



UPDATE OF SURVEY RESULTS

D1.1 REVIEW AND ANALYSIS OF CLIMATE SERVICE MARKET CONDITIONS

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1. BACKGROUND AND AIM

1.1 Background of EU-MACS

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 economic science theories on how service markets with public and private features can develop, and how innovations may succeed.

1.2 Aim of work package 1, deliverable 1.1

Work package 1 (WP1) – Current market conditions and innovation prospects in the markets for climate services – will prepare the ground for the analyses and tasks that will be carried out in the other WPs, this means to generate all basic information and insights necessary to identify barriers and enablers on the market for climate services, to understand their interactions and conditional validity so as to enable static and dynamic analysis of the climate services market.

Deliverable 1.1 – Review and Analysis of Climate Service (CS) Market Conditions – is, among other deliverables of WP 1, one part of the project's baseline and serves as input to the demonstration cases in WP 2 to 4. The static market analysis of D1.1 includes an assessment of current barriers and enablers on the climate service market and their significance. It was submitted in July 2017 and aims at providing a snapshot of the current market structures in the following aspects:

- Which actors are parts of the market; market here includes the private and public domains.
- What role do they have in the development, provision and use of climate services?
- What barriers occur in these steps?
- What has been achieved in the past years in terms of scientific progress and innovations?
- What are the main drivers behind these latest developments?

1.3 Update of survey results of deliverable 1.1

Some aspects of D1.1 – submitted in July 2017 – still merit further consideration, as additional survey results are now available. The updated version is therefore based on the results of the questionnaire, which did not lead to fundamentally new findings, but slightly changed the weighting of barriers for climate service take-up and climate service provision.

The following chapters highlight the differences between the previous and new results of the survey. In this regard, the outline and chapters of D1.1 are adopted to provide not only orientation but also a better and quicker comparability between D1.1 and the results of the updated survey.

In this regard, this update document is no stand-alone document. It is recommended to read it together with EU-MACS Del. 1.1, in which more background information on the methodology is given.

Most results only changed marginally. However, two significant changes should be highlighted clearly:

1. The average importance of barriers was rated higher than during the first run of the survey. This applies for both, providers and users. Still, the highest barrier for providers remain 'limited financial resources' and for users the 'lack of appropriate technology'.

2. Users and especially providers rate the influence of innovations to overcome these barriers as overall larger in January 2018 than in May 2017. It could therefore carefully be concluded that the possibilities of overcoming barriers may have slightly improved within that period of time.

2. METHODOLOGY: SURVEY

The online survey was created based on the findings of the literature review and launched at the end of March 2017. It was available to participants for six weeks until the beginning of May. By that time, 124 participants took part in the survey, of which 81 stated to be a provider and 43 to be a user.

In order to increase the amount of participants and to update and verify the initial findings, the survey was continuously promoted between Sept. 2017 and Jan. 2018 via

- The initial distribution list compiled for this purpose
- The EU-MACS Twitter account (several times)
- Major European Initiatives and projects such as the JPI Climate or ClimatEurope
- The networks of other EU-MACS partners.

This led to an increase of 23.9% and to a final number of 163 participants by 23th of January 2018. Out of these 163 participants 105 expressed to be a provider and 58 to be a user. Some participants did not finish the survey.

3. MARKET CONDITIONS ON THE CS MARKET

3.1 Involved actors – providers, intermediaries and users

The basic and updated results generated through literature research in D1.1 and through the evaluation of the survey are:

- Overall, it seems to be very difficult to have a clear-cut differentiation between users and providers. As the value chains that are built up in the generation of climate services are typically multi-stage and can take different routes, many organizations in intermediate positions are both providers and users. Depending on their self-perception they consider themselves either as a provider or user of climate services respectively (as we have seen in the survey, some scientists consider themselves as providers, some as ‘pure’ users).
- The largest groups of users that replied to the survey are public administration / politics (38.2%; in the earlier version of the survey 42.5%) and private businesses (32.7%; in the earlier version of the survey 30%) and universities or research institutions being the third largest group (20%; in the earlier version of the survey 15%).
- The largest groups of providers that replied to the survey are universities or research institutes (33.3%; in the earlier version of the survey 31%) followed by National Weather Services (30.1%; in the earlier version of the survey 25.4%) and private businesses (15.1%; in the earlier version of the survey 15.5%).
- As mentioned above, previous mappings showed that some public bodies consider themselves as providers of CS. This finding is also supported by the EU-MACS survey, in which in total 27 (in the earlier version of the survey 23) participants from public administration / politics responded; of this 27 roughly one fourth (6 in total; in the earlier version of the survey also 6 in total) indicated to be a (intermediary) provider.
- Other groups of actors that are either (intermediary) providers or ‘pure’ users are universities or research institutes and private businesses. This is also well in line with previous mapping activities.

FIGURE 1: DIFFERENT PROVIDERS AND USERS PARTICIPATING IN THE SURVEY (→ NEW: SURVEY RESULTS UNTIL 23. JANUARY 2018)

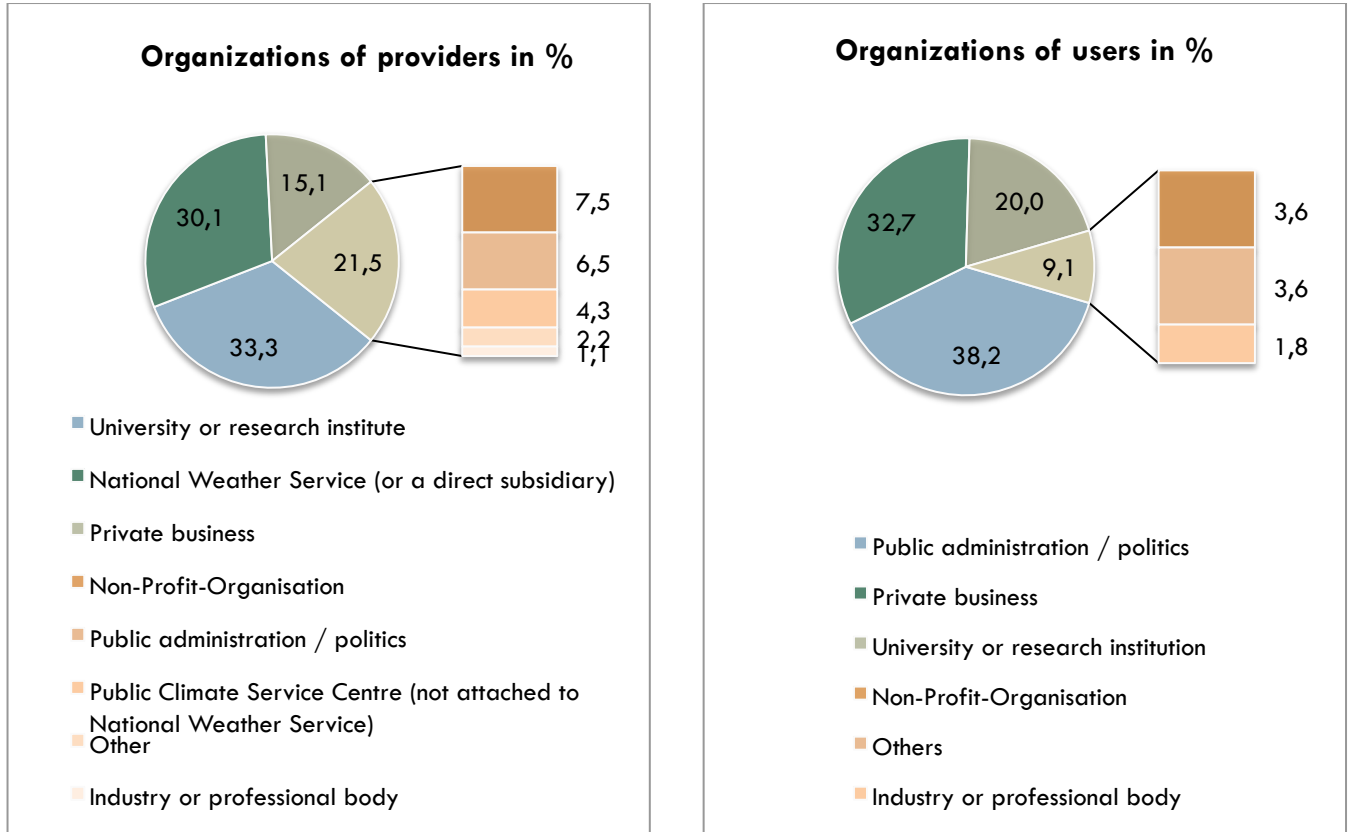
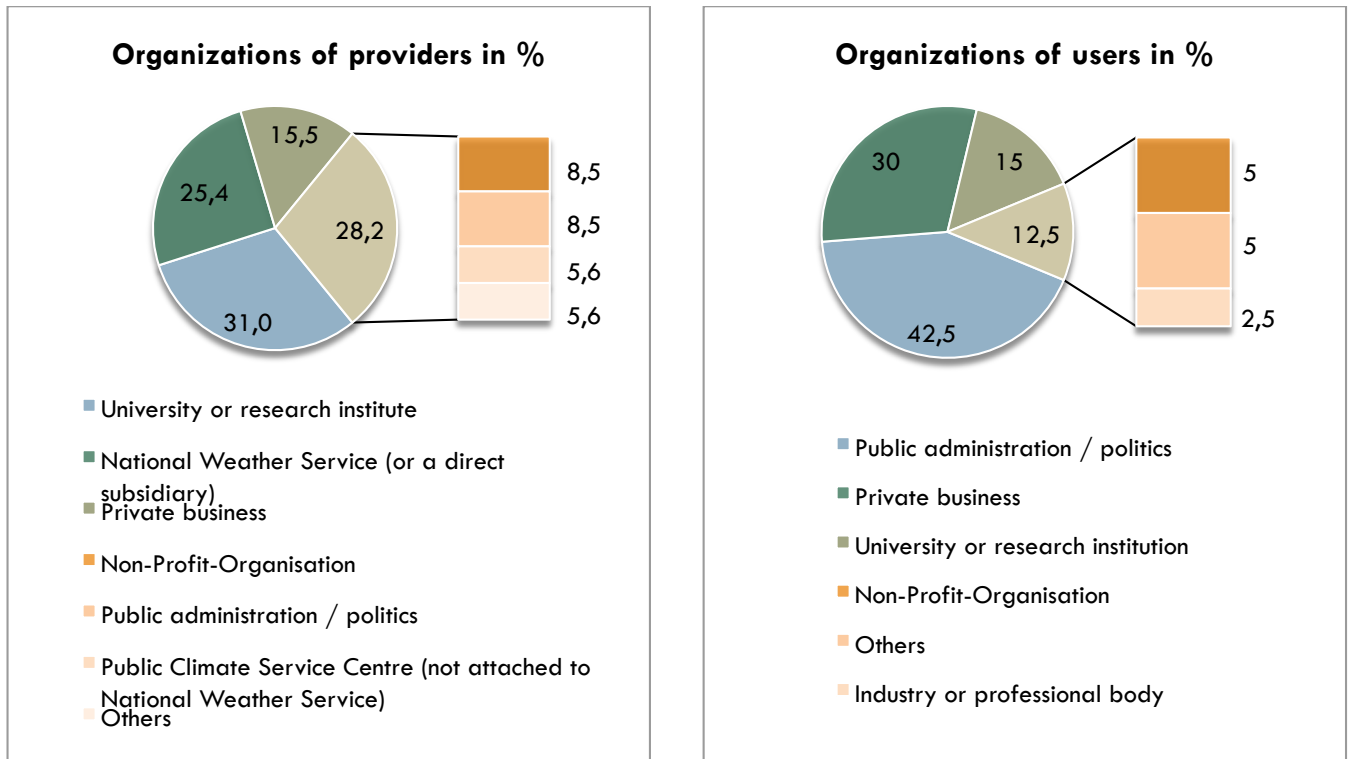


FIGURE 2: DIFFERENT PROVIDERS AND USERS PARTICIPATING IN THE SURVEY (→ OLD: SURVEY RESULTS UNTIL 19. MAY 2017)



3.2 Definition of products, sectors and sub-markets

Figure 3 shows the distribution of the three main types of CS providers to the sectors according to the EU-MACS survey.

Identical to the previous results of the survey, National Weather Services (NWS) provide services to almost all ‘sectors’, which is not much of a surprise as they are typically an operational service provider. Across all sectors, agriculture, water and energy seemed to be those primarily addressed by the participants of the survey. This is the same result as in the ERA-NET mapping of providers (see www.climate-knowledge-hub.org), in which 227 CS providers across 18 countries participated. These three sectors are – in the ERA-NET mapping – followed by spatial / urban planning and education, which are also sectors of high activities in EU-MACS.

FIGURE 3: SECTOR ENGAGEMENT OF DIFFERENT CS PROVIDERS (→ NEW: SURVEY RESULTS UNTIL 23. JANUARY 2018)

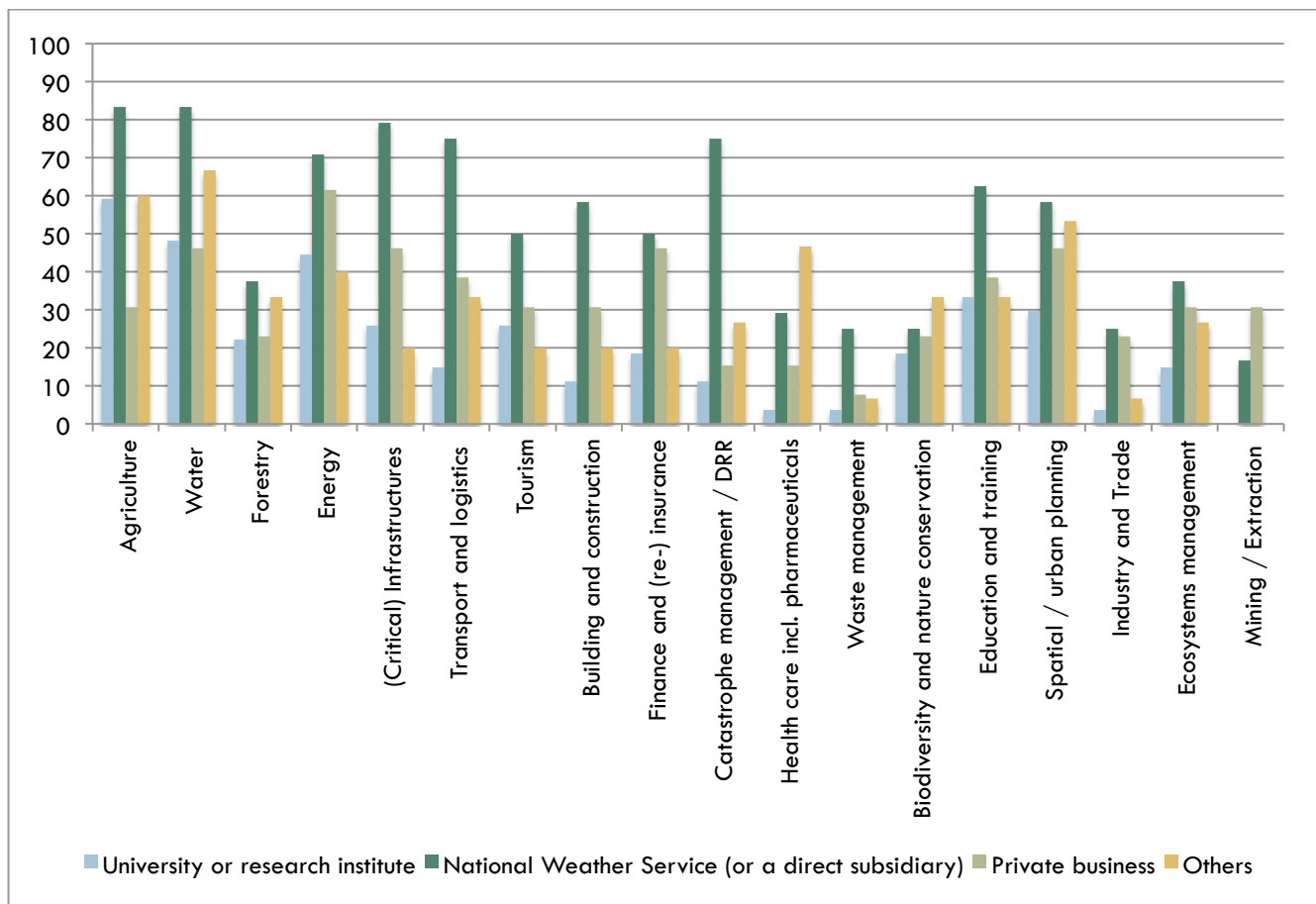
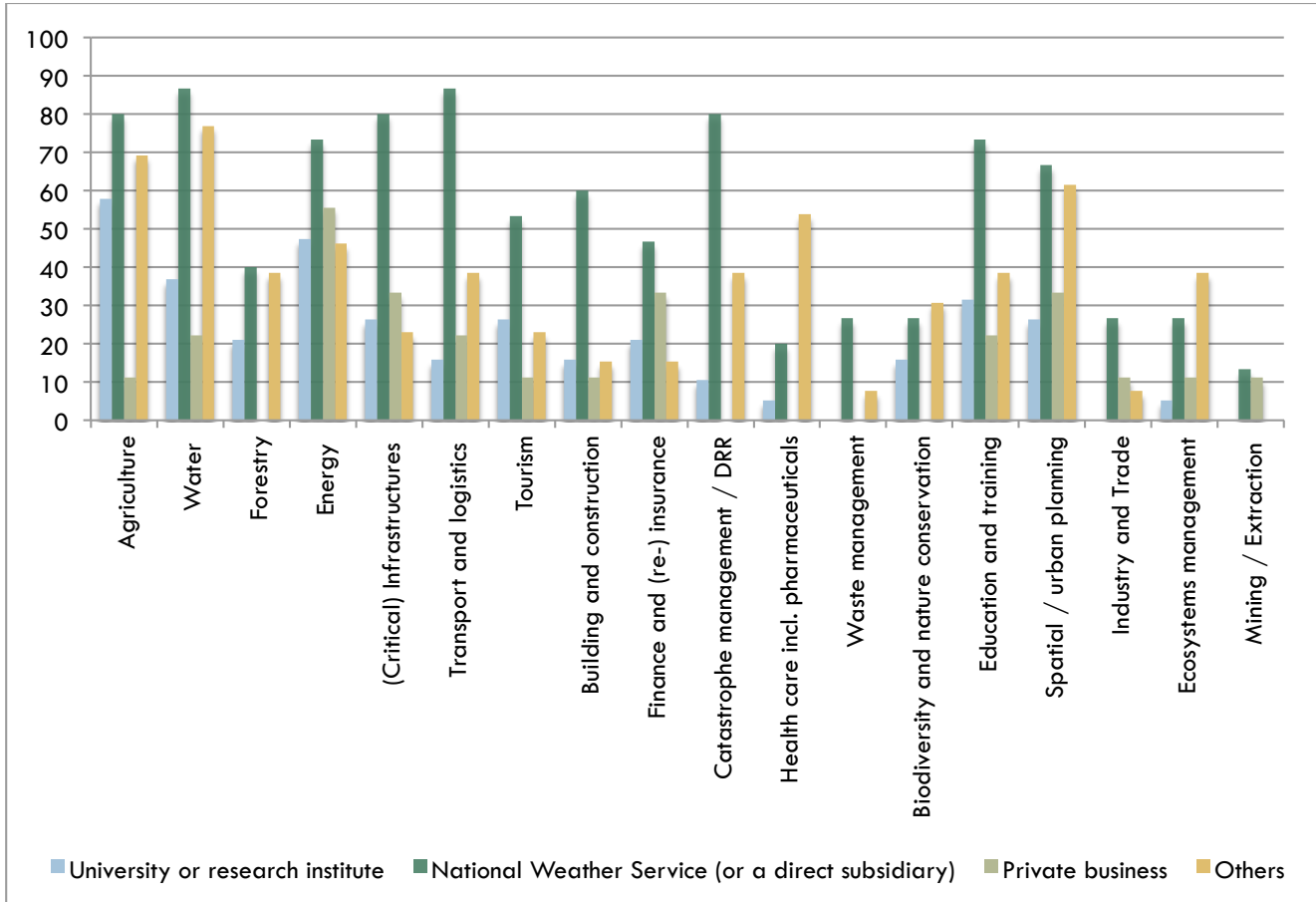


FIGURE 4: SECTOR ENGAGEMENT OF DIFFERENT CS PROVIDERS (→ OLD: SURVEY RESULTS UNTIL 19. MAY 2017)



3.3 Ways of CS provision and use

3.3.1 Economic features of climate services

Similar to the previous results of the survey, the most important economic barrier related to the use of CSs are the **often limited financial resources** available to users. According to Q33 of the survey, **human capital** (in terms of number and proficiency) is the second most important economic barrier. This is also in line with the previous results of the survey and shows that these two barriers are interlinked, as financial resources would also be needed to hire new or train existing staff.

Financial issues are also addressed in Q27 and Q28. Almost 90% of users stated that the acquisition of climate services entail no or only modest purchase costs (87.6%; in the earlier version of the survey 88.4%). On the other hand approximately 50% stated that the use of climate services requires no or no notable extra resources (43.8%; in the earlier version of the survey 46.2%). Furthermore, only a few non-users had participated in the survey (23.5%; in the earlier version of the survey 20.5%). It is therefore hard to say whether actual or perceived costs for the user are a significant barrier for uptake.

Another important barrier is the step from (co-) developing new climate services prototypes to their operationalization, i.e. to make them marketable. This is not only a question of related technical features

of services. It is also a question of **business models**. As the whole climate services market is still premature there are – at least for new service types – no established business models available yet. Business model development, according to Q12 of the survey was the second most important economic barrier for providers in the earlier version of the survey. In the updated version of the survey it is still evaluated as an influential barrier, as the third highest barrier of all the seven tested barriers. Interestingly, respondents from private CS providers tend to rate business model development as a more important barrier than those from public providers. This applies for both, the previous results of the survey and its updated results. Such an entrepreneurial orientation is also mentioned by Brooks (2013; see also section 3.6.2 of D1.1 for more information) as part of different processes that are currently subject to innovation as well. In addition, it was mentioned during the interviews that providers should establish better sales skills. A more detailed business model assessment is conducted in D1.2 as well as in WP3 in the sister project MARCO. Results will be integrated in the bi-project synthesis in WP5 of EU-MACS.

3.3.2 Technical Features

Closely related to the availability of financial resources is the lack of appropriate technology to use climate services, which is not only the most important technical / scientific barrier for users but also their highest barrier in general (Q35). In fact, the ‘lack of appropriate technology’ as the overall highest barrier for users has been evaluated even slightly higher during the second run of the survey (figure 5 and 6). According to the conclusion made in D1.1 this result shows once more that: When technological capacities are limiting CS use and, in addition, user could not invest much in improved technical equipment, provided services should fit in the existing infrastructure.

QUALITY ASSURANCE

The survey revealed that only a bit more than 60% of the participants have quality assurance process established. In this regard, there are almost no differences between the results between the former and new survey. While until May 2017 61.29% of the participants stated to have applied a quality assurance process, by the end of January 2018 62.5% of the participants mentioned to have such a process applied.

3.4 Barriers in CS development, provision and application

In order to identify current barriers and innovations to overcome them for actors being engaged in the CSs market, a market analysis was carried out. The PESTEL tool was used to systematically assess the influences of **p**olicies, **e**conomy, **s**ocial, **t**echnology, **e**thics, and **l**egislation on CS development, provision and use.

3.4.1 General findings

Consequently, participants of the survey got requested to report on the barriers, which they have faced when (co-) developing, providing and / or using climate services within the six fields mentioned above (**p**olicies, **e**conomy, **s**ocial, **t**echnology, **e**thics, and **l**egislation) and to rate their importance.

Figure 5 visualizes the six different tested groups of barriers and out of these groups the barriers that either have the highest or the lowest impact on both, providers and users. Providers and users were asked

to rate the importance of barriers and innovations on scale from 1 (low importance) to 5 (high importance).

The analysed findings – based on 61 or 60 answers given from providers (43 or 44 answers in the earlier distributed survey) and 30 or 29 answers given from users (24 or 25 answers in the earlier distributed survey) – show that there seems to exist a tendency on the providers side to evaluate barriers in total higher than users. While this result did not change with the increased amount of participants during the second run of the survey, the average importance of barriers was rated higher than during the first run of the survey. This applies for both, barriers with the highest and barriers with the lowest impact on providers and users. The red coloured results in figure 5 below illustrate the increase of importance in comparison to the results obtained until May 2017. Additionally, the red coloured box shows a change of barriers.

FIGURE 5: APPLIED PESTEL ANALYSIS – HIGHEST (+) AND LOWEST (-) BARRIERS FOR PROVIDERS (P) AND USERS (U)
 (→ NEW: SURVEY RESULTS UNTIL 23. JANUARY 2018)

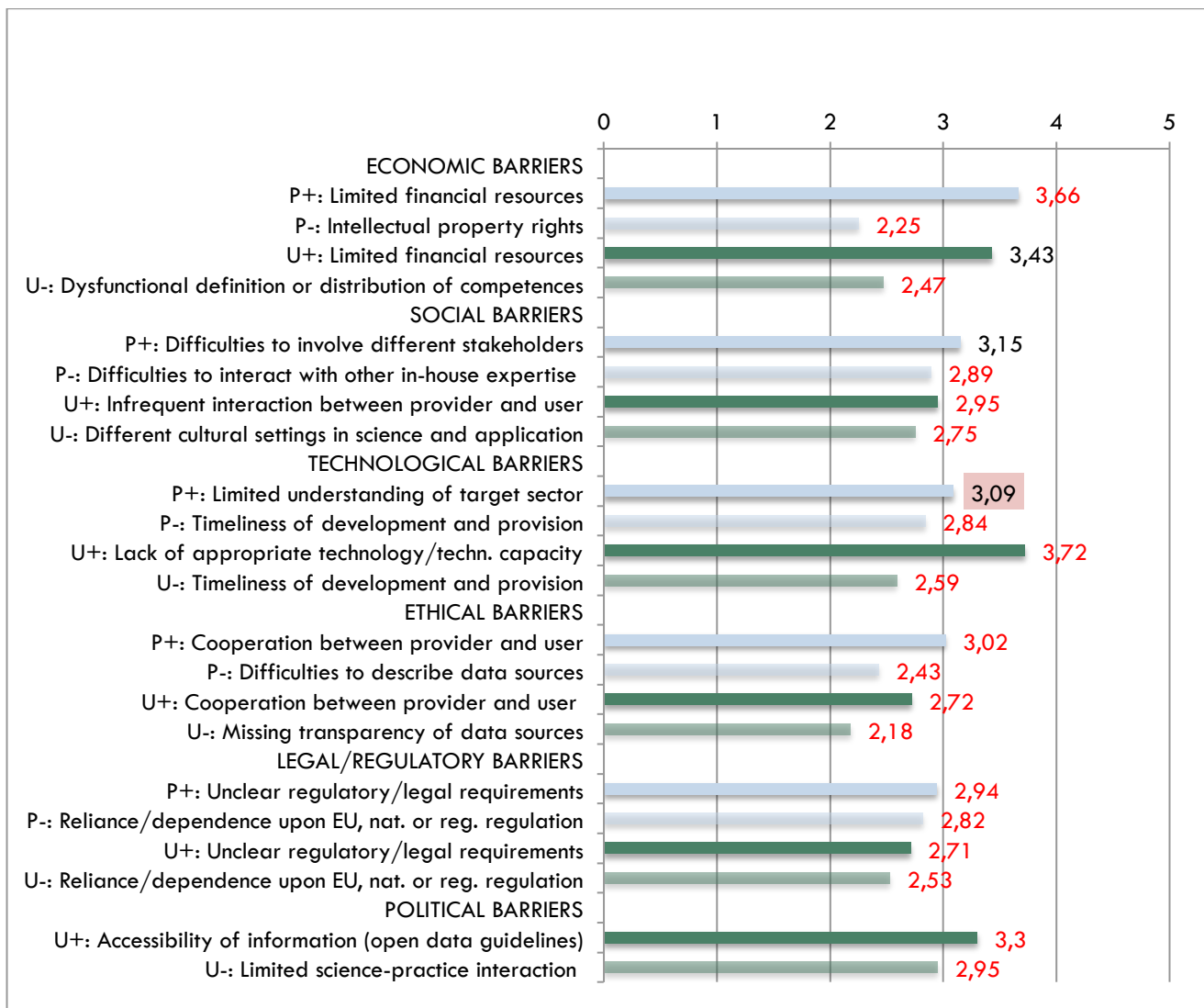
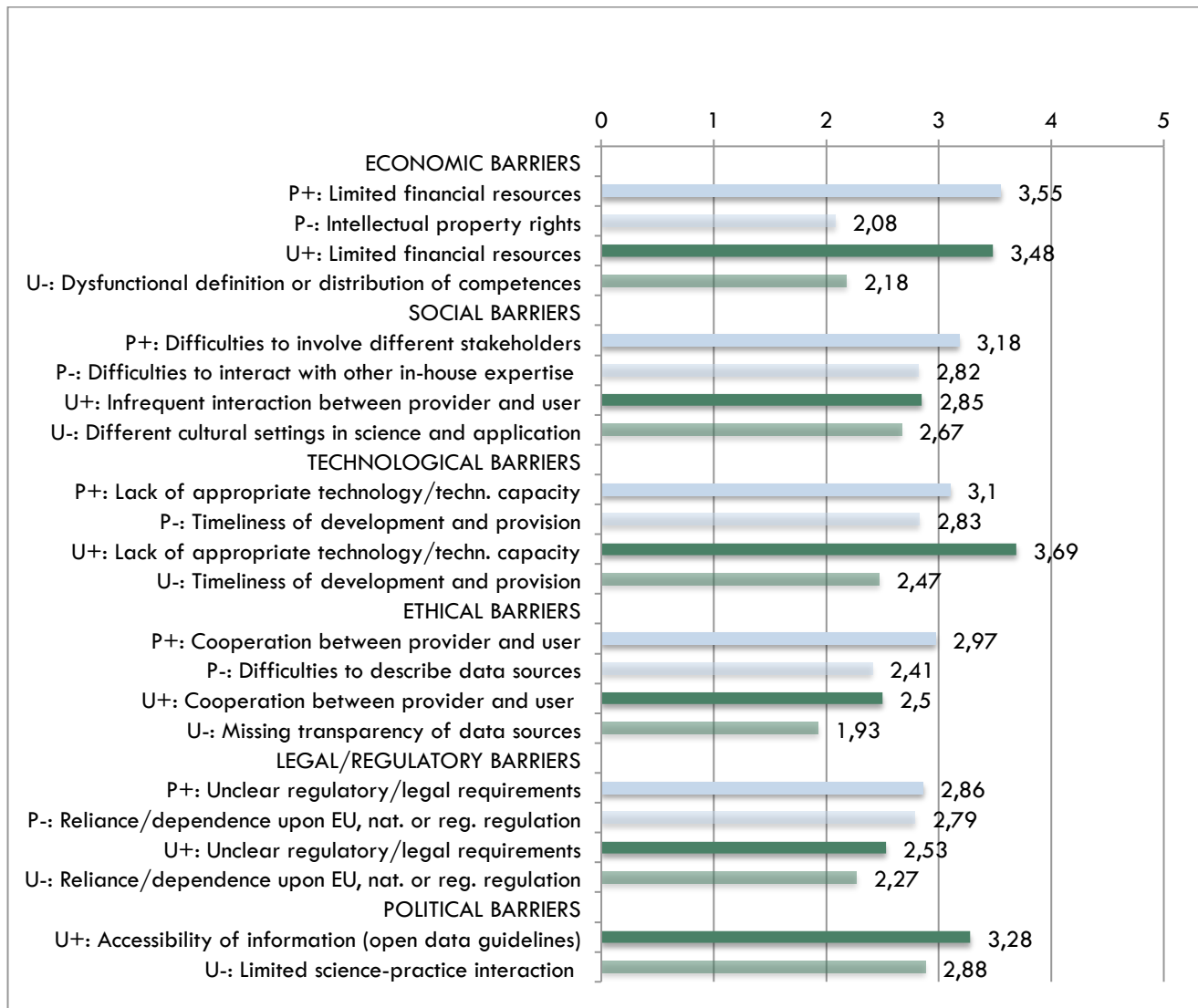


FIGURE 6: APPLIED PESTEL ANALYSIS – HIGHEST (+) AND LOWEST (-) BARRIERS FOR PROVIDERS (P) AND USERS (U)
 (→ OLD: SURVEY RESULTS UNTIL 19. MAY 2017)



Like shown in figure 5 and figure 6, the highest and lowest barriers of all tested groups remain the same, except of one. Providers rated one barrier as the new most important barrier within the group of technological barriers: a ‘limited understanding of target sector’. Thus, while providers rated the ‘lack of appropriate technology/technology capacity’ as the highest technological barrier until May 2017, the importance of a “limited understanding of the target sector” increased until January 2018.

However, on average and still in line with the former results of the survey, providers rate ‘limited financial resources’ as the most prominent barrier of all. This impression differs somewhat from feedback in the Task 1.2 and Task 1.3 interviews (see Deliverable 1.2), in which *public* CS providers tended to regard financial resources not as the primary limiting factor. Both users and providers rate ‘limited financial resources’ as the one barrier out of all possible economic barriers with the highest negative impact on their climate service activities, with a slightly bigger impact for providers. Also these results remain the same based on the updated version of the survey.

While ‘limited financial resources’ is seen as the overall main barrier for providers, users, however, identified the ‘lack of appropriate technology/technological capacity’ as the most influential barrier on their climate service activities, thus, a technological one. On average, they also have to face technological barriers first, followed by political, social, economic, legal and ethical barriers. This finding is very well in line with – yet unpublished – findings from the Urban Climate Under Change (Stadtklima im Wandel; <http://www.uc2-program.org>) project. Users consistently stated that the new climate service under development – i.e. a new urban climate model – has to meet the users’ technical requirements as they are not willing or not able to buy new computers to run the model. In comparison to that, providers are on average clearly confronted with economic barriers first, followed by social, technical, legal and ethical barriers. These results did not change.

Even though, ‘improved methodologies for science-stakeholder interactions’ are considered the second most important innovation by providers (Q17), ‘cooperation between providers and users’ are also considered the most important ethical barrier by both providers (Q15) and users (Q36). In addition, ‘difficulties to involve different stakeholders’ is the most important social barrier for providers (Q13). This is also in line with Q14, in which providers state that ‘limited / incomplete understanding of the targeted sector’ is the most important technological / scientific barrier. Thus, even though, considerable improvements have been made in stakeholder engagement, there still seems to be room to make the cooperation between CS providers and users more effective and efficient.

3.4.2 Barriers related to advisory services

Besides these overarching perspectives on barriers related to climate services in general, a closer look at the CS category ‘Advisory services, risk assessments and decision support tools’ reveals that (see figure 7):

- ‘Advisory services, risk assessments and decision support tools’ were selected the most by both providers and users of climate services. The second largest types of CS are – also in both groups – modeling (climate, impacts and socio-economics) (see figure 7, upper graphics).
- On average there seems to be the tendency that barriers are perceived as being more influential by providers’.
- Users rate the technical-scientific barrier ‘lack of appropriate technology’ (in the earlier evaluation of the survey: ‘missing standardization of information’) and the political barrier ‘accessibility of information, incl. open data policies’ as the two main barriers related to advisory services, while, at the same time, enhancements in open data policies in order to improve accessibility are considered the most important innovation (see figure 5, lower graphic).
- Providers, in contrast, rated ‘methodologies for stakeholder interaction’ the most important innovation. This is also reflected by the fact that ‘cooperation between providers and users’ is the second least interfering highest barrier out of all tested groups of barriers; users also rate this barrier as one of the least influential.
- Nevertheless, providers rated ‘different cultural settings in science and application’ (a social barrier) as the overall highest barrier related to advisory services (in the earlier evaluation of the survey the overall highest barrier for providers was ‘business model development’, an economic barrier).

- While users rated 3 barriers out of 6 as more influential than in May 2017, providers assessed the impact of barriers only once higher than in the earlier version of the survey. This means that the negative effect of barriers was overall evaluated lower than a year before.

The red coloured results in figure 7 below illustrate the increase of importance of barriers in comparison to the results obtained until May 2017. Additionally, the red coloured boxes in the lower graph of figure 7 show a change of barriers.

The findings displayed in the lower graphic of figure 7 look very different for other types of climate services. However, due to the comparison between the assessed barriers and innovations for all service types and those barriers and innovations for advisory services, it can be pointed out that the assessment of barriers and innovations varies depending on the type of service in place.

FIGURE 7: ASSESSMENT OF BARRIERS AND INNOVATIONS RELATED TO ADVISORY SERVICES, RISK ASSESSMENTS AND DECISION SUPPORT TOOLS
 (→ NEW: SURVEY RESULTS UNTIL 23. JANUARY 2018)

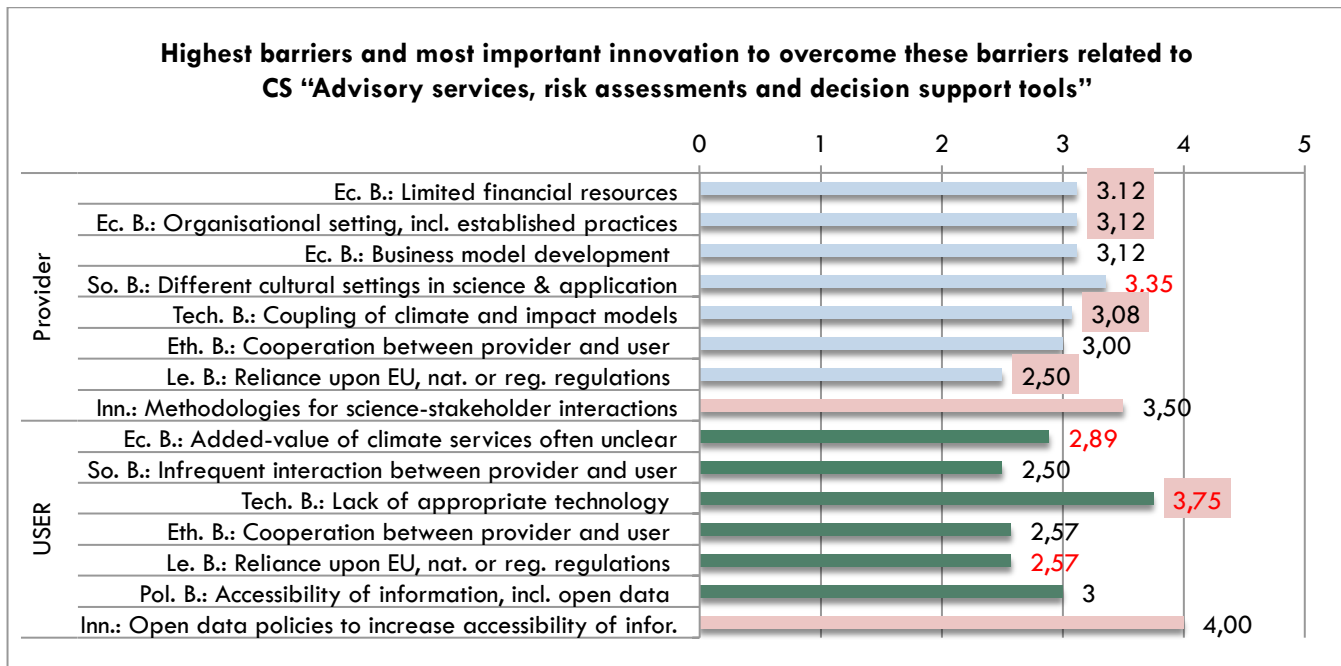
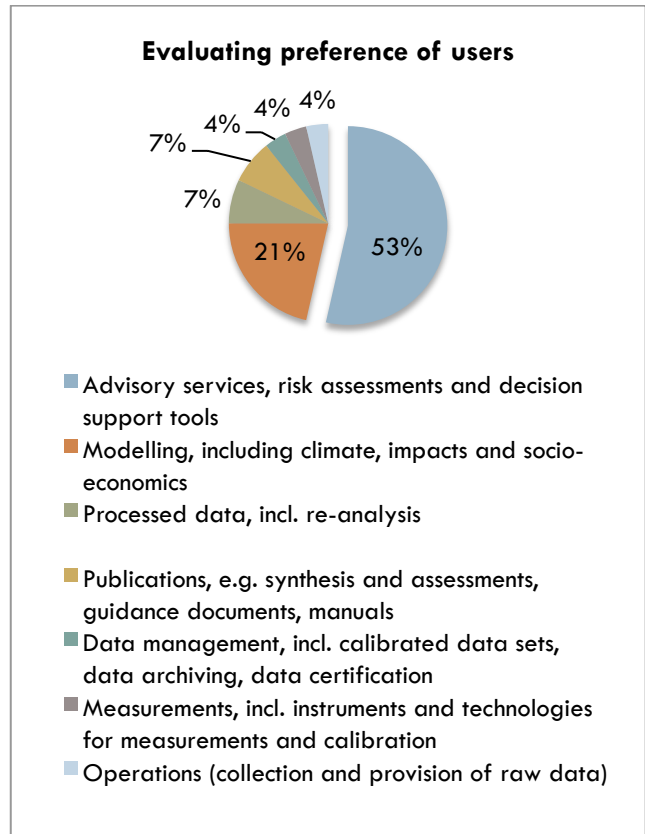
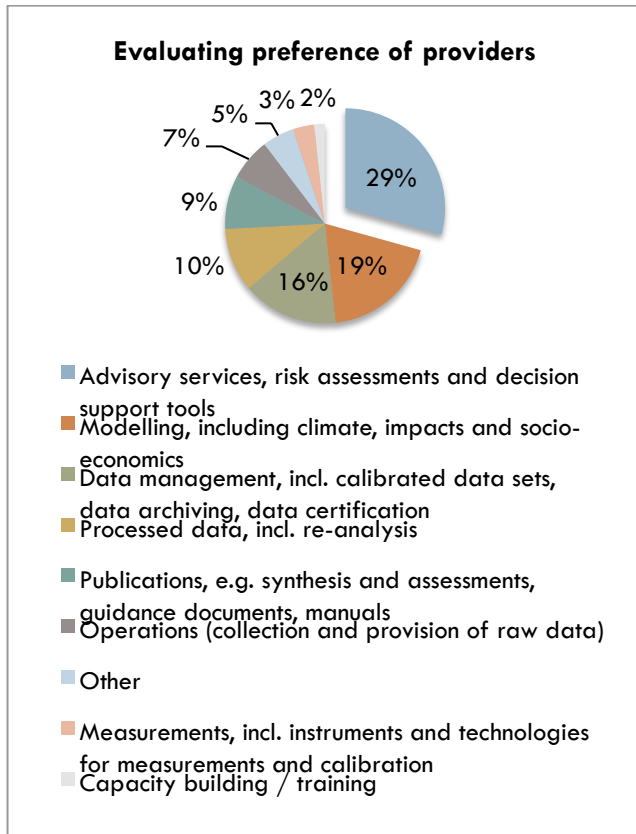
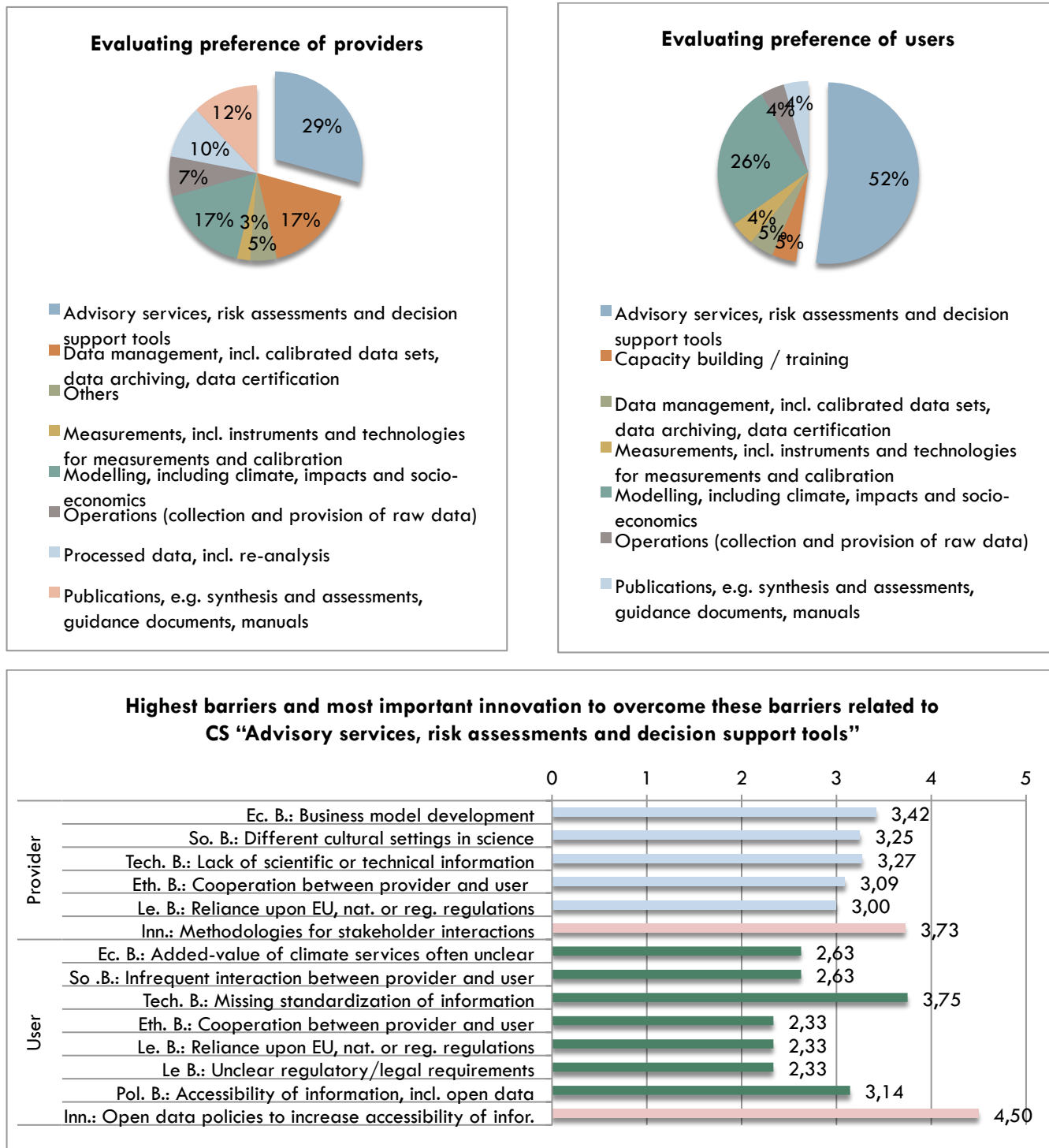


FIGURE 8: ASSESSMENT OF BARRIERS AND INNOVATIONS RELATED TO ADVISORY SERVICES, RISK ASSESSMENTS AND DECISION SUPPORT TOOLS
 (→ OLD: SURVEY RESULTS UNTIL 19. MAY 2017)



3.4.3 Reasons for non-use of climate services

Non-use of climate services is difficult to assess in a survey that addresses CS providers and users. So, only a few participants (n = 12, in the former survey n = 7) responded to the respective questions in the EU-MACS survey. However, there are at least some indications. The three most important reasons for not using climate services are:

- Users do not know where to get the service or it is not available
- The service is available but provided inappropriately
- The services are not understandable (too scientific).

Even though the response rates are far too low to allow any reasonable conclusion, there are some points to be made.

Firstly, all three reasons have – similarly – also been identified in the SECTEUR survey as important reasons for not using climate services (Alexander et al. 2016).

Secondly, the reasons for not using climate services seem to be related to some important barriers of using climate services. The second most important barrier related to advisory services (see figure 5, lower graphic) for instance is the accessibility, which is somehow linked to the “do not know where to get the service”. Q35 of the survey revealed that the inappropriate format of services (arithmetic average 3.47), difficulties to find suitable services (arithmetic average 3.26, in the earlier distribution of the survey 3.24), and difficulties to access suitable services (arithmetic average 3.40; in the earlier distribution of the survey 3.37), are barriers to some users. It might occur, that, while for some users these are barriers they can handle, these barriers lead to non-usage of available services by a small fraction of other users.

3.5 Scientific progress, innovation and innovation dynamics

Between May 2017 and January 2018, the assessment of the importance of innovations has hardly changed. Users still rate ‘open data policies’ and ‘improved high-performance computing capacity’ as the two most important innovations in order to overcome the indicated barriers. The innovation rated the least is policy reforms (in the earlier evaluation of the survey: ‘Guidance documents, manuals, laymen reports’).

Providers on the other side rate ‘internal capacity building’ as the most relevant innovation followed by ‘methodologies for stakeholder interactions’, assessed to be the most important innovation in May 2017. In contrast to that, ‘improved funding’ is seen as the least influential innovation in both, May 2017 and January 2018.

Besides these little differences in the assessment of innovations, users and especially providers rate the influence of innovation as overall higher in January 2018 than in May 2017. This is illustrated through the red coloured average ratings in figure 9, which indicate an increase to the ratings given until May 2017. It could therefore be concluded that the possibilities of overcoming barriers have slightly improved until January 2018. This is a development that, if it were continuous, could be considered successful.

FIGURE 9: IMPORTANCE OF INNOVATION (→ NEW: SURVEY RESULTS UNTIL 23. JANUARY 2018)

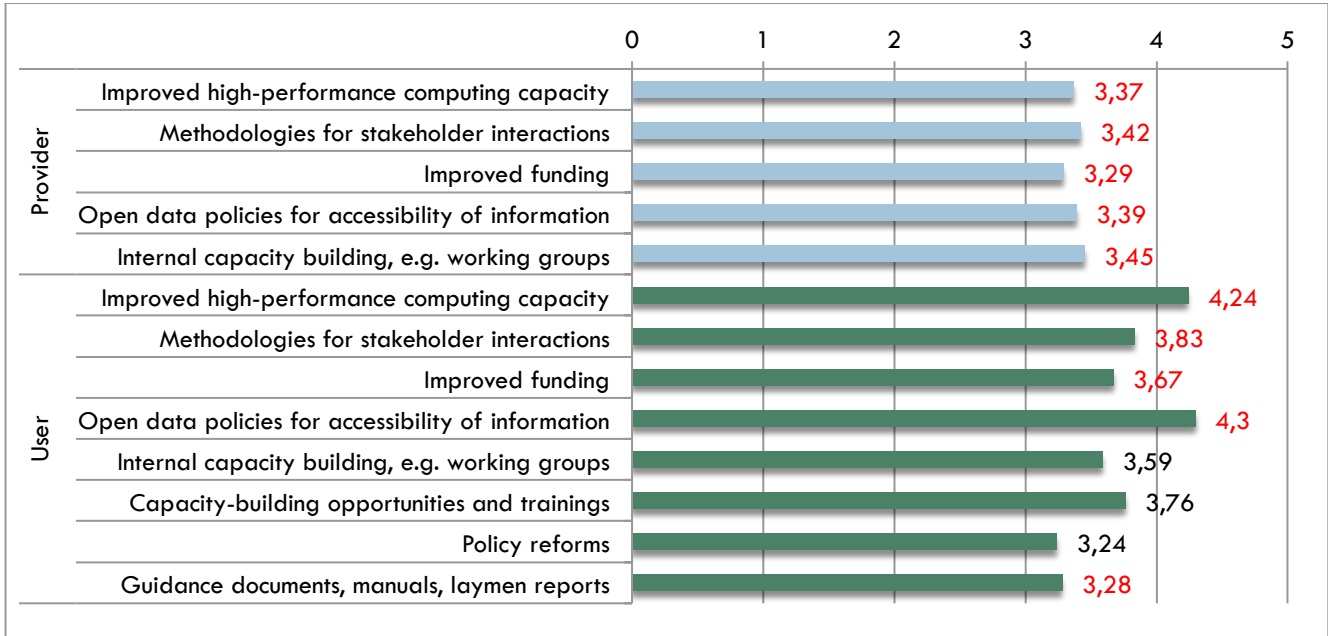
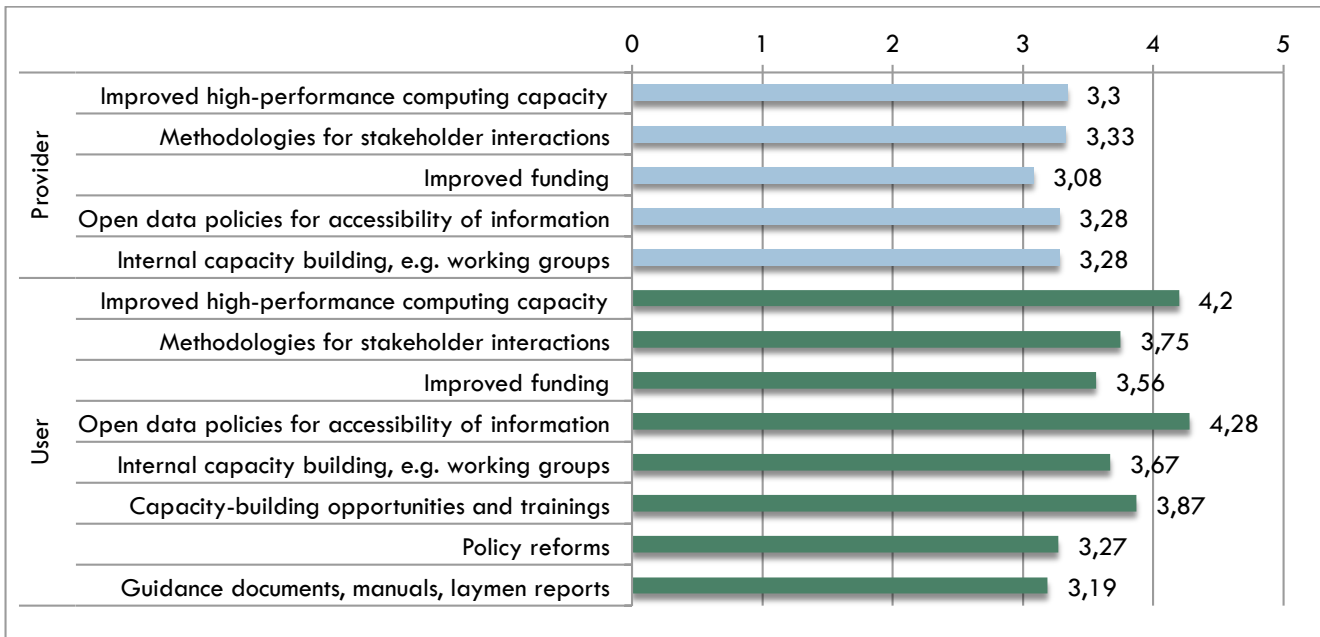


FIGURE 10: IMPORTANCE OF INNOVATION (→ OLD: SURVEY RESULTS UNTIL 19. MAY 2017)



REFERENCES

- Alexander, M., Bruno Soares, M., Dessai, S. (2016): Multi-sector requirements of climate information and impact indicators across Europe: Findings from the SECTEUR survey – Part 1. Deliverable 2.3 for the “SECTEUR” project: Sector Engagement for the Copernicus Climate Change Service (C3S) - Translating European User Requirements
- Brooks, M. S. (2013): Accelerating innovation in climate services: The 3 e’s for climate service providers, *Bull. Am. Meteorol. Soc.*, 94(6), 807–819, doi:10.1175/BAMS-D-12-00087.1, 14.05.2017