CLIPC MILESTONE (MS6)

User evaluation report

Dissemination level: PU (public)

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Date of issue: 7-6-2016

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1. INTRODUCTION

This report presents results of the task 2.2 'user requirement capture' and preliminary results of task 2.3 'user evaluation' for the period September 2015 – February 2016. The report describes the feedback of potential users on mock ups of the CLIPC Climate information portal, the facilitation methodology used in consultation as well as lessons learnt.

Climate data and information are of key importance for mitigation and adaptation decision-making. Climate data are increasing in size and complexity. Increasingly more sectors are concerned e.g. agriculture, floods and water management, urban planning, energy production and management. Until recently, researchers and climate scientists were the main users of climate data. The access to data was mainly confined to climate experts able to deal with complex datasets and at ease with coding. Yet, since the last few years the need for broadening the user groups of climate data and a good understanding of their information requirements are increasingly emphasized.

CLIPC aims to develop a data service infrastructure allowing a wide range of user groups to have access to climate data resources and tools. To ensure the creation of a well-functioning and user-oriented portal, regular feedbacks from users on mock ups of the portal are organised since September 2015 and are still ongoing.

To support active involvement of diverse users in the creation of the CLIPC climate information portal, a user consultation strategy has been developed distinguishing different categories of users (climate scientists, impact researchers and boundary workers) and tailored activities.
The constitution of a users panel and interaction with potential users from different user categories have started from the beginning of the project and have become increasingly more important.

2. OBJECTIVES OF USERS CONSULTATION AND IMPLEMENTED METHODOLOGY

2.1. Objectives

The consultation with potential users of the CLIPC climate information portal aims to :

- Assist the development of a climate information portal and indicator toolbox accounting for the future users' needs;

- Give feedback to colleagues from other CLIPC Work Packages on users' preferences and suggestions for improving mock ups;
- Facilitate discussions about trade-offs between technical possibilities/complexity and practical needs of users, and possible trade-offs between different users' groups;
- Prepare the final CLIPC demonstration and evaluation workshop by further specifying areas of users' interest, requirements and worries.

In February 2015, CLIPC started the consultation with a user requirement workshop in which about 40 users participated. During this meeting, the participants highly supported the proposal to regularly involve users in the development of the portal. Between September 2015 – February 2016, these consultations users were organised at different key moments when new components or mock ups were made available, so that the release of successive and actualized versions of the portal have alternated with users' consultation periods in between. The users consultations will continue to take place g until the final CLIPC demonstration and evaluation event in October 2016.

Different WP2 partners were responsible for the facilitation of the consultation sessions with TEC coordinating the entire process and developing guidelines for the preparation of the workshops and the reporting. TEC also made some recommendations for the facilitation of the workshops and the interaction with other CLIPC WPs. ALTERRA developed recommendations for mobilization of and communication with users.

2.2. The experiment of virtual workshops as a methodology to link climate information providers and users

2.2.1. The choice of virtual workshops

WP2 decided to experiment with virtual workshops to organise the interaction between data providers and potential users. A virtual workshop is a workshop organized throughout web-meeting tools, such as Skype or WebEx. The virtual workshop allowed users to interact directly with developers of the portal and with other users in a virtual meeting room. The workshop was structured and conducted on the basis of a semi-structured focus group discussion.

Virtual workshops were chosen for the following two main reasons:

(1) Saving time and resources. During previous qualitative interviews, many users mentioned that they are often asked to answer surveys which are very time-consuming for them. Users can attend virtual workshops without travelling long distances which is especially convenient for participants from East and Southern European countries. Session were kept short (1-1,5 hour) to avoid demanding too much time.

(2) Bridging the gap between climate information providers and users should go through direct interactions between providers and users. Although one virtual workshop maybe less effective than a face-to-face meeting with more personal interactions, virtual

workshops also provide an arena for such direct interactions. They have the added benefit that they can be held more often and as such build a community and eventually can lead to the same, or even higher levels of effectiveness.

2.2.2. Methodology

The methodology was based on steps and methods which are usually applied in consultations:

√ Define topics and audience

Topics were identified in collaboration with colleagues involved in other CLIPC Work Packages (climate information providers). In line with the selected topic, the user category(ies) to be invited were selected accordingly. Especially, Invitation of participants

For the invitation of participants, use of made of the user panel established just after the February 2015 workshop. In the course of time, the number of invited persons increased for which the data set developed in the beginning of the project as well as the professional network of colleagues were used.

√ Facilitation

The focus group method was applied to facilitate the workshops which allowed everybody to express him/herself during the session. WP2 was responsible for the process facilitators, MARIS and/or colleagues demonstrated the mock ups or portal components.

√ Reports

Users' feedback was written in reports to disseminate users' feedbacks to colleagues from other WPs. All reports are available on the CLIPC wiki.

2.3. Implementation of the workshops

Table 1 presents an overview of the virtual workshops organised between September 2015-February 2016. It shows the topics which were addresses, the number and type of user categories involved and CLIPC partners responsible for the facilitation. ome topics e.g. 'uncertainty

Table 1: Summary of virtual workshops (September 2015 - February, 2016)

Component/ Service	Participants (number, user group)	Facilitators	Method	Date
Uncertainty assessment	• **2 Participants** • Impact researcher (1) • Boundary worker (1)	TEC GERICS	Virtual workshop + 1 interview	16 Sept. 2015
Data viewer (My CLIPC)	• **1 participant** • Impact researcher (1)	TEC MARIS	Virtual presentation	16 Oct. 2015
Tier 1 indicators	• **2 Participants** • Climate scientist (1) • Boundary worker (1)	TEC MARIS CERFACS	Virtual workshop	22 Oct. 2015
MyCLIPC processing wizzard	• **6 Participants** • Climate scientist (2) • Impact researcher (2) • Boundary worker (3)	MARIS ALTERRA	Virtual workshop	29 Oct. 2015
Indicator Toolbox, User Interface	• **7 Participants** • Climate scientists (2) • Impact researchers (3) • Boundary workers (2)	MARIS GERICS	Virtual workshop	15 Dec. 2015
Uncertainty assessment	• **5 Participants** • Climate scientist (1) • Impact researcher (1) • Boundary worker (3)	GERICS	Virtual workshop + written feedback	29 Jan. 2016
Version 1.0	• **38 participants** • Climate scientists (13) • Impact researcher (19) • Boundary workers (6)	ALTERRA, MARIS	4 target virtual workshops	18 and 19 Feb. 2016

3. USERS' FEEDBACKS ON CLIPC COMPONENTS AND MOCK-UPS

3.1. General positive feedbacks on the added value of CLIPC components

The tools presented during the workshops have received positive feedbacks from users. Participants asked many questions and precisions about the tools and show a high interest in what was presented.
As many participants said it: "*we want to play around with the tools now*". However, users suggested many improvements still to be made, of which some had already been planned.

TABLE 2: FEEDBACKS ABOUT CLIPC COMPONENTS

CLIPC COMPONENTS	ADDED VALUE highlighted by users	TYPES OF USERS	ADDITIONNAL REQUIREMENTS / USERS PROPOSALS	COMMENTS
GENERAL FEEDBACK			• Professionals undertaking adaptation assessments (M&E) should be added as additional user category. It should be looked at what CLIPC has to offer this category of users and what can be simply added/changed to make it more useful for this type of users; • Add an overview table at the portal, where all available data/ indicators is listed.	• Remark made by one user
UNCERTAINTY ASSESSMENT TOOL	• A non-quantitative way to assess uncertainty could be useful, yet it may be more to difficult to rely on it. I ndeed, one can understand that it	**Boundary workers**	• The 'expert judgment' about the robustness of the indicator has to be explained, to avoid a 'black box'. Giving a maximum of transparency is important for boundary workers: • Proposal was made for pop-ups which	• This remark suggests that some users consider quantitative uncertainty information less subjective (or credible?). It should be noted that also quantitative uncertainty assessment has disadvantages, notably it can only

	relies on a subjective perspective.		explain the expert judgment process: • An explanation about what users can expect from the system is required: what they can do with ranking of uncertainty sources, etc. • Use the most simple language as possible • Make make scientific background clear by using pop-up bubbles	capture a limited part of the uncertainties and thus may suggest that we know more than we actually do; • Important is to add information about limitations of higher resolutions.
TIER 1 INDICATOR	• Maps are really useful • Users did not show interest about combining indicators but already for providing a risk assessment about possible impact of combined effects of weather/climate events such as high temperatures associated with lack of rainfall during seasons of interest.	**Boundary workers**	• The format of indicators (visual and textual) should be the most usable (fast, and easy to understand and use). For example, the maps can be used by potential investors. • More details provided helps to make better decision: from their perspective the most raw format as possible. • There is a need for providing climate information that gives a quick look (form of online consultation service) i.e. easy and quick to use, quick to be assessed. • Maps are a good tool, yet, it is challenging to explain uncertainty behind the color on a given map, and thus : - Climatology guidance to be provided - To be explain what information is and what is not represented on the maps. - Clarify disagreement among the climatic models, i.e. explain why and how to use an ensemble of model output.	
DATAVIEWER	• Is very useful especially for users who download datasets.	**Boundary workers**	• To spare time, the possibility to have a first look at the dataset, to get minimum information about it should be proposed, such as "Which dataset is useful for which objective?" • The layout of climate data search is really very confusing, it requires users to read a manual/explanations to access one of the	

			basic and most common functions; • The geobox should provide some predefined queries (Europe, global, all the continents); • Visualize anomalies (comparison with past data).	
DATAVIEWER	The data search is not useful to all types of (targeted) users	**Climate scientists**	• Users get overwhelmed by the amount of choices , better guidance is needed. For a good example check climatedataguide.ucar.edu (and UKCIP portal).	
My CLIPC data processing wizard	• The possibility to extract information and use it in people's own tool is something that adds value	**Impact researcher**	• User would like to see directly if it is possible to download data sets.	• Consider to use the term down loading possibilities as heading in the description
INDICATOR TOOLKIT	• The toolkit is very useful for users and has improved compared to the earlier versions. • Compare and combine indicators is very useful. For example, for providing a risk assessment about possible impact of combined effects of weather/climate events such as high temperatures associated with lack of rainfall during seasons of interest. • Glossary and pop-up definitions are useful. • The menu bar and mapped layers is intuitive and easy to use.		• There is a need for providing climate information that gives a quick look (form of online consultation service) i.e. easy and quick to use, quick to be assessed for boundary workers, with a limited number of mouse clicks needed to arrive at a certain goal; • The explanation of what is in the maps has to be improved (legends, units, time, data source, specific models and scenarios, etc.); • Exploring the addition of thresholds for particular impacts maybe useful; • While the combine and compare functions are interesting, proper guidance is needed to avoid actions that lead to meaningless results and a disclaimer that the results are the responsibility of the user; • There are too many choices to be made for new users. Short videos can help as guidance;	• One proposal is to let the portal interface be guided by the least technical user – the issue of different interfaces for different user categories remains to be optimized. • Some user categories were identified for which CLIPC may NOT be the right portal, e.g. adaptation assessment – maybe add links to adaptation information (Climate-ADAPT). • Videos are suggested – maybe this can be combined with examples of use cases, if resources allow. • There are many conflicting remarks: some people love pop-ups (e.g. definitions), others hate them, some people want more guidance, others less. CLIPC cannot please all, but maybe should appeal to the ones who do need these features. • The possibility to combine CLIPC datasets with datasets which have been

			• Reconsider the usefulness of the water/rural/urban division as long as the number of indicators is limited. Or maybe these tabs can be used to include explanatory text on vulnerability of these domains; • Suggestion to build in a 2-step approach - 1st select an overall issue (like temperature, precipitation, floods, etc.) and then a specific indicator within these categories; • Add functionality/processing tools for plotting trend lines, basic statistics to compare climatologies rather than daily values; • Many practical recommendations for improving the usefulness, like filtering out the sea when it is not needed, better visibility magnifying glass results, add predefined queries for geographic areas, explain (or avoid) all abbreviations/ acronyms, adding "download in progress" for slow downloads; • It would be appreciated to have different formats for image, shape and text file downloads; • Another benefit would be the possibility to choose the resolution of the data, or have an online processing tool, combining the available data into the needed format, e.g. if data are available in a daily resolution, but only monthly is needed.	developed by the users using CLIPC (e.g. combining indicators), or data sets which the users have would be great, but should be explained well (ownership, responsibility); • The limited number of tier 2/3 indicators is considered as a major weakness (random and not comprehensive selection of existing indicators) – even if this will be improved in 2016, this has to be clearly communicated that this is a prototype; • It should be made clear what a user can do and what not like e.g looking a certain range
	• Difficult to assess the usefulness as only tier 1 indicators are provided; • CLIPC portal could have	**Impact researchers**	• User would like to know where the climate projection data is coming from. When using climate projection data it should be immediately clear that for information on origin, uncertainty etc. one should check	• There are multiple remarks about meta data and what type of information is included in the meta data. Even if one uses the navigator function, it is not immediately clear how to access meta

	an additional value if it extends data from European to global scale; • The ability to combine and compare indicators would be very useful; • The combine and compare function are useful if you want to add picture to your report; • The CLIPC portal is interesting from a European/ national point of view, but less relevant is you need data on e.g. urban services for a specific small city.		the meta data and where he/she can find the meta data; • Histogram: user would like to know the resolution in the data; • Time series function: user wants to know the origin of the time series. It was suggested to look at the time functions in Climate adapt to see if efforts can be combined; • Time series: show the function directly in the map; • View and maybe even allow for interactions between time series and map at the same time; • Overlay – zooming – combine/compare function: user wants to know if it is possible to overlay everything. User agreed on the idea of 'proving 'warnings / guidance' in the use of the overlay function as well as in the use of 'zooming'. There is too much information buried in the meta data. It is suggested to add traffic lights and other types of warnings and guidance; • Use cases would be useful to show that different tasks at hand require different data sets and involve different uncertainties • Allow the user to change color range; • Time dimension of the currently displayed map should be more clearly visible/ explained; • Possibility to calculate a temporal and/or spatial average for a specific data set, e.g. change the time range and choose a geographical region.	data; • There is a lot of information buried in the meta data (which is hidden as well). We might consider to make better links with meta data and use different types of guidance.
INDICATOR TOOLKIT		**Boundary worker**	• Add a legend for the color gradient (a legend is shown in the combine function but not in the compare function); • Good tutorials or other forms of guidance	•

			need to be developed; • Comparing/combining function: It was suggested to organize workshop for boundary workers and impact researchers in the use of the function. Also use it in classes for students.	
		Climate scientist	• Comparing/combining function: provide statistics for climate and climate change for time periods. Use processing tools when you want to have data on different periods; • Comparing/combining function: Better explanation on how the weight function works; • Comparing/combining function: more information on legend and locations for graphs is needed; • It was suggested to include to functionality 'to compare time series for a specific location ' which is not yet the case; • An intuitive download function for indicators would be helpful.	•
GLOSSARY	•		• The glossary is important, but it has to be based on "accepted" existing glossaries and it should be checked if there are differences in definitions between source glossaries.	• We might need to make explicit where the information in the glossary comes from. In case of conflicting definitions, the IPCC glossary is being used.
	•	**Impact researcher**	• The question was raised whether the CLIPC glossary is in line with the one in the Climate Adapt portal. We explained that CLIPC is making use of different glossaries. In case of conflicting definitions, the IPCC glossary is being used	•

3.2. A shared concern by expert and non-expert users: guidance

Guidance appears to be a real issue shared by the different types of users. Yet, a distinction has to be made between guidance for experts (climate scientists, impact researchers) and guidance for less "skilled" users (boundary workers), because their respective requirements are partly different.

3.2.1. Guidance for expert users: demo tools, transparency and meta-data required

√ *Demo tools*

Participants made proposals to help expert users with the practical use of CLIPC. Their suggestions included:

- Develop a demo or a video tutorial, rather than a text manual of guidebook;
- Include some examples (uses cases);
- Include predefined queries.

√ *Transparency*

Participants also underlined the importance of transparency. For them, it is important to avoid tools being a "*black boxe*". For example in the case of the uncertainty assessment tool, it is necessary to explain which part consists of a is qualitative assessment, which part a quantitative assessment, how the assessment was carried out and how the results should be interpreted.

A corollary of that is the importance of meta-data that can be provided by the portal developers. For example: when climate projections are shown, some precautions are required about the limitations of these data. Bias corrections should be mentioned and explained.
Participants also recommended the use of pop-ups to advice or inform users. For example: *"This indicator has been computed by this model and so you need to be aware of…"*, etc.

3.2.2. Guidance for less- or non-expert users: taking precautions to prevent misunderstanding and misinterpretation

A general agreement came up during the workshops that non-expert users require particular guidance.
First of all, non-expert users have some difficulties to identify what type of information, indicators they need and how to retrieve it. As a participant underlines it : "*the (non-expert) user wants this indicator but does not know what is the best way to get it and needs explanations in an "assisted mode*"." They propose distinct video tutorials, separate meetings for boundary workers/less expert users.
Secondly, non-expert users need guidance to interpret information they accessed. The issue is to make sure that data are used and manipulated properly. A participant recommended**:** "*it is good to know who is going to use the output of the toolkit. For example, the use for an*

adaptation plan, people will look into the future. You need to think carefully about the use. The persons in charge of monitoring and evaluation people will use other data than the ones that make policy decisions in the near future. But the context of uncertainty differs very much and that should be made clear in the data."

Especially, they mention that there is a risk for maps, graphs and tables to be misunderstood (what is behind projections, maps, etc). Some warnings should be put forward: "*Combining nonsense is possible*." and concerning maps : "*it is challenging to explain uncertainty behind the color on a given map, and thus climatology guidance needs to be provided. It is a key issue to explain what information is and what is not represented on the maps."*;

Especially, CLIPC should include warnings for less expert users who want to go further, retrieve data or data products, calculate their indicators on their own. Pop-ups could be provided to guide them into how to interpret indicators and mapsFor example "*Please use this map/indicator/data for this and not for this", "This dataset is relevant for this and not for this"*, or concerning the data viewer . *Strong warnings should be given as well .For example concerning limits of the datasets.Concerning uncertainty assessment, clarify disagreement among the climatic models, i.e. explain why and how to use an ensemble of model output".*

4. AN INNOVATIVE METHODOLOGY FOR THE CONSULTATION OF USERS: LESSONS LEARNT FROM THE EXPERIMENT WITH VIRTUAL WORKSHOPS

4.1. Virtual workshops: general positive feedbacks on the method

The experiment with virtual workshops was positive. Both users and developers appreciated the method. Table 3 presents the main positive lessons learnt with use of the method as well as some remaining methodological challenges.

TABLE 3: LESSONS LEARNT ABOUT THE METHOD

	POSITIVE ASPECTS	CHALLENGES TO BE ADDRESSED
LESSONS LEARNT for users	• Virtual workshops are not time-consuming • Virtual workshops offer the opportunity to have direct interactions between users themselves • Direct interactions between users and providers offer the opportunity to better understand the tools developed and to make direct recommendations	• There is still a challenge to discuss with CLIPC colleagues which recommendations can be taken into account and on which basis?
LESSONS LEARNT for developers	• Direct interactions between users and providers offer the opportunity to better understand what users need and how they perceive the tools • Virtual workshops offer an opportunity to promote the tools they developed	• A question remains: how to prioritize the recommendations and feedbacks? and who has to do it (developers or facilitators?)?
LESSONS LEARNT for Facilitators	• Virtual workshops are simple to organize from a logistical perspective. • Good preparation is key for a successful consultation. This includes an early invitation of potential participants, well prepared and tested ppt presentations, clear task division between presenters and process facilitators and discussion about feedback results with (other) CLIPC portal developers.	• *How to target the "proper" audience? How to improve the mobilization of users before/after the workshops*? • It is not always clear on which basis users are motivated to participate. There is also a risk of a bias in the eventual active involvement of a small group of users for various reasons (availability of time, interest in specific topics, interest in

	• When mock-ups and tools are made available on-line, they enhanced the interest of users for consultation workshops and make them more involved and interested in the further progress of the portal development (the more we have to show, the higher the interest of users in consultations). • It would be ideal to have a stable "user panel" of users who provide feedback on consecutive evolving versions of the portal, but in practice the sessions attracted a combination of these users and new users, requiring time-consuming introductory presentations limiting the time for feedback. • The feedback provided during the sessions was mostly reactive to the presentations, through questions, with suggestions for improvements often implicit. • Notwithstanding initially positive verbal responses to requests to play around with the portal after the sessions and provide feedback via email, in practice few participants did this, probably because of lack of time and commitment.	and popularity of CLIPC as a project c.q. Copernicus as a programme, expectation of future usefulness, acquaintance with CLIPC team members or other participants). • Facilitators should actively promote concrete suggestions for improvement rather than questions. To encourage participants to provide feedback via email after the session, email reminders can be sent. • *How to involve developers of the portal in the organization of the workshop and after the workshop?* Due to busy agendas it has not always been easy to mobilize developers of the portal. • *How to improve the geographical representation of users?* Like in other projects of this kind, it appeared to be particularly difficult to get potential users from Central and Eastern Europe involved, and to a somewhat lesser extent from Southern Europe. On the one hand, one may expect that in these regions the interest in European information sources may be larger compared to Northern and Western Europe, where many countries have well-developed national climate information sources. But on the other hand, in these regions climate change may be lower on the research and policy agendas, and the number of people with interest, skills and time to make use of portals like CLIPC may be

		much smaller than in Northern and Western Europe.

4.2. Future challenges : Facing a large amount of potential users of diverse types and with diverse and evolving needs

From the user consultations it became clear that the variety of potential users is huge and their demands can change over time as a result of different and changing tasks for which they need climate information. Because notwithstanding the involvement of some dozens of participants in the consultations, the potential range of users is likely to be considerably larger. CLIPC delivering basically a prototype climate information portal, any follow-up will continuously have to keep in touch actively with the user community to track who they are and what they want. In this finals section we discuss the variety of users and their changing requirements.

√ A large range of users with different needs

From our observations, the community of potential users of the future portal does not have clear boundaries for the moment, so their needs are difficult to collect in a comprehensive way. In the consultations, we focused on three of the four users groups that CLIPC had identified: climate scientists, impact researchers, and boundary workers. Societal stakeholders such as decision-makers were expected to have insufficient time to participate in user consultation sessions that are not their core business, have insufficient background knowledge and skills, and are less interested in a product that is not ready. Now the portal is about ready for use, and follow-up work could explore if also selected decision makers in the public or private sector may be interested. The consultations confirmed the expectation that there is a wide range of users with different needs: climate scientists; impacts researchers such as hydrologists and ecologists; but also social scientists, decision-makers, and other people coming from different sectors (water management, agriculture, vine production, energy, etc.). This means that a “one-stop shop” climate information portal should offer a very broad range of products. As a participant to our workshops expresses it: " *It could be interesting for CLIPC to develop a large variety of products (season to season timescale, annual forecast, subseasonal to seasonal maximum, etc).* Several feedbacks from the workshops suggested that CLIPC should consider that the same basic information is used by many different persons for many different uses, which may have implications for the way the data can be accessed, processed and visualized.

EX1/Feedbacks from workshops: Time and spatial scales required for Tier 1 indicators might be very different, depending on the varied applications.

In vineyard sector, Production management, strategic planning for vineyards is based on 6 months periods and thus requires 6mth to annual forecast. Indicators are used for long-term adaptations and impact strategies on a 40 to 50 years scale. Approx. of 12 km x 12 km is considered too low for the operational purposes. Mainly the high spatial resolution as possible is required. Good compromise would be around 1 km.

In energy sector :

- for renewable energy : information and data about extreme wind at the finest resolution of less than 10 km would be useful,
- the maintenance of electrical power grids requires resolution of less than 1 degree latitude-longitude at regional and national level, and time scales at sub-seasonal and seasonal frequency.
- building construction requires decadal forecast to climate change.

Some of the needs expressed by different users can be conflicting and not have clear priorities, which can lead to a "shopping-list" – even if the full shopping list would be implemented, the result may be useful for some users but make the portal less attractive to others.

EX2/ Feedbacks from workshops: Visualization of indicators, depending again on the types of final user:

- The format (visual and textual) should be **the most usable (fast, and easy to understand and use)**. For example, **the maps** can be used by potential investors.
- More details provided helps to make better decision: from their perspective **the most raw format** as possible.

All products that user suggest cannot be developed because of lack of resources and time, but may also lead to a too complex, less usable portal and portal interface. There is a pitfall of developing a compromise between trying to address "the full shopping list" of everyone and taking into account the specificity of sectors – a compromise that eventually may serve no one very well. A portal for all may serve no one well.
An important issue is to work with other WPs, in particular those developing the portal to prioritize recommendations. Two complementary methods are proposed for future work:

(1) A set of criteria could be elaborated and used to screen recommendations, taking into account needs and requirements that can/cannot be technically addressed, the ones that can/cannot be addressed within the time and resource constraints of the project, the ones that respond to societal needs (tools or functionalities useful for adaptation plans for example), etc.

(2) Then, during the next round of consultation, we could ask users to prioritize through methods such as colour vote technique (i.e. a voting system where participants are asked to rank the recommendations thanks to different colours and argue their choice).

√ Evolving types of users…with fast evolving needs and capabilities !

A final important lesson is that user needs are changing over time. In particular "boundary workers" are not only an important and broad user category, because they work with clients who change over time, and who also have changing demands as a consequence of the development of climate responses, e.g. though a policy cycle from risk assessment to implementation and evaluation of measures. Information that those particular users need depends on the decisions they have to take (for harvesting planning, strategic planning and investments, etc). As the decision context evolves, the required information needs do evolve over time as well. Moreover, these users are developing their own expertise and rather than fixed, standard information they need climate information that follows the development of the demands of their clients. Even if the basic data may not change (observations and projections of climate variability and change and impacts), the specific statistics and the way indicators are developed and made accessible is likely to change over time.
As one participant underlines it, we have also to be aware of **the emerging needs in different sectors**: for example, some specialized users with a high expertise in vine production can formulate very pertinent and very precise recommendations about CLIPC tools in general. As a participant notes "*CLIPC should be aware of the fact that user needs are changing over time, and thus the climate service should be built to be flexible. Consequence is that users who develop their own expertise, don't require standard information ; a support desk would be useful (for example to allow a user to discuss uncertainty in the data with experts), i.e. "real people" rather than digital information.*

Because user needs are evolving, some users recommend to continue direct interactions between users and developers rather than provide access to a fixed set of indicators/indices. As mentioned above, others suggested CLIPC to have a support desk to address those evolving needs. Since it would be impossible to address all user needs even with the combination of basic data, processing tools, an indicator toolbox and a help desk (to answer simple questions), tailored climate services provided by public or, rather, private services providers will be important. A dynamic database of use cases is recommended for the follow-up of CLIPC not to lose the experience from actual applications of the portal to help future users to find cases similar to their questions.

APENDIX 1: GUIDELINES FOR NEXT CONSULTATIONS

To ensure the continuity and coherence during the consultation process in collaboration with the different partners of WP2, some "*consultation guidelines*" are proposed.

Preparation of the consultation with other WP is key for an effective consultation session

The preparation of a virtual workshop is time-consuming. But well-organized, it can be a powerful tool to discuss different options for the developments of CLIPC tools, as well as to understand more precisely users' needs and preferences in relation to their practices and then, to evolve from tools to climate services.

Before each round of consultation, good preparation with other WPs is crucial for the success of the workshop. The preparation includes the following activities:

- a short Skype meeting is organised by the WP2 developers in order to prepare the consultation. A couple of questions could structure this meeting;development of a short visual presentation in collaboration with other WPs. Some slides will be prepared by WP 2 (what is CLIPC, where are we in the development of CLIPC, keywords and subject of the workshop, precise questions to facilitate exchanges and debates after mock-ups presentation). The technical slides will be prepared by colleagues from other WPs

Box1: Questions guiding the preparation of the consultation sesions

Key- question: What are your main preoccupations with the subject of the consultation? Why do you need to discuss with users ?

Perimeter of the consultation : subject et off topic

- What do you need/want to discuss with users ?
- What is NOT the subject (choice already made, for example) ? what do you NOT want to discuss with users?

Participants

- Who would you like to participate in the consultation? What type of users would you

like to consult?

Form of the consultation

- Any idea and/or preference ?
- Participation in a virtual workshop: date, what do you want to present ?

Communication / Information to address the users about this consultation

- Key messages and key words ?

Are there any words to avoid in the communication with users?

The answers to the guiding questions (box 1) provide the basic framework for the consultation. Next, WP 2 partners propose a program for the consultation to the other WP partners concerned.
A skype meeting is required to discuss the draft Powerpoint presentation before it is presented to the participants of the consultation.

Communication: a crucial issue

The invitation need to be sent at the right moment (not too close to the workshop not too far away). A graphical designer can help to make the invitation more attractive. Preferably, the invitation procedure includes the following steps

- First step: launch invitations to users and choose a date for the consultation for which use can be made of Doodle/framadate ;
- Next, it is essential to book the date at least one week or 10 days before, to avoid losing participants;
- Then, it is important to stay in contact within close time range before and after the virtual workshop. Several emails, sometimes on the individual level will help to address unclarities, remind people to send their Skype contact details etc.
- Setting close deadlines helps to organize, send reminders and get feedbacks, e.g. deadline for the Doodle one week, deadline for feedback before Christmas

Virtual meeting: some "rules"

- The facilitator and the WP partner who make the presentation connect on Skype 15 minutes before the workshop;
- The facilitator adds the participants to the conversation;
- If there are many participants, it's better to mute the microphone when a participant is not speaking;

- 6-8 participants is ideal for one workshop otherwise it is really difficult to facilitate and it takes too much time to present a power point and also give the floor to participants to give their feedback.
- WebEx is a very good replacement for Skype. Easy to facilitate. Preferably, there should be one technical facilitator available dealing with WebEx technicalities who could take notes as well and one process facilitator
- WebEx needs a decent preparation in the sense of sending links to the different participants. If this is done properly it is easy to establish the connections.

Facilitation

- Keep introductions short to keep people interested and concentrated and set a time for 1 hour max
- There is need for a clear task division between the process facilitator, the facilitator dealing with WebEx and the facilitators presenting the components and mock-ups of the portal

A proposal for the framework of the consultation

- Short presentation of CLIPC
- State of the art of the portal development and planning of next stages in the development of the portal and tools
- Subject of the consultation
- Short presentation of the participants
- Presentation of the framework of the consultation
- General questions to start the interaction
- Presentation of components, mock-ups and preliminary versions of the portal
- Questions to and feedback of users