

# EVOKED

## Enhancing the value of climate data

Deliverable D4.2

User satisfaction of climate services

Work Package 4 – Co-Evaluation

Deliverable Work Package Leader:  
NGI

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## Note about contributors

Lead partner responsible for the deliverable: NGI

Deliverable prepared by: Bjørn Kalsnes

Partner responsible for quality control: NGI

Deliverable reviewed by: Carl Harbitz, NGI

Other contributors: CAU: Bente Vollstedt, Jana Koerth, Athanasios T. Vafeidis  
SGI: Lisa van Well, Gunnel Göransson, Godefroid Ndayikengurukiye  
Deltares: Gerard Jan Ellen, Kevin Raaphorst, Gerben Koers  
NGI: Amy Oen

## Project information

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Project partners: Norwegian Geotechnical Institute, Norway (p.nr. 20170408)  
Swedish Geotechnical Institute, Sweden  
Deltares, the Netherlands  
Christian-Albrechts University Kiel, Germany  
Larvik Municipality, Norway  
Värmland County Administrative Board, Sweden  
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City of Flensburg, Germany



Provincie Noord-Brabant



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## Summary

The EVOKED framework focuses on the co-creation aspects of climate services (co-design, co-development and co-validation) using Living Labs to engage stakeholders. Embedded in each of these steps, is a co-evaluation process to assess the experience of the stakeholders involved in the co-creation of climate services. Furthermore, co-evaluation assesses user satisfaction as feedback to bridge the process-content gap and thus to improve each step in the EVOKED framework and ultimately help build engaged communities.

To carry out co-evaluation during the EVOKED project, a questionnaire was developed and completed by the participants of the Living Labs. The questionnaire includes evaluations of the Living Labs process itself as well as the climate services being developed. This report D4.2 'User satisfaction of climate services' aims to document and present the use and results from the questionnaires as they were used in Living Lab workshops and during the different field trials for the development of tailored climate services for five EVOKED case study sites.

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## Review and reference page

# 1 Introduction

EVOKED Work Package 4 (WP4) Co-Evaluation evaluates the experience and satisfaction of stakeholders involved in the Living Labs at each of the different case study sites. Each Living Lab differs slightly depending on the climate service that is produced, the project issue at hand, the people involved and the context (geographical, social, and institutional). Each Living Lab was composed of a collection of activities such as workshops, interviews, focus group activities, surveys, as well as policy studies (see Figure 1).

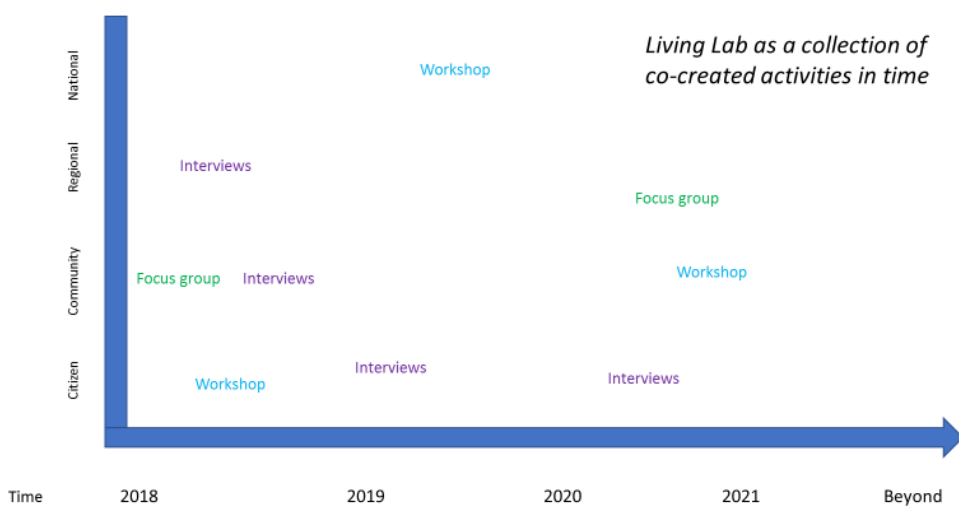


Figure 1: Example of Living Lab as a collection of co-created activities in time (SGI, 2018)

As part of the Living Lab process, several stakeholder meetings were organised for each of the case study sites in the form of workshops or field trials. The main objective of the workshops/field trials was to bring into practice the key aspects of EVOKED: the focus on climate services, the Living Labs approach, and the information design of the selected climate services for each of the EVOKED case study sites (Deltares, 2019).

WP4 has the following objectives:

- Provide feedback from Living Labs participants at individual workshops regarding the Living Labs user experience
- Provide feedback from Living Labs participants at individual workshops regarding the satisfaction with the use of climate services
- Integrate the feedback into adaptive management strategies

In order to evaluate the stakeholder satisfaction of these workshops, a questionnaire was therefore specifically developed in EVOKED. The intention of the questionnaire is thus to provide feedback from the Living Labs partners at the individual workshops from all case study sites.

The questionnaires used were similar for all case study sites. The questionnaire was used in most of the stakeholder meetings, including all field trials, and filled out by the respective participating stakeholders at the end of the meetings. In some workshops, alternative ways of evaluation of the stakeholder responses were made, among them one in Värmland presented in Chapter 3.2.3.

This document presents the outline and results of the questionnaire surveys used for the stakeholder meeting evaluations. Assessing user satisfaction provides feedback to bridge the process-content gap and thus improve each step in the EVOKED framework and ultimately help build engaged communities (WP4 Co-Evaluate).

The questionnaire includes evaluations of the Living Labs process and the Climate Services and was distributed in the EVOKED workshops. The Living Labs principles are described in WP1 Co-Design. The Climate Services are mainly developed in WP2 Co-Develop and in WP3 Co-Validate. The questionnaire reflects the intentions and content generated in these WPs.

## 2 Description of questionnaire

### 2.1 Use of questionnaire surveys

A questionnaire survey is a technique that is undertaken to analyse perceptions, attitudes, and values as well as behaviour and behavioural intentions of individuals. The aim of questionnaire surveys is to operationalise and measure such individual characteristics. At the same time, the information gathered would be suitable for further analysis. As one possible result, the data are analysed in a descriptive way, but individual data can also be aggregated, and patterns or other significant relations can be identified with the help of statistical tools.

The administration and actual use of questionnaire surveys differ. Potential forms are face-to-face-interviews, telephone surveys, web-based surveys and paper form questionnaires as used in the EVOKED project. Questionnaire results are often used in the context of marketing and politics and in social science research.

A questionnaire is constructed through specific questions, a specific combination and sequence of questions. Typically, a questionnaire contains two types of questions, closed response format questions and open questions. Closed response format questionnaires use a fixed reply format. Respondents are free in their reply when open questions are used. However, the statistical use of data gathered with open questions is limited as they are not standardised. Socioeconomic data such as age, gender, or education, is another type of question.

There are advantages and disadvantages of questionnaire surveys using primarily closed-response formats compared to qualitative social science methods. Questionnaire surveys are comparatively cheap and timesaving in conduction, and they can reach a

huge audience. They also make comparison between individual answers possible and offer easy-to-analyse data. However, questionnaire surveys might be processed inaccurately in terms of misunderstandings, ignorance, interpretation or reluctance of respondents in relation to complicated language, inaccurate or unclear questions and further complications.

The effectiveness of a questionnaire depends on respondents' ability to answer the questions and their knowledge about the topic, both of which depend on the relevance of the topic to potential respondents. Furthermore, there are some limitations of questionnaire surveys. Often, they exclude specific groups such as elderly people or children, what might have an impact on the results (Bühner 2011, Kallus 2016, Steiner and Benesch 2018).

## 2.2 Basic elements of the EVOKED questionnaire

The main purpose of the questionnaires used in EVOKED was to evaluate respondents' views on the Living Lab process and their satisfaction with the climate services. The use of the questionnaire was based on the following elements:

- The questionnaire will be the same for all Living Labs at all the different case study sites.
- The questionnaire will be the same throughout the project period, thus the same for all Living Lab phases.
- Question format will be of a rating type, from strongly agree to strongly disagree (5-point response scale)
- The questionnaire will be pre-tested by the EVOKED end-user partners
- The questionnaire will be translated to the local language (in most cases)
- The collection method will be paper-based, but a digital version using Smart telephone technology will also be explored.

The questionnaire used in EVOKED is presented in Appendix A. As described above, the questionnaire focuses on two topics; one about the experience of the Living Labs process, and one on the evaluation of Climate Services. In addition, it includes some general information about the user as well as some information about the intention of the questionnaire. The questionnaire was distributed in the EVOKED workshops. The Living Labs principles are described in WP1 Co-Design (Deliverable 1.1, SGI), and includes the following elements:

- Continuity: collaborations build on long-term learning and trust, which both take time
- Openness: sharing information and insight with parties.
- Realism: research in the natural context of the user.
- Influence: of users and stakeholders on the innovation process.
- Value: for the prospected end-user and stakeholders.
- Sustainability: The existing knowledge is captured and accumulated to build on further.



The Climate Services were mainly developed in WP2 Co-Develop and in WP3 Co-Validate, although some Climate Services were also developed by the case study sites themselves. The questionnaire reflects the intentions and content developed from these WPs. The questions are divided into two parts according to the aspects given below:

- Part 1 - Living Labs process
  1. The view of the actual meeting
  2. The view on the living lab process
- Part 2 - Climate Service satisfaction
  1. Knowledge about Climate Change Adaptation (CCA) in the locality of the respondent
  2. Evaluation of Climate Services
  3. Local Climate Services
  4. Concepts related to Climate Services

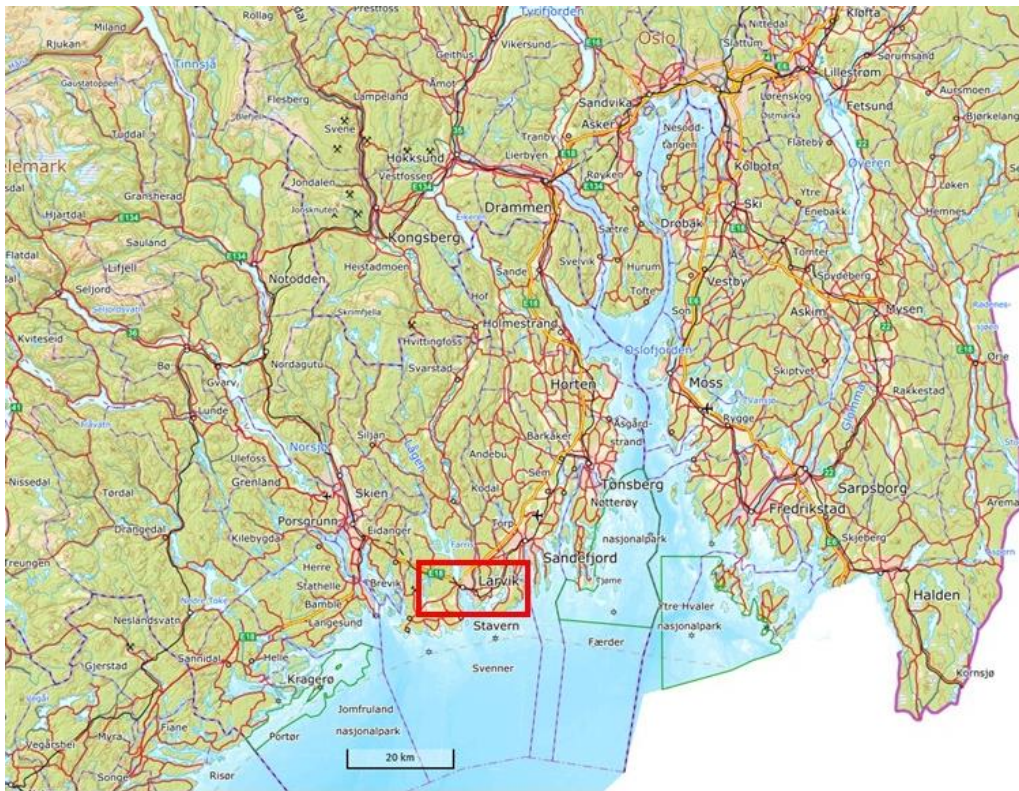
### **3 Results (of the EVOKED questionnaire surveys)**

This chapter presents the findings of the stakeholder satisfaction from the EVOKED case study sites in terms of results from the questionnaires used for the various workshops. It also includes some background information about the case study sites and context for the workshops carried out. More detailed descriptions of the case study locations are given in Deliverable D3.3 (Deltares, 2020), which for each case study site presents general information of the case study location, climate adaptation needs and visions, governance issues, main stakeholders, identified climate impacts, available climate services, and selected climate services worked with in EVOKED.

#### **3.1 Larvik, Norway**

##### **3.1.1 The case study site**

Larvik is a coastal city in southern Norway (see Figure 2) with approximately 25,000 inhabitants (47,000 in the whole municipality). As a coastal city, Larvik is exposed to weather and has always experienced floods, strong winds, and storm surges. However, these events are becoming more frequent, more severe and the costs of damages are increasing. All Norwegian municipalities have the obligation to map potential impacts of climate change in the framework of an overall risk and vulnerability assessment. To support the work of the municipalities with climate change adaptation, NGI has previously conducted a pilot study in Larvik, assessing potential impacts and consequences of natural hazards in a changing climate (NGI, 2016). The expected increase of extreme precipitation leads to an increase of intensity and frequency of urban flooding, erosion, quick clay slides, rock slides, and river flooding. An increasing storm activity in Skagerrak in combination with a rising sea level will increase the severity and frequency of storm surges, coastal flooding, and erosion in Larvik. Hazard and risk maps for Larvik were developed together with suggested local adaptation and mitigation measures.



*Figure 2 Location of city of Larvik (marked in red)*

Within EVOKED, it was decided together with the end-user partner, Larvik municipality, to target the use of climate services in connection with the development of a potential new dwelling area. Larvik municipality has recently completed a feasibility study to assess the development of Martineåsen, an area 1 km from the city center, Figure 3. The feasibility study provides input to the Area Zoning Plan for this area and illustrates potential solutions to support a public-private partnership with the landowners of this area, and at the same time explores solutions to ensure that changes in the scenery will not worsen flooding that is already occurring in vulnerable areas adjacent to Martineåsen. According to the Planning Program for Martineåsen (Larvik kommune, 2013; 2015), Larvik aims to create a new neighbourhood that will have an urban intensity and environmental qualities that attract young and resourceful people also including families.

The area of Martineåsen is outlined in red in Figure 3, which also illustrates its central location relative to the city center. One challenge in building these homes is the landscape of Martineåsen which is hilly and quite varied with tall deciduous trees as well as pine forests and heath. A small lake, Kleivertjønn, is located centrally in the area. There are also several bogs which is a type of wetland that accumulates peat. These physical qualities represent important blue-green infrastructure that must be considered in a comprehensive development of the area, especially with regard to the combined consequences of climate change and land-use change. Specifically, changes in the

existing land coverage influence infiltration and run-off which can worsen local flooding as well as flooding in the city center during intense rainfall events.

Another challenge related to comprehensive development is the ownership of the various properties within Martineåsen. Larvik municipality established contact with landowners already in 2014. In 2020, the landowners shipped a formal collaboration for the development of Martineåsen. In parallel, Larvik municipality has established contact with potential building developers for the area. The workshops for the Larvik case have all been related to the Martineåsen development. The aim and the participants for the individual workshops are described below.



Figure 3 Aerial photo of Larvik with Martineåsen outlined in red, and Kleivertjønn in blue

### 3.1.2 Workshops

Three workshops arranged in Larvik have used the questionnaires for evaluating the stakeholder satisfaction with respect to the Living Lab execution and the presentation of Climate Services used for the Martineåsen case study site. A list of the workshops is shown below in Table 1.

*Table 1 Workshops conducted in Larvik*

No.	Date	Workshop (WS) topic	Climate service introduced	Participants	No of responding participants
1	08.11.2018	Martineåsen feasibility study	No specific	Architect in charge of plan, municipality planners, land owners, technical experts	11
2	28.08.2019	Martineåsen WS with building developers	Blue-green factor, BREEAM Community	Building developers, municipality planners	10
3	15.09.2020	Martineåsen WS with building developers	Climate Menu (new CS by Larvik/NGI)	Building developers, municipality planners	10

Background data from the participants at the various workshops are presented in Table 2 below.

*Table 2 Overview of respondents participating at the Larvik workshops (results in %)*

Parameter		Workshop 1	Workshop 2	Workshop 3
Age*	20-30	0	0	0
	30-40	27	40	30
	40-50	18	40	30
	50-60	46	20	30
	60-70	9	0	10
Gender*	Female	40	20	42
	Male	60	80	58
Representation**	State or municipality	43	30	50
	Business/industry	16	60	50
	Interest groups	0	0	0
	Citizens	16	0	0
	School and academia	0	0	0
	Politicians	0	0	0
	Media	0	0	0
	Others	25	10	0
Involvement**	Work	67	42	38
	By invitation	33	58	45
	By interest	0	0	17
Special interest in CA work**	Local action	38	35	38
	Global concern	21	10	8
	Nature/environmental protection	21	30	34
	Economy	8	20	12
	Education and research	12	5	8
	Other	0	0	0

\* Based on the responses given, in a few cases information about gender and age is missing.

\*\*Participants can represent several groups.

### 3.1.3 Results

#### Workshop 1 (November 2018)

The focus of the first workshop was the feasibility study for the Area Zoning Plan Martineåsen with participation from MAD architect (who was responsible for developing the feasibility study), the municipality, technical experts and landowners. There was in total 16 participants (including 2 from NGI), where 11 of the participants answered the questionnaire, see Table 2. More details regarding the goal, the climate services (CS) presented and discussed in the meeting and the type of stakeholders are given in Table 3 below.

Table 3 Workshop 1, Larvik

<b>Goal</b>	To present first ideas of the feasibility study in the urban development of Martineåsen and collect ideas related to creating a unique residential neighbourhood that is both resilient to climate change and sustainable.
<b>Climate Service presented</b>	MAD architect used maps and photos to illustrate the area that is available for development; illustrating each layer that hinders development: landowner collaboration, sunshine, wind, flooding and bog area. The final map illustrates the various areas that can be developed, each with their own characteristics.
<b>Stakeholders and their role</b>	Specific roles were not discussed at the workshop, but an understanding of roles was apparent with Larvik municipality leading the project and ensuring that the landowners are both informed and engaged.

A diagram showing the results from the questionnaire is presented in Figure 4.

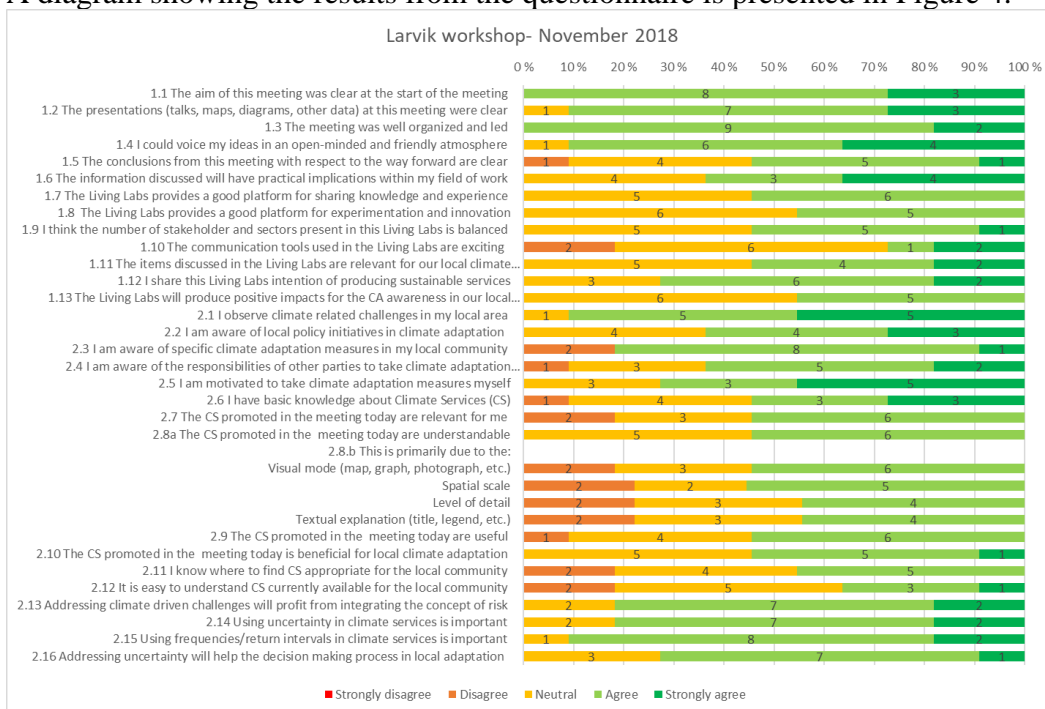


Figure 4 Results from questionnaire, workshop 1, Larvik (numbers represent number of participants responding to the various classes, from strongly disagree to strongly agree)

## Workshop 2 (August 2019)

In this workshop the main participants were potential building developers for Martineåsen, and planners from Larvik municipality. The aim was to introduce the development plan for Martineåsen with a focus on possible climate adaptation measures that may be used. Examples of relevant climate services to be used for this purpose were presented (Blue Green Factor, BREEAM Community). Ten participants answered the questionnaire, see Table 2 for background information of the participants.

More details regarding the goal, CS presented and discussed in the meeting and the type of stakeholders are given in Table 4 below.

Table 4 Workshop 2, Larvik

<b>Goal</b>	First Field Trial with building/real estate developers, feedback on feasibility study for Martineåsen, and use of Blue Green Factor or similar tools for climate adaptation services
<b>Climate Service presented</b>	Blue Green Factor work tool + BREEAM Communities (selected aspects related to climate change).
<b>Stakeholders and their role</b>	Representatives from the local real estate/building and construction sector, and representatives from the municipality.

A diagram showing the results from the questionnaire is presented in Figure 5.

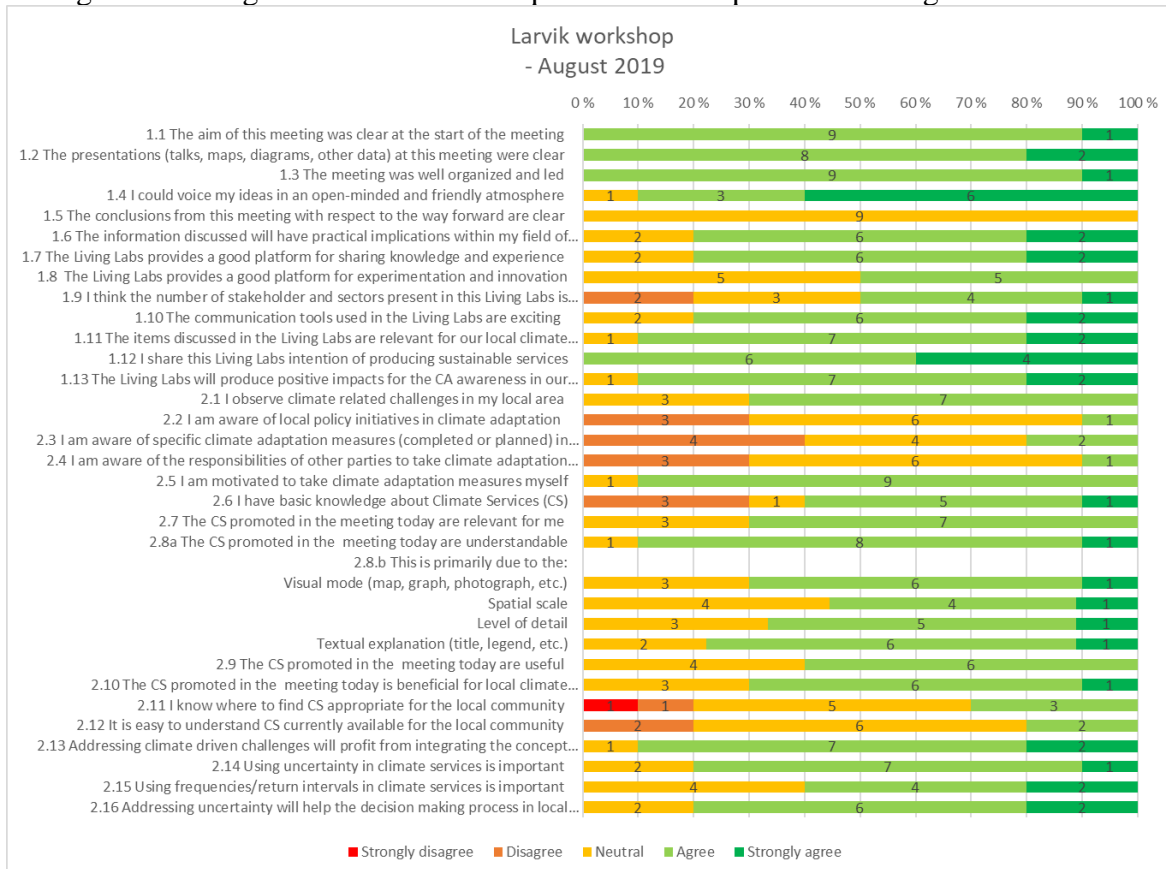


Figure 5 Results from questionnaire, workshop 2, Larvik

### Workshop 3 (September 2020)

In this workshop the use of climate services for the development of Martineåsen was elaborated further. In the planning process of this workshop, Larvik municipality and NGI developed a "Klimameny" (Climate Menu) framework for evaluating various climatic and environmental aspects related to the Martineåsen development in a semi-quantitative manner. The participants were mainly the same as for the August 2019 workshop, i.e. construction developers and municipality planners (see Table 2).

Due to the Covid-19 pandemic, the meeting took place as a virtual meeting using Teams. After some general presentations, the group was divided into two sub-groups which discussed the context in more detail including the purpose and effectiveness of using the proposed "Klimameny". The questionnaire responses were sent by e-mail at the end of the meeting. They were saved using an anonymous identification code and the e-mails were immediately deleted. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 5 below.

Table 5 Workshop 3, Larvik

<b>Goal</b>	Second Field Trial with building/real estate developers, feedback on development of Martineåsen and on the Climate menu climate service
<b>Climate Service presented</b>	Climate menu developed by Larvik municipality and NGI.
<b>Stakeholders and their role</b>	Representatives from the local real estate/building and construction sector, and representatives from the municipality.

A diagram showing the results from the questionnaire is presented in Figure 6.



Figure 6 Results from questionnaire, workshop 3, Larvik

## 3.2 Värmland and Arvika, Sweden

### 3.2.1 The case study site

Värmland County Administrative Board (VCAB) has a central role in climate adaptation and crisis management in the county. VCAB develops the Regional Climate Adaptation Plan and plays an active part in the European Union Flood Directive. Värmland is exposed to water (the rivers, the lake Vänern, the city of Karlstad situated on a delta) and has experienced several floods and landslides. VCAB is currently coordinating the regional efforts to adapt the society to a changing climate and assists the 16 municipalities in the county in their climate adaptation work. In the Regional Climate Adaptation Plan, most of the actions are related to communication and dissemination. Increasing knowledge about climate change and its consequences is an imported step to prevent future problems. A focus for VCAB is finding ways to communicate the integrated risks associated with a changing climate. Within EVOKED, VCAB together with SGI and Arvika municipality explored and developed different kinds of information channels on the topics of flooding, using digital solutions for these different topics in the county of Värmland. In the living lab, VCAB and SGI brought together different experts to make different target groups in Värmland aware of climate change, climate adaptation and risk assessment. The municipality of Arvika, situated in Värmland county, is the main local example of the case (Figure 7).

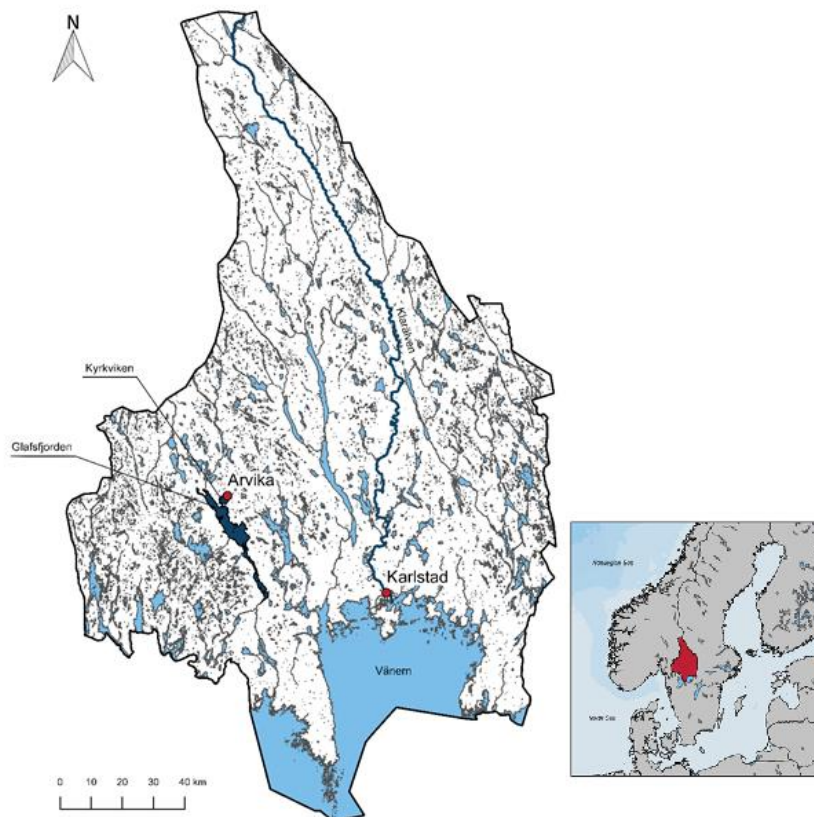


Figure 7 Map of Värmland with municipality of Arvika



### 3.2.2 Workshops

The questionnaires have been used twice in the Värmland case study site; September and November 2019. A list of the workshops is shown in Table 6, and background data from the participants at the various workshops are presented in Table 7.

Table 6 Workshops Värmland.

No.	Date	Workshop topic	Climate service introduced	Participants	No of responding participants
1	09.09.2019	VCAB and Arvika Target group and goal analysis	Story map target group analysis	Planners and GIS experts from Arvika and VCAB	6
2	26.11.2019	Karlstad workshop - story map trial	Outline of structure and content of Story map	Planners and climate strategists in all Värmland municipalities	8

Table 7 Overview of participants at the Värmland and Arvika workshops (results in %).

Parameter		Workshop 1 Arvika	Workshop 2 Karlstad
Age*	20-30	0	29
	30-40	16	14
	40-50	16	0
	50-60	68	57
	60-70	0	0
Gender*	Female	50	43
	Male	50	57
Representation**	State or municipality	100	100
	Business/industry	0	0
	Interest groups	0	0
	Citizens	0	0
	School and academia	0	0
	Politicians	0	0
	Media	0	0
	Others	0	0
Involvement**	Work	84	0
	By invitation	16	16
	By interest	0	84
Special interest in CA work**	Local action	67	57
	Global concern	0	14
	Nature/environmental protection	33	29
	Economy	0	0
	Education and research	0	0
	Other	0	0

\* Based on the responses given, in a few cases information about gender and age are missing.

\*\*Participants can represent several groups.

### 3.2.3 Results

#### **Workshop 1 – VCAB and Arvika in Karlstad (September 2019)**

The first workshop in Värmland took place at VCAB in Karlstad. The aim of this workshop was to determine answers to the following questions: 1) Why are we using Story Maps, what is the problem to be solved? 2) Who are the target groups, what do they know today, what do we want them to know, what do we want them to feel and what do we want them to do? 3) What is the message to the target groups? and 4) How and where can we reach the target groups with the Story Maps, which activities should be done?

More details regarding the goal, CS presented and discussed in the meeting and the type of stakeholders are given in Table 8. The questionnaire was administered at the end of this workshop (two participants had already left). As most of the respondents were quite well versed in English and the workshop was quite informal, the questionnaire was given in English, with the opportunity to ask about translations of certain questions if needed. A diagram showing the results from the questionnaire is presented in Figure 8.

*Table 8 Workshop 1, VCAB and Arvika in Karlstad*

<b>Goal</b>	Determine the target and target groups for an Arvika story map and a VCAB story map.
<b>Climate Service presented</b>	Story maps were briefly presented as the “climate service” to be produced within EVOKED.
<b>Stakeholders and their role</b>	The stakeholders present from VCAB and Arvika communication office, planners and GIS experts. They were divided into two groups to discuss the respective story maps for VCAB and Arvika, both groups were conducted by SGI EVOKED partners.

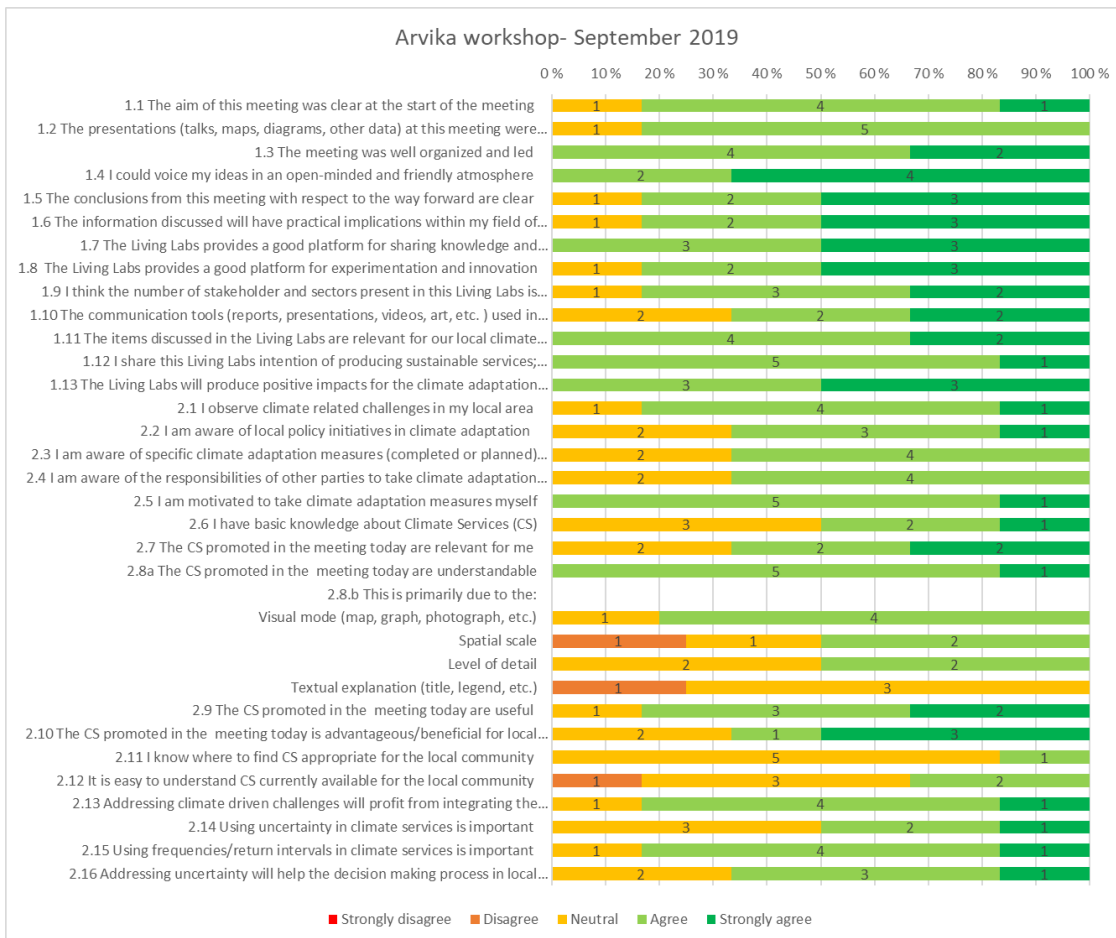


Figure 8 Results from questionnaire, workshop 1, Arvika

### Workshop 2, Karlstad (November 2019)

The second workshop in Värmland took place in VCAB at the county seat of Karlstad. The aim of this workshop was to present the first prototype and structure for the VCAB story map that VCAB will use to inform relevant decision-makers in the municipalities about climate impacts, what they can do to manage these impacts, how VCAB can help, and at the same time to gain stakeholder feedback on the prototype.

More details regarding the goal, CS presented and discussed in the meeting and the type of stakeholders are given in Table 9. As for workshop or field trial 1, the questionnaire was also administered in English, with the option to ask questions about formulations or translations. The idea of climate services (“klimattjänster” in Swedish) was explained at the beginning of the workshop, as this is still not a commonly used term in many areas of Sweden. Otherwise, there were no further requests for clarifications of translations. A diagram showing the results from the questionnaire is presented in Figure 9.

Table 9 Workshop 2, Karlstad.

<b>Goal</b>	Discuss the structure and contents of the first story map prototype for Värmland county.
<b>Climate Service presented</b>	Outline of the proposed story map.
<b>Stakeholders and their role</b>	Planners from the Värmland municipalities of Årjäng, Eda, Karlstad, Hammar, and Arvika, as well as planners and GIS experts from VCAB and SGI.

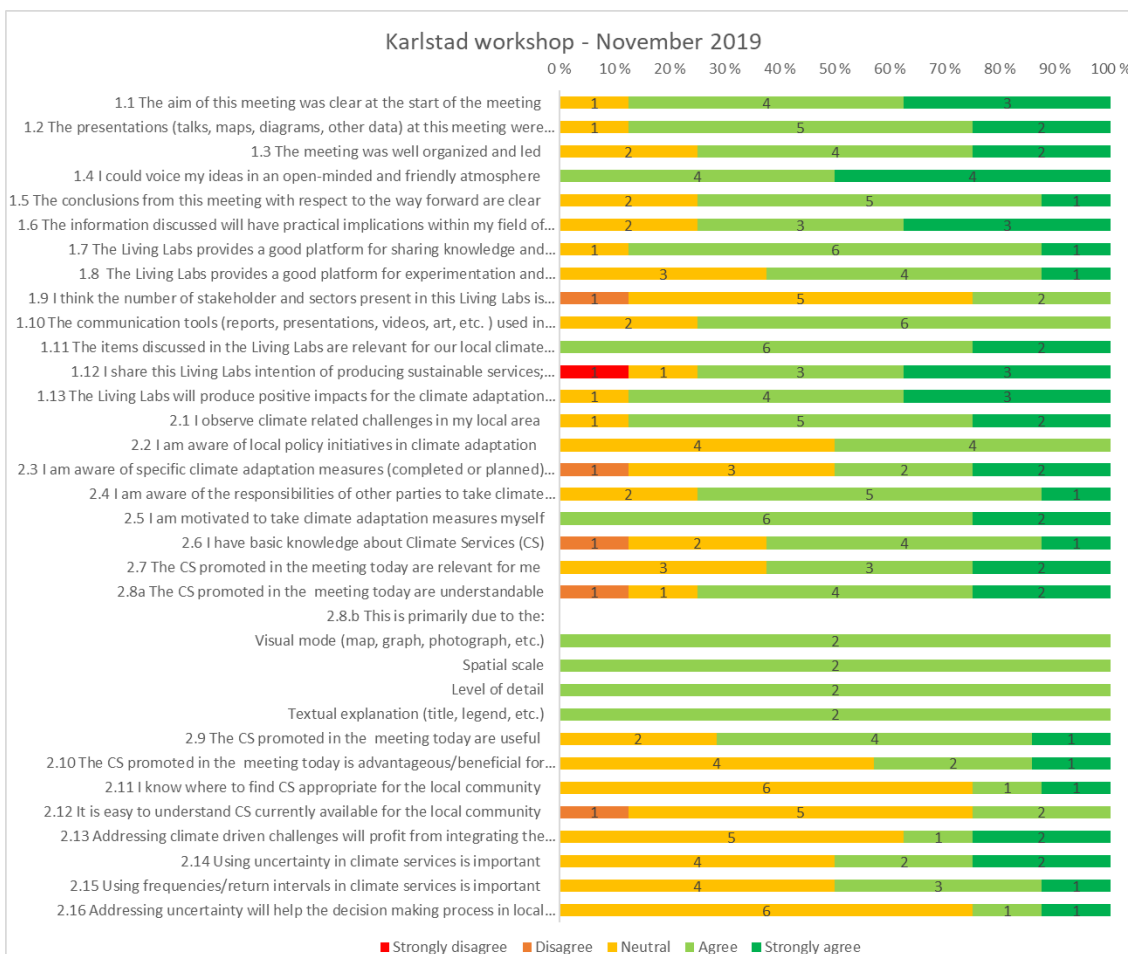


Figure 9 Results from questionnaire, workshop 2, Karlstad.

### Workshops where questionnaire were not used

The workshop planned in Arvika on their story map in November 2019 was cancelled due to illness, but SGI and VCAB have since 2019 had many informal skype planning meetings to help Arvika for developing their own story map. Due to the Covid-19 situation and other factors, a story map survey and digital hearing replaced the absence of field trials, see Table 10.

Table 10 Field trial, VCAB story map survey and digital hearing.

<b>Goal</b>	To gain specific feedback and answer questions on the penultimate version of the VCAB story map’s contents and functionality.
<b>Climate Service presented</b>	Penultimate version of the story map.
<b>Stakeholders and their role</b>	The invitation to the field trial was sent to survey planners and strategists who work with climate adaptation in all Värmland municipality. Subsequent digital hearing involved 11 planners and strategists from the municipalities as well as VCAB and SGI EVOKED partners.

Due to difficulties timing a workshop when the appropriate version of the story map was ready and the coincidence with other regional activities, the VCAB and SGI team instead decided to send out a survey with formal questions about the content and functionality of the story map and a link to the on-line story map. The story map link and the survey were sent to planners and strategists in all Värmland municipalities working with climate adaptation on 6 October 2020 and a short digital hearing on October 23<sup>rd</sup> was organised by VCAB and SGI for those stakeholders who wanted more information or explanation about the story map.

The informal hearing gathered 11 planners, and strategists from the municipalities and VCAB and SGI answered their questions. Most had only briefly looked at the story map, but after a presentation from VCAB, most felt that the story map could be useful in their climate adaptation work. The story map survey questions mainly dealt with the functionality and ease of use of the story map, as well as the level of difficulty of the contents and what types of information could be added or removed. It also asked for good examples from each municipality.

The EVOKED questionnaire was not used in the survey as the VCAB representative felt it was not feasible, since the digital hearing discussed neither Living Labs nor the concept of Climate Services (even though the story map is considered a CS). However, we did have a few questions related to the EVOKED questionnaire. These questions and answers related to the satisfaction of the story map as a climate service are presented in Table 11. Furthermore, the participants (n=5) were asked their opinion as to which target groups do you think that the story map is best suited. Having the option to select more than one target group, the results indicate the following target groups:

- Municipal citizens (n=3)
- Municipal administrators (n=3)
- Municipal decision makers (n=3)
- Municipal politicians (n=3)
- Municipal business interests (n=1)
- Other (n=3)

Table 11 Responses (absolute number as No. and percent as %) to selected story map survey questions for the digital hearing held October 23<sup>rd</sup>, 2020.

Question	Yes, absolutely		Yes, partly		No		Don't know	
	No	%	No	%	No	%	No	%
Are story maps a good way to communicate information in an accessible manner?	2	40	2	40	0	0	1	20
Is a story map a good way to communicate information on climate adaptation in an accessible manner?	1	20	3	60	0	0	1	20
Is a story map a good support for municipal administrators in their work with climate adaptation?	1	20	3	60	1	20	0	0
Is a story map a good support for municipal politicians in their political work?	1	20	3	60	1	20	0	0

The finalised story map for VCAB was launched in a webinar on 17<sup>th</sup> December 2020, also in connection with the presentation of the VCAB Climate and Vulnerability Analysis. While no questionnaire was administered at this time, a few of the comments from the municipalities in Värmland related to the evaluation of story map (as a climate service) were: “The story map is very attractive”, “It can help us with our climate adaptation strategy”, “I can recommend that everyone takes a look at this story map”.

### 3.3 Region of Northeast Brabant, the Netherlands

#### 3.3.1 The case study site

Northeast Brabant is in the south of the Netherlands (see Figure 10) and is home to roughly 580,000 inhabitants and consists of 17 municipalities, the Province of North Brabant, also including a waterboard. Generally, climate changes in the Netherlands are associated with rising sea levels and flooding. Regionally, however, water scarcity and drought can also have significant impact, especially concerning freshwater supply for agriculture and nature. Drought is expected to be a problem for the sandy soil areas in the south and the east of the Netherlands. However, this does not mean that flooding is not (simultaneously) an issue in these areas. Extreme rainfall and flooding in certain periods are expected to go hand in hand with drought in other periods. This will effect both rural and urban areas.

To face the challenges of climate change, the Province of North Brabant is cooperating with regional stakeholders in a joint adaptation agenda. On a regional level, there is no lack of information and data. However, access and applicability of this knowledge is limited. Therefore, the province is currently building a climate knowledge portal. This portal will be the main toolkit for providing tools, knowledge and best practices on climate change adaptation for all parties in the region.

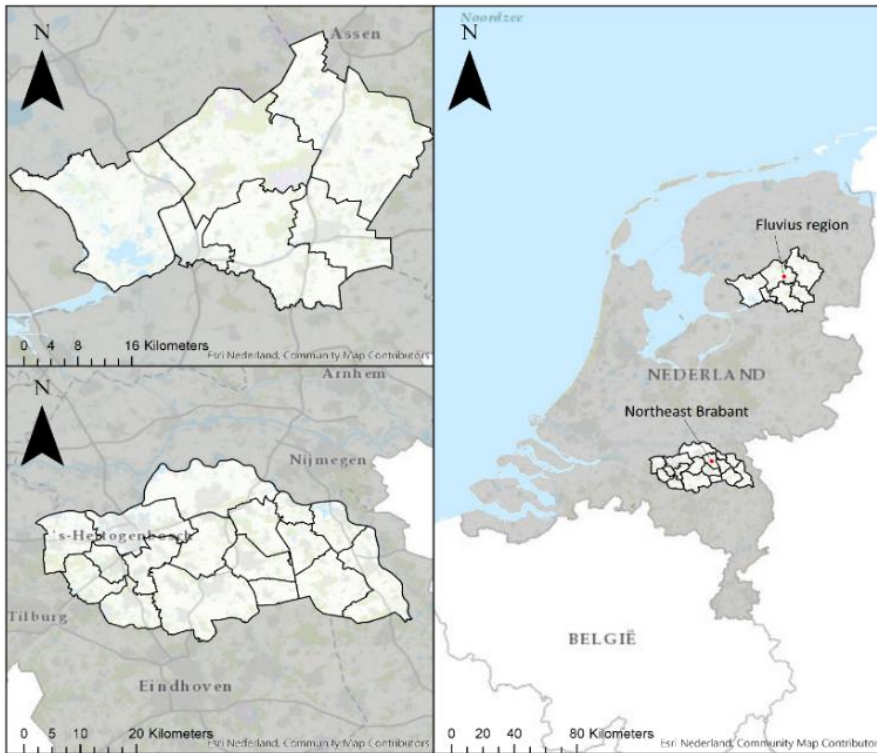


Figure 10 Map of the two Dutch case study sites, Northeast Brabant and the Fluvius region

For the case of Northeast Brabant, a new CS was not selected for development within the EVOKED project. The reason was that Deltares prioritised supporting the internal processes that were already started by the involved governmental stakeholders. As such, for the EVOKED project, Deltares was involved in the development process of making a regionalised version of the National Adaptation Strategy (NAS) infographic by consultancy firms TAUW and Org-ID, which shows the impact of each type of extreme weather, as well as the time scale and the level of government (local, regional, national) that is responsible. As such, it can be stated that the CS will be an addition to the already existing CS rather than an update (as was the case for the Fluvius region).

### 3.3.2 Workshops

The questionnaire has been used one time in the Northeast Brabant case study, in November 2018, Table 12. A second workshop was planned for 2020 to conduct the full questionnaire but was postponed indefinitely due to the Covid-19 pandemic. The questionnaire was conducted only partially since Deltares was not the organizing party of the workshop, meaning that the time that could be claimed from the participants was limited. Because of this limitation, questionnaire content was selected based on relevance, leaving primarily the questions directly relating to the CS (Part 2 of the questionnaire) and omitting the more general questions related to the Living Lab process (Part 1 of the questionnaire).

Table 12 Workshops Northeast Brabant

No.	Date	Workshop	No of responding participants
1	01.11.2018	Workshop 1	14

Background data from the participants at the various workshops are presented in Table 13.

Table 13 Overview of participants at the Northeast Brabant workshops (results in %)

Parameter		Workshop 1
Age*	20-30	
	30-40	
	40-50	
	50-60	
	60-70	
Gender*	Female	29
	Male	71
Representation**	State or municipality	93
	Business/industry	7
	Interest groups	0
	Citizens	0
	School and academia	0
	Politicians	0
	Media	0
	Others	0
Involvement**	Work	0
	By invitation	100
	By interest	0
Special interest in CA work**	Local action	
	Global concern	
	Nature/environmental protection	
	Economy	
	Education and research	
	Other	

\* Based on the responses given, in very few cases information about gender and age are missing.

\*\*Participants can represent several groups.

### 3.3.3 Results

#### Workshop 1 (November 2018)

The focus of the first workshop was to present the available CS to spatial planners and decision-makers of local municipalities and to evaluate to what extent their information needs were met. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 14 below.



Table 14 Workshop 1, Northeast Brabant

<b>Goal</b>	Inventory of information needs
<b>Climate Service presented</b>	'Fluvius Klimaatatlas' and NAS scheme.
<b>Stakeholders and their role</b>	Spatial planners, policy makers, urban designers.

A diagram showing the results from the questionnaire is presented in Figure 11. The questionnaire was only used for the group 2 questions, related to the Climate Services.

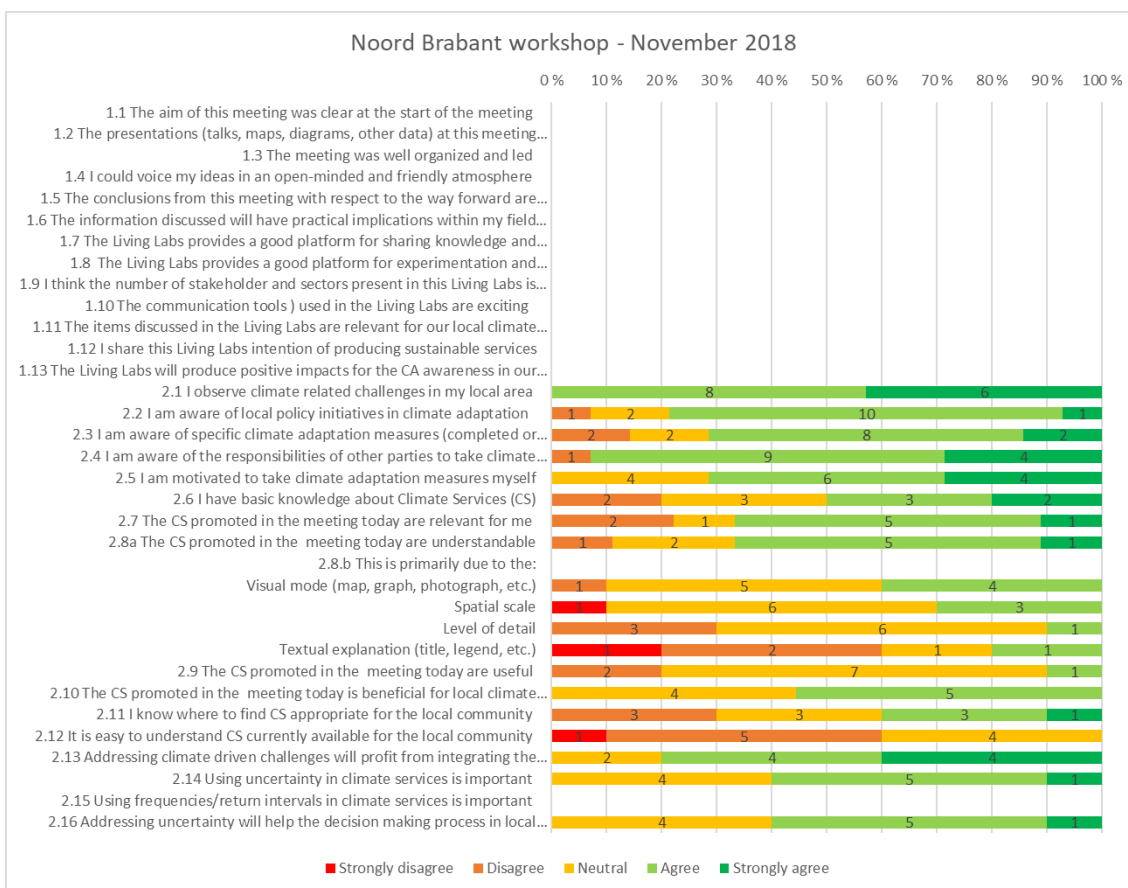


Figure 11 Results of questionnaire, workshop 1, Northeast Brabant

### 3.4 Fluvius work region, the Netherlands

#### 3.4.1 The case study site

The Fluvius region is in the north of The Netherlands (Figure 10). The abundant presence of water has driven the social and economic development in this region. The regional and local governments collaborate for a water robust and climate proof region, with the aim to provide for a water safe area in 2100 where living and working,

recreation and entrepreneurship can prosper. These collaborating governments have launched a program ‘Living with Water in the IJssel-Vechtdelta’ in 2014. One aim of the program is to improve the awareness of the communities within the region on the effects of climate change. Through communication of the risks of climate change and through participation on the development of coping strategies, communities may learn to respond better to floods or heat and thus enhance their resilience. Thereby, this aim addresses the ‘awareness gap’ that was found in an evaluation of the Dutch water governance in 2014. The key question the waterboard wants to bring into the EVOKED project is how (and to what extent) the collaborating governments can shape the preparedness of communities at risk through effective communication strategies. One specific issue that will be addressed in the project is to foster dialogues with various groups within communities (such as elderly people, youngsters or immigrants).

In the Fluvius case study, Deltares initiated the Field trial based on the upcoming ‘stresstest’. This will be an updated local version of the ‘Nationale Klimaateffectatlas’: the ‘Fluvius Klimaatas’, as well as the inclusion of a story map element. Another argument for focusing on this climate service is that it will be used in the first place by governmental stakeholders to establish vulnerable areas, and secondly, it will also be used in dialogues with other stakeholders. Especially as the ‘stresstest’ is seen as an important upcoming climate service in the Dutch context where a lot of expectations are put on national governmental policy documents (e.g. I&M, 2017).

### 3.4.2 Workshops

The questionnaires have been used three times in the Fluvius case study, between September 2018 and November 2020. A list of the workshops is shown below in Table 15. The questionnaire was conducted only partially in the first two workshops since Deltares was not the organizing party of the workshops, meaning that the time that could be claimed from the participants was limited. Because of this limitation, questionnaire contents was selected based on relevance, leaving primarily the questions directly relating to the CS (Part 2 of the questionnaire) and omitting the more general questions related to the living lab process (Part 1 of the questionnaire).

Table 15 Workshops Fluvius region

No.	Date	Workshop	No of responding participants
1	19.09.2019	Workshop 1	6
2	20.02.2020	Workshop 2	7
3	03.11.2020	Workshop 3	5

Background data from the participants at the various workshops are presented in

Table 16 below. As discussed above, the background information was lacking in the first two workshops and was limited in the third workshop.

Table 16 Overview of participants at the Fluvius workshops (results in %)

Parameter		Workshop 1	Workshop 2	Workshop 3
Age*	20-30			
	30-40			
	40-50			
	50-60			
	60-70			
Gender*	Female			80
	Male			20
Representation**	State or municipality			100
	Business/industry			
	Interest groups			
	Citizens			
	School and academia			
	Politicians			
	Media			
	Others			
Involvement**	Work			100
	By invitation			
	By interest			
Special interest in CA work**	Local action			
	Global concern			
	Nature/environmental protection			
	Economy			
	Education and research			
	Other			

\* Based on the responses given, in very few cases information about gender and age are missing.

\*\*Participants can represent several groups.

### 3.4.3 Results

#### Workshop 1 (September 2019)

The focus of the first workshop was a general project group meeting wherein the 'Fluvius KlimaAtlas' was presented and ideas for developing a story map were gathered. Only the second part of the questionnaire focusing on the climate services was completed. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 17 below.

Table 17 Workshop 1, Fluvius

<b>Goal</b>	Gathering input for story map development
<b>Climate Service presented</b>	'Fluvius KlimaAtlas'
<b>Stakeholders and their role</b>	Decision-makers of the local municipality managing the DPRA process.

A diagram showing the results from the questionnaire is presented in Figure 12.

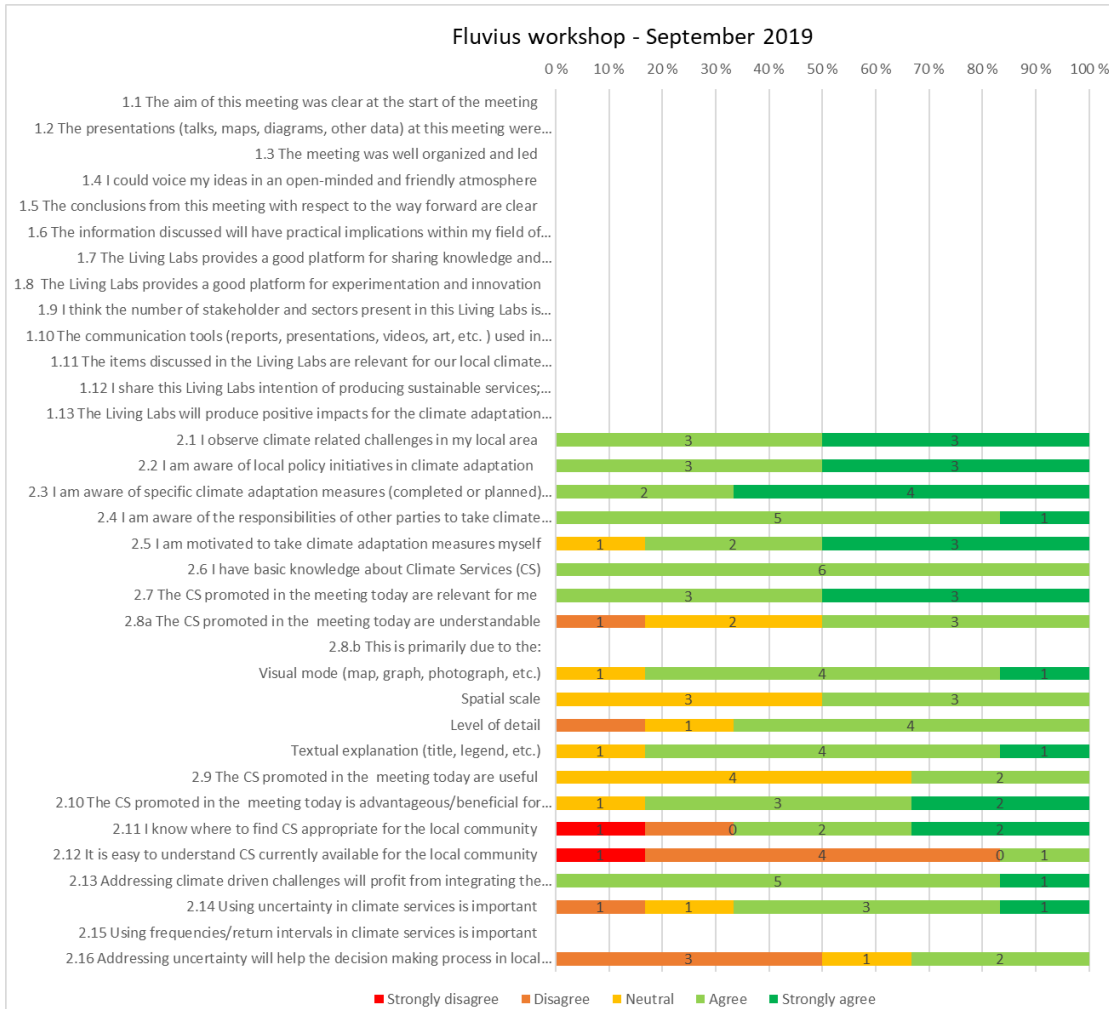


Figure 12 Results of questionnaire, workshop 1, Fluvius

### Workshop 2 (February 2020)

The focus of the second workshop was a presentation of the modified climate service, a final iteration of the story map extension to the 'Fluvius Klimaatatlas'. Only the second part related of the questionnaire focusing on climate services was completed. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 18 below.

Table 18 Workshop 2, Fluvius

<b>Goal</b>	Presentation of re-designed story map component of the climate service.
<b>Climate Service presented</b>	'Fluvius Klimaatatlas' story map content
<b>Stakeholders and their role</b>	Developers, representatives of the FLUVIUS municipalities.

A diagram showing the results from the questionnaire is presented in Figure 13.

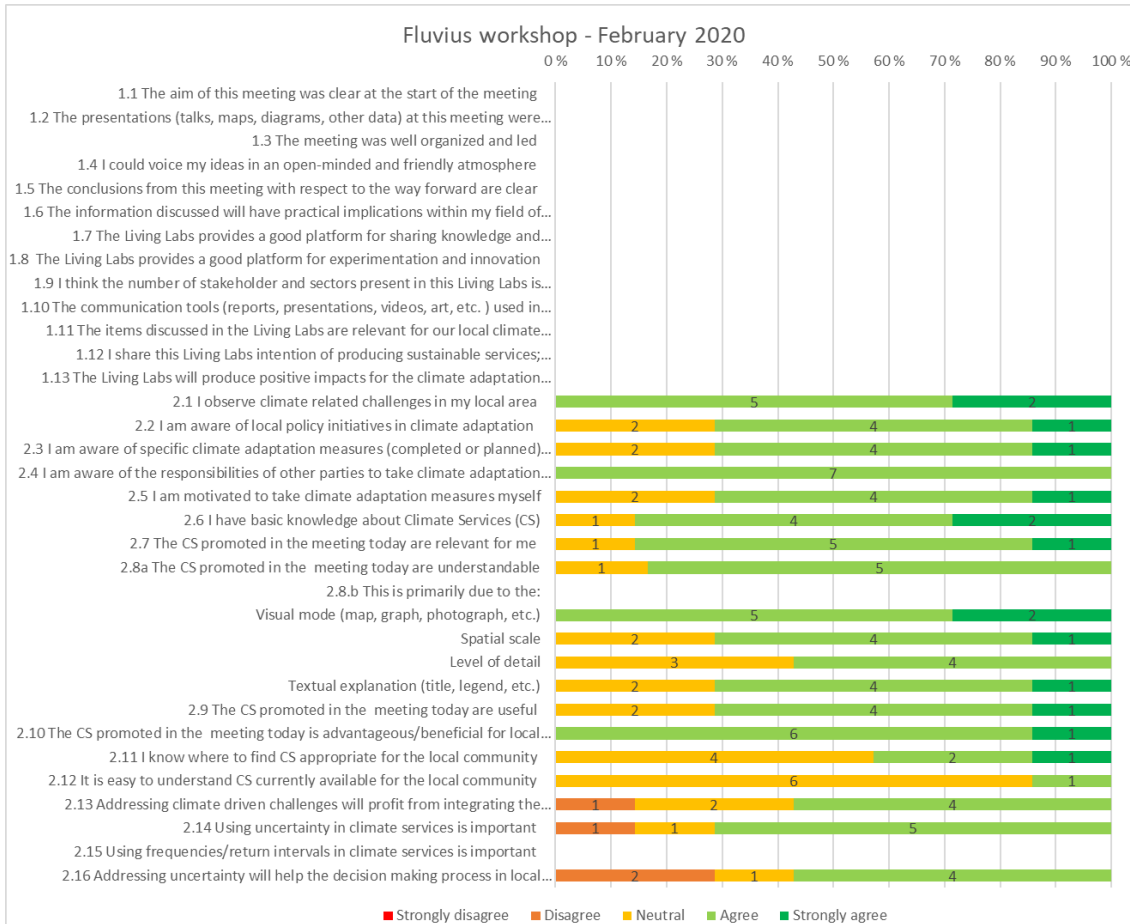


Figure 13 Results of questionnaire, workshop 2, Fluvius

### Workshop 3 (November 2020)

The focus of the third workshop was a try-out of the 'Fluvius Klimaatatlas' with the municipality of Meppel. This was a virtual meeting where we used MURAL (see the picture below – as an illustration of the approach) to interact with the stakeholders. We discussed a case related to the demolishing of an old hospital to explore new possibilities (e.g. housing for elderly people), and let the participants use the 'Fluvius Klimaatatlas'. We did so by asking what questions occurred to them when they heard about the case study from their own disciplines/departments within the municipality. These were for example, sustainability, but also roads and transportation. After they put these questions on the MURAL, we also asked them if there was a relation to climate change. For example, the questions were for how long the water remains on the roads after heavy rainfall, or if there is any kind of heat stress in the area. Next, we asked the participants to work with 'Fluvius Klimaatatlas' to see if they could find their answers, and screen-dump this on the MURAL. After this activity, the usability of the 'Fluvius Klimaatatlas' was discussed. At the end of the meeting the participants filled out the survey.



Figure 14 The Mural that was used and filled by the participants in the Meppel workshop (3-11-2020).

The full questionnaire was filled in. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 19 below.

Table 19 Workshop 3, Fluvius

<b>Goal</b>	Introducing the 'Fluvius Klimaatatlas' to employees of the municipality (who had no experience with the CS) to explore how useful the CS is.
<b>Climate Service presented</b>	'Fluvius Klimaatatlas'
<b>Stakeholders and their role</b>	Project managers, policy advisors, secretary

A diagram showing the results from the questionnaire is presented in Figure 15.

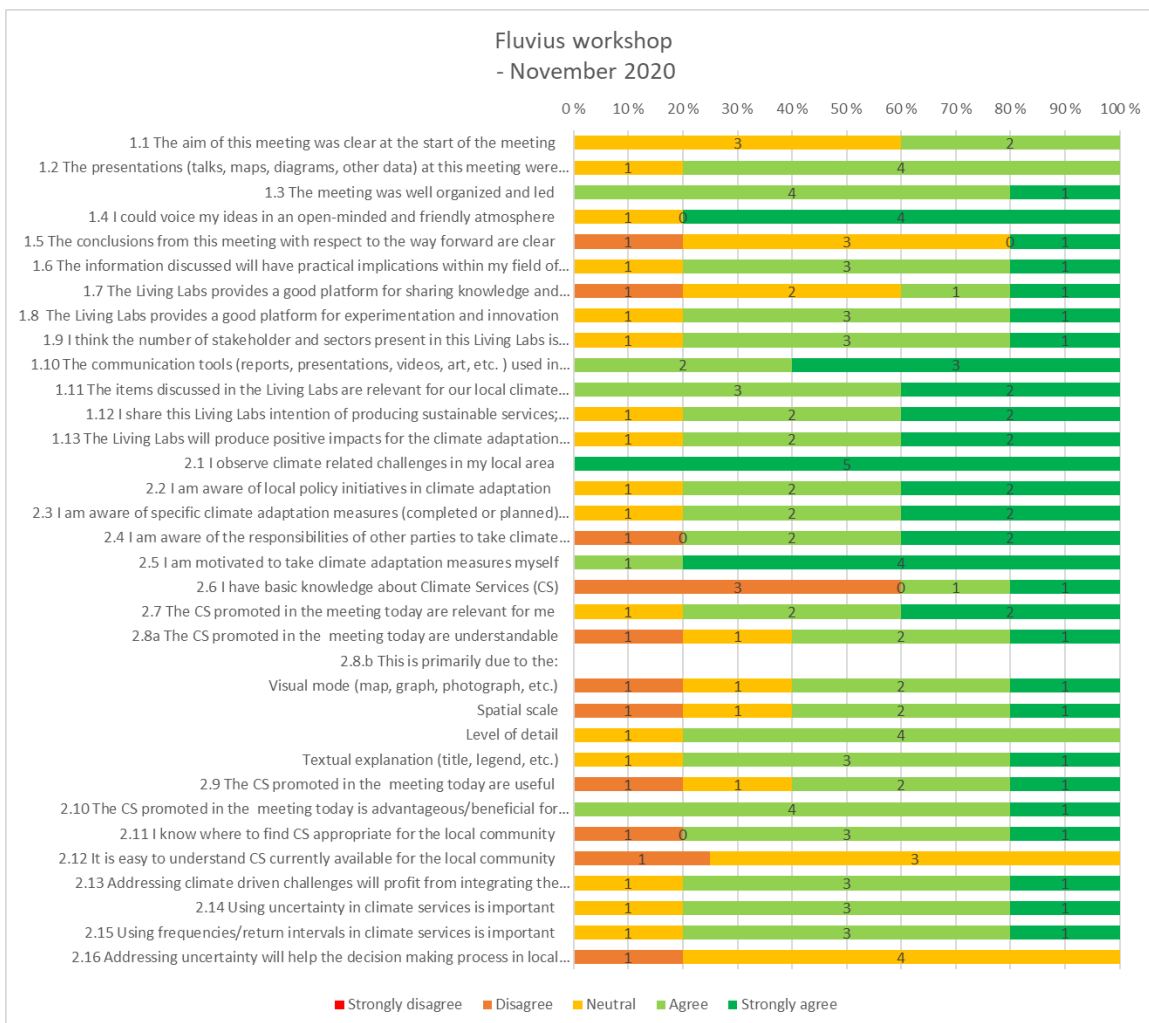


Figure 15 Results of questionnaire, workshop 3, Fluvius

### 3.5 City of Flensburg, Germany

#### 3.5.1 The case study site

The city of Flensburg has approximately 96 000 inhabitants (City of Flensburg, 2019) and is in the north of Germany at the Baltic Sea coast. Because of its location in the western Baltic Sea, regular coastal flooding occurs under strong north easterly winds and low-lying parts of Flensburg experience regular flooding (Jensen and Mueller-Navarre, 2008). Further, coastal flooding will increase in the Baltic Sea until 2100 as a result of climate-induced sea-level rise (SLR) (Sterr, 2008; The BACC II Author Team, 2015; Weiße and Meinke, 2017; Wong et al., 2014). Large-scale protection measures against coastal flooding such as dikes are not in place (Hofstede, 2008; Landesbetrieb für Küstenschutz; Nationalpark und Meeresschutz Schleswig-Holstein (LKN.SH, 2015).



Generally, the city of Flensburg has much to gain from starting a coastal adaptation process. Until recently, the city administration focused mainly on the issue of climate mitigation (SGI, 2019). However, in the face of climate change, the city of Flensburg is currently initiating the process of developing an adaptation agenda, in co-operation with local stakeholders. Currently, no assessment of vulnerability to coastal flooding exists for the region and no measures are in place. A collaboration between the city of Flensburg and CAU has been initiated to provide support in assessing vulnerability and in exploring potential adaptation options to cope with future flood risk. Within the living lab process, different climate services (e.g. flood maps, socio-economic scenarios, a story map, information on adaptation options) were developed in cooperation with a diverse group of stakeholders.

### 3.5.2 Workshops

The questionnaires have been used three times in the Flensburg case study, in November 2018, November 2019 and September 2020. A list of the workshops and events is shown below in Table 20.

Table 20 Workshops Flensburg

No.	Date	Workshop	No of responding participants
1	07.11.2018	Workshop 1	25
2	20.11.2019	Workshop 2	44
3	28.09.2020	Final discussion of project results with focus on adaptation.	5

Background data from the participants at the various workshops are presented in Table 21.

Table 21 Overview of respondents participating at the Flensburg workshops (results in %)

Parameter		Workshop 1	Workshop 2	Final Discussion
Age*	10-20	0	9	0
	20-30	4	30	0
	30-40	21	14	20
	40-50	38	9	40
	50-60	29	12	20
	60-70	8	26	20
Gender*	Female	32	48	100
	Male	68	52	0
Representation**	State or municipality	37	20	60
	Business/industry	10	12	20
	Interest groups	10	2	0
	Citizens	23	20	0
	School and academia	5	20	0

	Politicians	5	2	20
	Media	0	0	0
	Others	10	24	0
Involvement**	Work	28	56	20
	By invitation	56	31	80
	By interest	16	13	0
Special interest in CA work**	Local action	38	29	27
	Global concern	23	19	27
	Nature/environmental protection	27	26	27
	Economy	8	8	7
	Education and research	0	16	7
	Other	4	2	7

\* Based on the responses given, in very few cases information about gender and age are missing.

\*\*Participants can represent several groups.

### 3.5.3 Results

#### Workshop 1 (November 2018)

Twenty-five participants at the workshop also took part in the questionnaire survey. Those responding to the questionnaire constituted a very diverse group; all identified stakeholder groups were represented, apart from media. The workshop took place in the townhall of the city of Flensburg and lasted for an afternoon. The aim of the workshop was two-fold: first, to clearly communicate information on future sea level rise trends and its potential consequences for the city of Flensburg; and second, to identify and construct with the audience potential future socioeconomic development pathways of the city of Flensburg.

For this purpose, the group of attendants was divided into two sub-groups who participated in two parallel workshops. The group in the first workshop discussed a series of flood risk maps and the group of the second workshop worked on the compilation of scenarios for the potential future socioeconomic development of the city. In both workshops, a didactic mix of two-party and whole group discussions was employed, and results were recorded in written form. As a result of the meeting, the understanding of flood risk maps and socioeconomic scenarios in the groups greatly improved.

More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 22 below.

Table 22 Workshop 1, Flensburg with two parallel workshops

<b>Goal</b>	Initiating the Living Lab for Flensburg Workshop 1: discussing flood maps with stakeholders and visualising vulnerability (e.g. readability, first ideas on potential measures) Workshop 2: Discussing local socio-economic scenarios and plausibility check of those.
<b>Climate Service presented</b>	Different flood maps simulations Local SSP narratives
<b>Stakeholders and their role</b>	A diverse group of stakeholders (e.g. general public, NGO, companies, employees of the city administration). Stakeholders were asked to provide feedback on climate services; readability of flood maps and plausibility check of SSP narratives.

A diagram showing the results from the questionnaire is presented in Figure 16.

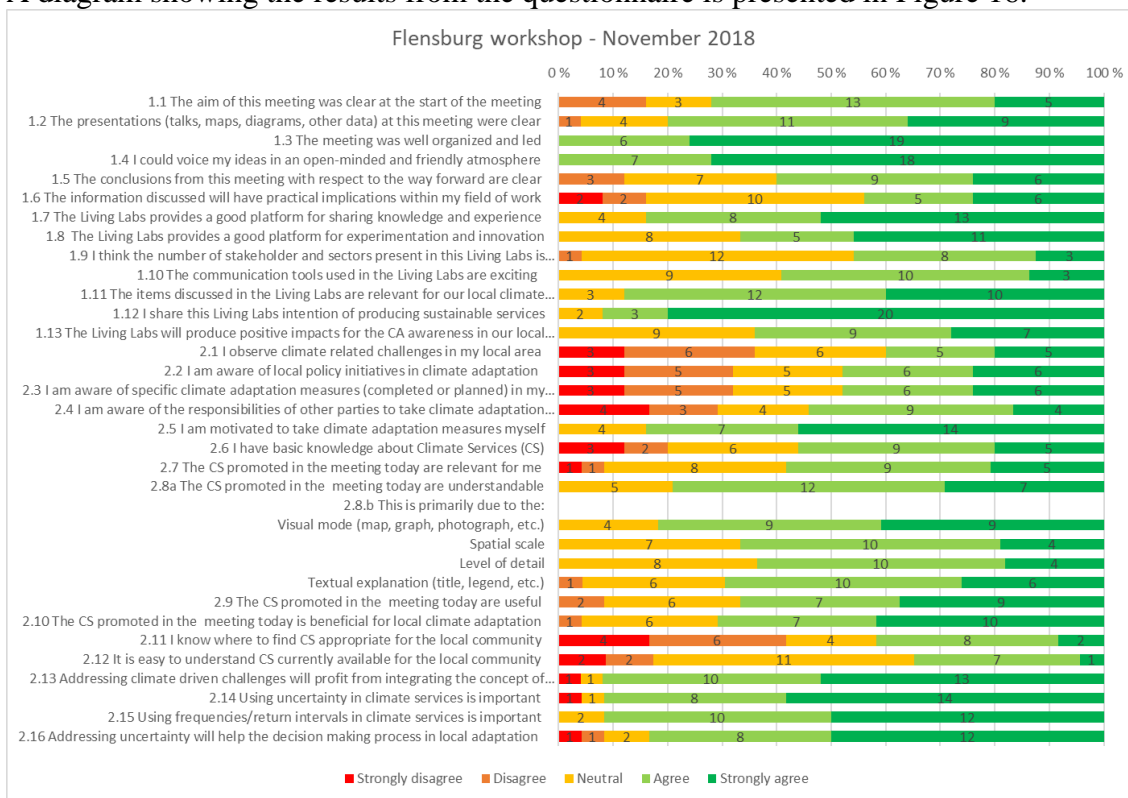


Figure 16 Results of questionnaire, workshop 1, Flensburg

### Workshop 2 (November 2019)

Also, in the second Flensburg workshop there was a very diverse group of stakeholders responding to the questionnaire, again all stakeholder groups were represented apart from media. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in Table 23 below.

Table 23 Workshop 2, Flensburg

<b>Goal</b>	Presentation and discussion of adaptation measures for the city of Flensburg. Identification of accepted measures and prioritisation. Getting insight if measures are changing with an increase in SLR.
<b>Climate Service presented</b>	Two flood map simulations (0.5m SLR plus storm surge event and 1.0m plus storm surge event) for two different areas of the city and potential adaptation measures to be used for future adaptation.
<b>Stakeholders and their role</b>	Stakeholders discussed and identified specific measures for the city of Flensburg. In the end they had the possibility to rate the most and less accepted measures.

A diagram showing the results from the questionnaire is presented in Figure 17.

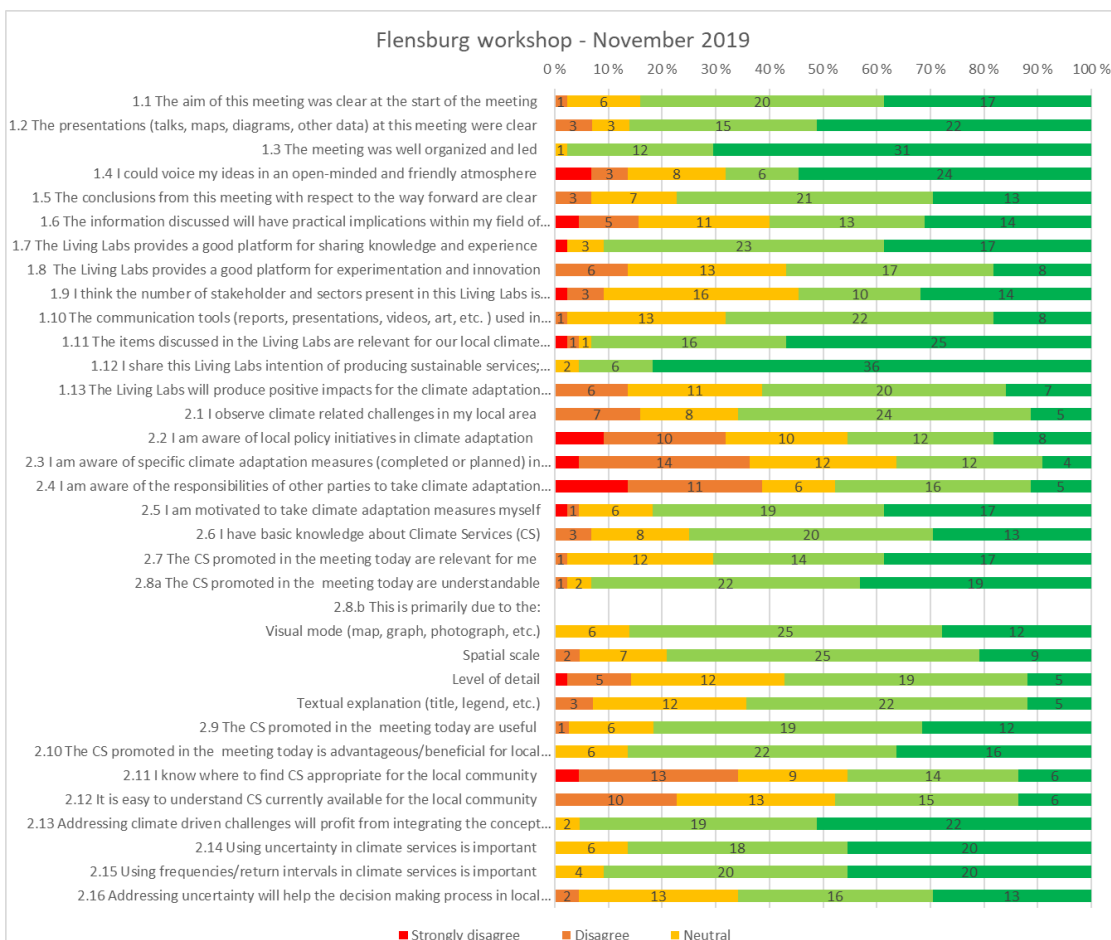


Figure 17 Results of questionnaire, workshop 2, Flensburg

### Workshop 3, closing event (September 2020)

Due to the Covid-19 pandemic a hybrid event was set up to facilitate both digital and analogue participation. A discussion with a city administration member, a researcher, and a decision maker took part as a live event and six stakeholders had the possibility

to join the event on site. Also, about ten stakeholders participated online. More details regarding the goal, CS presented and discussed in the meeting, and the type of stakeholders are given in

Table 24 below.

Table 24 Workshop 3, Flensburg

<b>Goal</b>	Discussion of overall project results with representative (politicians, researcher and decision) to identify future actions for SLR adaptation for the city of Flensburg.
<b>Climate Service presented</b>	No new climate service was presented, however, adaptation results from the previous workshop was presented as well as first ideas on the adaptation pathway approach.
<b>Stakeholders and their role</b>	Receiving information on the overall Living Lab and climate services production process in Flensburg and ideas on future actions.

A diagram showing the results from the questionnaire is presented in Figure 18.

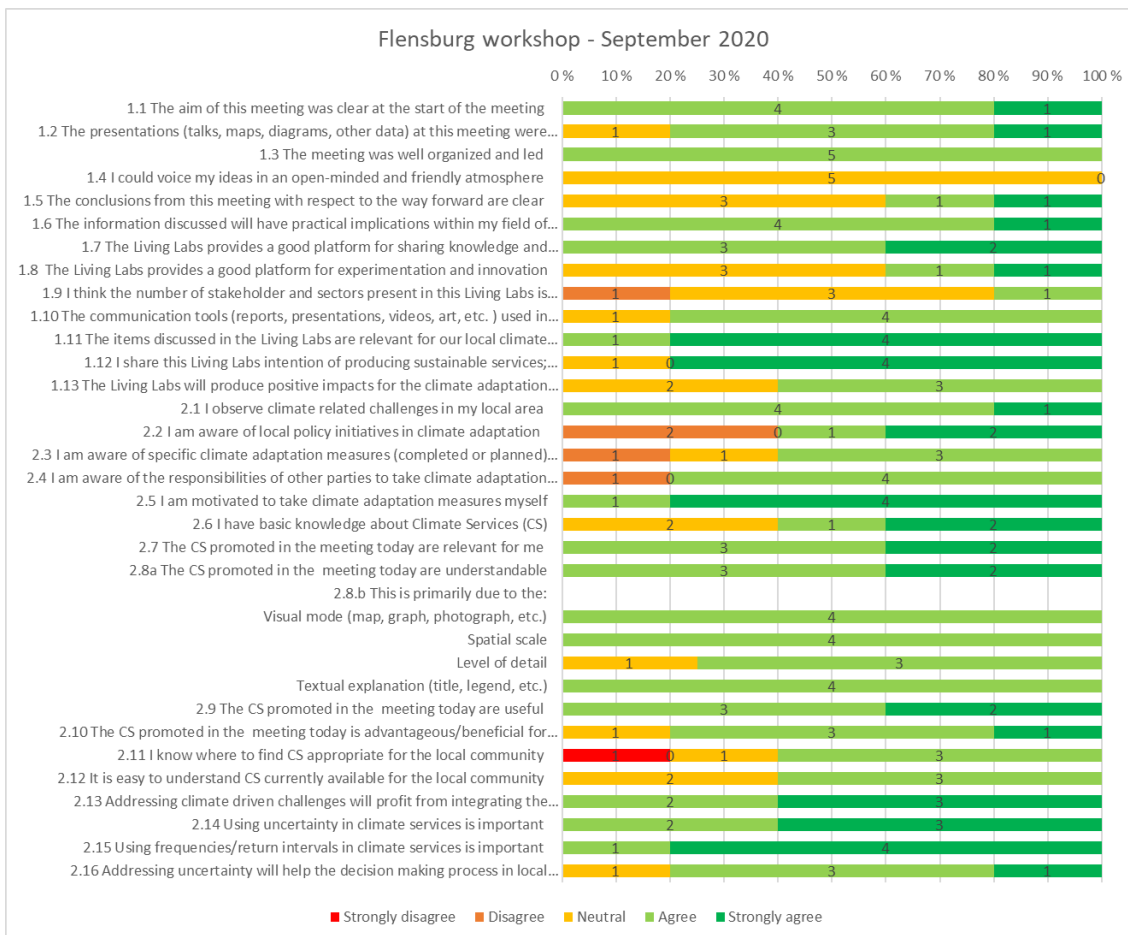


Figure 18 Results of questionnaire, workshop 3, Flensburg

## 4 Summary of questionnaire results

### 4.1 Overview of workshops that were evaluated

Aspects of interest include both the responses at the various case sites and the responses of the various questions. An overview of the workshops where the questionnaire was used is given in Table 25 below.

Table 25 Overview of workshops with use of questionnaire

Date	Case	Topic	Type of participants	No of Respondents	No participated before-no/yes
01.11.2018	Northeast Brabant 1	Information needs for climate adaptation.	Planners, policy makers, urban designers	14	14/0
07.11.2018	Flensburg 1	Understanding sea-level rise in Flensburg and creating information together.	Municipality (7), Landowners (10), Education (8), Politicians(6),State reps.(3), NGOs (3),Entrepreneurs (3)	25	25/0
08.11.2018	Larvik 1	Climate adaptation in practice. Feasibility study for the Area Zoning Plan Martineåsen	Landowners (6), MAD architect (2), NGI (2), Univ. Tromsø (1), Larvik municipality (4). Vestfold County (1)	11	11/0
28.08.2019	Larvik 2	Inform and discuss climate adaptation for Martineåsen.	Construction developers (7), Larvik municipality (6), NGI (2)	10	10/0
09.09.2019	Värmland and Arvika 1 (Karlstad)	Development of story maps	Planners and GIS experts from Arvika and VCAB	6	6/0
19.09.2019	Fluvius 1	Need for story map content in climate adaptation	Developers, representatives of FLUVIUS municipalities.	6	6/0
20.11.2019	Flensburg 2	Adaptation to sea level rise	Municipality (14), Landowners (8), Education (29), Politicians(6),State reps.(2), NGO (3), Entrepreneurs (5)	44	23/17
26.11.2019	Värmland 2 (Karlstad)	Development of story maps	Planners and climate strategists in all Värmland municipalities	8	8/0
20.02.2020	Fluvius 2	Presentation of modified climate service: story map	Developers, representatives of FLUVIUS municipalities.	7	7/0
15.09.2020	Larvik 3	Presentation of CS Klimamøny for building developers and municipality	Construction developers (6), Larvik municipality (6), NGI (2)	10	6/4
28.09.2020	Flensburg 3	Final discussion of project results with focus on adaptation.	Planners and politicians	5	4/1
03.11.2020	Fluvius 3	User test of the 'Fluvius KlimaAtlas'	Municipality of Meppel	5	2/3

## 4.2 Participants

The number and character of the participants varied a lot between the various case study sites. Flensburg, for instance, informed about climate services for Flensburg municipality for a broad audience, and invited a wide specter of participants. Larvik, on the other hand, focused much more narrowly presenting climate services related to construction development of a new area, and thereby mainly involved participants directly involved in the planning process. Table 26 to Table 28 presents an overview of the representation of the responding participants.

*Table 26 Participants in the various workshops (age numbers in %)*

Date	Workshop	No of participants	Male	Female	Age <20	Age 20-30	Age 30-40	Age 40-50	Age 50-60	Age 60-70
01.11.2018	North Brabant 1	14	71	29						
07.11.2018	Flensburg 1	25	68	32	0	4	21	38	29	8
08.11.2018	Larvik 1	11	60	40	0	0	27	18	45	9
28.08.2019	Larvik 2	10	80	20	0	0	40	40	20	0
09.09.2019	Värmland and Arvika 1 (Karlstad)	6	50	50	0	0	17	17	67	0
19.09.2019	Fluvius 1	6								
20.11.2019	Flensburg 2	40	52	48	9	30	14	9	12	26
26.11.2019	Värmland 2 (Karlstad)	8	57	43	0	29	14	0	57	0
20.02.2020	Fluvius 2	7								
15.09.2020	Larvik 3	10	62	38	0	0	30	30	30	10
28.09.2020	Flensburg 3	5	0	100	0	0	20	40	20	20
03.11.2020	Fluvius 3	5	20	80						
<b>Average</b>			<b>58</b>	<b>42</b>	<b>3</b>	<b>14</b>	<b>21</b>	<b>22</b>	<b>27</b>	<b>14</b>

Table 27 Representation of participants (in %)

Date	Workshop	No of participants	Authorities	Industry	Interest	Citizens	Scholls /academia	politicians	Media	Other
01.11.2018	Northeast Brabant 1	14	93	7	0	0	0	0	0	0
07.11.2018	Flensburg 1	25	38	10	10	24	5	5	0	10
08.11.2018	Larvik 1	11	42	17	0	17	0	0	0	25
28.08.2019	Larvik 2	10	30	60	0	0	0	0	0	10
09.09.2019	Värmland and Arvika 1 (Karlstad)	6	100	0	0	0	0	0	0	0
19.09.2019	Fluvius 1	6								
20.11.2019	Flensburg 2	40	20	11	2	20	20	0	2	23
26.11.2019	Värmland 2 (Karlstad)	8	100	0	0	0	0	0	0	0
20.02.2020	Fluvius 2	7								
15.09.2020	Larvik 3	10	50	50	0	0	0	0	0	0
28.09.2020	Flensburg 3	3	60	20	0	0	0	20	0	0
03.11.2020	Fluvius 3	5	100	0	0	0	0	0	0	0
<b>Average</b>			<b>48</b>	<b>16</b>	<b>2</b>	<b>12</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>12</b>

Table 28 Interests of participants (in %)

Date	Workshop	No of participants	Local action	Global action	Nature & environment	Economy	Educa-tion	Other
01.11.2018	Northeast Brabant 1	14						
07.11.2018	Flensburg 1	25	38	23	27	8	0	3
08.11.2018	Larvik 1	11	38	21	21	8	13	0
28.08.2019	Larvik 2	10	35	10	30	20	5	0
09.09.2019	Värmland and Arvika1 (Karlstad)	6	67	0	33	0	0	0
19.09.2019	Fluvius 1	6						
20.11.2019	Flensburg 2	40	29	19	26	8	16	2
26.11.2019	Värmland 2 (Karlstad)	8	57	14	29	0	0	0
20.02.2020	Fluvius 2	7						
15.09.2020	Larvik 3	10	38	8	33	13	8	0
28.09.2020	Flensburg 3	5	27	27	27	7	7	7
03.11.2020	Fluvius 3	5						
<b>Average</b>			<b>35</b>	<b>18</b>	<b>27</b>	<b>9</b>	<b>9</b>	<b>2</b>



## 4.3 Results from questionnaire surveys

As mentioned previously, the questions were divided into two parts for reflections on i) the meeting and the Living Labs process and ii) the climate services. A summary of the number of questions for each of these two parts are listed below, with all results presented in Appendix B (figures with average values and variation in responses).

Part 1: The view of the meeting and the Living Labs process:

- Questions 1.1 to 1.6 My view of the meeting (questions 1 to 6 in Appendix B)
- Questions 1.7 to 1.13 My view of the Living Labs process (questions 7 to 13 in Appendix B)

Part 2: The view on the Climate Services:

- Questions 2.1 to 2.5 Climate Change Adaptations in my area (questions 14 to 18 in Appendix B)
- Questions 2.6 to 2.10 Climate Services from my point of view (questions 19 to 27 in Appendix B)
- Questions 2.11 to 2.12 Local Climate services (questions 28 and 29 in Appendix B)
- Questions 2.13 to 2.16 Concepts related to Climate Services (questions 30 to 33 in Appendix B)

### 4.3.1 Themes of specific interest

The individual results presented in Chapter 3, and summarised in graphs in Appendix B, may be statistically too sparse for conclusive measures. Nonetheless, in some cases they provide quantitative representations of the "stakeholder satisfaction" from the various workshops. Themes that are found to be of specific interest for interpretation are:

- In which way there is a change in attitude to the Living Labs (LL) and the CS presented for the individual case study sites, especially for those where certain stakeholders have participated in various workshops (mainly Larvik and Flensburg).
- The general response to the various questions raised in the questionnaire, specially related to which questions having "positive" responses, and which having "negative" (average values given in Appendix B).
- The level of uniformity in the participating group for the various questions (value of variation in Appendix B).
- Identifying workshops where the response deviated considerably from the others for certain questions or groups of questions.
- Identifying responses for some key questions related to the stakeholder view of the Climate Services, both with regard to the awareness of the local use of CS and to the CS presented and discussed at the various workshops.

### 4.3.2 Observations

Some observations to specific themes and in general are summarised in Table 29 below.

*Table 29 Observations from the results of the questionnaire surveys*

Theme	Observation	Figures
Change in attitude at the same case study site	Somewhat more positive response from last workshop where some stakeholders participated in several (Larvik 2019-2020, Flensburg 2018-2019).	B3, B4, B11
General level of response	Much more positive to Part 1 questions (the meeting, LL) than Part 2 questions (CS). Most positive responses related to the view of the actual meeting.	B1, B2
	Northeast Brabant and Larvik (2018, 2019) most negative about evaluation of CS, while Fluvius and Flensburg (2020) most positive.	B1, B2
	By far largest variation for Flensburg 2018, 2019.	B1, B2
Specific questions	Q2.11 and Q2.12: By far the most negative response related to CS for the local community.	B2
	Q2.2-Q2.5: Largest variation related to awareness of climate change and local adaptation policies.	B2
	Q1.6 Practical implications for work: Generally positive, most positive for Arvika (2019), most negative for Flensburg (2018).	B1
	Q1.12 Ambition of sustainability: Very positive, most positive for Flensburg 2018/19/20, most negative for Larvik, 2018 and for Arvika and Karlstad.	B1
	Q1.13 Positive impact from LL: Generally positive, most positive for Arvika (2019) and Larvik (2020), most negative for Larvik (2018).	B1
	Q2.2 Awareness of local climate adaptation: Generally negative, more positive for Flensburg (2019), most negative for Fluvius (2019).	B2
	Q2.5 Personal motivation: Generally positive, most positive for 2020 workshops.	B2
	Q2.13 Concept of risk: Generally positive, most positive for Flensburg (2018/19/20).	B2
	Q2.16 Addressing uncertainty: Generally negative, more positive for Flensburg (2018/19/20), very negative for Fluvius (all).	B2
General observations	Generally positive reactions from participants.	
	Homogenous participation gives more homogenous responses, heterogeneous participation results in greater variation in responses.	
	General positive response to use of LL, general negative to awareness of local CS.	
	Some country-wise differences between Germany and Sweden, this could be age related.	
	Representation is major factor; what brought them there (work, general interest, NGO).	

## 4.4 Reflections

### Norway

It was early decided to focus on the Larvik Living Labs workshops on the development of a potential new dwelling area, Martineåsen, just outside the city center. This decision of course made decisive impact on (i) the types of representation in the workshops, and (ii) what type of Climate Service to use and develop within the project. Apart from the first initial workshop (which had a bit broader representation), the Larvik workshops mainly included two types of participants: representatives from the Larvik municipality (in addition to the ones involved in Evoked), and representatives from building developers. Thus, the participants mainly had a professional interest in the topics addressed in the Living Labs, which may have had an impact on the responses given in the questionnaires (relatively small variations in responses).

The Climate Services presented in the LLs were directly related to the interest of the participants. In the workshop of 2019, already existing climate adaptation tools for use in these kind of projects (Blue Green Factor, BREEAM Community) were presented. However, as the response during the workshop were not so enthusiastic from the participants, Larvik municipality, with the assistance of NGI, decided to develop a complete new tool that can be used in planning and development of new dwelling areas (Climate Menu). Thus, the Evoked workshops not only resulted in a general evaluation of Climate Services available for a specific problem, but also served as a starting point for a potential new Climate service that can be of help for Norwegian municipalities facing similar projects as Larvik does for Martineåsen. The questionnaire responses showed that this was well received by the participants.

### Sweden

The Swedish Living Labs piggy-backed their activities on already on-going events, workshops and measures being taken in Värmland. This is in line with the principle of “realism” (section 2.2) whereby activities were consolidated with those that the county/municipality already had to do, and thus an attempt to avoid “workshop fatigue”. Thus, it was not always appropriate to use the EVOKED questionnaire, as we often did not specifically discuss Living Labs or Climate Services (other than explaining that the workshops were part of a Living Lab and the story map developed was a type of Climate Service). The advantage to this approach is that the story map (as the Climate Service) can become an integrated part of the VCAB climate work and pragmatically addresses the needs of the municipalities in the county to bridge the “usability gap”. The disadvantage was that the questionnaire was less used in the Swedish case, as it was felt that it would take too much time away in the meetings.

In the Swedish case study in Värmland (both the county and the city), stakeholders as users of the story map as a climate service, were engaged and interested in cooperation. But as mentioned above, their attitude was very pragmatic. They needed help navigating in the large amount of information on climate impacts that is available, and particularly the smaller municipalities in the county need help in communicating the importance of climate adaptation to decision-makers. In this sense the climate service of the story map

was seen as useful and needed and can be seen as a positive tool for awareness raising, communicating, and making sense of the complexity of climate impacts.

### **The Netherlands**

The context of the meetings in both the Fluvius Region and in the North East Brabant region were all embedded in the decision-making process on climate adaptation policy. The difference between the regions was that the North East Brabant region consisted of 17 municipalities, so the diversity between the different municipalities was much larger. The Fluvius region consists of 5 municipalities, the Waterboard DOD and the Province of Drenthe and Overijssel. This also had its impact on the meetings. The Fluvius meetings were much more interactive and cooperative as the participants knew each other well, due to biweekly meetings. In the North East Brabant region there was less cohesion between the participants and also a larger difference between the frontrunners and the (smaller) municipalities just starting to address climate changes as one of their societal challenges – next to education, healthcare, social welfare, etc.

The meetings in both case study sites in the Netherlands were held at the city hall of one of the municipalities, until the Covid-19 when the meetings switched to Teams (e.g. the meetings that were held after March 2020). Also, all the EVOKED meetings after that date were held online using teams, assisted with online workshop tools such as MURAL.

The same was relevant for the questionnaires, during the meetings pre Covid-19 these were all handed out and collected on paper. After March 2020 all surveys were set out using a professional licensed version of survey monkey.

### **Flensburg**

EVOKED was instrumental for the initiation of the adaptation process in Flensburg. In 2017, the city of Flensburg had mainly concentrated on climate mitigation efforts without initiatives or an appointed person responsible for adaptation to climate change. This changed with EVOKED following some information sessions with representatives of the city on climate change. The first EVOKED workshop was one of the first occasions where the public was invited to address and discuss the topic of sea level rise.

Many of the participants were present in two or more workshops during the project indicating high engagement and long-term interest. All workshops were well-attended, except for the last hybrid workshop (which took place both online and on-site) in the year 2020, which was affected by the Covid-19 pandemic. The participants represented a well-mixed group of stakeholders in all meetings and the discussions were very lively, particularly in the workshop in 2019. Most participants took part in the questionnaire survey which took place in the end of each meeting. Stakeholders from the city administration participated in all workshops, thus having the opportunity to engage in discussions related to adaptation. This is deemed as particularly important since these people will be involved in adaptation decision-making in the future. A noteworthy outcome of the process was that during the project, the city administration expanded the role of the person responsible for climate mitigation to also address future adaptation planning.

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# Appendix A

## Questionnaire

### Contents

A1 Questionnaire	2
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## **A1 Questionnaire**

This appendix presents the detailed questions used in the workshops.



Dear Living Labs participant,

In order to improve the Climate Services in your local area, we need to learn from your feedback. With this survey, you have the possibility to take part in the development of the Living Labs process and of the Climate Services (see definitions below). The aim of the questionnaire is both to be able to analyse your evaluation of this meeting and the workshop process as such, and to analyse your evaluation of the amount and effect of the climate services available in your local community.

We would kindly ask you to answer the questions below. It will only take a few minutes. Your answers will be analysed anonymously and kept confidential.

Thank you for your cooperation!

[insert names of EVOKED team members]

### **Definitions:**

#### **Living Labs (LL):**

EVOKED definition of Living Lab: "The general idea is to involve a range of committed stakeholders in real-life 'laboratory' settings to test and develop alternative solutions for complex challenges, such as climate adaptation or risk and uncertainty assessments".

The Living labs

- are bounded in time
- have multi-method approach
- do experimentation and learning in real life setting

#### **Climate Services (CS):**

EVOKED definition of Climate services: "Climate services' has a broad meaning: transforming climate-related data and other information into customised products such as projections, trends, economic analysis, risk assessments, advice on best practices, development and evaluation of solutions, and any other climate-related service liable to benefit that may be of use for the society".

**1. Living Labs Workshop/date xx.xx.xxxx\*.**

**To what extent do you agree or disagree with the following statements?**

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My view on this meeting	1.1 The aim of <b>this</b> meeting was clear at the start of the meeting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2 The presentations (talks, maps, diagrams, other data) at <b>this meeting</b> were clear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3 The meeting was well organized and led	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.4 I could voice my ideas in an open-minded and friendly atmosphere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.5 The conclusions from this meeting with respect to the way forward are clear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.6 The information discussed will have practical implications within my field of work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My view on the Living Labs process	1.7 The Living Labs provides a good platform for sharing knowledge and experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.8 The Living Labs provides a good platform for experimentation and innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.9 I think the number of stakeholder and sectors present in this Living Labs is balanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.10 The communication tools (reports, presentations, videos, art, etc. ) used in the Living Labs are exciting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.11 The items discussed in the Living Labs are relevant for our local climate adaptation needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.12 I share this Living Labs intention of producing sustainable services; ecologically, socially and environmentally	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.13 The Living Labs will produce positive impacts for the climate adaptation awareness in our local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**2. Climate services (CS), date **xx.xx.xxx**\***

**To what extent do you agree or disagree with the following statements?**

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Climate change and adaptation in my area	2.1 I observe climate related challenges in my local area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2 I am aware of local policy initiatives in climate adaptation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.3 I am aware of specific climate adaptation measures (completed or planned) in my local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4 I am aware of the responsibilities of other parties to take climate adaptation measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.5 I am motivated to take climate adaptation measures myself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate Services from my point of view	2.6 I have basic knowledge about Climate Services (CS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7 The CS promoted in the meeting today are relevant for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.8a The CS promoted in the meeting today are understandable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.8.b This is primarily due to the:					
	Visual mode (map, graph, photograph, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Spatial scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of detail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Textual explanation (title, legend, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.9 The CS promoted in the meeting today are useful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.10 The CS promoted in the meeting today is advantageous/beneficial for local climate adaptation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Common practice of climate services for the local community	2.11 I know where to find CS appropriate for the local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.12 It is easy to understand CS currently available for the local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concepts related to climate services	2.13 Addressing climate driven challenges will profit from integrating the concept of risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.14 Using uncertainty in climate services is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.15 Using frequencies/return intervals in climate services is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.16 Addressing uncertainty will help the decision making process in local adaptation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Identity (2 last letters of father's name + 2 last numbers of mother's year of birth)</b>									
<b>Sex</b>	Male	Female							
<b>Age (yrs)</b>	10-20	20-30	30-40	40-50	50-60	60-70	70-100		
<b>Representing</b>	State or municipal government	Business/industry	Interest groups (local/national)	Citizens		Schools and academia	Politicians	Media	Other interests (please name):
<b>How did you get involved in EVOKED? (multiple answers possible)</b>	By invitation	By interest	Work						
<b>Specific interest in climate adaptation work (multiple answers possible)</b>	Local action	Global concern	Nature/environmental protection	Economy		Education and research	Other (please name):		



Question	
1	1.1 The aim of this meeting was clear at the start of the meeting
2	1.2 The presentations (talks, maps, diagrams, other data) at this meeting were clear
3	1.3 The meeting was well organized and led
4	1.4 I could voice my ideas in an open-minded and friendly atmosphere
5	1.5 The conclusions from this meeting with respect to the way forward are clear
6	1.6 The information discussed will have practical implications within my field of work
7	1.7 The Living Labs provides a good platform for sharing knowledge and experience
8	1.8 The Living Labs provides a good platform for experimentation and innovation
9	1.9 I think the number of stakeholder and sectors present in this Living Labs is balanced
10	1.10 The communication tools (reports, presentations, videos, art, etc. ) used in the Living Labs are exciting
11	1.11 The items discussed in the Living Labs are relevant for our local climate adaptation needs
12	1.12 I share this Living Labs intention of producing sustainable services; ecologically, socially and environmentally
13	1.13 The Living Labs will produce positive impacts for the climate adaptation awareness in our local community
14	2.1 I observe climate related challenges in my local area
15	2.2 I am aware of local policy initiatives in climate adaptation
16	2.3 I am aware of specific climate adaptation measures (completed or planned) in my local community
17	2.4 I am aware of the responsibilities of other parties to take climate adaptation measures
18	2.5 I am motivated to take climate adaptation measures myself
19	2.6 I have basic knowledge about Climate Services (CS)
20	2.7 The CS promoted in the meeting today are relevant for me
21	2.8a The CS promoted in the meeting today are understandable 2.8.b This is primarily due to the:
22	Visual mode (map, graph, photograph, etc.)
23	Spatial scale
24	Level of detail
25	Textual explanation (title, legend, etc.)
26	2.9 The CS promoted in the meeting today are useful
27	2.10 The CS promoted in the meeting today is advantageous/beneficial for local climate adaptation
28	2.11 I know where to find CS appropriate for the local community
29	2.12 It is easy to understand CS currently available for the local community
30	2.13 Addressing climate driven challenges will profit from integrating the concept of risk
31	2.14 Using uncertainty in climate services is important
32	2.15 Using frequencies/return intervals in climate services is important
33	2.16 Addressing uncertainty will help the decision making process in local adaptation

# Appendix B

## Questionnaire results

### Contents

<b>B1</b>	<b>Questionnaire results</b>	<b>2</b>
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## B1 Questionnaire results

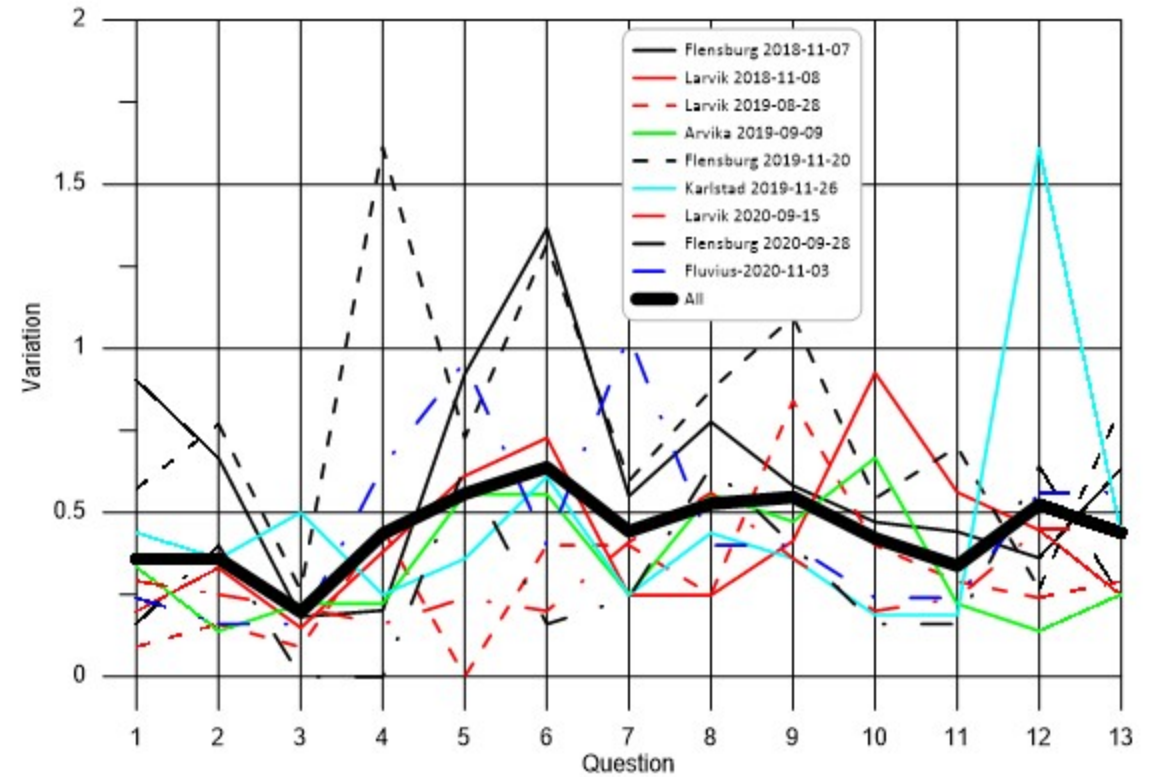
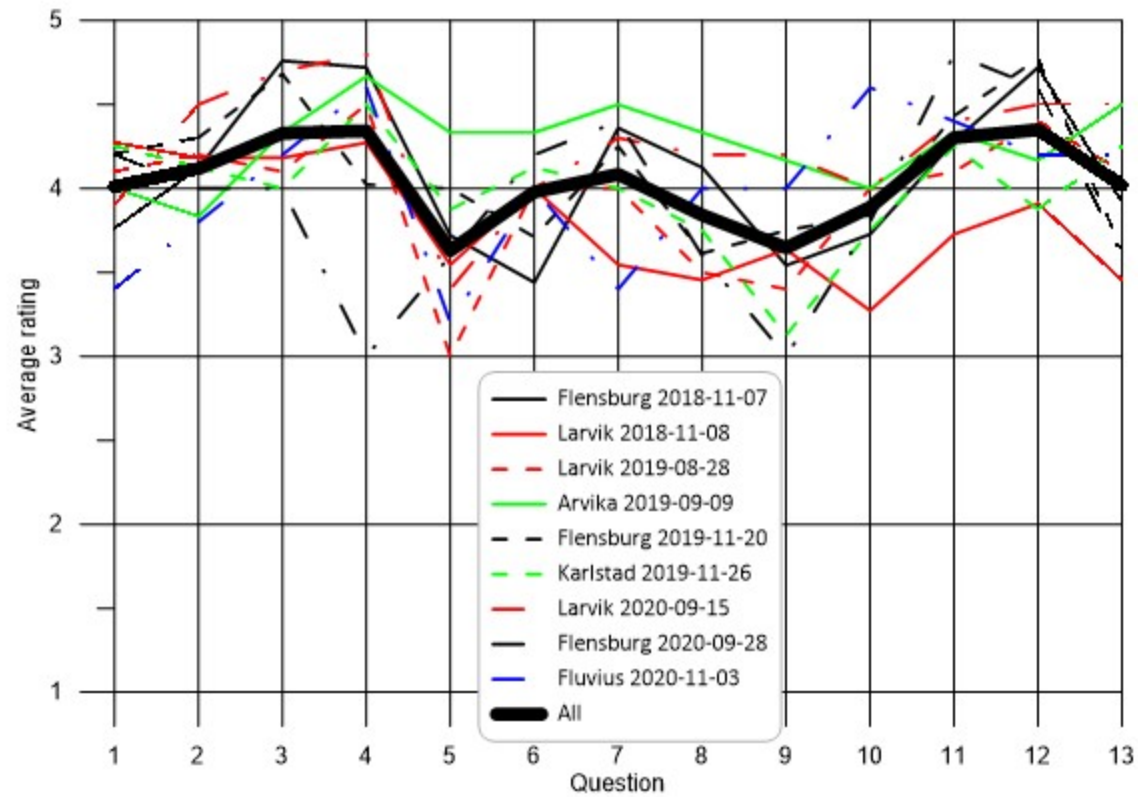
This appendix presents results from the questionnaire surveys in the form of

1. Average values, i.e. average rate from the participants for each question for the workshops.
2. Variation, i.e. value of variation from the participants for each question for the workshops.

<b>Figure</b>	<b>Text</b>	<b>Group</b>
B1	Results from all workshops	Group 1 – Living Lab process
B2	Results from all workshops	Group 2 – Climate Services
B3	Results from Larvik workshops	Group 1 – Living Lab process
B4	Results from Larvik workshops	Group 2 – Climate Services
B5	Results from Värmland workshops	Group 1 – Living Lab process
B6	Results from Värmland workshops	Group 2 – Climate Services
B7	Results from Noord Brabant workshops	Group 2 – Climate Services
B8	Results from Fluvius workshops	Group 1 – Living Lab process
B9	Results from Fluvius workshops	Group 2 – Climate Services
B10	Results from Flensburg workshops	Group 1 – Living Lab process
B11	Results from Flensburg workshops	Group 2 – Climate Services



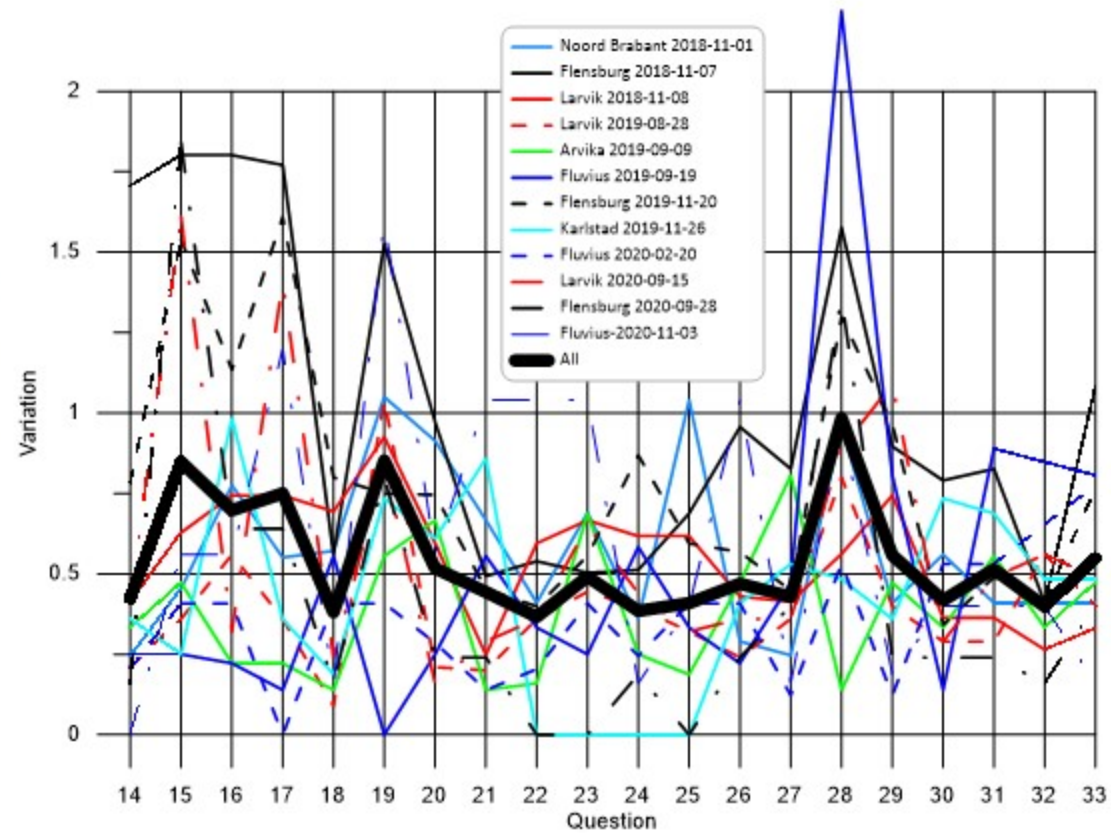
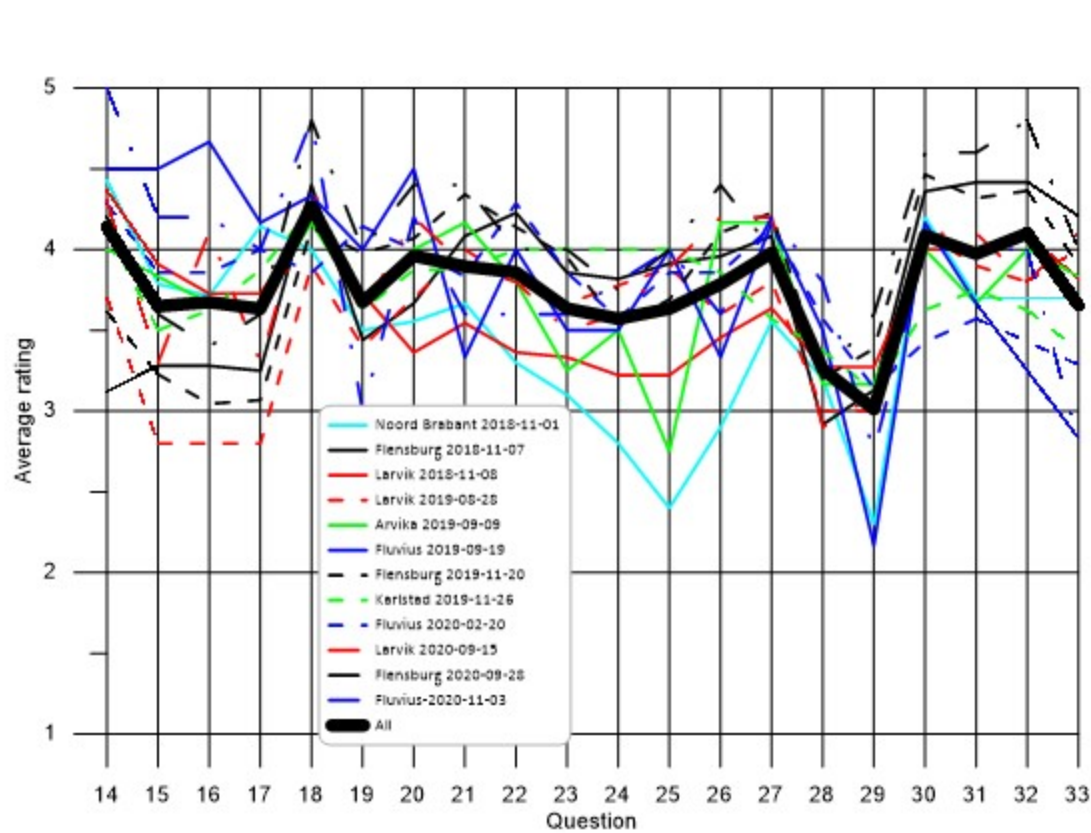
Figure B1 – Results from all workshops – Living Labs process



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 1-13 are presented in Appendix A

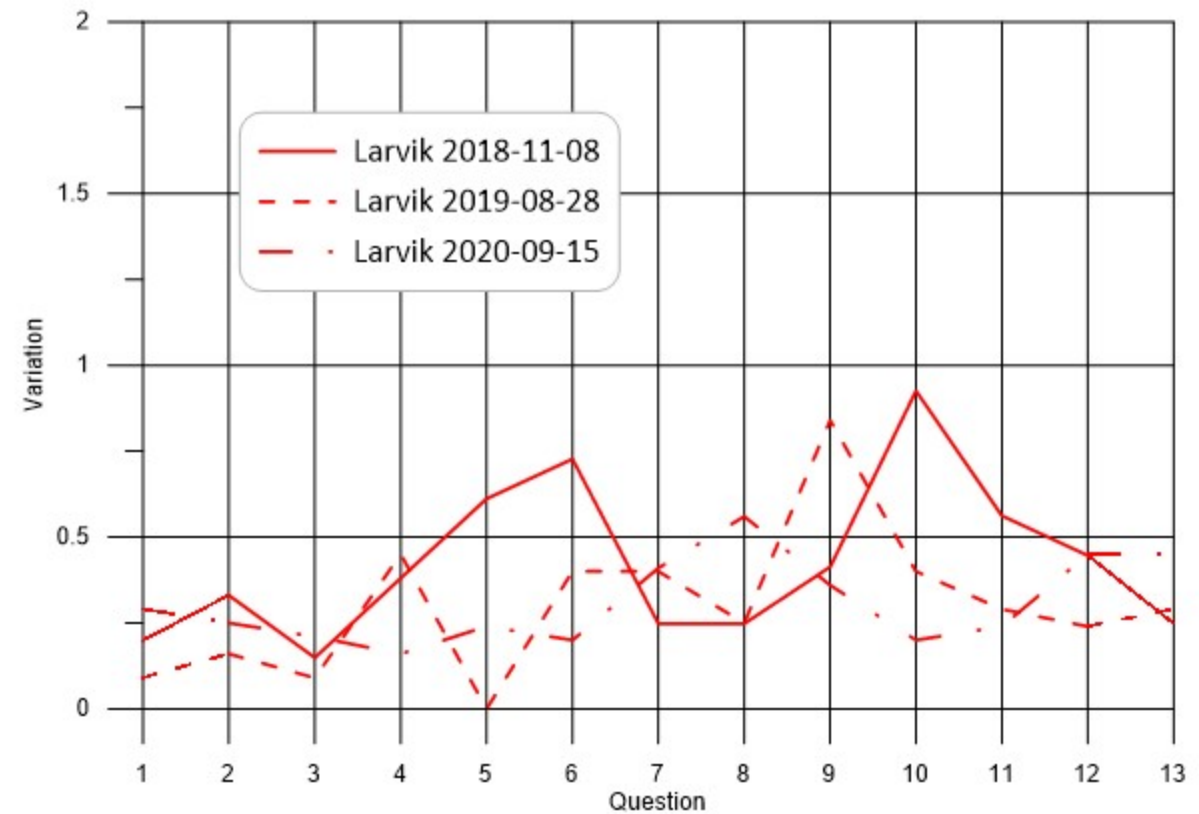
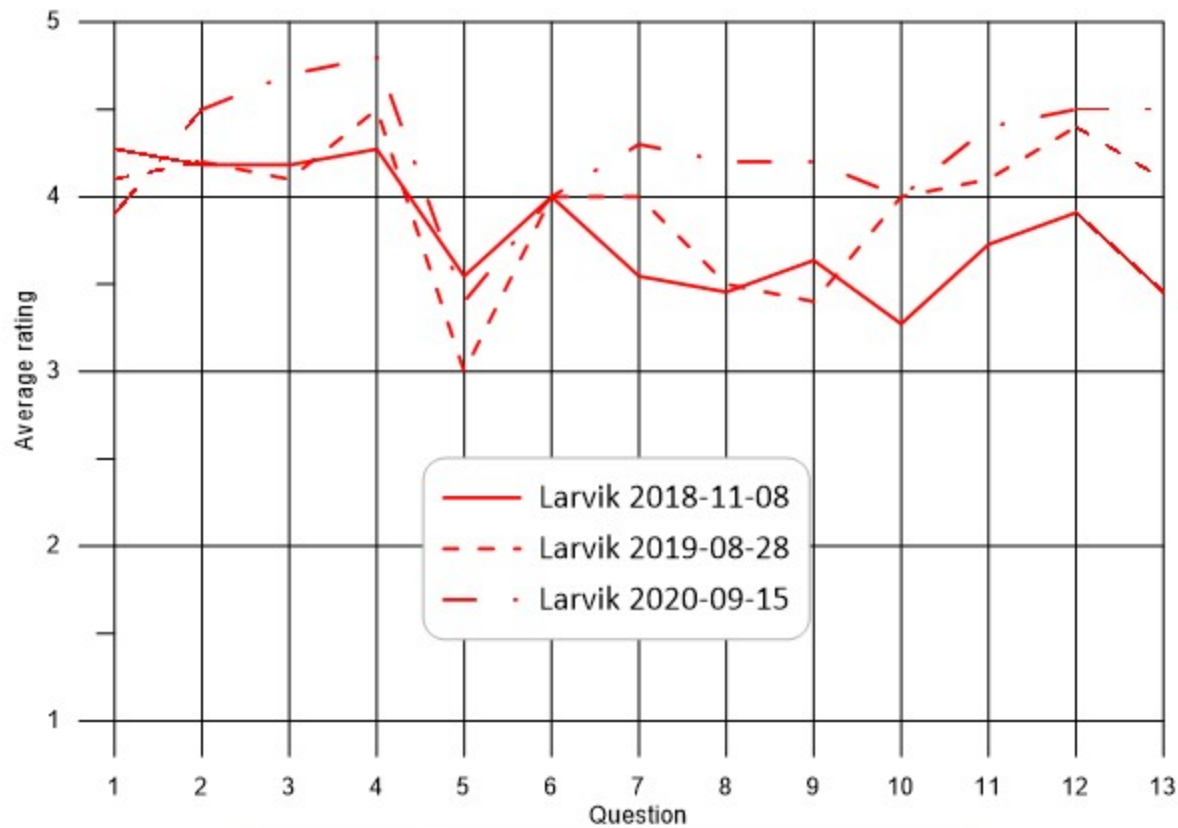
Figure B2 – Results from all workshops – Climate Services



Value	Corresponding to
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2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 14-33 are presented in Appendix A

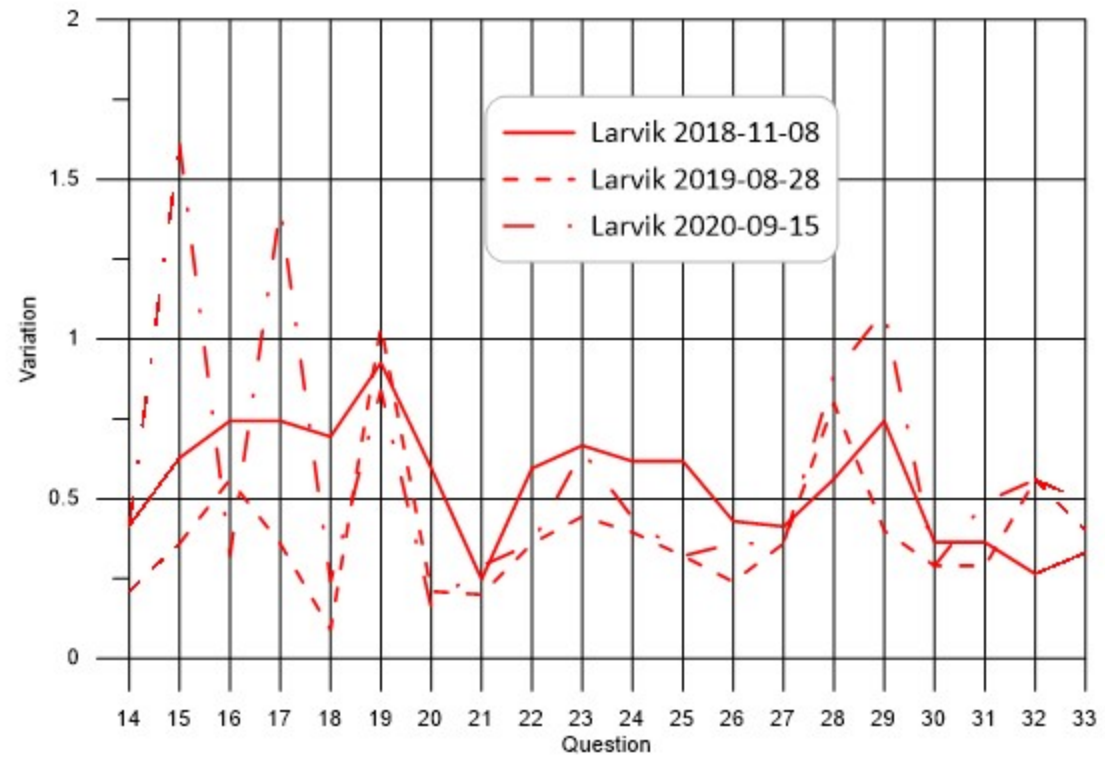
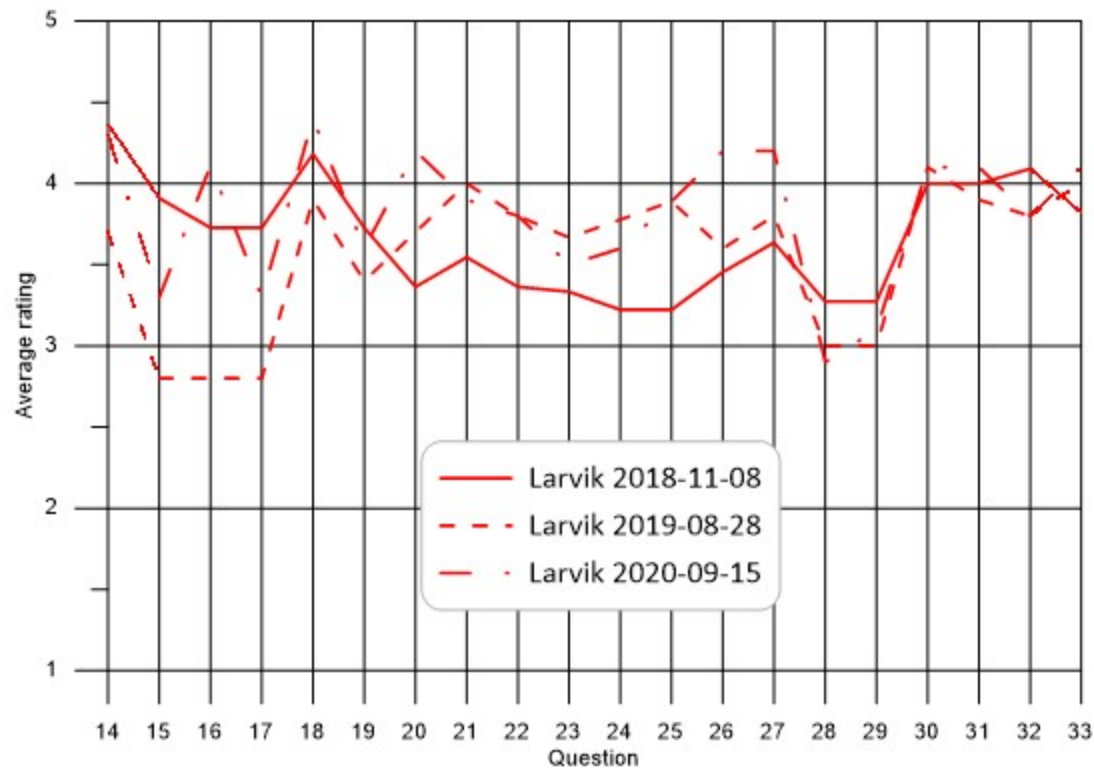
Figure B3 – Results from Larvik workshops – Living Labs process



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 1-13 are presented in Appendix A

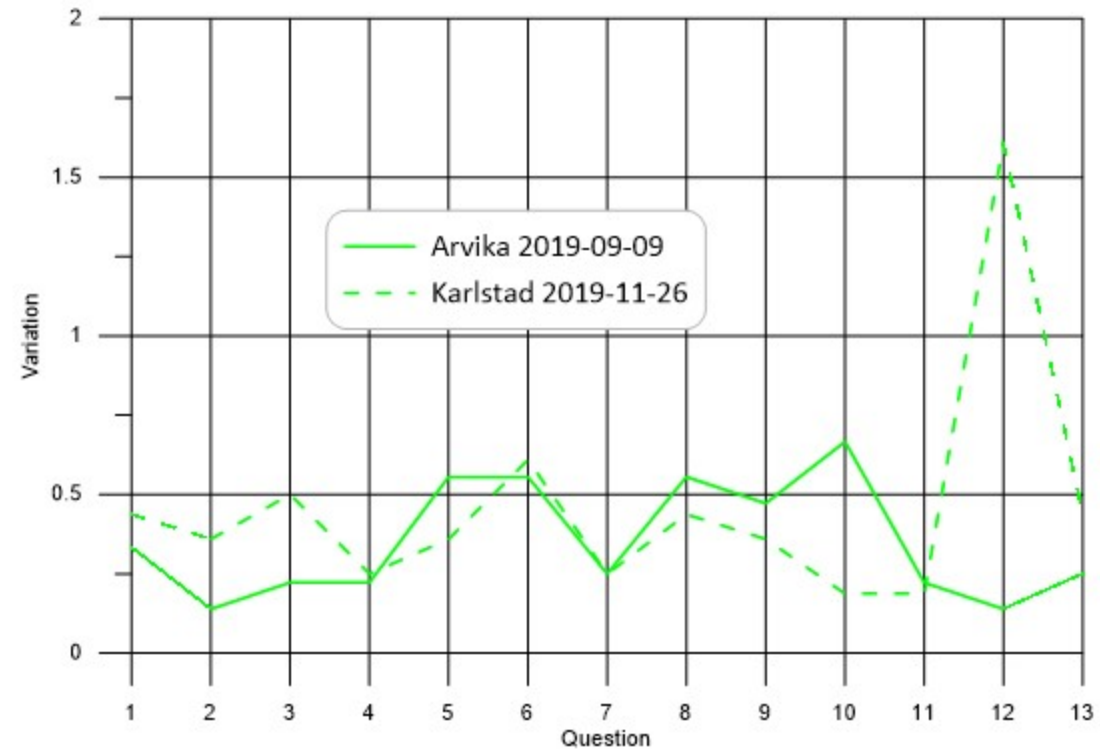
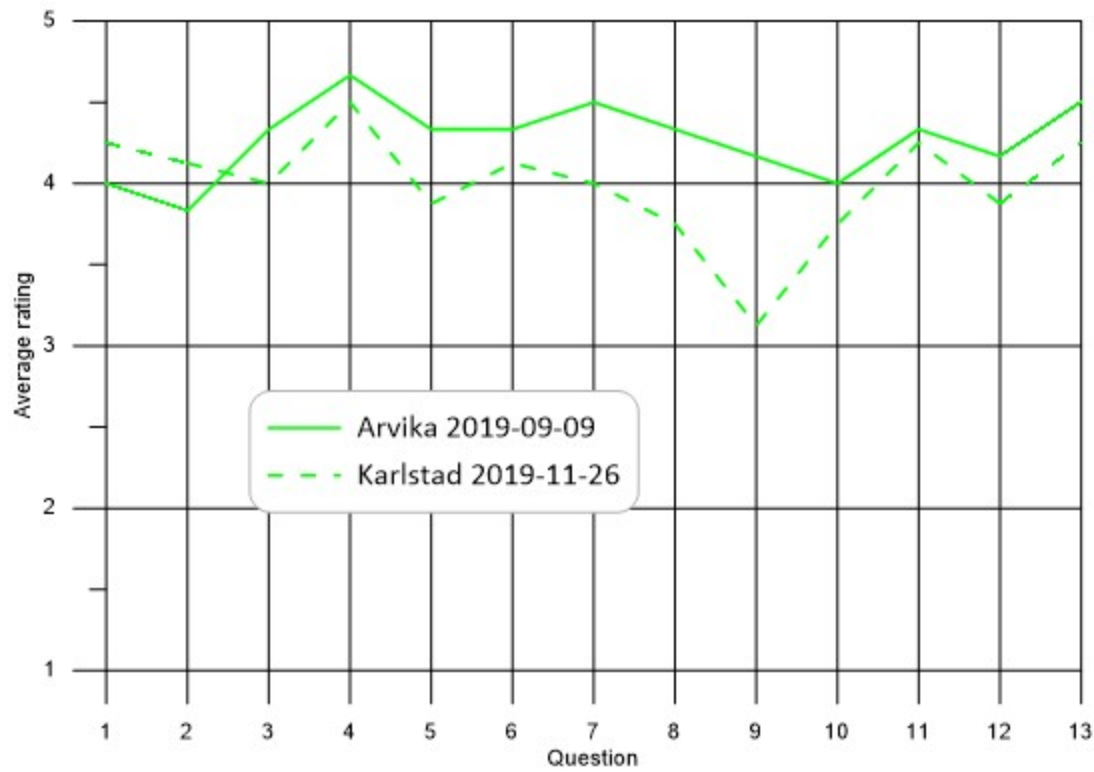
Figure B4 – Results from Larvik workshops – Climate Services



Value	Corresponding to
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2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 14-33 are presented in Appendix A

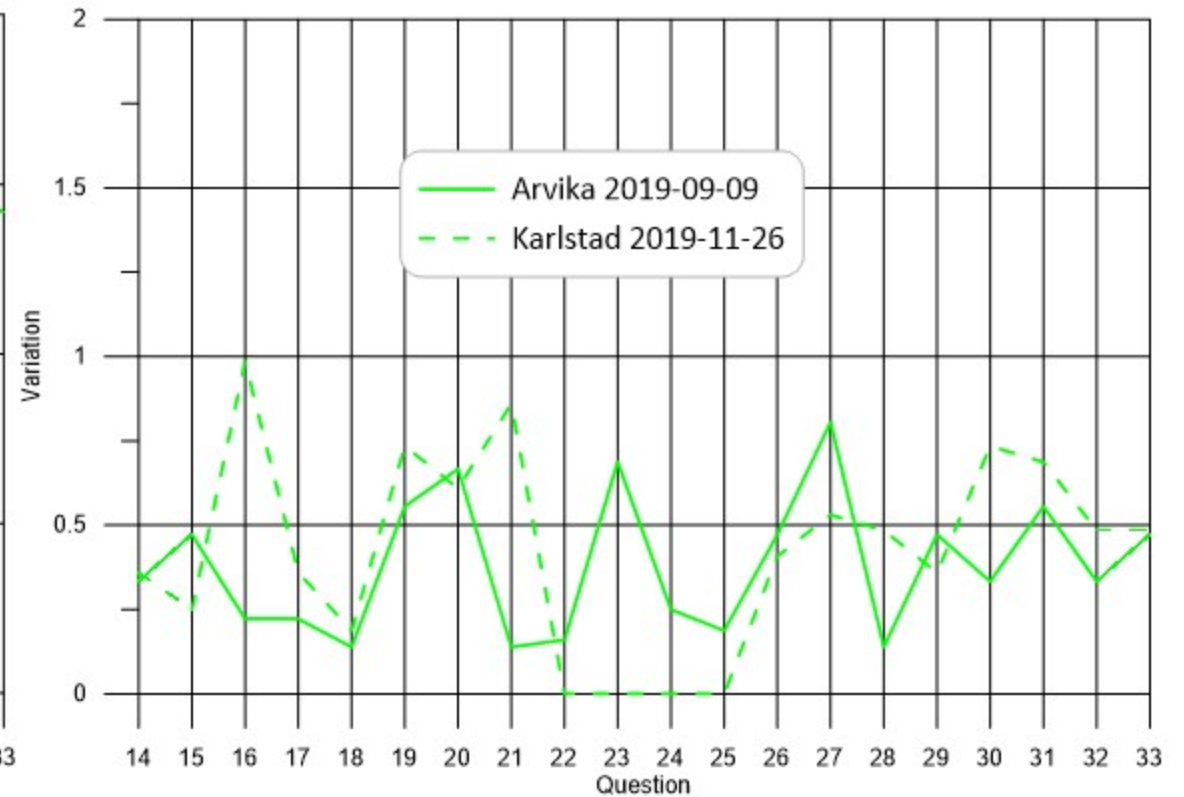
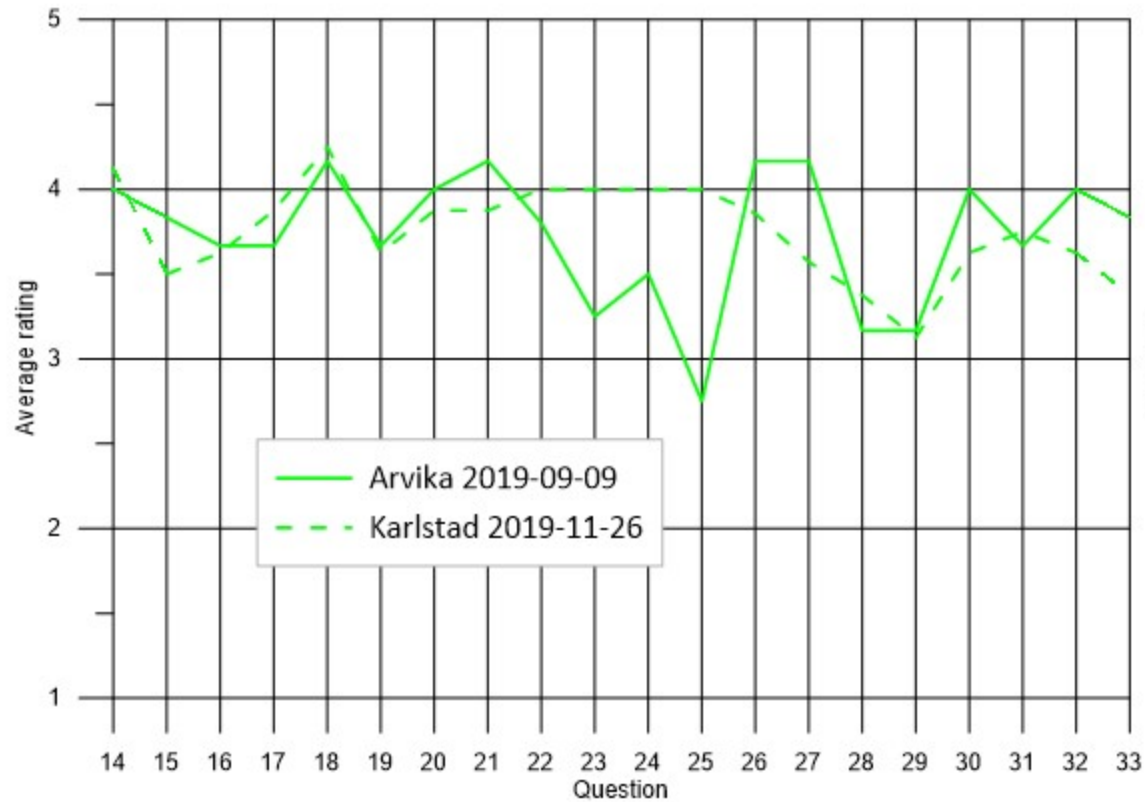
Figure B5 – Results from Värmland workshops – Living Labs process



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 1-13 are presented in Appendix A

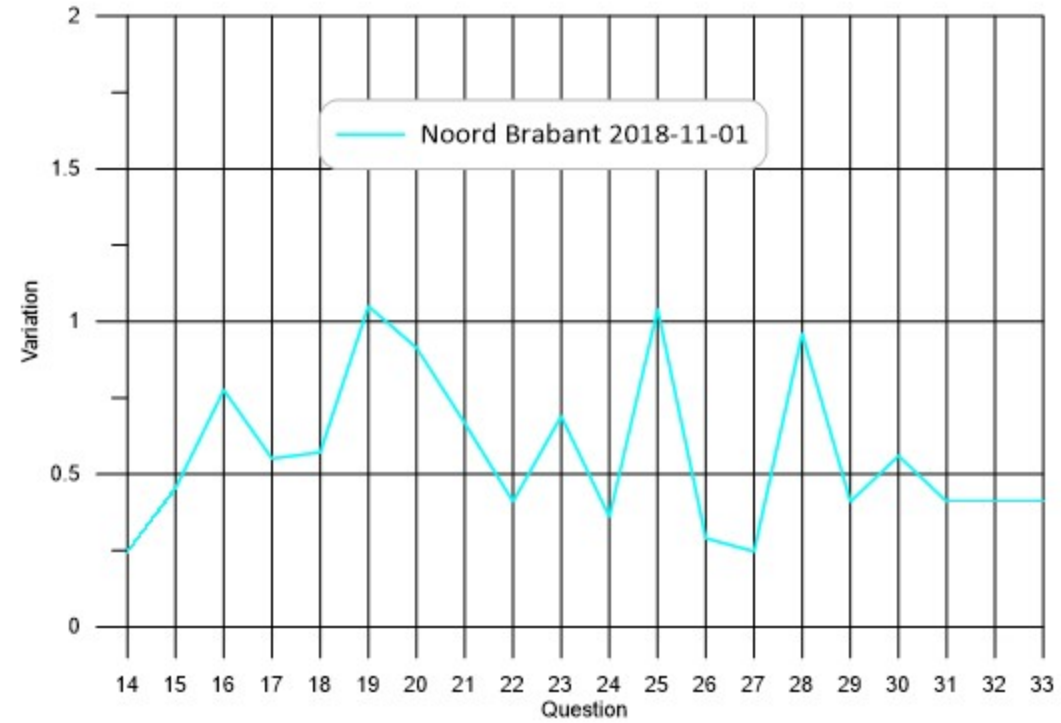
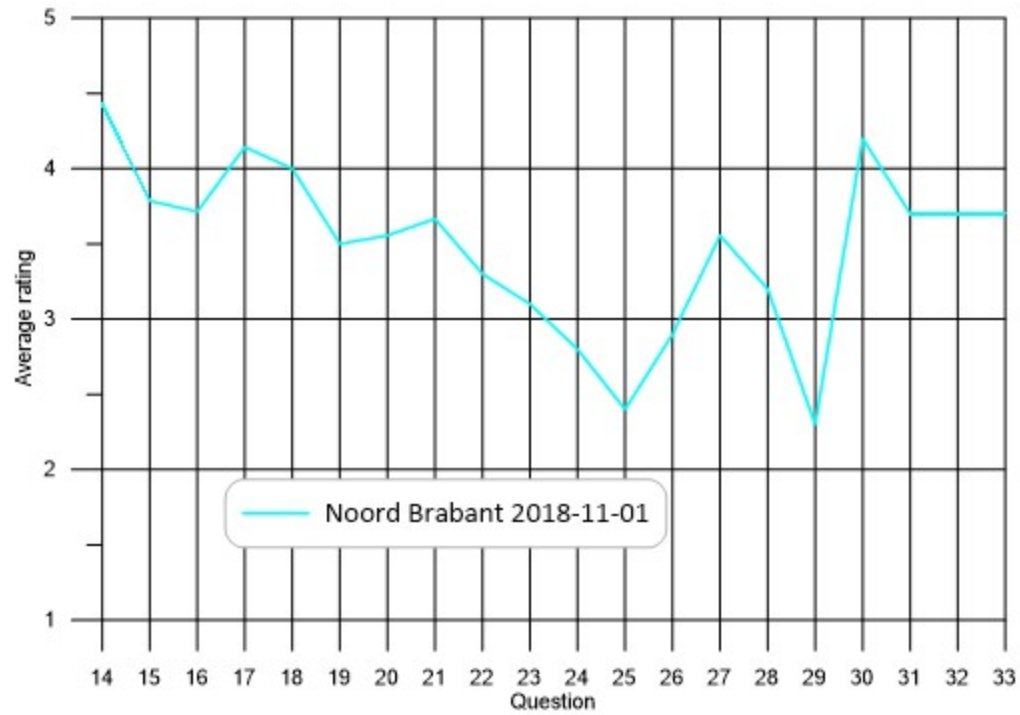
Figure B6 – Results from Värmland workshops – Climate Services



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 14-33 are presented in Appendix A

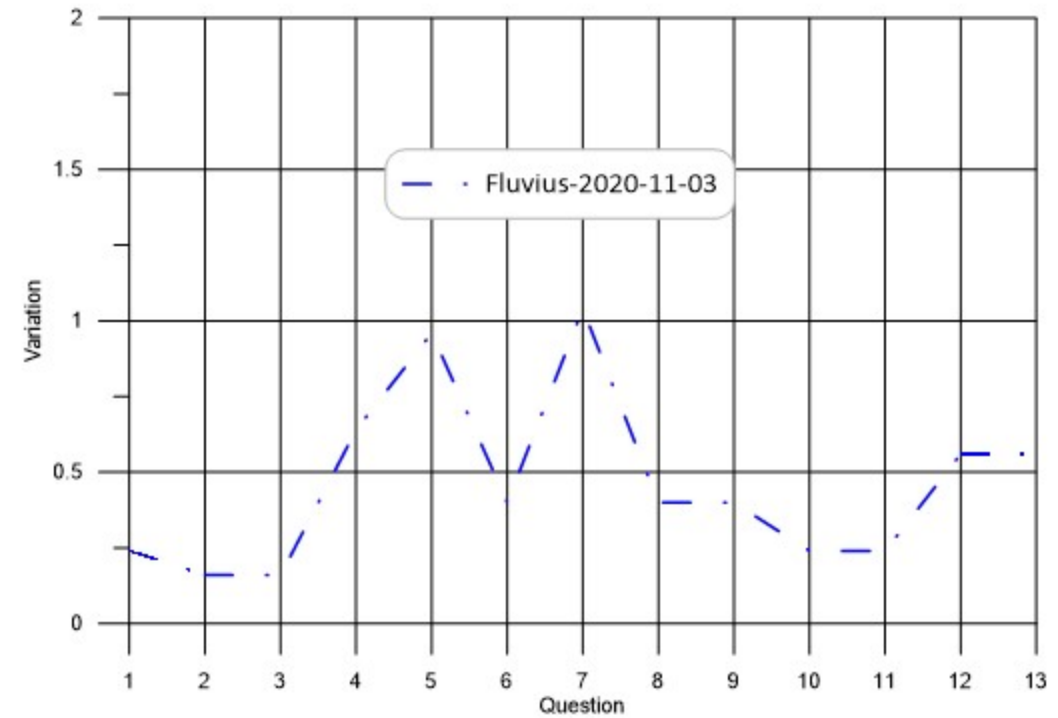
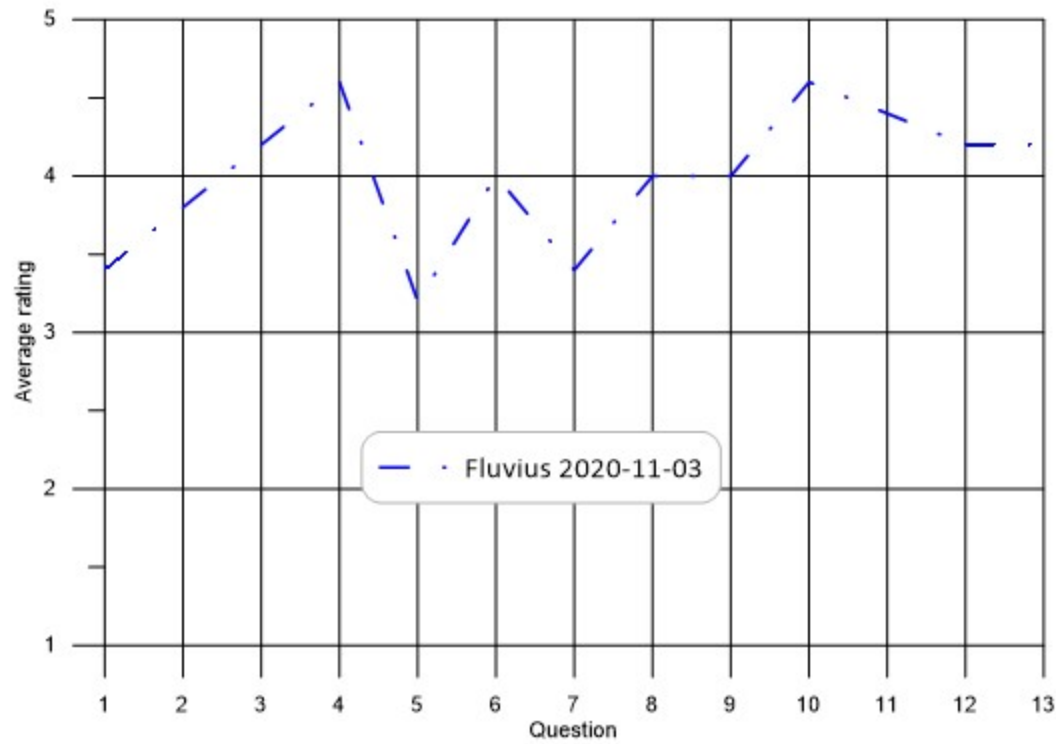
Figure B7 – Results from Noord Brabant workshops – Climate Services



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 14-33 are presented in Appendix A

Figure B8 – Results from Fluvius workshops – Living Labs process

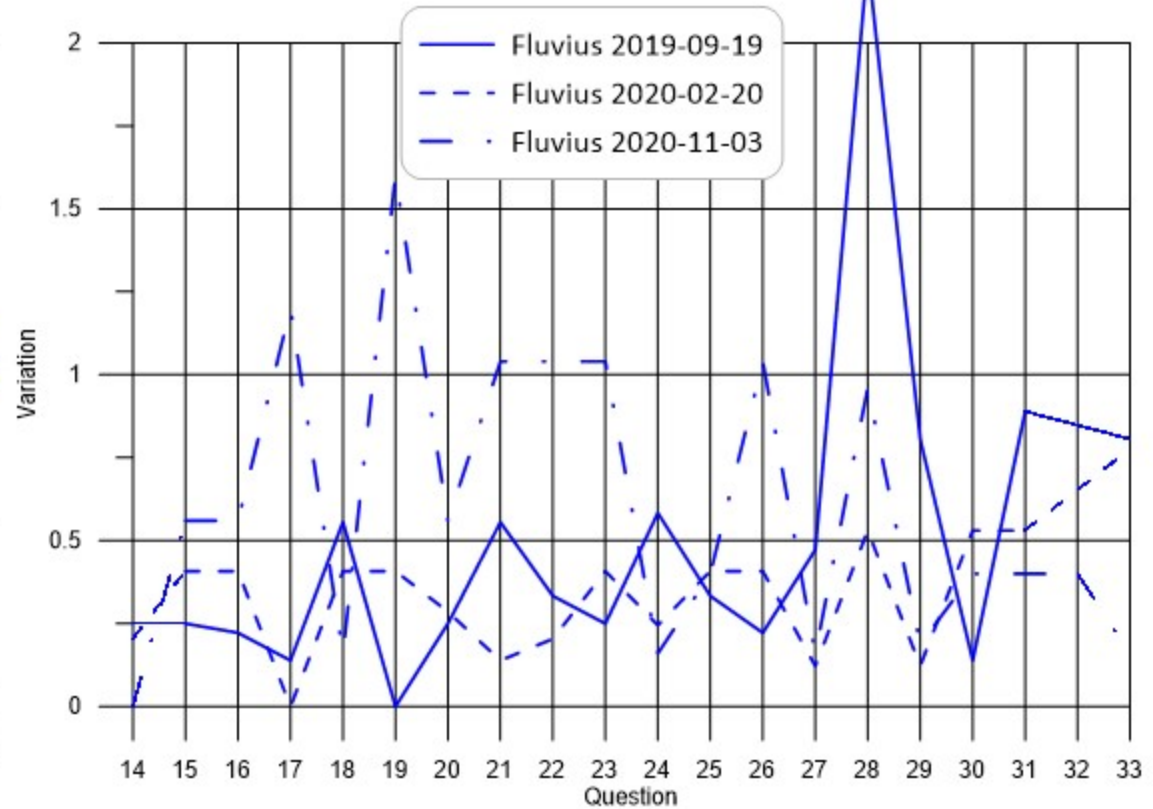
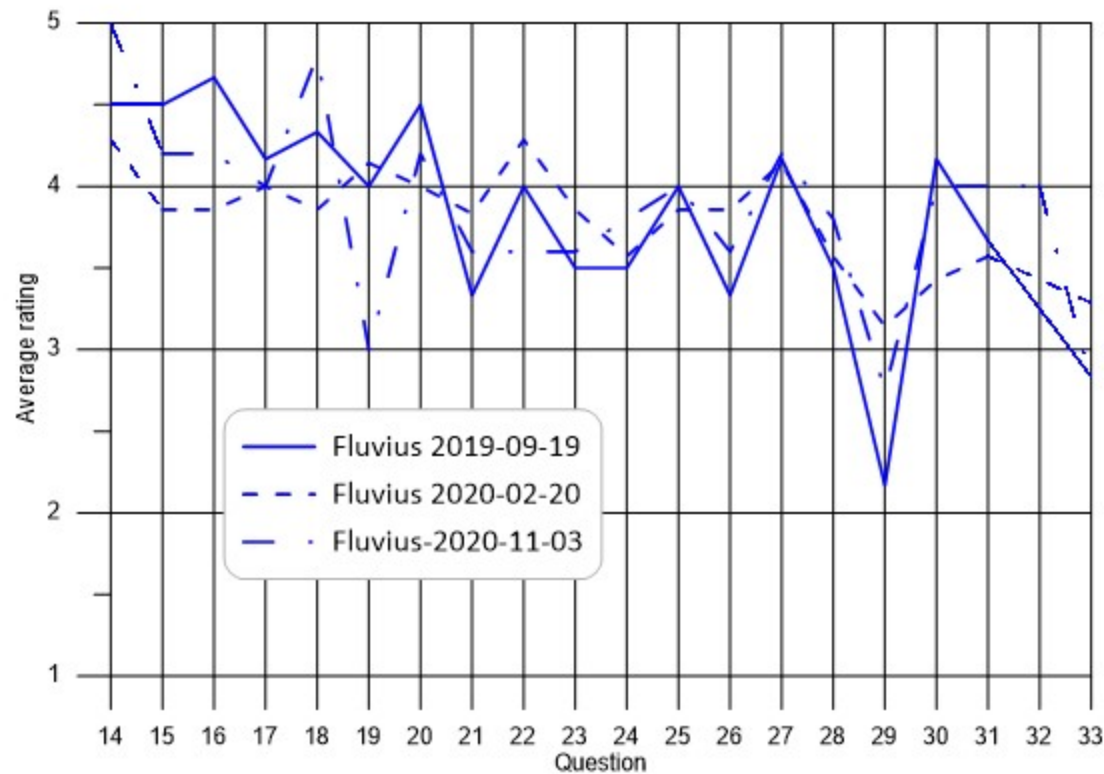


Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 1-13 are presented in Appendix A



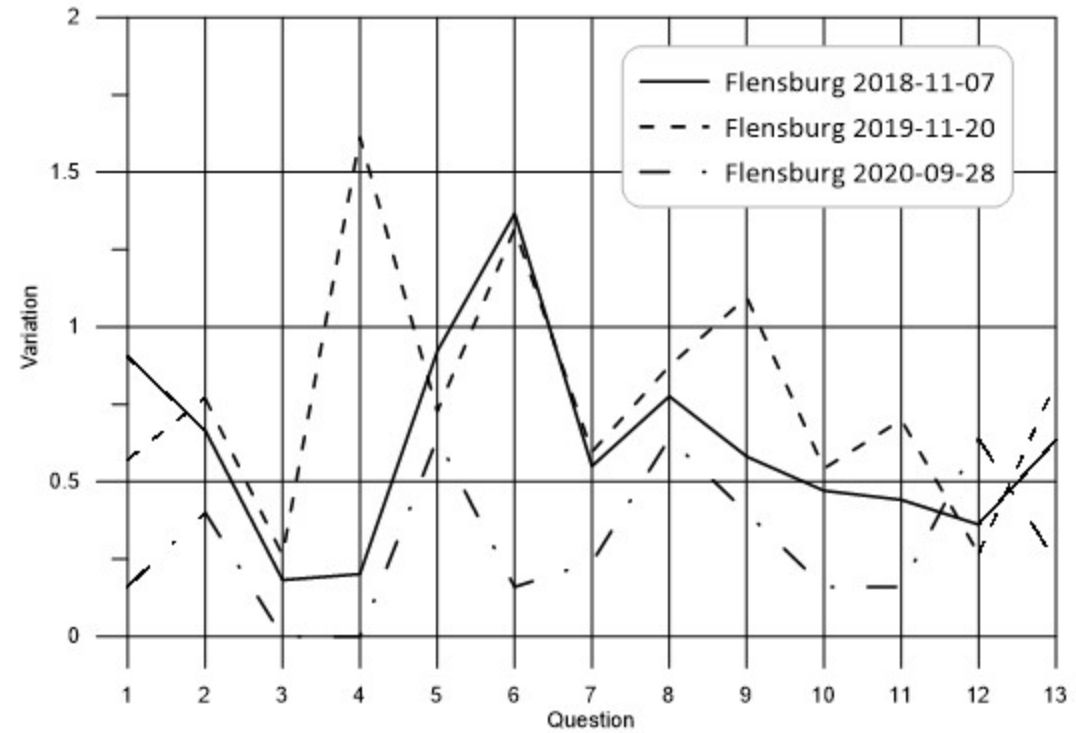
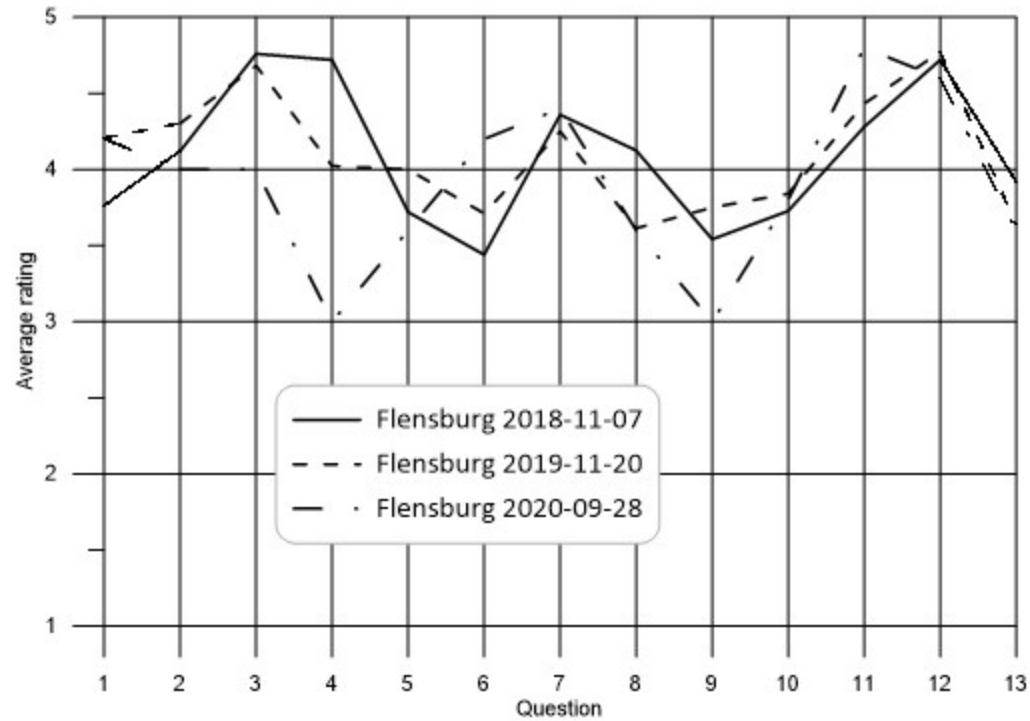
Figure B9 – Results from Fluvius workshops – Climate services



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 14-33 are presented in Appendix A

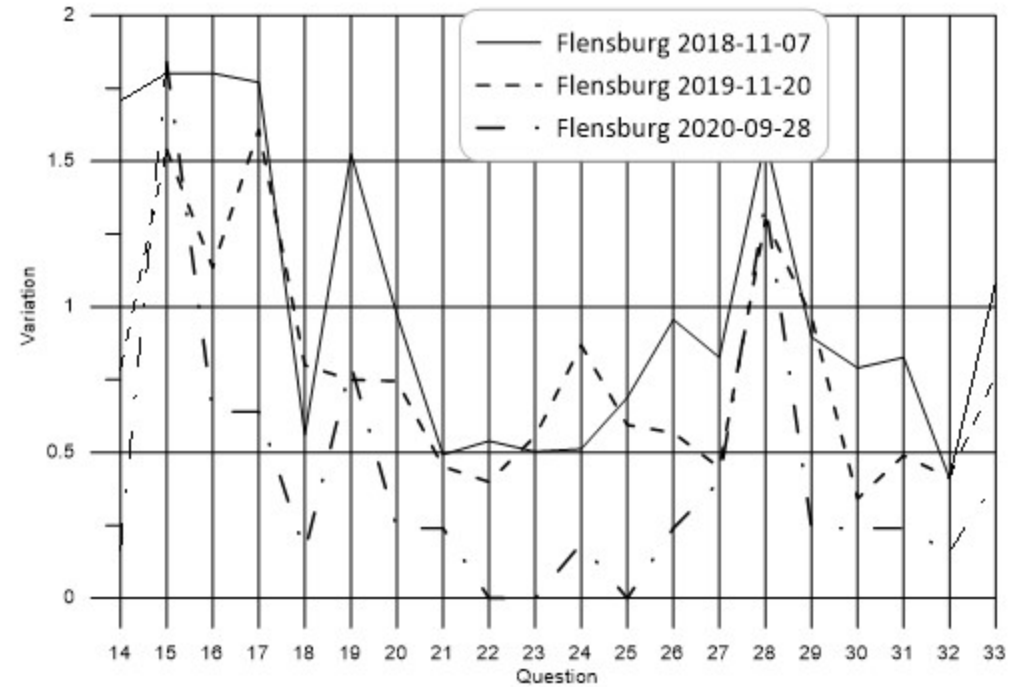
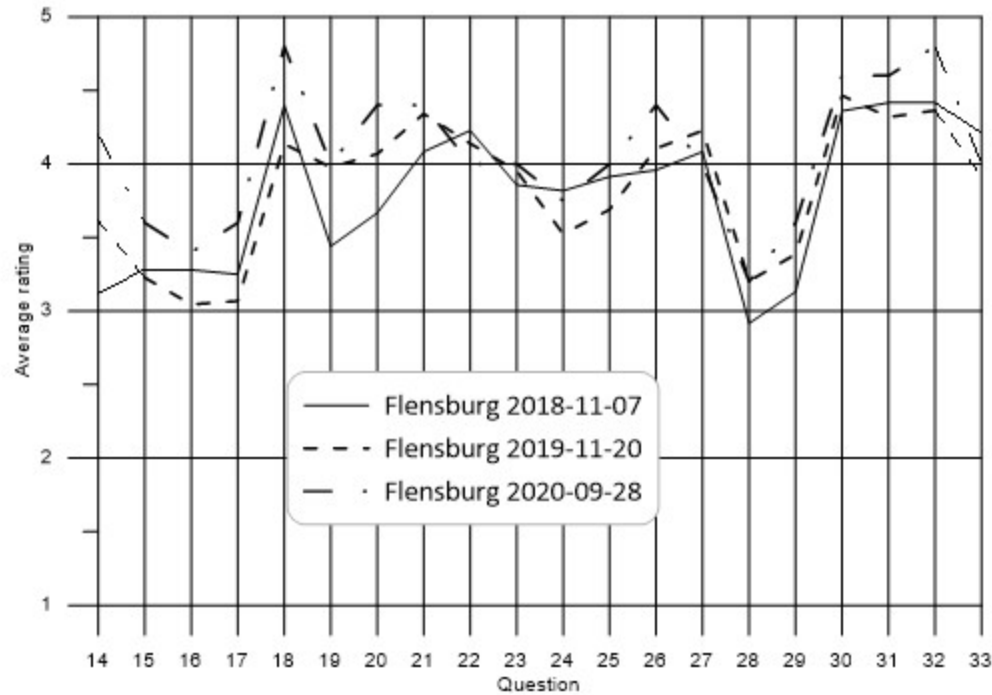
Figure B10 – Results from Flensburg workshops – Living Labs process



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 1-13 are presented in Appendix A

Figure B11 – Results from Flensburg workshops – Climate Services



Value	Corresponding to
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

Questions named 14-33 are presented in Appendix A

