report on usage of easy accessible media for dissemination project results to end users	22	11.00	R	PU	46
D44.4	Service status and usage report	6	22.00	R	RE	48
D44.5	Report on Web interface for end users of climate service prototypes	6	22.50	R	PU	48
		Total	89.00			

Description of deliverables

D44.1) Provide an inventory of existing climate data portals and their requirements: An inventory will be made of existing tools and portals that are available, and gather interface requirements on how the project climate service prototypes can be integrated into these existing portals. [month 30]

D44.2) Plan to integrate prototypes into existing architecture and dissemination protocols: A plan will be developed to integrate climate service prototypes into the architecture and dissemination protocols developed by CLIMRUN and ECLISE. [month 36]

D44.3) Report on usage of easy accessible media for dissemination project results to end users: Media to be described includes for example, YouTube and podcasts. The end user target audience are non-specialists. [month 46]

D44.4) Service status and usage report: Report will describe the status and usage of relevant data from the project via existing climate portals. Interim report will be produced at PM 36. [month 48]

D44.5) Report on Web interface for end users of climate service prototypes: A user friendly web interface for general public and relevant decision makers will be developed, and described in the report. [month 48]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS37	Release of first version of the Web interface for end users of climate services prototypes	6	33	Web interface released
MS38	Second release of the Web interface for end users of climate services prototypes	6	39	Release made available to partners
MS39	Final release of the Web interface for end users of climate services prototypes	6	46	Web interface released to the public

WT3:
Work package description

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

One form per Work Package

Work package number [53]	WP45	Type of activity [54]	RTD
Work package title	Climate services as a business opportunity		
Start month	36		
End month	48		
Lead beneficiary number [55]	18		

Objectives

This WP will assess whether a market for climate services in Europe exists and whether this can be effectively and efficiently used by SMEs and other relevant stakeholders. A general methodology will be developed and it will be applied to specific key sectors to check the economic viability of climate serivce prototypes produced in WP 42 of this project.

Description of work and role of partners

Climate services can help to minimise climate risks and to develop related opportunities in key sectors of the economy. New strategies and technologies can be combined to create services that will provide advantages to those sectors sensitive to climate. For some of the key sectors of the economy, there may be a business opportunity to work with model development managers, to develop a new generation of climate analysis software for the projects assessment stage.

As an example, the modelling of future climate variations and extremes on energy yields within the renewable energy sector will be used to demonstrate the subsequent effects on project siting, return on investment and cash-flow stability. This analysis will help further understanding of the impacts, vulnerability, risks and their costs in order to strengthen investor confidence within the RE sector and stimulate adaptation measures such as “weather derivatives” (Klug and Strack, 2004). In the water sector, the potential water scarcity problems that could appear due to climate variability may be critical in some European regions. The water sector also needs more information to take no-regret decisions, and the risk reduction produced by a better knowledge of the external impacts can be translated into an important costs reduction.

Task 45.1: Methodology to assess business opportunities of the climate services developed.
A characterisation of the different prototypes developed in the project will be carried out. The characteristics of exising products identified at Project Month 16, will help assess which differentiation aspects should new climate service prototypes include to gain market share. The next step will assess the client needs and the potential increase in its competitiveness and productivity. These are key aspects to quantify the willingness to pay for a specific climate service. A qualitative analysis will be performed which will take into account the knowledge and criteria of key stakeholders participating in the project. A potential price will be set through evaluating the costs of production and maintenance of the service. Finally, an identification of the clients will be done to evaluate the future market potential. With all this information gathered, the return on investment for the client can be calculated and the efficiency of the investment can be analysed. This WP will interact with the CLIMRUN project team (www.climrun.eu), who have valuable experience in the renewable energy sector, to provide concepts for a European climate service able to be applied to key sectors of economy. (CETaqua, IC3, Met O, WFP, Predictia, UL-IDL)

Task 45.2: Application of the methodology to key sectors.
Water sector (CETaqua, UL-IDL)
Renewable energy (IC3, EDF, UL-IDL)
Road maintenance (Predictia)
Tourism and Agriculture (TEC, UL-IDL)
Food security and Disaster risk reduction (WFP)
Forestry (UL-IDL)

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	Met Office	4.00
2	TEC	6.00
6	Predictia	10.00
11	IC3	6.00
13	UL	14.00
18	CETaqua	11.00
23	EDF	0.50
	Total	51.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D45.1	Report on methodology to assess business opportunities	18	51.50	R	PU	48
		Total	51.50			

Description of deliverables

D45.1) Report on methodology to assess business opportunities: Report will describe the methodology to assess business opportunities of the climate services developed. Including, as appendices, individual reports summarising the business opportunities, suitability and cost-effectiveness of climate services for each sector [month 48]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS40	Draft methodology description	18	40	Internal report

WT4:
List of Milestones

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

List and Schedule of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS1	ECOMS Board first meeting to discuss priorities for European S2D climate service activities	WP2	1	4	ECOMS Board in place. First meeting held. MS1 is co-ordinated by EUPORIAS and SPECS
MS2	Selection of prototype case studies	WP3	1	16	Selection by General Assembly, and shared with WP 42
MS3	Establishment of Stakeholder Board	WP11	3	4	Jointly led with Met O, and an outcome of European Stakeholder Climate Services Conference
MS4	Preliminary report on sector specific vulnerabilities	WP11	10	9	Preliminary Report
MS5	Climate User Interface Platform prototype component	WP11	1	24	Will be available to input into WP 12
MS6	Workshop with national meteorological organisations and other stakeholders	WP12	14	3	Workshop minutes released
MS7	Preliminary report on user needs	WP12	14	12	Report released
MS8	Preliminary report on surveys of users' needs	WP12	14	18	Report Released
MS9	Workshop with S2D climate prediction developers	WP12	14	23	Workshop minutes released
MS10	RCM historical climate simulations driven by EC-Earth completed	WP21	15	15	Data saved
MS11	EC-Earth ANI hindcast runs for selected case-study years completed	WP21	15	15	Model level data saved and quality checked, and made available for downscaling
MS12	Provision of bias-corrected, downscaled data	WP21	10	24	Data made available for use in hydrology asssessment and impact models in WP 23

WT4:
List of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS13	Provision of downscaled data	WP21	15	24	Data made available to support hydropower case studies and models
MS14	Provision of statistically downscaled surface climate data	WP21	5	27	Data from EC-Earth ANI hindcasts made available and quality checked
MS15	Provision of statistically downscaled surface climate data	WP21	5	30	Data from selected EUROSIP hindcasts made available and quality checked
MS16	Provision of derived climate indices using the meteo toolbox	WP21	5	30	Data made available to support case studies and selected climate service prototypes in RT4
MS17	Provision of dynamically downscaled data from ANI GCM hindcasts	WP21	15	32	Data made available as imput to WFP LEAP and other impact models
MS18	Provision of CIIs based on downscaled data	WP21	4	36	Data made available to case studies and climate service prototypes
MS19	Agreement on preliminary set of CIIs	WP22	4	6	Set agreed on by WP partners
MS20	Agreement on specialised set of CIIs	WP22	4	12	Set agreed on by WP partners
MS21	Define common flow conditions for hydrological skill analysis	WP23	9	3	Commom cases of high and low flow conditions defined. Reported back to Board
MS22	Define common yield conditions for agriculatural skill analysis	WP23	1	3	Commom cases of high and low yield conditions defined. Reported back to Board
MS23	Initial simulations for common cases ready	WP23	9	15	Simulations started
MS24	Model improvements, based on initial assessments, implemented, and reruns initiated	WP23	9	21	Model improvements implemented and simulations started
MS25	Assessment of impacts model skill,	WP23	1	30	Assessments based on common comparison

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
	focussing on water, agriculture and forestry sectors				between hindcast predictions and observations. Report available
MS26	Internal report on S2D uncertainty assessment protocol for impact models	WP31	5	10	Protocol made available to partners
MS27	Deliver impact model S2D scenarios to central database/ftp server	WP31	9	18	Impact models scenarios on the server
MS28	One or more reports on model and case specific results with recommendations to reduce uncertainties	WP31	15	36	Give recommendations to reduce or cope with uncertainties. Papers/reports released
MS29	Deliver protocol guide for uncertainty analysis in climate predictions	WP32	5	24	Guide delivered to the Management Board
MS30	Review of management strategies to deal with impacts, uncertainty and risk within a DMP	WP41	17	38	Completion of first phase stakeholder meetings, research and review of DMPs and strategies within different sectors
MS31	Assessment of the quantitative and qualitative value of DMPs	WP41	14	38	Completion of second phase stakeholder meetings, research and analysis of information skill and value, within different sectors
MS32	Assessment of the impact of, and risk related to, climate information on the DMPs and DSSs	WP41	11	43	Completion of second phase stakeholder meetings, research and analysis of climate impacts within different sectors
MS33	Identify and agree a set of criteria for selecting case studies	WP42	1	15	Set of criteria agreed and reported back to the Management Board
MS34	Choose final list of case studies, and the 2 to 3 case studies for use in rest of WP 42 activities	WP42	1	16	Shared with WP 3 (MS2)
MS35	Run sector specific workshops and	WP43	6	42	Workshops completed, and reports completed

WT4:
List of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
	present the service prototypes developed in WP 42				
MS36	Run a high visibility workshop at end of this WP	WP43	22	48	Workshop run and documented (report, movie etc.)
MS37	Release of first version of the Web interface for end users of climate services prototypes	WP44	6	33	Web interface released
MS38	Second release of the Web interface for end users of climate services prototypes	WP44	6	39	Release made available to partners
MS39	Final release of the Web interface for end users of climate services prototypes	WP44	6	46	Web interface released to the public
MS40	Draft methodology description	WP45	18	40	Internal report

WT5:
Tentative schedule of Project Reviews

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

Tentative schedule of Project Reviews

Review number [65]	Tentative timing	Planned venue of review	Comments, if any
RV 1	24	Brussels	

WT6:
Project Effort by Beneficiary and Work Package

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

Indicative efforts (man-months) per Beneficiary per Work Package

Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 11	WP 12	WP 21	WP 22	WP 23	WP 31	WP 32	WP 33	WP 41	WP 42	WP 43	WP 44	WP 45	Total per Beneficiary
-13 - UL - IDL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 - Met Office	50.00	13.00	8.00	13.00	3.00	3.00	12.00	12.00	40.00	6.00	3.00	3.00	3.00	30.00	12.00	6.00	4.00	221.00
2 - TEC	0.00	0.00	0.00	0.00	8.00	9.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	3.00	2.00	5.00	6.00	40.00
3 - ENEA	0.00	0.00	0.00	3.00	14.00	8.00	10.00	9.00	0.00	0.00	0.00	0.00	0.00	7.00	6.00	2.00	0.00	59.00
4 - MeteoSwiss	0.00	0.00	0.00	0.00	0.00	2.00	10.00	30.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	45.00
5 - UC	0.00	0.00	0.00	8.00	0.00	6.00	32.00	6.00	0.00	6.00	12.00	0.00	0.00	18.00	0.00	6.00	0.00	94.00
6 - Predictia	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	29.00	25.00	10.00	80.00
7 - AEMET	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	20.00	2.00	0.00	4.00	0.00	0.00	0.00	27.00
8 - DHI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	4.00	2.00	2.00	0.00	10.00	0.00	21.00
9 - WU	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	18.00	18.00	6.00	0.00	2.00	0.00	5.00	5.00	0.00	58.00
10 - DWD	0.00	0.00	0.00	0.00	15.00	0.00	38.00	0.00	0.00	0.00	0.00	0.00	10.00	8.00	0.00	0.00	0.00	71.00
11 - IC3	0.00	0.00	0.00	0.00	4.00	9.00	0.00	42.00	2.00	19.00	0.00	0.00	18.00	36.00	6.00	4.00	6.00	146.00
12 - KNMI	0.00	0.00	0.00	0.00	0.00	0.00	12.00	25.00	0.00	0.00	0.00	0.00	0.00	13.00	0.00	11.00	0.00	61.00
13 - UL	0.00	0.00	0.00	0.00	7.00	4.00	21.00	21.00	0.00	9.00	12.00	0.00	0.00	0.00	0.00	0.00	14.00	88.00
14 - UNIVLEEDS	0.00	0.00	0.00	0.00	0.00	29.00	0.00	0.00	13.00	10.00	3.00	36.00	26.00	0.00	0.00	0.00	0.00	117.00
15 - SMHI	0.00	0.00	0.00	0.00	5.00	0.00	34.00	0.00	24.00	10.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	85.00
16 - ULUND	0.00	0.00	0.00	0.00	3.00	2.00	0.00	0.00	10.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.00
17 - METEO-France	0.00	0.00	0.00	0.00	0.00	0.00	9.00	13.00	6.00	0.00	6.00	6.00	10.00	25.00	0.00	0.00	0.00	75.00
18 - CETaqua	0.00	0.00	0.00	0.00	5.00	4.00	0.00	0.00	5.00	0.00	0.00	0.00	4.00	2.00	2.00	0.00	11.00	33.00

WT6:
Project Effort by Beneficiary and Work Package

Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 11	WP 12	WP 21	WP 22	WP 23	WP 31	WP 32	WP 33	WP 41	WP 42	WP 43	WP 44	WP 45	Total per Beneficiary
19 - IPMA	0.00	0.00	0.00	0.00	3.00	4.00	11.00	12.00	0.00	9.00	10.00	0.00	0.00	7.00	2.00	0.00	0.00	58.00
20 - WFP	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	2.00	0.00	0.00	0.00	14.00
21 - WHO	0.00	0.00	0.00	0.00	0.00	7.00	0.00	12.00	0.00	0.00	1.00	1.00	12.00	0.00	0.00	0.00	0.00	33.00
22 - FutureEverything	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	15.00	0.00	35.00
23 - EDF	0.00	0.00	0.00	0.00	0.50	0.50	1.50	1.50	0.50	0.00	0.00	0.50	0.50	1.00	1.00	0.00	0.50	8.00
24 - Meteo-RO	0.00	0.00	0.00	0.00	2.00	1.00	0.00	3.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	8.00
25 - FCUL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 - BSC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	50.00	13.00	8.00	24.00	71.50	95.50	194.50	186.50	128.50	90.00	76.00	59.50	99.50	173.00	85.00	89.00	51.50	1,495.00

WT7:
Project Effort by Activity type per Beneficiary

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

Indicative efforts per Activity Type per Beneficiary

Activity type	Part. -13 UL - ID	Part. 1 Met Off	Part. 2 TEC	Part. 3 ENEA	Part. 4 MeteoSw	Part. 5 UC	Part. 6 Predict	Part. 7 AEMET	Part. 8 DHI	Part. 9 WU	Part. 10 DWD	Part. 11 IC3	Part. 12 KNMI	Part. 13 UL
1. RTD/Innovation activities														
WP 3	0.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 11	0.00	3.00	8.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	4.00	0.00	7.00
WP 12	0.00	3.00	9.00	8.00	2.00	6.00	6.00	1.00	0.00	0.00	0.00	9.00	0.00	4.00
WP 21	0.00	12.00	0.00	10.00	10.00	32.00	0.00	0.00	0.00	4.00	38.00	0.00	12.00	21.00
WP 22	0.00	12.00	0.00	9.00	30.00	6.00	0.00	0.00	0.00	0.00	0.00	42.00	25.00	21.00
WP 23	0.00	40.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	18.00	0.00	2.00	0.00	0.00
WP 31	0.00	6.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	18.00	0.00	19.00	0.00	9.00
WP 32	0.00	3.00	0.00	0.00	0.00	12.00	0.00	20.00	3.00	6.00	0.00	0.00	0.00	12.00
WP 33	0.00	3.00	7.00	0.00	0.00	0.00	0.00	2.00	4.00	0.00	0.00	0.00	0.00	0.00
WP 41	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	10.00	18.00	0.00	0.00
WP 44	0.00	6.00	5.00	2.00	0.00	6.00	25.00	0.00	10.00	5.00	0.00	4.00	11.00	0.00
WP 45	0.00	4.00	6.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	6.00	0.00	14.00
Total Research	0.00	103.00	35.00	43.00	42.00	68.00	51.00	23.00	19.00	53.00	63.00	104.00	48.00	88.00
2. Demonstration activities														
WP 42	0.00	30.00	3.00	7.00	3.00	18.00	0.00	4.00	2.00	0.00	8.00	36.00	13.00	0.00
WP 43	0.00	12.00	2.00	6.00	0.00	0.00	29.00	0.00	0.00	5.00	0.00	6.00	0.00	0.00
Total Demo	0.00	42.00	5.00	13.00	3.00	18.00	29.00	4.00	2.00	5.00	8.00	42.00	13.00	0.00
3. Consortium Management activities														
WP 1	0.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

WT7:
Project Effort by Activity type per Beneficiary

3. Consortium Management activities														
Total Management	0.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Other activities														
WP 2	0.00	13.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WP 4	0.00	13.00	0.00	3.00	0.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total other	0.00	26.00	0.00	3.00	0.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total	0.00	221.00	40.00	59.00	45.00	94.00	80.00	27.00	21.00	58.00	71.00	146.00	61.00	88.00

WT7:
Project Effort by Activity type per Beneficiary

Activity type	Part. 14 UNIVLEE	Part. 15 SMHI	Part. 16 ULUND	Part. 17 METEO-F	Part. 18 CETaqua	Part. 19 IPMA	Part. 20 WFP	Part. 21 WHO	Part. 22 FutureE	Part. 23 EDF	Part. 24 Meteo-R	Part. 25 FCUL	Part. 26 BSC	Total
1. RTD/Innovation activities														
WP 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
WP 11	0.00	5.00	3.00	0.00	5.00	3.00	2.00	0.00	0.00	0.50	2.00	0.00	0.00	71.50
WP 12	29.00	0.00	2.00	0.00	4.00	4.00	0.00	7.00	0.00	0.50	1.00	0.00	0.00	95.50
WP 21	0.00	34.00	0.00	9.00	0.00	11.00	0.00	0.00	0.00	1.50	0.00	0.00	0.00	194.50
WP 22	0.00	0.00	0.00	13.00	0.00	12.00	0.00	12.00	0.00	1.50	3.00	0.00	0.00	186.50
WP 23	13.00	24.00	10.00	6.00	5.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	128.50
WP 31	10.00	10.00	3.00	0.00	0.00	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.00
WP 32	3.00	0.00	0.00	6.00	0.00	10.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	76.00
WP 33	36.00	0.00	0.00	6.00	0.00	0.00	0.00	1.00	0.00	0.50	0.00	0.00	0.00	59.50
WP 41	26.00	0.00	0.00	10.00	4.00	0.00	10.00	12.00	0.00	0.50	2.00	0.00	0.00	99.50
WP 44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00	89.00
WP 45	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	51.50
Total Research	117.00	73.00	18.00	50.00	29.00	49.00	12.00	33.00	15.00	6.00	8.00	0.00	0.00	1,150.00
2. Demonstration activities														
WP 42	0.00	12.00	0.00	25.00	2.00	7.00	2.00	0.00	0.00	1.00	0.00	0.00	0.00	173.00
WP 43	0.00	0.00	0.00	0.00	2.00	2.00	0.00	0.00	20.00	1.00	0.00	0.00	0.00	85.00
Total Demo	0.00	12.00	0.00	25.00	4.00	9.00	2.00	0.00	20.00	2.00	0.00	0.00	0.00	258.00
3. Consortium Management activities														
WP 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Total Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00

WT7:
Project Effort by Activity type per Beneficiary

4. Other activities														
WP 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00
WP 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.00
Total other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.00

Total	117.00	85.00	18.00	75.00	33.00	58.00	14.00	33.00	35.00	8.00	8.00	0.00	0.00	1,495.00

WT8:
Project Effort and costs

Project Number [1]	308291	Project Acronym [2]	EUPORIAS

Project efforts and costs

Beneficiary number	Beneficiary short name	Estimated eligible costs (whole duration of the project)						Requested EU contribution (€)
		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat-rate or scale-of-unit (€)	Total costs	
-13 (UTRO)	UL - IDL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	Met Office	221.00	858,301.00	9,000.00	146,000.00	671,192.00	1,684,493.00	1,156,851.50
2	TEC	40.00	240,000.00	0.00	17,150.00	154,290.00	411,440.00	294,780.00
3	ENEA	59.00	196,042.00	15,000.00	123,000.00	198,226.00	532,268.00	371,018.00
4	MeteoSwiss	45.00	353,079.00	0.00	49,381.00	241,476.00	643,936.00	473,536.80
5	UC	94.00	293,750.00	0.00	12,000.00	183,450.00	489,200.00	354,400.00
6	Predictia	80.00	250,800.00	0.00	21,000.00	163,080.00	434,880.00	286,169.20
7	AEMET	27.00	170,800.00	0.00	28,000.00	119,280.00	318,080.00	21,000.00
8	DHI	21.00	206,493.00	0.00	9,000.00	200,298.00	415,791.00	302,157.75
9	WU	58.00	402,154.00	16,178.00	24,000.00	337,810.00	780,142.00	566,784.00
10	DWD	71.00	430,168.00	0.00	64,668.00	297,401.00	792,237.00	571,212.50
11	IC3	146.00	369,267.00	59,200.00	38,541.40	305,035.75	772,044.15	546,062.81
12	KNMI	61.00	415,562.00	0.00	30,173.00	375,253.00	820,988.00	572,000.00
13 (UTRO)	UL	88.00	242,169.00	0.00	40,500.00	169,601.40	452,270.40	254,402.10
14	UNIVLEEDS	117.00	486,720.00	2,546.00	164,991.00	391,026.60	1,045,283.60	784,599.20
15	SMHI	85.00	510,000.00	1,500.00	29,000.00	510,000.00	1,050,500.00	738,750.00
16	ULUND	18.00	130,770.00	0.00	4,000.00	80,862.00	215,632.00	161,724.00
17	METEO-Fran	75.00	458,250.00	0.00	21,000.00	95,850.00	575,100.00	375,615.00
18	CETaqua	33.00	181,764.00	0.00	13,000.00	38,952.80	233,716.80	168,678.00
19	IPMA	58.00	82,446.00	0.00	10,000.00	55,467.60	147,913.60	104,277.00

WT8:
Project Effort and costs

Beneficiary number	Beneficiary short name	Estimated eligible costs (whole duration of the project)						Requested EU contribution (€)
		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat-rate or scale-of-unit (€)	Total costs	
20	WFP	14.00	172,916.00	0.00	14,000.00	37,383.20	224,299.20	164,924.40
21	WHO	33.00	326,700.00	0.00	40,000.00	73,340.00	440,040.00	330,030.00
22	FutureEver	35.00	125,000.00	50,000.00	80,000.00	123,000.00	378,000.00	148,000.00
23	EDF	8.00	62,568.00	0.00	4,000.00	51,635.00	118,203.00	59,101.00
24	Meteo-RO	8.00	16,000.00	0.00	6,000.00	3,000.00	25,000.00	18,750.00
25	FCUL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	BSC	0.00	137,288.00	5,510.00	6,795.59	94,087.62	243,681.21	151,900.02
	Total	1,495.00	7,119,007.00	158,934.00	996,199.99	4,970,997.97	13,245,138.96	8,976,723.28

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It cannot be changed unless agreed so during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

53. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

54. Type of activity

For all FP7 projects each work package must relate to one (and only one) of the following possible types of activity (only if applicable for the chosen funding scheme – must correspond to the GPF Form Ax.v):

• **RTD/INNO =** Research and technological development including scientific coordination - applicable for Collaborative Projects and Networks of Excellence

• **DEM =** Demonstration - applicable for collaborative projects and Research for the Benefit of Specific Groups

• **MGT =** Management of the consortium - applicable for all funding schemes

• **OTHER =** Other specific activities, applicable for all funding schemes

• **COORD =** Coordination activities – applicable only for CAs

• **SUPP =** Support activities – applicable only for SAs

55. Lead beneficiary number

Number of the beneficiary leading the work in this work package.

56. Person-months per work package

The total number of person-months allocated to each work package.

57. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

58. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

59. Milestone number

Milestone number:MS1, MS2, …, MSn

60. Delivery date for Milestone

Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

61. Deliverable number

Deliverable numbers in order of delivery dates: D1 – Dn

62. Nature

Please indicate the nature of the deliverable using one of the following codes

R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

63. Dissemination level

Please indicate the dissemination level using one of the following codes:

• **PU =** Public

• **PP =** Restricted to other programme participants (including the Commission Services)

• **RE =** Restricted to a group specified by the consortium (including the Commission Services)

• **CO =** Confidential, only for members of the consortium (including the Commission Services)

• **Restreint UE =** Classified with the classification level "Restreint UE" according to Commission Decision 2001/844 and amendments

• **Confidentiel UE =** Classified with the mention of the classification level "Confidentiel UE" according to Commission Decision 2001/844 and amendments

• **Secret UE =** Classified with the mention of the classification level "Secret UE" according to Commission Decision 2001/844 and amendments

64. Delivery date for Deliverable

Month in which the deliverables will be available. Month 1 marking the start date of the project, and all delivery dates being relative to this start date

65. Review number

Review number: RV1, RV2, ..., RVn

66. Tentative timing of reviews

Month after which the review will take place. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

67. Person-months per Deliverable

The total number of person-month allocated to each deliverable.

PART B Table of Contents

B1 Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan

B.1.1 Concept and project objective(s)

Concept:

While societies have flourished or collapsed (Diamond 2005) depending on their ability to adapt to changes in climate, it is only recently that science and technology have been able to provide insights into future climate. Seasonal to decadal (S2D) forecasts hold the potential to be of great value to a wide range of decision-making where outcomes are influenced by climate variability and change. Recent advances in our understanding and ability to forecast climate variability and climate change have brought us to the point where skilful predictions are beginning to be routinely made. Access to credible forecast data, supported by informed guidance from the science community, could lead to significant advances in society's ability to effectively prepare for and manage climate-related risks. Despite its potential utility in informing European business and adaptation strategy, such forecast information is currently under-exploited and not as useful as it should be. A clear opportunity therefore exists to develop new and improved methodologies to exploit the emerging prediction capabilities in climate science and, more importantly, to engage with potential users of such predictions in developing tools to extract useful and usable information tailored to the users' specific sectoral needs.

Our vision is that by developing end-to-end climate impact prediction services, operating on S2D timescales, and clearly demonstrating their value in informing decision-making, we will stimulate a market for these new tools and thus improve the resilience of society to climate variability and change.

This will increase the competitiveness of EU businesses and the ability of regional and national authorities to make effective decisions in climate sensitive sectors. A companion proposal SPECS, also submitted under this call, aims to improve the climate prediction systems themselves, whereas EUPORIAS concentrates primarily on improving the usability and use of S2D predictions. While EUPORIAS and SPECS are independent projects, there has been close communication between the two during their development, so that improvements can be maximised in all aspects of the chain: from numerical forecast systems, through delivery of forecast information, to its application in a range of sectors and business concerns. EUPORIAS will also use seasonal predictions generated by WMO Global Producing Centres (WMO GPCs), two of which are partners in this proposal, and distributed via WMO Leading Centre - Long-Range Forecast Multi-Model Ensemble (LC-LRFMME) at the Korea Meteorological Administration (KMA), an affiliated partner in the project. The flow of S2D data from producing centres to project partners and into the climate services is an important issue in the project which is taken up by the project's Work Packages and a specific role of the Data Flow Manager.

Finally, a brief explanation behind the name of the project: in ancient Greek mythology, Euporia was one of the Horae, whose dance was responsible for the alternation of the seasons. Euporia is associated with prosperity and plenty, and it is therefore fitting to associate our project with them.

Objectives

EUPORIAS has six top-level objectives, each of which are associated with project milestones and deliverables as follows:

1. Develop and deliver reliable and trusted impact prediction systems for a number of carefully selected case studies. These will provide working examples of end to end climate-to-impacts-to-decision-making services operating on S2D timescales. (Deliverable D42.3).

2. Assess and document key knowledge gaps and vulnerabilities of important sectors (e.g. water, energy, health, transport, agriculture, tourism), along with the needs of specific users within these sectors, through close collaboration with project stakeholders. This will be important not only for the development of EUPORIAS itself

but also for any development that would occur in other projects funded under this call. Europe will be able to take an early leadership role in the development of the UIP (User Interface Platform) within the WMO's Global Framework for Climate Services (GFCS). (Milestone 5 and Deliverable 43.2).

3. Develop a set of standard tools tailored to the needs of stakeholders for calibrating, downscaling, and modelling sector-specific impacts on S2D timescales. (Deliverable 22.2 and Milestone 30).

4. Develop techniques to map the meteorological variables from the predictions systems provided by the WMO GPCs (two of which -Met Office and MF- are partners in the project) into variables which are directly relevant to the needs of specific stakeholders. (Deliverables 22.1 and 22.2).

5. Develop a knowledge-sharing protocol necessary to promote the use of these technologies. This will include making uncertain information fit into the decision support systems used by stakeholders to take decisions on the S2D horizon. This objective will place Europe at the forefront of the implementation of the GFCS, through the GFCS's ambitions to develop climate services research, a climate services information system and the user interface platform. (Deliverables 33.3 and 41.4).

6. Assess and document the current marketability of climate services in Europe and demonstrate how climate services on S2D time horizons can be made useful to end users. (Milestone 40 and both milestones in Work Package 43).

The primary forecast timescale for the project is one season to one year ahead, with a secondary focus on the more scientifically challenging ~2-10 year timescale which is less likely to provide reliable information in the coming few years . The main study area is Europe, with a secondary focus on Africa, in particular with reference to food security, agriculture and disaster risk reduction.

These objectives relate to the topics addressed by the call as follows:

- Reliable seasonal-to-decadal climate predictions will be used to provide value to society and key economic sectors (energy, water, health, infrastructure, food security, forestry and tourism) by informing their short and medium term planning and decision-making;
- The output from climate models will be used at the temporal and spatial scales relevant to different stakeholders in Europe;
- Research will focus on the crucial task of managing uncertainty in the development of reliable climate services;
- The impacts of climate variability and climate change at regional and local scales will be assessed, and mapped onto existing vulnerabilities;
- Relevant stakeholders will be involved throughout.

Meeting the top-level objectives identified by the call under the EU FP7 Environment Theme (ENV.2012.6.1-1) will improve preparedness, reduce costs of emergency interventions, prepare the market for the availability of climate-dependent products and services, and promote higher business continuity and resilience of society. This will represent a key contribution to the WMO GFCS, and provide new business opportunities for SMEs through the provision of specialised climate services.

A key feature of the proposed approach is that it will start from stakeholders needs in developing service prototypes. EUPORIAS will represent a major bottom-up initiative on S2D climate predictions and will be a major European contribution to climate services.

How will these objectives be met?

Central to the success of the project is the role of the stakeholders who will provide essential input from a user/decision-makers perspective. They will be engaged from an early stage through the stakeholder group in a two-way interaction where users needs will be brought to the scientific community and where the current capability and its limitations will be presented to the stakeholders. The case studies will also reflect the stakeholders' interests and needs in the project. At the beginning of the second year a subset of case studies will be selected for development into climate service prototypes. While such a selection will be based on the skill of impact predictions, it will also depend on the identification of suitable stakeholders with clear demands and the ability to use the climate service to influence their decisions. Selecting case studies in this way will help to identify those where the climate service will have a positive impact on addressing users' needs (***objective 1***).
This user engagement phase will be essential to the success of the first Research Theme (RT 1) on "users' needs and sector specific vulnerabilities". *WP 11,* led by ENEA, will focus on assessing vulnerability and the user engagement side, while *WP 12,* led by the University of Leeds, will concentrate more on user needs currently not addressed by available technology. This initial stage, between the kick-off meeting and the end of the first year, underpins most of the rest of the project . ***This will meet objective 2***.

The second Research Theme (RT 2) represents the engine of the whole project by developing and providing the tools needed by the case studies, as well as by providing an assessment on the predictability of the impacts. *WP 21,* led by SMHI, will focus on the correction of biases in seasonal predictions, as well as dynamical and statistical downscaling towards impact-relevant resolutions. ***This will meet objective 3***. This is one area of the project where we will develop the scientific capability well beyond the state of the art. A thorough analysis of the value of dynamical downscaling over and above what is available from statistical methods will be completed, filling an important gap in current knowledge.
WP 22, led by MeteoSwiss, will use the conclusions of RT1 to develop a number of user-relevant climate indices derived directly from the seasonal predictions using index-specific post-processing. Stakeholders will be engaged to ensure that early in the project we can provide a tangible improvement on present impact-relevant predictions. Indices such as cooling degrees days, frequency of heavy precipitation or the probability of a winter wind storm will be produced to address specific users' needs. ***WP 22 will meet objective 4.***

WP 23, co-led by the Met Office and WU, will develop complex impact models (e.g. hydrological and crop models) that are relevant to stakeholders involved in the case studies. The WP will use a combination of complex off-line models (e.g. sub-basin based hydrological model, grid based land surface models, vegetation models) and simpler holistic models embedded within the prediction model itself (e.g. such as those embedded within the Met Office seasonal forecast system GloSea5). The predictability provided by such process-based models can be useful for a number of critical sectors (e.g. agriculture and water management) where simple post-processing is often inadequate to provide a reliable assessment of impacts.

The third research area is a cross-cutting theme (CCT 3) primarily focused on uncertainty. While it is important to communicate predicted impacts to potential users, it is also essential to make users aware of the uncertainties associated with these predictions. The predictions of impacts on S2D timescales are best presented using a risk analysis framework which maps uncertain predictions onto the likelihood of specific outcomes ***Together the three work packages in CCT3 will meet objective 5***.

WP 31, led by WU and the University of Leeds, will assess the uncertainty associated with the project impact models. The WP will assess differences obtained by using the same impact model given a specific meteorological scenario (perfect forecast). Slight changes to the way the impact models are formulated (e.g. numerical values of the parameters describing unresolved processes) can have important consequences on the impact predictions. For

complex impact models (e.g. hydrological models) this assessment could be based on a perturbed physics approach similar to the one used in the UK Climate Projections 2009 (UKCP09). For simpler models (e.g. non-linear transfer functions) statistical tools such as 'goodness of fit', will be adopted to estimate the uncertainty in the specific function linking impacts to climate predictions.
WP 32, led by *UC*, will look at the best way of combining the two main sources of uncertainty in seasonal impact predictions (i.e. uncertainty from the climate predictions and uncertainty in the impact model formulation) into a single coherent assessment. This is important given that most of the interactions between climatic conditions and impacts are likely to be non-linearly interlinked and consequently covariance terms may potentially be important.
WP 33, led by *DHI*, represents the conclusion of activities in this RT. Its main focus is the linkage between impact predictions and stakeholders, with an emphasis on communication of the level of certainty/uncertainty. Since the current skill of S2D predictions is not always high, it will be crucial for the success of EUPORIAS to identify suitable methodologies to cope with uncertain predictions in a decision support system. Consequently, communicating the errors becomes at least as important as communicating the actual forecast values (***objective 5***). The WP will also identify the best strategy for providing alerts in situations when there is relatively high predictability, such as the cold spell that affected much of Europe during winter 2010-2011.

The fourth Research Theme (RT 4) brings activities from all the other research themes together for the development of a number of climate service prototypes. The selection of case studies will be also made in RT4, on the basis of the predictability of associated impacts and the availability of stakeholders with a well defined set of options they could take action upon. The selected case studies will be transformed into semi-operational prototypes of climate services. A real-time forecast will be issued during the course of the project as a demonstration of such a prototype.
WP 41, co-led by *Meteo France and IC3*, will provide an assessment of the value of using S2D forecasts in the decision making process, based on sector-specific cost-benefit analysis. This will be developed through close collaboration with stakeholders in each case study that will be then transformed into a prototype.
This work package, in conjunction with WP 44, will meet objective 5. In coordination with WP 42 it will also meet objective 1.

WP 42, led by *Met Office*, is one of the two demonstration WPs. Its main aim is to bring together knowledge acquired during the course of the project and produce a working climate service, appropriate for informing stakeholders and demonstrating how a climate service can be developed to address specific user needs (***objective 1***).
WP 43, led by *Predictia*, is the second demonstration WP and will focus on user engagement. Workshops will be organised with stakeholders and a wider audience to present the results of the project. More specifically, the prototypes developed in WP 42 will be used as a starting point for a discussion with stakeholders. This will allow the project to disseminate its results and to receive feedback on the prototypes in time to incorporate this feedback in to the development process. The WP will capitalise on the experience of FutureEverything and their innovative approach to communication. This WP will also be responsible for the development of podcasts, project tweets, and YouTube videos that will be made available throughout the course of the project.
WP 44, led by *KNMI*, will take care of delivery mechanisms. While a web portal will likely be an important component of delivery, the WP will also explore innovative ways of making seasonal, and wherever possible, decadal impact-predictions feed into stakeholder-specific decision support systems (***objective 5***). The WP will also look at possible ways of delivering alerts every time a specific set of circumstances arise.
Finally *WP 45* led by *CETaqua* will assess the marketability of climate services in Europe (***objective 6***). By looking at profit margins, market competition, cost-effectiveness, and users needs, this WP represents the natural conclusion of the project.

B.1.2 Progress beyond the state of the art

B.1.2.1 State of the art

Research on seasonal and decadal forecasting has resulted in a number of major advances in recent years. Since the development of the EU DEMETER project (Palmer et al. 2004) seasonal predictions have shown to exhibit useful skill for certain regions and seasons (Graham et al. 2005). It has also been shown that socioeconomic benefits are derived from seasonal forecasts in areas such as food production and health (Morse et al. 2005; Challinor et al. 2005). More recent developments reveal significant improvements in skill of forecast parameters, such as the annual number of tropical cyclones (Keenlyside et al., 2008; Smith, et al., 2007; and Smith, et al., 2010) for specific ocean basins. Nevertheless, significant effort is still required to improve the skill of such forecasts. Perhaps more importantly, significant effort is needed to improve the use and usefulness of forecasts in a range of climate-sensitive sectors of the economy (Kirtman and Pirani, 2009).

It has been documented that in a seasonal forecasting context the predictive skill of an impact model (IAV) is sometimes higher than that of its driving climate model (e.g. grassland-Australia-ENSO, McIntosh et al. 2005). In the case of agricultural productivity, this may be be due to non-linear signal propagation from rain to soil moisture to plant production, and/or due to the documented better skill in predicting modes of variability rather than grid point magnitudes for rainfall. Research has shown that the use of forcing ensembles can increase seasonal hydrologic forecast skill (e.g. Cloke and Pappenberger 2009 and Addor et al. 2011). Recent work, undertaken by SMHI and Lund University indicates it is possible to substantially improve spring flood forecasts with the use of multi-model ensemble forecasts, combining statistical analyses and downscaling of large-scale atmospheric circulation with dynamic hydrological modeling (Foster and Uvo 2010, Foster et al. 2011 and Olsson et al. 2011).

The latest generation of impact models account for a large set of natural and man-modulated processes. The land surface [1] models used in the project (JULES, VIC, LSHEL[1]) all include river routing and are thus able to simulate discharge hydrographs that can be compared to actual observations, similar to the basin models (HBV, EHYPE). Some models include natural lakes (LSHEL); while others (VIC, LPJmL) include dams and reservoir operation schemes that differ for irrigation, hydropower, or discharge regulation purposes. Ecosystem models can be used to assess climate impacts on forest productivity and damage risk (LPJ-GUESS) which can provide useful information for forestry management.

The latest impact models are being developed to allow integrated assessment of climate impacts across different sectors. For example JULES-impacts (JIM) now includes a crop model which is dynamically linked to river-flow via an irrigation scheme. Thus, environmental impacts that reduce river-flow can impact crop productivity within the model.

B.1.2.2 Main limitations at present

To date, the exchange of information between providers of seasonal to decadal "forecasts" and stakeholder communities has mostly followed a top-down approach, in which the science community has produced climate information mostly based on scientific priorities and the stakeholder community has received this information, often of limited usefulness and without a full understanding of its merits and limitations. Research faces formidable challenges to capitalize on the social and economic benefits promised by improvements in climate information. The corresponding research agenda will require increased participation from the social science and end-user communities (Ruth, 2010). A similar problem occurred in end-to-end European projects, such as PRUDENCE and ENSEMBLES, in which the design of the climate experiments was largely carried out by the science community with limited stakeholder engagement.

One barrier to progress has been the lack of well-accepted methods for relating the uncertainty of S2D forecasts with decision variables. The reasons for this may be the decision-makers' tendency to act in a risk averse manner (e.g. Block, 2001) or the "poor" forecast skill. However, it can also be attributed to difficulties in integrating forecasts into existing decision support systems and to the lack of focus on specific user needs (e.g.

[1] For the acronyms and the characteristic of each model the reader is referred to the table in appendix 3

Goddard, et al., 2010). To date, the majority of research efforts have focused on improving the representation of a specific process in the underlying prediction systems rather than on the usability of the ensuing forecasts in practical applications,for example: land surface (Koster et al. 2004), sea ice (Balmaseda et al. 2010), and stratospheric processes (Ineson and Scaife 2009).

As the WMO High Level Taskforce for the Global Framework for Climate Services (GFCS) recognised, "To be useful, climate information must be tailored to meet the needs of users. Existing climate services are not well focused on user needs and the level of interaction between providers and users of climate services is inadequate. Users need access to expert advice and support to help them select and properly apply climate information. Climate services often do not reach “the last mile”, to the people who need them most, particularly at the community level in developing and least developed countries".

Seasonal to decadal forecasts are generally available as GCM output, constituting an ensemble of forecasts that sample a portion of the total forecast uncertainty associated with initial condition uncertainty, model inaccuracies and climate system non-linearity. These forecasts are generally biased when compared to observed climate outcomes. Such biases include the mean climate or interannual variability, but may also affect statistics such as the frequency of synoptic weather patterns. Such systematic biases must be corrected for successful use of forecast data. Knowledge about systematic biases, which vary across GCMs, season, forecast lead-time, location and predicted variable, is developed through observational evaluation of numerous hindcasts (retrospective forecasts).

Biases in climate model data may be amplified in impact models as these sometimes involve cumulative indices to trigger certain processes (e.g. growing degree days to trigger leaf budding in temperate natural vegetation or sowing date for crops, or cumulative precipitation or soil moisture thresholds in tropical climates). It is important to evaluate the error propagation for each specific combination of region and lead time. Another level of (un)certainty mostly overlooked in S2D forecasting is the systemic uncertainty. This can be expressed as a combination of structural uncertainty in model formulation, uncertainties related to imprecise knowledge of model parameters describing sub-grid processes and the uncertainty arising from the initialization of the model. While in the climate community the use of ensembles as an approach to estimate each of these uncertainty sources has become commonplace, the impact community has just started to explore the use of ensembles, see the WATCH example for hydrological models (Haddeland et al. 2011).

Forecasts presently are made at a resolution of ~100-200km per model grid box while climate services generally require forecast information at significantly finer spatial scales for it to be usable and useful in regional planning and business activities. Furthermore, due to their low resolution, GCMs poorly represent the extreme tails of the climate probability frequency distribution (PDF) which is populated by infrequent but intense events that have a non-linear impact on both society and nature, for example intense weather systems and associated storm wind speeds and extreme rainfall. Despite this, an accepted methodology to downscale seasonal and decadal predictions is still largely lacking.

B.1.2.3 EUPORIAS will move beyond the state of the art in:

1. Methology and approach,

Stakeholders and potential users of climate services in Europe will be central to the project from the very beginning. Starting from an assessment of user needs, EUPORIAS will collaborate closely with stakeholder groups and will develop and deliver a reliable and trusted impact prediction system to showcase end-to-end climate to impacts to decision-making services. These prediction systems will provide sector-specific climate information at S2D timescales, and will develop accepted methods to characterise related uncertainties.

2. Science / Tools

To bring GCM data to impact-relevant scales the project will develop a set of tools, tailored to the needs of a range of users, for bias correcting, calibrating and downscaling S2D predictions. Over Europe, where a good observational record exists, downscaling will largely be based on statistical methods. EUPORIAS will also assess the added value in forecast skill induced by combining dynamical and statistical downscaling methods. This will be assessed in a well defined case study over East Africa where seasonal prediction skill is noticeably

higher than over Europe. For this downscaling task EUPORIAS will use an innovative methodology using a [2]-coupled GCM, initialized through an anomaly-initialisation technique (ANI) to provide boundary conditions to a number of RCMs (see footnote and WP 21 for more information). The output of these high resolution models will then be compared to observations for the region, as well as to results obtained through statistical methods. While the ANI-GCM driven RCM (see footnote) represents the main methodological approach for the project, comparison will be sought with results of other projects (such as the DFID funded Climate Science Research Partnership in Africa) which plan to use coupled GCMs initialised using a full-field approach (FFI)to drive an RCM.

The project will use a combination of complex off-line models e.g. sub-basin hydrological models, grid based land surface models and vegetation models as well as simpler holistic models embedded within the prediction model itself to assess the impacts for those sectors where simple post-processing is inadequate to provide reliable assessments. Examples include river flows, water resources and agricultural productivity.

EUPORIAS will engage with a number of international activities working to integrate instrumental and earth observation data-sets, and streamlining their use in S2D and impact models The EUPORIAS consortium is well represented in these activities including in the Global Monitoring for Environment and Security (GMES) programme, the European Space Agency's Climate Change Initiative, and WMO's observational programmes. This will allow EUPORIAS to use near-real-time (earth) observations to initialize impact prediction systems. EUPORIAS will also take advantage of recent EU initiatives in climate-service development and assessments such as CLIMRUN and ECLISE, whose leading institutions are well represented within the consortium.

3. Assessment

Rather than assessing the skill of seasonal predictions using climate-related metrics EUPORIAS will assess the benefits of S2D forecasts at the regional level using user-defined metrics of the prediction of impacts. While closely addressing the needs of users, EUPORIAS will also take into consideration a wide range of existing strategies and recommendations on climate and disaster risk management, including the UN International Strategy for Disaster Risk Reduction and the WMO Commission on Climatology Task Team on Climate Information for Adaptation and Risk Management.

The cross-cutting theme (CCT3) will quantify uncertainty associated with each part of the modelling procedure and carefully address the communication of forecast uncertainty to stakeholder groups. Downscaled data will be developed for a range of case studies, in communication with stakeholders in RT1 and used as input to impact models in WP 23 applied to the selected case studies.

[2] Coupled GCMs can be initialized in two generic ways for seasonal-decadal forecasting, with initialisation of the slower varying parts of the system being important on these timescales, particularly the upper ocean and soil water. The two initialisation methods are referred to as full-field (FFI) and anomaly initialization (ANI). Both aim to initialize the coupled model using observed information about the ocean state for a given start date. This information is generally derived from a global ocean assimilation system. FFI uses a full estimate of the state of the ocean, atmosphere and land surface, for the given date and interpolates this to the GCM grid, providing an initial condition for model forecasts. ANI first calculates the anomalous state of the observed/analysed ocean/atmosphere/land-surface for the given start date, relative to a long-term observed climatology. These anomalies are then added to the mean climate of the coupled model, forming an initial condition made up of the model's preferred climate, modified by observation-based anomalies.

B.1.3 S/T methodology and associated work plan

B.1.3.1 Overall strategy and general description

The project is organised in a simple linear structure, going from user needs (RT1) to service prototypes (RT4). The second research theme (RT2) represents the engine of the project. It is largely informed by the results of RT1 and informs activities in RT4, by providing the underlying technologies to be used in the climate service prototypes. Aside from this main structure (RT1, RT2, RT4), we have a cross cutting theme on uncertainty (CCT3) and a set of case studies coordinated by the project's science lead.
While RT2 will develop the impact prediction systems used in the case studies, these will be the result of a multidisciplinary effort involving most WPs. We resisted the temptation to identify the exact nature of these case studies at the proposal stage as we believe these are best designed through direct and close dialogue with our stakeholders. At the same time we are committed to have at least one case study for each of the key focus areas: energy, water, health, food security (agricultural productivity), infrastructure (including transport), forestry and tourism.

Early in the second year (PM 16) the general assembly will select the best case studies from those available. Selection will be made on the basis of:

- the impact prediction skill demonstrated over the hindcast period
- the identification of a clear stakeholder, with relevant decision portfolio, who can exercise options in the decision-making process based on the predicted climate-driven information of impacts
- the lack of a viable service already addressing users' needs

Most effort will then be put into fully developing the selected cases into operational climate service prototypes. Such a development, mainly occurring in RT4, will include the development of a communication strategy, interaction with industry-defined decision support systems and the delivery mechanism. The prototypes will first be run over the historical past, to assess how the climate/impact information could have been used and how it may have helped in the decision making process. The prototype will then be run in forecast mode, providing a number of fully working operational (supported for the duration of the project and partially supported afterward) impact prediction systems.
At the same time some activities will continue on the case studies not selected for prototyping.

Particularly towards the end of the project significant effort will be put into outreach and dissemination of project findings, both to stakeholders and the general public. By presenting the methodology we followed to develop these fully functional climate services, we expect to promote the use of these new technologies beyond EUPORIAS. The project will conclude with an assessment of the marketability of the developed services in Europe based on project results.

B.1.3.1.1 Data flow

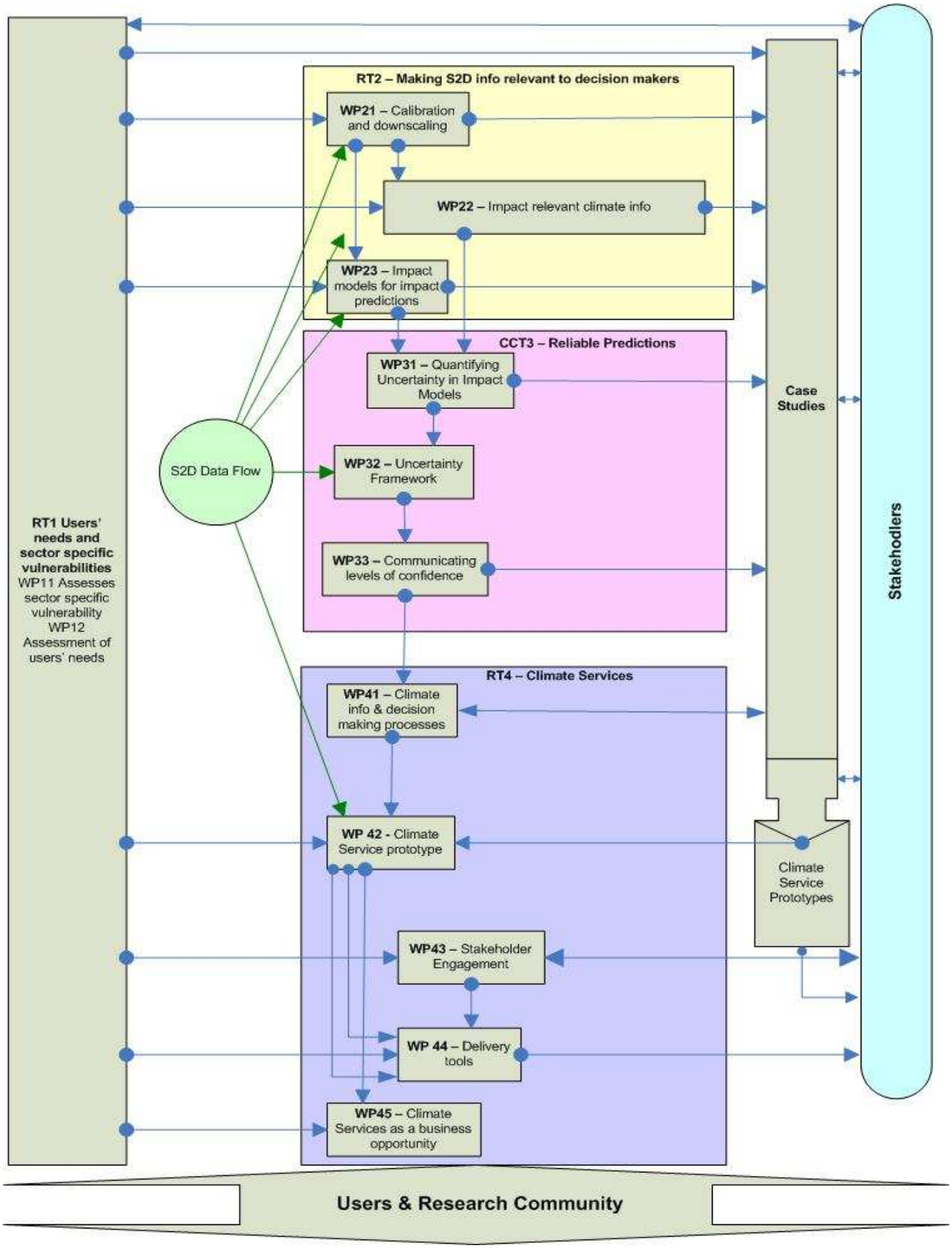
Although EUPORIAS won't generate the massive volume of data typically generated by model Intercomparison projects, the data flow in and out of the project will be fairly substantial. For the initial part of the project, the work in RT1, RT2 and CCT3, will only need to use hindcast data. This will be obtained by a number of different sources including ENSEMBLES, CMIP5, and EUROSIP. The two WMO GPCs (Meteo France and Met Office) will make available some additional model output to the project. EUPORIAS will also aim to acquire all the data that will be made available by other projects that the commission fund under this call. Aside from these S2D datasets, the project will use weather and impact observations made available by partners (e.g. GRDC and EWS datasets for river flows or EUSTAT for crop yeild).
Some of this data-gathering may require specific data recovery actions and the Met Office will lead on this. All of the data will flow into the project via WP 4 which will be responsible for dissemination of the date to project partners. This centralised approach will ensure a uniform approach to data flow issues irrespective of the data source. The experience that the University of Cantabria acquired in previous projects such as ENSEMBLES will be extremely valuable here. The diagram below shows schematically how the climate information is expected to be distributed to the different WPs.

Finally in the last two years of the project EUPORIAS will require operational forecasts. Depending on the nature of the prototypes these will be provided by EUROSIP or by the GPCs.

Figure 1.3.1.1: Schematic flow of the data in the project.

A list of IAV models used to study sectoral impacts of S2D climate variability can be found in Appendix 3

B.1.3.1.2 Graphical presentation of the components showing their interdependencies



B1.3.1.3 Significant risks and associated contingency plans

EUPORIAS, like all projects, is susceptible to risks, arising from the ambitious (but realistic) objectives, inherent risks associated with undertaking research, and by breaking new ground in bridging the current gap between climate service providers and users.

The Met Office has developed expertise in the management of risks in this context through other large projects such as ENSEMBLES. The Project Office, supported by the Met Office's Risk Manager will draw on the knowledge and experience of partners within the consortium and will ensure that risks within EUPORIAS are managed effectively throughout the life of the project.

Within EUPORIAS risks can be categorised into political, financial, scientific, and managerial. The significant risks and associated contingency plans are described below.

Financial risks
Europe is undergoing a period of financial tumult at the present time. While unlikely to occur, this may put pressure on some partners and in extreme cases a partner may need to withdraw from the consortium due to financial difficulties. A process for replacing partners or re-allocating the work that the partner who has left would have done is all part of the formal consortium agreement phase.

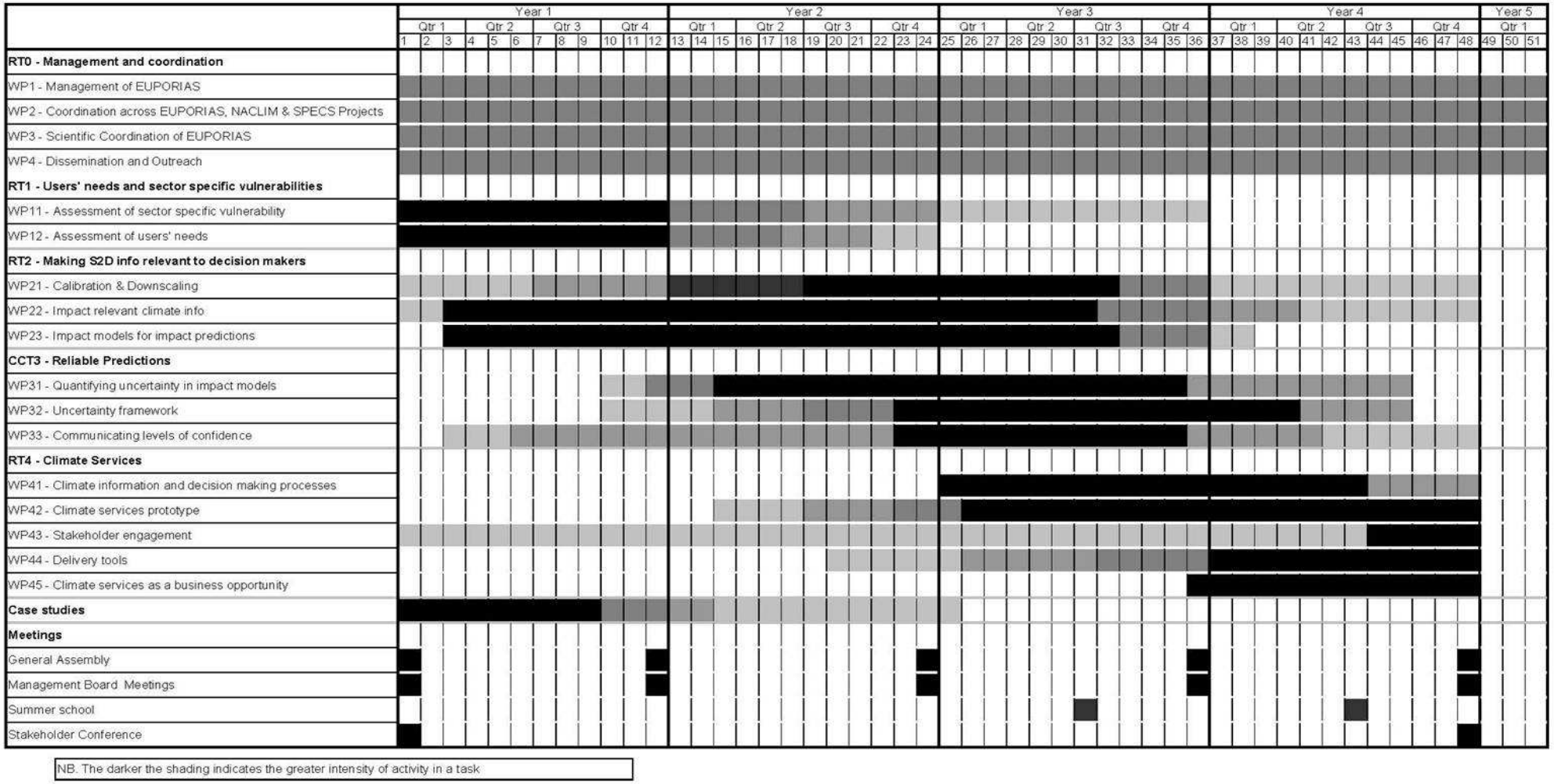
Scientific risks
Data flow is an important element of the EUPORIAS project and it is essential that data is gathered, managed and disseminated correctly. There is a risk that data could be handled incorrectly causing problems for the project. Accordingly a Data Flow manager has been appointed within the project to ensure that the appropriate focus is maintained on this task and that any issues will be avoided or minimised.
One of the objectives of the project is to produce case studies. It will be the responsibility of the WP leaders to ensure that sufficient work is undertaken with partners and stakeholders to gather and use the required information for the case studies. The Management board will, if needed, ensure that appropriate action is taken to keep stakeholders engaged in the development of the case studies.
A key objective is the development of prototype Climate Services. To make this as successful (i.e. of use and value to decision makers) as possible the development needs to maximise the involvement of decision makers, which the project will achieve through its stakeholder engagement, and through the involvement of the partners who are involved in decision making. This risk will be mitigated through the creation of the Stakeholder Group (described in more detail in Part B.2.1 below) which itself will have close interaction with the project's activities.
The project is also taking a risk by breaking into new ground bridging the current gap between climate service providers and users. This project will be at the forefront of this activity, but other international initiatives are starting to think about this topic, most notably WMO's GFCS and the newly formed international Climate Services Partnership. EUPORIAS will have an Advisory Board which includes the Head of the GFCS at WMO and the coordinator of the Climate Services Partnership. The EUPORIAS Coordinator is part of the core writing team for the GFCS and part of the core team of the Climate Services Partnership, and so this team will be able to provide invaluable insight on international activities and developments.

Managerial risks
EUPORIAS will offer an opportunity for individuals from a wide range of disciplines to work together on an exciting and innovative project. Partners will work together to assist any partners that need to recruit people to work on the project.
The Coordinator has considerable experience in running large FP projects and will have access to a wealth of experience from partners for help and support during the operation of EUPORIAS. The Management structure has been clearly laid down and detailed in Part B.2.1 to ensure that EUPORIAS will minimise the project management risks, such as delays to tasks and Work packages.
There is a risk regarding the management of personal data as highlighted in Part B.4. The SIMG will be tasked with overseeing the management of personal and private data to ensure that the data is managed in accordance with EU guidelines and rules.
The recruitment and retention of suitably experienced researchers and stakeholders could be a risk. The project has already identified the critical mass of partners and stakeholders needed to make the project successful. While

recruitment of additional stakeholders may strengthen the project it is retention that is the biggest risk. The recruitment risk will be mitigated by partners using existing contacts to enthuse and recruit Stakeholders. The risk of not retaining stakeholders will be mitigated by ensuring they are fully engaged with the project throughout (such as through the planned workshops and meetings, and constant engagement through the Work Packages and communications of progress and activities.

During the consortium agreement phase, a comprehensive risks register will be created along with appropriate management of the risks. Whilst in general consideration will be given to reducing the risks through mitigation strategies, ultimately the identified risks will be retained and monitored. However, consideration will have to be given to avoiding and sharing risks where appropriate.

B.1.3.2 Timing of work packages and their components



The darker the shading of the Gantt bar, the greater the intensity of activity.

B.2 Implementation

B.2.1 Management structure and procedures

EUPORIAS brings together a large number of partners from across Europe, and will have strong interactions with stakeholders in order to develop and deliver user-driven climate services. It is therefore essential the project has an effective management structure and decision-making procedures, as described below. The aims of the management structure and procedures are to ensure that as well as managing the project on a day to day basis, individual strands of the project are fully integrated so that full benefit can be realised from the output of each work package.
To achieve this, a management theme (RT0) has been included in the project. The primary purpose of this management theme is to ensure activities carried out throughout the project are fully integrated towards a common purpose; and the project is able to deliver the benefits in full to the stakeholders, users and wider community. RT0 will provide top level management of the project, ensuring research is carried out in an effective and efficient manner and progress is reported to the European Commission on a regular basis. RT0 has four work packages; WP 1 (Management of EUPORIAS), WP 2 (Coordination across EUPORIAS, NACLIM and SPECS projects), WP 3 (Scientific Coordination of EUPORIAS) and WP 4 (Dissemination and Outreach).

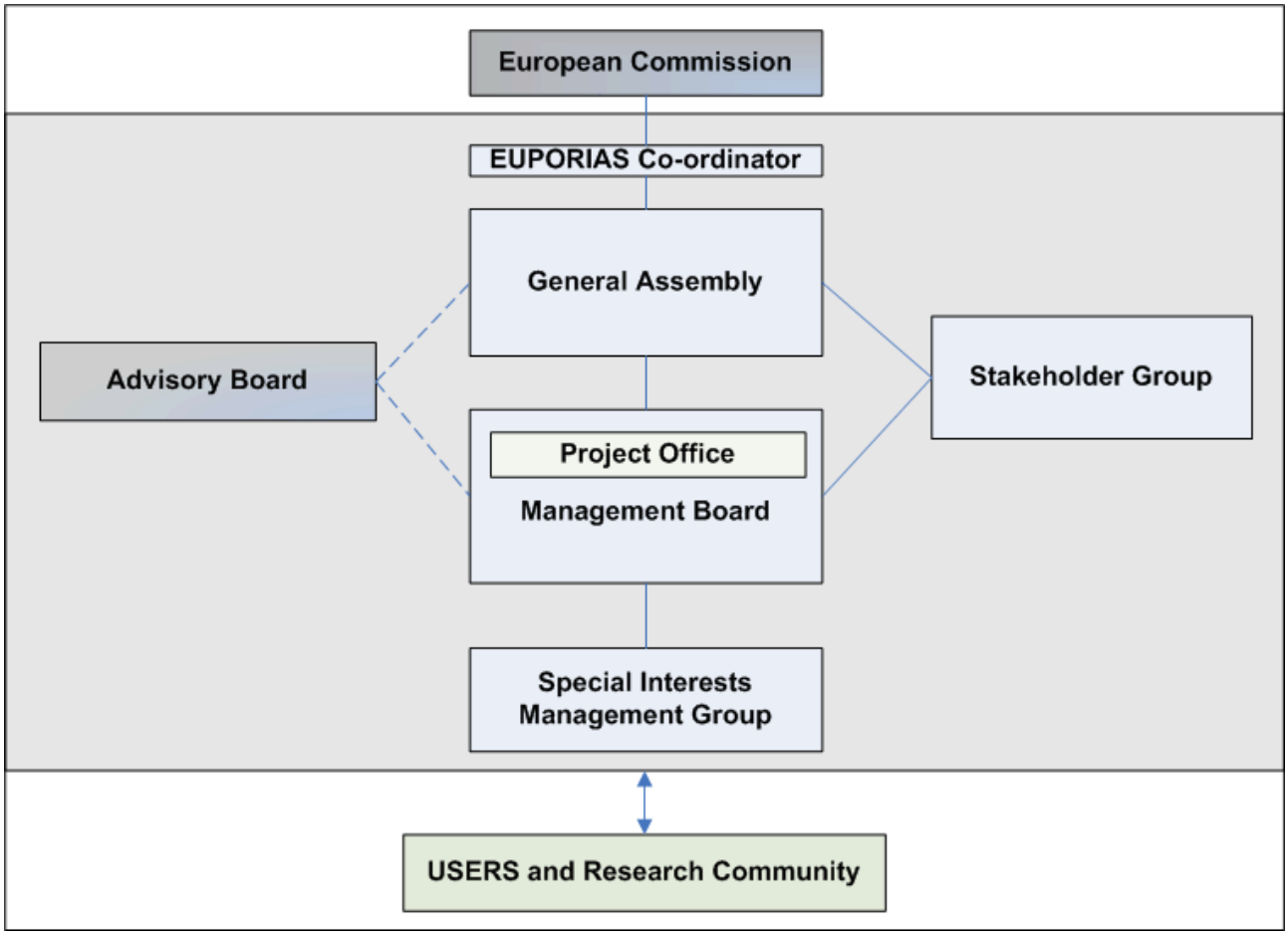


Figure 2.1 EUPORIAS Management Strucure

The management structure is designed to manage the interactions and information exchange between partners, project administration, the European Commission and stakeholders in as rapid and efficient a manner as possible. The structure has been kept as simple as possible to optimise important interactions between all parties.

The project will be coordinated by Dr Chris Hewitt, from the Met Office, who has considerable experience in the international climate services community and in leading large projects. All project administration and management of financial reporting and contractual matters will be handled by a team at the Met Office, supported by experienced legal, finance and communication teams, with extensive experience of European Framework Programmes.

Details of the components of the management structure, identified in Figure 2.1, are given below, together with the specific roles and responsibilities of individuals associated with each group. In summary:

- The General Assembly of all partners is the primary decision-making body for the project;
- The Management Board will be the supervisory body ensuring a successful execution of the project;
- The day-to-day management of the project will be conducted by the project office;
- The Special Interest Management Group (SIMG) will be convened to provide specialist advice to the Management Board on issues such as IPR, ethics and gender balance;
- The Stakeholder Group will influence and advise on project activities from a stakeholder/user perspective;
- The Advisory Board will provide independent advice on the project's progress and plans from the perspective of external experts.

The above bodies are in charge of the EUPORIAS project only. In addition, due to the clustering and coordination mechanism with EU FP7 NACLIM and SPECS, there will be a European Climate Observations, Modelling and Service initiatives Board (ECOMS Board). The ECOMS Board will discuss priorities for European activities relating to climate observations, modelling and services on seasonal to decadal timescales. It is also a 'think tank' to make recommendations to the European Commission for priorities for European activities to be aligned with the Global Framework for Climate Services. The tasks and responsibilities of this board are described in WP 2.

B.2.1.1 EUPORIAS Management Structure

2.1.1.1 General Assembly

The General Assembly consists of one member of each of the partner institutions. Its purpose will be to:

- act as the final decision-making body for the project;
- discuss progress of the project and plans; and
- advise the management board on matters relating to the work plan.

Meetings will be held at least once a year, including one at the start of the project and a final meeting at the end of the project.

Any member of the General Assembly may, provided it has written support of 50% or more of the consortium members, request that the EUPORIAS coordinator convene a General Assembly. This must then be convened at the earliest practicable opportunity. Decisions made by the General Assembly will be acted on by the project office or the Management Board as appropriate, where the decision has been supported by at least two thirds of the partners. Members can attend the meeting and vote in person, appoint a proxy to vote on their behalf or register their vote in writing prior to the meeting if they cannot attend.

2.1.1.2 Management Board

Overall management and oversight of the project will be carried out by the Management Board, who will be responsible for:

- acting on the decisions of the General Assembly;
- ensuring work packages are fully integrated;
- sharing knowledge as widely as possible across and beyond the project;
- agreeing the work plan;
- recommending resolutions for any disputes between partners;
- ensuring the proper operation of the consortium, including financial management, reporting, communication,
- delivering the aims, deliverables and milestones of the project.

In the event of changes to the consortium composition or budget allocation changes, the Management Board will make recommendations for the General Assembly to approve.

The Stakeholder Group (discussed below) will be represented on the Management Board and at the General Assembly by the Science Coordinator (discussed below). The Special Interests Management Group (discussed below) will be formed as required by the Management Board and will be represented on the Management Board by the Project Manager.

Management of Risk

The Management Board will be responsible for risks, issues and benefits realisation of the project. Day-to-day maintenance of the registers will be undertaken by the project office.

Membership of the Management Board

The management board will consist of:

- EUPORIAS coordinator (chair of the board);
- Project manager (reports to the board);
- Science coordinator;
- All work package leaders;
- EUPORIAS administrator (secretary for the board);
- Individuals from each UN Organisation represented in the project as partners (WHO/Regional Office for Europe and WFP).

For quorum at Management Board meetings, all of the following must be present, although they may appoint a deputy if they are unable to attend:

- EUPORIAS coordinator or a representative from the project office (to chair the meeting);
- At least one WP leader from each of RT1, RT2, CCT3 and RT4.

The Management Board will meet at project inception and thereafter at each of the general assemblies. Additional meetings can be called at any time as required by any member of the management board. However, these can be conducted via video-conferencing/Skype/Webex if appropriate.

Voting on any matters will be based on a simple majority of the management board. If no majority is reached; then the coordinator, or delegated chair, will have the casting vote.

The EC project representative and the coordinators (or appointed deputies) of NACLIM and SPECS will be invited to Management Board meetings in an advisory capacity, but they will have no voting rights.

2.1.1.3 EUPORIAS Coordinator and Project Office:

EUPORIAS will be co-ordinated in all the administrative, financial and management aspects by the Met Office Management tasks include:

- Administrative and financial management: Responsiblity for distributing finances and payments to all project parties; monitoring and controling the budget; and providing necessary financial reports to the EC;
- Providing clarification on any budget and financial issues arising;
- Scheduling, organising and chairing the standard consortium meetings; such as inception and final meetings; the General Assembly meetings (in collaboration with appropriate partners); the Management Board meetings, and Special Interests Management Group meetings;
- Providing support and planning tools for work package management. This includes resource management, reporting mechanisms, and checklists for actions and decisions;
- Managing, monitoring and reporting on progress of the project against the agreed deliverables and milestones. Any significant modifications of the work plan (as agreed by the Management Board) also need to be managed;
- Ensuring that the project risks, issues and benefits are recorded and well managed;
- Managing the Special Interests Management Group. This group will be comprised of various partner members;
- Providing the necessary coordination with other EU-funded, and international, projects.

Membership and Responsibilities of the Project Office

EUPORIAS Coordinator (Dr Chris Hewitt)

Responsible for the overall coordination of the project; coordination with other EU funded and international projects; chair of the management board; communicating with the EC on agreements and deviations from agreed plans; acting as the project point of contact for the EC; point of contact for the advisory board. Reports to the European Commission and is assisted by the project manager and science coordinator.

Science Coordinator (Dr Carlo Buontempo)

Responsible for monitoring scientific progress of the research themes and work packages; provides science leadership for the project; coordinating the scientific work of the research themes and work packages; leading the case studies cooordination; member of EUPORIAS management board; chair of the stakeholder group. Reports to the EUPORIAS coordinator and is assisted by the work package leaders.

Project Manager

Responsible for facilitating internal communication within the project; scheduling meetings of the project; providing regular communications to the EC and the EUPORIAS Coordinator; managing, monitoring and reporting of project finances and budget; leading the Special Interests Management Group and represents the group on the Management Board; management of the risks, benefits and issues registers. Reports to the Management Board and is assisted by the EUPORIAS administrator.

EUPORIAS Administrator

Responsible for assisting with the communication between the different groups; organising meetings of the project; assisting with management, monitoring and reporting of project finances/budget; assisting with maintenance of the risks, benefits and issues register; providing secretarial support to the EUPORIAS coordinator, project manager and science coordinator. Reports to the project manager.

Specialist support (e.g. finance, legal and communications) will be provided to the project office by the appropriate Met Office departments; and other partners institutes when necessary.

2.1.1.4 Special Interests Management Group

The Special Interests Management Group (SIMG) will be formed as required to provide specialist advice on the management of aspects of Intellectual Property Rights (IPR), ethics and gender, complaints and dispute resolution. The project manager will co-ordinate these activities and report to the general assembly and management board on behalf of the SIMG. The ultimate responsibility for the management of these matters will remain with the management board and the general assembly, depending on whether the matter relates to the work plan or to issues affecting partners respectively.

IPR, Ethics and Gender Aspects Management

IPR issues will impact all partners and the IP management will be a regular task for the SIMG. IP management is detailed under Part B.3.2. Ethics issues are detailed in Part B.4 and Gender aspects in Part B.5 of this Description of Work.

Dispute resolution

In the event of a dispute between partners, the SIMG will form a temporary panel to identify a resolution to the dispute. The resolution will be passed back to the management board or general assembly as appropriate via the project manager for action to be taken.

Complaints Management

In the event that any complaints are received about the project, a panel from within the SIMG will be formed to manage the complaint through to a successful resolution. The resolution will be passed back to the management board or general assembly as appropriate via the project manager for action to be taken.

2.1.1.5 Stakeholder Group

A stakeholder is an invited individual or organisation who has a specific interest in the activities and outputs of the project, such as the tools and techniques that are being proposed. Stakeholders bring high levels of sector- and subject-specific knowledge that will be used to help develop the project's deliverables, including the case studies

and the climate service prototypes. They will be able to participate in the work packages and provide support and advice throughout the project.
The stakeholder group is already well advanced (a subset of those identified have provided letters of support – see Appendix 4) and will be formally formed just after the project start (WP 11). There will be two stakeholder conferences, one near start of the project and one at the end. Other stakeholder meetings will be arranged with appropriate partners as required.
The stakeholder group will be chaired by the science coordinator, who will also represent them on the Management Board and at the General Assembly.

2.1.1.6 Advisory Board

This small independent group will be created by the EUPORIAS Coordinator, and will be made up of distinguished experts in the area of climate services. The advisory board members will provide independent advice and recommendations about improvements to the project's work plans, tools and techniques. Consulting with the advisory board will ensure that the deliverables, milestones and associated products and prototypes of EUPORIAS, support the overall aims of EUPORIAS and parallel European and international policies (such as the WMO GFCS). The advisory board will receive information detailing the project status and results. The advisory board is currently composed of:

- Dr Steve Zebiak, Director General, the International Research Institute for Climate and Society (IRI), USA and Coordinator of the International Climate Services Partnership
- Filipe Lucio, Head, Global Framework for Climate Services Office, WMO, Switzerland

The final composition of the board will be decided early in the project, allowing important input from stakeholder groups to be fully considered.

B.2.1.2 Dissemination and Communication Strategy

It will be important to communicate effectively both internally within the project, and externally beyond the project.

Communication within EUPORIAS have the potential to be complicated by the disparate and dislocated nature of the partners. Every effort will be made to minimise the requirement for face to face meetings, by use of email, the internet, teleconferencing, video conferencing, Skype and other forms of remote communication that may be available. To ensure that partners are kept informed with the way the project is progressing, an internal website will be set up. All project reports and documents will be available through this website.

Communications beyond the EUPORIAS partners and stakeholders will be coordinated by the project office (WP 4). The dissemination of project results is described in detail in Part B.3.2, and a Dissemination Plan will be developed at the start of the project.

B.2.1.3 Data Flow Management

The University of Cantabria will provide the data flow management for the project. This dedicated role to deliver this important activity will ensure data is managed in a consistent manner and that data (e.g. historical hindcast, forecasts, and observations) are made available to all project partners in a common format and from a single location. This method will provide producers and data users with confidence in the quality and consistency of the data.

B.2.1.4 Project Technical Reviews

One technical project review has been proposed (according to Special Clause 5 of the Grant Agreement). This independent review will be the mid-term project review.

B.2.2 Beneficiaries

Partner 1: Met Office (short name MetO)

Brief description of the organisation:
The Met Office is the UK's National Weather Service. It includes the Met Office Hadley Centre (Met O) with 180 employees who specialise in climate research and prediction to inform decision-making. The Met Office employs a total of 510 Scientists. The Met Office is a Trading Fund within the UK Government's Department for Business, Innovation and Skills. This status engenders a business approach in addition to our R&D activities resulting in successful products and service delivery.
The Met Office has developed and delivered climate services within the UK and internationally for many years. Users are from a variety of sectors including water, energy, health, transport, agriculture and tourism. These services inform decision-making for adaptation and mitigation to climate variability and climate change. The development of the Met Office's Climate Service is a key strategic aim to satisfy customer requirements. Over the last few years the MetO has been at the forefront of research into climate variability and predictability; development of operational ensemble-prediction systems, derived applications and products for seasonal to decadal timescale.
The Met Office is highly active in numerous international climate service-related activities, including

- WMO's GPCs for long-range forecasts. Outputs from these will be part of climate services in Europe;
- WMO's key strategic activity to develop the Global Framework for Climate Services (GFCS): Involvement in writing the Implementation Plan being written for approval by WMO Extraordinary Congress;
- Climate Services Partnership (CSP): Co-organised the First International Conference on Climate Services in October 2011. This led to the creation of the CSP, where the Met Office has a seat on the Core Group;
- FP6 ENSEMBLES project: Co-ordinated by the Met Office. The footing for climate services in Europe;
- Other EU FP projects, e.g.: EUCLIPSE - Climate cloud processes; ERA-CLIM - Global climate re-analyses; ICE 2 SEA - Sea and sea-ice processes for climate; and COMBINE - Improvements in climate modelling.

Tasks assigned/Role in the project:
The Met Office will coordinate and manage EUPORIAS and lead WP 1, WP3 and WP4; WP 42 and co-lead WP 23. The Met Office will contribute to all other WPs. Its research activities will include the assessment of user needs and vulnerabilities, assessment of dynamical downscaling, climate information indices, development of complex impact models, quantifying and communicating uncertainty in impact models and developing a framework for dealing with uncertainty, the use of climate information in decision-making, developing climate service prototypes and delivery tools, engage with stakeholders, and assess climate services as a business opportunity.

Short profile of key personnel involved:
Dr Chris Hewitt: Head of Climate Service Development, responsible for developing strategic relationships to improve and maximise the use of climate service capabilities. He has considerable international experience through research collaborations including FP4, 5 and 6 projects; project and programme management (including FP6 ENSEMBLES); developing and writing the WMO's GFCS implementation plan, shaping European Met Services' plans for climate services, and the newly formed International Climate Services Partnership.
Dr Carlo Buontempo: leads the climate hazard and impact processes team. He coordinates the activities of collaborators developing innovative ways of making climate knowledge and information relevant to decision makers in the private and public sector. Carlo has led numerous projects involving climate change adaptation and regional modelling in Europe, Africa, Asia and N. America. He is involved in communication of climate science collaborating with international artists on novel ways to make climate information relevant to a wider audience.
Dr Felicity Liggins: Climate Consultant with expertise in communicating science to a variety of audiences. Combining a post-graduate degree in science communication with experience in interpreting climate model data, she has both led and contributed to a wide range of communication and engagement activities. She also has an understanding of using online and novel media to communicate complex science, risk and uncertainty.
Jemma Gornall: Senior Climate Impacts Scientist. Extensive experience of climate impacts modelling. Work includes assessment of climate impacts using the state of the art Hadley Centre Earth System model developed for the IPCC 5th Assessment. A key role in the development of the Met Office climate impacts model, with focus on the inclusion of a generic crop model. Ensures model products are targeted to customer requirements and has lead several projects delivering climate impacts information to customers including UK government.

Partner 2: Tourisme, Transports, Territoires Environnement Conseil (TEC)

Brief description of the organisation:
TEC is a private consultancy with a long-term involvement in research projects focusing on the relationship between tourism and climate change, on adaptation strategies at regional and local scales, and on the implementation of climate services. This includes in particular the relationship between climatology and stakeholders, communicating climate change and uncertainty management. TEC conducts research for French and EU research programs, for ministries, cooperation agencies, and international organisation.

Recently TEC has been involved in the following projects:

- Tourism and climate change in Tunisia: impacts and strategies, for the German Agency for Coopération (GIZ, was GTZ), 2009-2010
- Weather, climate and tourism: tourist strategy and behaviour French ministries of Tourism and of the Environment, 2008-2009
- Tourism development and carbon dependency in French overseas territories: now and in the future (Agence française de développement, AFD), September 2008 - June 2009
- Air traffic, ernergy and tourism in the Mediterranean, Plan Bleu, 2009
- Climate local information in the Mediterranean Responding Users Needs (CLIMRUN). FP7 project. TEC is leading WP5 on tourisme.

Tasks assigned/Role in the project:
TEC will coordinate case studies on tourism, and will contribute to several topics in Work packages WP 11, WP 12, WP 33, WP 42, WP 43, WP 44 AND WP 45: the assessment and communication of uncertainty, the elaboration of prototypes, the assessment of climate services in a business perspective

Short profile of key personnel involved:
Dr. Ghislain Dubois is TEC's director and Associate Professor at the University Of Versailles. He has written many books and articles, including articles in peer-reviewed journals, published in France and abroad. He was contributing author in IPCC AR4.

Dr. Jean Paul Ceron is one of TEC's associate consultants. He holds a Doctorate in Economics and is a graduate of the HEC School of Management. He is currently a researcher at Limoges University, Centre national de la recherche scientifique (CNRS). For the last ten years he has carried out research on the relationship between tourism and climate change, and was named IPCC lead author for AR4 (WGII) and AR5 (WGIII) for this reason.

Adeline Cauchy, TEC's researcher, is working on the CLIMRUN FP7 project on climate services, and on several climate change vulnerabilities and adaptation contract. She graduated with a Masters Degree in Climate Change and Sustainable Development Management. She frequently collaborates with climatologists, so as to define some tailored climate products for clients and other stakeholders.

Partner 3: ENEA

Brief description of the organisation:
ENEA is the Italian government agency responsible for the areas of new technology, energy and the sustainable economy. Its two fundamental tasks are to conduct research in these areas and to diffuse the results nationally. ENEA's activities in the Environmental sector involve: Environmental surveying and monitoring; Climate modelling and analysis at global and regional scale; Global change assessment; Research and assessment of the impact of productive activities on the human and natural environments; Development of advanced technologies and new products with low environmental impact. The Agency has around 3000 staff throughout Italy, operating nine major Research Centres and a number of smaller facilities.

ENEA has a special laboratory devoted to Climate Modelling and Impacts with a staff of 15 employees. This laboratory combines long standing expertise both in the area of oceanic and atmospheric modelling (regional and global) and impact evaluation in relevant sectors (energy, infrastructure, agriculture, ecosystems). Its major fields of research are Mediterranean and African climate, the analysis of the regional hydrological cycle and related teleconnections, energy and environmental modelling, forecasting applications for renewable energy, electric grid, infrastructure maintenance and planning. This laboratory is coordinating the EU-FP7 CLIMRUN project on climate services for the energy and tourism sectors.

Tasks assigned/Role in the project:
ENEA will lead WP 11 and be involved in WP 12, in WP 21 and WP 22, WP 42, WP 43, and WP44. Its specific tasks will be: developing a strong interaction between climate experts and stakeholders (WP 11, WP 12), provision of regional simulations (WP 21), analysis of regional climate simulation (CORDEX) and implementation of targeted runs (WP 21); modelling impact assessment in energy sectors (WP 21, WP 22); pilot applications and tools (WP 42, WP 43, WP 44). In order to establish collaborative effort with relevant stakeholders in Europe and East-Africa, ENEA will dedicate considerable efforts in WP 11, WP 21, WP 22 for education and training of young scientists. To this aim ENEA commints to dedicate the necessary EUPORIAS budget in order to recruit a two years fellowship and/or post-doc contract.

Short profile of key personnel involved:
Dr. Paolo M. Ruti: Ph.D. in Geophysics, University of Torino. Currently senior scientist and head of the Climate Modeling and Impacts Lab at the ENEA (UTMEA-CLIM). Current research interests focus on two main lines:
1. The simulation and analysis of the large scale atmospheric mechanisms and their impact at local scale;
2. The development of targeted climate information for stakeholders.
Management Activity: Coordinator of the EU-FP7 project CLIMRUN (Climate Local Information over the Mediterranean to Respond to User Needs). 2005-2009, leader of the Modeling WP in the AMMA EU project (African Monsoon Multidisciplinary Analysis).
GEWEX (Global Energy and Water Cycle Experiment) steering committee member.
Sandro Calmanti: Senior scientist in UTMEA-CLIM at ENEA. Activities include a collaboration with the UNWFP on the development of a weather index based early warning/livelihood protection system for Ethiopia and on the use of climate scenario simulation for strategic planning of risk financing in Africa.

Dr. Matteo De Felice: Ph.D. in Computer Science and Automation from the University of Rome "Roma Tre" in 2007 and 2011, respectively. From 2007 to 2010 he was working in the Energy Efficiency Department of ENEA (Italian Energy, New Technology and Environment Agency) and in 2011 he joined the Energy and Environment Modelling Unit in the same institution. His current research interests include statistical modelling and its applications on energy-related modelling. He serves as a reviewer for many international journals and on the Program Committee of international conferences.

Emanuela Caiaffa. Degree in Physics, University of Rome. Research scientist since July 1983 has been working at EURATOM ENEA Frascati designing and realizing application software for real-time data acquisition, from CAMAC hardware modules, in the FTU program. She is the GIS expert in several scientific projects (DeSurvey, LITTORISK, Life02env/It/000111) and at institutions including the European Environment Agency, the Italian Ministers of Public Works Minister and Environmental, And is working on several studies on the possibility of using GIS as tool to manage the complex decision makers processes.

Partner 4: Federal Office of Meteorology and Climatology MeteoSwiss (MeteoSwiss), directly subordinated to Eidgenoessisches Departement Des Innern

Brief description of the Organisation:
MeteoSwiss is, by federal mandate, the national provider for weather and climate services in Switzerland. In this role, it serves the general public, authorities, research and industry. MeteoSwiss monitors the atmosphere over Switzerland and operats the corresponding networks. It issues weather forecasts, warns the authorities and the general public of dangerous weather conditions and monitors the Swiss climate. The legal duties include the provision of climate information and climatological services for the benefit of the general public. MeteoSwiss provides generic and tailor-made datasets and services for customers, and conducts research on themes from now-casting to climate prediction. Weather and climate in the Alpine region is one of its core competences.
MeteoSwiss hosts the national GCOS office and is the official representative of Switzerland in various international organisations (WMO, ECMWF, EUMETSAT, EUMETNET etc.), and member of the Swiss Centre for Climate Systems Modelling (C2SM). MeteoSwiss participates in the Swiss National Centre for Competence in Research on Climate (NCCR-Climate), in the EU FP7 project EURO4M, in the EUMETSAT CM SAF CDOP 1 and 2 and in several COST actions. In its research MeteoSwiss collaborates with academia (e.g. ETH Zurich), with other governmental offices (e.g. hydrology) and the private sector (e.g. reinsurance). In the framework of the CH2011 Initiative, MeteoSwiss has contributed substantially to the latest Swiss Climate Change Scenarios http://www.ch2011.ch/en. MeteoSwiss has issued seasonal forecasts to commercial customers for over ten years now and has also a profound experience in the communication of such forecasts to the public and media.

Tasks Assigned/Role in the Project:
MeteoSwiss will lead WP 22 they will provide a preliminary set of Climate Information Indices (CII) to the case studies and will implement and evaluate indices relevant for the insurance sector and applicable to the case studies and the prototype climate services.
In WP 21, MeteoSwiss will assess the added value of data from complex downscaling methods with a focus on how rare or extreme events are represented, how the uncertainty can be propagated through the dynamical and statistical modelling cascade and how the corresponding reliability can be improved. The results will be summarized in a report.
In WP 12, MeteoSwiss will contribute to the expert interviews (Task 1.2.2) to assess and consolidate the user needs in the (re)insurance sector.
In WP 42, MeteoSwiss will collaborate in the selection and definition of the climate service prototypes in order to communicate the technical capabilities and optimally match and serve the corresponding needs with activities in WP 22.

Short Profile of Key Personnel:
Dr. Christof Appenzeller: Head of the Climate Division at MeteoSwiss (~20 collaborators) and senior lecturer at the Swiss Federal Institute of Technology ETH Zürich. He has long-standing research experience in the analysis and prediction of the atmosphere-ocean-cryosphere system and has been Principle Investigator (PI) of several research projects on climate variability and climate risk management. He is author of numerous papers, including Science and Nature, and is governmental representative in various commissions (ECSN, WMO and IPCC).

Dr. Mark A. Liniger: Head of the Climate Analysis Group (10 collaborators) and is responsible for several ongoing climate projects. He has research experience in climate change in observations and future climate scenarios, statistical methods in climate science, (such as extreme value theory, spatial interpolation, downscaling, time series analysis and probabilistic verification) extreme climatological events in Europe and Alpine region, sub-seasonal to decadal predictability, tropospheric and stratospheric dynamics, and dynamic meteorology. In the past 10 years, his work has focused on the verification and application of dynamical monthly, seasonal and decadal forecasts, climate risk management and statistical data analysis. In these fields, and has led several research projects with the weather derivative and insurance sector on topics including European winter storm risk, and seasonal and decadal predictions. His group is responsible for the preparation and communication of S2D forecasts. He is Co-Principle Investigator (Co-PI) of the MeteoSwiss contribution to the Swiss NCCR-Climate, member of the management committee of the COST Action ES1102 VALUE and member of the C2SM.

Partner 5: University of Cantabria (UC)

Brief description of the Organisation:
UC is one of the leading research universities in Spain. With 1,098 professors and researchers (485 Ph.D. permanent staff), 28% women, UC has been involved in the EU FP from the start. The UC Research Groups have participated in 27 – FP5 projects and 16 – FP6 (totalling 2.4% of the EU funds for the whole country).
Regarding the present proposal, UC has leading research groups at European and International level in environmental sciences. Most of these groups are involved in sustainable development policies in collaboration with administrations of different regions in Spain.

The Santander Meteorology Group (http://www.meteo.unican.es) conducts research on different topics related to regional climate modelling (including dynamical and statistical downscaling methods), information technologies applied to data and metadata processing (including web portals and services for data access and post processing). In particular, this group is specialised in the production of regional predictions projecting low-resolution outputs from global models to high-resolution related surface variables. This group participated in EU FP6 ENSEMBLES, E-science grid facility for Europe and Latin America (EELA2), and Common Metadata for Climate Modelling Digital Repositories (METAFOR) projects in tasks regarding regional projections and data access/downscaling portals. The group is currently involved in the FP7 Forest fires under climate, social and economic changes in Europe, the Mediterranean and other fire affected areas of the world (FUME), Quantifying Weather and Climate Impacts on Health in Developing Countries (QWeCI) and CLIMRUN projects working in the application of climate predictions and projections in the fire and health sectors, in close collaboration with stakeholders.

Tasks Assigned/Role in the Project:
UC will lead WP 32 and be involved in WP 4, WP 12, WP 21, WP 22, WP 31, WP 42 and WP 44. Its contribution to those WP will be the coordination of data flow management (WP Dissemination), interaction with climate data end-users (WP 12), provision downscaled and calibrated data simulations (WP 21), and climate indexes for users (WP 22). Activities on uncertainty assessment and propagation will be made (WP 31 and WP 32) based on strong statistical founding. As commitment to end and stakeholder users, the UC will contribute to develop climate services (WP 44) and deployment of these services for use cases (WP 42).

Short Profile of Key Personnel:
Dr. Antonio S. Cofiño: Associate Professor. PhD (2004) in Applied Mathematics and Computer Sciences. His main research areas are the development and deployment of earth science applications (e.g., global and regional climate models) to run in geographically distributed data and computing environments (GRID computing) with research contributions in both Earth Science and GRID computing. He has experience in regional modelling and high-performance computing and data management (EELA2 and METAFOR projects). He lectures in pre- and post-graduate programmes in the Area of Computer Sciences and Artificial Intelligence for Masters of Mathematics and Computation, Physics and Technology; and in the Ph.D. Programme on Science, Technology and Computation. He has participated in FP6 (ENSEMBLES and EELA) and current FP7 (QWeCI, FUME and CLIMRUN); leading the UC collaborating activities in FP7 (EELA2 and METAFOR).

Dr. Jesús Fernández: Assistant Professor at UC and Head of Numerical Modelling Research in the Santander Meteorology Group. His research interests include regional climate modelling, its sensitivity to physical parameterizations and uncertainty estimation through ensemble techniques. He is involved in the international CORDEX initiative, namely running model simulations for Africa and Europe. He coordinates a national initiative around the Weather Research and Forecasting (WRF) model which, among other goals, develops modifications to suit the model for climate applications and for running on distributed Grid infrastructures. He participated in several EU projects related to regional modelling and Grid computing including ENSEMBLES, EELA, EELA2 and CLIMRUN.

Partner 6: Predictia Intelligent Data Solutions (Predictia)

Brief description of the Organisation:
Predictia is a SME that emerged as spin-off from a data mining group at the University of Cantabria. With over 10 years experience, It offers data management and data mining solutions for problems in scientific disciplines including climate and health, that require:

- Special handling for storage, access and visualization; and,
- Non-standard data mining techniques to extract relevant information for a specific problem.

Predictia offers solutions based on Web technologies that include development of portals for access to data and/or online data mining algorithms. Predictia maintains a core of R&D as a key driver of competitiveness of their products.

Predictia has experience in delivering S2D impact predictions, predominantly because of the Downscaling Portal. The Downscaling Portal (DP) allows end-users to automatically obtain regional climate change projections from global simulations with statistical downscaling methods.

Downscaling is nowadays a mature and complex multi-disciplinary field involving a cascade of different scientific tools to access and process large amounts of heterogeneous data. Therefore, interactive user-friendly tools are necessary in order to ease the downscaling process for end users, thus maximizing the exploitation of the available predictions. The DP has been designed following an end-to-end approach in order to transparently connect data providers and end users. To this aim, Internet and distributed computing technologies have been combined together with statistical tools to directly downscale GCM outputs to the regional or local scale required by impact applications. Thus, users can test and validate online different downscaling methods (regression, neural networks, analogs, weather typing, etc.) using a web browser.

Predictia also makes specialized predictions in several sectors, such as the road sector. Thanks to road characterisation, GCM predictions can be optimised for better describing local road conditions. These predictions are offered to end-users with an interactive web portal.

Tasks Assigned/Role in the Project:
Predictia will lead WP 43 and will also contribute to WP 12, WP 23, WP 44 and WP 45. Its activities will focus primarily on the links with the local stakeholders, demonstrating ways in which a climate service can be developed to address specific users' needs. Another area of focus will be the empowering of other SMEs to develop their own climate services.

Short Profile of Key Personnel:
Daniel San Martín: Studied Telecommunication Engineering at the UC and has a Masters degree in Mathematics and Computation. His main research topics are the development of earth science applications. Since 2006 has been involved in the development of web based climate data management portals. He has participated in several EU FP such as ENSEMBLES, QWeCI and METAFOR.

Max Tuni: Studied Telecommunication Engineering at the UC and has a Masters degree in Mathematics and Computation. He has worked at Instituto de Física de Cantabria involved in several national research programmes. He has acquired very good high-end computing skills, mainly in database management and ETL processes. Max is the technical manager of the DP development project. He has had technical responsibility of the DP integration with other projects such as METAFOR (standard metadata query services) or MOSAICC (the FAO system for agricultural impacts of climate change).
Additionally, non-permanent staff, will be recruited to assist in the delivery of the work. At least one individual, will have experience in stakeholder engagement, and will be responsable for stakeholders engagement and the organisation of workshops (WP 12, WP 23 and WP 43). Other individuals will have a technical background including experience in mobile/web applications development, involved in the tasks 4.3.6, 4.4.2, 4.4.4 and 4.4.5.

Partner 7: AEMET

Brief description of the organisation:
AEMET is a National Agency of the Ministry of Agriculture, Food and Environment. It is responsible for the official meteorological and climatological functions in Spain, including aeronautical and maritime services, as well as meteorological support to Defence. The direction and most of the general management activities, as well as most of the technical departments, are located at the AEMET headquarters in Madrid. There are 15 Regional Centres distributed throughout the continental territory and the isles. Each one is responsible for local dependencies (42 observatories and local offices some of them managing specialised functions, 31 aeronautical offices in civil airports and 25 Defence meteorological offices in air bases and other military buildings). There is also a centre for forecasting services to Defence located in Madrid (CPVD). 10 out of the 15 Regional Centres perform forecasting functions through a "Forecasting Group" (GPV). The total number of staff is slightly over 1,400; about 500 have their working posts at the headquarters and 1,000 at the regional centres and local offices.

AEMET represents Spain at intergovernmental meteorological organisations including the WMO, the ECMWF, EUMETSAT and the IPCC. There is a significant participation of the AEMET in a number of international groups of co-operation between meteorological services, mainly in association with other European countries such as ECOMET, EUMETNET, etc.

AEMET is very actively involved in the development and provision of climate-related services. AEMET currently coordinates at national level the generation of regionalised climate change projections serving as input to numerous studies on impact and adaptation to climate change. AEMET is also very active on operational seasonal forecasting, in particular exploiting and combining the available information on seasonal forecasts coming from different sources. AEMET is also contributing in conjunction with WMO to develop an operational framework to provide regional seasonal forecasts tailored to user needs.

Tasks Assigned/Role in the Project:

AEMET will mainly contribute to WP 32 by developing a statistical framework to best combine the seasonal predictions from different sources. They will also contribute to WP 12, WP 33 and WP 42.

Short Profile of Key Personnel:

Ernesto Rodríguez-Camino: Head of Climate Evaluation and Modelling at AEMET, responsible for research on issues related to climatology, climate modelling and seasonal forecasting. His group is also responsible for the generation of downscaled climate change projections over Spain feeding a wide variety of impact studies. He has long experience in atmospheric modelling and has also participated in many national and international projects in connection with modelling. He was deputy project leader of the High Resolution Local Area Modelling (HIRLAM) project for the development of an operational limited area model for short-term forecasting. He has recently participated in the shaping of European Met Services' plans for climate services in the frame of the WMO GFCS.

José A. López Díaz: Head of the Climatological Techniques Unit. His areas of expertise include the study of climatological variability, climate extremes and stochastic processes. He has been manager of the European Climate Support Network in 1999-2002 and has participated in IPCC meetings about the treatment of uncertainty. He belongs to the directive staff of the Spanish Climatological Association.

Partner 8: Danish Hydraulic Institute (DHI)

Brief description of the Organisation:
DHI is an independent, international consulting and research organization authorized by the Danish Ministry of Science, Technology and Innovation as an Approved Technological Service Institute (GTS). DHI provides a broad range of research, consulting and policy services as well as leading edge technologies. DHI's activities include the development and application of know-how and advanced technologies within coastal, river, ports and offshore engineering as well as water resources, urban and industrial water and other areas related to the water environment, such as agriculture and human health. DHI is an internationally recognised provider of hydro-informatics technology well-known for both the development and application of modelling software and DSS.

The DHI group comprises more than 1000 staff across 28 international offices on all continents. Each year DHI invests approximately 25% of its human resources in R&D to extend its knowledge in the various fields related to water and environment and to develop the software tools. DHI therefore provides a strong platform to provide and exploit national and international research and development. DHI is designated as Collaborating Centre for the United Nations Environmental Programme, UNEP, and furthermore as Advisory Centre for the Global Water Partnership. DHI has had extensive experience working for international funding agencies and managing international projects. DHI has participated in numerous international and European collaboration projects and EU research projects and has directly participated in more than 30 research projects under each of EU's last three framework research programmes. Furthermore DHI is key partner and initiator in the two major European research networks (Euraqua and Hydrolab) and the European Water Supply and Sanitation Technology Platform. DHI directly collaborates with more than 40 universities and research organisations worldwide and has recently established a joint research centre with the Nanyang Technological University, Singapore.

Tasks Assigned/Role in the Project:

DHI will act as WP leader for WP 33. DHI has considerable experience both in linking research results to commercial application and the development and application of real-time water management and decision support systems. We will draw upon these strengths to ensure a strong interaction within CCT3 and RT4 with the EUPORIAS stakeholders and in implementation of new strategies for communicating confidence levels to decision-makers. DHI will contribute to WP 32 strengthening the linkages with these activities. DHI's main contribution (WP 44 together with WP 41 and WP 42) will focus on the development of a new generation of water management decision support systems (DSS) that will extend and enhance the EUPORIAS climate services for operational decision-makers. By extending a recently developed DSS planning framework to S2D forecasts, this tool will allow decision-makers across the water sector (water supply, irrigation, agriculture, hydropower, flooding, etc.) to fully exploit the new EUPORIAS services by integrating them with additional capabilities such as alternative management scenarios, optimisation and multi-criteria analyses.

Short Profile of Key Personnel:
Dr. Michael Butts: Head of Innovation for Water Resources and Land Management at DHI. He has more than 20 years of professional experience in hydrology ranging from hydrological and geophysical fieldwork, to the development and application of modelling tools and decision support systems in water resource planning, flood forecasting and climate change and adaptation. Dr Butts was the scientific coordinator for *FLOODRELIEF -- A real-time decision support system integrating hydrological, meteorological and radar technologies* (2003-2007) EVK1-CT-2002-00117. He is currently Associate Editor of the Journal of Hydrology, on the advisory panel for the UK FRMRC (Flood Risk Management Research Consortium) and most recently on the expert panel on terrestrial water under climate change for climate service centre, Germany.
Mario Sales: Chief Software Architect for Solution Software at DHI. He has more than 13 years of experience in a wide range of water related IT solutions and Decision Support Systems. Mr Sales has been involved in numerous projects involving design, development and application of hydrological databases and the development and application of integrated water management systems and decision support tools within water resources planning, water and flood forecasting as well as climate change.

Partner 9: Wageningen University (WU)

Brief description of the organisation:
Wageningen University (WU) & Research Centre is a cluster of internationally-leading knowledge institutions offering applied and scientific research to promote the sustainable use of our environment. WU has a longstanding record of successfully conducting and coordinating large European projects within the current and past EU FP's. The Earth System Sciences and Climate Change (ESS-CC) of the Environmental Science Group of WU will be participating in EUPORIAS.
ESS-CC is one the leading groups in global and regional scale climate studies including impacts and adaptation. The group develops global and regional hydrology and land surface models (LSM), as well as related agricultural models. It also leads several regional and global water resources analyses. The group has conducted and coordinated more than 20 large EU project consortia during the last 10 years (NeWater, Scenes, FP6 WATCH and HighNoon are among the more recent ones) and is presently engaged in several projects focussing on Climate Change impacts (e.g. FP7 IMPACT2C) and ESM land component improvement (e.g. Combine, EMBRACE).

Tasks assigned/Role in the project:
The ESS-CC group will contribute the S2D impact studies related to water resources, agriculture and energy. It will coordinate WP 31 by coordinating S2D impact model Intercomparisons, and developing perturbed physics ensembles within the project. MetO; WU will co-lead WP 23 in order to assess and possibly improve upon predictive skills of hydrology and crop models in an S2D context. The ESS-CC group will study the impact of S2D climate variability on water resources and water temperature, in respect to cooling water use for power plants, using the VIC (Variable Infiltration Capacity) and LPJ-mL (Lund-Potsdam-Jena managed Land) models, and on agricultural productivity with CGMS (Crop Growth Monitoring System) and again LPJ-mL models. Further minor contributions of ESS-CC: WP 41, WP 43 and WP 44 to engage with relevant stakeholder groups for these water, (energy) and agriculture sectors. They will also contribute to WP 21 and WP 32.

Short profile of key personnel involved:
Dr Ronald WA Hutjes: A senior scientist whose main interests are in measuring, scaling and modelling of land-atmosphere exchange processes at continental and regional scales including hydrology, carbon and nutrient cycling. He is board member of Dutch national climate programme CcSP and various EU projects (WATCH, IMPACT2C, EMBRACE, IS-ENES). He will be leading WP 23.

Dr. Fulco Ludwig: A senior research scientist whose main interests are in climate change impacts and adaptation in relation to water resources and agriculture. Within the FP6 WATCH he coordinated the Work Block on Water Resources and he co-ordinates WaterMIP - an Intercomparison project of global hydrological and Land Surface model Intercomparison. In IMPACT2C he co-ordinates hydrological impact studies for Bangladesh. He has a lot of experience in climate change impact and adaptation studies for both agriculture and water resources. He will be leading WP 31.

Prof. Pavel Kabat: Chair of the ESS-CC group and director of the national research programme 'Climate changes Spatial Planning'. His research focuses on land use–hydrology interactions; climate impacts on water resources and global environmental change processes. He acted as PI and research coordinator in over 25 EU supported projects. He retains a supervisory role at WU whilst on temporary leave to International Institute for Applied Systems Analysis (IIASA).

Dr Iwan Supit, **Hester Biemans** and **Michelle van Vliet** will contribute to the work with specific expertise on the models used.

Partner 10: Deutscher Wetterdienst (DWD)

Brief description of the Organisation:
DWD, founded in 1952, is the National Meteorological Service of the Federal Republic of Germany. It is responsible for providing services for the protection of life and property in the form of weather and climate information. This includes the meteorological safeguarding of aviation and marine shipping and the warning of meteorological events that could endanger public safety and order. The DWD is also responsible for tasks including the provision of services to Federal and Regional governmental authorities and institutions administering justice, as well as the fulfilment of international commitments entered into by the Federal Republic of Germany. The DWD co-ordinates the meteorological interests of Germany on a national level in close agreement with the Federal Government and represents the Government in intergovernmental and international organisations such as the WMO. Currently DWD has about 2300 employees at over 130 locations over Germany. DWD's spectrum of activity is very wide and includes:

- Weather observation and forecasting around the clock.
- Climate Monitoring and modelling at local, regional and global scale,
- Development of precautionary measures to avoid weather-related disasters and to provide support for disaster control
- Advice and information on meteorology and climatology to customers,
- National and international co-operation in meteorological and climatological activities,
- Outlooks on possible future climatic conditions at local, regional and global scale,
- Research and development.

Tasks Assigned/Role in the Project:
The DWD will contribute to the WP 11, WP 21, WP 41 and WP 42. Research activities will be spent on dynamical downscaling as well as on the assessment of the users' needs and vulnerabilities by data evaluation (WP 11) and the development of a S2D climate service (WP 41, WP 42). By participating in these various activities, DWD aims to meet the wide spectrum of the project.

Short Profile of Key Personnel:
Dr. Peter Bissolli: Leader of the group "Regional Climate Centre" in the Department Climate Monitoring at DWD. He has more than 15 years experience in climate diagnosis and monitoring. He has participated in several WMO and other projects and activities aiming at generating and analysing climate data sets for climate monitoring services.

Dr. Barbara Früh: Previously a scientist at the Johannes-Gutenberg-University of Mainz in the fields of radiative transfer modelling, downscaling of orographic precipitation, convection, and verification. At the University of Karlsruhe she became acquainted with the regional climate model COSMO-CLM and the analysis of regional climate simulations and extreme events. She went to DWD in 2008 where she is working in urban modelling with climate impact models and regional climate modelling with COSMO-CLM.

Partner 11: Catalan Institute of Climate Sciences (IC3)

Brief description of the Organisation:
IC3 is a public research centre created in 2008, located in Barcelona, Spain. IC3's main objective is to generate knowledge about Climate Sciences to the highest quality and with a regional approach. It does this through cutting-edge research, education and application development and tools to evaluate and link current and future climate risks. IC3 is already participating in seven European projects including FP7 VIROCLIME, QWECI (2009), CLIMRUN (2010), and DENFREE (2011). Among the Marie Curie Actions, IC3 is coordinator of Tree-Rings & Climate, INCLIDA and MEMENTO. We also participate in an Interreg project (FLUXPYR) and receive grants from the Spanish Government for various R&D projects: Med3D, MIDAS-6 SMOS, RUCSS. For this project, two IC3 Units will be involved:

- **The Climate Forecasting Unit (CFU**) undertakes research on the development and assessment of dynamical and statistical methods for the prediction of global and regional climate on time scales ranging from a few weeks to several years. The formulation of the predictions includes the development and implementation of techniques to statistically downscale, calibrate and combine dynamical ensemble and empirical forecasts to satisfy specific user needs in the framework of the development of a climate service.
- **The Climate Dynamics and Impacts Unit (UDIC**) core focuses are 1) Understanding dynamical processes responsible for climate impacts at different timescales, and 2) The improvement of the current capacity for simulating those impacts, particularly climate effects on health, ecosystems, food energy and the water cycle.

Tasks Assigned/Role in the Project:
The IC3 CFU will co-lead WP 41: Focusing on the impact and application of seasonal to decadal climate forecasts for wind, solar and hydro energy. CFU will build upon stakeholder relations already established across the public and private sector. They will also contribute to other work packages: WP 12, WP 22, WP 31, WP 42, WP 43 and WP 45 to establish clear communication between climate and the renewable energy sectors.
The IC3 UDIC participation lies in their central activity of Health. The health case study will bear a close interrelationship with other WPs, and UDIC will be participating in the following work packages: WP 11, WP 12, WP 22, WP 23, WP 31, WP 42 and WP 44.

Short Profile of Key Personnel:
Ms. Melanie Davis: Renewable energy climate service manager at IC3. She has several years experience working with renewable energy leaders and pioneer companies across Europe and Latin America, to position and promote the uptake of clean energy technologies. At IC3, she is coordinating the renewable energy case study for the ongoing FP7 CLIMRUN project, where she represents a link between climate scientists and renewable energy stakeholders, to facilitate adaptation of the sector to future climate variability.

Dr Virginie Guemas: An experienced Post-Doctorate researcher within the CFU. She focuses on S2D forecasts, including: the evaluation of different methods of forecast initialization, initialization with anomalies, nudging of variables oceanic and atmospheric, evaluation of methods of perturbation of the initial state and the evaluation of methods of stochastic perturbation of the model parameters during the forecast

Prof. Xavier Rodó: Director of IC3, Head of the UIDC and Leader of the Research Team on Modelling Climate – Disease Interactions. He has been working for the last 10 years on disentangling the role of climate in infectious diseases and in developing climate-driven diseases models that can cope with those complex transient associations. He wrote the section on climate impacts on water-borne and food-borne diseases in the last IPCC AR4 (2007)

A 3-year postdoctoral researcher is also foreseen in the frame of the current project.

Partner 12: Royal Netherlands Meteorological Institute (KNMI)

Brief description of the organisation:
KNMI is the national research and information centre for weather, climate and climate change in the Netherlands. KNMI has a long tradition in operational and scientific activities. Research at KNMI aims at observing and understanding the weather/climate system, in order to improve weather forecasts and climate projections.

Tasks assigned/Role in the project:
KNMI will work on S2D predictions of user-oriented climate indices with a focus on hydrological applications. It will also work on the development and effective delivery of (prototype) services. KNMI will lead WP 44 and will contribute to WP 21, WP 22 and WP 42.

Short profile of key personnel involved:
Dr. Gé Verver: A researcher in the Climate Services department of KNMI. He is involved in the FP7 EURO4M which develops regional reanalyses of past weather and user-oriented data products for monitoring climate variability and change in Europe. He works on the assessment of user requirements for the new Dutch climate scenarios. In the past he participated in several national and European projects and coordinated the FP6 STAR project on tropical atmospheric research. He did his Ph.D. at Utrecht University on the interaction of atmospheric chemistry and boundary layer mixing.

Dr. Albert Klein Tank: Scientist actively involved in observational research embedded in international projects and programmes. Albert co-ordinates the FP7 EURO4M project, and leads the European Climate Assessment & Dataset project that joins over 40 meteorological services in Europe and the Mediterranean. Albert is also involved in the production of IPCC AR4 and AR5. Currently, he co-chairs a global expert team on the topic of detection and attribution of anthropogenic climate change. On a national level, he co-ordinates the climate change scenarios for the Netherlands constructed by KNMI for local adaptation to climate change. Albert has published papers in scientific journals, as well as policy relevant reports (www.knmi.nl/~kleintan).

Wim Som de Cerff (MSc. computer science, Twente University): A senior researcher at the R&D Information and Observation Technology division of the KNMI. Wim has over five years experience leading software development and research projects developing data centres. He is task leader in FP7 IS-ENES, developing a prototype data and information portal to enable the use of climate model data for the climate impact community. Within KNMI he is the architect of the SDP KDC project which will build the next generation KNMI data center, providing data curation for science data and a satellite data processing platform.

Dr. Jules Beersma: Studied Theoretical Physics, now working in the field of validation of climate models and statistical downscaling. He is familiar with the problems associated with the construction of climate change scenarios and with the limitations of different types of climate change scenarios for various applications. His work on validating climate models focussed on impact relevant parameters i.e. daily and interannual variability and extreme events. He contributed to the development of weather generators for large river basins like the Rhine and to a national Drought study to investigate the probability of extremely dry years. On this subject he received a PhD at Wageningen Universitet. He participated in the FP6-ENSEMBLES and RheinBlick2050 projects; in particular regarding the construction of very long time series for hydrological modelling in the Rhine basin. He is involved in the development and application of bias correction methods and of new methods to construct probabilistic precipitation and discharge scenarios.

Partner 13: IDL, University of Lisbon (UL-IDL).

Brief description of the organisation:
UL-IDL is a research centre that quantitatively studies most of the important components of the Earth System. It combines analytical studies, data analysis, observational activities and modelling focusing on a wide range of processes including the structure of the deep Earth, surface processes, atmospheric processes and natural hazards at or near the Earth surface. UL-IDL aims to be a national nucleus of scientific activities and an educational platform of high-level research and teaching, providing a stable base for European partnership in major research initiatives in these areas.
UL-IDL organization relies on a Scientific Council, grouping all researchers, which are organized into 10 research groups, each one led by a senior researcher. The ultimate goal of UL-IDL is to develop physics based tools to study Earth processes. These tools combine theoretical approaches, numerical and physical modelling, and a range of applications that go from the global scale earth processes to local scale environmental problems. UL-IDL research activity is combined with an active commitment to conduct post-graduate and graduate teaching. UL-IDL maintains a number of laboratory facilities at Lisbon University, including a cluster for numerical modelling, an experimental tectonics lab, a rock magnetic lab, mobile arrays of seismic sensors and a series of high quality instruments.
Tasks Assigned/Role in the Project:
IDL will contribute to WP 11, WP 12, WP 21, WP 22, WP 31, WP 32, and WP 45. Considering the particular interests of the Portuguese end users already associated with the project, the UL-IDL team will work on the optimization of climate products for three main areas: Energy, Water and Agro-forestry. In the case of Energy and Water, UL-IDL will work with the three main players in the Portuguese market (EDP, REN, and Águas de Portugal). These are mostly interested in seasonal to decadal forecasts of precipitation, which may account for a very large fraction of the total energy production in wet years, but has large interanual variability. The Agro-forestry sector end users, including some of the largest players such as Portucel/Soporcel and Amorim, will be interested in large scale forest management (of Cork oak, Eucalyptus and Pine). This includes growth forecasts and particularly fire risk, in Agriculture risks, and in high value wine production. UL-IDL will work with the end users to calibrate models developed by EUPORIAS. UL-IDL will apply downscaling techniques to climate data provided to those models. End users data will be used by UL-IDL to assess uncertainty in climate products.
Short profile of key personnel:
Dr. Susana Barbosa: Expert in Statistics, with a PhD in Survey Engineering at Porto University. Will lead the UL-IDL group on Earth Observation and Space Geodesy. She is experienced on the use of statistical methods to the analysis of climate related trends, in particular the distribution of extreme events.
Dr. Cathy Besson: PhD in Vegetal Ecology from Paris University. Experience includes a Post Doc at the Agronomy Institute and a researcher at the UL-IDL group on Land-Climate Interactions. She has been working on climate influence on forest performance, through changes in hydrological factors, in particular in relation with evergreen oaks and pine trees.
Dr. Rita Cardoso: PhD in Meteorology at the University of Leeds. Experience includes mountain meteorology and regional climate modelling. She has been working in EC-Earth global climate simulations, using the European modelling system IFS+NEMO, and in regional climate simulations with the climate version of WRF. Rita has participated in several Portuguese research projects relating with climate services and its application in the forest sector.
Prof. Pedro Miranda: Head of the Atmospheric and Climate Modelling group at UL-IDL, and head of Department at the University of Lisbon. He has led the climate team in the two Portuguese climate change assessments (SIAM, 2001, and SIAM2, 2006), interacting with a multidisciplinary team in many areas of climate impacts. He has participated in three European Projects (GITEC, GITECTWO, EUROCS), and leads one of the Portuguese groups in the European EC-Earth climate modelling consortium. He has coordinated several Portuguese research projects in the area of Meteorology and Climate. He has co-authored 50 papers in leading scientific journals.
Dr. Pedro Soares: PhD in Physics (Meteorology) at the University of Lisbon. He has been working in clouds and turbulence, in a perspective of model development, and regional climate change. He led Portuguese research project in Iberian Regional Climate, and has participated in several other projects. His PhD project was a done in the framework of the European Project EUROCS. Presently he is involved in the Portuguese team of the EC-Earth consortium.

Partner 14: University of Leeds (UNIVLEEDS)

Brief description of the organisation:
The University of Leeds is one of the largest Universities in the UK with over 32,000 full-time students, 7,500 staff and an annual turnover of €545 million. Leeds is among the top ten universities for research in the UK with 3,000 full-time researchers and an annual research income of more than €120 million, of which ~10% is from EU awards. The University is the national leader in receipt of NERC funding for the last two years and has gained a number of interdisciplinary awards spanning the natural and social science dimensions of environmental research. The School of Earth and Environment is a large school with ~70 academic staff, ~35 support staff and ~65 Postdoctoral Research Fellows and Associates. Within the University, the School of Earth and Environment (SEE) is an internationally recognised centre for research and teaching in earth and environmental system science and social science. The School currently has over 60 academic staff, 35 support staff and over 50 Postdoctoral Research Fellows and Associates. SEE houses both the Sustainability Research Institute (SRI) and the Institute for Climate and Atmospheric Science (ICAS). Both SRI and ICAS conduct world-class research on climate change and its impacts, from social and natural science perspectives, respectively

Tasks Assigned/Role in the Project:
SRI will lead the assessment of user needs (WP 12) and contribute to the evaluation of climate information and the decision-making process (WP 41). This builds on a European Research Council Starting Grant (ERC Stg) on "Advancing Knowledge Systems to Inform Climate Adaptation Decisions" (ICAD). The ICAD project focuses on understanding climate information needs across society and the social status of techno-scientific knowledge in adaptation to climate change. Its spatial and temporal focus is limited to the United Kingdom and multi-decadal climate information.
ICAS will contribute to the development of impact models for impact predictions (WP 23) and the quantification of uncertainty in impact models (WPs 31 and 32). This will build on work within the NERC EQUIP consortium bringing together the UK climate modelling, statistical modelling, and impacts communities to work closely together for the first time on developing risk-based prediction for decision making in the face of climate variability and change.
University of Leeds will co-lead WP 33.

Short profile of key personnel involved:
Prof. Suraje Dessai: Professor in Climate Change Adaptation at the Sustainability Research Institute, School of Earth and Environment, University of Leeds. He is the recipient of a European Research Council Starting Grant on "Advancing Knowledge Systems to Inform Climate Adaptation Decisions" (2012-2016). Suraje is also currently involved in two large multi-institution projects: Water System Resilience (ARCC-Water) and End-to-end Quantification of Uncertainty for Impacts Prediction (EQUIP). He is an Associate at the UK's Centre for Climate Change Economics and Policy (CCCEP) and a visiting scientist at the Climate Change Impacts, Adaptation and Mitigation Unit of the University of Lisbon. Suraje has published 37 peer-reviewed papers in journals such as Science and Global Environmental Change, seven book chapters and edited a journal special issue. He is currently a Lead Author on the chapter "Foundations for Decision-making" for the AR5 IPCC Working Group 2 (Impacts, Adaptation and Vulnerability) and also serves on the IPCC's Task Group on Data and Scenario Support for Impact and Climate Analysis.

Prof. Andy Challinor is a Professor of Climate Impacts at the University of Leeds. His research focuses principally on using climate modelling and process studies to understand food production and food security, treatments of uncertainty and managing risk, and climate-resilient pathways and adaptation. Andy leads a team of 10 researchers at Leeds. He is the PI of the NERC EQUIP consortium and Theme Leader for 'Adaptation pathways under progressive climate change' – one of four themes of international programme on Climate Change, Agriculture and Food Security (CCAFS). He is also Research Director for the University of Leeds Africa College Partnership and Lead Author on the 'Food Production Systems and Food Security' chapter of the forthcoming AR5 of the IPCC. He has contributed to FP6 ENSEMBLES and AMMA, FP5 DEMETER and FP5 PROMISE.

Partner 15: Swedish Meterological and Hydrological Institute (SMHI)

Brief description of the Organisation:
SMHI is a government agency under the Swedish Ministry of Environment. SMHI offers products and services that provide organisations with important environmental information in support of decision-making. SMHI is the government organization responsible for national meteorological, hydrological and oceanographic forecasting and the production of regional climate change projections. The main fields of research at SMHI include weather and climate modelling, data assimilation, hydrology, oceanography and air quality. Climate research is a cross-departmental activity, with all six research sections at SMHI contributing to the development and communication of regional climate projections, impact assessments and communication with stakeholders, regional authorities and major utilities.

Tasks Assigned/Role in the Project:
SMHI coordinates WP 21, contributing both to statistical downscaling of seasonal-decadal forecasts over Europe and performing dynamical downscaling over East Africa. SMHI will perform impact assessments using seasonal-decadal hindcasts focusing on the Nordic Hydropower industry, Nordic forestry and European hydrology, particularly in relation to flood warning. SMHI contributes to RT1 through engagement with a range of stakeholders from the aforementioned sectors, plus two regional government authorities. SMHI further contributes to WP 23 and CCT3 through the development, application and uncertainty assessment of sector-specific impact models directed towards Hydropower, flood forecasting and forestry. The overall SMHI research contributions to EUPORIAS are oriented to contribute to all steps of four case studies in the areas; hydropower, surface hydrology, forestry and food security in East Africa. SMHI has proposed two prototype climate service applications linked to hydropower and flood forecasting. They will also contribute to WP 11, WP 31 and WP 42.

Short profile of key personnel involved:
Dr. Colin Jones: Head of The Rossby Centre with around 20 years experience in climate research. He was previously Professor and Director of the Canadian Regional Climate Modelling Network at the University of Quebec. He is co-chair of the WCRP Task-Force on Regional Climate Downscaling, a member of the WCRP Working Group on Coupled Modelling and co-leads the WCRP Project CORDEX. He is a member of the EC-Earth Steering Group and coordinates the FP7 project EMBRACE (Earth system Model Bias Reduction and Abrupt climate change). His research focuses on the development of global and regional climate models and their application to climate prediction and climate change.

Phil Graham: Senior researcher, international projects manager and associate professor with ~25 years experience in hydrological modelling and climate science. He presently focuses on analyses and hydrological modelling of impacts from climate change, and has published widely on these topics. Previous research focused on dam safety and optimizing allocation of water resources and water supply development in Europe, Africa and USA.

Lars Barring: Senior research scientist at SMHI and adjunct professor at Lund University. He has extensive experience in applying climate change simulations with a range of impact assessment studies and has worked extensively in the field of communicating climate change information and associated uncertainties with stakeholder groups. He has extensive experience of working in EU projects directed towards climate impacts and services, such as ECLISE, IMPACT_2C and IS-ENES.

Jonas Olsson: Senior researcher at SMHI and Associate Professor at Lund University. His work comprises of rainfall modelling and downscaling, development and evaluation of rainfall-runoff models and forecasts and hydrological climate change assessment. He has had a range of scientific commitments including EU-project work package leader, committee member and conference convener.

Kean Foster: PhD candidate and researcher. His research examines seasonal to decadal hydrologic forecasting. His other work includes development and evaluation of rainfall-runoff models and hydrological climate change assessment.

Patrick Samuelsson: PhD in meteorology from the University of Uppsala. Senior research scientist. He works extensively on the development of land-surface parameterizations in the Rossby Centre regional climate models and leads development of the SMHI high-resolution offline land-soil-hydrology-ecosystem-lake climate impact assessment model. He has extensive experience of working in EU projects dealing with regional climate change and has previously coordinated work-packages in such projects.

Dr. Chantal Donnelly: Researcher with expertise in coastal hydraulics and hydrological modelling. She is scientific coordinator for large-scale hydrological modelling research and has lead her group's large-scale hydrological modelling work in the GEOLAND2, SUDPLAN, ECOSUPPORT, ECLISE and OPERR projects including the development of the Balt-HYPE and E-HYPE models.

Partner 16: Lund University (ULUND)

Brief description of the Organisation:
ULUND, established in 1666, is the largest institution of research and higher education in Scandinavia. The university has eight faculties; engineering; science; law; social sciences; economics; medicine; humanities & theology; performing arts and several research centres and specialised schools.
It is a research intensive university with over 2300 active researchers. The University has a significant experience from EU Research and has participated in over 650 projects over the years. In FP7, researchers are involved in more than 200 projects, in all areas of research.

Tasks Assigned/Role in the Project:
ULUND will contribute to WP 11, WP 12, WP 23 and WP 31 with research activities related to the forest case study. Work will include a stakeholder survey assessing the forestry sector vulnerabilities to weather and climate change (WP 11). By involving stakeholders in discussions on forestry need of tailored seasonal predictions (WP 12), impact models of relevance to forestry will be produced (WP 23), and the uncertainties of model predictions will be quantified in relation to the precision required by the stakeholders (WP 31).

Short Profile of Key Personnel:
Dr Anna Maria Jönsson: A researcher at the Department of Physical Geography and Ecosystem Science. Her research focuses on developing impact models for assessing biological effects of climate change. She has specialized in tree damage caused by extreme weather events and attacks by insect pests. This includes modelling of the risk for storm felling (including ground frost), attacks by spruce bark beetles, tree drought stress, spring phenology and risk frost damage, as well as quantifying the risk for damage given different forest management regimes.

Partner 17: Météo-France (MF)

Brief description of the Organisation:
Météo-France is the French national meteorological service. It has the responsibility of observing weather and climate over the country. Its primary mission consists of observing and forecasting the evolution of the atmosphere, of the snow and the surface oceanic characteristics and so ensuring the security of people and property. It routinely provides forecasts and information at scales from 2km short-range to the global climate change scale. Numerical modelling at these scales is very effective because of the powerful computers, the active research, and the collaboration with ECMWF. Météo-France has good experience in European Research projects, especially on seasonal forecasting including the FP6 DEMETER and ENSEMBLES projects.
Météo-France has been a WMO-recognised Global Producing Centre (GPC) since November 2006. It leads the Long-Range-Forecast node of the network-Regional Climate Centre (RCC) for the Regional Association VI (Europe).
The Climatology Department (DClim) is responsible for conducting and coordinating the majority of the current activities related to climate matters, including operational seasonal forecasting and provision of climate and climate change information. DClim has a great experience in conveying climate information to end users from various sectors including energy, water resources, tourism, health and agriculture. Under the DClim coordination, the French DRIAS platform has been developed for providing regional climate change scenarios, especially to the national adaptation community. In addition, some research activities are also conducted in close cooperation the CNRM (Centre National de Recherche Météorologique), especially those related to the use of climate information, tailoring with respect of users' needs and the evaluation of the usefulness/benefits related to such an information.

Tasks Assigned/Role in the Project:
Météo-France will lead WP 41. It will also contribute to other work packages in RT2; WP 21, WP 22 and WP 23; CCT3; WP 32 and WP 33; and RT4 (WP 42). Its research activities will focus primarily on downscaling and tailoring climate information with respect of stakeholders' needs, especially targeting the energy and water resource domains. Météo-France will investigate the skill and value of such information and document the impact and the value of this information onto decision making chains. In addition, it will adapt the DRIAS platform to the new Climate Services raised in the first RT in order to allow an operational provision of such services to the targeted stakeholders.

Short Profile of Key Personnel:
Jean-Pierre Céron: Deputy Director of the Climatology Department. He conducts, supervises and coordinates the developments related to seasonal forecasting applications and production. Leads and coordinates scientific activities done under the DClim responsibility. Chairs (with Dr Takano from JMA) the OPACE III of the Commission of Climatology of WMO dealing with Climate Products and Services and their Delivery Mechanisms.
He is involved with the Climate Information and Prediction Services (CLIPS) project evolution and its transition into the GFCS, the Regional Climate Centre establishment, the Global Seasonal Climate Update and communication issues about Climate matters among others. Previously a lecturer scientist of the National School of Meteorology, he has been involved in many research projects dedicated to intra-seasonal to seasonal variability and prediction.
Jean-Michel Soubeyroux: Head of the Hydroclimatic Analysis and Watch division. He is leading and coordinating all related activities including the climate monitoring and analysis activities on different time scales including decadal. His division is in charge of operations in seasonal forecasting and thus supervises implementation in and production of the operational forecasting suite. It is the main support to the GPC and RCC including provision of products, users' bulletins and WMO verifications. It is also in charge of development of tailored products for specific users (mainly civil users) and is especially involved into the liaison with the French water resource stakeholders.
Two non-permanent staff members, under the responsibility of the key personnel above, will be recruited to help to achieve the work. One will have a RTD profile and will be more specifically dedicated to the work in RT2, CCT3 and WP 41. This person will especially work on the downscaling, the impact related information, the uncertainty framework, the impact forecasts and the impact of these information into the decision making processes. The other non-permanent member will work on the adaptation of the French DRIAS platform (WP 42) to the provision of S2D products and services (contributing to a seamless use of information) in relationship with the RTD outcomes. Also, three other permanent staff members (already working on climate matters), seasonal forecasting and in the DRIAS project will work on the different topics in close liaison with the above personnel.

Partner 18: CETaqua Water Technology Centre (CETaqua)

Brief description of the Organisation:
CETaqua is a non-profit research centre which sets-up, manages and performs research, technological development and innovation projects in the field of water, particularly the complete urban water cycle. CETaqua was created to take advantage of the synergies between its three founding partners: Spain's biggest water utility, Aguas de Barcelona (Agbar); the Technical University of Cataluña (UPC) which has almost 3000 faculty and research staff; and the Spanish National Research Council (CSIC), which has almost 130 centres throughout Spain. This allows CETaqua to take advantage of the knowledge and resources of both the academic and industrial sector, to know the day-to-day and future needs of the sector and to transfer and apply the results of its research.

The Global Change Impacts Programme in CETaqua analyses the way climate change affects the availability and quality of water resources. It also studies extreme hydroclimatic events risks with the aim of defining and implementing mitigation and adaptation measures. CETaqua is currently involved in several projects related to the impacts of climate variability in the water sector:

- FP7 PREPARED brings together urban utilities and research partners to assess whether cities are currently prepared for meeting present and future challenges brought about by climate change in the water supply and sanitation cycle. CETaqua is involved in developing methodologies to include the impacts of climate change to storm water and water resources management in an urban context.
- WATER CHANGE (LIFE+), coordinated by CETaqua, deals with modelling of water resources for medium and long term accounting for adaptation to global change in the Llobregat basin (Spain). It aims to propose appropriate adaptation measures for the Llobregat system, based on the evaluation of their benefits and costs, economic and environmental, in order to determine the most suitable ones.
- Private funding projects aiming at quantifying the impacts and the resilience of water resources and infrastructures against climate change in urban areas, including case studies in Spain, France and USA.

Tasks Assigned/Role in the Project:
CETaqua will lead WP 45 related to the identification of business opportunities for the climate services developed in the project. CETaqua will also contribute to WP 11, WP 12, WP 23, WP 41, WP 42 and WP 43, its research activities will focus on assessing the potential impacts and related vulnerabilities of the water sector produced by climate variability. It will coordinate and gather data among those stakeholders related to the water sector, as it is included as a key case study in the project. CETaqua will also evaluate whether a market for climate services in Europe exists and whether this can be effectively exploited by SMEs.

Short Profile of Key Personnel:
Dr. Montserrat Termes: Received her MSc and PhD degrees from the Universitat de Barcelona (UB) in 1982 and 1989 respectively. Since 1989, she is associated professor in the Economics and Business Faculty of UB. Her main research area is Public Sector Economics, Regional and Urban Economics and Economics of Water. She has been involved in research projects on Privatisation and Regulation and she is also scientific director of Water, Economics and Society at CETaqua. She has taken part in several Spanish and European research projects and she has published and co-authored several journal, books and conference articles.

Àngels Cabello: MSc in Civil Engineering with nine years of experience in projects related to the water sector, especially in modelling floods, sewer and drainage networks and water resources. Since May 2009, she has been managing international research projects in the Global Change Impacts Programme of CETaqua, and since June 2011 she is responsible for its research Programme. She is currently participating in several FP7 projects related to climate change and water: Coordinating the work package focused on the impacts of Global Change in the FP7 IMPRINTS project, developing vulnerability assessments of floods in urban areas and proposing adaptation strategies to increase their resilience in the FP7 CORFU project, and contributing to the storm water management and climate change impacts section of the FP7 PREPARED project. She has experience in climate change impact studies, statistical analysis of climate modelling data and implementation of adaptation and/or mitigation measures.

Partner 19: **Instituto Português do Mar e da Atmosfera (IPMA)**

Brief description of the organisation:
IPMA, is a State Laboratory whose mission is to promote R&D activities in science and technology in the following areas: marine natural resources, aquaculture, marine biology, geophysics and marine geology, meteorology, and climate. IPMA is the Portuguese National meteorological Service (NMS). In the field of atmospheric sciences, IPMA has the following goals: Monitor weather and climate in Portugal, including the issue of weather forecasts and warnings, operate and maintain the network of national meteorological stations, and develop R&D in the fields of meteorology, climate and climate services.

IPMA has about 500 workers, including 110 researcher scientists.

IPMA researchers contributed to the detailed assessments of climate change in Portugal, with involvement in the production of two reports – SIAM (2002) and SIAM II (2005). IPMA is involved in project ECEARTH, in partnership with the University of Lisbon, and contributed to model development and production of scenarios for CMIP5. IPMA is also involved in a project to characterise changes in the Iberian climate, financed by the Portuguese science Foundation and the Portuguese Committee for climate change. IPMA regularly meets with public and private users to establish needs for climate services and is associated with AEMET in the Iberian Centre for Climate Change Services (CISCLIMA). IPMA is a member of the National Strategy for Adaptation to Climate Change, an Inter-ministerial Committee to draft a strategic plan for adaptation.
Other relevant areas of research in the fields of atmospheric sciences and geophysics are remote sensing applications (Land Surface Analysis Satellite Applications Facility (LSA SAF), coordinated by IM and financed by EUMETSAT, and FP7 geoland-2 and MACC-II (Monitoring Atmospheric Composition and Climate)) and seismology and tsunami propagation (FP7 TRIDEC). Across its broad marine and atmospheric activities, IPMA is involved in more than 70 research projects funded by the Portuguese Science Foundation, EU FP7 programme and EUMETSAT.

Tasks Assigned/Role in the Project:
IPMA will contribute to WP 11, WP 12, WP 21, WP 22, WP 31, WP 32, WP 42 and WP 43.

Short profile of key personnel:
Dr. Pedro Viterbo: Head of the Meteorology and Geophysics Department, which includes a team of more than 25 researchers working on remote sensing of land surface parameters, climate change, paleoclimate, and limited area ensemble prediction. Between 1986 and 2005 he was a researcher at ECMWF, where he acquired substantial experience in Numerical Weather Prediction, land surface modelling and surface data assimilation, reanalysis, and applications of remote sensed data in hydrology. He has the following experience:

- Project Officer at ECMWF for the EU FP5 projects ELDAS and GEOLAND.
- Project Officer at University of Lisbon for EU FP6 project WATCH, 2006-2011;
- Project Leader of the Portuguese Science Foundation projects BRIEF, on Ensemble Forecasting, and AMIC, on climate modelling and climate scenarios production;
- Project Officer at IM for the European consortium EC-EARTH, for the development of a climate system model;
- Project Manager at IM, for the LSA SAF.

Dr. Viterbo is also affiliated with the University of Lisbon where he has taught post-graduate students and regularly supervises MSc and PhD students.

Dr. Mariana Bernardino: Currently working on climate modelling, dealing with IPMA CMIP5 simulations performed with EC-EARTH consortium. Between 2003 and 2009 she was a research scientist in an ocean wave modellers group at Instituto Superior Técnico, Lisbon, where she participated in several national and EU research projects. She joined IM (currently IPMA) in 2010, starting to work on climate modelling.
Dr. Bernardino teaches undergraduate meteorology at a Technical Institute in Lisbon.

Partner 20: World Food Programme (WFP)

Brief description of the organisation:
WFP is the United Nations' agency mandated with providing food assistance to (i) support economic and social development; (ii) meet emergency food needs; and (iii) promote world food security. The World Food Programme was jointly established by the United Nations and the Food and Agriculture Organization (FAO) of the United Nations in 1961 and was made operational in 1963. According to Art. VIII of WFP's General Regulations, WFP is an autonomous joint subsidiary programme of the United Nations and FAO, and accordingly, WFP has legal capacity to enter into contractual arrangements with a range of entities further specified in Art. VIII No.2 (a) of the General Regulations.

WFP identifies climate variability and change as one of the emerging challenges to ensuring food security in the most vulnerable communities. WFP is therefore working closely with key institutions to identify climate-related risks and vulnerabilities, and develop tools and services that can be used to better inform decision-making.

WFP is highly active in numerous international climate service-related activities, including:

- WMO's key strategic activities to develop the GFCS: WFP has been an active contributor to the GFCS, and is currently involved in guiding the strategy for the implementation of the user interface platform (UIP) of the GFCS through active participation in the process;
- Climate Services Partnership (CSP): WFP participated in the First International Conference on Climate Services in October 2011 which led to the creation of the CSP, and has a seat on the Core Group, and all of the sub-groups of the CSP, including the Economic Valuation of Climate Services Working Group created under the CSP.

Tasks Assigned/Role in the Project:
WFP will assess food security-specific vulnerabilities under WP 11. The main activities will include an assessment of the effectiveness of seasonal and decadal climate models to identify food security vulnerabilities. This activity will help prioritise user needs.

WFP will collaborate under WP 41 and WP 42, in the assessment of the cost-effectiveness of climate services in guiding food security and disaster risk reduction planning – these two sectors have been identified as priority sectors under the GFCS.

WFP will also participate as a stakeholder throughout the process to help develop, test and evaluate the climate services.

Short profile of key personnel:
Richard Choularton: A Senior Policy Officer in the Office for Climate Change and Disaster Risk Reduction at WFP. He is responsible for coordinating climate and vulnerability analysis, developing climate services with partners, and implementing risk transfer mechanisms for resilience building. He has considerable international experience linking climate services to food security analysis and early warning. He helped design WFP's corporate early warning system and led the Famine Early Warning Systems decision and planning support activities from 2003 to 2008 where he worked to develop a series of tools for translating climate services into food security planning and early warning tools. He has also led WFP's engagement in the GFCS process.

Krishna Krishnamurthy: Climate Change and Hunger Analyst. He has expertise in climate vulnerability and risk assessment in the context of food security. He has collaborated with key scientific institutions, including the MetO, the International Research Institute for Climate and Society (IRI), and the Climate Change, Agriculture and Food Security (CCAFS) Research Theme of the CGIAR to develop analytical frameworks to analyse climate impacts on food security at different temporal and spatial resolutions. Recent activities include the development of a global Climate and Hunger Vulnerability Index; reports of climate risk and food insecurity in Mali and Nepal; in-depth climate risk profiles for several countries to inform climate change adaptation planning. He has also engaged in the GFCS process.

Partner 21: World Health Organisation, Regional Office for Europe - WHO EURO, International (WHO)

Brief description of the organisation:
WHO, Regional Office for Europe, supports 53 Member States in the WHO European Region in developing and sustaining their national health policies, health systems and public health programs; working to identify, prevent and overcome potential threats to health; anticipating future challenges; and advocating public health.

WHO's work is a two-way exchange: gathering best expertise from key partners in national and international institutions, and analysing data and the research results to propose evidence-based public health interventions. This enables WHO/Europe to inform and advise countries on the most effective ways to improve the health of their populations.

WHO/Europe runs or has direct access to essential databases providing authoritative health data from the 53 countries in the Region. The Health Evidence Network (HEN) and the European Environment and Health Information System (ENHIS) are additional valuable resources for health policy-making. WHO/Europe provides tailored support to countries through technical programs addressing a wide range of public health issues. These programs work together, covering areas including disease prevention and control, response to public health emergencies, environmental health, health determinants and health systems.

The Climate change, Green health service and Sustainable development (CGS, former GCH, Global Change and Health) team at WHO/Europe, is active in science and policy work on health effects of global change, climate change since 1997 and, more recently, on sustainable development. It has contributed to the environment and health process and four of the five ministerial conferences in the European Region. The team has participated to several projects on the topic co-funded by the European Commission in DG SANCO (Directorate-General for Health and Consumers) and DG Research. Among these are PHEWE (Assessment and Prevention of acute Health Effects of Weather conditions in Europe), cCASHh (Climate Change And Adaptation Strategies For Human Health), EuroHEAT (health effects of heat in European cities), CEHAPIS (Climate, environment and health action plan and information system), CIRCE (Climate change and impacts research) and IMPACT2C (Quantifying projected impacts under 2°C warming). WHO/Europe works to identify policy options to help prevent, prepare for and respond to the health effects of these changes, and supports its Member States in selecting and implementing the most suitable strategies. The team also coordinates the extreme weather emergency response in the WHO European Region

Tasks Assigned/Role in the Project:
WHO/Europe will contribute to WP 12, WP 22, WP 32, WP 33 and WP 41.

Short profile of staff members undertaking the work
Dr. Christoph Beyer: A Medical Doctor, who worked in particular on disasters and emergencies. He will be starting working with the WHO on this project. He has expertise in assessing vulnerability to heat stress and other emergencies developed for a range of countries. Previously he worked in the Robert Koch Institute in Berlin and earlier in the WHO disaster and emergency unit. He developed the WHO assessment tool for hospitals.
Mr James Creswick: Worked in the European Commission as public information advisor and has now joined the WHO team as Communications Officer.
Dr Franziska Matthies: Worked in the WHO and helped to develop the heat health action plans for Europe.
Dr Bettina Menne: Medical Doctor and Medical specialist in Hygiene and Public Health. Will supervise WHO Euro staff. Dr Menne coordinated the setting up of the WHO European Centre for Environment and Health program on health and global changes (climate change, stratospheric ozone depletion, energy, extreme weather events and globalisation) and coordinates several research teams (within, and outside of, WHO) and policy making processes. She was the Convening Lead Author of the health chapter in the 4th assessment report of the IPCC.

Partner 22: Future Everything (FutureEverything)

Brief description of the organisation:
Now in its 17th year, FutureEverything is amongst the UK's leading organisations showcasing and driving emerging trends in new media. Its Vision is to bring the future into the present, by championing and leading global innovation in art, society and technology. We find and share the small sparks that grow into new ways of seeing the world. based in Manchester UK, they present an award winning international festival of art, music and ideas, and include a conference, awards and digital innovation projects.

Their festival is unique, bringing together world premieres of astonishing artworks, an explosive music programme, visionary thinkers from around the world, and awards for outstanding art, design and innovation. Its conference is the crucible that allows artists, technologists and future-thinkers to share, innovate and bring the future into the present. FutureEverything also runs year-round innovation laboratories; it has a very strong global network and international profile, using mass participation in creativity and social innovation to bring the future into the present. The organisation is recognised around the world for leading pioneering projects and important international debates.

Tasks Assigned/Role in the Project:
FutureEverything will be a key delivery partner interfacing the scientific community with non-specialist and public audiences. It will be involved in WP 43 and WP 44 delivering original and accessible solutions that will enable wide debate and engagement with the EUPORIAS and the products created. This will be achieved by bringing together teams of artists, producers, ethnographers, data visualisers, technologists and audience participation experts to create new arts and engagement products that can be rolled out internationally. An important element of the involvement will be to take the key scientific messages and make them accessible to the wider community across Europe and wider. This will be achieved by using innovative methods to communicate the message in as many formats as possible.

Short profile of key personnel involved:

Stewart McCombe: General Manager at FutureEverything. Following a highly successful career to date in the private sector (banking), he will bring strong commercial disciplines to his responsibility for project management. In recent years, he has applied his commercial background to a number of not for profit organisations across England, and after a period advising the board of FutureEverything, has taken on this executive role. Having been responsible for managing large funding proposals with borrowers and lenders during his banking career, he is equipped to manage the programme responsively.

Amalie Roberts: Special Projects manager at Future Everything. An experienced producer and project manager, a writer and performer of music, and a published academic in creative industries management and intellectual property law. Curating, commissioning and delivering high-quality events, specialising in live music, her focus is always on nurturing, exploring and re-imagining the position of live music performance within the contemporary cultural landscape. Experienced at working with policy makers, city council leaders and arts organisations across the North West of England, Amalie has worked in an advisory role to many small-to-medium sized creative companies in the region, making investment decisions, and designing and implementing strategies for economic growth within the creative sectors.

Partner 23: Electricité De France (EDF)

Brief description of the Organisation:
The EDF Group, one of the leaders in the energy market in Europe, is an integrated energy company active in all the businesses: production, transport, distribution, energy selling and trading. The Group is the leading electricity producer in Europe. In France, it has mainly nuclear and hydraulic production facilities where 95% of the electricity output involves no CO2 emissions. EDF operates 1,200,000 km of low and medium voltage overhead and underground electricity lines and around 100,000 km of high and very high voltage networks. The Group is involved in supplying energy and services to more than 40 million customers around the world, including more than 28 million in France. The Group generated consolidated sales of € 58.9 billion (of which 42% in Europe excluding France) and net income from ordinary operations of € 4.2 billion in 2006. EDF is listed on the Paris Stock Exchange and is a member of the CAC 40 index.

Another main feature of the EDF Group is its involvement in research into climate change and new generation technologies in the energy area. This includes renewable energies and their impact on the network, conventional technologies such as nuclear, and the interaction between energy market and electric system constraint.

EDF R&D: The aim of the EDF's R&D Division is to keep electricity costs competitive, prepare the generating facilities of the future, enhance the quality of supply while preserving the environment, as well as to develop innovative solutions with the customer in mind. The variety of these objectives has led EDF to set up a strong R&D function, including multidisciplinary knowledge, and with a balance between basic research and industrial applications.
Figures for EDF's R&D activities in 2005:
- 1329 researchers of whom 27% women
- 96 teaching researchers, 55 PhD candidates
- Participating in 53 FP6 projects (7 co-ordinated by EDF)
- 4 main research sites: Clamart (France), Chatou (France), Les Renardières (France), Karlsruhe (Germany)

Tasks Assigned/Role in the Project:
EDF R&D will act as a partner in the project and will contribute to WP 11, WP 12, WP 21, WP 22, WP 23, WP 33, WP 41, WP 42, WP 43 and WP 45. They will provide the opportunity of enrolling the whole EDF Group as a stakeholder of the project.
EDF R&D will adapt its own analogue method to seasonal forecasts, for temperature and precipitation, and compare the results with its high quality data over France. These forecasts will be introduced into their own hydrological models, and the water flow forecasts will be compared to current reference methods as well as other partners' forecasts.
EDF R&D will also share its experience in collecting end users' needs, and communicating uncertainty in forecasts to end users. EDF will contribute to the definition of the prototypes and case studies, in particular those based on hydropower production and renewable energies.
Finally, EDF R&D will bring its high level network in the energy sector to the EUPORIAS consortium.

Short Profile of Key Personnel:
Dr. Laurent Dubus: An engineer in marine environment and holds a PhD in Physical Oceanography. He is now an expert researcher at EDF R&D, where he is working on the improvement of the way in which weather and climate data and forecasts can be used in the power sector to better manage electrical systems on all time scales from a few days to several years.

Dr. Julien Najac: An engineering degree in fluid mechanics and holds a PhD in Climate Science. He is currently a research engineer at EDF R&D, working on the impacts of meteorology on the electricity supply-demand balance.

Partner 24: Romania National Meteorological Administration (Meteo-Ro)

Brief description of the Organisation:
The National Meteorological Administration (ANM) (Meteo-Ro) (http://www.meteoromania.ro) is the national authority in meteorology in Romania acting within the Ministry of Environment and Forests. ANM is the owner and unique administrator of the meteorological, climatological and aerological Romanian databases. ANM coordinates the National Meteorological Observation Network, which consist of: 162 meteorological stations, 2 aerological stations, 8 radar centers, 60 agrometeorological stations and 8 actinometrical stations. ANM is a member of major international organizations in this field: WMO, EUMETSAT, ECMWF and ECOMET.
One major research activity of ANM focuses on climate variability and change at the regional scale and climate predictability. The main research topics are:

- analysis of characteristics of climate variability over Romania using long term observations (trends, shifts, extreme events);
- connections between Romanian climate and large-scale phenomena (e.g. the North Atlantic Oscillation/ Arctic Oscillation, Atlantic Multi-decadal Oscillation);
- projections of global climate change on local scale using statistical and dynamical downscaling models;
- validation of global/regional climate models on large-scale and regional scale;
- climate predictability.

Meteo-Ro has participated in several in European and international climate-related projects including FP6 – ENSEMBLES (2004-2008); FP5 STARDEX- Statistical and regional dynamical downscaling of extremes for European regions (2002-2005); COST 730 -Towards a universal thermal climate index UTCI for assessing the thermal environment of the human being'; COST ES0601 – 'Advances in homogenisation methods of climate series: an integrated approach (HOME).

Tasks Assigned/Role in the Project:
Meteo-Ro will contribute to WP 11, WP 12, WP 22 and WP 41. Its research activities will focus primarily on Danube case study and related climate services and knowledge transfer to local stakeholders involved in energy sector (such as Hidroelectrica), flood/drought risk assessment and agriculture (such as Apele Române Authority/Ministry of Environment and Forests, Ministry of Agriculture), tourism (such as National Institute for Tourism) and ecosystem services (GEOECOMAR, Danube Delta Reserve).

Short Profile of Key Personnel:
Dr. Roxana Bojariu: Head of Climate Section. Expertise in climate variability and change and associated predictability. She has acted as Romanian Project director/scientific coordinator for several national and international projects. She has been involved in European projects such as EuroGLOBEC (European global ocean ecosystem dynamics), FP6 DYNAMITE (Understanding the Dynamics of the Coupled System), FP6 IPY-CARE (Climate of the Arctic and its role for Europe – an European component of the International Polar Year), FP6 CECILIA (Central and Eastern Europe Climate Change Impact and Vulnerability Assessment), FP7 METAFOR, FP7 Euro4M and in international ones (e.g. Small Pelagic Fishes and Climate Change). She was lead author of Chapter 3 on observations in the IPCC WGI AR4 and Review Editor of the AR4 Synthesis Report. She is lead author of Chapter 11 on near term climate predictability and change in the IPCC WGI AR5. Dr. Roxana Bojariu will scientifically coordinate Romanian team in the project and will carry out activities related to climate services and knowledge transfer towards local stakeholders involved in energy sector and in flood/drought risk assessment and agriculture.

Dr. Liliana Velea: Researcher, Climate Section. She holds a PhD degree in Methods and Technologies for Environmental Monitoring. She has experience in climate modelling and numerical models assessment and she has collaborated in internal and international climate-projects (e.g. 'Studies on climate change issues in Romania; present dimensions of global heating; Problems of natural and anthropogenic impact, adaptation and prevention strategies';FP6-'DYNAMITE'). Dr. Liliana Velea will be involved in designing local climate services and products related to air-sea interaction and tourism.

B.2.3 Consortium as a whole

With nine National Met Services (France, UK, The Netherlands, Sweden, Spain, Portugal, Romania, Switzerland and Germany) as partners in the project, EUPORIAS represents a very strong link to the WMO. It potentially represents the largest regional coordination of meteorological organisations in the world relating to climate services. Such a leading position is further reinforced by the fact that two of the WMO Global Producing Centres for long-range forecasts (MF and the UK Met Office) are partners in the project, a condition that will facilitate the flow of both knowledge and seasonal and decadal predictions into the project. The consortium has a strong link to the GFCS, with the coordinator being on the WMO's core writing team for the GFCS Implementation Plan, ensuring that the European Commission's research and climate service activities are well aligned with the GFCS.

Despite its strong meteorological roots, EUPORIAS draws on a wide set of expertise from both Academia and the private sector. While most of the partners are scientific organisations with specialist expertise on either impacts assessment (UNIVLEEDS, WU, DHI) or seasonal prediction (KNMI, DWD, AEMET) or both (Met O, MeteoSwiss, MeteoFrance, IC3, ENEA), a number of partners have complementary skills. For instance, FutureEverything, a UK Community Interest Company (CIC), brings to the consortium the innovation and communication expertise of one of the most successful arts and technology festivals in Europe. EDF, TEC and CETaqua provide expert linkages with highly important climate-vulnerable sectors such as energy, water and tourism. Although the main regional focus of EUPORIAS is Europe, the consortium includes a number of international organisations. Specifically, the World Health Organisation (WHO, Regional Office for Europe) and the World Food Programme (WFP) will both play an important role among the project partners and will provide unique expertise on health and food security.

Additionally the consortium has strong links with end user organisations, many of which will be involved in the project's activities through a stakeholder group and stakeholder activities. The central role of stakeholders in the structure of EUPORIAS is well demonstrated by the number of end users who are actively taking part in the project. A quarter of the partners come from the private sector (EDF, CETAqua, DHI, TEC, Predictia, FutureEverything). The commitment of the project toward a sustainable development of the climate service in Europe is demonstrated by the involvement of three SMEs. One of these, Predictia, leads WP 43, which will provide part of the basis for the future development of climate services in Europe.

B.2.3.1 Subcontracting

No core tasks within EUPORIAS will be subcontracted.
The subcontractors selected for EUPORIAS have been selected according to the rules for subcontracting laid down in the Guide to Financial Issues relating to FP7 Indirect Actions (Version 16/01/2012) and Article II.7 of the FP7 Grant Agreement - Annex II General Conditions. Therefore, the subcontracts will be awarded under conditions of transparency and equal treatment. The work to be subcontracted is as follows:

- Partner 3, Sub-contractor 1: ENEA will sub-contract the development of a web targeted portal for stakeholder interaction. Technical support for these activities will also be provided through this sub-contract. ENEA will implement requirements for a targeted interactive web portal for stakeholder involvement for a European Climate User Interface. Budget 15,000**€**. Deliverable D11.3.
- Partner 9, Sub-contractor 1: WU plans to hire an individual from an African institute for approximately two months. They will support the active participation of one or two non-European (e.g. African) institutes in the identification of DMP relevant information and subsequent dissemination process of (especially seasonal) climate and impact forecasting products under RT4. Budget 13,678**€.** Task 41.3.
- Partner 11, Sub-contractor 1 and 2: IC3 plans to sub-contract to two university professors from the University of Montpellier - INSERM (Prof Jean-Marie Robine) and the University of Geneva (Prof François Hermann) to contribute a unique database of human mortality as explained in the description of the Health Case Study in WP 22. These professors will work with IC3 over one year to (i) update and calibrate the mortality database (M data); (ii) incorporate information on age, sex, health status, demography and societal adaptation capacity into the database; and (iii) impart their expertise on mortality and human physiology. The justification for planning to use two specific university professors is their unique work and expertise, as well as international renown, on the effects of temperature extremes on

human health, particularly regarding the medical side of this important problem. Their work has ranged from epidemiological studies taking into consideration age-structure, particularly for the elder, to the environmental exacerbators of temperature extremes. Noticeably, these two researchers have worked on adaptation and mitigation strategies and their expertise will be of great use for the project. They have advised different EU sectoral commissions on the subject and through the years they have assembled an unparalleled database of human morbidity and mortality. UDIC/IC3 climate & health RG established a fruitful collaboration with these two scientists a few years ago and as a first result of it, last year a high-impact article was published in Nature Communications (Ballester et al., 2011, Long-term projections and acclimatization scenarios of temperature-related mortality in Europe. Nature Communications, 2: 358). This study, centered over near 200 regions in Europe provided the first approximation with the same methodology to both cold and warm extremes in the Temperature/Mortality relationship. Budget 52,600**€.** Task 22.2.

- Partner 22 will sub-contract out activities in support of the delivery of web-based engagement tools and marketing activities, within WPs 43 and 44. Budget 50,000**€**.
- Partner 22, Sub-contractor 1: FutureEverything will sub-contract to third party developers to deliver web-based engagement tools, a design intervention, and marketing and documentation activities, within WP 43 and 44.
- Partner 22, Sub-contractor 2: A digital agency (or agencies) specialising in interactive data visualisation will be required to create online interaction and engagement and to deliver design solutions for disseminating project video and other media (Task 43.3).
- Partner 22, Sub-contractor 3: An art-designer will supply specialist innovation around the prototype (Task 43.4).
- Partner 22, Sub-contractor 4: A dedicated PR company will be used to provide press and PR services for the Public Event (Task 43.2).
- Partner 22, Sub-contractor 5: A film company will support project documentation (Task 44.5).

B.2.3.2 Other Countries

There are no participants requesting EU funding from outside of the EU.

B.2.3.3 Additional Partners

There are no additional partners anticipated at this stage.

B.2.3.4 Third Party Resources Available to IC3

The Third Party modality which applies here is the model of a third party making its resources available to a beneficiary. According to the situation described, the third party (ICREA, Institut Català de Recerca i Estudis Avançats) does not carry out any part of the work, it just lends resources to the beneficiary (IC3). These resources are directly used by the beneficiary, the work is performed in its premises and there is no reimbursement by the beneficiary to the third party. The third party makes available some of its resources to a beneficiary, which does not reimburse the cost to the third party, but which charges the costs of the third party as an eligible cost of the project. Its costs will be declared by the beneficiary in its Form C but must be recorded in the accounts of the third party.

B.2.4 Resources to be committed

(Note that all monetary figures in Part B.2.4 are indicative and amounts presented here might differ from the budget figures in Part A and the GPFs. For example - due to the rounding to whole integers.)

The total cost of the EUPORIAS project is estimated at **13,048,572 €,** with the consortium requesting funding from the EC for **8,976,723.45 €. Therefore 31% o**f the total budget is mobilised by the consortium via matched funds. **1495** person months (PM) have been offered to the project from the 24 partners.

B.2.4.1 Financial Planning for the Project

The majority of the funding for EUPORIAS is required for personnel costs, as the project will be relying on the skills and many years of expertise of the partner organisations involved. Therefore it was key that the budget was calculated using an estimation of costs associated with the experts identified to deliver the project's objectives, and their role within the project. Thus, as the tasks and description of the work packages developed; the associated estimate of personnel resources developed. This iterative approach to calculating the required budget to deliver the work packages and the project as a whole will ensure a good estimate of the resources required, and associated funding required.

Partners were asked to estimate their own travel budget and other costs required (e.g. to cover hosting and conducting workshops). These requests were then challenged and compared to ensure consistency. When considering the travel required in this project, all partners and stakeholders will, as best practise, avoid unnecessary travel, and use alternative forms of communication (such as teleconference, Skype).

B.2.4.2 Distribution and Breakdown of Resources

B.2.4.2.1 Personnel Costs

Costs for personnel amount to 55% of the total project budget. A dedicated fraction is required at the start of the project (RT1) as engagement with the stakeholders. This is essential to identify user's needs and gaps in information. Once this information is acquired, RT2, with around a third of the budget, will generate the model methodology and tools to address the needs identified in RT1. A small proportion of the project is ring fenced for CCT3 which looks in detail at the uncertainty of both impacts models and S2D prediction models. These are a fundamental part of the information that is envisaged will be provided by the project. Lastly a third of the budget is allocated for RT4. Again this shows the importance of the stakeholders and final users within this project. RT4 is about outreaching, developing and defining prototypes of Climate Services. Therefore the personnel costs are well spread across the project activities (WPs) and there are a good proportion of costs allocated to the important tasks associated with demonstration.

Partner Two (TEC) will be using the flat rate based on the allowances used in the People Specific Programme (2011) for the calculation of the personnel costs of the SME owner who does not receive a salary. The details used to calculate this flat rate are presented in the Table 2.4.1.

Table 2.4.1: Summary of TEC - SME Owner Salary Assumption

Participant	**Partner 2 - TEC**
Researcher Category	Experienced (greater than 10 years experience)
Country of Residence	France
Year of Publication of the Call	2011 (People Work Programme)
Annual (Living) Allowance	87,500 (Euros)
Productive Hours	1,575
Correction Coefficient/100	115.8/100 = 1.158
Hourly Rate	64.33 Euros

It is worth clarifying the following aspect:
ENEA will dedicate considerable efforts in WP 11, WP 12, WP 21, WP 22 and WPs 42, 43 and 44 for education and training of young scientists. To this aim ENEA commits to dedicate the necessary EUPORIAS budget in order to offer at least a three-year fellowship and/or recruit post-doctorate personnel.

In the context of the third party resources available to Partner 11 (IC3) referenced in Section B.2.3.4, ICREA resources corresponding to the dedicated time of Prof Dr Xavier Rodó will be available for the whole duration of the project for mainly RTD activities. Dr Rodó's effort will be concentrated in all activities (with a strong focus on the health sector) except IC3's activities within WP32, WP41, WP43 and WP45. In accordance with the IC3 A3.1 form, the estimated effort for Dr Rodó is 12 person months which equates to an estimated personnel cost of 42,000**€**. This represents around 8% of the total budgeted personnel costs for Partner 11.

B.2.4.2.2 Management and Other Costs

704,024**€** (5.4%) of the total project budget will be used for the core project management activities (WP1 and WP4) [described in Part B.2.1] and the coordination across EUPORIAS, SPECS and NACLIM (WP2). The personnel costs will cover the EU Coordinator, a Project Manager working 70% of their time on EUPORIAS, Science Coordinator and Project Administrator.

Apart from the core Project Management activity, eight person months have been allocated to UC to manage the flow of data within the project. This is particularly important given the overall objective of the project. UC have been chosen to manage this task based on their experience gained in previous projects such CURATOR and FP7 METAFOR (for metadata annotation), and the FP6 ENSEMBLES project (for data format and conventions).

International Summer School*s*
The two EUPORIAS summer schools will provide a way of educating and training a new generation of scientists in the arena of climate science and stakeholder engagement. The schools will be primarily self-financing, though salary costs of the trainers (ENEA) may be covered by the project if required.

These summer schools will be open to junior researchers within and beyond the project, with the aim of developing and training new research expertise to interface between seasonal to decadal science and stakeholder application. Each summer school will cover fundamental climate and predictability issues and specific applications issues related to the EUPORIAS sectors. The central section of each workshop will be focused on a variety of 'cross-over' themes essential for the delivery of climate services. These will include, for example, the correct interpretation of 'seasonal forecasts' and associated uncertainties, presentation issues, decision processes, and transfer methods. Extensive practical and lab sessions will be organised as part of these summer schools, for the junior researchers to practise methods in which to engage stakeholders in the risk assessment evaluation based on seasonal to decadal information.

B.2.4.2.3 Other Direct Costs

986,863**€** of the total budget has been put aside for other direct costs (non-personnel costs). These costs are primarily associated with travel and workshops. 397,661**€** of direct costs is set aside for workshops, test laboratories, interviews and surveys – all ways by which stakeholders will be actively involved in the project. These are primarily within RT1 and RT4. Again this is demonstrating how crucial and valuable stakeholder input and engagement will be to EUPORIAS. 589,202**€** (again direct costs) is for travel, again associated with engaging with users and stakeholders. Table 2.4.2 provides a breakdown per partner of these other direct costs.

Table 2.4.2: Summary of Other Direct Costs

Partner	Description of cost	Value € (total budget) excluding overheads (indirect costs)	Deliverable	Activity (i.e., RTD)
1	Item 1: Travel and subsistence costs for Met O Project Office, plus hosting of any management meetings; travel costs for advisory board members as required	25,000	T1.1, T1.2	MGT

Partner	Description of cost	Value € (total budget) excluding overheads (indirect costs)	Deliverable	Activity (i.e., RTD)
Met O	Item 2: Travel costs for Met O at ECOMS Board meetings, and for coordinator to joint kick-off/final conference. Hosting of any ECOMS meetings. ECOMS engagement	25,000	MS1, T2.2, D2.3	OTHER
	Item 3: Travel and subsistence costs for Met O Science Coordinator and any administrative support staff to project science meetings (including General Assemblies, stakeholder meetings, decision lab attendance and joint scientific meetings on cross-cutting themes with NACLIM and SPECS), and attendance at other science fora	33,000	T3.1, T3.2, T3.5; T11.1, D11.1, D12.2, D12.3; D23.1, D23.2; D33.1, D33.2, D33.4	RTD
	Item 4: Travel costs for stakeholders (primarily to two European Stakeholder Climate Services Conferences), plus Met O travel costs associated with networking and dissemination activities	55,000	T4.4, T4.5	OTHER
	Item 5: Travel costs to stakeholder meetings and workshops	8,000	D43.1	DEM
	total	146,000		
2	Item 1: Travel costs for stakeholders interviews and workshop attendance	4,000	D 11.1, D 11.2	RTD
TEC	Item 2: Hosting workshops on tourism cases	4,000	D 11.1, D 11.2	RTD
	Item 3: Travel costs to seminars and interviews on uncertainty	2,000	D 33.1	RTD
	Item 4: Attending workshop and conferences on protoypes	2,500	D 42.1, D 44.2, D42.3	DEM
	Item 5: Travel to workshop to engage tourism stakeholders	2,000	D 43.1	DEM
	Item 6: Travel /Meeting with climate portal managers	1,350	D 44.1	RTD
	Item 7: Travel / Meeting on business opportunity for the tourism sector	1,300	D 45.1	RTD
	total	17,150		
3	Item 1: Hosting workshops	10,000	D11.1, D11.2	RTD
ENEA	Item 2: Travel and subsistence costs to attend conferences and project meetings	28,333		RTD
	Item 3: Travel and subsistence costs to attend conferences and project meetings	6,667		DEM
	Item 4: Hosting workshop, consumables and durables (i.e., disks for data-base tailored for stakholder's use)	33,333	D43.1, D43.2	DEM
	Item 5: Durables - Disks for data-base tailored for stakeholder's use	40,667	T11.1, T11.2, T11.3	RTD
	Iten 6: Consumables	4,000		RTD
	total	123,000		
4	Item 1: Hosting workshop	5,000	D22.2	RTD
MeteoSwiss	Item 2: Travel expenses	36,381	D12.3, D22.1, D22.2, D22.3, D42.2, D42.3	RTD
	Item 3: Publication costs	8,000	D21.3, D22.2, D22.3, D42.2	RTD
	total	49,381		
5	Item 1: Seminars, Workshops and Meetings attendance	6,000	D21.1, D21.2, D22.1, D22.2, D22.3	RTD
UC	Item 2: Seminars, Workshops and Meetings attendance	6,000	D32.1, D32.2	RTD
	total	12,000		
6	Item 1: Travel costs for stakeholders interviews and workshop attendance, plus project meetings/General Assemblies	5,500	D 12.2; D 12.3	RTD
Predictia	Item 2: Attending impact models workshops	2,500	D 23.1; D 23.2	RTD
	Item 3: Hosting and attending workshops	9,062	D 43.1	DEM
	Item 4: Consumables	3,938		RTD
	total	21,000		
7	Item 1: Travel costs and subsistence to attend conferences and project meetings	18,000	D 32.2, D12.2, D12.3	RTD
AEMET	Item 2: Attending workshops and working meetings on prototypes	4,000	D42.2, D42.3	DEM
	Item 3:Attending workshops and working meetings on communication confidence levels	6,000	D33.1, D33.2, D33.3	RTD
	total	28,000		

Partner	Description of cost	Value € (total budget) excluding overheads (indirect costs)	Deliverable	Activity (i.e., RTD)
8	Item 1: Travel and subsistence costs to attend project meetings and conferences	9,000	D32.2, D33.1, D33.4, D44.2, D44.5	RTD
DHI				
	total	9,000		
9	Item 1: Travel to project meetings	8,000		RTD
WU	Item 2: Computing (HPC CPU time) and storage costs	4,000	D31.1, D23.4	RTD
	Item 3: Stakeholder workshop organisation costs (including travel support for non-EU non-project 'partners')	12,000	T43.1, D43.1	DEM
	total	24,000		
10	Item 1: Room rent	28,333	D11.2, WP21, WP41	RTD
DWD	Item 2: Travel and subsistence costs to attend conferences and project meetings	15,000		RTD
	Item 3: Travel and subsistence costs to attend workshops and project meetings	7,668		DEM
	Item 4: Consumables	13,667		RTD
	total	64,668		
11	Item 1: Networking material, storage and removable hard disk (RT2)	6,000		RTD
IC3	Item 2: Publication and printing costs	2,000		RTD
	Item 3: Travels/meeting RT1	7,000		RTD
	Item 4: Travels/meeting RT2	7,000		RTD
	Item 5: Travels/meeting CCT3	7,000		RTD
	Item 6: Travels/meeting RT4	7,000		RTD
	total	36,000		
12	Item 1: Travel and subsistence costs to attend conferences and project meetings RT 2	23,743	D21.1, D21.2, D21.3, D22.1, D22.2, D22.3	RTD
KNMI	Item 2: Travel and subsistence costs to attend conferences and project meetings RT4	6,430	D42.1, D42.2, D42.3, D44.1, D44.2	DEM
	total	30,173		
13	Item 1: Equipment (high performance rack servers for computer cluster)	23,500	D21.2	RTD
UL-IDL	Item 2: Consumables	1,500	D12.2,D12.3,D12.4; D21.2; D22.1; D32.1,D32.2	RTD
	Item 3: Travel and subsistence costs, attend conferences and meetings	15,500		RTD
	total	40,500		
14	Item 1: Hosting two workshops	37,499	D12.2, D12.4	RTD
UNIVLEEDS	Item 2: Travel WP 12 for interviews	39,164	D12.3	RTD
	Item 3: Transcribing of interviews & survey costs	19,582	D12.3	RTD
	item 4: Travel WP 41 for interviews	39,165	D41.3	RTD
	Item 5: Hire of decision labs WP 33	19,582	D33.4	RTD
	Item 6: Training networking & dissemination (including publications)	9,999	Various	RTD
	total	164,991		
15	Item 1: Travel and subsistence costs to attend conferences and project meetings	21,000		RTD
SMHI	Item 2: Travel and subsistence costs to attend project meetings and workshops	4,000		DEM
	Item 3: Stakeholder workshop on winter transport	2,000	D11.1, D11.2	RTD
	Item 4: Stakeholder workshop on Hydropower Climate Service	2,000	WP 42/Task 42.3. D42.1-3	DEM
	total	29,000		
16	Item 1: Travel and subsistence costs to attend project meetings	4,000		RTD
ULUND				
	total	4,000		

Partner	Description of cost	Value € (total budget) excluding overheads (indirect costs)	Deliverable	Activity (i.e., RTD)
17	Item 1: Travel and subsistence costs to attend conferences and project meetings	18,000		RTD
Meteo-France	Item 2: Travel and subsistence costs for kickoff and closure meetings	3,000		RTD
	total	21,000		
18	Item 1: Travel and subsistence costs to attend conferences and project meetings	10,000		RTD
CETaqua	Item 2: Hosting a local workshop for the water sector	3,000	T11.2, D11.1	RTD
	total	13,000		
19	Item 1: Travel and subsistence costs to attend project meetings, General Assemblies and conferences	7,000		RTD
IPMA	Item 2: Travel and subsistence costs to attend project meetings, General Assemblies and conferences	3,000		DEM
	total	10,000		
20 WFP	Item 1: Assess vulnerabilities in food security		T11.1, T11.2, T11.3; D11.1, D11.2, D11.3	RTD
	total	14,000		
21	Item 1: Travel and subsistence costs to attend conferences and project meetings	37,000		RTD
WHO	Item 2: Venue hire, translation costs associated with workshops and interviews	3,000	D12.2, D12.3, D12.4	RTD
	total	40,000		
22	Item 1: Hosting participatory workshop and conference event	20,000		RTD
FE	Item 2: Hosting participatory workshop and conference event; plus arge scale public communication experience	35,000		DEM
	Item 3: Travel and subsistence costs to attend conferences and project meetings and for media documentation team	5,000		DEM
	Item 4: Travel and subsistence costs to project meetings	5,000		RTD
	Item 5: Consumables	15,000		RTD
	total	80,000		
23 EDF	Item 1: Travel and subsistence costs to attend conferences and project meetings	4,000		RTD
	total	4,000		
24 Meteo-RO	Item 1: Cost of mobilities (travel, accommodation, per diem for scientific meetings)			RTD
	total	6,000		
	Total	**986,863**		

B.2.4.2.4 Demonstration Activities

The activities and tasks described in WP 42 and WP 43 are classed as Demonstration Activities, and involve all but five of the partners. A breakdown of the activities within these two work packages by each partner, is given in Table 2.4.3.

Table 2.4.3: Demonstration Activities

Partner	Description of Demonstration Activities	Value € (total budget) including overheads (indirect costs)	Task/Deliverable	Work Package
1	Activity 1: Identify criteria for selection of case studies that will be taken through to prototype		T42.1, D42.1, MS34	42

Partner	Description of Demonstration Activities	Value € (total budget) including overheads (indirect costs)	Task/Deliverable	Work Package
Met O	Activity 2: Collect the background information that will inform the selection of the case studies		T42.2, T42.4, D42.1, D42.2	42
	Activity 3: Implement the selected prototypes which will include the latest developments of the impacts models		D42.1, D42.2, D42.3	42
	Activity 4: Run the prototypes in operational forecast mode, and assess outcomes/results		T42.7, T42.8, D42.3	42
	Activity 5: Co-organise and support the running of the workshop|(s) with the key sector stakeholders		T43.1, T43.2, D43.1, MS36, MS37	43
	Activity 6: Contribute to a sector-specific publication on climate services		D43.2	43
	Activity 7: Liaise and work with stakeholders and 'artists' to identify novel communication channels		D43.3	43
	Activity 8: Co-produce podcasts, videos and a mobile phone application; and define editorial guidelines for the project 'Twitter' feed		D43.3, D43.4	43
	total	297,719		
2	Activity 1 : Prototype development for tourism sector		D 42.1, D 42.2, D 42.3	42
TEC	Activity 2: Tourism stakeholders engagement		D 43.1	43
	total	55,200		
3	Activity 1: Designing a prototype for a climate watch		T42.2	42
ENEA	Activity 2: Gathering background information		T42.4	42
	Activity 3: Energy impact models		T42.5, T42.6, T42.7; D42.2, D42.3	42
	Activity 4: Run workshops with key sector stakeholders		T43.1, T43.2; D43.1, D43.2	43
	total	129,000		
4	Activity 1: Contribute to the design and planning phase		T42.1, T42.2	42
MeteoSwiss	Activity 2: CII Hindcast production		T42.6, D42.2	42
	Activity 3: CII forecast production		T42.7, D42.3	42
	total	37,661		
5	Activity 1: Prototype assessment		T42.5, T42.6, T42.7	42
UC	Activity 2: Prototype demonstrations		D42.1, D42.2, D42.3	42
	total	90,000		
6	Activity 1: Run workshops and meetings with key sectors stakeholders (with focus on transport sector)		D43.1	43
Predictia	Activity 2: Establish an active communication with stakeholder groups		D43.3, T43.3, T43.4	43
	Activity 3: Produce a sector-specific publication demonstrating how a climate service can be developed		D43.2	43
	Activity 4: Develop a mobile application to help access information produced by climate prototypes		D43.4, T43.6	43
	total	159,963		
7	Activity 1: Assess benefits and limitations of protoypes		D42.1, D42.2, T42.8	42
AEMET	Activity 2: Prototype development for water sector		D42.3, D42.2	42
	total	72,960		
8 DHI	Activity 1: Prototype development for water resources sector		D4.2.2	42
	total	38,742		

Partner	Description of Demonstration Activities	Value € (total budget) including overheads (indirect costs)	Task/Deliverable	Work Package
9 WU	Activity 1: Workshop + 5PM organise, host and report on workshop with stakeholder to evaluate service prototypes		T43.1, D43.1	43
	total	75,790		
10 DWD	Activity 1: Design a prototype for a climate watch (RCC-CM component)		T42.2	4.2
	total	91,861		
11	Activity 1: Development of a climate service prototype for the Renewable Energy (RE) sector and Health sector		T42.1, T42.4, T42.5, T42.8	42
IC3	Activity 2: Seasonal to decadal climate forecasts for the RE sector		T42.6, T42.7, D42.2, T43.5	42/43
	Activity 3: Stakeholder engagement (RE sector) via online communications, meetings, events and workshops		T43.1, T43.2, D43.1	43
	total	262,824		
12	Activity 1: Design prototype climate watch		T42.2	42
KNMI	Activity 2: Hindcast runs prototype		T42.6, D42.2	42
	Activity 3: Forecast run prototype		T42.7, D42.3	42
	total	174,964		
15	Activity 1: Scoping meeting with key stakeholders, presentation and evaluation of approaches		T42.3, MS34	42
SMHI	Activity 2: Selection of final case study, methodology, visualisation and distribution requirements in collaboration with stakeholders		T42.3, MS35	42
	Activity 3: Development of the prototype (i.e., hydropower climate service prototype)		T42.3	42
	Activity 4: Evaluation of test case in collaboration with stakeholders, comparison with state-of-the-art-system		T42.3, D42.1, D42.2	42
	Activity 5: Test prototype in operational conditions together with stakeholders		T42.3, D42.3	42
	total	198,000		
17	Activity 1: Prototype development/adaptation (at seasonal scales) for water sector		all Tasks (except T42.2), D42.2, D42.3	42
Meteo-France	Activity 2: Extension of activity 1 to Energy sector		all Tasks (except T42.2), D42.2, D42.3	42
	Activity 3: Assessment of prototype limitations		D42.1, T42.8	42
	Activity 4: Prototype for Climate Watch activity		T42.2	42
	total	222,840		
18	Activity 1: Provide user requirements for a climate prototype focused on the water sector		T42.1, T42.2 D42.1	42
CETaqua	Activity 2: If the water sector is selected as a case study, contribute to the report assessing the benefit of this climate service prototype		T42.4, T42.5 D42.2	42
	Activity 3: Participate in one sector-specific workshop (water sector) and contribute to the sector-specific publication demonstrating how a climate service can be developed		T43.1 D43.1, D43.2	43
	Activity 4: Participate in the general key sector stakeholder workshop at the end of the project		T43.2	43

Partner	Description of Demonstration Activities	Value € (total budget) including overheads (indirect costs)	Task/Deliverable	Work Package
	total	26,438		
19	Activity 1: Lead on assessment on the usefulness and limitations of protoypes focussed on water sector, energy sector, agriculture and forestry		T42.1, T42.8, D42.1	42
IPMA	Activity 2: If any of the four sectors above are selected as a case study; contribute to the benefit assessment report		T42.4, T42.5, D42.2	42
	Activity 3: Participate in sector-specific workshops and general workshop with stakeholders		T43.1, T43.2, D43.1	43
	Activity 4: Develop a mobile application to help stakeholders in one of the sectors defined above		T43.4, D43.4	43
	total	26,627		
20 WFP	Activity 1: Prototype of climate services for food security (using LEAP platform)		T42.1, T42.2, T42.4, T42.5, T42.6, T42.7; D42.1, D42.2, D42.3	42
	total	13,200		
22	Activity 1: Run a high visibility general workshop and public event		T43.2	43
FE	Activity 2: Establish active communication channel - Social media tools like twitter and podcasts		T43.3	
	Activity 3: Art and design innovation during development of the prototype(s)		T43.4, T43.4, T43.5, T43.6	
	Activity 4: Podcasts, videos, social media - linked to events programme		D43.3, D43.4, T43.4, T43.4, T43.5, T43.6	
	total	146,000		
23	Activity 1: Assist in the choice, development and evaluation of the climate service prototype		T42,1; T42,2; T42.4; T42.5; T42.6; T42.7;D42.3	42
EDF	Activity 2: Share experience and assist in communication with stakeholders and end-users; facilitate communication with stakeholders from the energy sector		T43.1; T43.2; T43.5; D43.1; D43.2	43
	total	37,165		
	Total	**2,156,955**		

B.2.4.2.5 Sub-contracting

Subcontracts are only planned for non-core tasks, which cannot be provided by partners (158,824€ - including audits). The sub-contracts will all be with institutions that are well connected with the appropriate partner and therefore have the full endorsement of their capability from these partners. However, they will be awarded under conditions of transparency and equal treatment. These sub-contracts are detailed in Table 2.4.4 below, and also listed in Part B.2.3.2.

Eight partners will be required to submit Certificates on the Financial Statements. Five partners have budgeted for costs for external auditors under 'sub-contracting' costs as listed in the table below. KNMI, Meteo-France and DWD state that the costs of external audit will not be charged to the project as they make use of their own government auditors.

Table 2.4.4: Sub-contracting Breakdown

Partner	Description of sub-contract	Value € (total budget)	Deliverable/ Activity (i.e., RTD)
3 ENEA	1. ENEA will sub-contract, to a well established SME, the development of a web targeted portal for stakeholder interaction. Technical support for these activities will also be provided through this sub-contract. ENEA will implement requirements for a targeted interactive web portal for stakeholder involvement for a European Climate User Interface.		D11.3 (RTD)
	total	15,000	
9 WU	1. WU plans to hire one or two individuals from an African institute for several months. They will support the active participation of one or two non-European (e.g. African) institutes in the identification of DMP relevant information and subsequent dissemination process of (especially seasonal) climate and impact forecasting products under RT4.		T41.3 (RTD)
	total	13,678	
11 IC3	1 and 2. IC3 plans to sub-contract the University of Montpellier - INSERM (Prof Jean-Marie Robine) and the University of Geneva (Prof François Hermann) to contribute a unique database of human mortality as explained in the description of the Health Case Study in WP 22. The universities will work with IC3 over one year to (i) update and calibrate the mortality database (M data); (ii) incorporate information on age, sex, health status, demography and societal adaptation capacity into the database; and (iii) impart their expertise on mortality and human physiology.		T22.2 (RTD)
	total	52,600	
22 FE	1. FutureEverything will sub-contract to third party developers to deliver web-based engagement tools, a design intervention, and marketing and documentation activities, within WP 43 and 44		WP43 and WP44 (DEM and RTD)
	2. A digital agency (or agencies) specialising in interactive data visualisation will be required to create online interaction and engagement and to deliver design solutions for disseminating project video and other media (Task 43.3).		T43.3 (DEM)
	3. An art-designer will supply specialist innovation around the prototype (Task 43.4)		T43.4 (DEM)
	4. A dedicated PR company will be used to provide press and PR services for the Public Event (Task 43.2)		T43.2 (DEM)
	5. A film company will support project documentation (Task 44.5)		T44.5 (RTD)
	total	50,000	
1 Met O	Audit		MGT
	total	9,000	
9 WU	Audit		MGT
	total	2,500	
11 IC3	Audit		MGT
	total	12,000	

Partner	Description of sub-contract	Value € (total budget)	Deliverable/ Activity (i.e., RTD)
14 UNIVLEEDS	Audit		MGT
	total	2,546	
15 SMHI	Audit		MGT
	total	1,500	
	Total	158,824	

B.2.4.3 Resources that will complement the EU contribution

The following contributions to EUPORIAS are 'in kind' and will therefore enhance the offering of the project:

- Considerable involvement during the full duration of the project by numerous stakeholders from across the EU countries;
- External collaborations from data centres (e.g. KMA) and other institutes (e.g. ICPAC, ACMAD);
- Computer costs for CPU time on super-computing facilities by the partners to run climate model simulations;
- The 27 person months of effort from AEMET as they will only be claiming their associated travel from the EC.

The Met Office, EDF and FutureEverything's requested rate from the EC for research activities is at 50%, therefore providing extra value for money.

B.3 Potential Impact

B.3.1 Strategic impact

B.3.1.1 Expected impacts:

1. *Improved preparedness, from seasons to years ahead, for the impact of variable climatic conditions, in particular for the occurrence of high-risk events.*
2. *Reduced costs of emergency interventions.*
3. *Better market preparation for the availability of climate-dependent products or services (e.g. agricultural products, energy distribution, transport services).*
4. *Improved business continuity and resilience of society to the impacts of climate variability and change.*
5. *New business opportunities for SMEs offering specialised climate services.*
6. *Contribution to the World Meteorological Organization (WMO) Global Framework for Climate Services.*

The main outcome of EUPORIAS will be the development and the delivery of robust and usable probabilistic predicitons of the impact of high risk events.

These predictions will focus on the water, energy, health, transport, food security, infrastructure, forestry and tourism sectors on timescales from seasons to years ahead.
EUPORIAS's tools will allow users to better understand high-risk climate patterns relevant to their sector, leading to enhanced business continuity through appropriate action being taken, thus making society more prepared and resilient to the impacts of climate variability and change. In turn, this will reduce the associated costs of emergency interventions.
As an example, tools created by the project (with the involvement of climate service developers, providers and users) will allow industries in the water, energy and transport sectors to assess the impacts of a change in high-risk weather events, such as flooding, winter storms, heatwaves or droughts. This will improve preparedness for these events, such as through modifying investment plans and reviewing contingency plans.
Furthermore, it will encourage engagement with emergency responders and set realistic expectations about the level of confidence available through S2D climate services.
Similarly, the health and food security sectors will be able to use project tools to inform their medium term (seasons to years ahead) responses to changes in airborne disease patterns, heat waves, etc. This will allow them to make better informed decisions while preparing their services, informing aspects such as staffing, infrastructure, product development and preventative measures.
Coping with climatic conditions need not always be measured in risks but may also present opportunities. Businesses, Governments, NGOs, and society can all be more resilient and responsive to variability and change of the climate. The end result will be a strong climate service market within Europe, as well as further afield, offering the opportunity for SMEs to capitalise on improved tools for management of weather and climate risks.
EUPORIAS will also present the opportunity for European-wide, cross-sector initiatives to be developed, and coordinated responses created across multiple agencies. Further to this, on the basis of the climate service prototypes, EUPORIAS will assess how climate services in Europe could provide new business opportunities for SMEs and establish the main limiting factors inhibiting their market penetration.

B.3.1.2 Other national and international research activities

EUPORIAS will take account of national and international research activities which are underway to address the science of seasonal-to-decadal (S2D) forecasting since S2D forecasting capability is the basis of the services to be provided.

Contribution to the WMO GFCS

The WMO GFCS and the EUPORIAS consortium have strong links. Members of WMO Task Teams engaged in developing the GFCS implementation plan are included in the consortium. A representative of the GFCS will be on the project Advisory Board, sit on the stakeholder group and will be invited to attend project meetings. The GFCS sees National Met Services (NMSs) at the centre of the implementation of the Global Framework, with a key role at the national and regional level, and in some cases at the global level, along with other climate-related institutes. The EUPORIAS consortium has very strong European NMS representation as well as key European institutes involved in climate and climate impacts activities. EUPORIAS is therefore a natural focus for Europe's role in WMO's GFCS.

In addition, two of the partners (Met Office and Meteo France) are WMO Global Producing Centres for long range forecasts, as is the Korean Meteorological Administration (KMA) who will be an affiliated partner to the project.

The GFCS has identified five main components of the global framework. EUPORIAS will directly deliver into the three of these that are most relevant to the provision of climate services from the user perspective:

1) A user interface platform as a means for users, climate researchers and climate service providers to interact (through the activities in RTs 1 and 4);

2) A climate services information system, needed to distribute climate information according to the needs of users (through the activities in RTs 2 and 3 as well as WPs 42 and 44);

3) Building capacity to support the development of institutions and infrastructure to provide effective climate services (through the activities across the entire project, and in particular in RT 4).

EUPORIAS will also contribute to the other two components of the GFCS through interaction with other initiatives addressing these specific items. EUPORIAS will strongly inform and influence the research, modelling and prediction component of the GFCS to promote the needs of climate services within research agendas.

World Climate Research Programme, Coupled Model Intercomparison Project, CORDEX, IPCC

The World Climate Research Programme (WCRP) is a well-established international activity, to which many EUPORIAS partners contribute. Under WCRP, the Working Group on Coupled Modelling (WGCM[3]) established the Coupled Model Intercomparison Project (CMIP) as a standard experimental protocol for studying coupled Global Climate Models (AOGCMs). CMIP provides a community-based infrastructure in support of climate model diagnosis, validation, intercomparison, documentation and data access. WGCM now sponsors the fifth phase of the Coupled Model Intercomparison Project (CMIP5) which will be the main international modelling contribution to the IPCC 5th Assessment Report. For the first time CMIP5 includes an experiment protocol addressing near-term climate prediction. Following this protocol, the international GCM groups have produced an extensive set of ensemble hindcasts, covering the period 1960-2010, as well as a number of initialized climate predictions out to 2035. All CMIP5 data is openly available to the international research community in a common format, constituting a unique data set to investigate climate predictability. Six of the EUPORIAS partners (Met Office, Meteo-France, SMHI, KNMI, IC3 and IPMA) have contributed CMIP5 decadal predictions using 3 different GCMs (HadGEM, ARPEGE and EC-Earth) and therefore have extensive experience of the CMIP5 decadal prediction protocol. An important future requirement for WCRP, clearly enunciated at both the WMO Third World Climate Conference and the WCRP Open Science Conference, is that future WCRP research more clearly targets the needs of user groups, such as those represented in EUPORIAS. The close interaction between climate prediction scientists and a large body of stakeholders in EURPORIAS will provide important feedback to WCRP on the potential practical utility of the CMIP5 decadal predictions. Such feedback will be critical in the development of future coordinated experiment protocols that clearly address the needs of important user groups.

In 2008, WCRP initiated the Coordinated Regional Downscaling Experiment (CORDEX). One of the main activities of CORDEX has been the coordination of international efforts to downscale CMIP5 GCM projections to high regional resolution, covering all land areas of the globe. This downscaling effort is intended to provide a link between CMIP5 GCM simulations and the needs of regional impact, adaptation and vulnerability (IAV)

[3] SMHI and Met Office are represented in WGCM by Colin Jones (WP leader) and Cath Senior respectively.

practitioners. CORDEX has taken a leading role within WCRP with respect to developing collaboration between the climate science community and IAV researchers. Furthermore, CORDEX is actively engaged in capcity building in a number of developing regions of the world, where trans-disciplinary groups have been formed to evaluate and use, in practical applications, CORDEX simulated data. Colin Jones (SMHI) co-leads CORDEX and is also WP 21 leader in EUPORIAS. As with CMIP5, feedback from EUPORIAS will be important in further development of regional downscaling activities in both CORDEX and wider WCRP activities.

EUPORIAS partners are also members of the WCRP Working Group on Seasonal to Interannual Prediction (WGSIP) where the Met Office (co-chair with Adam Scaife), IC3 and Meteo-France are represented. WGSIP is the main international body organizing coordinated GCM simulations on seasonal timescales, such as the Seasonal Prediction Intercomparison Project (SMIP) under the WCRP Climate-system Historical Forecast Project (CHFP). EUPORIAS partners contribute simulations into SMIP that will be important data within the project. Feedback from EUPORIAS, in terms of practical utility of SMIP/CHFP simulations, will help direct WGSIP acitivities towards the user communities.

Other International Activities
ECLISE (led by KNMI) is a European effort in which researchers, in close cooperation with users, develop and demonstrate local climate services to support climate adaptation policies. The central objective of ECLISE is to take the first step towards the realisation of a European Climate Service. Although ECLISE focuses more specifically on climate change adaptation than EUPORIAS, the two projects have areas of complementarity, particularly with respect to helping user communities best utilize climate model simulated data in their practical arenas. KNMI will provide the necessary link between the two projects, ensuring maximum cross-benefit is achieved.

CLIM-RUN (led by ENEA) aims at developing a protocol for applying new methodologies and improved modelling and downscaling tools to provide climate information at regional to local scale that is relevant to and usable by different sectors of society (policymakers, industry, cities, etc.). Unlike EUPORIAS, the focus of CLIM-RUN is almost exclusively on the Mediterranean and only partially cover the seasonal time scale. Paolo Ruti, who coordinates CLIM-RUN, is also the WP leader of WP 11 in EUPORIAS and will ensure the two projects can benefit from one another.

EU COST Action ES1102 VALUE Validating and Integrating Downscaling Methods for Climate Change Research. The project started on 12.12.2011 and will end 11.12.2015. UC, KNMI, SMHI, and MeteoSwiss are participating in this Cost Action. While this cost action focuses on a different time scale, i.e. 30-100 years it potentially serves EUPORIAS by providing methods for downscaling and bias correction techniques and algorithms.

Circle-2 Joint Initiative on Climate Uncertainties: http://www.circle-era.eu/np4/P_UNCERT.html is led by Dessai and Challinor who are both partners in the project and will provide useful insights for the WPs in CCT3.

European Research Council Starting Grant: ICAD (Advancing Knowledge Systems to Inform Climate Adaptation Decisions): Suraje Dessai (PI) will act as a liaison officer between the two projects.

ETC-CCA European Topic Centre on Climate Change impacts, vulnerability and Adaptation (http://cca.eionet.europa.eu/ Dessai) can potentially take advantage from some of the climate services developed here.

EU JPI: Food, Agriculture and Climate ChangE (FACCE) will benefit from some of the development in WP 23 and will be informed by Challinor who is part of JPI team.

National Activities
At the national level EUPORIAS will link with a number programs on climate adaptation and service provision, for example:

UK the UK's Climate Change Risk Assessment will provide useful inputs into the vulnerability analysis; the UK Climate Impacts Programme can benefit from some of the development of

	downscaling methodologies and from the assessments of climate impact uncertainty; EQUIP end-to-end quantification of uncertainty for impacts prediction will inform some of the activities of WP 31; ARCC-Water adaptive and resilient water systems will use some of the results emerging from the case study on water; Centre for Climate Change Economics and Policy will use some of the results of WP 33 and WP 41.
Netherlands	Knowledge of Climate -a large programme to climate-proof the nation- in which both WU and KNMI are major partners can benefit from some of the results of EUPORIAS
Spain	National Plan for Climate Change Adaptation. UC has developed regional climate change scenarios "Escenarios-PNACC 2012" to be used in the different impact studies in Spain. Some of the development in the downscaling technique will inform such a plan CISCLIMA joint centre for climate services (IPMA and AEMET). The common portal of climate change data display and the development of Iberian indices of climate change are some of the actions of these centres that can potentially be informed by EUPORIAS.
Portugal	Both REWRITE and AMIC (funded by the Portuguese Science Foundation and led by IPMA and UL-IDL), 2009-2012, can provide insight on model developments for regional climate change to EUPORIAS. The cmmittee on the National Strategy for Adaptation will be informed by IPMA and UL-IDL through the Portuguese Climate Change Office of the development achieved by EUPORIAS in the field of impacts assessment on S2D scale.
France	DRIAS project (GICC funded - Gestion et Impact du Changement Climatique) is the French platform for accessing the Climate Change regional scenarios over France (Lémond et al. 2011). It can potentially include information developed by EUPORIAS
Germany	MiKlip (via DWD) is a German project on decadal predictions started at the end of 2011 and funded by the national research ministry of Germany. In contrast to EUPORIAS, MiKlip focuses rather on the model development itself, its regionalisation and validation. MiKlip can benefit from the work of EUPORIAS as it could probably take advantage of the development of the user interface through which climate services will be delivered while EUPORIAS can benefit from the use of some of the advanced tools developed within MiKlip http://www.fona-miklip.de/en/index.php
Denmark	HYACINTS: HYdrological Modelling for Assessing Climate Change Impacts at differeNT Scales (HYACINTS) to develop new methodologies and tools to enable easier and more accurate use of regional scale climate and hydrological models to address local scale water resources problems. The project – through DHI - can be informed by some of the development occurring in WP 21.
Sweden	Climate and Vulnerability Inquiry (Government). Each county administration were to appoint a designated climate adaptation coordinator to assist and promote local adaptation work. SMHI was tasked with providing expert support and providing regionalised climate change information. This body of knowledge acquired through this Swedish project will be important in the definition of some of EUPORIAS case studies. National climate adaptation network: SMHI is the expert node and coordinator of the project and can feed back into it any development that will occur in EUPORIAS. SMHI coordinate three additional projects will feed back the development on impact modelling that will occur in EUPORIAS. These three projects are Mistra-Swecia (cross-disciplinary adaptation including land use/forestry), ADSIMNOR (Arctic impacts) and HYDROIMPACTS (hydrological impacts).

B.3.1.3 Steps needed to bring about impacts

There are several critical steps needed to achieve the above impacts:

- Strong engagement with the forecast providers and the users/decision makers.
- Joint development of reliable and useful climate services and tools, sharing knowledge to develop and promote the technologies created within the project.

- Use of innovative communication mechanisms drawn from the arts and humanities sectors to ensure that information reaches the final users and is used by them in the most effective manners.
- A clear public engagement strategy to ensure that others can follow the steps of what is developped in the project and develop their own climate service
- An assessment of the marketability of this services in Europe

This engagement and ethos of joint development are at the heart of the project, running through the Research Themes and through the composition of the project consortium and the strong and much wider stakeholder engagement (WP 11, WP 12, WP 33, WP 41, and WP 43). There will be close interaction between service providers and stakeholders to improve the users' understanding of their vulnerability to varying climatic conditions (RT1). This will in turn increase their willingness to use these tools and improve their decision- making and ultimately the preparedness and resilience of society to the impacts of climate variability and change. One key assumption here is that it will be possible to develop tools that are of use to decision makers. This assumption seems realistic since some climate services are already being provided to decision makers, but the users are demanding better services and the project's Work Packages have been developed to tackle the issues that users are demanding. WP 43 will sepcificaly address this question.

The stakeholders are fundamental to the overall success of this project. We expect them to play an important role in the dissemination of the results through their own channels and in this way provide a long-term legacy from the project. While we do expect the composition of the stakeholder board to be decided during the first phase of the project, we have already identified a number of stakeholders who are willing to support the project. While the interested reader can find a complete list in the annex, it is worth stressing here that these committed supporters include energy companies, regional water authorities, road and energy network operators, a regional tourist council, wine producers, regional forestry commissions, multinational corporations and reinsurance companies.

In addition, the project intends to make an impact on the GFCS. As described above, the project will be leading the way internationally in developing tools and techniques for the provision of climate services at national, regional and global levels, just at the time when the GFCS is aiming to begin its implementation (from 2013 onwards).

European approach

This project requires a Europe-wide approach for the following key reasons:

- As demonstrated by the central European floods of summer 2002 and the winter of 2010/2011, the impact of climate variability transcends national borders. This supports the approach that adaptation responses need to be common at least throughout Europe. By providing a set of common tools that EU businesses can use and by delivering targeted climate services EUPORIAS will effectively promote a common approach to climate risk management across the continent.
- A European approach will benefit the project and the Seventh Framework Programme, by utilising key expertise and knowledge in the S2D field. Currently, this is being developed across Europe in semi-isolation. This project will allow researchers to collaborate and share knowledge in a structured manner, demonstrating value to stakeholders and enabling faster exploitation of the results.

B.3.1.4 Potential areas and markets of application

EUPORIAS will increase the use of seasonal predictions within the European business community. The tools developed in the course of the project will provide the building blocks necessary for SMEs and larger companies to develop targeted climate services. Furthermore, the project will provide a set of end-to-end climate services to be used as working examples of the way seasonal to decadal climate predictions can be generated, processed, presented and linked into the decision chain of different stakeholders (WP 42). Given the constraints of a four year project, EUPORIAS will focus on a manageable set of climate impact prediction systems, using stakeholder case studies (RT2). These will be chosen based on a combination of good seasonal prediction skill, strong linkages between climate forcing and impacts and the stakeholder decision-making process. Sectors/case studies that are not selected for the development of a full service, will also benefit from this exercise. RT1 will inform stakeholders of the current capability of the S2D prediction systems while at the same time gaining important insights into users' needs and information gaps. Both of these aspects will be essential in informing the development of the European climate services market.

There are several barriers which could prevent SMEs from entering into the climate service markets, such as data availability; reliability and useability of the impact prediction; a knowledgeable set of customers able to value and

use the information provided. EUPORIAS will address these barriers and provide the community with a better understanding of users' needs which will provide a way to improve S2D prediction systems.

B.3.1.5 Potential advantages of the resulting technologies

EUPORIAS offers a significant advantage beyond the projects and services available today. Previous projects have adopted a science-led approach, focusing on climate prediction uncertainty and its communication. EUPORIAS is taking the opposite approach, viewing the issue from a user perspective. This fundamental difference will ensure that:

- Users are involved throughout the project, resulting in a relevant and useable prototypes, which the users are already engaged with, and which can fit easily into their exsisting activity protfolio.
- Users will understand the benefits of further developing the tools.
- EUPORIAS will provide an assessment of the whole uncertainty chain in impact modelling operating on a S2D scale.
- a preferred way of combining uncertainty estimates in climate models with impact model uncertainty, something that has never been systematically done before, will be identifued.

B.3.2 Plan for the use and dissemination of foreground

B.3.2.1 Dissemination and exploitation of the results

Measures proposed for Dissemination

There are three work packages specifically aiming at disseminating and exploiting the results, i.e. through the climate impact prototypes developed in WP 42, stakeholder engagement in WP 43 and delivery tools in WP 44.
In addition several European and international projects/initiatives will take advantage of the EUPORIAS outcomes increasing the impact of the project:

- **European and international scientists**: Regional research projects, such as EUROSIP for seasonal to interannual forecasting; the contribution to the GFCS Climate Services Information System for the European and Mediterranean regions; PRESANORD (WMO initiative for regional seasonal forecast and climate outlook over North Africa); the World Climate Applications and Services Programme (WCASP) fostering the effective application of climate knowledge and information for the benefit of society and the provision of climate services, including the prediction of significant climate variations both natural and as a result of human activity; the Climate Information and Prediction Services (CLIPS) project, which is an implementation arm of WCASP around the globe.
- **Political decision-makers**: Ministries responsible for environmental and energy issues, local and regional authorities, European Commission (particularly DG Research and Innovation, and DG Environment), UN agencies on Civil Protection, European Environment Agency
- **Private sector**: This project will raise awareness of the different ways that climate information can support business sectors and initiatives. The main sectors will be Energy, Tourism, Water, Forestry, Health and Transport.

The following dissemination methods will be used:
a) Website: Development of a front-end web climate service as a multi-user platform with several levels of information and connected to the project database. This web portal will be the main project tool for:

i) integrating the different levels of information and tailoring the dissemination to different categories of stakeholders (policy makers, business stakeholders, etc);

ii) an on-line survey to extend the number of stakeholders beyond the case-study level;

iii) further internal and external project communication (web communication tools, blogs);

iv) e-learning tools (training on-line, interactive material etc).

This objective will be supported by a cross-WP group for website, data and other IT issues. The specific tasks will be to prepare a multimedia handbook on climate information for stakeholders and organize e-learning courses based on the training workshops developed within the project.
Search engine optimisation and a well defined cross linking strategy for the web site will be some of the tools explored as to increase web reach.Web and e-portal activities will be coordinated with similar efforts already underway at the European level, such as the IS-ENES climate modelling portal (https://verc.enes.org/), where both

KNMI and SMHI play an active role and the ENSEMBLES downscaling portal hosted by the University of Cantabria (https://www.meteo.unican.es/downscaling/ensembles).

b) Workshops: This project is based on the two-way interaction between stakeholders and climate experts; the workshops are one of the main tools as detailed in WP 43 and in the description of the case-studies methodology.
The project will provide extensive opportunities for advanced on-the-job training at the doctoral and post-doctoral level across a wide range of disciplines in seasonal-to-decadal forecasts and downscaling, advanced statistical methods, applications in relevant economic sectors and data mining. The project will have a strong focus on the development and training of a new professional expertise lying at the interface between climate science and stakeholder application. A summer school will be organised and managed by WP 4 to give junior scientists an opportunity to learn about the science of climate services.

d) Reports and reviews. These will be produced for audiences including scientists, other related EU research project leaders and stakeholders. Two types of report will be produced:

i. Web reports of key findings from the workshops
ii. Published reports and popular publications on paper and on the web;

Reports and reviews will be accessed through the website where they will provide a rapid and dynamic means of communicating key findings. Where appropriate, an opportunity for comments to be made could be provided, thus engaging a wider audience. Where the findings are of sufficient significance or novelty they will be published more formally. These published reports will form a more permanent record of the key findings of the project and will ensure they can be fully referenced by other researchers.

e) Electronic newsletters. These will be available via the project website. In addition, copies will be sent to key individuals and organisations identified by WP Leaders and Stakeholder Group. The project will contribute regular features on key issues and findings. The e-newsletters will contain news of other relevant research and meetings. In addition, stakeholders and users will be encouraged to contribute material to the newsletters, such as 'opinion pieces'.

f) Publications. These will be produced for the research community and informed stakeholders. Significant reviews or new findings will be prepared as research papers for submission to academic journals. Peer reviewed papers will be submitted to academic journals and user friendly, illustrated reports will be made available through the internet and in print so that EUPORIAS influences S2D prediction and climate service practices throughout Europe and the world.

Public awareness will be raised through popular publications on paper and the web.

Dissemination Media	**Purpose with respect of the project objectives**	**Measures of success of dissemination strategy**
Web portal	• Exchange results within the project consortium and through stakeholder group. • Describe the project, its partners and its outputs to a large public audience • Summarise findings in a form understandable to end users (guidelines, operative manual) • Information about upcoming events • Host blogs and forums that will keep track of progress of activities • Link to scientific publications from the consortium	• Monitoring website traffic through analytics. • Number of responses on blogs and forums. • Analysis of participation at events resulting from the website.
Electronic newsletters	• Presentation of the project progress and achievements.	• Feedback from readers. • Requests for diffusion of the

Dissemination Media	Purpose with respect of the project objectives	Measures of success of dissemination strategy
	● Presentation of partners. ● Presentation of WP outputs. ● Summary of conclusions and recommendations from the stakeholder workshops. ● Information about upcoming events.	electronic newsletter.
Articles in scientific and popular journals	● Presentation of the project methodology and results to the scientific community. ● Evaluation of scientific quality of the project. ● Interaction with the scientific community.	● Number of scientific publications. ● Citation index. ● Feedback with referees.
Stakeholder workshops	● Presentation of the project goals and achievements. ● Discussion of national stakeholders' needs. ● Discussion of adaptation strategies and emergency responses. ● Assessment of the project outputs and further recommendations. ● presentation/discussion of climate projections - particularly with respect to issues relating to confidence, uncertainty, reliability, robustness.	● Number of participants. ● Stakeholders feedback. ● Feedback on the dissemination strategy. ● Interest on the project achievements and use of the project products.
Training	● Intensive training on relevant topics to provide useful climate information to stakeholders ● Discussions with end-users on the developed tools (for instance, visualisation tools)	● Use of the project tools and products by stakeholders for emergency preparedness ● User feedback ● Dissemination of the developed tools and products to the wider user community (external survey)
Participation to scientific conferences	● Presentation of the project methodology and results to the scientific community ● Evaluation of the scientific quality of the project ● Interaction with the scientific community	● Participant feedback ● Interest in the project results and products ● Interest of junior scientists through involvement in the project as a PhD student or postdoc
International conferences	● Presentation of the project goals and achievements to scientists, national and international stakeholders and policy makers ● Promotion of results to a large community of potential users of the project products ● Discussion on the use of the project products and on future recommendations	● Number of participants ● Implications for international institutions and policy makers ● Participant feedback ● Reports and proceedings ● Integration of the project outputs

B.3.2.2 Management of Intellectual Property

The Consortium partners in the EUPORIAS project appreciate that properly managing intellectual property used and generated during the project shall be key to its overall success. The Partners shall adopt a strategy that encapsulates the guiding principles of FP7 and a suite of management protocols to deliver the objectives within that strategy. Furthermore, everything agreed by the partners will be consistent with the General Conditions of the FP7 Grant Agreements dealing with Intellectual Property. The SIMG will oversee compliance and ensure the protocols are fully integrated within all the activities undertaken by the project. The overall aim will be to maximise all developed intellectual property to its fullest extent to achieve maximum benefit for and on behalf of the stakeholders.

The Management Board will be the owner and the SIMG will be the Steward of all foreground intellectual property. The SIMG will identify foreground intellectual property, protect it in line with the partners' protocols and, thereafter, steward its future use. The SIMG will deal with all contentional issues that may arise during the lifetime of the project.

Background intellectual property will be catalogued and distributed under licenses to the partners who require it for use or development. Derived intellectual property will be handled in accordance with the agreements reached by the partners. Each of the partners will have the right to exclude specific pre-existing know-how from the other partners access, as far as the restrictions are announced before the signature of the funding contract or before the effective joining of a new partner. The procedure to handle these cases will be settled in the Consortium Agreement.

Foreground intellectual property will be identified at the point of creation and steps taken to ensure its protection. Partners will respect their individual Intellectual Property Rights. In the event of an invention being the work of a single partner of the project and solely the result of individual intrinsic skills rather than shared knowledge, this partner will be the exclusive owner of the results, subject to granting access rights to the other partners where necessary for their execution of the project or to the use of their own results. The conditions will be fixed in the Consortium Agreement. For the case in which the designated owner of the results waives its option to start registration proceedings the SMIG will follow a proceedure outlined in the Consortium Agreement to allow other project partners the opportunity to obtain or maintain such protection. All foreground Intellectual Property will be catalogued and made available under license. Interdependencies will be noted and cross referenced for ease of future use. Protocols will permit the use of background and foreground intellectual property together where interoperability is crucial to its optimised use.

The SIMG will be tasked with dissemination of foreground intellectual property, having due regard to the legitimate interest of each beneficial partner. The partners will provide unfettered access to as much of the foreground intellectual property where legitimate interests are not compromised. At all times the requirement of the FP7 Grant Agreement will be the minimum standard for the project to work under. All published work will contain reference to the research funding leading to the results.

Access rights will be considered on a case by case basis and where appropriate after consultation with the partners concerned.

All records will be maintained electronically, both locally and centrally (by the SIMG), providing reconcilable audit trails for the Commission.

IPR awareness training can be given for personnel working on the project; and the partners' legal teams will be engaged to provide support and advice on IPR matters.

B.3.2.3 Measures proposed to increase the likelihood of market update of project results

EUPORIAS is a big demonstration experiment whereby the technology associated with tools based on S2D predictions is made useful to stakeholders through the impact models and communication strategies tailored to their needs. Two work packages, namely WP 42 and WP 43, are flagged as demonstration activities and will provide plenty of opportunities to engage with the stakeholders about the climate service prototypes developed here. The project will put great attention in managing the project-stakeholder relationship (e.g. WP 11, WP 12) and will develop an effective communication protocol to make impact predictions effectively usable by stakeholders (e.g. WP 33 and WP 41). This will put SMEs and larger enterprises in Europe in a unique position to take full advantage of any emerging commercial possibilities associated with S2D climate services. Finally WP 45 will provide useful insights and recommendations on the best way to approach new opportunities.

B.4 Ethics Issues

The nature of the research proposed under this project means that there are very few ethical issues. The proposed research will be looking at the impacts of climate related risks, allowing decision makers to make better informed decisions for their industries.
There will be no research undertaken that requires the conduct of experiments using humans, human tissue, human embryos, human foetuses or animals.

The project will be undertaking research that will involve gathering data on healthy adult volunteers.This means that there will be an impact on the privacy element of the ethics requirements of the European Commission. All research information will be gathered in accordance with guidelines laid down by the European Commission, and in accordance with Leeds University ethics guidelines
http://researchsupport.leeds.ac.uk/index.php/academic_staff/good_practice/university_ethics_policies/
Ethics will be managed as part of the overall project management as detailed in Section 2.1

B.4.1 Users' survey and interviews

Participants will be recruited by invitation (by e-mail, phone or in person).

B.4.2 Consent

Before participants take part in the questionnaire survey, they will be provided with an introduction sheet explaining the study and their right to confidentiality. In addition, they will be required to sign (or initial) a 'Consent Form' which will outline the following:

- Participation is completely voluntary.
- They are free to withdraw at anytime.
- Questionnaires will be destroyed upon completion of the study,
- Any raw data used for results will be kept in secure storage.
- The answers provided may be published, but their anonymity will be maintained.

These consent form will be stored separately from the questionnaires.

B.4.3 Interviews

At the start of the interviews, the investigator will explain the study and the confidentiality.
Participants will be asked if the interview can be tape recorded.

The survey will collect answers about information needs for adaptation decision-making and the organisation (e.g. position within organisation). Limited personal questions will be asked.,
Information recorded from this format will be given an identification code, not the participants' name. Participants contact details will be deleted upon completion of the study or upon request. Audiotapes will be heard solely by the project team and not passed on. All identifying information will be deleted from the questionnaires and tapes where possible.

The Partners undertaking this work (UNIVLEEDS) have sought ethical approval for the collection of data from their Research Ethics Committee, and this approval has been granted.

B.4.4 Declaration of any Ethics Issues

	Research on Human Embryo/ Foetus	YES	Page
	Does the proposed research involve human Embryos?	***No***	
	Does the proposed research involve human Foetal Tissues/ Cells?	***No***	
	Does the proposed research involve human Embryonic Stem Cells (hESCs)?	***No***	
	Does the proposed research on human Embryonic Stem Cells involve cells in culture?	***No***	
	Does the proposed research on Human Embryonic Stem Cells involve the derivation of cells from Embryos?	***No***	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	***Yes***	

	Research on Humans	YES	Page
	Does the proposed research involve children?	***No***	
	Does the proposed research involve patients?	***No***	
	Does the proposed research involve persons not able to give consent?	***No***	
	Does the proposed research involve adult healthy volunteers?	***Yes***	WP 33
	Does the proposed research involve Human genetic material?	***No***	
	Does the proposed research involve Human biological samples?	***No***	
	Does the proposed research involve Human data collection?	***Yes***	WP 33
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	***No***	

	Privacy	YES	Page
	Does the proposed research involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	***Yes***	WP 33
	Does the proposed research involve tracking the location or observation of people?	***Yes***	WP 33
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	***No***	

	Research on Animals1	YES	Page
	Does the proposed research involve research on animals?	***No***	
	Are those animals transgenic small laboratory animals?	***No***	
	Are those animals transgenic farm animals?	***No***	
	Are those animals non-human primates?	***No***	
	Are those animals cloned farm animals?	***No***	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	***Yes***	

	Research Involving non-EU Countries (ICPC Countries2)	YES	Page
	Is any material used in the research (e.g. personal data, animal and/or human tissue samples, genetic material, live animals, etc) : a) Collected and processed in any of the ICPC countries?	***No***	
	b) Exported to any other country (including ICPC and EU Member States)?	***No***	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	***Yes***	

	Dual Use3	YES	Page
	Research having direct military use	***No***	
	Research having the potential for terrorist abuse	***No***	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	***Yes***	

B.5 Consideration of Gender Aspects

Approximately 26% of the scientists named by the partners as working on EUPORIAS are female. Three out of the 17 WP leaders and co-leaders are female. This is a not particularly high proportion, but does indicate that females are an integral part of the EUPORIAS project.

The Consortium is aware of the importance of attracting more high quality female researchers into the sphere of scientific research. EUPORIAS will ensure it acts upon the EC recommendation through the FP7 'Science in Society Programme' to stimulate young people to take on science studies, and promote the progress of women in scientific careers. (http://ec.europa.eu/research/fp7/index_en.cfm?pg=society: FP7 'Science in Society' Programme). EUPORIAS will support equal participation between men and women within all activities of the project; whilst complying with legislation concerning gender equality. Although no gender issues relating to subject matter are expected in connection with this work, actions will be undertaken during the course of the project to promote and ensure gender equality in EUPORIAS.

B.5.1 Present Consideration of Gender Aspects by the Consortium

Many of the partners in EUPORIAS have gender action plans at the institutional level as part of their commitment to gender equality. These include programmes to raise awareness of the issues involved in gender equality, commitments to family friendly work practices and career breaks, and provision of child-care facilities.
Organisational initiatives to encourage gender equality have high-level support within partner institutes. For example, the Met Office has an ongoing equality training programme, co-ordinated at Executive level, which is mandatory for all staff. In fact, the number of female employees at the Met Office has increased from 22% in 2007 to 25% in 2009.

B.5.2 Management of Gender Aspects

The promotion and monitoring of gender equality throughout the project will be the responsibility of the SIMG (see Section 2.1), through a specifically created project Gender Aspects Management Team. One of the first actions of the Team will be to produce a Gender Action Plan (GAP), which will be fully communicated to partners. The Team will be responsible for ensuring the GAP is applied throughout the project, and that a process is followed for monitoring gender equality. The GAP will encompass both internal and external participants, stakeholders and those involved in surveys and trials.
The Gender Action Plan will:

- Encourage recruitment of women at equal scientific merit; all job advertisement will state the project's commitment to equality and to a family-friendly working environment;
- Help the participation of women/working parents by utilising modes of communication that do not involve the necessity to travel (i.e. e-conferencing);
- Ensure all partners encourage flexibility in the working hours of individuals involved in project;
- Ensure all the consortium are aware of EU gender legislation, including advertising gender equality on internal EUPORIAS website.

The SIMG will encourage all partners to promote training opportunities to their project participants (for example, the EC Research DG conducts training on understanding the gender aspects within scientists' research fields).
An Annual Gender Action report will be produced by the Project Manager which will detail the extent to which actions promoting gender equality have been performed, and the levels of gender participation at all levels of the project, including the Management Board level.

APPENDICES

Appendix 1: References

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Appendix 2: Glossary of Terms/Acronyms

A

AEMET: Agencia Estatal de Meteorologia
AGU: American Geophysical Union
AMMA: African Monsoon Multidisciplinary Analysis
ANI: anomaly initialisation
ANM National Meteorological Administration (Meteo-Ro)
AFD: **A**gence **f**rançaise de **d**éveloppement
AR4: IPCC Assessment report 2007
AR5: IPCC Assessment report 2013

B

Balt-HYPE model: **Balt**ic Sea basin-wide **HY**drological **Predictions** for the **E**nvironment model
BBC: British Broadcasting Coorporation
BIS: UK Government Department for **B**usiness **I**nnovation and **S**kills
BONUS: EU FP6 project focussing around the Baltic Sea

C

SC2SM: Swiss Centre for Climate Systems Modelling
CAMAC: **C**omputer **A**utomated **M**easurement And **C**ontrol, DeSurvey; FP6 project contributing to the implementation of the actions 'Mechanisms of desertification' and 'Assessment of the vulnerability to desertification and **early** warning options' within the 'Global Change & Ecosystems priority'
CBS: **C**ommission for **B**asic **S**ystems (WMO)
CCAFS: **C**limate **C**hange, **A**griculture and **F**ood **S**ecurity
cCASHh: Climate Change And Adaptation Strategies For Human Health project
CCCEP: Centre for Climate Change Economics and Policy
CCl: **C**ommission of **Cl**imatology (WMO)
CcSP: Climate Change Science Programme
CCT: Cross Cutting Theme
CCI: Climate Change Initiative
CECILIA: FP6 project: Central and Eastern Europe Climate Change Impact and Vulnerability Assessment
CEHAPIS: Climate, environment and health action plan and information system
CFU: Climate **F**orecasting **U**nit
CGMS: Crop Growth Monitoring System
CGS: Climate change, Green health service and Sustainable development, WHO, Regional Office for Europe
CHA: Clearinghouse Adaptation
CII: Climate Information Indices
CIRCE: Climate change and impacts research
CIRCLE2: a European Network of 34 institutions from 23 countries committed to fund research and share knowledge on climate adaptation and the promotion of long-term cooperation among national and regional climate change programmes.
CISCLIMA: Iberian Centre for Climate Change Services
CLIMRUN: FP7 project: Climate Local Information in the Mediterranean region: Responding to User Needs
CLIPS : **Cl**imate **I**nformation and **P**rediction **S**ervices (WMO)
CLIVAR: CLIVAR is the World Climate Research Programme (WCRP) project that addresses Climate Variability and Predictability, with a particular focus on the role of ocean-atmosphere interactions in climate. It works closely with its companion WCRP projects on issues such as the role of the land surface, snow and ice and the role of stratospheric processes in climate.

CNRM : **C**entre **N**ational de **R**echerche **M**étéorologique (National Centre for Meteorological Research - MF)
CNRS: Centre **n**ational de la **r**echerche **s**cientifique
CMIP5: Coupled Model Intercomparison Project, Phase 5
CM SAF CDOP 1 and 2: Satellite Application Facility on Climate Monitoring
COMBINE: EU FP7 project;
CO-PI: Co-Principle Investiator
CORDEX: **CO**ordinated **R**egional climate **D**ownscaling **E**xperiment - WCRP-sponsored program
CORFU: FP7 Project, Collaborative Research on Flood Resilience in Urban areas
COSMO: DWD operational regional numerical weather forecasting model (**CO**nsortium for **S**mall-scale **MO**delling)
COSMO-CLM: Regional climate model based on COSMO
COST: European Cooperation in Science and Technology
COST 730 – Project - Towards a universal thermal climate index UTCI for assessing the thermal environment of the human being
COST ES0601 – Project - Advances in homogenisation methods of climate series
CPU: **C**entral **P**rocessing **U**nit
CPVD: Spanish Centre for forecasting services to Defence
CSIC: Spanish National Research Council
CSRP: Climate Science Research Partnership
CSP: **C**limate **S**ervices **P**artnership
CUIP: Climate User Interface Platform

D
DClim : **D**irection de la **Clim**atologie (Climatology Department - MF)
DD: Dynamical Downscaling
DEMETER - FP5 project
DENFREE: FP7 Project Dengue research Framework for Resisting Epidemics in Europe
DG SANCO: Directorate-General for Health and Consumers
DMP: **D**ecision **M**aking **P**rocess
DP: Downscaling Portal
DRIAS : **D**onner accès aux scénarios climatiques **R**égionalisés français pour l'**I**mpact et l'**A**daptation de nos **S**ociétés et environnements (Providing access to French Regional climate scenarios for Impact and Adaptation of our Societies and environments)
DSS: **D**ecision **S**upport **S**ystem
DWD:
DYNAMITE: FP6 Project - Understanding the Dynamics of the Coupled System

E
E-HYPE model: (Hydrological Predictions for the Environment – Europe) model
E-OBS: ENSEMBLES daily gridded observational dataset for precipitation, temperature and sea level pressure in Europe
EC: European Commission
ECA&D: European Climate Assessment & Dataset
EC-EARTH: developing a European Earth System model based on ECMWF modelling systems
ECOMET: Economic Interest Grouping of the National Meteorological Services of the European Economic Area
ECMWF : **E**uropean **C**entre for **M**edium-Range **W**eather **F**orecasts
ECLISE: FP7 collaborative research project: **E**nabling **CL**imate **I**nformation **S**ervices for **E**urope
ECOMET: Economic Interest Grouping of the National Meteorological Services of the European Economic Area

ECOMS: European **c**limate **o**bservations, **m**odelling and services initiative
ECOSUPPORT: BONUS funded project - Advanced tool for scenarios of the Baltic **ECO**system **SUPPORT** decision making
ECSN: European Climate Support Network
EDP: Energias de Portugal
EDF: Electricity of France; project partner
EELA2: FP6 project: E-science grid facility for Europe and Latin America
EGU: European Geosciences Union
EMBRACE: FP7 project - **E**arth system **M**odel **B**ias **R**eduction and **A**brupt climate change
ENEA: National agency for new technologies, Energy and sustainable economic development; project partner
ENHIS: European Environment and Health Information System
ENSEMBLES: EU FP6 project
ENSO: El **N**iño **S**outhern **O**scillation
EQUIP: **E**nd-to-end **Q**uantification of **U**ncertainty for **I**mpacts **P**rediction
ERA-CLIM: EU FP7 project;
ERA-INTERIM: ECMWF reanalysis product
ERC Stg: European Research Council Starting Grant
ESS-CC: Earth System Sciences and Climate Change
ESM: Earth System Model
ETCCDI: Expert Team on Climate Change Detection and Indices
ETL: Extract, Transform and Load (IT process term)
EU: European Union
EUCLIPSE: EU FP7 project;
EUMETSAT: European Organisation for the Exploitation of Meteorological Satellites)
EURATOM: The European Atomic Energy Community
EUROCS: FP5 EUROpean Cloud Systems
EUPORIAS: EUropean Provision Of Regional Impact Assessment on a Seasonal-to-decadal Timescale
EUROBRISA: Euro-Brasilian Initiative for Improving South America Seasonal Forecast
EuroHEAT: Health effects of heat in European cities project
EuroGLOBEC: Project: European global ocean ecosystem dynamics
EUROSIP: European seasonal to internannual prediction
EURO4M: European Reanalysis and Observations for Monitoring
EUSTAT:
EWA: European **W**ater **A**rchive

F
FAO: Food and **A**griculture **O**rganization (UN)
FAOSTAT: FAO Statistics Division
FFI: Full Field Initialisation
FLOODRELIEF: A real-time decision support system integrating hydrological, meteorological and radar technologies
FP: Framework Programme
FUME: FP7 project: Forest fires under climate, social and economic changes in Europe, the Mediterranean and other fire affected areas of the world.

G
GEOLAND2: EU FP7 project carried out in the context of GMES – Operational Monitoring Services for our Changing Environment

GCH: Global Change and Health, WMO
GCM: General circulation model (also known as a global climate model)
GCOS: Global Climate Observing System
GEWEX: Global Energy and Water Cycle Experiment
GFCS : **G**lobal **F**ramework for **C**limate **S**ervices
GIS: geographic information system
GITEC: Genesis and Impact of Tsunamis on the European Coasts
GIZ: German Agency for Coopération (formerly GTZ)
GloSea5: Met Office Seasonal Prediction System
GMES: EU-led initiative - **G**lobal **M**onitoring for **E**nvironment and **S**ecurity
GPC : **G**lobal **P**roducing **C**entre (for long range forecasts)
GPV: Spanish forecasting group
GRDC: Global **R**unoff **D**ata **C**entre
GRID computing: geographically distributed data and computing environments
GTS: Approved Technological Service Institute
GTZ: See GIZ
GWP: Global water Partnership

H
HEN: Health Evidence Network
HIRLAM: High Resolution Local Area Modelling
HOME: Advances in homogenisation methods of climate series: an integrated approach
HYPE Model: **HY**drological **P**redictions for the **E**nvironment Model

I
IAV: Impact, Adaptation, and Vulnerability
ICAD: Inform Climate Adaptation Decisions
ICAS: Institute for Climate and Atmospheric Science (Leeds University)
ICE 2 SEA: EU FP7 project
ICREA: Institut Català de Recerca i Estudis Avançats
IFS-NEMO: European modelling system
IIASA: International Institute for Applied Systems Analysis
IPMA: Portuguese Institute for the Sea and the Atmosphere
IMPACT2C: Quantifying projected impacts under 2°C warming project
IMPRINTS: FP7 Project, IMproving Preparedness and RIsk maNagemenT for flash *floods*
INCLIDA: Initialization of global decadal climate forecast: a new challenge for multi-scale data assimilation
INFRA: Innovative & Novel First Responders Applications
INSERM: Institut National de la Santé et de la Recherche Médicale (University of Monpellier)
IPCC: Intergovernmental Panel on Climate Change
IPR: Intellectual Property Rights
IPY-CARE: FP6 project: Climate of the Arctic and its role for Europe – an European component of the International Polar Year
IRI: International Research Institute for Climate and Society
IS-ENES: FP7-project INFRA-2008-1.1.2.21
IC3: Catalan Institute of Climate Sciences; project partner

J
JCOMM: Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
JIM: JULES Impact Model

JMA : **J**apan **M**eteorological **A**gency
JULES: Joint UK Land Environment Simulator

K
KMA: Korean Meteorological Agency
KNMI: Koninklijk Nederlands Meteorologisch Instituut (Royal Netherlands Meteorological Institute)

L
LC-LRFMME: WMO Leading Centre for Long Range Forecast Multi Model Ensemble
LIFE+: EU Environmental Policy & Governance programme
LITTORISK: project INTERREG III (Patrimoine et Prévention de Risques naturels: Habitats Diffuses Littoraux)
LPJ-mL: Lund-Potsdam-Jena managed Land models
LSA SAF: Land Surface Analysis Satellite Applications Facility
LSM - Land Surface Models

M
MACC II : Monitoring Atmospheric Composition and Climate project
METAFOR: FP6 project: Common Metadata for Climate Modelling Digital Repositories
MF : **M**étéo-**F**rance
MGT: Management
MOHC: Met Office Hadley Centre
Met O: Met Office & Met Office Hadley Centre
MF: Meteo-France

N
NCCR-Climate: Swiss National Centre for Competence in Research on Climate
NERC: Natural Environment Research Council (UK)
NMHS: National Meteorological and Hydrological Services (WMO terminology)

O
OPACE : **O**pen **Pa**nel of **C**Cl **E**xperts
OPERR: FP7 project: **O**perational **P**an-**E**uropean **R**iver **R**unoff

P
PDF: Probability Density Function
PHEWE: Assessment and Prevention of acute Health Effects of Weather conditions in Europe
PI: Principle Investigator
PM/pm: Person months
PREPARED: FP7 Project
PRINCE2: Projects IN Controlled Environments
PROMISE - FP5 project;
PRUDENCE: FP6 project

Q
QWeCI: FP 7 project: Quantifying Weather and Climate Impacts on Health in Developing Countries

R

RAI: Radio Audizioni Italiane
R&D: Research and Development
RCC-CM: Regional Climate Centre on on Climate Monitoring
RCM: Regional Climate Model
REN: Redes Energeticas Nacionais (Portugese power transmission Grid)
RheinBlick2050 – Project on the impact of regional climate change on discharge in the Rhine River basin
ROC: Receiver Operating Characteristic
RT: **R**esearch **T**heme
RTD: Research and technological development

S
S2D - Seasonal to Decadal
SD: Statistical Downscaling
SDP KDC: **S**atellite **D**ata **P**latform of the **K**NMI **D**ata **C**entre
SEE: School of Earth and Environment (Leeds University)
SIAM: Portuguese climate change assessments
SIMG: Special Interests Management Group
SME: Small and Medium Enterprises
SMHI: Swedish Meteorological and Hydrological Institute
SPECS: Seasonal-to-decadal climate Prediction for the improvement of European Climate Services
SRI: Sustainability Research Institute (Leeds University)
SST: Sea **S**urface **T**emperature
STAR: EU FP6 project: **S**upport for **T**ropical **A**tmospheric **R**esearch
STARDEX: Statistical and regional dynamical downscaling of extremes for European regions
SUDPLAN: EU FP7 under Information Communication Technology programme - **S**ustainable **U**rban **D**evelopment **PLAN**ner for Climate Change Adaptation

T
TEC: Tourism Environment Consultant; project partner
TRIDEC: collaborative, complex critical decision processes in evolving crises

U
UDIC: Climate Dynamics and Impacts Unit (Spain)
UK: United Kingdom
UKCP09: UK Climate Projection
UIP: WFP, User Inteface Programme
UL-IDL: University of Lisbon; project partner
UNEP: United Nations Environmental Programme
UPC: Technical University of Cataluña
UTMEA-CLIM: Energy and Environment Modeling
ULUND: University of Lund; project partner

V
VIC: Variable Infiltration Capacity
VIROCLIME: Virology Water and Climate Change

W

WATCH: FP6 Project
WaterMIP: Intercomparison project of global hydrological and Land Surface model intercomparison.
WATER CHANGE: An EU LIFE+ Proejct Medium and long term water resources modelling as a tool for planning and global change adaptation. Application to the Llobregat basin

WCRP: **W**orld **C**limate **R**esearch **P**rogramme
WFP: **W**orld **F**ood **P**rogramme
WGII: IPCC Working Group
WGIII: IPCC Working Group
WMO: **W**orld **M**eteorological **O**rganisation
WP: **W**ork **P**ackage
WU: Wageningen University and Research Centre
WRF: Weather Research and Forecasting

X
Y
Z

Appendix 3: IAV models used to study sectoral impacts of S2D climate variability[4]

Sector Model	Impact categories	Scale characteristics1)	Coupling	Climate Input2)	references
Hydrology					
JULES	Soil moisture, Discharge, Vegetation prod.	60 km Hourly Seas. - Decadal	Online - GLOSEA5		Best et al. 2011 Clark et al. 2011
JULES-impacts (JIM)	Soil moisture, Discharge, Irrigation demand Vegetation prod.	Variable spatial Hourly Seas. - Decadal	Offline	R, S, T, W, Q, LW, SW, SP	Best et al. 2011 Clark et al. 2011
VIC	Soil moisture, Discharge, Lakes/Reservoirs Water temp	3-Hourly- Daily, Seas. - Decadal	Offline	P, Tmax, Tmin, W, Q, LW, SW, SP	Liang et al., 1994 Van Vliet et al., 2012ab
LPJmL	Discharge, Lakes/Reservoirs, Crop yield, Vegetation prod.	0.5o, global, Daily-Monthly, Decad. - Centen.	Offline	P, T, LWn, SW	Biemans et al., 2011
EHYPE	Soil moisture, Discharge, Water temperature, Lakes/Reservoirs	Sub-basin (~120km2), Europe, Daily, Decadal	Offline	P, T	Lindstrom et al., 2010 Donnelly et al. 2011
Crop production					
GLAM	Soil Moisture, Potential Crop Yield	Variable spatial Daily, Seas. - Decadal	Offline	P, Tmin, Tmax, SW, Q	Chalinor et al. 2005 Challinor et al. 2010
CGMS	Soil Moisture, Potential Crop Yield	Nuts2, Europe, Daily, Decadal	Offline	P, Tmin, Tmax, W, SW, Q	Supit et al., 2010ab

[4] 1) respectively: spatial resolution, spatial domain (typical), temporal resolution, temporal domain (typical)
2) R: Rainfall rate, S: Snowfall rate, P: Precipitation (rain or snow distinguished in the model), T: Mean daily air temperature, Tmax: Maximum daily air temperature, Tmin: Minimum daily air temperature, W: Wind speed, Q: Specific humidity, LW: Longwave radiation flux (downward), LWn: Longwave radiation flux (net), SW: Shortwave radiation flux (downward), SP: Surface pressure
3) The LSHEL model is an offline, surface model under development which brings together a number of surface and associated impact models into a single framework. It is based on the SURFEX land-soil scheme (Le Moigne et al. 2009), with additional components including, the HYPE surface hydrology model (Lindstrom et al., 2011), the LPJ-GUESS dynamic vegetation model (Smith et al. 2001) and FLAKE for modelling large lakes (Kourzeneva et al., 2005).

Sector Model	Impact categories	Scale characteristics1)	Coupling	Climate Input2)	references
LPJmL	Potential Crop Yield	See above	Offline	See above	Gerten et al., 2011
JULES-impacts (JIM)	Potential Crop Yield, Irrigation demand	See above	Offline	See above	
Forestry					
LSHEL	Risk of storm felling, Ground frost, Attacks by pests, Tree drought stress, Spring phenology. Risk of frost damage	1km, Europe, Hourly, Decadal	Offline	P, T, Tmin, Tmax,	Various 3)
Sustainable energy					
PVSYST	Solar Power energy potential	?, Mediterranean, Hourly, Decadal,	Offline	SW	http://www.pvsyst.com
WasP	Wind energy potential	?,?, Hourly, Decadal,	Offline	W	http://www.wasp.dk/
SAM	Energy mix optimisation	?,?, Hourly, Decadal	Offline	T, W, SW, Q, SP	Blair et al. 2010 https://sam.nrel.gov/
HOMER	Energy mix optimisation	n/a	Offline	Optimises across energy options, input from models above	Georgilakis, 2005 https://analysis.nrel.gov/homer/
KERES	Hydropower production potential	Sweden	Offline	Runoff from hydrology models ??	
LASKER	Hydropower production potential	Alps	Offline	Runoff from hydrology models ??	

Appendix 4: Letters of support to EUPORIAS

1. **ICP Forests Programme**
2. **SwissRe**
3. **AdP Portugal**
4. **ALTRI Forestal**
5. **ADVID**
6. **BfG (Bundesanstalt für Gewässerkunde = German Federal Institute of Hydrology)**
7. **DGAR (National Agricultural Advisory Service Portugal)**
8. **AMORIM**
9. **REN (Redes Energeticas Nacionals – Portugal)**
10. **Aguas de Anarbe (Portugeses Water Suplier)**
11. **EDF (Frenc Utilities Company)**
12. **MSB (Swedish Civil Contingencies Agency)**
13. **NVE (Norwefian Water resources and Energy Directorate)**
14. **SKOGFORSK (Forestry Research Institute of Sweden)**
15. **EDP (Portugese Utilities Company)**
16. **ELOFORSK (Swedish Powere generation research)**
17. **Länsstyrelsen Ostergötland (German Climate Chnage organisation)**
18. **Länsstyrelsen**
19. **Savoie Mont Blanc (Tourism organisation)**
20. **SOGRAPE VINHOS (Portugese fine wine company)**
21. **Cargill International (Producer of food, agricultural, financial and industrial products)**
22. **ALVAC (Spanish road maintenance company)**
23. **Terna (Italian electricity transmission grid Operator)**
24. **WMO**
25. **Northumbrian Water (UK Water Supplier, part of Cheung Kong Infrastructure Holdings Ltd)**
26. **Miniserio De Fomento (Spanish Minsitry)**
27. **Suez Environment (French company)**
28. **Aigues de Barcelona**
29. **Confederación Hidrográfica del Ebro (Spain)**
30. **National Grid (UK Energy Transmission grid)**
31. **KMA (Korean Meterological Administration)**
32. **Rhône Alps Tourisme (French Tourism organisation)**
33. **Allianz Re (German Insurance provider)**