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Glossary of Terms

Term	Explanation
climate service	The transformation of climate related data – often together with other relevant information - in to customized information products, offered as such or embedded in consultancy and/or education [condensed version of European Roadmap definition]
<i>climate service:</i> seasonal forecast	A prediction of weather tendencies (often expressed as probabilistic deviations from long term averages typical for the considered period and area) stretching from approx. 1 month to 6 months or more.
<i>climate service:</i> long term forecast	A prediction of climate conditions for a certain area and for typical time units (diurnal to annual) referring to decadal or multi-decadal averages several to many decades ahead
Constructive technology assessment	The modulation of ongoing technological developments by ‘soft intervention’ aiming at a better understanding of the technology in focus and its impacts. There are three generic strategies for CTA: technology forcing, strategic niche management, and loci for alignment.
Interview	A question and answer sequence in which a relevant stakeholder – constituting one or more persons, provides answers to designated EU-MACS representatives. Interviews are conducted orally (i.e. not as ‘email interview’) in most cases as virtual meeting and sometimes face-to-face. Interviews are recorded. The written representation of the interview is sent to the interviewees for inspection and approval.
Meta-data	Description of a data file in terms of its contents, origin, ownership, allowed level of openness, etc.
Survey	Questionnaire based collection of responses of individuals or individuals representing an organisation; part of the responses is coded in numerical scores for ease of comparison and analysis; the rest is text response
Workshop	Gathering of invited experts and other stakeholders to discuss a coherent set of topics relevant for a work package, and to jointly analyse questions and issues with the aim to provide the work package with input helpful for generating solutions and deliverables
Web based exploration	Structured and recurrent sets of inter-related questions answered by invited experts, which help to devise tools and recommendations in WP2-WP4

List of Abbreviations

AEC	Advisory Expert Committee
CA	Consortium Agreement
CTA	Constructive Technology Assessment
DoA	Description of Actions
Dn.m	Deliverable no. m from WPn
EB	Executive Board
EBRD	European Bank for Reconstruction and Development
GA	General Assembly
GAG	Grant Agreement
ICLEI	Local Governments for Sustainability

JPI	Joint Programming Initiative
PMH	Project Management Handbook
TFCD	Task Force on Climate-related Financial Disclosures
WP	Work Package (WPn – Work Package no. n (1 – 7))

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1. INTRODUCTION

The study

To support further product development and effective widespread uptake of climate services, as a means to boost mitigation of and adaptation to climate change as well as capabilities to cope with climate variability, the European Commission has included several actions in its current research programme Horizon 2020 (H2020). Essentially these actions follow from the logic to implement the European Research and Innovation Roadmap for Climate Services (cf. European Commission, 2015)

EU-MACS and its twin project MARCO deal with analysis of the climate services market. In addition demonstration calls were launched on the added value of climate services for supposedly high value added sectors with hitherto little uptake of climate services (SC5-01-2016-2017), while other actions focus more on networking activities interlinking to better connect relevant players, such as the Coordination and Support Action (SC5-05b-2015) called Climateurope. In addition the ERANET for climate services (ERA4CS) is a programme that contains both testing of particular types of climate services in selected sectors and exploration of suitable climate service types for selected sectors.

An extremely important sub-programme in H2020 is the COPERNICUS Climate Change Service (C3S) programme, which aims to generate a very comprehensive coherent and quality assured climate data set meant to support mitigation and adaptation planning, implementation and monitoring. In due course, also coping capabilities of (current) climate variability are addressed.

In this framing, EU-MACS – European Market for Climate Services – will analyse market structures and drivers, obstacles and opportunities from scientific, technical, legal, ethical, governance and socioeconomic vantage points. The analysis is grounded in economics and social sciences, embedding innovation theories on how service markets with public and private features can develop, and how innovations may succeed.

The scope and remit of this report

Originally all three work packages (WP2-WP4), dealing with focus sector interaction for the sectors finance, tourism, and urban planning respectively, were planned to have a workshop at the beginning and at the conclusion of the interaction process with sector stakeholders. During the implementation of the work packages we learned that workshops are to a varying degree and in different ways a daunting concept for the three sectors. Urban planning has a solid tradition in broad and extensive stakeholder consultation and co-development processes. Hence for this sector (WP4) workshops didn't constitute any problem as such. Furthermore, for this sector EU-MACS had probably most tangibly to offer something, beyond 'deeper insight'. Just as in tourism the urban planning stakeholders have full agendas, yet because of the different expectations what could be gotten in return from the interaction process and the workshops urban planning stakeholders much more often decided to participate, also – or even more so – in the second workshops. In contrast, for tourism a much larger share of the stakeholders appeared still in quite early stages of a learning process regarding the use of CS. As a consequence after initial stages many tourism stakeholders seemed to need more reflection time without the explorations of the EU-MACS project, and/or seemed to have decided to anyhow limit their adaptation issues to concrete questions as part of snowmaking strategies. This meant that there was not enough interest to stage a second workshop.

For the financial sector confidentiality appeared to severely limit their perceived possibility to engage in workshops. Furthermore, as for tourism, many actors are (or were) at quite early stages of familiarizing with climate risks and related information needs, which added to the reluctance to engage in workshops.

The project compensated for this by resorting to other forms of interaction and confirmation.

The purpose of the report is to draw lessons from the interaction processes in terms of:

- whether the original aims of the interaction processes were still achieved
- whether, given the purpose of the project, possibly longer lasting but more flexible and (partly) less demanding interaction processes may be preferred – e.g. allowing stakeholders more time to acquaint with the issues and possible consequences
- what other interaction formats may be helpful for future similar studies

The report first briefly describes the structure of the interaction processes pursued in each of the work packages 2 to 4. It subsequently describes what compensating measures and methods have been used for not having 2nd workshops (or no workshops at all), and what other methods could be used in future studies. Last but not the report discusses to what extent the stakeholder interaction has created more lasting networks, with the consortium partners and/or with other involved actors.

2. SUMMARIES OF THE INTERACTION PROCESSES

Despite variations at a more detailed level all three work packages (WP2-WP4) had the same logic in the structure of subsequent Tasks, being:

- An initial phase meant to deepen the understanding of the focus sector, building on output from WP1 supplemented by own desk research and interviews of stakeholders; in WP4 a particular focus was added regarding a more thorough social network analysis for the selected cities;
- A subsequent interaction phase, in which on the one hand was assessed what obstacles are encountered and what kind of climate services and what kind of provision modes seem in demand, and on the other hand was explored how appealing and useful climate services could actually be (co)developed;
- A synthesis of the findings and identification of measures

In the sections below we summarize how the actual task sequence was realized in the consecutive work packages WP2 – WP4. A common feature is the difficulty to engage with stakeholders for *a longer time and more intensively*. Since the project's aim was to assess market and product offer functionality rather than testing new climate services, it was demanding to realistically clarify to stakeholders what the benefits of engaging would be. 'Better insight' or 'better information processes' are fairly elusive concepts, which are harder to sell than a 'new climate service for free'.

For urban planning the interaction plan could be implemented more or less as designed, probably because this user segment has already a better awareness level and some degree of use, and – equally important – is very much used to open deliberative processes, hence less reservations have to be overcome to participate. For various reasons the other two focus sectors necessitated the consortium partners in larger changes in the interaction formats. Especially in the case of the financial sector this caused the duration of the work package WP2 to be much longer than planned.

WP2 Finance

The financial sector is large and diverse. Furthermore, the fast operational pace and strong responsiveness of money markets, causes many actors in this sector to demand high degrees of confidentiality and much caution with what parties to share particular types of information. Information can in this case also denote opinions and priorities as these may come forward in the type of explorations endeavoured in EU-MACS. As a consequence the envisaged sequence of 'initial workshop → jointly explored interaction formats → final workshop' could not be implemented in this way. The nearest alternative, staging a selection of mini-workshops each with a small number of participants, would have been possible in theory, but would have demanded too much resources and would have entailed comparability problems. Thanks to two parallel projects of WP2 lead partner Acclimatise an alternative set-up could be followed.

Throughout the EU-MACS study, Acclimatise was simultaneously involved in two other financial services and climate-related projects: (1) UNEP FI's working group of 16 international banks piloting the TCFD recommendations and (2) EBRD and Global Centre of Excellence on Climate Adaptation (GCECA) developing climate risk disclosure recommendations for corporates. These projects allowed for further stakeholder engagement opportunities and observations of CS barriers and enablers in the sector. Participants of these projects at times provided examples and testimony which has been used in this report, following full consent.

In addition to these stakeholders, we approached experts working at the nexus of climate and financial services sector. We started with our existing contacts in this space, and pursued new contacts made throughout the course of the project. These included independent consultants, sector associations and NGOs

Interviews with users, providers, and experts were conducted in a phased approach. First, semi-structured interviews with users and providers were carried out. Early consultation with these groups helped establish a map of stakeholders and information flows in the sector, as well as important background motivations in the sector such as the evolution of climate risk and its governance. This phase also allowed for further stakeholder groups and segments of the sector to be targeted for engagement.

A second phase of interviews was based around the Constructive Technology Assessment (CTA)-based CS product types developed in EU-MACS Deliverable 1.4 (Stegmaier & Visscher, 2017). CTA in EU-MACS has been appropriated and interpreted to help shape CS and CS markets. Concretely, our consortium partners from the University of Twente (UT) devised a set of CS scenarios or product-typologies. These use-cases include description of users, providers, technologies, value creation and potential tensions (including the organisational use context). A CTA-based exercise around these use-cases was devised along with UT partners, in order to further tailor a typical CTA style workshop to suit the financial services sector. A typical workshop where stakeholders are brought together in one location for at least half a day was tailored down to a shorter exercise which could be carried out in a one or two-hour meeting, with just one or two stakeholders. More details can be found in Hamaker-Taylor et al (2018).

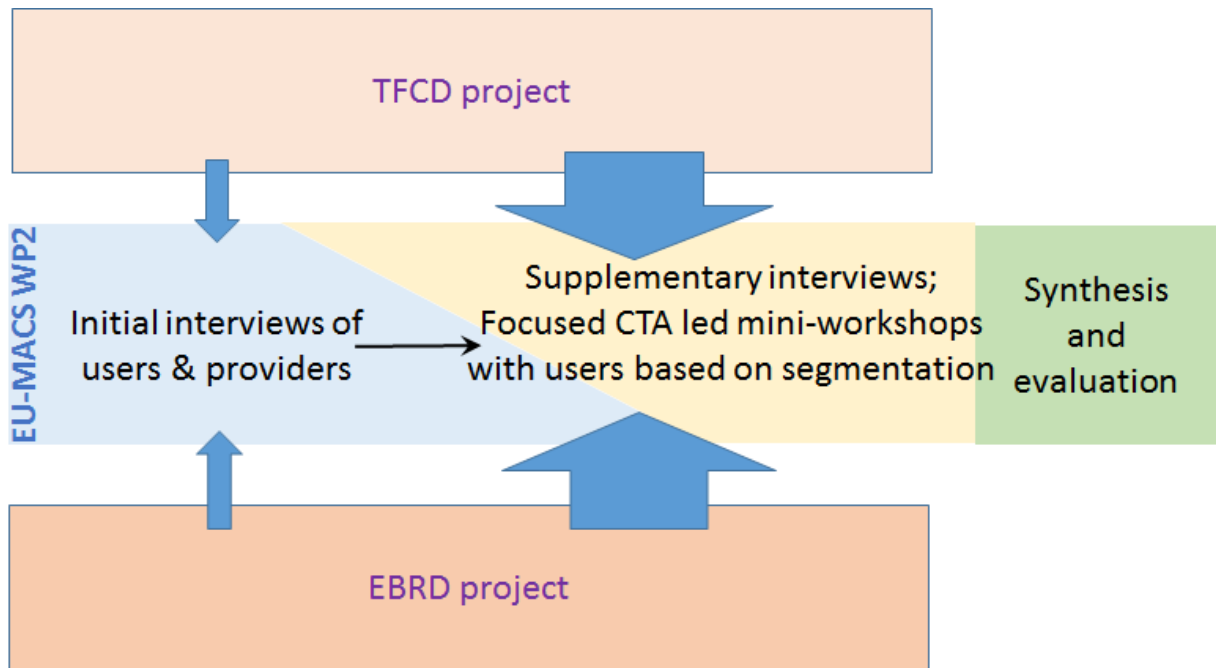


FIGURE 1 MAIN WORKFLOW IN WP2 REGARDING STAKEHOLDER INTERACTION

WP3 Tourism

The processes for Austria and Finland were running in parallel. For **Austria** semi-structured interviews were conducted with CS providers and (potential) end-users from the tourism industry. The interviews aimed at identifying the current supply and use of CS in tourism, perceived barriers to the use and provision of CS, and (unmet) user needs. In addition, we asked tourism stakeholders about their risk perception and stakeholder networks. The risk perception helps to contextualize the given answers to current use, barriers and user needs. The questions about their stakeholder networks aimed at validating the stakeholder mapping.

The stakeholder workshop aimed at bringing together the different types of stakeholders from the tourism industry as well as CS providers, allowing an exchange of views on climate services use and provision, obstacles and enablers. The stakeholder workshop in Graz, Austria, consisted of three parts (cf. Stegmaier and Visscher 2017). The first part included an introduction to the project and a presentation and discussion of first findings from the interviews regarding barriers and enablers of CS in stakeholder comparison. The second part was dedicated to Constructive Technology Assessment (CTA). The CTA part of the workshop offered a set of specific viewpoints to consider alternative CS product types in a scenario setting, while at the same time giving ample space for discussion of aspects stakeholders find important. In the afternoon session – the third part of the workshop – we discussed two typical business cases, one specifically with regards to ski lift operators' views and one regarding the situation and demands of local tourism organisations. Here, the value proposition canvas was applied.

In **Finland** the process also started with semi-structured interviews, aimed at better understanding of the context and perspectives of Finnish winter tourism businesses on climate services. The focus was mainly on Lapland, but in order to better understand the issue also ski resort representatives from other parts of Finland were interviewed. Following the first round of interviews, an online survey was prepared. The survey consisted of five types of (hypothetical) predictions and related questions and one question about the preferable form of CS (the product types cf. Stegmaier and Visscher 2017). Originally, this phase of work was planned as a workshop, but due to the low interest and possibility to participate, the workshop was cancelled in favor of a survey.

After the survey in Finland, a brief summary leaflet about the preliminary results of EU-MACS supplemented with additional tips and information was prepared and sent to the Finnish stakeholders. The aim was to raise awareness and disseminate EU-MACS and MARCO findings and remind the stakeholders about the project. The leaflet got positive response, with several stakeholders enquiring about the possibility to disseminate it further (which was granted). After the leaflet distribution, a second round of interviews took place in January and February 2018. Here, six stakeholder experts were interviewed with the aim to validate the earlier results and check if some major themes or issues were missing. The interview structure was simplified and the emphasis was on specific CS related questions

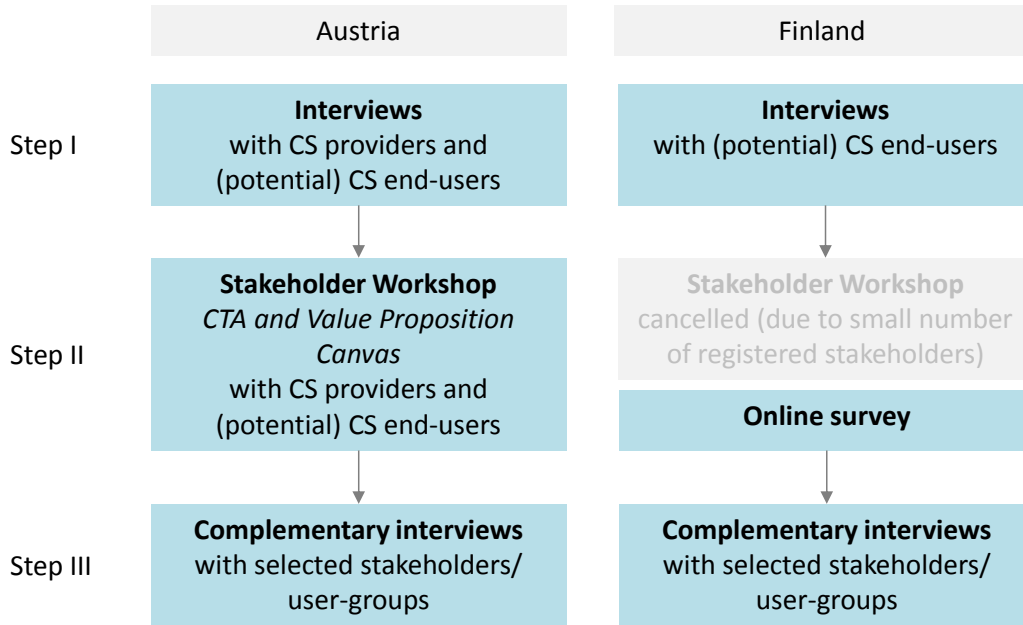


FIGURE 2: WP3 WORKFLOW REGARDING STAKEHOLDER INTERACTION

WP4 Urban planning

The main goal of the interaction process with the stakeholders in the urban planning field was to identify the main barriers hampering the mainstream of CS in the planning activities for climate change adaptation. Figure 3 shows the main steps of the interaction process implemented in the two EU MACS urban case studies, namely Bologna and Helsinki.

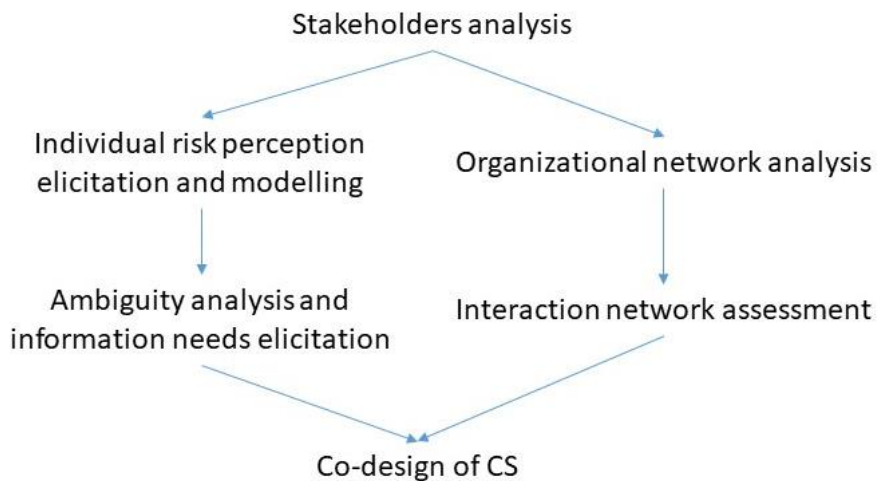


FIGURE 3 MULTI-STEPS PROCESS IMPLEMENTED IN HELSINKI AND BOLOGNA

The interaction with the stakeholders was conceived as a multistep process, composed by meetings with the stakeholders and analytical phases. The activities carried out in the demo case studies were meant to facilitate a co-design process, based on Living Lab approaches.

In the first phase of the process, a round of individual semi-structured interviews was carried out in the two case studies. The interviews aimed at understanding the role played by the interviewees in the urban planning process, the kind of information currently used and existing information gaps. Besides, the interviews aimed at mapping the network of interactions in which the interviewee operates. Hence, information was collected concerning the interaction with other decision-makers, the flow of information and the sharing of specific tasks. From 10 to 15 decision makers were interviewed in each of the case studies. Members of the municipal and regional organizations were contacted.

The results of the interviews were analysed and the outcomes were used to design the first workshop. The first stakeholder workshop in Helsinki was held back-to-back with the mid-term seminar, this enabled consortium wide presence in the workshop even though other WP representatives acted mainly as observers. Specifically, the analysis of the first phase allowed to detect potential barriers to the acquisition and actual use of CS. Two different approaches were used in the two case studies. In Helsinki, participants were provided with a catalogue of available CS – result of literature review – and were requested to suggest innovative ways to fill in the information gaps that were hampering the design and implementation of adaptation measures – results of the first round of interview. Finally, participants were requested to suggest potential improvements in the interaction network, in order to reduce the key vulnerability and, thus, to facilitate the sharing of climate-related information. In Bologna, specifically, the Lego Serious Play© approach was implemented. Participants were requested to describe, individually, the main characteristics that, in their opinions, could facilitate the use of CS in urban planning. The workshops in Helsinki and Bologna were both debriefed and conclusions were published in the guidelines for Living Labs in CS, on the EU-MACS website.

The second round of stakeholders' workshop in both Bologna and Helsinki were structured as role playing game. The main scope was to assess the capability of CS to support the collaborative process for urban planning for adaptation. Figure 4 shows the different phases of the exercise.

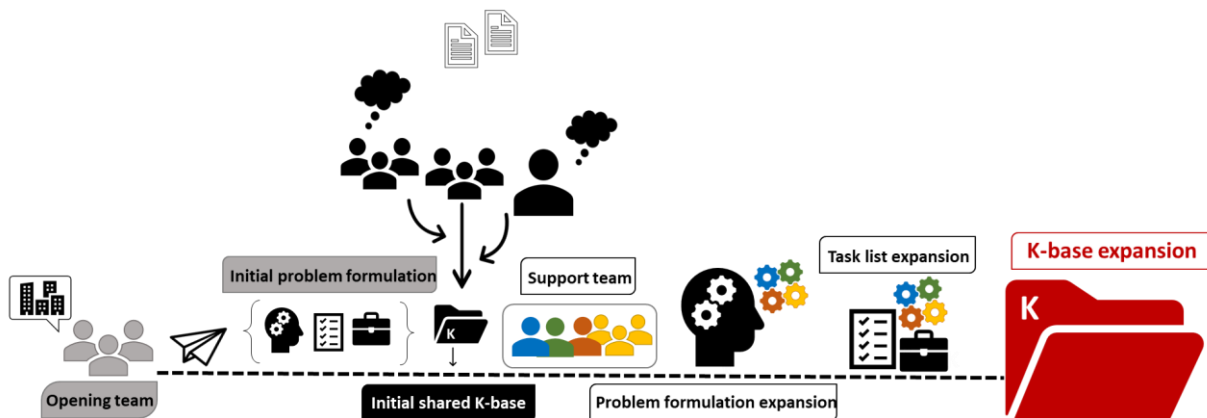


FIGURE 4 STRUCTURE OF THE SECOND ROUND OF STAKEHOLDERS WS

Participants were provided with the description of a real problem related to urban planning for adaptation. They were required to simulate a collaborative decision-making process, based on the sharing of climate-related information. The analysis of the interaction taken place during the exercise allowed us to draw

some conclusions on the capability of existing CS to enable collaboration among different decision-makers. The report of the WS was then sent to all participants.

Project workshops as integrators

Next to the kick-off meeting the project staged several internal workshops to facilitate co-working on cross-cutting issues and the synthesis work. Even though the consortium partners managed well to coordinate work bilaterally at Task and WP level, it was felt useful to have an internal workshop to flesh out concepts and their interpretations more thoroughly. The workshop of 1 December 2017 was held back to back with the H2020 and JPI Climate Services projects events on 29 and 30 November in Brussels. The

The following workshops were held:

1. testing some first outlines of obstacles structures; and the role of technology & innovation (1.12.2017) – to facilitate co-ordination across WP2-WP4 and the use of WP1 output
2. conducting a web based group-interview with C3S representative Carlo Buontempo (4.6.2018)
3. joint workshop with MARCO on planning of a joint synthesis (12/13.7.2018)

1. At the 1.12.2017 workshop first 3 presentations were given, by Dickie Whitaker (Oasis Hub) on *roles and forms of brokerage*, by Janette Bessembinder (KNMI) on *experiences with climate services provision, notably by Met_offices and large data platforms*, and by Alexander Flesjø Christiansen (DNV-GL) on *use of blockchain technology in certified risk assessment & management*

All these three items proved to be recurrent issues in the remained of the project and relevant for many of the consortium partners. In May 2018 an EU-MACS webinar was held about blockchains and quality management of climate data. Also the inclusion of the AEC via member Janette Bessembinder was useful for continued commitment in the project. Prior to the presentations the consortium experts engaged in initial discussions on key questions concerning stakeholder engagement, and fitting interaction formats and obstacles. After the presentations we returned to these questions, in order to arrive at shared views and use these in the WPs 2-4, and 5. Finally, work planning for WP2-WP4 was discussed.

2. In order to raise the knowledge level about C3S across the whole consortium, to hear the latest news on how the C3S service is unfolding, to clarify the EU-MACS work to C3S, and to ask *and answer* some questions a web-based interview & discussion was staged and recorded on 4.6.2018. We learned more on where seems to be hitherto the focus in private sector use of C3S (directly or mediated via expert organisations) and more generally that hitherto the experiences and expectations are that a lot of use and reuse related to seasonal climate service products that can generate tangible benefits within an overseeable time space (from less than a year to a few years)
3. On 12 and 13 July 2018 10 consortium parties of EU-MACS and/or MARCO met in the spaces of mutual part Unternehmer_TUM in Munich to assess and decide how the joint synthesis of the two projects should be approached and implemented. A work plan and task assignment was agreed at the end. The workshop was preceded by the joint preparation of a memo outlining the scope and purpose of the joint synthesis. This workshop was really essential to create sufficient mutual understanding and enable a useful coordinated effort.
4. On Friday 28.9 the stakeholder event was opened with a presentation of MARCO and EU-MACS highlights. Feedback from the audience concerned, among others, the role of public vs. private CS providers in conjunction with open data policies and degree of separation of public and private CS domains [EU-MACS], as well as the possible roles of a so-called market observatory [MARCO].

Subsequently, the use of business model identification tools (e.g. BM canvas) was illustrated and comments from the audience elicited. There was a solid common understanding that essential ingredients for a successful CS are: (1) relevance for the user, and (2) economic value unleashed by CS. The BM concept was further elaborated and tested in a task group session dealing with CS for different sectors.

In the afternoon a panel discussion was staged, including Jean-Noël Thépaut (C3S), Robin Hamaker-Taylor (Acclimatise/ EU-MACS), Markku Vieru (University Lapland), Marc Weissgerber (Climate KIC Germany), Jürgen Kropp (Potsdam Institute for Climate), Jörg Cortekar (HZG GERICS/EU-MACS & MARCO) and moderator Jaroslav Mysiak (CMCC/EU-MACS).

3. REMEDIAL MEASURES TO SAFEGUARD THE INTERACTION PROCESSES

The project encountered challenges when it came to deepening engagement with stakeholders. The combined large network of stakeholders of all consortium parties together offered as such a good basis to find sufficient substitute stakeholders for initial contacts. However, that feature is less important when it comes to more prolonged and deeper interaction as pursued in EU-MACS, as prolonged commitment requires building of trust and substitute stakeholders usually don't start at the same trust level.

It appeared therefore more fruitful to seek for interaction formats that best suit the targeted stakeholders, and subsequently try get the maximum out of it, given the chosen interaction frame.

For WP2 (Financial sector) this meant that after all an appreciably larger number of stakeholders has been interviewed than originally foreseen, whereas a part of these stakeholders agreed to be interviewed twice and some of them also fill in a questionnaire.

The aim of the EU-MACS project was to analyse market structures and drivers, obstacles and opportunities. As it was not part of the project to develop a concrete service or tool, it was difficult to keep stakeholders interested in a prolonged iterating process. In the tourism case study in Austria we managed to organize a workshop after the first round of interviews. However, in Finland the planned workshop was cancelled in favor of a survey due to the low interest and possibility to participate. Furthermore, we increased the number of interviews in the first interaction round and conducted follow-up interviews instead of a second series of workshops. Bilateral talks allowed an in-depth analysis of perceived barriers and needs of different stakeholder groups.

The main problem that we encountered in the interaction process concerned the stakeholders' interests in the Bologna case study. Quite some stakeholders seemed more interested in the use of the climate-related information rather than the service itself. Moreover, EU MACS was not meant to develop new tools. Therefore, in order preserve a good level of interest among the stakeholders, while being capable of organizing the second workshop, WP4 decided to change the focus of the second workshop somewhat, giving more space to the simulation of the decision-making process. In Helsinki, in order to reduce the stakeholders' fatigue, the EU MACS WS was merged with a FMI workshop for the presentation of a report on urban climate risk assessment (the need of which was inter alia inspired by the EU-MACS deliberations).

The project had also two other options to reflect the results with stakeholders, firstly through the joint stakeholder event with MARCO on 29.9.2018 and secondly thanks to the dedicated stakeholder feedback oriented session at ICLEI Resilient Cities 2018 (Perrels et al 2018). In both cases a fair amount of endorsement was obtained regarding project findings and preliminary conclusions.

By and large one could say that some of the workshops were replaced by more individual forms of interaction (interviews), of which the earlier results could be used in subsequent semi-structured interviews (learning process), whereas to some extent web based questionnaires with focused questions on what kind of information or service is relevant supplemented the interviews. Also considering the endorsement of findings received in various occasions gives us enough reasons to trust that eventual purpose of the project could still be served adequately.

There is just a maximum amount of commitment one may expect from stakeholders. For R&D projects aiming at developing particular products more tangible benefits can be presented for a fairly limited number of stakeholders, which however may in that case be willing to invest more time. On the other hand for review type of R&D projects such as EU-MACS a larger collection of stakeholders can be appealed, but only very few of them will see enough benefits in participation to justify more intensive engagement. Last but not

least the climate service theme area is also clearly suffering from stakeholder fatigue. Still better sharing of survey and review experiences as well as more institutionalized efficient observation may help to overcome these obstacles to some extent.

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