Enhancing the value of climate data - translating risk and uncertainty utilizing a living labs approach

Steps to initiate the field trials at the case study sites using climate information design

In preparation for initiating the field trials at the EVOKED case study sites, a series of steps have been proposed. These steps are useful for collecting the necessary data to either improve already existing climate services, or to create a new climate service, subsequently reducing the 'usability-gap' between the climate service and its user (Lemos et al., 2012). Central to these activities is a methodology that has been developed on how to operationalize climate information design methodology to reframe climate services (D3.1: Field trials framework for the use of knowledge concerning climate adaptation measures and their implementation).

The methodology developed by Raaphorst et al. (2018) assumes that climate service visualizations have an implicit or explicit goal, and that the quality of visualization will influence the extent to which that goal is achieved. Each of the EVOKED case study sites will operationalize this methodology in the field trials by using the Climate Information Design template (Figure 1).

Step 1: Identify relevant stakeholders for the climate change problem

A comprehensive list of all potential stakeholders has previously been made for each of the EVOKED case study sites. Those stakeholders that are relevant for the specific climate change problem to be addressed in the field trials are identified and invited to participate in these Living Labs.

Step 2: Identify climate services at the case study sites

Climate services that are currently available at the case study sites should be identified to determine which are relevant. This is accomplished by considering the climate impacts that are being addressed by the climate services and by evaluating the format of the climate services.

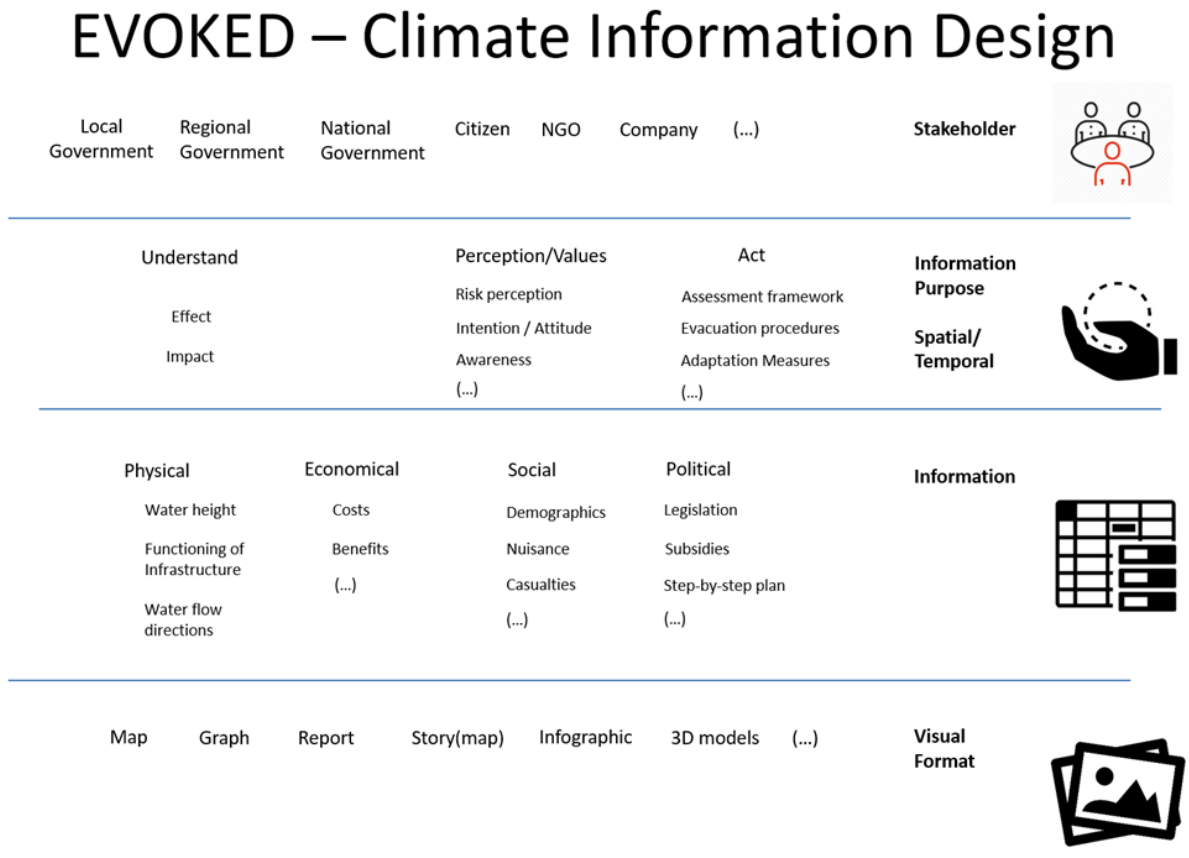

Figure 1. Operationalization of the climate information design methodology. Adapted from Raaphorst et al. (2018).

Step 3: Identifying the information needs of the relevant stakeholders

The third step is to find out what information needs the climate service(s) hope to fulfil for the relevant stakeholders. This can be accomplished by conducting interviews. In these interviews stakeholders are asked about the problems they face in their practices, which information they already have and which information they would need in order to be better able to tackle the challenges of climate change. Furthermore, the interview also serves to find out which visual formats are most suitable.

Step 4: Applying the operationalized Climate Information Design methodology to locate potential usability-gaps

Completing the Climate Information Design template gives insight into which information is required by the relevant stakeholders (Figure 2). Usability gaps can in turn be identified by comparing information needs and outcomes. This gap provides a point of departure for creating an improved information design.

Step 5: Creating an improved information design to overcome the usability gap

The results from Step 4 provides an indication on how to improve the information design of the climate service. Improvements can be made by:

- Reaching out to another stakeholder.
- Revising the purpose of the information.
- Focusing on different climate information.
- Changing the visualization format.

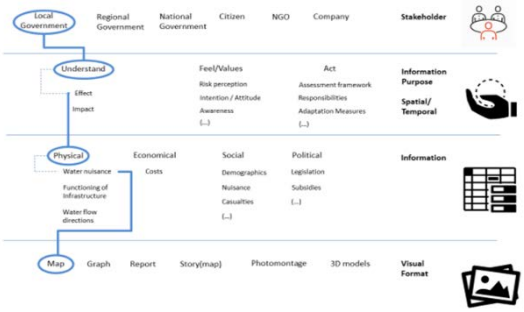

Figure 2. An example of the assessment of an existing climate service intended to understand the effects of water nuisance as visualized on a map.

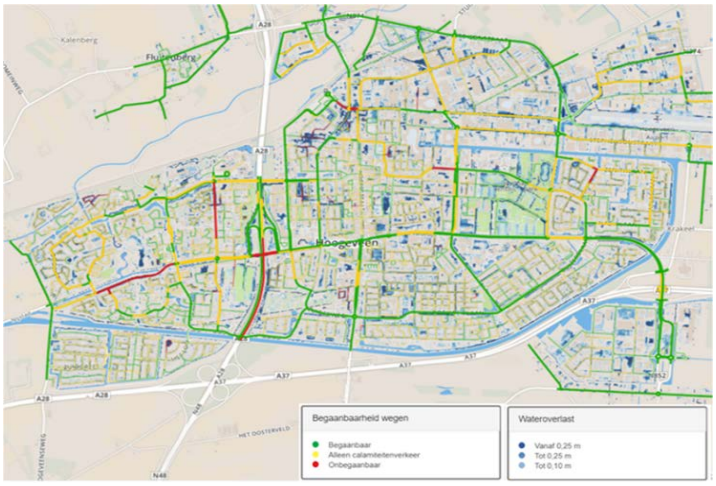

Figure 3. An example of a climate service illustrating the effect of water nuisance on existing infrastructure in the Dutch city of Hoogeveen (red indicating greatest impact). Illustration taken from the WDOD Klimaateffectatlas.

Step 6: Testing the improved Climate Information Design

Testing the improved climate service can be accomplished by completing a survey after discussing the design with the intended stakeholder. Survey results provide insight into how the climate service was perceived by the stakeholder and if it improved the understanding or action intended by the climate service. The survey results act as a feedback loop for the Living Labs and field trials at each of the case study sites.

An example from the Netherlands. Applying the Climate Information Design template (Steps 4 and 5) is illustrated for the climate change problem of water nuisance. Figure 2 shows the assessment of the existing climate service: it is intended for local government to understand the physical effects of water nuisance (water depth) as illustrated on a map. However, stakeholders have indicated that what they actually need is information on the climate impacts of the water nuisance. This requires more information on the functionality of the city's infrastructure and not just water depths (as shown in Figure 3).

References.

Lemos, M.; Kirchhoff, C.; Ramprasad, V. (2012): Narrowing the climate information usability gap. Nature Climate Change. 2 (11), p. 789-794.

Raaphorst, K.; Roeleveld, G.; Duchhart, I.; van der Knaap, W.; van den Brink, A. (2018). Reading landscape design representations as an interplay of validity, readability, and interactivity. Visual Communication (forthcoming).

Värmland County Administrative Board and Arvika municipality, Sweden- Case study sites

Located in west central Sweden, Värmland county is bordered by mountains to the north and the large lake Vänern to the south. The county is largely characterized by its forests and its proximity to water. The main climate adaptation challenges are increased pluvial and fluvial flooding as well as the emerging risks drought, forest fires and reduced provision of drinking water.

Figure 4. The map of Värmland (photo: Google maps).

The Värmland County Administrative Board (VCAB) has the regional responsibility for coordination of climate adaptation work within the county, including coordination among municipal, regional and national actors. This work also encompasses knowledge dissemination, development and follow-up of action plans and climate and vulnerability analyses. Finding ways to communicate the integrated risks associated with a changing climate and improving the awareness and knowledge capacity of municipal stakeholders are the main challenges that the VCAB is dealing with in the EVOKED Living Lab process.

Regional development and dealing with natural hazards. Regional development of the county is a priority. Employment levels are stable and are best in the bigger cities, such as the county seat - Karlstad, as are opportunities for entrepreneurship and new businesses. While there is a good demand for housing within the region, supply is slightly lacking, and thus the desire for new construction in attractive areas, such as those close to water, but which are at risk for flooding. Despite the risks of natural hazards like flooding from watercourses and lakes, building in flood-prone areas remains an attractive strategy for cities in the county as living close to water is seen as a draw to attract residents and businesses. Thus, VCAB is dealing with the challenges of balancing the need to build more housing in the city centers in attractive areas at risk for flooding, and protecting housing and infrastructure extreme weather events.

Climate adaptation in Arvika.

Arvika is the third largest municipality in Värmland with a population of 26 000. In Arvika the consequences of climate change have been visible for years and include flooding events, drainage system overload and impaired water quality in Kyrkviken, a bay at the center of Arvika city, with a recent history of costly flooding in 2000. While Arvika does not have the press of new residents and such a need for new housing, the goal is rather to protect the existing structures against the consequences of flooding, maintain a good quality of life and a long-term vision that the water quality in the lake is so good that residents are able to swim in the waters.


Figure 5. Aerial photo of Arvika (photo: Arvika municipality).

Water quality and citizen safety are prioritized with the construction of a new flood protection dam, due to be finished in 2019. However, the backside of the new reduced vulnerability is that the flood dam provides is that many feel a false sense of security and thus building in the risk zones may be allowed.

Figure 6. Drone photo of the construction of a new flood protection dam (photo: NRC Group).

Providing climate services. As an EVOKED pilot study within Värmland county, Arvika is interested in finding ways to communicate risk and uncertainty associated with climate change impacts and adaptation measures to the public at large. This includes identifying the risks and shortcomings in the water-related sectors and systems, evoking a feeling of responsibility and accountability on behalf of municipal representatives, and understanding the impacts and socio-economic consequences of climate change within a local climate adaptation strategy.

This strategy would be seen as a type of climate service to bridge the gap between the ample supply of flood maps and regional climate change scenarios and how this information can more easily be used in taking decisions on specific climate adaptation measures. Within the EVOKED Living Labs, as well as within a related Interreg North Sea project (CATCH), VCAB will help Arvika by providing guidelines for developing a local climate adaptation strategy and by developing information design principles to re-visualize existing climate data through story-maps and infographics to show how flooding can impact society.

EVOKED – project facts

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Partners: end-users and research organizations

NGI

Värmland County Administrative Board

Drents Overijsselse Delta

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FLENSBURG

SGI Swedish Geotechnical Institute

Larvik kommune

Deltares

CRSLR Research Group

CAU Christian-Albrechts-Universität zu Kiel

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NWO

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