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User requirements, part 1

Strategies for user consultation and engagement and user requirements: Synthesis from past efforts

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Author(s): *Annemarie Groot, Rob Swart, Hans Olav Hygen, Rasmus Benestad, Adeline Cauchy, Channah Betgen, Ghislain Dubois*

Reviewer(s): *Rob Swart Alterra Martin Juckes, STFC*

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Abstract

To create a well-functioning, user-oriented portal for climate observations and projections data and an impact indicator toolbox, detailed understanding of user requirements and regular feedback from users on prototypes of the portal is needed . This report analyses experiences with user consultation and engagement and users' data preferences developed in earlier and ongoing projects and initiatives. These experiences show difficulties in effectively engaging users in a sustained manner. Based on the lessons learnt, four potential user categories for the CLIPC project are defined, three of which are prioritized. For each of these user categories a consultation and engagement strategy is outlined.

grant agreement n°607418

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Executive Summary

To create a well-functioning user-oriented portal for climate observations and projections data and an impact indicator toolbox, detailed knowledge of user requirements and regular feedback from users on prototypes of the portal is needed. This report analyses experiences with user consultation and engagement, and users' data preferences developed in earlier and ongoing projects and initiatives. These experiences show difficulties in effectively engaging users in a sustained manner. This document discusses the essence of the knowledge gathered in other projects on how to engage the users, and to a lesser degree, specific user needs of climate and climate impacts data and a climate and climate impacts data service infrastructure. 11 Projects have been reviewed in detail and another 55 projects and initiatives have been quickly scanned. In the review four potential user categories have been considered:
A: Climate scientists
B: Impact researchers
C: Intermediary organisations (or "boundary workers")
D: Societal end users

Definitions of these categories are provided in chapter 2.

Informed on the one hand by the available experiences from earlier and ongoing user consultation initiatives, and expectations about what CLIPC will offer on the other hand, Categories A,B and C are considered priority user groups for the CLIPC project. Category D is assumed to be reached primarily via intermediary organisations, like consultants, environmental protection agencies, research institutions involved in policy support. Within the three priority categories most of the interaction will be with those users who are relatively easy to consult, which include potential users who are already part of the CLIPC consortium, those who are involved in related projects, and those which have European networks involved in European adaptation and climate services development.

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A strategy for user consultation is outlined for categories A, B, and C. The approach and activities depend on the level of involvement in and the relationship with the CLIPC project. The potential users of categories A,B and C already involved in the CLIPC project and those who are involved in related projects will be consulted through a combination of interviews and on line questionnaires. Potential users from categories A,B and C who are not part of the CLIPC network will be reached through sessions and lectures at conferences and workshops organized independent of CLIPC. Included in the consultation strategy is the establishment of

consultation or user panels representing potential users from categories A-C and who are already involved in the CLIPC project and/or in related projects. While users from category D will not be excluded from the user engagement activities if they express interest, CLIPC will not develop a major outreach initiative to engage them, due to the very large number and variety of potential end users, whom in practice often receive their information through the other categories. The CLIPC user consultation and engagement strategy will focus on the quality and relevance of the CLIPC European portal in the English language and will not involve specific case studies or climate data tailoring activities which would require intensive interactions at a local level.

1. Introduction

This report presents the results of the first task 'on user needs strategy development' of CLIPC Work Package 2. CLIPC aims to develop a data service infrastructure allowing different user groups to have access to climate data resources. CLIPC will also develop a climate impacts toolkit which is of relevance to various user groups and aims at helping them to inform decision making, in particular on adaptation to climate change.
Accessibility of data and user relevance require proper knowledge of potential user groups, their data and information requirements and their preferences for ways to have data communicated and disseminated. It also demands regular interaction between the providers of the data and the users (e.g. Wirth et al., 2014; Hammil et al., 2013; Bessembinder, 2012; Swart et al., 2011). However, experiences with user interactions in past and ongoing climate services projects show difficulties in effectively engaging users in a sustained manner (e.g. ISENES1, ToPDAd) resulting in supply-oriented portals with limited relevance for the intended users (e.g. see Hammil et al., 2013 for an analysis of climate and development knowledge brokerage platforms).

CLIPC intends to target a wide range of user groups, from scientists to policy makers and private sector decision makers (Juckes et al., 2013). Each of these user groups might require different data or information as well as different communication strategies. Therefore the objective of Work Package 2 is to determine the user requirements for the data access platform and the climate impacts toolkit through consultation across a range of user groups in order to ensure that the system will match the needs of a broad user community. However, because the variety of potential users is extremely large and therefore unmanageable in the context of one project, they will be grouped into a limited number of user categories.
As CLIPC will build upon earlier experiences, task 2.1 examines the lessons learnt from user interactions in earlier and on-going scientific networks and projects. Specifically, this report describes relevant experiences and discusses:

- The diversity of potential user groups and their priorities
- A consultation strategy for the different (prioritized) user groups
- A strategy for engaging the prioritized user groups and sustaining the interaction
- Initial data and information requirements per priority user group

The lessons learnt and choices made will inform a next step in which the different selected user groups will be engaged and consulted to further specify their data requirements and preferences (task 2.2).

In chapter 2, the methods used for reviewing and analysing past and ongoing climate service projects and initiatives are described. Chapter 3 discusses the results of the review. Chapter 4

syntheses these results in terms of prioritized user groups, consultation strategies and initial users' requirements and preferences.

2. Methodology

Adaptation policy and decision makers from around the world are calling for the production and diffusion of 'useful information' to support decision making. Useful information is salient, credible and legitimate (McNie, 2007; Cash and Buizer, 2005). Salient information is information that is important and relevant for the user's decision making. Useful information is credible in that it is perceived by the users to be accurate, valid and of high quality. And useful information must be legitimate in that those who produce it are perceived to be free from political bias (McNie, 2007). Practice shows, however, that decision makers often lack useful information needed for good decision making. Alternative strategies and processes are called for to forge productive relationships between the suppliers of climate data and users in order to reconcile the supply with user demands.

Very often, policy makers or decision makers do not themselves directly look for detailed data on climate observations or projections or climate impacts, but receive their information from intermediaries, such as consultants, environmental protection agencies or research institutions that provide (policy) support. Also climate scientists and climate impacts researchers are important users of climate and climate impact data to be served by CLIPC. While much of their work may be curiosity driven, from the perspective of CLIPC it is assumed that also their work eventually has societal relevance and will feed into the information about climate change communicated to societal policy makers and decision makers.

The last few years, useful but fragmented and unsustained experience has been developed on consulting and engaging users in relation to climate services. Most of the user consultation and engagement[1] activities in these earlier and ongoing projects either do not make a distinction between different user categories, conclude at the end of the project that different groups have to be dealt with in different ways rather than take it as a starting point. Often these projects implicitly assume that all users are "end users" (as defined and discussed below). Therefore, our methodology to develop a user consultation and engagement strategy did not start a priory with a distinction between user categories. To further build upon these experiences, the review described in this report is mainly based on:

1. An analysis of user consultation and engagement activities in earlier projects, and existing networks of research projects and stakeholders.

For the review we also used:

[1] With user consultation we refer to a low level of interaction (in terms of frequency and intensity), while with user engagement we refer to a high level of interaction.

2. Discussions during the kick off meeting of the CLIPC project in London (January 2014). This meeting gave good guidance on potential user groups, priorities in user groups and possible sources of user information.
3. Two IS-ENES & CLIP-C Engagement Workshops organised at the CIRCLE2 Adaptation frontiers conference in Lisbon (10 -12, March 2014). In these meetings the climate data requirements of potential user groups were discussed as well as preferable user consultation strategies.

Analysis of user consultation activities in earlier projects and existing networks

The selection of projects was built on the knowledge of the CLIPC partners. The main selection criteria for the initiatives to be reviewed include:

- The projects should deal with the management and the making accessible of climate data and/or derivation of products from the data, including impact indicators and tools for applying data in urban and rural contexts;
- The projects should emphasise the relevance of the provided data and information for users.

Table 1 shows the selected projects and initiatives reviewed in support of this strategy. The first 11 European and national projects/initiatives have been reviewed in detail, the rest of the projects were only scanned.

Table 1: Projects or climate (adaptation) service initiatives reviewed in detail to inform the CLIPC strategy

Detailed review			
Area covered	Name	Reference	Type[2]
Europe (section 3.1)	IS-ENES 1	https://verc.enes.org/ISENES2/archive	D
	CLIMRUN	www.climrun.eu	S
	CLIMATE-adapt	http://climate-adapt.eea.europa.eu/	S
	JPI Climate	http://www.jpi-climate.eu/home	S
	EUPORIAS	http://www.euporias.eu/	S
	COST Action	http://www.value-cost.eu/	I

[2] D- Data oriented project: providing access to raw climate data, I –Impact oriented project: Primarily providing better insight in the impacts, S- Service oriented project: Enhancing the access to climate information for selected groups or society as a whole, but going beyond the realm of access to raw climate data,

	ES1102 VALUE		
	ToPDAd	www.topdad.eu	I
Regional, national and international projects (section 3.2)			
Finland, Sweden, and Norway	CARePOL	Report 2: Survey on the use of climate scenarios in climate change research in Finland, Sweden, and Norway	**S**
Netherlands	KNMI Inventory of user requirements / Dutch National Climate portal	http://www.klimaatportaal.nl (in Dutch) http://climate-ADAPT.eea.europa.eu/viewaceitem?aceitem_id=2907	**S**
Norway	Norwegian weather and climate portals	http://www.yr.no http://www.seNorge.no http://eKlima.met.no	S
	Project Troms	-	S
International	Understanding Needs, Meeting Demands: A user-oriented analysis of online knowledge brokering portals for climate action and development.	http://www.iisd.org/pdf/2013/understanding_needs_platforms.pdf	S

The review is based on an analysis of websites and project documents. In addition, interviews with project members have been conducted. To get comparable data from the projects, a form was used to gather the data (see annex 1).The analytical framework used in the review encompassed the following elements:

- Strategy used to consult users (including processes and methods used to articulate user needs and preferences), to maintain interaction and to evaluate implementation
- Strategy used to engage users (including processes and methods used to maintain interaction and evaluate implementation)
- Types of users targeted (e.g., scientific – non-scientific)
- Type of data preferred (per user group) (climate data, impact data, socio-economic data)
- Focus of the project (e.g., sectors, region)
- Themes (urban, rural, water, crosscutting)
- Level (regional, national, European)
- Contact persons
- Names of individual users (individuals, organisations)
- References – sources of information (reports, portals)

For all of these elements and especially the first three on user interactions and preferences, the lessons learnt and recommendations for the CLIPC project were highlighted.

Table 2: Quickly scanned projects or initiatives

Quick scan			
Area	Name	Reference	Type[3]
International	IPCC DDC	http://www.ipcc-data.org/	D
	IRI	http://iri.columbia.edu/	S
European or regional	NPCC	https://earthsystemcog.org/projects/downscalingmetadata/	D
	GEOMON	http://geomon.ipsl.jussieu.fr/	D
	ENSEMBLES	http://www.ensembles-eu.org	D
	COMBINE	http://www.combine-project.eu/	D
	EARLINET ASOS	http://www.earlinet.org/	D
	SPECS	http://www.specs-fp7.eu/SPECS/Home.html	D
	IMILAST	http://www.proclim.ch/imilast/index.html	D
	Santander Meteorology Group	*http://www.meteo.unican.es/en/portal/downscaling*	D
	BALTEX	http://www.baltex-research.eu/	D/S
	ECLISE	http://www.eclise-project.eu/	S
	CLAVIER	http://www.clavier-eu.org/clavier/	S

[3] D- Data oriented project: providing access to raw climate data, I –Impact oriented project: Primarily providing better insight in the impacts, S- Service oriented project: Enhancing the access to climate information for selected groups or society as a whole, but going beyond the realm of access to raw climate data,

	HYDRATE	http://www.hydrate.tesaf.unipd.it/	S
	MOTIVE	http://cordis.europa.eu/projects/rcn/91252_en.html	S
	SAFEWIND	http://www.safewind.eu/	S
	PRUDENCE	http://prudence.dmi.dk/	S
	STARDEX	http://www.cru.uea.ac.uk/projects/stardex/	S
	MICE	http://www.cru.uea.ac.uk/projects/mice/	S
	BASIN	http://cordis.europa.eu/projects/rcn/80086_en.html	S
	ADAGIO	http://www.adagio-eu.org	S
	IMPACT2C	http://www.hzg.de/mw/impact2c/	I
	WATCH	http://www.eu-watch.org	I
	ENHANCE	http://www.livingwithclimate.fi/	I
	ESCAPE	http://escapeproject.eu/	I
	QUANTIFY	http://www.pa.op.dlr.de/quantify/	I
	CIRCE	http://www.bo.ingv.it/circeip/	I
	RECLAIM	http://www.climateandfish.eu	I
	ICEPURE	http://cordis.europa.eu/projects/rcn/90978_en.html	I
	INCREASE	http://cordis.europa.eu/projects/rcn/90503_en.html	I
	CLIMATE FOR CULTURE	http://cordis.europa.eu/projects/rcn/92906_en.html	I
	NOAHS ARK	http://noahsark.isac.cnr.it/	I
	MESMA	http://cordis.europa.eu/projects/rcn/92591_en.html	I
	MOVE	http://www.move-fp7.eu/	I
	SafeLand	http://www.safeland-fp7.eu/	I
	MICRODIS	http://www.microdis-eu.be/	I
	IRASMOS	http://www.slf.ch/irasmos	I
	MICORE	http://cordis.europa.eu/projects/rcn/88552_en.html	I
	MEECE	http://cordis.europa.eu/projects/rcn/89307_en.html	I
	climateWater	http://www.climatewater.org/	I

	EASAC	http://www.easac.eu/home/press-releases/detail-view/article/easac-warns-1.html	I
	ACQWA	http://www.acqwa.ch/	I
	CES	http://www.norden.org/en/publications/publikationer/2011-502	I
Sweden	SMHI open data catalogue	http://opendata-catalog.smhi.se/explore/	D
Netherlands	KNMI climate explorer	http://climexp.knmi.nl/start.cgi?id=someone@somewhere	D
Norway	NVE, Statens vegvesenet og Jernbaneverket	http://varsom.no	S
Norway	MET Norway	http://halo.met.no	S
Norway	InfraRisk	http://www.ngi.no/en/prosjektnett/infrarisk	I
Norway	IFCC	http://www.forskningsradet.no/servlet/Satellite?c=Prosjekt&cid=1244733932727&pagename=norklima/Hovedsidemal&p=1226993599906	I
United Kingdom	UKCP09	http://ukclimateprojections.metoffice.gov.uk/21678	S

The quick scan is based on a selection of relevant projects from a catalogue of research done under the framework of the European Union, as input for the UNFCCC COP-15 meeting (European Commission and Directorate-General for Research and Innovation, 2013) . This review was supplemented by searches in the EU database. A downloaded digital copy (PDF) was used for carrying out a search on the key words “data”, “prediction”, “end user”, “portal”, “temperature”, “precipitation”, and “decision-maker” to identify projects relevant for CLIPC. Also, some of this review was based on experience and knowledge through a general participation in the research community and learning about projects at conferences and projects familiar to the task leader MetNo. The selection excluded projects with a non-European regional focus, or studying the carbon/nitrogen cycle, paleoclimate, or volcanoes. Text describing the projects and considered relevant to CLIPC has been copied and pasted, and to some degree edited to fit into this report.

Additional projects from which lessons may be learnt or with which CLIPC may coordinate its user needs activities include: EURO4M (www.euro4m.eu) and it’s follow-up UERRA, CHARMe (www.charme.org.uk), CORE-CLIMAX (www.coreclimax.eu); Cryoland (www.cryoland.eu), EUCLEIA (eucleia.eu), Euro CORDEX (www.euro-cordex.net), COMBINE (www.combine-project.eu), EUCLIPSE (www.euclipse.eu/), EMBRACE (www.embrace-project.eu); ECLISE (www.eclise-project.eu); ECOMS (http://naclim.zmaw.de/ECOMS-initiative.2214.0.html), IMPACT2C

(http://www.hzg.de/mw/impact2c/), IMPRESSIONS (impressions-project.eu). These projects will be addressed in the next phase of the project.

From the review and quick scan it appeared that projects use different terms for similar user groups. To ensure comparable outcomes from the projects, we used the following working definitions for the following user groups:

Climate scientists:	Climate change scientists who are highly specialized and aim to advance knowledge. Climate scientists usually work in universities or public or private research institutes.
Impact researchers:	These scientists may overlap with the 'climate scientists' to some extent, but this group is not involved in developing and running climate models. They also aim to develop state of the art knowledge. Most of this group will be people from the hydrology, biology, agriculture, engineering, health or socio-economic communities. Some of them have more experience in dealing with data and statistics than others.
Intermediary organisations or boundary organsations:	People or organisations who work as intermediaries assisting stakeholders in decision making. They help them in specifying information requirements, applying information and sharing experience. They can also help to jointly generate new knowledge. Intermediaries are sometimes referred to as intermediaries or knowledge brokers. Organisations such as the EEA but also consultants, national environmental protection agencies, research institutes providing policy support, and managers of national and international climate and climate adaptation portals as well as facilitators of climate discussion fora can be considered 'intermediaries'.
Societal end users:	Policy makers supporting others (e.g. government officials informing politicians, or company staff informing company management) in taking decisions. End users sometimes also encompass decision makers themselves such as, city council members or company managers, and can include practitioners who are involved in the implementation of adaptation such as water managers, urban planners or farmers.

3. User consultation strategies and user requirements: Lessons learnt

This chapter briefly describes the results of our review, summarizing experiences with user consultation and engagement, and their requirements from past and ongoing projects and other initiatives. It also discusses lessons learnt and recommendations for the CLIPC project.

Paragraph 3.3 summarizes the main findings of the IS-ENES & CLIP-C User Engagement Workshop organised at the CIRCLE2 Adaptation frontiers conference in Lisbon (10-12, March 2014).

3.1 European projects

CLIM-RUN

Climate Local Information in the Mediterranean Region Responding to User Needs
Funded under the European Commission's Seventh Framework Programme (FP7), *2011-2014*
Dr. Paolo M Ruti, CLIM-RUN Project Coordinator
Head Climate & Impact Modeling Laboratory
Energy and Environmental Modeling Unit *(*ENEA*)*
www.climrun.eu

The project aims at developing a protocol for the provision of adequate climate information at regional to local scale that is relevant to and usable by different sectors of society (policymakers, local authorities, urban and energy planners, industry, city government, etc.). The general time horizon of interest for the project is the future period 2010-2050. The project focuses on the Mediterranean region and targets representative areas (mountainous regions, coastal areas, islands). It is based on the implementation of a bottom-up protocol, involving, through case studies, end users at local and regional scales in various climate-sensitive sectors: tourism (France-Alps, Cyprus, Tunisia and Croatia), energy (Spain, Morocco, Cyprus, and Croatia), wildfires (Greece) and also a cross-sectoral case study (Venice). CLIM-RUN is thus also intended to provide the seed for the formation of a Mediterranean basin-side climate service network which may eventually converge into a pan-European network.
The project provides useful examples of approaches and their limitations for identifying user requirements at the subnational level, gives an overview of the main challenge for climate services providers and offers perspectives to achieve a successful interaction with stakeholders.

Users groups and needs were identified through an on-going iterative consultation and collaboration with stakeholders which involves different methods and tools: organisation of workshops (per sector and case study), interviews, literature review, stakeholder analysis etc. Prior to the consultation phase, a first draft protocol (WP1) provided a method to be used for identifying stakeholders that may be relevant to the project. It was based on a stakeholder analysis that encompasses three steps: "The first step involves the identification of stakeholders and their classification by types. The second step aims at categorizing stakeholders into priority groups in order to determine who to involve in the participatory processes of CLIM-RUN. The third step implies a careful analysis of stakeholders'

characteristics (from both a socioeconomic and climate change point of view) and interrelations between stakeholders" (WP1 draft protocol). It is not clear whether such a systematic process was used to identify and select stakeholders in all case studies. Networks and contacts from previous projects were often used as a valuable starting point. In most cases a typology was made using the scale of intervention of the users (local, regional, national etc.) and the category to which they belonged (decision-makers, planners, etc.). A perception and data needs questionnaire was designed to provide the "who" information, i.e., basic information for the identification, characterization and classification of stakeholders. It aimed also to initiate the process of providing the "what" information, what data and related information do stakeholders need. It was divided in the following sections: (i) your institution/organisation, (ii) risk perception and current use, (iii) your perspective on climate services, (iv) data requirements, and (v) handling uncertainties.

Users

CLIM-RUN is targeting societal end users operating at the national, regional and local levels.

User consultation and engagement process

At an early stage of the project a set of *case studies* was defined to provide a "*real-world context*" bringing together experts on the demand and supply side of climate services.
Case studies were defined by the different CLIM-RUN partners during the elaboration of the proposal. A protocol was designed describing a strategy for the consultation and collaboration with stakeholders. The strategy included:

- General guidance to select and engage the stakeholders and communicate with them (communication channels that are « a priori » needed);
- An iterative bottom-up approach to be implemented in the case studies;
- Systematic planning of implementation of the whole process;
- A toolkit (materials for workshops, questionnaire for capturing users' perceptions etc.).

Parts of the strategy that might be relevant for CLIPC are summarised below.

Lessons learnt and recommendations for CLIPC

Identifying, consulting and engaging user groups

- *The section on risk perception* addresses several questions: how are the decision-making processes at the level of the organisation as a whole affected by climate change? What is the importance of the climate information compared to other factors? What are the climate parameters and impacts the organisation is sensitive too? This risk perception analysis can be used for an in-depth assessment of the end users' needs (local authorities, water managers, urban planners, tourist operators, etc.) and can

provide useful information for the climate modellers and impact researchers to design their indicators;

- *The section on data requirements* was designed by the climate team to ensure the collection of all the information needed for the required output: type of parameters/variables, temporal resolution, spatial scale, time scale and format. In most cases, the data requirements section was shortened and/or simplified. The most technical questions about data formats required and representation of uncertainty were rarely answered. Nevertheless, those questions can be used to assess the needs of climate modellers and impact researchers who are familiar with the raw data processing;
- *Various versions* of a questionnaire were finally produced and adapted to the sector/and or case studies context. This flexibility was very important in the whole consultation process;
- *The questionnaire was used in structured face-to-face interviews* with stakeholders. Interviews often allowed for an in-depth assessment of user needs. For some of the case studies, the questionnaire was also sent by email prior the workshops but received a low response rate. Shortened questionnaires were also distributed during the workshops;
- *A glossary* is often needed for societal end users;
- User groups and needs were also specified through *dedicated workshops*. They were organised per sector at a case study level.

  For the tourism sector : in Tunisia, France-Alps, Cyprus and Croatia;
  For the energy sector : in Morocco, Spain, Cyprus and Croatia;
  For the Wildfires : in Greece;
  For the integrated case study: in Venice.
- It is useful to provide scientific workshop organizers with *a protocol* for the successful implementation of workshops. CLIMRUN provided case study leaders with suggestions for presentation of the project, leaflets, issues that must be addressed, etc;
- *Potential benefits of the engagement* need to be explained clearly to the stakeholders (transparency on the objectives of the project);
- *Workshop approaches* should be designed according to the local circumstances including the number of participants; involving *skilled facilitators* can lead to more innovative and productive interactions (even if in CLIMRUN a number of potentially useful approaches were identified prior the consultation (e.g. World Café) more classical approaches were finally used like presentations by researchers and time for 'roundtable' discussion);
- *Translation into local languages* was necessary for some of the case studies (in French, Croatian, etc.). *Targeted communication* is needed to reach the different user groups;
- User interactions should be designed to meet the *users time schedules* rather than those of the scientists. In most cases, the attendance to CLIMRUN events was very low. It was difficult to mobilize societal end users for research workshops. Some case studies

(energy sector) have chosen to diversify their approach going to meet users in their workshops rather than organizing a workshop only dedicated to CLIM-RUN. Sometimes, it may be more efficient to approach the users in such a way;

- Iterative consolidation and collaboration should be *planned realistically*, since it is difficult to achieve over time, especially with societal end users who have little time and change roles periodically;
- *Sessions per user category* (per sector in this case) are more efficient than crosscutting, generic sessions, to specify the requirements in detail;
- A *check list for facilitating stakeholder involvement* is useful. A check list for facilitating stakeholder involvement in research projects' based on the experience of the CIRCE project was delivered by the coordinator of the whole case studies (WP4). It provides useful guidelines that can be applied to the CLIPC strategy[4];
- There is a need to strengthen the *participation of social science* and *communication experts* to facilitate the communication process with end users (translation of the material into end users language, targeted communication for different groups of users, etc.);
- It should be evaluated to what extent the project actually addresses the needs identified. *Feedback from stakeholders* was collected through a second round of workshops within the CLIM-RUN project. Guidelines were given for this evaluation: (i) evaluate the relevance of the analysis, simulations and tools produced to address users' needs, (ii) assess the usefulness of data produced to improve adaptation decision-making, (iii) evaluate the quality of the interactions between climate experts and stakeholders, and (iv) analyse the possibility to expand these interactions to establish more permanent institutional links and procedures;
- At the end, one of the main lessons identified by the project is that to be effective, the "model for climate services" between climate data providers and final end users should incorporate *a third interface* level constituted by intermediary organisations that are already used to play this interface role.

Users' data and information preferences

<u>Climate variables</u>

- Temperatures and precipitation and derived indices/extremes are often required by all sectors, case studies and categories of users (heavy rainfall, high temperature, heat waves, drought, flood, hail, etc.)
- Specific needs were identified for the energy sector and related case studies:

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Source: <u>Clare Goodess (UEA) Deliverable 4.1– First workshops organisation "Workshops 1 planning and resource document"</u>

- General climate variables: hailstorms / snow cover - frequency and duration; humidity; aerosol variability; temperature
- Specific: wind energy (wind data – speed, direction, consistency), radiation (especially DNI) for solar energy

- Specific needs for the wildfire case study:
  - Fire Weather Index (FWI)
- Specific needs for the tourism case studies:
  - General climate variables: sea and lake bathing water temperature, tourism comfort indices, sea level rise for seaside tourism actors
  - Specific: future snow conditions in mountains areas, local winds, etc.
- A need for impact indicators and tailored products has been identified for all case studies (but it was outside the scope of CLIM-RUN). Climate parameters are of a limited interest for final end users.

Temporal horizons

- Historical variability (over past 1, 2, 10, 30 up to 50 years) is often requested (energy, tourism)
- Future predictions (1, 2, 5, 10, 30 years are the main horizons)
- End users are more interested in seasonal/decadal predictions rather than longer « climate » timescales, but such predictions cannot yet reliably be provided

More information and advice from CLIM-RUN is given in Annex 3.

Climate-ADAPT

European Climate Adaptation Platform (Climate-ADAPT)
Ongoing, started in March 2012
Project coordinator: EEA
Project website: http://climate-adapt.eea.europa.eu

The European Climate Adaptation Platform (Climate-ADAPT) was launched in March 2012. It aims to support Europe in adapting to climate change. It is an initiative of the European Commission and helps users to access and share data and information on:

- Expected climate change in Europe
- Current and future vulnerability of regions and sectors including agriculture and forest; biodiversity, coastal areas, disaster risk reduction, financial, health , infrastructure, finance, fisheries
- National and transnational adaptation strategies for sectors
- Adaptation case studies and potential adaptation options
- Tools that support adaptation planning

The scope and focus of Climate-ADAPT is on adaptation, with only a limited amount of information available on climate observations and projections on the "observations and scenarios" pages, which are filled in collaboration with the Joint Research Centre in Ispra.

The project started with an Adaptation Clearinghouse for Europe (ACE) workshop to identify user needs. A scoping document was prepared in which the objectives and scope of Climate-ADAPT were explained (sectors, geographic scale, information sources, knowledge structuring and tools). It also clarified what information was expected from the participants. One additional workshop was held in the beginning of the project to identify user needs for the platform. Lack of clarity about the actual users and their needs was an important challenge throughout the development of the platform and still is, today. A small user group, related to the formal Adaptation Steering Committee, was kept engaged through online discussion sessions. Every time a new version of the platform was delivered and discussed according to a predefined time schedule.

Users

At the start of the initiative, the project focused on governmental policy makers (EU and national level) looking for information to develop and implement strategies in interaction with the EU policy agenda and agencies, intermediary organisations and research projects, which are both producers of relevant contents and end users. The personal networks of the people involved in the project were used to identify and approach potential user groups.
After some time the intended user group was extended with other organisations such as business companies and the general public. While Climate-ADAPT is mainly focusing on non-scientific users, initial inventory of actual users suggests that the platform has a large share of scientific users. The European Environmental Agency (EEA) hosts and manages the platform, supported by the European Topic Centre on Climate Change Adaptation (ETC/CCA).

Lessons learnt and recommendations for CLIPC

Identifying, consulting and engaging user groups

The following lessons can be derived from the Climate-ADAPT experiences in terms of user engagement and users' data and information preferences:

- The *user consultation group of Climate-ADAPT* may again be approached for CLIPC, as well as the *EIONET system* coordinated by the EEA that includes national focal points and national climate reference centres
- It appears useful to create a concise CLIPC *scoping document* before starting a formal user consultation process. This scoping document should indicate e.g. sectors and tentative ideas on geographic scale, types of data en information sources, knowledge structuring and tools the CLIPC portal will probably provide

- The *user interactions* should be *facilitated by a person who is informed* and can filter the necessary information in order to keep focus and avoid raising false expectations or deviating from the goal of the user requirements
- *Sustained engagement of users is important*, by being clear on the necessity and purpose of the input from the users and by giving them regular feedback on what their input has meant for the project
- Accompanying maps with a short story help users to understand the conclusions that can be derived from the maps;
- A clear description is required on what the data output means and how it should be interpreted - ideally *a link* should be created *to an expert* who knows the data well.
- A few *use cases* can help users to discover how to use the portal;

Users' data and information preferences

Users' data and information preferences are specified in the Annex 3 on Climate-ADAPT.

JPI Climate

Joint Programming Initiative (JPI Climate) Funded by participating countries Ongoing, started December 2011 Project chair of the Government Board: Mannila Heikki (Academy of Finland) Project website: http://www.jpi-climate.eu/home

The following information on JPI Climate is taken from the JPI Climate website (http://www.jpi-climate.eu/home). JPI Climate is a collaboration between 14 European countries to coordinate jointly their climate research and fund new transnational research initiatives. Transnational coordination of the research base aims to overcome research fragmentation, to make better use of previous public R&D resources and to facilitate cross border collaboration between top scientists. JPI Climate connects scientific disciplines, enables cross-border research and increases the science-practice interaction. The main objective of this JPI Climate programme is bringing together existing and developing new excellent scientific knowledge that is needed to assist policy makers and practitioners to adequately transform society towards climate resilience and consequently providing integrated climate knowledge and decision support services for societal innovation. It is an ongoing initiative that began in December 2011, supported by the research funding agencies of collaborating European countries and by the EU through a Coordination and Support Action. The research to be funded or aligned is to be funded primarily by the national funding agencies, but shared funding with the EU is being considered, e.g. in the context of a new ERANET on climate services. One of the 4 JPI Climate working groups is focusing on (research in support of) climate services and hence the most relevant for CLIPC.

The lessons for CLIPC are based on a document[5] with general information on how to set up user requirements activities for climate services. In this document general recommendations for developing user engagement in support of climate services are provided as well as information requirements of a range of users from climate modellers to the general public derived from previous studies and documents.

Users
Policy makers on the European level and climate scientists.

Lessons learnt and recommendations for CLIPC

Identifying and engaging user groups

- To come into contact with representative users, *contacts in previous projects* can be used in which intended users are involved and contacts can be built with professional organisations that represent specific users in specific sectors (for more advice see Annex 3c on JPI Climate);
- Workshops or meetings are useful methods for identifying data/information requirements. However, preferably *workshops or meetings should not be limited to only one*, as the continued and informed engagement of users is critical to both the development and delivery of climate services;
- The *differences in needs of climate data between different user groups should be considered*. For example, the user category "impact researchers" often needs time series of climate variables and indices as input for their impact models. Adaptation researchers' requirements depend on what aspect of the assessment process they are considering (e.g., risk assessment, adaptation options assessment, implementation or evaluation of implemented measures);
- *User needs should be articulated with precision*. It should always be asked how and for what purposes the data will be used and who the intended end user is. Users should be asked to provide examples of good and bad information, presentation and accessibility. The aims and knowledge level of the user looking for information should be considered;
- It is important to let the users *define why and how the data/information* that they require *is going to be used*, to understand their motivation behind requiring climate services. The suggestion is to make this a starting point. The document provides a list of questions one could ask users to make their requirements more clear (see Annex JPI Climate).

5 Bessembinder (2012). Guidance to support the identification and assessment of users' requirements, first concept.

- When interacting with users, an early focus should be kept on *expectation management*. Users should be told what is possible and what not, to limit high expectations.
- Sustained engagement of users can be achieved by working together to tailor specific projects, by engagement throughout the development and delivery of climate services, and by actually working for some time in the organisation of the user/stakeholder. *Only a digital platform is not enough* to meet users' information need. Regular contact with users is needed, since user requirements may change over time. Regular contact can also improve understanding by both users and providers of information for users.
- Information that is delivered by user interaction should be checked with representatives of the targeted users. Several methods can be used to *organise user feedback.* Common methods are presented in Annex JPI Climate, such as (online) questionnaires, meetings with representative users and personal contacts/interviews.

Users' data and information preferences

- Data should be provided with a high level of guidance, so that interpretation of the data is facilitated and the data are used correctly.
- More data and information preferences of users are given in the Annex, such as type of climate variables, additional data such as land use data and storylines related to climate trends and projected changes.

More information and advice from JPI Climate is given in the Annex 3c on JPI Climate.

EUPORIAS

European Provision Of Regional Impacts Assessments on Seasonal and Decadal Timescales (EUPORIAS)
Funded under the European Commission's Seventh Framework Programme(PF7)
Project coordinator: Chris Hewitt, Met Office, Science coordinator : Carlo Buontempo, Met Office.
Project website: www.euporias.eu

EUPORIAS is a four-year collaborative project funded by the European commission under the seventh framework programme. EUPORIAS commenced on 1 November 2012. The EUPORIAS consortium is made up of 24 partners from across Europe and brings together a wide set of expertise from academia, the private sector and the national met services. Working in close relation with a number of European stakeholders this project wants to develop a few fully working prototypes of climate services addressing the need of specific users. The time

horizon is set between a month and a year ahead with the aim of extending it towards the more challenging decadal scale. The main objectives are:

- To assess and document key knowledge gaps and vulnerabilities of important sectors (e.g. Water, Energy, Transport, Food security, Health, Tourism etc.) along with the needs of specific users within these sectors, through close collaboration with project stakeholders;
- To develop and deliver a reliable and trusted impact prediction system for two or three semi-operational prototypes. These will provide working examples of 'end-to-end' climate-to-impacts-to-decision-making services operating on the Seasonal and Decadal (S2D) time scales;
- To develop a set of standard tools and techniques tailored to the needs of stakeholders for calibrating, downscaling, and modelling sector-specific impacts on S2D timescales;
- To develop a knowledge-sharing protocol necessary to promote the use of these technologies;
- To assess and document the current marketability of climate services in Europe.

In EUPORIAS, key partners 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). A “stakeholder board” has been established by the project based on the partners’ network. Regular communication is ensured with different communication tools (email, social-media, newsletters, etc.). The board is composed of organisations (private and public, acting European, national and regional level) selected by the project partners around Europe and covers all the main sectors of interest : agriculture, energy, tourism, insurance, water resource management.

In the project 5 prototypes will be developed for facilitating the discussion on specific climate questions with selected stakeholders:

- Winter conditions and its impacts on the UK transport network
- Food security in Ethiopia and the LEAP model
- Land management and agricultural practices in the UK
- Resilience of the renewable energy production
- Hydroelectric energy production in Sweden
- River management in two French basins

User requirements are identified through a wide variety of methods:

- A European Stakeholder Climate Services Conference (E2SC) – dedicated to the Euporias project-which allowed to develop a stakeholder board within the project and a first collection of information on vulnerabilities and needs;

- A workshop with national meteorological organisations and other researchers involved in S2D predictions which have already an in-house knowledge of user needs through their engagement with stakeholders - interactive sessions during the workshop were useful to collect a large amount of feedback on user requirements;
- Expert interviews with key stakeholders (around 100 targeted – on-going activity) to assess current vulnerabilities and user needs (semi-structured interview protocol). The questionnaire presents a common section and one adapted to the sectoral context. The general section includes the following parts: general characteristics, decision making-processes in the organisation, use of climate and weather information, use of S2D climate information, dealing with uncertainties;
- Survey of user needs to gather more representative samples of user needs across society (on-going activity). This survey will be sent across Europe using mainly networks of the different partners. To facilitate its dissemination, several options have been envisaged: translation of the questionnaire into 5 languages, different texts accompanying the survey (for emails, tweets, newsletters etc.).

The project pays attention to ensuring an effective interaction with stakeholders in the development of semi-operational prototypes. A workshop between partners allowed to share the best practices that could be used to develop the prototype as *the User Experience Design (EDX) method.* This method encompasses traditional human-computer interaction (HCI) design and extends it by addressing all aspects of a product or a service as perceived by users[6]. User experience design most frequently defines a sequence of interactions between a user (individual person) and a system, virtual or physical, designed to meet or support user needs and goals, primarily, while also satisfying systems requirements and organisational objectives. This method offers opportunities to successfully develop an interface that answer user requirements with the aim of delivering an interface that is: useful, usable (an interface must be easy to use), desirable (visual and emotional interest), navigable (we do not want to lose time searching for items), accessible and credible (figure 1). Annex 3 c on the Euporias project presents several graphics to illustrate the method used.

The method is considered promising to support a dynamic interaction process and could be used both in the user requirement captures and the user's evaluation. The evaluation process could be based on those key criteria: usefulness, accessibility, usability and desirability.

Users

EUPORIAS is targeting organisation representatives from the energy, transport, health, insurance, forestry and tourism sectors, consultants and policy makers at the national and local levels. Climate scientists and impact researchers are also approached.

[6] http://en.wikipedia.org/wiki/User_experience_design

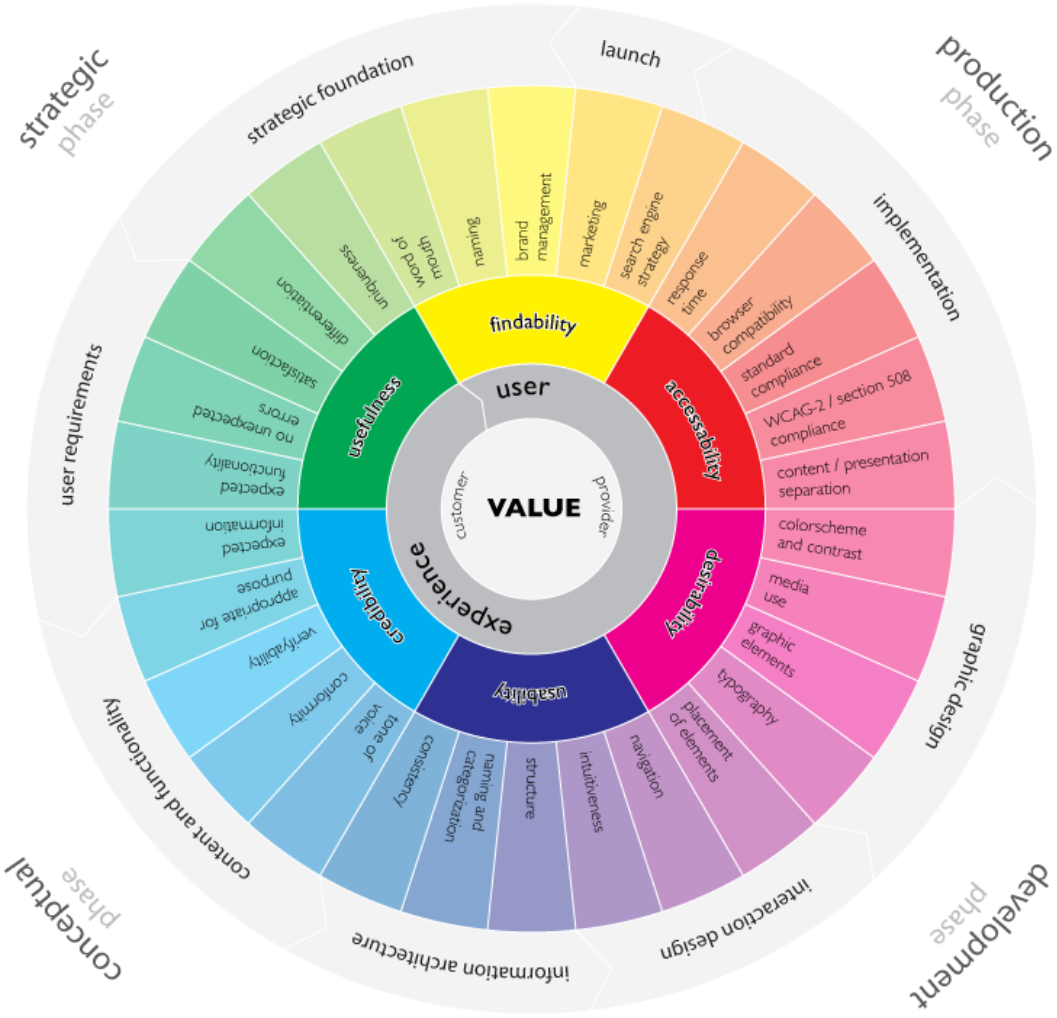

Figure 1: The user experience Design (Source: http://www.randsinrepose.com/assets/wheel-large.png)

Lessons learnt and recommendations for CLIPC

Identifying, consulting and engaging users groups

- The *contacts with users* should be maintained by specific project partners who have specific experience;
- A "*stakeholder board*" appears to be useful for ensuring an effective communication with the users. It could be replicated with a limited number of stakeholders (40/50) within CLIPC project;
- It can be useful to develop *"prototypes" for the process of addressing specific climate questions with selected stakeholders.*

Users' data and information preferences (seasonal to decadal scales)

The European Stakeholder Climate Services Conference (E2SC) allowed to better understand the needs of the selected organisation. These needs are detailed in the public deliverable 11.1 Outlook of sector specific vulnerabilities for Europe S2D horizon and can be summarized as follows:

- Water resources management: temperature and rainfall (highly correlated with hydrological processes studied and/or controlled by the stakeholder, ie. changes in river flows and groundwater recharge;
- Hydro resources management: precipitation but also temperatures and pressure variables (to evaluate variations in energy demand);
- Health: temperatures and precipitation, sea surface temperature, wind storms;
- Transport: ground temperature (influenced by air temperature, wind, soil, moisture), number of marginal nights (zero-crossing);
- Insurance : number of land-falling tropical storms, Extreme precipitation (river runoff over threshold 'x' in Asia and Europe), insurance specific drought indices, weather profile of year including lack of snow and late frosts, general "crop failure indices" with focus on the USA and China, length of dry spells;
- Agriculture and forestry: temperature, total precipitation, number of rainy days, dry spells, drought and Standardised Precipitation Index (SPI), low temperature, SST, number of frost days, snow cover.

COST Action ES1102 VALUE

COST Action ES1102
Funded by COST, 2012 - 2015
Project coordinator: Prof. Dr. Douglas Maraun. GEOMAR | Helmholtz Centre for Ocean Research Kiel
Project website: http://www.value-cost.eu/

The COST Action VALUE project will provide a European network to validate and develop downscaling methods and improve the collaboration between the dispersed research communities and with stakeholders. The Action will systematically compare the different downscaling approaches and assess validation aspects as to temporal variability from sub-daily to decadal time scales including climate change, extreme events, spatial coherence and variability, and inter-variable consistency together with the related uncertainties.

The COST-action ES1102-VALUE brings together the providers of climate information and the end users and aims to bridge gaps between scientists and stakeholders as well as between climate scientists, statisticians, and end users. VALUE is one of very few initiatives which emphasise validating downscaled results, which subsequently will be used in climate services.

The involvement of statisticians ensures proper validation, rather than just 'superficial' comparisons between means and standard deviations. One working group (synthesis) has produced a white paper on getting an overview of user needs[7], and which give valuable input to CLIPC. VALUE also will make use of a data portal designed by the University of Cantabria (http://www.meteo.unican.es/en/portal/downscaling).

Users

The COST Action VALUE project showed difficulties to involve end users, but also included accounts on how the data providers perceived the reception of the climate information. VALUE decided to group the users into three levels dependent on the data needs:

1. Decision makers and programme initiators: They may need climate projection results on a single page (see ICCS2 impressions) aggregated in an understandable way.
2. Natural science impact modellers (with a regional focus) need the "raw data" in a way they are familiar with (time-series of station data, or if they work on the broader scale gridded data (cf. IMPACT2C).
3. Economic researchers or end users from the private sector. They need information about changes in the impacts (heat waves, floods, wind damages, etc.), and are often satisfied with (regional) changes in the changes in occurrence probability of the impacts, either from the climatological community or from the impact modelling community.

Lessons learnt and recommendations for CLIPC

- The COST Action VALUE project shows the importance of developing *different strategies for different types of user communities*;
- It appears to be important to assess the models' ability to predict changes in statistics of extremes in order to make practical use of projections of standard meteorological indicators;
- End users do not necessarily appreciate the more sophisticated validation processes needed to establish the quality of this information, but it may be useful to communicate the difficulties involved in these processes to facilitate the interpretation of the data by the users and put them into perspective.

ToPDAd

Tool-supported policy development for regional adaptation project (ToPDAd)
Funded under the European Commission's Seventh Framework Programme (PF7)

[7] http://www.value-cost.eu/sites/default/files/d1_enduserneeds_whitepaper.pdf

Ongoing, started in 01-10-2012 Tony Rosquist Project Coordinator Project Web Site: www.topdad.eu

ToPDAd's objective is to develop methods and tools for businesses and governments to address technical and socio-economic developments within the fields of energy, transport and tourism, in order to assess the aggregated impacts of climate change hazards on health, environment and the economy. ToPDAd aims to deliver state-of-the-art socio-economic methods and tools for an integrated assessment, helping adaptation decision-makers to evaluate regional, national and EU-level climate change adaptation strategies and policies more comprehensively than before.

So far, the project has not yet been very successful in involving end users in the project. This project shows that it appears to be very difficult to motivate end user-groups such as consultants, intermediaries, policy makers and societal end users to participate in workshops, even if a workshop is organised at a relatively short distance. Until now two stakeholder workshops were organized to find out general user requirements for the ToPDAd tool set and to get an understanding of processes and situations where CCA decisions are made, and what kind of information and inputs are needed to support decision-making. The first workshop gathered 16 participants of which only 5 can be considered potential end users. For this workshop a set of 25 questions was sent in advance to the workshop participants to enable preparation for the workshop sessions. Some of these questions aimed to find out about: the typical climate change related decisions and adaptation measures in the organisations; data requirements to support climate change adaptation measures; and the dissemination of the project results.

Users

ToPDAd is targeting business representatives from the energy, transport and tourism sectors, consultants and policy makers at the national and local levels. However, climate scientists and impact researchers also have been approached.

Lessons learnt and recommendations for CLIPC

Identifying, consulting and engaging user groups

- Within a government organisation or agency, CLIPC should look for potential end users in different departments. To identify and involve government policy makers, the CLIPC project has to take into account that adaptation is not the responsibility of a single body, but scattered across government sectors and linked to several decision making processes. Thus, *there is not a single expert that can fully represent adaptation decision-making at any government level;*

- For identifying user requirements, it appears useful to *start from the timing and focus of decision-making processes in which end users are involved*. However, interaction between the end users and providers is needed to avoid false expectations, as in CLIPC we will not generate new data. E.g. policy makes at the lower level and societal end users tend to require high resolution climate data/info (0.25 grid). It is still to be seen if CLIPC is able to provide this data;
- For identifying user requirements, explicit *questions about spatial and time scales, and units* to be used are relevant.

Users' data and information preferences

The ToPDAd consultant (advisor in the domain of energy, transport and tourism) and researchers identified a large set of data / information requirements (see Annex 3). Of relevance to CLIPC can be:

- Description of current climate
- Probability of extreme weather events sorted by category of effect, preferably at regional level (e.g. summer temperature, winter temperature, summer rainfall, winter rainfall, wind speed, snow-cover- days)
- Probabilistic distributions of mean (climate) and extreme (weather) conditions on a reasonably fine spatial scales, e.g. (0.25 grid)
- Seasonal projections and detailed forecasts (for defined local areas)
- Observed natural impact of climate change, societal scenario data, and societal impacts (observed and simulated)
- Sources of uncertainty in data and information

Relevant for the CLIPC impact indicator toolbox are:

- Demographic data, GIS, asset values, cultural and historical values, technology, economic expectations and scenarios, different life spans, and especially for the private sector, 1) trend data: political (regulations, policies, subsidies), cost and revenue projections, customer trends, technology, 2) current situation (emission, cost based, quality of product/services, energy intensity), 3) variable/factors to create scenarios and decision basis
- Adaptation measures and their monitored effects
- Information on costs of measures, costs of no action and insurance premiums
- Criteria for selecting adaptation measures (societal costs and benefits, vulnerability of critical services, reliability, acceptability, ability to compensate losers of adaptation measures, no serious regret risk, measures delivering more flexibility, real options, lessons-learnt and what-if analysis)

IS-ENES 1

Infrastructure project of the European Network for Earth System Modeling (IS-ENES)
Funded under the European Commission's Seventh Framework Programmema (FP7)
March 2009 – February 2013
Project coordinator: CNRS-IPSL
Project website: https://verc.enes.org/ISENES2/archive

IS-ENES (the Infrastructure project of the European Network for Earth System modeling) project is an FP7-Project funded by the EU under the Capacities Programme, Integrating Activities. The project began in March 2009 and ended in February 2013, but is continuing in a second phase project as IS-ENES 2. The project distinguishes four objectives:

- Foster the integration of the European climate and Earth system modelling community;
- Foster the development of Earth System Models for the understanding of climate change;
- Foster high-end simulations enabling to better understand and predict future climate change;
- Foster the application of Earth system model simulations to better predict and understand future climate change impacts.

To identify the potential user groups and data/information requirements, IS-ENES made use of an online questionnaire followed by a workshop, and later again a follow-up workshop to evaluate progress (see Annex 3). The workshop addressed issues including: potential user groups, user consultation strategies, variables/indicators to be made available, and dealing with uncertainty. An online questionnaire was send two years later and focussed on the use and interface of the IS-ENES Climate Impact Portal. Questions focussed on user background, technical aspects of the portal and usability. More information and advices on the IS-ENES portal are given in the Annex 3, IS-ENES.

Users
Part of the IS-ENES project is the ENES Portal Interface for the Climate Impact Communities (EPICIC). EPICIC focuses on climate change impact modelers, impact and adaptation consultants, as well as other experts using climate change data. CLIPC builds on and collaborates with ISENES, including the EPICIC portal.

Lessons learnt and recommendations for CLIPC

Identifying, consulting and engaging user groups

- If *online questionnaires* are used, mechanisms have to be designed and implemented to obtain sufficient feedback;
- In addition to on-line questionnaires, it is important to organize *face-to-face interactions*. Workshops give a large amount of feedback of user requirements on data/information, especially if multiple sectors are involved;
- A workable method for a user workshop can be to *separate the participants* into groups working on the *same theme* (water, ecosystems etc.) and to allow the participants to discuss in groups on given questions for user requirements;
- In CLIPC, a search option should be made available where users can retrieve information that is problem-oriented. Data sources are usually project-based and therefore limited to institutions participating in the projects; there is a large need for a *problem-oriented search portal* where all projects from all institutions can be found. This limits the need to search via institutes. The ISENES document does not recommend which problems should be searchable;
- Future user consultation should build on existing user consultation mechanisms. EUMETNET, ACE, CIRCLE-2 are mentioned as examples.

Users' data and information preferences

- The most important type of data identified by the participants in the last ISENES workshop on the Climate Impact Portal as required from the portal is precipitation (total over x days), river discharge, air temperature, sea surface temperature, sea level.
- User guidance is important on how to deal with uncertainties. It is suggested to present uncertainties in data as ensembles spread.

3.2 Regional, national and projects

CARePOL

Climate change adaptation in Norway, Sweden, and Finland – do research, policy and practice meet? (CARePOL)
Contact: Prof. Inger Hanssen-Bauer
Funded by the research councils in Norway, Sweden and Finland; 2009 - 2010

CARePOL (Climate change adaptation in Norway, Sweden, and Finland – do research, policy and practice meet?) was a project in the Nordic countries of Norway, Sweden and Finland that surveyed and compared provision and need of climate information by surveying three distinct groups: climate information providers, climate scenario users, and decision makers. The results are available in three reports:

- Available local and regional climate projections by country and downscaling technique – Information providers
- Report on results of Questionnaire 2 – Climate scenario users
- Report on results of Questionnaire 2 – Decision makers

Three individual surveys were performed. The results from part 2 where users and user needs are presented are most relevant for CLIPC. Part one does not really mention the response rate, but was built on a small group of focused interviews. Part 2 had a response rate of about 27%, and part 3 had a response rate of about 50%. Part two, about the scenario users, was sent out both to general addresses for selected institutions, and targeted to personal contacts of participants in the project. The data indicates that there is no significant variation in response rate between these two contact methods, institutional contact and direct contact to known users, used in part two. One lesson for CLIPC is to expect a low response rate on a general questionnaire, while, obviously, an approach more focussed on the interest of specific users might get a better response. The scenario users gave a clear indication that precipitation and temperature are the most interesting elements, followed by humidity, snow, wind, and air pressure; unfortunately the report did not state what they wanted to know about these extra elements. A list of more detailed information requirements which the climate scenario users considered to be unavailable includes soil frost, convective precipitation, daily variations in temperature.

Users

CARePOL intended to target the following user groups: climate information providers, climate scenario users, and decision makers.

Lessons learnt and recommendations for CLIPC

- There is no significant variation in response rate between the 'institutional contact method' using the general e-mail address of selected organisations' and direct contact with known users;
- An approach focussed on the specific interests of particular user groups might get a better response rate than if a general questionnaire is used;
- The specific niche of a European portal like CLIPC has to be defined as most of the climate scenario users make use of national portals to obtain the necessary data and information. This may include transparent links between the European and national portals where the added value of the information accessible through the CLIPC portal should be clearly communicated.

More information and advices are provided in Annex 3.

KNMI Inventory of user requirements / Dutch National Climate portal

Dutch climate portal
Funded by the Dutch government
2009-2011
Project coordinator: Platform Communication on Climate Change (PCCC)
Project website: www.klimaatportaal.nl

The Dutch national climate portal is available on www.klimaatportaal.nl and is a national portal where scientific information on climate (change) can be found. It has been created by the Platform Communication on Climate Change (PCCC) which is a partnership between several Dutch research institutes. The project is part of the communication theme of the Dutch Climate changes Spatial Planning programme. The project began in 2009 and ended in 2011. The website is currently not being updated anymore. The identification of data/information requirements of users was done via a number of methods such as interviews, consultations, workshops and other meeting sessions that made an inventory of user requirements concerning climate information per sector. This information was used as background information for creating the Dutch climate portal. The portal was then evaluated with an online questionnaire focusing on the available information on the portal.

Users
The portal focused on making climate information available for national policymakers businesses, interest groups, media and the general public.

Lessons learnt and recommendations for CLIPC

Identifying, consulting and engaging user groups

- *Regular contact with users* through projects and meetings is important. This is difficult to achieve for CLIPC, but by using other project meetings to get feedback it might be possible to some extent;
- Feedback on the web portal can be stimulated by an online text box in which web visitors can easily give their remarks, ask questions, or make suggestions for other projects providing or requiring additional information. This would require an active response team or *help desk.*

Users' data and information preferences

- Information preferences on climate variables can be found in the Annex, some examples are temperature: minimum- and maximum day temperature (averages and extremes) and rain deficit changes throughout the year;
- It is recommended to include *'Frequently Asked Questions'* (FAQ's) where answers are given to questions posed to the organisations included in this project (several of the questions/remarks form the review in this report can be included). Under these FAQs also several of the requests from the users from the meeting and review can be answered;
- Users (if possible!) should be given *sector-specific guidance* on how to deal with different scenarios, uncertainties, frequencies and extremes.
- A possible way of *presenting uncertainties* on climate change and its impacts is by showing it *sector specifically*. Differentiate uncertainties between the location, the level and the source of uncertainties. If available quantitative information on uncertainties should be provided;
- The *same set of scenarios and time horizons* should be provided *for all sectors* (as far as possible). And when there is agreement among experts when to use which data sets/scenarios/methods in certain situations, following this expert judgment may result in more consistency in the approaches followed.

More information and advices on the Dutch climate portal are given in Annex 3.

Norwegian weather and climate portals

Institutions: collaboration between MET Norway, Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Broadcasting Cooperation (NRK), Statens vegvesenet og Jernbaneverket and Kartverket.
Norway
http://www.yr.no
http://www.seNorge.no
http://eKlima.met.no

Several web portals exist for climate and weather data in Norway. The most popular site is http://www.yr.no providing forecasts, radar data, satellite data, and observations for recent dates. There is also http://www.seNorge.no, which provides climatological maps of temperature, rain and snow. A recent web portal for avalanche risk warnings is http://www.varsom.no. Norway has also provided free access to its national climate archives for several years (http://eKlima.met.no) and provided more advanced products to its customers on http://halo.met.no.

Users

All of these portals mostly focus on societal end users and especially local planners operating at the municipality level.

Lessons learnt and recommendations for CLIPC

The choice of information source depends on reputation, accessibility, and experience from previous use. The web portal www.yr.no for weather information has become one of the most widely used IP address *f*or weather information in Norway, but also outside the Norwegian borders. The reason is that the data is freely available and easy to understand. The portal is an untraditional collaboration between the Norwegian broadcasting corporation (NRK) and MET-Norway, where the two partners do what they are best at: NRK in the framing of the information, MET Norway in providing the contents. The portal is operational around-the-clock, and 7 days a week. The language is both in Norwegian and English.

Project Troms

Climate adaptation as part of municipal planning in Northern Norway (Project Troms)
Funded by Norwegian Directorate for Civil Protection
Contact Lill-hege Nergaard (County governor of Troms)
Ongoing, started in 01-12-2012

Project Troms is a small project in Northern Norway looking into how climate adaptation and thus climate change information can be integrated into the municipal planning process. This rather small and local project is included in the CLIPC survey because there are some clear results that might be interesting for the product development of CLIPC.

Users
Project Troms is targeting local planners operating at the municipality level.

Lessons learnt and recommendations for CLIPC
The most striking result in the project is the huge knowledge gap between information providers, like MET Norway and the information needs by the users (smaller municipalities). The municipalities need strongly tailored products, like present and future flood zones, fitting their planning needs. If they do not get this kind of well-tailored products, only very limited climate adaptation will be included in the municipal plans for future development. The project has produced two documents as end products that will be published in the spring of 2014: A guideline on how to integrate climate adaptation in the planning process, and a simplified climate profile for the county, readymade for the municipalities to integrate in their planning documents.

A lesson for the development of climate information portals is to be aware of the perceived need from the users of high resolution data, especially in space, in contrast to the scientific community's perception of "good enough" information.

Understanding Needs, Meeting Demands: A user-oriented analysis of online knowledge brokering portals for climate action and development

Understanding Needs, Meeting Demands: A user-oriented analysis of online knowledge brokering portals for climate action and development.
Funded under the UK Department of international development and DGIS
Ended and reported 2013
Anne Hammil et. al.
http://www.iisd.org/pdf/2013/understanding_needs_platforms.pdf

This report is an evaluation of online resources (climate knowledge brokerage (CKB) platforms) for climate action and development. The project used a combination of a web questionnaire and interviews with specific user groups for the evaluation. There were no attempts for any prolonged engagement of the users beyond answering the questionnaire and the interviews. The focus of the assessment was on advice for climate action and development portals (focused on developing countries).

User groups
The user groups targeted in this initiative included societal end users such as NGOs and government officials operating at the national level

Lessons learnt and recommendations for CLIPC

- One lesson for portal design is the recognition of the contrast between supply-driven and needs-driven portals. There was a clear tendency in the portals to try to compensate lack of understanding of the user needs in the design by adding extra data, thus moving the portals more towards supply-driven portals;
- CKB platforms are not changing the way users initiate searches for information;
- The vast majority of research participants started their searches for climate change-related information at search engines or specific institutional websites; this was also the expectation of platform managers interviewed for the four case studies. CLIPC should take this into account in the design of the platform and the dissemination activities; Users still prioritize accessing information and knowledge in "traditional" (written) formats. Despite the growing popularity of social media and Web 2.0 technologies, users involved in the evaluation still primarily accessed CKB platforms to download research reports, policy documents and journal articles; while they would appreciate a possibility to get

access to experts. Despite the strong preference for accessing documents, the case studies did reveal a desire among some users to be linked to other people and/or personal experiences.

- CKB platform users still prefer to receive information than share knowledge online. It is unknown if there is a relationship between the kind of user (age, role, gender, educational level) and their preference for written information and their interest in engagement in two-way interaction, but this is something a CLIPC user strategy may have to consider.
- Most survey and case study respondents identified themselves as occasionally active when sharing information and knowledge online. People appear to be aware of the range of outlets for sharing information and knowledge but simply do not do so frequently.
- .Platforms should recognize the value of blending online and offline functions.

3.3 IS-ENES2 & CLIP-C user consultation workshop

Two IS-ENES2 & CLIP-C user consultation workshops were organised at the CIRCLE2 Adaptation frontiers conference in Lisbon (10 -12, March 2014). The main objectives of the workshops were:

- Articulation of user requirements;
- Formulation of recommendations to IS-ENES2 and CLIP-C for an integrated strategy for user consultation in the coming years;
- Inventory of users interested to participate in future user consultation and engagement activities.

Most of the participants of the workshops categorized themselves as ‘societal end users’ and ‘intermediaries’ or ‘boundary worker’. The distinction between ‘societal user’ and ‘boundary worker’ was not always clear. Some representatives from environmental agencies for instance see themselves as societal users and others as intermediaries. Only two participants considered themselves being an ‘impact researcher’. No climate scientists participated in the workshops.

Priority user groups

Participants indicated that the number of potential societal users and the variety of contexts, scale levels, challenges, and other dimensions is too large for climate data providers to be able to cater to their specific needs. It is therefore necessary to make choices. It was recommended to focus on intermediary organisations (consultants, managers of national portals, environmental agencies, and climate discussion fora).

User consultation strategy

Participants recommended to link the identification of data requirements to the users’ decision-making context. Data are very important for societal end users (e.g. private

companies, local authorities) and intermediaries, but given the complexity of decision making processes, a simple transfer of raw data is most often not possible or meaningful. Translation and tailoring of raw data into formats useable for decision-makers is needed but requires additional efforts. A relevant information format for end users can be a story line starting from a description of a phenomenon (e.g. the Urban Heat Island effect) and link it to climate change scenarios, (bio)physical impacts and social-economic impacts on sectors. The CLIPC portal could find ways to present such formats, like story lines, putting climate data and information into potential end users contexts. The participants also recommended to establish test groups.

Users' engagement and sustaining interaction

Exchanges must be characterized by reciprocity; both providers and users must learn and be ready to adapt their common practices. So, organizing regular feedback on preliminary results is more important than identifying needs in the beginning of the project. The latter has already been done in so many other projects and workshops. Lessons learnt in the We-Adapt web space are relevant and can inform CLIPC. Intensive engagement between users and providers of climate data during the project requires investments of time, money and effort.

The participants also recommended to make use of professional facilitators to organize exchanges between data providers and potential users.

Data requirements

The participants identified the following issues and needs:

a. The resolution of existing data (temporal and spatial) is not sufficient to study impacts nor adaptation strategies at local levels satisfactorily.

Examples mentioned during discussions were:

- Study of urban heat island effects;
- Study of ecosystems, for instance in mountainous or coastal areas, where the heterogeneity of local circumstances is large;
- Study of extreme conditions;
- Distribution of precipitation;
- Sea level rise (e.g., increase in cm in 50 and 100 years).

b. Need for other parameters included:

- Urban surface fluxes of energy, matter (H_2O, CO_2, particles), needed to study/model the specific urban local climate.
- Ocean conditions, for example ocean pH, swell, waves, that have an impact on coastal ecosystems.
- Relative humidity, e.g. required for biological assessments.

The discussions on data needs in the two sessions showed the importance of an exchange between data providers and users. Sometimes users may have too high expectations in relation to what is currently possible in terms of reliable information, based on existing data and tools. CLIPC should include a discussion on the extent to which, or the specific questions for which, high resolution data is really needed for more effective decision making. CLIPC should also help users to find their way in the large and growing collection of climate and climate impacts data sets.

4. Syntheses and conclusions

According to the Description of Work of the CLIPC project, "*CLIPC will provide access to climate information of direct relevance to a wide variety of users, from scientists to policy makers and private sector decision makers.*" This wide set of users does not provide a clear foundation for a one-stop-shop portal to be built on users' needs. Moreover, there is limited time and financial resources to initiate and sustain the engagement of a wide variety of user groups. Therefore a selection of the most important user groups is required, and subsequently a choice of associated networks or representative users.

First, this chapter synthesizes the lessons from the reviewed projects and initiatives with respect to user consultation and engagement strategies and user requirements. Second, based on these experiences in combination with the scope and available resources in the CLIPC project, recommendations for priority user groups are formulated. Finally, for each of the priority user groups a consultation strategy is elaborated.

4.1 Lessons learnt for user engagement

Targeted user groups

Earlier experiences clearly show that there is not one user but many and also that a one-size fits all strategy is bound to fail. Users of climate services as targeted by CLIPC have to be grouped into distinct categories which can be done in different ways. They can be divided according to sector(s) of interest, intended use (research, decision/policy making) or capabilities to deal with climate and climate impact data. Most of the reviewed projects distinguish between scientific users (e.g. climate scientists, climate impact researchers, climate adaptation researchers) and societal end users (policy makers, NGOs, engineers, water managers, city planners, farmers). Intermediary users or intermediary organisations who operate at the interface between science and society (e.g., (climate) consultants, environmental protection agencies, research institutions supporting policy making or managers of climate information platforms) form a specific user category. Section 4.3 discussed these categories in more detail.

Most of the reviewed projects either explicitly or implicitly focus on both scientific users and societal end users. A few projects such as Climate-adapt [8](3.1), CLIMRUN[9] (3.1), ToPDAd[10] (3.2) and EUPORIAS[11] (3.1) specifically target societal end users. Others such as IS-ENES

[8] http://climate-adapt.eea.europa.eu/
[9] www.climrun.eu
[10] www.topdad.eu
[11] http://www.euporias.eu/

1[12] (3.1) focus on scientific users mainly. It is often not clear to what extent the projects have been able to reach the intended target groups as, unfortunately, this aspect is usually not systematically evaluated and can only indirectly be inferred from project documentation or interviews with project collaborators.

Getting into contact with users

Usually projects establish initial contacts with users through the networks of the project collaborators and/or through digital distribution of questionnaires through climate related channels. The experience of the CARePOL project (3.1) with contact strategies shows that there is no significant variation in response rate between the 'institutional contact method using general the general e-mail address of selected organisations' and 'direct contact with known users'.

User consultation strategy

One common challenge from the reviewed work seems to be the serious difficulty in actively engaging user groups in the research projects and maintain interaction, in particular societal end users. The reasons for this could include:

- To non-scientists, information provided by researchers may be too cryptic and often these people have too little time to devote to learning new things that may or may not be of relevance. Professional communication experts and facilitators who can help scientists to bring out the main messages are often lacking (CLIM RUN) (3.1);
- In order to minimize (bur probably not avoid) misunderstandings about terminology, a glossary with clear definitions to which can be referred in communication is required.
- The level of climate science understanding amongst societal stakeholders is generally low (COST-Action VALUE project[13] (3.1) and the Norwegian Troms project (3.2)) and communication between climate scientists and stakeholders poor;
- For most businesses, so far, climate change has not been a big issue (ICSS2). There is a lack of belief that climate change will have a strong impact on the next couple of decades (COST- Action VALUE project) (3.1);
- In case of capital-based investments it may be too optimistic to assume that users will be satisfied with data and information provided by a web portal, especially when there is a risk of potential loss that can have detrimental effects on the business. Most serious business decisions require thorough analysis and a good understanding of the risks, which would imply personal consultation. Experience from ICCS2 and the COST- Action VALUE project suggests that "knowledge is never going to be downloaded from a web site"(3.1).

[12] https://verc.enes.org/ISENES2/archive

[13] http://www.value-cost.eu/

The experiences show the following lessons with respect to user consultation strategies:

- For a good exchange of information and knowledge, it is vital that the information providers understand the concerns, specific questions and goals of the different users. The implication is that there is a need to link the data/information to the user's decision-making context;
- Regular contact with users through projects and meetings is important. The needs of users may change with time, for instance if people learn that climate change may affect them in ways that they previously have been unaware about. This is one reason to organize the identification of user requirements as an iterative process;
- The use of CLIPC scoping documents like in Climate-ADAPT or a protocol like in EUPORIAS and CLIMRUN for selected users groups appears to be useful to involve users more effectively (3.1). Such a scoping document will require a project charter, a name, project justification, as well as project requirements, milestones, and deliverables;
- Earlier projects suggest that notwithstanding new technological possibilities, many users may still prefer mainly written information (documents) and may not be motivated to engage in two-way interactions. It should be explored to what extent communication methods depend on age, gender, level of knowledge or regional background;
- One way of improving the communication of climate and climate impact data, in particular to intermediary organisations or societal end users, is the development and usage of clear 'storylines' linking basic climate data with information about impacts and their relevance to decision-making challenges. The application of 'use cases' like in the ISNES2 project can help impact researchers to discover how to make best use of the portal.

Strategies for engaging the user groups and sustaining the interaction

The review of projects offers limited information about strategies for engaging the user groups and sustaining the interaction throughout the project. However, it is likely that for users to become actively engaged an important question is "what is in it for me" or whether they see the activity as a waste of time. In order to be successful, it is important that the project members, the scientists, acknowledge the needs of the user groups and are skilful communicators. It is also a question about building trust and confidence, which may require longer time than is available through a few days project meetings. A key word for success is expectation management. It is important that all partners have matching expectations, and a common understanding of the end results. It is also important that the work lives up to promised goals. Using a standard set-up for meta-data may also send the message that the information has undergone some quality checks and give a more professional impression.

The creation of a multi-disciplinary, motivated and representative users committee (or "stakeholders board") like in the EUPORIAS project (3.1) , provides guidance at all steps of the project development and could be particularly relevant for the CLIPC project to ensure an effective involvement at all steps (i.e. to define the effective and strategic needs, to evaluate

prototypes by testers of beta portal versions, to validate choices made by the project team, etc.). Furthermore, to the extent possible it is important to adjust the timing of the projects user consultation and engagement activities to the objectives and time schedules of the users rather than requiring them to adjust their objectives and time schedules to a pre-determined research plan, which requires a fair amount of flexibility in designing the activities.

Organising regular feedback on the web portal is important and can be stimulated by an online text box in which web visitors can easily give their remarks, ask questions, or make suggestions for other projects providing or requiring additional information. This requires an active response team or help desk.

Use of climate information portals

People increasingly search the internet for climate information, but some portals are more visited than others. The choice of information source may depend on reputation, accessibility, and experience from previous use. The web portal www.yr.no for weather information has become one of the most widely used IP address *f*or weather information in Norway, but also outside the Norwegian borders (3.2). The reason is that the data is freely available and easy to understand. The portal is an untraditional collaboration between the Norwegian broadcasting corporation (NRK) and MET-Norway, where the two partners do what they are best at: NRK in the framing of the information, MET Norway in providing the contents. The portal is operational around-the-clock, and 7 days a week. The language is both in Norwegian and English which favours its use by the societal end users such as policy makers at municipality level.

4.2 Lessons learnt for user data requirements

Initial types of user requirements

The identification of user requirements will be part of the second task in Work Package 2. When identifying user requirements it is most important to know for what purpose data will be used (Bessembinder, 2012). In this section we do not intend to provide a complete picture of the requirements of the different user groups, the review however provides some insights, for example:

Climate scientists and climate impact researchers generally have a relatively high level of knowledge about climate change and the possibilities and limitations of climate data. These user categories make use of climate variables (e.g. maximum and minimum temperature, precipitation, extreme precipitation), for different time horizons (current climate, around 2020/2030, around 2050), using a generic set of climate scenarios or tailored/extreme climate scenarios, usually comparing those with a baseline/reference period (using different periods and different sets of observational data). Impact researchers also require data/information for impacts such as impacts on hydrology, ecosystems, agriculture, health, and other sectors,

including changes in groundwater levels, agricultural productivity, and presence of species (Bessembinder et al., 2012). For climate impact researchers (and societal end users) it is relevant to provide information in the form of processed data (climate indices). Particularly, indices on extreme events and on worst or best case scenarios appear to be relevant from an impact perspective. Spatially explicit information (maps) and first order delta indices are also particularly relevant (Swart and Avelar, 2011). In addition, to better respond to the needs of the impacts community, simple post-processing tools should be developed and made available, e.g. for simple statistics, data conversions, or visualization, accompanied by guidance on how to use and interpret the information with proper account of uncertainties and data limitations (Swart and Avelar, 2011).

Societal end users who might want to raise the profile of climate change on the political or public agenda may be more interested in information about extremes, maps or (photo) graphs that clearly illustrate climate trends and projected change, including information on recent extremes that have had large socio-economic impacts. For example, the Troms project found that many end users, such as policy-makers on a municipal level, want results in the form of geographical maps. Extreme events are important to the society, which implies the need of statistics on heavy rainfall, high temperature, heat waves, drought, flood, hailstorms.

‘Story lines (sometimes referred to as ‘enriched information chains’ appear to be useful for societal end users. These storylines are related to observed climate trends and projected changes and include information about impacts on biophysical systems and socio economic sectors. Societal end users may also need additional data such as land cover data, elevation, social-economic data, and emissions (including scenarios for the future).

It is also important to emphasize the need for observation-based information, be it ground measurements, satellite data, or meteorological data from a station network. Some end users are already accustomed to time-series of station data, however, the more advanced user asks for uncertainties, frequencies and extremes. To make the understanding of societal end users more clear, a glossary appears to be useful (CLIM RUN) (3.1) and/or a FAQs section (Dutch climate portal)[14] (3.2).

Users from different sectors require different data and information, and have different capacities to access and use the available information, knowledge and data. Some users in the energy industry want to know about aerosol variability, cloudiness, radiation, and wind. When it comes to wind-related risk exposure then both wind speed and direction matter. The fire weather index is an important indicator for the risk of wild fires, and hence important to the civil protection agencies. When it comes to tourism, sea and lake bathing water temperature, future snow conditions in mountains areas, local winds, and sea level rise for seaside tourism actors seem to be of interest (CLIMRUN). Expressed interest in more specialized information

[14] http://www.klimaatportaal.nl (in Dutch)

such as river discharge and sea surface temperature is also found in the review. Some of this information is needed to compute present and future flood zones. Noteworthy is that there may also be users that do not necessarily need climate variables. They may want to use story lines that are based on the different climate scenarios (e.g., qualitative information related to exceeding a particular threshold).

Temporal and spatial resolution: Interest has been expressed in historical weather statistics and climate on time horizons of 1, 2, 10, 30 up to 50 years (CLIMRUN). For the future, the time horizons mentioned in the context of this review have included 1, 2, 5, 10, 30 years. In addition, there has been a demand for seasonal scales. For weather impacts of heat waves, floods and wind damages, regional scales are regarded as sufficient. There have been suggestions of standard tools for post-processing climate and climate impacts data. The COST-Action VALUE project shows the need for a range of spatial scales demanded by the end user: 100m x 100m to 20km x 20km. The highest resolution is unrealistic in the sense of pure model results, but from observational point of view, it is well-known that nearby values of weather elements have a strong dependency on each other, especially in a statistical and climatological sense. A 100m x 100m grid contains a high degree of redundant information.

Meta data -uncertainty

There has been little discussion about meta-data and controlled vocabulary, although EUPORIAS has established a glossary[15] describing basic aspects. However, this glossary does not cover technical terms concerning what methods have been used for deriving the results, how they have been validated or bias-corrected, and what the different types of skill scores mean. The projects NPCC[16] and ESGF[17] have made some efforts in building up a meta-data-base on methods, but not on data, validation, skill score, and results. Tagging the data in a standard fashion will make them well documented and traceable. This labelling is relevant for climate information providers, climate scenario users, and decision makers. It is a risk that climate data will be used incorrectly, possibly leading to bad decisions with potential legal consequences, which justifies the transparent provision and explanation of associated meta data.

Users require information about uncertainty (e.g., types of uncertainty included, quantification of uncertainties and/or qualitative information, etc.), information on biases in the data and on robustness. However, the ‘climate scientists’ category is also likely to have a different perception of the concept of ‘uncertainty’, meaning areas for further research, whereas the other three categories may view the different aspects of uncertainty as more undesirable and problematic. The term uncertainty is a catch-all phrase, itself often with a vague definition.

15 http://www.euporias.eu/glossary

16 https://earthsystemcog.org/projects/downscalingmetadata/

17 http://esgf.org/

There is experience with some infographic presentation of uncertainty for e.g. weather forecasts (green, yellow, and red colouring). Climate adapt provides useful guidelines on dealing with uncertainty.

4.3 Priority user groups for CLIPC

Based on the experience in past projects, the recommendations from IS-ENES2 & CLIP-C user consultation workshops and the limited resources in the CLIPC project, a pragmatic approach is applied to select priority user groups. This pragmatic approach builds on the idea that potential users already involved in the CLIPC network or in related projects in which CLIPC partners participate are more easily to interact with than others. The potential users can be sorted in three circles dependent on the involvement in the CLIPC project and related projects (figure 4):

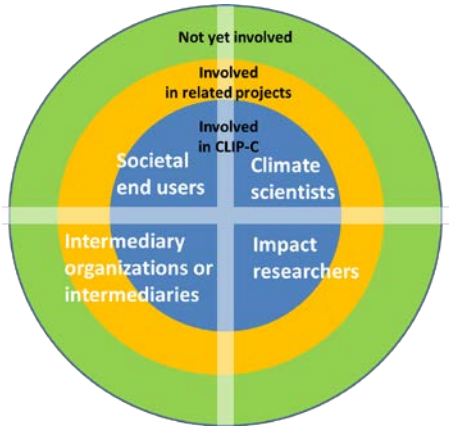

Figure 2: Suggested classification of users groups in three circles dependent on connection to the project

First circle: Potential users already involved in projects of CLIPC partners;
Second circle: Users already involved in other similar European and national projects. The CLIPC partners participate in these related projects;
Third circle: Potential users of interest known by various partners but not necessary involved in any projects at the time.

To get a more targeted picture of the user needs we subdivide each of these three groups into four categories, according to expected requirements and capabilities to handle climate data:

A. Climate Scientists
B. Impact researchers
C. Intermediary organisation (boundary organisations)
D. Societal end users

Category A involves climate scientists including the data providers themselves, who for instance need observational data to evaluate their model results or to make use of empirical ground truth in other data processing activities. It includes both earth system modelers as well as regional modelers working on dynamic downscaling. The impact researchers group (category B) may overlap with the 'climate scientists' to some extent, e.g. for researchers working on land-atmosphere interactions, but this category is not involved in developing and running climate models. This group may include the downscaling community who need data for empirical-statistical downscaling or bias correction, in addition to model validation. However, most of this group will be people from the hydrology, biology, agriculture, and engineering communities, with some experience dealing with data, and statistics. Category B encompasses also socio-economic impact researchers of some are less experienced in handling complex than biophysical impact researchers.

'Intermediary organisations and intermediaries' in category C include consultants who work at the interface between the scientists and the societal end users. Organisations such as the EEA but also consultant agencies, environmental protection agencies, research institutes involved in policy support, facilitators of climate discussion fora and managers of national climate portals will be considered in this category. 'The societal end users in category D represent policy makers (e.g., people involved in policy development within governmental institutions and technical staff in business firms), decision-makers (people who are making the actual decisions like politicians, company managers) and practitioners (people involved in the implementation of adaptation such as NGOs, water managers, farmers, or civil servants who often do not have a high climate or science literacy). Table 3 provides examples of organisations, networks and 'groups' in each of the four user categories.

Table 3: Examples of organisations, networks and 'groups' in each of the four user categories

	Circle 1: Users in CLIPC	**Circle 2: Users in related projects**	**Circle 3: Other users**
Category A: Climate scientists	.... (modellers interested in climate observations)	ISENES, IMPACTS2C, EUPORIAS, UERRA, CORE-CLIMAX, CRYOLAND, EURO-CORDEX, COMBINE, EUCLIPSE, EMBRACE,	Climate researchers in central/eastern Europe
Category B: Climate impact researchers	PIK, ALTERRA, UNIDO, JRC, SYKE	CIRCLE-2, ToPDad, RAMSES, BASE, CARePOL, DRIAS, Eucleia, ECLISE, VALUE, JPI-Climate	ISI-MIP.AgMIP modeling groups

Category C: Intermediary organisations or intermediaries	TEC	EEA (Climate-ADAPT), PBL, UKCIP, UFZ, . EUPORIAS DRIAS, CHARMe, IMPACT2C, ECMOS, IMPRESSIONS	ACCLIMATIZE, Climate-KIC Adaptation Services projects
Category D: Societal end users	-	CLIMRUN, EUPORIAS DRIAS	Local administrators , national decision makers, construction industry, road and rail authorities, dam and river authorities, NGOs

The four groups will require different climate data. In general terms and supported by the lessons learnt from the review, category A is expected to require a high level of detail and have a preference for large sets of little processed data. The focus of category A users will be on tier1 data[18]. Category B users are likely to require post-processed data, usually a specific subset of available data, and they will have an interest in tier 1 and 2 indicators. Category C users will prefer post-processed data, and tools to self-process raw data. Their focus will be on tier 1, 2 and 3 data, with a special preference for tier 3 indicators Category D is expected to require mainly concise processed information, possibly post-processed by category B or C users. Their focus will be on tier 1, 2 and 3 data with a special preference for tier 3 indicators (see figure 2). From category A to C the understanding of the quality of the data can be assumed to decrease, requiring different levels of guidance to support adequate interpretation of the data or information provided. The use of data tags and metadata is becoming increasingly more important with the proliferation of models, downscaling strategies, validation methods, and skill scores. From the differences between the four groups, one may expect that they require different types of metadata. However, this is to be verified in task 2.2 of the CLIPC project.

[18] CLIPC distinguishes between primary climate data (tier 1), observed and modelled changes in natural systems (tier 2), and socio-economic impacts (tier 3).

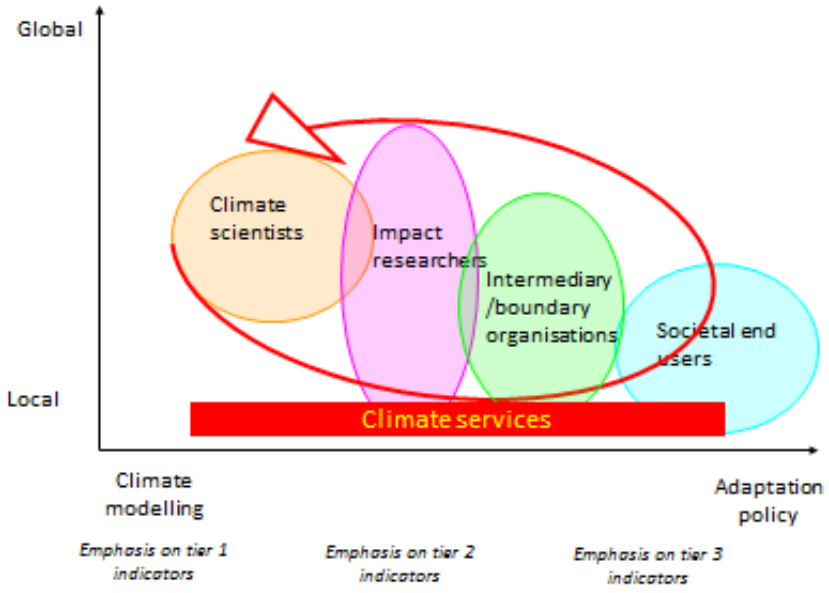

Figure 3: Four different categories of users and their main practices and preferences

In addition to the priority user groups for the CLIPC project proposed above, one should also consider who amongst the four categories will be interested in an *European* portal rather than a national or local source of information. For example, users in countries without national climate portal will probably be more interested than users in countries with a well-developed infrastructure such as Germany, UK, France or Scandinavia. Climate modellers are likely to have their own sources of information in their own modellers networks (e.g. the World Climate Research Programme projects such as CMIP and CORDEX), but may be interested in easier access to observational data. To accommodate all of the different user profiles fitting these categories will be extremely difficult, bordering on impossible. This expectation is not only supported by the review but also by a recent study on communication on climate change adaptation (Wirth et al., 2014). This study demonstrated that societal end users need specific information and presented in a way that cannot be achieved in the CLIPC project.

By way of conclusion, to develop a portal that will be of relevance and used by user groups, it is suggested that the CLIPC project focuses on climate scientists (category A), impact researchers (category B), and intermediary organisations (category C). Within category A, B and C, users will be selected from the three major thematic areas (urban, rural, cross-cutting). To 'reach' the societal end users, primarily the intermediary organisation will be consulted. They are assumed to know their clients' needs and to satisfy these by translating or transforming the data of the CLIPC portal into useful information for societal end users. For example in IS-ENES2, master classes for intermediaries are being planned. They can be asked to give feedback on tentative results of the CLIPC project. In case societal end users

voluntarily express an interest of becoming involved, this will of course be accepted – the sessions organized during the CIRCLE-2 final conference suggest that the boundaries between societal end users and intermediary organisations are not always clear.

4.4 Strategy for user interaction per user category

For each of the three circles, a user consultation strategy for category A, B and C is briefly described. Table 4 provides a summary of this description.

First circle: users involved in the CLIPC project – category A, B and C (20-30 people)
Climate scientists, impact scientists and intermediaries already involved in the CLIPC project will be relatively easily accessible. They are assumed to be motivated to assist in building a portal that meets their needs. Actions and methods to interact with category A, B and C include:

- Joint sessions during CLIPC meetings
- Tailor made interviews – and targeted skype meetings
- Dedicated workshops
- Questionnaire survey: for each category a tailor made survey will be developed.
- Social media (e.g. blog)

The last two methods could be combined with 2nd circle users (see below). It can be expected that relatively less effort is needed to interact with these users during the project.

Second circle: Users already involved in other similar projects in which CLIPC partners participate - category A, B and C (max. 60 people)
This group of users is familiar with the challenges to get good information at a European or regional level. This user group will not be as easily accessible or motivated as the users directly involved in the CLIPC project. It is expected however that with targeted effort the different user categories can be consulted. Actions and methods to interact with category A, B and C of the 2nd circle include:

- Questionnaire survey tailored for each category (to capture users' requirements)
- Interviews –skype meetings (to capture users' requirements and organise feedback on tentative results)
- Exchanging information on user groups' requirements between the projects (e.g. EUPORIAS, ISENES2)
- Joint sessions during meetings organized by the associated projects (e.g. ISENES2, e.g. project master classes) and networks (e.g. EEA, European Climate Services

Partnership, ICSS, EMS, JPI Climate). These sessions will be mainly used to organise feedback on tentative results and to jointly develop storylines

Third circle: Potential users of interest known by various partners but not necessary involved in any projects - category A, B and C (max. 30 people)

Due to the effort needed to identify and build contact with stakeholders within the third circle, only little time will be devoted to interact with this set of users. No action will be taken towards category A as it is assumed that sufficient climate scientists will be reached through circle 1 and 2. Category B and C will be informed about the progress made by CLIPC by CLIPC newsletters, website and other PR activities. These communication means will be used to invite these categories to participate in consultation.

Table 4: consultation strategy per category users and circle

	Circle 1: Users in CLIPC	**Circle 2: Users in related projects**	**Circle 3: Other users**	**Focus of user consultations**
Category A: Climate scientists	• Dedicated user sessions during CLIPC meetings • Questionnaire survey • User panel participation	• Dedicated sessions during meetings of related projects to be discussed with coordinators • Questionnaire survey • User panel participation	• No specific action: sufficient share of climate scientists covered by circles 1 and 2	• Focus on tier 1 data • High level of detail, little post-processing (raw data)
Category B: Impact researchers	• Dedicated user sessions during CLIP-C meetings • Questionnaire survey • User panel participation	• Dedicated sessions during meetings of related projects to be discussed with coordinators (e.g. JPI Climate, Nordic Conference) • Questionnaire survey • User panel participation • Relatively much effort required to engage this group	• Use CLIPC climate information channels (newsletter) to invite interested people • Relatively much effort required to engage this group	• Focus on tier 1&2 data • Attention to post-processed data • Feedback requested on methods and tools developed in WPs 7 and 8
Category C: Intermediaries	Advice TEC	• Dedicated sessions during meetings of related projects	• Use climate information channels (climate-	• Focus on tier 1, 2 & 3 data • Attention to post-processed

		to be discussed with coordinators (e.g. EEA/EIONET, EPAs, known consultants) • Questionnaire survey • User panel participation • Focus on tier 1&2&3 data • Much effort to engage this group	list,newsletter) to invite interested people • Relatively much effort is required to engage this group	data and tools to self post-process raw data • Much information about do's and don'ts • Feedback requested on methods and tools developed in WPs 7 and 8
Category D: Societal end users	Not applicable	• No effort to engage this group directly, only via intermediary organisations	• No effort to engage this group directly, only via intermediary organisations	• Focus on tier 1, 2 & 3 data • Attention to post-processed data • Much information available about do's and don'ts

4.5 Next steps

Based on the suggested consultation strategies per priority user category, the following actions will be carried out in the next 7 months.

Establishing user consultation panels (= milestone MS4, task 2.1)
Three different user consultation panels will be established;

1. a user consultation panel for category A from circle 1 and 2
2. a user consultation panel for category B from circle 1 and 2
3. a user consultation panel for category C from circle 1 and 2

To establish these panels, the participants of the reviewed projects (chapter 3) and those participants of the CIRCLE 2 conference who showed their interest in the CLIPC project will be contacted by email to find out about:

- their specific role as user of climate information (climate system scientist, climate impact scientist, climate adaptation researcher, intermediary, other);
- their interest to become actively involved in the CLIPC project to advice on, and/or test, the CLIPC climate information platform.

In case the interest in participating in the CLIPC project is too limited (like in the ToPDAd project) (see 3.2), more effort will go to participation in meetings organised by associate initiatives and facilitate feedback on CLIPC's preliminary results.

Establishing a user committee (task 2.2)
A subgroup of motivated users (max 25) from the three mentioned consultation panels, will be establish so as to follow the development of the project, from the users perspective. These persons will be involved at several stages of the project to provide feedback on tentative results (task 2.3).

Development of a scoping document (task 2.2)
In collaboration with CLIPC WP 10 (dissemination), a scoping document will be developed for the project indicating amongst others the priority user categories, consultation strategy per user category, sectors that will be covered, geographic scales, information sources that will be provided, knowledge structure and tools. The scoping document will support the communication with potential users and help to manage expectations.

Development and implementation of an online survey per user category (task 2.2)
An online survey per user category will be developed. The online survey aims to capture user requirements for climate data and information, meta data, uncertainty and for communication. Part of the questions will address the tier 1, 2 and 3 indicators to develop story lines as part WP 7 and 4.

Development and implementation of individual qualitative interviews (task 2.2)
The online survey will provide quantitative results even though the sample will not be statistically representative of users, since we do not know the features of the population of users. In addition to this approach, we will conduct a series of qualitative interviews, conducted with a small sample (n=15) of involved users, so as to reach a more in-depth understanding of their requirements. A common interview guide, following the method of semi-structured interviews, will be used.

Joint sessions during meetings organized by the associated projects (task 2.2 - task 2.3)
Meetings organized by associated projects in which CLIPC partners participate will form a good opportunity to identify users to e involved, to capture users' requirements and to organise advice on/ test the CLIPC climate information platform.
Opportunities include:

- EEA –CLIPC WP7/WP2 meeting (13-14 May, Copenhagen)
- Copernicus- Sentinels Serving Society and the Environment conference (12 - 13 May 2014, Athens)

- Adapting to Change: From Research to Decision-making: Third Nordic International Conference on Climate Change Adaptation (Copenhagen, 25-27 August 2014).
- ECCA-2 (2nd European Climate Change Adaptation Conference, Copenhagen, 12-15 May 2015.
- EEA/ EIONET meeting with National References Centers (June 2014)

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Annex 1: Form used for reviewing past and ongoing projects

Towards developing a strategy for user consultation: Frame for collecting information (task 2.1)

Name of the initiative /project/network, including timeline of the project:											
What strategy has been used to capture user needs?	**Process-methods (need articulation, sustaining interaction)**	**General focus - case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact person**	**Names of individual users**	**Potential CLIPC user groups members:**	**References – sources of information (reports, portals etc.)**	**Lessons learnt and recommendations for CLIPC strategy (need articulation, ongoing interaction, users' evaluation)**

Annex 2: Review results of past and ongoing projects and other initiatives

CLIM-RUN

CLIM-RUN									
What method has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus or case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References –sources of information (reports, portals etc.)**
Workshops 2 rounds of workshops (2 per/case studies)	Need articulation via workshops Ongoing interaction and feedback from stakeholder	Case specific Italia (cross-sectoral) France (Alps tourism) Spain (Energy) Greece (Wildfires) Cyprus (Energy and Tourism) Tunisia (Tourism)	Climate data – from decadal to long-time timescales	Cross cutting	Scientific and non-scientific	Regional and national	Paolo Ruti (Coordinator) ENEA Clare Goodess	The users are not systematically listed in the different workshops reports. Need to contact all the relevant WP leader to get the lists of the most relevant per sector	-Public Deliverables available on the website www.climrun.eu (workshop reports and other deliverables i.e WP4 first workshops organisation) -TEC involvement in the project

		Morocco (Energy) Croatia (Tourism)							
Perception data needs and questionnaire Face to face interviews or distributed during the WS sessions and other meetings.	Need articulation	Generic and case specific (shortened version of the questionnaire, context specific etc.)	Climate data from decadal to long-time timescales	Cross cutting	Scientific and non-scientific	Regional and national		Need to contact all the relevant WP leader to get the lists of the most relevant per sector	-Public Deliverables available on the website www.climrun.eu (WP4 deliverable) -TEC involvement in the project
Potential CLIPC user groups members:	Partners of CLIM-RUN project (Categories A and C) Categories A, B, C and D (users not directly involved in the project but consulted during the workshops or through the perception questionnaire)								

Climate Adapt

Climate Adapt									
What method has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus or case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**
Workshop ACE (adaptation clearinghouse for Europe)	Need articulation	General focus,	Climate data on observations and scenarios; Vulnerabilities and risks; adaptation options and strategies, research projects, uncertainty guidance, policies and tools	No themes mentioned	Scientific	European	Rob Lokers	See list in Annex	Conclusions of the ACE validation and alignment workshop (1.0 – draft) (Alterra,2010).

WebEx meetings	Ongoing interaction	General focus	Climate data Climate data on observations and scenarios; Vulnerabilities and risks; adaptation options and strategies, research projects, uncertainty guidance, policies and tools	No themes mentioned	Scientific	European	Rob Lokers	-	Personal interview with Rob Lokers

Information from the documents

One user workshop at the beginning of project consisting of 24 people. From this group one user group of around 10 people was used as a reflection group during the making of the platform. Every few months a new version of the platform would be ready and the user group would comment and discuss the platform in sessions using WebEx. No questionnaires or workshops were used in further stages of the process.

Users who were involved in policy making had three types of data they requested; information on adaptation measures on the European level and on the national level, a guidance tool which gives a stepwise approach to creating adaptation policy, spatial visualisation of maps and indicators, tools supporting prioritization of risks and measures. Further distinction between user group requirements were not noticed. The information given on the platform was supply-oriented not demand driven. Maps on the platform do not incorporate uncertainty. On the platform is a separate guide on uncertainty.

Users requested four ways of search & discovery:

- Hierarchical search using predefined structures like menus
- Free search (like Google) which are based on indexes and give an non-structured overview of the findings
- Network based search like Tags were items are linked with each other
- Enable spatial search

Other prioritized datasets by the participants were:

- Uncertainty analysis (of regional) climate scenarios
- Observations on climate change and impact
- GCOS essential climate variables

Specifically mentioned information sources in the discussion on these data sources were:

- ENSEMBLES datasets
- Observations and scientific analysis IPCC
- EEA resources on observations and impacts

CARePOL

CARePOL, 2009-2010, Survey on the use of climate scenarios in climate change research in Finland, Sweden, and Norway									
What strategy has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus - case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**

Questionnaire (27% institutional response)	Onetime survey	General	Climate data	All of them	Scientific	National	Inger Hanssen-Bauer (MET Norway)	There are three different user groups in the project: Climate modelers (Data providers), Climate Scenario users, Policymakers and practitioners.	Three different reports, one for each user group.

Information from the documents

CARePOL part one on the data providers does not add much information on the user requirements to the portal or the data since it is mostly an inventory of downscaled projections. For CLIPC relevant data providers include:

Organisation	**Website**	**Nation**
Finnish Meteorological Institute(FMI)	www.fmi.fi	Finland
University of Helsinki, Div. of Atmosph. Sciences and Geophysics (UiH)	www.geo.physics.helsinki.fi	Finland
VTT Technical Research Centre of Finland (VTT)	www.vtt.fi	Finland
Rossby Centre, Swedish Meteorological and Hydrological Institute (SMHI)	www.smhi.se	Sweden
University of Gothenborg (UGOT)	www.ugot.se	Sweden

Bjerknes Centre for Climate Research (BCCR)	www.bjerknes.uib.no	Norway
Norwegian Meteorological Institute (met.no)	www.met.no	Norway

CARePOL part two, survey on the scenario users:

- There was around a 27% response rate in the questionnaire
- Most used their national meteorological institute as a source, and Finland in particular supplied the information from the national source with IPCC
- About the same number of recipients got data as raw data/time series and ready made products
- Geographical coverage matches the availability
- At the stage of this report there was a slight tendency to ask the providers information
- Air temperature and precipitation (various formats of precipitation) were the most frequent type of data used, but also data on humidity, snow, wind, pressure etc. were required
- Table 14 mentions required, but unachievable, data: soil frost (past and future), snow cover and depth, convective precipitation, occurrence of extreme days and daily variation (temperature, precipitation), lake and river temperatures (past and future ice cover extent), wind speeds (past and future), cloudiness, short scale and local scenarios and several other, depending on the adaptation question - Baltic sea wave height, drought periods, specific rain events, ice thickness, PMP, i.e. extreme precipitation, max wind speed, daily max temperature, evapotranspiration, urban temperatures, urban relative humidity taking into account urban heat island effects (maybe also effects of increasing urbanisation), water temperature of inland waters, ice, and a general request for “reliable parameters”
- There is a tendency towards requiring mid-century data. Time and space resolution reflects the availability (Daily to yearly and 1 km^2 to global)
- The following pattern has been described in the project regarding the use of the data: “The answers show that Finnish users have a more or less equal distribution of interests over the three categories. Norwegian users focus less on adaptation and strategy planning, although it can be argued that the “general information” projects provide input to the former. Swedish users appear to focus a lot on general effects of climate change, and little specifically on effects on private sectors.”

- The theme of interest shows a top priority on energy, second priority on agriculture. Beyond these to theme was the response from these three countries to varied to get any structure beyond “everything”.
- In a general comment part has the authors made these points:
- ”Several users (in Finland, Norway and Sweden) remark that although scenario providers are very cooperative, accessibility and usability of scenario data still needs improvement. While scenario data are free of charge, users report that historical data often cost money, and to have also these data freely available would be helpful.”
- “With regard to usability, users note that scenarios with higher spatial resolution (e.g., to make them more “ecologically relevant”) are needed.”

Climate scenario users:

Organisation	**Nation**
AMAP	Norway
Bioforsk	Norway
CICERO	Norway
CIVITAS	Norway
Fiskeriforskning	Norway
Havforskningsinstituttet	Norway
NERSC	Norway
NFR	Norway

NGI	Norway
NGU	Norway
NIFU STEP	Norway
NILU	Norway
NINA	Norway
NIVA	Norway
Nordlandsforskning	Norway
Norges Naturvernforbund	Norway
Norsk Polarinstitutt	Norway
Norut	Norway
NTNU	Norway
NUPI	Norway
MVE	Norway
Samisk Høgskole	Norway
SFT	Norway

SINTEF Byggforsk	Norway
SINTEF Energiforskning	Norway
SINTEF Fiskeri og havbruk AS	Norway
SINTEF IKT	Norway
SINTEF MARINTEK	Norway
SINTEF Materialer og kjemi	Norway
SINTEF MRB AS	Norway
SINTEF NBL AS	Norway
SINTEF Petroleumsforskning AS	Norway
SINTEF Teknologi og samfunn	Norway
Skogforsk	Norway
Statkraft	Norway
UMB	Norway
UNEP/Grid	Norway
The Norwegian Barents Secreteriat	Norway

Vestlandsforskning	Norway
WWF	Norway
Østlandsforskning	Norway
Chalmers Tekniska Högskola	Sweeden
Göteborgs Universitet – Institutionen för marin ekologi	Sweeden
IVL Svenska Miljöinstitutet	Sweeden
Jordbruksverket	Sweeden
Karlstads Universitetet	Sweeden
KTH Arkitektur och Samhällsbyggnad - Byggvetenskap	Sweeden
Lunds universitet - Institutionen för Naturgeografi och Ekosystemanalys	Sweeden
Miljöförvaltningen – Göteborgs stad	Sweeden
Mälardalen Universitet	Sweeden
Naturvårdsverket	Sweeden
Statens väg- och transportforskningsinstitut	Sweeden

Stockholms universitet - Institutionen för tillämpad miljövetenskap	Sweeden
Stockholms universitet - Institutionen för naturgeografi och kvartärgeologi	Sweeden
Sveriges lantbruksuniversitet - Administration	Sweeden
Sveriges lantbruksuniversitet - Institutionen för Ekologi	Sweeden
Sveriges lantbruksuniversitet - Institutionen för sydsvensk skogsvetenskap	Sweeden
Sveriges lantbruksuniversitet - Institutionen för mark och miljö	Sweeden
Sveriges lantbruksuniversitet - Institutionen för markvetenskap	Sweeden
Sveriges lantbruksuniversitet - Institutionen för skoglig resurshushållning	Sweeden
Sveriges meteorologiska och hydrologiska institut	Sweeden
Swedish Weather & Climate	Sweeden
Umeå universitet - Institutionen för ekologi, miljö och geovetenskap	Sweeden

Umeå universitet - Institutionen för folkhälsa och klinisk medicin	Sweeden
Uppsala universitet - Centrum för miljö- och utvecklingsstudier	Sweeden
Uppsala universitet - Evolutionsbiologiskt centrum	Sweeden
Uppsala universitet - Institutionen för geovetenskaper, meteorologi	Sweeden
Emergency Services College	Finland
Finnish Environment Administration	Finland
Finnish Forest Research Institute (Metla)	Finland
Gaia Consulting Group	Finland
Helsinki School of Economics (HSE)	Finland
Helsinki University of Technology (TKK)	Finland
Ministry of Agriculture and Forestry	Finland
MTT Agrifood Research Finland	Finland
Pellervo economic research institute (PTT)	Finland

Technical Research Centre of Finland (VTT)	Finland
The Finnish Institute of International Affairs	Finland
The Finnish Meteorological Institute	Finland
The Government Institute for Economic Research (VATT)	Finland
The National Institute for Health and Welfare (THL)	Finland
The Research Institute of the Finnish Economy (Etla)	Finland
Turku School of Economics (TSE)	Finland
University of Helsinki	Finland
University of Joensuu	Finland
University of Kuopio	Finland
University of Lapland	Finland
University of Oulu	Finland
University of Tampere	Finland

University of Turku Finland

CARePOL Part three:

Decision makers: There is an even distribution on using national and local scenarios. The results clearly reflects the respondents in question of scale: Finland with mostly national respondents gets a stronger emphasis on the national and global scenarios. Beyond this is it clear that this report does not really relate to CLIPC.

Policymakers and Practitioners: There are a total of 140 (36 Finnish, 40 Swedish, 64 Norwegian), sources in this part. The respondents were mainly ministries and municipalities. It is chosen not to include a list of these participants since they probably will not be in the core user group of CLIPC.

COST Action ES1102 VALUE

COST Action ES1102 VALUE									
What strategy has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus - case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**

2 Interview based surveys, and national surveys: Preliminary survey with 9 respondents Comprehensive Survey with 62 respondents	Direct contact with predefined survey to partners in the COST action at national branches.	General focus, (Bottom up approach to uncover user needs)		Water, rural, cross cutting	Impact researchers	National	Rasmus Benestad	No comprehensive list of participants in the surveys were published	Value white paper

Information from the document

The COST-action ES1102-VALUE is a European effort to bring together the providers of climate information and the end users and to bridge gaps between scientists and stakeholders as well as between climate scientists and statisticians. As opposed to many of the previous efforts which have been characterized by a top-down structure, VALUE is a bottom-up initiative which involves climate researchers and end users of the climate data.

In COST-action ES1102-VALUE, most experts were impact modellers doing research from hydrology (56%), agriculture (28%), forestry (17%), soil, and energy (both 15%).

VALUE have clear three level classification of the users:

1. Decision makers and programme initiators may need climate projection results on a single page (see ICCS2 impressions) aggregated in an understandable way
2. Natural science impact modellers need the “raw data” in a way they are familiar with (time-series of station data, or if they work on the broader scale gridded data (IMPACT2C)
3. Socio-economic impact researchers and users from the private sector. They need information about changes in the impacts (heat waves, floods, wind damages, etc.), and are often satisfied with (regional) changes in the changes in occurrence probability of the impacts, either from the climatological community or from the impact modelling community

The use of the following leading question can be useful for CLIPC “What are the worst data you can still work with and generate reasonable impact assessment from.” In this way, we could go beyond the wish list and get to the real needs.

VALUE organized the work in two phases: A pre-survey of 9 participants, and a national survey for each participating country with a total of 60 participants (Response rate not mentioned, but R. Benestad has expressed that he felt they did not get a continued and sufficient user engagement.

Conclusions from the survey:

- "To boil down the information given by the respondents in the surveys above, data requested for climate projections is basically the same one can receive from today's meteorological stations"
- Most important variables are temperature and precipitation at hourly or daily resolution with spatially coherent time-series including extreme values from now until 2100. This need is directly related to the standard modelling and analytics methods applied by the end users
- Unlike in climate sciences, probability distributions of the variables (like probability density functions, PDF) are seldom used to validate models but instead the performance on a day to day sequence is assessed. This is partly due to best practice in their research field, partly to lack of knowledge
- Two other challenges in the communication between the climate model output downscaling community and the end users are addressed in our surveys:
  - The very specific needs for data accuracy depending on the considered impact and the region of interest
  - The temporal scale discrepancy between some impact models input data demands and climate models data output

EUPORIAS

EUPORIAS									
What method has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus or case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**

Perception questionnaire (face to face interviews –100 interviews of organisations targeted)	Need articulation	Energy Water Health Tourism Agriculture Forestry Transport, roads and emergency response Financial and insure sector	Seasonal to decadal time scales Climate and data impacts	Crosscutting	Scientific and non-scientific	Regional, national and European	Suraje dessai Marta Soares U°L	Confidential	On-going activity www.euporias.eu (Preliminary report on user needs)
Stakeholder workshop Roma	Need articulation	Energy Water Health Tourism Agriculture Forestry Transport, roads and emergency response Financial and	Seasonal to decadal time scales Climate and data impacts	Crosscutting	Scientific and non-scientific	Regional, national and European	Carlo Buontempo Met Office Paolo Ruti, ENEA	See annex (Stakeholder WS list)	Public Deliverable www.euporias.eu

		insure sector							
'Climate services providers and users' needs workshop	Need articulation	Energy Water Health Tourism Agriculture Forestry Transport, roads and emergency response Financial and insure sector	Seasonal to decadal time scales Climate and data impacts	Crosscutting	Scientific	national and European	Suraje Dessai (UoL)	See annex (Stakeholder WS list)	
Online survey (1000 respondents targeted)	Need articulation	Energy Water Health Tourism Agriculture	Seasonal to decadal time scales Climate and data impacts	Crosscutting	Scientific and non-scientific	Regional and national And European	Suraje Dessai (U°L)	On-going consultation	TEC involvement in the project

		Forestry Transport, roads and emergency response Financial and insure sector							

Figure (taken from www.euporias.eu) shows the stakeholder pathway in the EUPORIAS project. Figures @-@ illustrate some other user consultation tools used in the project

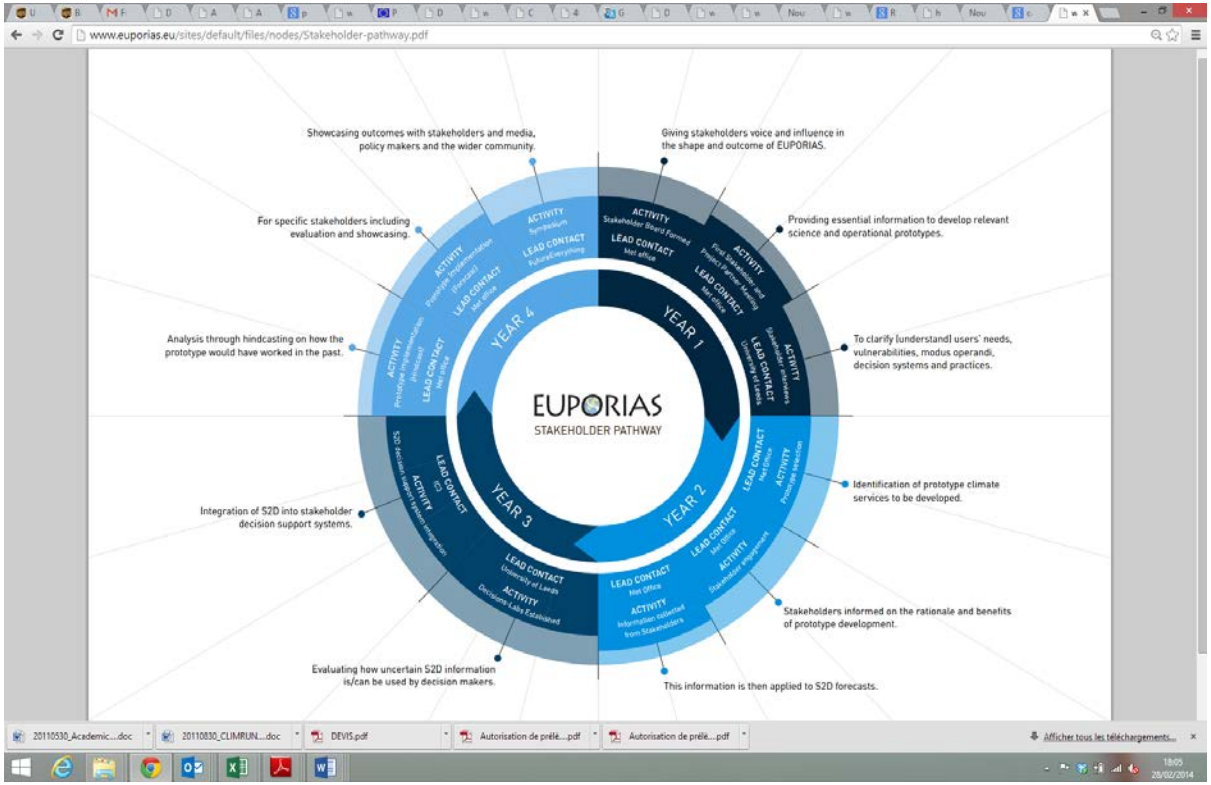

Figure 4: Stakeholder pathway in the EUPORIAS project

Figure 5: The user experience HoneyComb

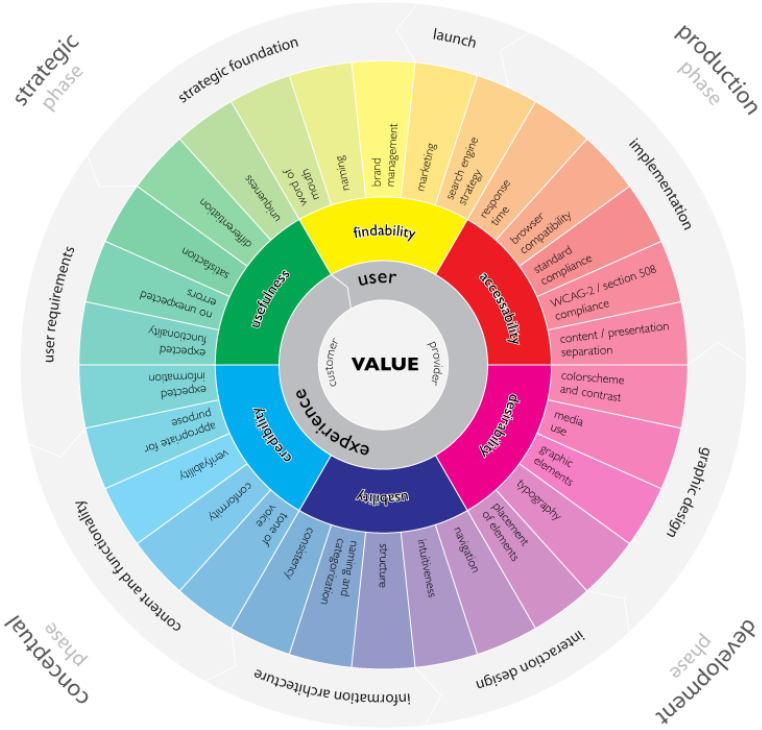

Figure 6: The user experience Design (Source : http://www.randsinrepose.com/assets/wheel-large.png)

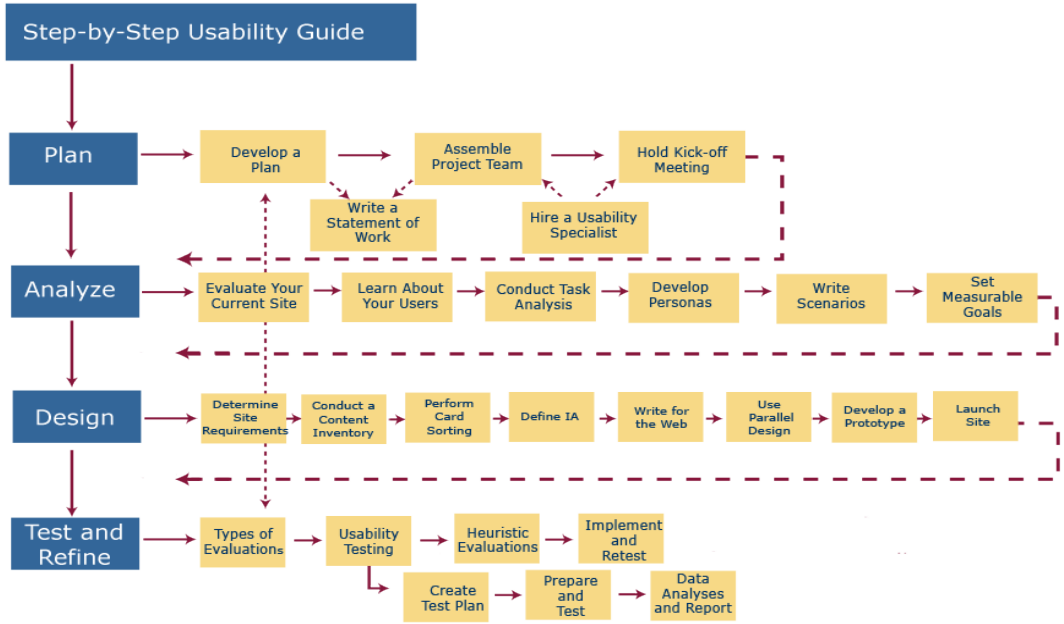

Figure 7: The user-centred design process map (Source : http://www.usability.gov/)

IS-ENES 1

IS-ENES									
What method has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus or case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References –sources of information (reports, portals etc.)**
Workshop with a follow-up online questionnaire.	Need articulation and evaluation	Case specific: Data needs retrieved from: -water management -ecosystems, agriculture and forestry -urban areas, health, coastal management sectors	Most important: Climate data on precipitation (total over x days), river discharge, air temperature, sea surface temperature, sea level	Cross cutting	Scientific: Climate modellers, impact researchers	European	Ronald Hutjes, Rob Swart	47 persons, see list in Annex	E-portal: http://climate4impact.eu/impactportal/general/index.jsp Document: Swart R. and D. Avelar (Eds) (2011). Bridging climate research data and the needs of the impact community workshop document and summary and IS-ENES Minutes of the WP11/JRA5 Workshop Meeting (Pagé, 2013)

Information from the documents

A workshop (11-12 January 2011): started off plenary and then went on in three parallel sessions distinguishing between sectors with reviewing the ECLAT workshop outputs from 10 years ago. The user needs developed in that workshop are still quite valid. Further discussion was guided by questions:

- Which variables/indicators should be made available?
- Where to go the find the required data?
- How to deal with uncertainty?
- Which problems did and may arise for the provision of climate data?
- Which categories of users?
- How can users be reached?

The workshop continued in plenary sessions.

An online questionnaire (Oct 2012- Jan 2013): First draft was prepared and discussed during a document sprint workshop at KNMI in May 2012. Questionnaire focused on the use and interface of the IS ENES Climate impact portal. Questions focussed on user background, technical aspects of the portal and usability. Invitees were asked multiple choice questions and yes/no questions with room for explanation.

An evaluation workshop (11-12 February 2013): 16 users involved in the WP11/JRA5 evaluated the climate data access of the portal and the ways forward. The workshop brought together climate modellers, impact researchers and policy advisors at regional, national, trans-boundary and EU levels using climate data. The participants originated from several EU countries and worked for European and national research institutes. These participants are likely to be future users of CLIPC and therefore the participants list can be used for creating a CLIPC user panel (see Annex User list).

Preferred data/information from climate modellers, impact researchers and policy advisors

- The most important type of data that users require from the portal: precipitation (total over x days), river discharge, air temperature, sea surface temperature, sea level
- Users should have the possibility to decide on which type of data is needed (raw or processed). Processed data (climate indices) can be better implemented in impact assessment. If raw data is provided post-processing tools should be made available with the necessary guidance

- Users have a high demand for bias-corrected data on different scales or at least examples and a guide with tools for bias corrections. This is to allow users to be aware of biases and to make sure the biases in the data do not lead to wrong conclusions. Ideally the climate modellers would provide already bias-corrected data
- As input to the portal climate modellers should provide a large number of ensemble models to allow users to see the data spread for different models for their data selection and to allow users to make their own selection (average or extremes)
- Uncertainties (in data, models, scenarios) should be made understandable and should be presented in the climate data as showing the range of ensembles, and different scenarios should be used to describe the future. Guidance is required to understand these uncertainties, also clarification on the difference in uncertainties originating from global and regional models is needed. There is still a strong need for improvement in presenting uncertainties
- Socio-economic and land-use scenarios as input into climate models should also be available to users
- The data should be available in a minimum temporal and spatial resolution and higher temporal and spatial resolution should be available on demand
- For maximum usability of output maps are required for different regions instead trend plots. No additional information on preferences towards communication/visualisation of results are given

Engagement of users

- Users have a need to engage not only researchers and climate modellers, but also end users and private sector. The output of the data should be on the level of the user in terms of volume of date available to the user and guidance specific for user.
- Climate modellers and impacts communities should work together to adequately select relevant climate data.
- A high level of guidance on data (on the European level) is needed. 7 types of guidance can be distinguished: guidance on climate scenario selection and uncertainty, on harmonization of time horizons, on understanding the scope and limitations of models, on errors and skills of different models, about scale relations (time and space), on terminology and glossaries, on socio-economic scenarios.
- It should be taken into account that different European regions have a different level of knowledge on climate change.
- Develop training programmes on use and interpretation of climate modelling results.

- Previous user engagement mechanisms have often failed due of the lack of resources and of a sustained interaction mechanism. A mechanism should therefore be formed. This mechanism should provide feedback between data provider and user, manage expectations, identify users in a wide set of other projects, target practitioners, include national users and European networks.
- Further interactions between researchers, end users and climate modellers should use existing user consultation mechanism from EUMETNET, ACE, CIRCLE-2 etc.

Comments on the use of the IS-ENES portal

- Different types of climate information should be made available through one entry point consisting of seamlessly linked systems with user guidance. Additionally it should have harmonized tools in terms of architecture and technology.
- Data sources are usually project based and therefore limited to institutions; there is a large need for a problem oriented search portal where all projects from all institutions can be found. This limits the need to search via institutes. The document does not explain which problems should be searchable
- Other actors, such as health and urban area actors require information beyond temperature and precipitation, like radiation, and would like to see this on the portal
- Accessibility of data should be improved by removing as many institutional and financial constraints as possible. The document does not give examples of these constraints

Evaluation process after implementation of portal

- 18% of the invited people filled in questionnaire of which 50% was a climate modeller
- Required data wasn’t always easy to find. It should be made clear where which data can be found. Give a stepwise example of how the retrieve a certain dataset
- Documentation section was good
- Most users didn’t understand the single sign on of the portal

- If the portal gives an error it should be understandable what this error means so that the user can solve the error. If the error occurs on a connected service it should be made clear that the connected service is at fault
- The portal in general was considered to be slow in operation and more guidance was required to handle large amounts of datasets.
- There wasn't a clear 'search' option to search directly for a data set
- Users found it interesting that the portal provided more than data, but also tools for transformation and data processing after downloading the required data.
- Keep the interface simple and limit the number of initial (upon entrance) options

There is no clear information on how uncertainty should be presented according to the involved participants. What is clear is that user should be given guidance on how to deal with uncertainties.

JPI Climate

Information from the documents

The following information is taken from Bessembinder (2012). The document has a lot of information on user needs from previous projects, including possible questions to determine user needs and background knowledge, the user data, information and knowledge needs, methods for gathering and analyzing information on users' requirements and advise on contacting representative users.

Possible questions to determine user needs and background knowledge.

Questions to understand the background knowledge and capabilities of users:

- What do they know about the current climate, climate change and the impacts of climate on their and related sectors?
- What is their definition of climate and climate change, climate scenarios?
- Where do they look to find this information?

- Where do they currently get their climate information/data?
- How regularly do they need information on climate?
- In their opinion has the climate changed considerably? If yes, how and since when? If no, why not?
- According to the users, what is the cause of climate change?
- What uncertainties exist about climate change and its impacts? What about these uncertainties, are they important from their perspective and why?
- Questions on their computational skills and data/information handling capabilities: Can they process data themselves? How much time do they have available to include climate information/data? Examples of data they have handled in the past.

Questions intended to understand the users' framing of climate and climate:

- According to the users, is climate an important issue? If so, what aspects are most important and why? If not, why and what are more important problems/issues and what is the relative role of climate information/data?
- What are important policy issues and sensitive subjects in the users' organisations or sector? Which one is most important?
- Should adaptation/mitigation measures be taken because of climate change and when? Why or why not?
- What is their risk perception and tolerance (use figure about risk aversion)?
- What is their view on the role of the precautionary principle in the context of climate change?
- What are their drivers for using climate data, information and knowledge (internal, external, regulatory, business, policy, etc.)?
- Questions about the organisational structure and decision making process:
- Who decides which scenarios and time horizons you will take into account in your impact studies, decisions or policy making?
- Is there clear agreement in your organisation about objectives and values related to addressing climate and climate change?
- Do you know whether your sector/organisation is vulnerable to climate (change)? If so, do you know what are critical processes and thresholds?

- Why do you request climate information and why this climate information? Do you consider their sector/company/organisation at risk, are there legal requirements to take climate (change) into account, are there other groups that ask about the impacts of climate change? Will you use the climate information/data for decision making about mitigation or adaptation, is it used to increase awareness, or to inform policy or practices?
- Have you identified specific climate-related thresholds or sensitivities? Are there different aspects/parts of your decisions, operations or policies that are more or less sensitive to climate?
- What kind of decision making approach is followed in your organisation (see Dessai & Van de Sluijs, 2007) Is it possible to include climate risks into these processes/methods?
- How do you (and your organisation) deal with uncertainties in the information that you use (e.g., socio-economic information/data)? How would you expect to deal with uncertainties in climate information/data?
- What is your risk perception/aversion (see Figure 1)?
- What type(s) of decisions or policy analysis are you undertaking (see Figure 4)? Do these currently include climate information/data? If so, from where is this information/data obtained and why?
- Is it important that you have specific data/information? If so, why?
- Are your decision- or policy-making processes able to address new/updated data and information? What are the decision or policy making timeframes?
- Does your company/organisation have a focal point (champion or working group) on the topic of climate or climate change and why?

Questions about how climate data/information is used:

- How is data/information on the current climate used in models/policy making in your organisation? From whom did you get this data/information?
- Have you previously used climate data/information about the future?
- Do you process climate data yourself?
- What will be the result of your study and what role does climate data play in the end-result?
- Are you especially interested in certain thresholds, because thresholds are used in decision making? What are critical situations in your sector in which weather/climate plays a role? Can you give examples of these critical situations?

- Have they used or are they capable of using figures/graphs/maps within their decision or policy making process? If so, how would they use them and what would they be trying to conclude?
- What constrains their use of climate data, information and knowledge in their decision and policy making (how and why). This could include information about uncertainty, likelihood, as well timing of availability, access, quality (real or perceived), ability to use (including utility and relevance), etc.

Data, information and knowledge needs

- Climate variables (maximum and minimum temperature, precipitation, extreme precipitation exceeded once in 10 years, cloud cover, etc.), time horizon (current climate, around 2020/2030, around 2050, etc.), spatial and temporal resolution, area-average or point data, etc. (for an example of the type of questions and information collected see annex 1), is a generic set of climate scenarios needed, or tailored/extreme climate scenarios, baseline/reference period (what period and using which set of observational data?
- Similar data/information for impacts such as hydrology, ecosystems, agriculture, health, and other sectors: changes in groundwater levels, production, presence of species; time horizon of interest, spatial and temporal resolution, etc.
- Additional data such as land cover data, elevation, social-economic data, emissions (including scenarios for the future)
- Indices and other data related to known thresholds (e.g., heating/cooling/growing degree days, days without precipitation, days with temperature over/under a particular temperature, and special indices (e.g., aridity index, drought indices and those related to extremes such as the STARDEX indice)
- Storylines related to climate trends and projected changes (more than the data) and can be a combination of impacts and adaptation measures related to climate trends and projections; and,
- Adaptation options and supportive information (what they comprise and why they were introduced)

Users also require (and request):

- An overview of the available information/data and other available services
- Consistency between information/data on climate and climate change and its impacts (same time horizon, same climate scenarios, same socio-economic scenarios, etc.)

- Information about uncertainty (e.g., types of uncertainty included, quantification of uncertainties and/or qualitative information, etc.), information on biases in the data and on robustness
- Scientific and other publications related to the information/data available and its use (building credibility and legitimacy)
- Metadata for the information/data on offer (that required to support an understanding of precisely what it is and its lineage)
- Information related to the evolution of the information/data (e.g., how does current information/data relate to that previously available and expected updates, similarities and differences to allow users to interpret the implications for previous work)
- Tools to generate e.g. time series, derived data such as indices, maps
- Case studies of good/acceptable and bad examples of uses of the available services, including what and how the information/data was used and why. Users often find in easier, informative and reassuring to refer to examples of what others have done, especially if first time users or undertaking a new task

Methods for gathering and analyzing information on users' requirements

- Questionnaire (web-based or through focus groups and personal interviews)
- Workshops/meetings with a group of representative users (can be organized for specific sectors or groups of users, or for broader groups of sectors and users). Care should be taken that a representative set of users participate (e.g., range of appropriate types of users, capabilities and sectors) and that methods employed within the workshop provide opportunities for all participants to express their views and perspectives regarding requirements)
- Personal contacts with users, either short contacts (requests for advice/information) or contacts in longer lasting projects (need to ensure that requirements are properly noted and recorded
- Interviews with providers of climate services drawing on their experiences of working with different users: information about users' requirements can probably also be collected from questions (or frequently asked questions). National Meteorological and Hydrological Institutes (NM(H)I's), other providers of climate services also have some knowledge about users' requirements
- Drawing on existing information on users' needs from other countries (or earlier compiled inventories in the same country). Care should be taken when interpreting users' requirements from other countries to ensure that circumstances (e.g., scope of users' requirements, including capabilities and areas of interest) are similar by verifying those results with users within your own country

- Drawing on comments by users of existing climate information/data and supportive information (e.g., what they liked and did not like, and what was missing). Many users already access climate information/data from domestic and international sources for a wide variety of potential providers, including data , information in documents or web-based, and advice resulting from research and other projects
- Information on users' requirements may also be collected in a two-step or iterative approach. In the first step, information related to the most important questions or issues related to the intended use (i.e. framing and context) and the information/data that could be used to address these is compiled by involving both users and providers. In a second step, this compilation and the resulting recommendation are considered by both users and providers as to whether the recommendations (including the identified information/data and supportive materials) is indeed fit for purpose
- As part of the above methods, opportunities should also be sought to understand requirements and capabilities with respect to requirements related to the presentation and accessibility of information/data, supportive guidance and resources (i.e. what constitutes user-friendly to the different users)

When part of an overall, long-term engagement strategy and plan involving both users and providers the following may also provide useful information:

- To support the identification and analysis of users' requirements, a method comparable to the SCRUM method may be used (http://en.wikipedia.org/wiki/Scrum_(development)), in which regular feed-back of (potential) users on their requirements can be obtained. There is a need to take care that this is truly engagement and that the reasons behind the resulting positive and negative feedback is sought. In addition, responses to the feedback should be recorded and communicated to those participating (necessary to encourage and show the benefits of engagement);
- User Requirement Documents (URDs) for websites on climate (change) and data portals may also contain useful information, especially when they are developed together with users;
- Mapping of relations/information networks/issues/opinions may be useful to get insight in the decision processes and how climate information is used?

Advise on contacting representative users

- Use your contacts in projects where you are working together with users. They may help you give an overview of the various representatives within a sector (organisations and persons), whether there are various "schools", etc.)
- Get into contact with professional organisations that represent specific users in specific sectors

- Understand the representativeness and reach of those you have engaged (i.e. the breadth of the users within a sector they represent)
- Look for representatives of the various user groups in the same sector
- Don't expect to have a representative group/network within a short time
- Realize that users' requirements may change, but also that the users within a given sector can change

KNMI Inventory of user requirements concerning climate information / Dutch National Climate portal

KNMI Inventory of user requirements concerning climate information/ Dutch national climate portal									
What method has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus or case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References –sources of information (reports, portals etc.)**
Personal contact in the form of interviews, consultations, workshops and sessions	Need articulation	Case specific: Water (urban, rural area, water safety) Transport, Construction, Energy Health and	Climate data	Cross cutting	Both	National and regional (IJsselmeer area)	Bessembinder J., Overbeek B., Verver G. (KNMI)	No user list, but organisation list.	Bessembinder, J., Overbeek, B., Verver, G. (2011). Inventarisatie van gebruikerswensen voor klimaatinformatie, de Bilt, 2011. Technical report; TR-317 Dr. J.J.E. Bessembinder et al., (2012), Tailoring information about climate change and its

		Recreation Agriculture and Nature Financial services Industry							impacts, KfC report number 52/2012.

There are two documents of interest for the climate portal. First there is a document on the inventory of user requirements concerning climate information (Bessembinder et al., 2011) which describes the user requirements for climate information in the KNMI next scenarios per sector. This information was used as background information for creating the Dutch climate portal. The document gives extensive information on who requires which type of climate variable, on what time- and spatial scale. Users are kept up to date via a newsletter (once or twice per year). Part of the second document (Bessembinder et al., 2012) is the evaluation of the pilot web portal on www.klimaatportaal.nl that was evaluated by 30 researchers, policy makers, NGOs and engineering agencies through an online questionnaire.

Information from the documents

Methods for identifying user requirements

Part of the user input was obtained during a workshop which was organized for the project leaders of the several projects within the Knowledge for Climate programme. For the online questionnaire users of climate information, involved in one or more of the sectors climate, hydrology, nature, land use or agriculture, were contacted.

Preferred data from users (overall and some sector specific) on climate variables:

- Temperature: minimum- en maximum day temperature (averages and extremes)
- Precipitation: numbers on more or less extreme then every ten years, day-to-day variation en between years. Also extremes for other forms of precipitations, such as hail and snow

- Rain deficit changes throughout the year
- Wind strength throughout the year and wind direction (water safety). Wind extremes occurring more often than once a year.
- Radiation and less important humidity (agriculture, nature, health etc.)
- Sea-level extremes and time series with water levels of rivers
- CO_2 concentrations time series (agriculture)
- Time series of soil- and water temperature (agriculture and nature)
- Next to information on the years 2050 and 2100, information is required from many sectors on the year 2030
- Provide information on the frequency of occurrence of extremes during a plausible climate scenario. For water safety frequency of occurrence of extremes is also important for the more unlikely climate scenarios

A number of issues on resolution can be taken into the CLIPC project:

- Time: for extreme rainfall time series of 1 hour (or even every 10 minutes) preferable for urban water management. For water safety 1 to 3-hourly wind strength and direction is required
- Time series very relevant for temperature, precipitation, wind and evaporation (day-to-day and yearly variation)
- Spatial: higher spatial resolution required for current climate information on a national scale and better distinction between urban and rural climate information. River discharge calculations should be tuned with the surrounding countries

Tailoring of data and information:

- make data more easily accessible by presenting an overview of existing data sets (for all sectors)
- process data/prepare specific data sets (for hydrology, land use)
- provide tools for selecting or making datasets for e.g. specific locations (for hydrology)
- provide guidance in the use of the available data and the required data for impact modeling (for climate, nature, agriculture)

- presenting an overview can also be considered as a form of tailoring information

On the design of the portal the following comment was given; using a uniform structure at the web pages of the different sectors. On the sub portals the same headings are used: home, data/information, documentation, uncertainties. With the help of this uniform structure it was tried to give similar information for each sector.

Project Troms

Project Troms, 2012 – 2014. Provision of climate adaptation information for the planning process in the municipalities									
What strategy has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus - case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**
User meetings	Continued user meetings driven by the users with experts part of the team	General focus on the needs of the municipalities	Natural data that effects the planning process in municipalities.	All	Non-scientific, Municipal planners	Local (municipalities)	Hans Olav Hygen	County governor of Troms Målselv, Balsfjord, Tromsø and Lyngen municipalities	In progress, and only in Norwegian

Lessons learnt and recommendations **for CLIPC strategy (need articulation, ongoing interaction, users' evaluation)**	User driven focus, and not supply driven focus has been a key							**Potential** **CLIPC user groups members:** **NO**	

Information from the documents

In Norway the municipality is a key in climate adaptation and disaster prevention, almost all of the planning that affects the daily life is done on a municipal level. One challenge is the size of a Norwegian municipality, where the population ranges from 210 (Utsira) to 632990 (Oslo) and an area which ranges from 6,17 km^2 (Kvitsøy) to 9707,43 km^2 (Kautokeino). This large variation in the municipalities results in a large variation in adaptation capacity.

The process in this project has been fairly simple meeting about every second month where representatives of municipalities, the count governor of Troms, Norwegian Directorate for Civil Protection, Norwegian Water Resources and Energy Directorate, and Norwegian Meteorological Institute have met and slowly worked through the municipal planning process with climate and climate adaptation in focus. The key to the apparent success has been to take the science into the planning rooms for a prolonged time period, and use this as a foundation for future development.

The themes have been quite wide, but water, and handling of flood water, is important for the planning process. Sociological themes, as change in population, or economic themes have not been part of the project.

ToPDad

ToPDad									
What method has been used to capture user needs?	**Process- methods (need articulation, ongoing interaction evaluation)**	**General focus or case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**
Stakeholder workshop: purpose was to find out general user requirements for ToPDAd tool set and to get an understanding of processes and situations where CCA decisions are made, and what kind of information and inputs are needed in the decision-making. 5 participants were considered as possible	Brainstorming with the help of computer-aided software called MeetingSphere. The participants of the workshop referred their answers to their own experience of decision-making A questionnaire was put on the Internet to involve a larger group of potential end users (only 2 out of 6 responded)	Requirements are linked to: investment and policy related decisions, implementing green policies , problems arising from extreme events and planning of	Users identified the following requirements (see below for more details: probability of extreme weather events	Tourism, Energy and Transport	Representatives (civil servants, advisors) of energy, transport and tourism sector Also a consultancy in climate change issues for companies was represented. Experience of participants	Local level only (EU-level and country-level decision-making was not represented)	Jyri Hanski (VTT)	Via Hasse Goosen or via contact person	Hanski et al. 2013. End user requirements of tool-based decision-support. deliverable 2.1. ToPDad project.

end users Questions were sent in advance to the workshop participants to enable preparation to the workshop session		current and future climate services			covered both operational and strategic level of decision making				

Information from the documents

Preferred data/information by researchers and civil servants, advisors in the domain of energy, transport and tourism operating at the local level

- Data sources and categories identified by potential end users include: probability of extreme weather events sorted by category of effect preferably at regional level (summer temperature, winter temperature, summer rainfall, winter rainfall, wind speed), information on costs of measures, costs of no action and insurance premiums, probability distribution of snow-cover-days and days when artificial snow is possible to be made and probability of longer periods with good weather
- Datasets containing weather / climate data (at the right spatial and temporal scales), description of current climate / pre-impacts state of nature, observed natural impacts, current/recent climate societal conditions, societal scenario data, and societal impacts (observed and simulated), and clearly specified adaptation measures and their monitored effects
- Probabilistic distributions of mean (climate) and extreme (weather) conditions on a reasonably fine spatial scales e.g. (0.25 grid)
- Observed natural impact of cc, societal impacts
- Demographic data, GIS, asset values, cultural and historical values, technology evolvement (modular solutions, life cycle design, reusability), economic expectations and scenarios, different life spans, and especially for the private sector, 1) trend data: political (regulations, policies, subsidies), cost and revenue projections, customer trends, technology 2) current situation (emission, cost based, quality of product/services, energy intensity) 3) Variable/Factors to create scenarios and decision basis
- Adaptation measures and their monitored effects
- Criteria for selecting adaptation measures (societal costs and benefits, vulnerability of critical services, reliability, acceptability, ability to compensate losers of adaptation measures, no serious regret risk, measures delivering more flexibility, real options, lessons-learnt and ‘what-if analysis’

- Make explicit the sources of uncertainty
- Seasonal projections and detailed forecasts at defined local areas on factors of heating demand developed

Understanding Needs, Meeting Demands: A user-oriented analysis of online knowledge brokering portals for climate action and development

Understanding Needs, Meeting Demands: A user-oriented analysis of online knowledge brokering portals for climate action and development. May 2013									
What strategy has been used to capture user needs?	**Process-methods (need articulation, ongoing interaction evaluation)**	**General focus - case specific**	**Type of data (climate data, impact data, soc. economic data)**	**Themes (urban, rural, water, cross cutting)**	**Types of users (scientific – non-scientific)**	**Level (regional, national, European)**	**Contact persons**	**Names of individual users (individuals, organisations)**	**References – sources of information (reports, portals etc.)**
Interview Web-questionnaire	NA	Focus on users need compared to portal delivery	NA	Cross cutting	Practitioners (NGO's and government)	National / continent (developing countries)	-	-	http://www.iisd.org/pdf/2013/understanding_needs_platforms.pdf

This report is an evaluation of online resources for climate actions and development. The project used a combination of web questionnaire and interview with specific user groups for the evaluation. There were no attempt for any prolonged engagement in the users except answering the questionnaire and interview. The focuses in the portals were advice for climate action and development (aimed at developing countries) with a target group of practitioners at a national level.

Key points identified by this project (each point is elaborated in the report) in designing a climate portal:

- CKB platforms are not changing the way users initiate searches for information
- The vast majority of research participants started their searches for climate change-related information at search engines or specific institutional websites; this was also the expectation of platform managers interviewed for the four case studies
- Users still prioritize accessing information and knowledge in “traditional” (written) formats
- Despite the growing popularity of social media and Web 2.0 technologies, users are still primarily accessing CKB platforms to download research reports, policy documents and journal articles. …but wouldn’t mind accessing people
- Despite the strong preference for accessing documents, the case studies (particularly AA, CFO and ECCRG) did reveal a desire among some users to be linked to other people and/or personal experiences
- CKB platform users still prefer to receive information than share knowledge online
- Most survey and case study respondents identified themselves as occasionally active when sharing information and knowledge online. People appear to be aware of the range of outlets for sharing information and knowledge but simply do not do so frequently
- Platforms may be aligned with most user expectations (which remain modest), but out of sync with other expectations
- Should platforms drive or respond to demand for online KB?
- Platforms should recognize the value of blending online and offline functions

Annex 3: Summary of Quick **scan** of past –ongoing projects and initiatives

ENSEMBLES

ENSEMBLES
Funded under the European Commission's Sixth Framework Programme (PF6)
Start: 01/09/2004. Duration 60 months
Dr. Paul Van Der Linden Project Coordinator
Met Office, Hadley Center, U.K.
http://www.ensembles-eu.org

The overall goal of ENSEMBLES is to maintain and extend European pre-eminence in the provision of policy relevant information on climate and climate change and its interactions with society. ENSEMBLES will achieve this by: (a) Developing an ensemble prediction system based on the principal state-of-the-art, high resolution, global and regional Earth System models developed in Europe, validated against quality controlled, high resolution gridded datasets for Europe, to produce for the first time, an objective probabilistic estimate of uncertainty in future climate at the seasonal to decadal and longer timescales; (b) Quantifying and reducing the uncertainty in the representation of physical, chemical, biological and human-related feedbacks in the Earth System (including water resource, land use, and air quality issues, and carbon cycle feedbacks); (c) Maximising the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications, including agriculture, health, food security, energy, water resources, insurance and weather risk management. The relevance to CLIPC is the type of information provided (temperature and precipitation). Main user-category is: A-Climate scientists.

COMBINE

COMBINE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/05/2009; duration: 48 months
Dr. Marco Giorgetta Project Coordinator
Max-Planck-Gesellschaft zur Farderung der Wissenschaften e.V., Hamburg — Germany
http://www.combine-project.eu/

Comprehensive Modelling of the Earth system for better climate prediction and projection. The project brought together research groups to advance Earth system models (ESMs) for more accurate climate projections and for reduced uncertainty in the prediction of climate and

climate change in the next decades. Results from the comprehensive ESMs were used in an integrated assessment model to test the underlying assumptions in the scenarios, and hence to contribute to improved scenarios. COMBINE made use of the experimental design and of the scenarios proposed for IPCC AR5. Therefore the project was able to contribute to the AR5, by its relevant research and by the contribution of experiments to the IPCC data archives. Another objective was to improve initialisation and error correction schemes for decadal climate predictions and use the Earth system models for decadal climate prediction and climate projection experiments following the protocols of the Coupled Model Intercomparison Project for IPCC AR5 simulations. Two possible relevant aspects for CLIPC are that the project aims to quantify the impacts in two sectors: water availability and agriculture, globally and within the regions, and analyze the effect of selected new components on these impacts. The project does not mention downscaling, however. Main user-category is: A-Climate scientists.

WATCH

WATCH
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/02/2007; duration 48 months.
Dr. Richard Harding Project Coordinator
Natural Environment Research Council, UK — Swindon
http://www.eu-watch.org

Water and Global Change brought together the hydrological, water resources and climate communities to analyse, quantify and predict the components of the current and futureglobal water cycles and related water resources states, evaluate their uncertainties and clarify the overall vulnerability of global water resources related to the main societal and economic sectors. Some of the tasks were: Analyse and describe the current global water cycle, especially causal chains leading to observable changes in extremes (droughts and floods); Evaluate the uncertainties in the predictions of coupled climate-hydrological- land-use models using a combination of model ensembles and observations; Provide comprehensive quantitative and qualitative assessments and predictions of the vulnerability of the water resources and water-/climate-related vulnerabilities and risks for the 21st century. One main objective was to develop a new consolidated dataset, and a new, highly consistent modelling framework for water resources, hydrology and climate studies. Furthermore, WATCH aims to build a new generation of interfaces between water resources, hydrological and climate models, attempting a maximum possible consistency in spatial and time scales involved, and in related process descriptions. The project describes the use of 'consistent downscaling algorithms'. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

ENHANCE

ENHANCE
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 1/05/2006; duration 9 months
Dr. Jaakko Helminen Project Coordinator
Finnish Meteorological Institute, Helsinki — Finland
http://www.livingwithclimate.fi/

Enhancing the European Participation in Living with Climate Variability and Change: Understanding the Uncertainties and Managing the Risks. The project delivered all arrangements as to organizational and implementation aspects of a WMO Conference (LWCVC, Espoo, Finland, 2006) on Living with Climate Variability and Change: Understanding the uncertainties and managing the risks will cover decision making research and the following five key sectors that are especially sensitive to climate variability and change: agriculture and food security, disasters and early warning, energy and built environment, human health and disease control, and water resources. The sectors will be considered from three different perspectives: business, society, and environmental protection. Additional five crosscutting issues are planned: long-term planning & development: from the perspective of the public and private sector, risk assessment & risk management, interdisciplinary applied research, financial mechanisms, and long-term planning & development: from the perspective of developing countries. The most relevant aspect of LWCVC to CLIPC is that it will shed light on how best to integrate climate information, including current information, predictions, and scenarios, into strategic planning, day-to-day decision-making and risk management, recognizing that climate will frequently be only one of several contributing information streams. The work will encompass all planning horizons (1 month -> 100 years) relating to climate variability and change, where climate variability is expressed as distributions of describing variables, like monthly mean temperatures, while climate change allows for changes in the distribution. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: C - Intermediaries.

GEOMON

GEOMON
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/02/2007; duration 48 months
Dr. Philippe Ciais Project Coordinator
institution Commissariat a l'Energie Atomique, Paris — France
http://geomon.ipsl.jussieu.fr/

Global Earth Observation and Monitoring. The access to data and data-products was coordinated at a common data centre for more efficient use. GEOMON supported data gathering at existing networks if necessary, rescue and compile existing ground-based data, and develop new methodologies to use these data for satellite validation and interpretation. In addition, GEOMON tried to enable innovative ground-based measurements complementary to satellites. Establish a Data Centre to provide users with comprehensive and easy access to key European atmospheric composition data and data-products and ensure appropriate dissemination at various levels of the quality assured and integrated data sets to assist scientific and policy communities. The relevance of GEOMON to CLIPC is their provision of data for climate services. Main user-category is: A-Climate scientists.

EARLINET ASOS

EARLINET ASOS
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 1/03/2006; duration 60 months
Dr. Gelsomina Pappalardo Project Coordinator
CNR — Consiglio Nazionale delle Ricerche, Rome — Italy
http://www.earlinet.org/

European Aerosol Research Lidar Network: Advanced Sustainable Observation System contributed to the improvement of continuing observations and methodological developments that are urgently needed to provide the multi-year continental scale data set necessary to assess the impact of aerosols on the European and global environment and to support future satellite missions. The most relevant aspect of project to CLIPC is that it intends to establish a database provided with a user interface for dissemination of data. The expected outcome is the most comprehensive data source for the 4-D spatio-temporal distribution of aerosols on a continental scale. This project bears some similarities to EUSAAR — European Supersites for Atmospheric Aerosol Research. The relevance of EARLINET ASOS to CLIPC is their provision of data for climate services. Main user-category is: A-Climate scientists.

ESCAPE

ESCAPE
Funded under the European Commission's Seventh Framework Programme (PF7)
2008 -2012
Dr. Monique van der Hoek Project Coordinator
Utrecht Universiteit, Utrecht — The Netherlands

http://escapeproject.eu/

European Study of Cohorts for Air Pollution Effects a large collaborative project in the Environment and Health program. The call asked for research within existing cohorts among children as well as elderly adults as sensitive groups, and it asked to consider the role of other environmental exposures such as noise, and of biomarkers and gene-environment interactions. The relevance for CLIPC seems to be the direct involvement of end-users. ESCAPE actively engaged stakeholder organisations and policy makers so that results can be swiftly translated to support policy development and implementation.

QUANTIFY

QUANTIFY
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/03/2005; duration 60 months
Dr. Robert Sausen Project Coordinator
Deutsches Zentrum fűr Luft- und Raumfahrt e.v.; Kőln — Germany
http://www.pa.op.dlr.de/quantify/

Quantifying the Climate Impact of Global and European Transport Systems intends to quantify the climate impact of global and European transport systems for the present situation and for several scenarios of future development. The project goal includes provision of forecasts and other policy-relevant advice, which will be supplied to governments and to international assessments of climate change and ozone depletion. Several transport scenarios and potential mitigation options need to be assessed on a sound common basis to identify the most effective combination of short and long-term measures and to inform policymakers and industry. They aimed to provide such guidance by focused field measurements, exploitation of existing data, a range of numerical models, and new policy-relevant metrics of climate change. To achieve the goal, several advances in our fundamental understanding of atmospheric processes were be required such as the mechanisms by which pollutants are transported from exhaust into the free atmosphere, the impact of pollutants on clouds and the role of absorbing aerosols. Forecasts was built on models, which was refined and improved in this project by exploitation of existing data for model testing and validation and by the provision of new data on fundamental processes. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B impact researchers.

CLAVIER

CLAVIER
Funded under the European Commission's SIXth Framework Programme (PF6)
start: 01/09/2006; duration 36 months
Dr. Daniela Jacob Project Coordinator
Max-Planck-Gesellschaft zur Főrderung der Wissenschaften e.V, Hamburg — Germany
http://www.clavier-eu.org/clavier/

Climate Change and Variability: Impact on Central and Eastern Europe established a large data base, tools and methodologies, which contribute to reasonable planning for a successful development of society and economy in Central and Eastern European countries under climate change conditions. The members of this project may be regarded as potential users of data provided by the CLIPC portal .

CIRCE

CIRCE
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/04/2007; duration 48 months
Dr. Antonia Navarra Project Coordinator
Istituto Nazionale di Geofisica e Vulcanologia, Rome — Italy
http://www.bo.ingv.it/circeip/

Climate Change and Impact Research: the Mediterranean Environment analysed a number of climate parameters including: temperature, precipitation, atmospheric humidity, wind, waves, sea-level rise, surface radiative fluxes, balance between evaporation-precipitation, saline output to the Atlantic, water vapour export, frequency and distribution of extreme events, nutrient load into the sea, and sensitivity to water stress. CIRCE built on the extensive modelling experience already available, but it developed specific modelling scenarios for the Mediterranean, in terms of resolution, process and feedback inclusions, understanding and specific diagnostic studies for the Mediterranean area. A comprehensive set of data describing the physical impacts of climate change were developed, and then used to assess the consequences of climate change for human society and ecosystems. The members of this project may be regarded as one group of potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

RECLAIM

RECLAIM
Funded under the European Commission's Sixth Framework Programme (PF6)

start: 01/01/2007; duration 36 months
Dr. Adriaan Rijnsdorp Project Coordinator
Wageningen IMARES B.V., The Netherlands
http://www.climateandfish.eu

Resolving Climatic Impacts on fish stocks analysed changes in ecosystem structure and functioning from fisheries and scientific survey data including planktonic, benthic and fish production and consumption in relation to climate forcing and fishing. Relevant spatial and temporal scales of climate change and variability were explored using time series analyses, spatial statistics and coupled 3-D hydrodynamic ecosystem models. Using a variety of approaches, RECLAIM both hindcasted as well as forecasted the effects of climate change on the productivity and distribution of fish and shellfish stocks to formulate hypotheses and research needs to be addressed in future EU research. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

ICEPURE

ICEPURE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/02/2009; duration 36 months
Dr. Paul Labbett Project Coordinator
King's College London, London — UK
http://cordis.europa.eu/projects/rcn/90978_en.html

The Impact of Climatic and Environmental factors on Personal Ultraviolet Radiation Exposure and human health collected satellite and ground station data to establish terrestrial UVR spectral irradiance, cloud, albedo, ozone and aerosol data, at the locations and times of exposure. These dosimeters were used in field studies working with, water, beach and snow situations in four different countries, including studies with children. The members of this project may be regarded as one group of end-users of data provided by CLIPC. Main user-category is: B-Impact researchers.

INCREASE

INCREASE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/03/2009; duration 48 months
Dr. Ivan Kristoffersen Project Coordinator
Københavns Universitet, Noerregade — Denmark
http://cordis.europa.eu/projects/rcn/90503_en.html

An Integrated Network on Climate change Research Activities on Shrubland Ecosystems improved the technology and methodology for studies of climate change effects on European shrublands. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: A-Climate scientists.

CLIMATE FOR CULTURE

CLIMATE FOR CULTURE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: under negotiation; duration 60 months

Dr. Johanna Leissner Project Coordinator
Fraunhofer Gesellschaft zur Főrderung der angewandten, Műnchen — Germany
http://cordis.europa.eu/projects/rcn/92906_en.html

Damage Risk Assessment, macroeconomic Impact and Mitigation for Sustainable Preservation of Cultural Heritage in the Times of Climate Change will connect future climate projections with whole building simulation models and new damage assessment functions. The members of this project may be regarded as potential users of data provided by the CLIPC portal. Main user-category is: C-Intermediaries.

NOAHS ARK

NAOHS ARK
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/06/2004; duration 36 months
Dr. Cristina Sabbioni Project Coordinator
Consiglio Nazionale delle Ricerche Istituto di Scienze dell'Atmosfera e del Clima, Italy
http://noahsark.isac.cnr.it/

Global Climate Change Impact on Built Heritage and Cultural Landscapes intended to determine the meteorological parameters and changes most critical to the built cultural heritage. Important changes included alterations in temperature, precipitation, extreme climatic events, soil conditions, groundwater and sea level. Some processes of building decay will be accelerated or worsened by climate change, while others will be delayed. The members of this project may be regarded as one group of potential users of data provided by the CLIPC portal. Main user-category is: B-Impact researchers.

MESMA

MESMA
Funded under the European Commission's Seventh Framework Programme (PF7)
start: under negotiation; duration 48 months
Dr. Jan A. van Dalfsen Project Coordinator
Wageningen IMARES B.V., IJmuiden — The Netherlands
http://cordis.europa.eu/projects/rcn/92591_en.html

Monitoring and Evaluation of Spatially Managed Areas will supply innovative methods and integrated strategies for governments, local authorities, stakeholders and other managerial bodies for planning and decision making at different local, national and European scales. This will also comprise an easy accessible information system to gain support from politicians,

stakeholders and the public in general for difficult (inter)national decisions that will be needed for sustainable use and protection of this vulnerable area. Climate change will alter the composition and functioning of marine ecosystems, calling for a robust approach of future spatial planning that also takes cross boundary developments into account. The members of this project may be regarded as one group of potential users of data provided by the CLIPC portal. Main user-category is: B-Impact researchers.

MOVE

MOVE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/10/2008; duration 36 months
Dr. Sergio Boncinelli Project Coordinator
Universita degli Studi di Firenze
Florence — Italy
http://www.move-fp7.eu/

Methods for the improvement of Vulnerability Assessment in Europe created knowledge, frameworks and methods for the assessment of vulnerability to natural hazards in Europe. It used indices and indicators to help improve societal and environmental resilience. Floods, temperature extremes, droughts, landslides, earthquakes, wildfires and storms will be studied. Emphasis were placed on clear, capable measurement and accounting for uncertainties. Stakeholders were consulted systematically in order to understand their needs and to enable MOVE to draw attention to the practical value of its methodologies. The members of this project may be regarded as one group of end-users of data provided by the Copernicus portal and CLIPC. Main user-category is: C-Intermediaries.

HYDRATE

HYDRATE
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/09/2006; duration 45 months
Dr. Marco Borga Project Coordinator
Universita Degli Studi di Padova, Padua — Italy
http://www.hydrate.tesaf.unipd.it/

Hydrometeorogical data resources and technologies for effective flash flood forecasting developed a freely accessible European Flash Flood Database to make available the collected hydrometeorological data to the international research community. The final aim of

HYDRATE was to enhance the capability of flash flood forecasting in ungauged basins by exploiting the extended availability of flash flood data and the improved process understanding. The members of this project may be regarded as potential users of provided by CLIPC. Main user-category is: A-Climate scientists.

SafeLand

SafeLand
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/05/2009; duration 36 months
Dr. Bjorn Kalsnes Project Coordinator
Norges Geotekniske Institutt
Oslo — Norway
http://www.safeland-fp7.eu/

Living with landslide risk in Europe: Assessment, effects of global change, and risk management strategies developed generic quantitative risk assessment and management tools and strategies for landslides at local, regional, European and societal scales and establish the baseline for the risk associated with landslides in Europe, to improve our ability to forecast landslide hazard and detect hazard and risk zones. The project aimed to improve the knowledge on triggering mechanisms, processes and thresholds, including climate-related and anthropogenic triggers, and on run-out models in landslide hazard assessment. The members of this project may be regarded as potential users of data provided CLIPC. Main user-category is: C-Intermediaries.

MICRODIS

MICRODIS
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/02/2007; duration 36 months
Dr. Debarati Guha-Sapir Project Coordinator
Universite Catholique de Louvain, Louvain-la-Neuve, Belgium
http://www.microdis-eu.be/

Integrated health social & economic impacts of extreme events: evidence, methods & tools aimed to strengthen prevention, mitigation and preparedness strategies in order to reduce the health, social and economic impacts of extreme events on communities. It further intended to develop and integrate knowledge, concepts, methods and databases towards a common global approach and to improve human resources and coping capacity in Asia and Europe through training and knowledge sharing. The outputs included an evidence-base on impacts, field

methodologies and tools for data compilation, impact models, and integrated vulnerability assessments. It also strengthened standardised data collection of extreme events and their impacts at local, regional and global levels. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

IRASMOS

IRASMOS
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/09/2005; duration 33 months
Dr. Jakob Rhyner Project Coordinator
Swiss Federal Research Institutes WSL/SLF, Davos Dorf — Switzerland
http://www.slf.ch/irasmos

Integral Risk Management of Extremely Rapid Mass Movements reviewed, evaluated, and augmented methodological tools for hazard and risk assessment extremely rapid mass movements. Expected results include Best Practice Handbook for quantifying and managing total risk from rapid mass movements given possible constraints set by known environmental and administrative boundary conditions. The work intended to provide a total risk assessment in the form of a comprehensive catalogue of triggers and threshold conditions for extremely rapid mass movements, countermeasures, and sensitivity of hazard, vulnerability, and risk indicators, allowing customized decision-support for prevention, intervention and rehabilitation efforts in European mountain ranges. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: C-Intermediaries.

MICORE

MICORE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/06/2008; duration 36 months
Dr. Franca Siena Project Coordinator
Universita Degli Studi di Ferrara, Ferrara -Italy
http://cordis.europa.eu/projects/rcn/88552_en.html

Morphological Impacts and Coastal Risks induced by Extreme storm events contributed to the development of a probabilistic mapping of the morphological impact of marine storms and to the production of early warning and information systems to support long-term disaster reduction. All data were compiled into in a homogeneous database of occurrence and related

socio-economic damages, including the following information on the characteristics of the storms, on their morphological impacts, on the damages caused on society, on the Civil Protection schemes implemented after the events. The members of this project may be regarded as potential users of data by CLIPC. Main user-category is: B-Impact researchers.

MEECE

MEECE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/09/2008; duration 48 months
Dr. Julian Icarus Allen Project Coordinator
Plymouth Marine Laboratory, Plymouth — UK
http://cordis.europa.eu/projects/rcn/89307_en.html

Marine Ecosystem Evolution in a Changing Environment used a combination of data synthesis, numerical simulation and targeted experimentation to further our knowledge of how marine ecosystems will respond to combinations of multiple climate change and anthropogenic drivers. The project improved the decision support tools to provide a structured link between management questions and the knowledge base that can help to address those questions. It is assumed that a strong knowledge transfer element will provide an effective means of communication between end-users and scientists. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

MOTIVE

MOTIVE
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/05/2009; duration 48 months
Dr. Alfons Bieling Project Coordinator
Forstliche Versuchs- und Forschungsanstalt, Baden-Wuerttemberg, Freiburg — Germany
http://cordis.europa.eu/projects/rcn/91252_en.html

Models for Adaptive Forest Management evaluated the consequences of the intensified competition for forest resources given climate and land use change. The project tried to develop and evaluate strategies that can adapt forest management practices to balance multiple objectives under changing environmental conditions. It intended to provide insights, data and tools to improve policymaking and adaptive forest resource management in the face of rapidly changing climatic and land-use conditions. One of the main deliverables of

MOTIVE was an Adaptive Forest Management toolbox. The toolbox provides up-to-date methods for planning and decision making in AFM to the decision maker (forest resource manager, policy maker) for actual use in strategic and tactical forest management planning. The members of this project may be regarded as potential users of data provided by the Copernicus portal and CLIPC. Main user-category is: B-Impact researchers.

ClimateWater

ClimateWater
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/11/2008; duration 36 months
Dr. Gaborne Balazs Project Coordinator
VITUKI, Environmental Protection and Water Management, Research Institute, Budapest — Hungary
http://www.climatewater.org/

Bridging the gap between adaptation strategies of climate change impacts and European water policies carried out analysis and synthesis of data and information on the likely (known, assumed, expected, modelled, forecasted, predicted, estimated etc.) water related impacts of the changes of the climate with special regard to their risk and to the urgency of getting prepared to combat these changes and their impacts. Research needs in the field of 'climate impact on the water cycle and water users' were identified with special regard to enable the ranking of adaptation action in the light of the magnitude of impact on water resources and the urgency of the action needed. The most important output of the project will be the identification of gaps that would hinder the implementation of the EU water policy in combating climate impacts on water. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: C-Intermediaries.

SAFEWIND

SAFEWIND
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/09/2008; duration 48 months
Dr. Valentine Vierne Project Coordinator
Association pour la Recherche et le Developpement des, Methodes et Processus Industriels, Paris — France
http://www.safewind.eu/

Forecast with emphasis to extreme weather situations for secure large-scale wind power integration improved wind power predictability in challenging or extreme situations and at

different temporal and spatial scales. Prediction of wind is considered as a system design parameter linked to the resource assessment phase, where the aim was to take optimal decisions for the installation of a new wind farm. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: A-Climate scientists.

InfraRisk

InfraRisk
Funded under the Norwegian Research council
Dr. Anders Solheim Project Coordinator
Norwegian Geotechnical Institute, Oslo - Norway
http://www.ngi.no/en/prosjektnett/infrarisk

InfraRisk was concerned with the occurrence of extreme weather events (EWE) and the related threats to infrastructure in Norway. The project 'Impacts of extreme weather events on infrastructure in Norway' was a three year project (2010-2013) and part of the NORKLIMA-programme, a 10-year programme (2004-2013) funded by The Research Council of Norway (RCN) which deals with 'Climate change and impacts in Norway'. Some of the objectives were (a) to improve the understanding of past and future variability of extreme weather events (EWEs) in Norway and its connection to characteristics of natural hazards, that are relevant for the Norwegian infrastructure (e.g. roads, railways and critical structures); (b) move towards a more complete national mapping of EWE-related natural hazards in Norway, suggest an improved standard for hazard mapping, quantify the vulnerability of infrastructure objects to EWE-related hazards and investigate the mitigating measures that are available. The project operateded in close collaboration with several research institutes and different end-users. The climatic data of interest include heavy precipitation (annual max 24-hr precipitation, 5-day precipitation, and 10-day precipitation; number of events above threshold: 24-hr precipitation above 10mm, 5-day precipitation above 40 mm, and 10-day precipitation above 60 mm), heavy snow (annual max snow depth, annual max snow fall; number of events with 24-hr snow fall above 5 mm and 30 mm; number of 3-day events greater than 50 mm snow; number of 5-day events with snow fall greater than 80 mm), and number of days with temperature around zero. These were used to make geographical maps of hazard zones. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

BALTEX

BALTEX
A programme umbrella for a number of research projects.

International BALTEX Secretariat, Helmholtz-Zentrum Geesthacht, Germany
http://www.baltex-research.eu/

The Baltic Sea Experiment studies the hydrological cycle and the exchange of energy between the atmosphere and the surface of the Earth, as they control and regulate the climate in a fundamental manner. These projects may provide information complimentary to that of CLIPC, but the members of this project may also be regarded as one group of potential users of data provided by CLIPC. Main user-category is: A-Climate scientists.

PRUDENCE

PRUDENCE
Funded under the European Commission's Fifth Framework Programme (PF5)
From 2001-11-01 to 2004-10-31
Dr. Jens Hesselbjerg Christensen Project Coordinator
DANISH METEOROLOGICAL INSTITUTE
http://prudence.dmi.dk/

Prediction of Regional scenarios and Uncertainties for Defining EuropeaN Climate change risks and Effects provided a series of high-resolution climate change scenarios for 2071-2100 for Europe, characterising the variability and level of confidence in these scenarios as a function of uncertainties in model formulation, natural/internal climate variability, and alternative scenarios of future atmospheric composition. The project provided a quantitative assessment of the risks arising from changes in regional weather and climate in different parts of Europe, by estimating future changes in extreme events such as flooding and windstorms and by providing a robust estimation of the likelihood and magnitude of such changes. The project also examined the uncertainties in potential impacts induced by the range of climate scenarios developed from the climate modelling results. This provided useful information for climate modellers on the levels of accuracy in climate scenarios required by impact analysts. Furthermore, a better appreciation of the uncertainty range in calculations of future impacts from climate change may offer new insights into the scope for adaptation and mitigation responses to climate change. In order to facilitate this exchange of new information, the PRUDENCE work plan places emphasis on the wide dissemination of results and preparation of a non-technical project summary aimed at policy makers and other interested parties. PRUDENCE was one of the early research projects that established a data portal for downscaled climate model projections, and in this sense, bears some relevance to CLIPC. Main user-category is: B-Impact researchers.

STARDEX

STARDEX

Funded under the European Commission's Fifth Framework Programme (PF5)
From 2002-02-01 to 2005-07-31
Dr. Clare Goodess Project Coordinator
Climatic Research Unit, U. East Anglia, U.K.
http://www.cru.uea.ac.uk/projects/stardex/

STARDEX provided a rigorous and systematic inter-comparison and evaluation of statistical, dynamical and statistical-dynamical downscaling methods for the construction of scenarios of extremes. The more robust techniques were identified and used to produce future scenarios of extremes for European case-study regions for the end of the 21st century. These helped to address the vital question as to whether extremes will occur more frequently in the future. The type of results provided by projects like STARDEX are likely to be of interest to end-users, and the members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: A-Climate scientists.

MICE

MICE
Funded under the European Commission's Fifth Framework Programme (PF5)
From 2002-01-01 to 2004-12-31
Dr. J.P. Palutikof Project Coordinator
INSTITUTO DE CIENCIA APLICADA E TECNOLOGIA DA FACULDADE DE CIENCIAS DA UNIVERSIDADE DE LISBOA or Climatic Research Unit
http://www.cru.uea.ac.uk/projects/mice/

The objectives of Modelling the impact of climate extremes include identifying and cataloguing extremes in observed and modelled climate data; Assessing future changes in climate extremes using Extreme Value Theory; Assessing the impact of changes in extremes; and communicating the results to stakeholders. The type of results provided by projects like MICE are likely to be of interest to end-users, and the members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

EASAC

EASAC

Coordinator: Prof Øystein Hov

Published 2013

http://www.easac.eu/home/press-releases/detail-view/article/easac-warns-1.html

The European Academies Science Advisory Council recently published the report 'Trends in extreme weather events in Europe: implications for national and European Union adaptation strategies'. The focus of this report was extreme heat and cold, extreme precipitation, storms, winds, surges, and drought. The type of results provided by report written EASAC are likely to be of interest to decision-makers, and this council may also represent potential users of data provided by CLIPC. Main user-category is: C-Intermediaries.

BASIN

BASIN
Funded under the European Commission's Seventh Framework Programme (PF6)
From 2006-07-01 to 2008-03-31
Dr. Michael St. John Project Coordinator
Universitat Hamburg, Hamburg, Germany
http://cordis.europa.eu/projects/rcn/80086_en.html

Basin-scale Analysis, Synthesis, and Integration: Resolving the impact of climatic processes on ecosystems of the North Atlantic Basin and shelf seas developed a plan to assess, predict and mitigate the effects on marine ecosystems of the North Atlantic and their services. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

ACQWA

ACQWA
Funded under the European Commission's Seventh Framework Programme (PF7)
start: 01/10/2008; duration 60 months

Dr. Martin Beniston Project Coordinator
University of Geneva, Geneva — Switzerland
http://www.acqwa.ch/

Assessment of Climatic change and impacts on the Quantity and quality of Water assessed the impacts of a changing climate on the quantity and quality of water in mountain regions. Regional climate models provided the essential information on shifting precipitation and temperature patterns, and snow, ice, and biosphere models will feed into hydrological models in order to assess the changes in seasonality, amount, and incidence of extreme events in various catchment areas. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

ADAGIO

ADAGIO
Funded under the European Commission's Sixth Framework Programme (PF6)
start: 01/01/2007; duration 30 months
Dr. Josef Eitzinger Project Coordinator
University of Natural Resources and Applied Life Sciences, Vienna, Austria
http://www.adagio-eu.org

Adaptation of agriculture in the European regions at Environmental risk under climate change analysed and evaluated potential and actual adaptation measures in agriculture for different climatic and agro-ecosystem regions under risk in Europe. The project considered future scenarios, results based on modelling tools, as well as already visible ongoing changes. One objective was adaptation measures for a better and realistic assessment of potential future adaptation measures at the regional level. One relevant aspect to CLIPC is that it intends to establish a continuous interacting information and discussion network, connecting the research level with decision makers and support a holistic approach to solve the related problems. The members of this project may be regarded as potential users of data provided by CLIPC. Main user-category is: C-Intermediaries.

SPECS

SPECS
Funded under the European Commission's Seventh Framework Programme (PF7)
From 2012-11-01 to 2017-01-31
Dr. Francisco J. Doblas-Reyes Project Coordinator
Institut Català de Ciències del Clima, Barcelona, Spain

http://www.specs-fp7.eu/SPECS/Home.html

Seasonal-to-decadal climate Prediction for the improvement of European Climate Services aims to identify the main problems in climate prediction and investigate a battery of solutions from a seamless perspective. The project will undertake research and dissemination activities to deliver a new generation of European climate forecast systems, with improved forecast quality and efficient regionalisation tools to produce reliable, local climate information over land at seasonal-to-decadal time scales, and provide an enhanced communication protocol and services to satisfy the climate information needs of a wide range of public and private stakeholders. SPECS collaborates closely with EUPORIAS, and the results from this project will be relevant to Copernicus and CLIPC. Main user-category is: C-Intermediaries.

ECLISE

ECLISE
Start date: 1 February 2011; End date: 31 January 2014
Funded under the European Commission's Seventh Framework Programme (PF7)
Project Coordinator: Roeland van Oss,
KNMI, De Bilt, The Netherlands
http://www.eclise-project.eu/

The central objective of ECLISE is to take the first step towards the realisation of a European Climate Service. The project is a European effort in which researchers, in close cooperation with users, develop and demonstrate local climate services to support climate adaption policies, providing climate services for several climate-vulnerable regions in Europe, organized at a sectorial level: cities, water resources, coastal defence and energy production. ECLISE will define, in conceptual terms, how a pan-European Climate Service could be developed in the future, based on experiences from local services and the involvement of a broader set of European decision makers and stakeholders. Main user-category is: B-Impact researchers.

IMPACT2C

IMPACT2C
Start: October 2011; End: September 2015
Funded under the European Commission's Seventh Framework Programme (PF7)
Coordinator: Dr. Daniela Jacob
Climate Service Center, Hamburg - Germany
http://www.hzg.de/mw/impact2c/index.html.en

This project enhances knowledge, quantifies climate change impacts, and adopts a clear and logical structure, with climate and impacts modelling, vulnerabilities, risks and economic costs, as well as potential responses, within a pan-European sector based analysis. It utilizes a range of models within a multi-disciplinary international expert team and assesses effects on water, energy, infrastructure, coasts, tourism, forestry, agriculture, ecosystems services, and health and air quality-climate interactions. Main user-category is: B-Impact researchers.

IMILAST

IMILAST
Dr. Urs Neu Project Coordinator
ProClim / Swiss Academy of Sciences (SCNAT), Bern, Switzerland
http://www.proclim.ch/imilast/index.html

Intercomparison of mid latitude storm diagnostics aims at providing a quantitative comprehensive assessment of all types of uncertainties inherent in the mid-latitudinal storm tracking by comparing different methodologies, and pointing out the information that can be drawn from specific methods. The intercomparison can also provide a multi-method data set that could serve as a baseline for climate impact studies. Main user-category is: A-Climate Scientists.

Santander Meteorology Group

University of Cantabria
Dr. Gutiérrez, J.M.
http://www.meteo.unican.es/en/portal/downscaling

The downscaling portal at the University of Cantabria is connected to the ENSEMBLES, in addition to COST-VALUE and CORDEX-ESDM. It provides a web-based tool for downscaling precipitation and temperature, and is relevant to CLIPC in the sense of being a complimentary data provision service. The members of the group operating this portal may also be regarded as potential users of data provided by CLIPC. Main user-category is: B-Impact researchers.

IRI

IRI
Head: Lisa Goddard
International Research Institute for Climate and Society, USA
http://iri.columbia.edu/

The mission of International Research Institute for Climate and Society is to enhance society's capability to understand, anticipate and manage the impacts of climate in order to improve human welfare and the environment, especially in developing countries. The IRI

conducts this mission through strategic and applied research, education, capacity building, and by providing forecasts and information products with an emphasis on practical and verifiable utility and partnership. IRI has long experience with data provision and disseminating information and knowledge to end-users. Their know-how is of relevance to CLIPC. Main user-category is: C-Intermediaries.

NPCC

NPCC
USA
https://earthsystemcog.org/projects/downscalingmetadata/

NPCC hosts the Downscaling Metadata project is an open community collaborative international project that is coordinated and facilitated by the National Climate Predictions and Projections platform (US) under the auspices of the ES-DOC international project. Participation in the project is voluntary and includes representatives from US as well as the international CORDEX project, and the European IS-ENES2 and COST-VALUE projects. The larger downscaling community is being updated regularly about the work and progress of the Downscaling metadata project through the use of the CORDEX ESD group mailing list (which includes many members of the COST-VALUE project as well), the ES-DOC mailing list and the Downscaling metadata participants list. This project is developing a standard set of descriptive terms for downscaling that is consistent with community standards. It will use the Common Information Model (CIM) as its metadata schema, and will create a new Controlled Vocabulary for downscaling. This vocabulary will be used by NCPP's Downscaling 2013 Workshop to populate a database of standardized descriptions and evaluations of downscaling methods as well datasets generated using those methods. This will allow practitioners who use climate data at local and regional scales to make better judgements about which climate projection data to use. The relevance of NPCC to CLIPC include their experience on categorizing downscaling models and methods, and their adoption of a CIM. Main user-category is: A-Climate scientists.

IFCC

IFCC
Funded under the Norwegian research council
01.04.2009 - 01.01.2013
Dr. Arnoldo Frigessi Project Coordinator
Norwegian computing, University of Oslo, Norway
http://www.forskningsradet.no/servlet/Satellite?c=Prosjekt&cid=1244733932727&pagename=norklima/Hovedsidemal&p=1226993599906

Insuring Future Climate Change has applied a point of view, reflecting problems and challenges posed by the insurance business itself. The members of the project form a cross-disciplinary and cross-national collaboration of statisticians, actuaries, economists, geographers, meteorologists and climate researchers from Norway, the UK and the USA. The work addresses extreme weather events and natural perils, which today are covered by the Norwegian Natural Perils pool, and are likely to become more frequent as the climate changes. Efforts are also devoted to dissemination; to distribute widely and efficiently the results of the project, build networks, contribute to training of students and recruit future researchers and research leaders in the field. The IFCC project provides some information about what type of information end users from the insurance industry need, and is in this context of relevance to CLIPC. For instance, spatial extent of extreme events matters in addition to the event's severity. Main user-category is: D-Societal end users.

CES

CES
Funded under the NORDEN (Nordic council)
2007 - 2012
Thorsteinn Thorsteinsson and Halldór Björnsson Project Coordinator
http://www.norden.org/en/publications/publikationer/2011-502
http://en.vedur.is/ces

Climate and Energy Systems looked at climate impacts closer in time and assessed the development of the Nordic electricity system for the next 20-30 years. The project started in 2007 and finished with a report in 2012. It looked into the conditions for production of renewable energy in the Nordic area might change due to global warming. One focus was on the potential production and the future safety of the production systems as well as uncertainties. The CES project provides some information about what type of information end users from the energy industry need, and is in this context of relevance to CLIPC. Main user-category is: B-Impact researchers.

Norwegian weather and climate portals

Institutions: collaboration between MET Norway, Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Broadcasting Cooperation (NRK), Statens vegvesenet og Jernbaneverket and Kartverket. *Norway*

Several web portals exist for climate and weather data in Norway. The most popular site is http://www.yr.no providing forecasts, radar data, satellite data, and observations for recent dates. There is also http://www.seNorge.no, which provides climatological maps of temperature, rain and snow. A recent web portal for avalanche risk warnings is http://www.varsom.no. Norway has also provided free access to its national climate archives for several years (http://eKlima.met.no) and provided more advanced products to its customers on http://halo.met.no. These portals can provide some ideas for what type of information is provided to end-users and in what form, and are of relevance to CLIPC. All of these portals are mostly related to category D-Societal end users

Swedish weather portal

SMHI weather and climate portal Sweden

A new web portal from the Swedish Meteorological and Hydrological Institute (SMHI) provides free data: http://opendata-catalog.smhi.se/explore/. This portal can provide some ideas for what type of information is provided to users and in what form, and is therefore of relevance to CLIPC. Main user-category is: B-Impact researchers.

Annex 4: Potential users of the CLIPC portal based on previous projects

Name	Organisation	Position/role	Email	Former project
Adeline Cauchy	TEC	consultant		EUPORIAS
Adrian Broad			Adrian.broad@metoffice.gov.uk	Climate adapt
Albert Klein Tank	KNMI (Royal Netherlands Meteorological Institute)	Senior scientist	kleintank@knmi.nl	IS-ENES
Anca Brookshaw	UK Met Office			EUPORIAS
Andre Jol	EEA	head of group vulnerability and adaptation	andre.jol@eea.europa.eu	IS-ENES
Andrea Taylor	University of Leeds			EUPORIAS
Andreas Gobiet	Univ. Graz / current: Climate Service Center Germany	Vice Director, Assist Prof,	andreas.gobiet@uni-graz.at	IS-ENES
Andreas Weigel	Cargill International SA	Climatologist		EUPORIAS
Anna Bratt	County Administrative Board Östergötland	Coordinator Climate Change Adaptation		EUPORIAS
Anna Lilja	SMHI	Researcher		EUPORIAS
Anna Maria Jönsson	Lund University	Associate professor		EUPORIAS
Anne Gobin	VITO	Project Manager	anne.gobin@vito.be	IS-ENES
Antonia Andúgar			antonia.andugar@copa-cogeca.eu	Climate adapt

Antonio Graça	SOGRAPE VINHOS SA	R&D		EUPORIAS
Arie Kattenberg			arie.kattenberg@knmi.nl	Climate adapt
Bastian Klein	Federal Institute of Hydrology	Researcher		EUPORIAS
Ben Caspar			benjamin.caspar@ec.europa.eu	Climate adapt
Bengt Andersson	Skogforsk	Programme Manager		EUPORIAS
Bertrand Sudre	ECDC	Scientific Officer Environmental Determinants of C		EUPORIAS
Bettina Menne	WHO	Dr		EUPORIAS
Blaz Kurnik	EEA	Project officer	blaz.kurnik@eea.europa.eu	IS-ENES
Bram Smaing	KNMI	Internal invitee		IS-ENES
Bruno baldissara	ENEA	Research		EUPORIAS
Carlo Buontempo	EUPORIAS (Met Office)	Science coordinator		EUPORIAS
Celine Deandreis	IPSL	Postdoc	cdeipsl@ipsl.jussieu.fr	IS-ENES
Chantal Donnelly	SMHI	Invited speaker		IS-ENES
Chris West			chris.west@ukcip.org.uk	Climate adapt
Christian Pagé	CERFACS	Climate Research engineer	christian.oage@cerfacs.fr	IS-ENES
Christian Seiler	WUR	Internal invitee		IS-ENES
Christoph Spirig	MeteoSwiss			EUPORIAS

Clare Goodess	University of East Anglia			EUPORIAS
Clemens Hasse			clemens.hasse@uba.de	Climate adapt
Cor Jacobs	WUR	Internal invitee		IS-ENES
Daniel San Martín	Predictia			EUPORIAS
David Avelar			david.a.avelar@gmail.com	Climate adapt
Edoardo Bucchignani	C.M.C.C.	Research Scientist	e.bucchignani@cira.it	IS-ENES
Ernesto Rodríguez-Camino	Agencia Estatal de Meteorología			EUPORIAS
Felicity Liggins	Met Office	Climate Scientist		EUPORIAS
Fokke De Jong	WUR	JRA5 partner		IS-ENES
Francesca de'Donato	Department of Epidemiology, Lazio Regional Health Service	Biometeorologist		EUPORIAS
Francisco Lima da Costa	CESNOVA	Auxiliary Researcher	francisco.costa@fcsh.unl.pt	IS-ENES
Frank Kaspar			frank.kaspar@dwd.de	Climate adapt
Fulco Ludwig	Wageningen University		fulco.ludwig@wur.nl	Climate adapt
Geert Jan van Oldenborgh	The Royal Netherlands Meteorological Institute			EUPORIAS
Gennaro Niglio	GSE SPA - Gestore dei Servizi Energetici	Head		EUPORIAS

Giovanni Cinque	HIMET Srl	CEO		EUPORIAS
Guy Brasseur	Climate Service Center	Director	guy.brasseur@hzg.de	IS-ENES
Hans-Martin Füssel	EEA	Project manager	Martin.Fuessel@eea.europa.eu	IS-ENES
Jaap Kwadijk	Deltares	Director of Science Dep. Inland water systems	jaap.kwadijk@deltares.nl	IS-ENES
James Creswick	World Health Organisation			EUPORIAS
Janette Bessembinder	The Royal Netherlands Meteorological Institute			EUPORIAS
Jean-Pierre Ceron	Metéo-France			EUPORIAS
Jelle van Minnen	PBL		jelle.vanminnen@pbl.nl	Climate adapt
Jennifer Lenhardt	Deutscher Wetterdienst (German Weather Service)	Scientific associate	Jennifer.Lenhardt@dwd.de	IS-ENES
Jeroen Ticheler			info@geocat.net	Climate adapt
John Aardenne, van	European Environment Agency	Project manager air and climate change mitigation	jva@eea.europa.eu	IS-ENES
Julian Tait	Littlestar Media Production Limited	Head of Innovation		EUPORIAS
Julian Wilson			Julian.wilson@jrc.ec.europa.eu	Climate adapt
Krishna Krishnamurthy	World Food Programme	Climate Change and Food Security Analyst		EUPORIAS
Lars Bärring	SMHI, Rossby Centre	Senior scientist	lars.barring@smhi.se	IS-ENES

Laura Ferranti	European Centre for Medium-Range Weather Forecasts			EUPORIAS
Laurent Dubus	Electricité de France			EUPORIAS
Laurent Pouget	CETaqua			EUPORIAS
Leendert van Bree	PBL		leendert.vanbree@pbl.nl	Climate adapt
Louise Grøndahl			lgr@ens.dk	Climate adapt
Maarten Plieger	KNMI	JRA5 partner		IS-ENES
Maria Dolores Frias	University of Cantabria			EUPORIAS
Maria Eugenia Magarino	University of Cantabria			EUPORIAS
Mariana Bernardino	Instituto Português do Mar e da Atmosfera			EUPORIAS
Marina Koussathana			Marina.Koussathana@ec.europa.eu	Climate adapt
Marit Heinen	Climate changes Spatial Planning	Scientific programme officer	m.heinen@programmemabureauklimaat.nl	IS-ENES
Markus Quirmbach	dr. papadakis GmbH	Deputy Managing Director	m.quirmbach@drpapadakis.de	IS-ENES
Markus Stowasser	Allianz SE	Senior Research Analyst		EUPORIAS
Marta Bruno Soares	University of Leeds	Research fellow		EUPORIAS
Martina Flörke	Center for Environmental Systems Research	Senior Scientist, Head of GRID Water group	floerke@usf.uni-kassel.de	IS-ENES

Massimiliano Pasqui	CNR - IBIMET	Researcher		EUPORIAS
Matteo De Felice	ENEA	Staff Scientist		EUPORIAS
Max Tuni	Predictia	CTO		EUPORIAS
Melanie Davis	IC3, Catalan Institute for Climate Sciences	Climate Services for Renewable Energy		EUPORIAS
Michael Duffield	Future Everything CIC	Admin		EUPORIAS
Michaela Schaller			Michaela.Schaller@gkss.de	Climate adapt
Mike Harrison	Climate-Insight			EUPORIAS
Murat Türkeş	Çanakkale Onsekiz Mart University	Lecturer and Professor, Member University Senate	comu.muratturkes@gmail.com	IS-ENES
Nadine Brisson	INRA	Research director	brisson@avignon.inra.fr	IS-ENES
Niels Balzer	World Food Programme	Policy Officer		EUPORIAS
Nils Hempelmann	HZG	External invitee		IS-ENES
Ole B Christensen	Danish Meteorological Institute	Senior scientist	obc@dmi.dk	IS-ENES
Paolo Ciavola	University of Ferrara/MICORE Project	Associate Professor/Project Coordinator	cvp@unife.it	IS-ENES
Paolo Michel Ruti	ENEA	Head of Climate Modeling and Impacts Lab	paolo.ruti@enea.it	IS-ENES
Pascale Braconnot	LSCE	Researcher at CEA		IS-ENES

Paula Harrison	Environmental Change Institute, University of Oxford	Senior Research Scientist	paharriso@aol.com	IS-ENES
Peter Verweij			peter.verweij@wur.nl	Climate adapt
Philip Amingo	IGAD Climate Prediction and Applications Centre (ICPAC)	Climate Research Scientist		EUPORIAS
Philippe Verjus	– Direction Régionale et Interdépartementale de l'Energie et de l'Environnement	– Responsable de la Mission Gestion Quantitative de	–	EUPORIAS
Rachel Lowe	IC3	Postdoctoral Scientist		EUPORIAS
Ramon Creus Rodriguez	Agbar	Operations Support Manager		EUPORIAS
Rasmus Benestad	Meteo Norway			EUPORIAS
Ricardo Aguiar	LNEG - Nat. Lab. for Energy and Geology, Portugal	Senior Researcher	ricardo.aguiar@lneg.pt	IS-ENES
Richard Choularton	World Food Programme	Sr. Policy Officer		EUPORIAS
Richard Fischer	Thünen-Institute for World Forestry	Programme Manger ICP Forests		EUPORIAS
Rob Collins	EEA	Project Manager Agriculture and Water	Robert.PeterCollins@eea.europa.eu	IS-ENES
Rob Lokers			rob.lokers@wur.nl	Climate adapt
Rob Schoonman			Rob.Schoonman@minvrom.nl	Climate adapt

Rob Swart	Alterra	coordinator international climate adaptation research	rob.swart@wur.nl	IS-ENES
Roeland van Oss	The Royal Netherlands Meteorological Institute			EUPORIAS
Roger Street	United Kingdom Climate Impacts Programme			EUPORIAS
Ronald Hutjes	Alterra	senior scientist	ronald.hutjes@wur.nl	IS-ENES
Rosie Eade	The Met Office	Scientist		EUPORIAS
Roxana Bojariu	Meteo-Romania			EUPORIAS
Rüdiger Gerdes	Alfred Wegener Institute	unknown	Ruediger.Gerdes@awi.de	IS-ENES
Rui Pestana	REN - Rede Eléctrica Nacional, S.A.	Assistant Director		EUPORIAS
Ruth Lawford-Rolfe	University of Leeds			EUPORIAS
Sander Janssen			Sander.Janssen@wur.nl	Climate adapt
Sara Venturini			sara.venturini@cmcc.it	Climate adapt
Saskia Werners	WUR		Saskia.Werners@wur.nl	Climate adapt
Serge Planton	Météo-France / CNRM-GAME	Head of the climate research group	serge.planton@meteo.fr	IS-ENES
Simona Vecchi	Department of Epidemiology, Lazio Region	Epidemiologist		EUPORIAS
Sonja Otto			Sonja.Otto@uba.de	Climate adapt
Stefan Niemeyer	Joint Research Centre, European	Researcher in Agricultural		EUPORIAS

	Commission	monitoring and forecast		
Stephane Isoard	EEA	Project Manager 'CC adaptation and economics'	stephane.isoard@eea.europa.eu	IS-ENES
Suraje Dessai	University of Leeds			EUPORIAS
Sylvain Lassonde	CNRS/IPSL	JRA5 partner		IS-ENES
Sylvie Joussaume	CNRS/IPSL	Coordinator IS-ENES	sylvie.joussaume@lsce.ipsl.fr	IS-ENES
Sylvie Parey	EDF/R&D	Senior scientist	sylvie.parey@edf.fr	IS-ENES
Teresa Zölch	Climate Service Center			EUPORIAS
Thomas Hickler	BiK-F / Goethe University Frankfurt	Professor	thomas.hickler@senckenberg.de	IS-ENES
Tiago Capela Lourenço	FFCUL	C2 coordinator	tcapela@siam.fis.fc.ul.pt	IS-ENES
Tomas Halenka	Charles University, Prague	associate professor	tomas.halenka@mff.cuni.cz	IS-ENES
Valentina Pavan	ARPA Emilia-Romagna	Dr.		EUPORIAS
Vittorio Marletto	ARPA Emilia-Romagna	R&D Agrometeorology		EUPORIAS
Wilco Hazeleger	The Royal Netherlands Meteorological Institute			EUPORIAS
Wim Som de Cerff	KNMI	Senior researcher ICT	sdecerff@knmi.nl	IS-ENES
Xavier Litrico	Lyonnaise des Eaux	Director R&D		EUPORIAS