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Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology MeteoSwiss

Severe Weather Warnings:
impact of an event vs. impact of a warning

Optimizing warnings for authorities: A Jobs-to-be-done study

Saskia Willemse, **Nathalie Popovic** (MeteoSwiss)
Nikolina Fuduric, Leonie Bisang, Cécile Zachlod (Fachhochschule Nordwestschweiz)

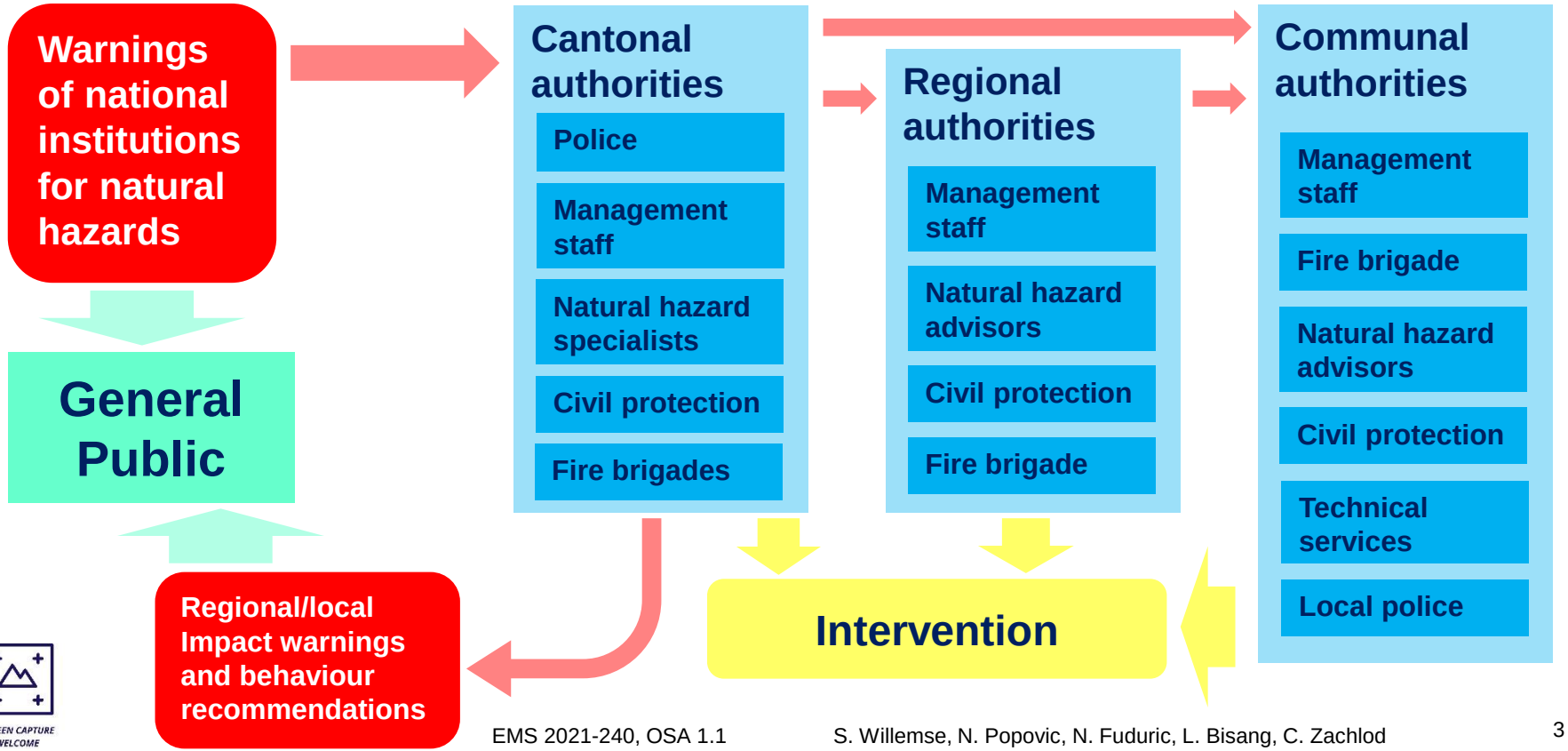
Guiding principle of the program OWARNA2@MCH*

*“Our warnings help the population and the **concerned organizations** to take measures to minimize victims, accidents and damages caused by extreme weather events.”*

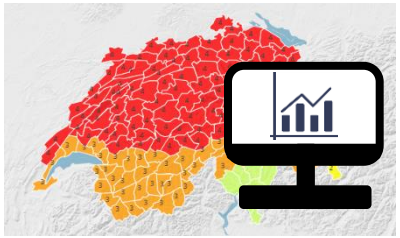
➔ *Not only improve the warnings but also their impact*
➔ *Recipients need to understand the warnings in order to be able to act*

* Program initiated at MeteoSwiss to renew and develop the severe weather warning system.

The authorities are very diverse…



The study was carried out with two roles within the cantonal authorities



Natural hazard experts,

«coordinating bodies»

Fire brigades

«intervention bodies»

The Method: Jobs to be done

Developed by Prof. Clayton Christensen & Anthony Ulwick

Understand which jobs users need to get done instead of asking what solution they want

Fachhochschule Nordwestschweiz
Hochschule für Wirtschaft

Research team:

- Dr. Nikolina Fuduric, Professor for Marketing & Product Management
- Cécile Zachlod, Docent for Digital Marketing & Communication
- Léonie Bisang, Research Fellow: Statistics

- MeteoSchweiz (Additional goal: knowledge transfer)

The Method: Jobs to be done

Jan - Feb

Qualitative Phase

- Interviews with 6-7 individuals of user groups to define their „job map“

March - Apr

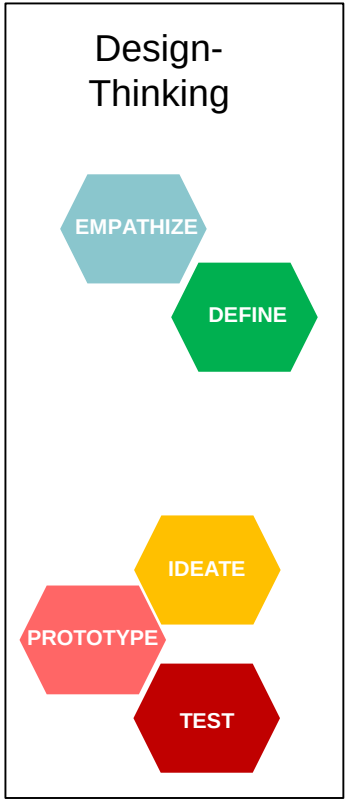
Quantitative Phase

- Representative survey to test jobs and identify potential for optimization

June

Design Thinking Workshops

- Design sprint, develop creative ideas for solution together with experts and users



Participants

	Cantonal authorities	Fire brigades
Contact through	Naturgefahrenkoordinatoren	Feuerwehrkoordination Schweiz FKS CSSP CSP
Interview participants	7 natural hazard experts and management staff BE, FR, GR, LU, NW, SO, VS	7 cantonal fire inspectors BE, BS/BL, LU, NW/OW, SO, VD
Survey participants	49 natural hazard experts and management staff 23 cantons + FL	76 fire inspectors and commanders 23 cantons + FL

Interviews: Method

Duration: 30-40 Minutes

Main Question: « What do you have to do when you receive a warning. Tell me about your process step by step»

SCREEN CAPTURE WELCOME

Interviews results – natural hazard experts (NHW)

I have to interpret severe weather data to help cantonal officials make sound decisions

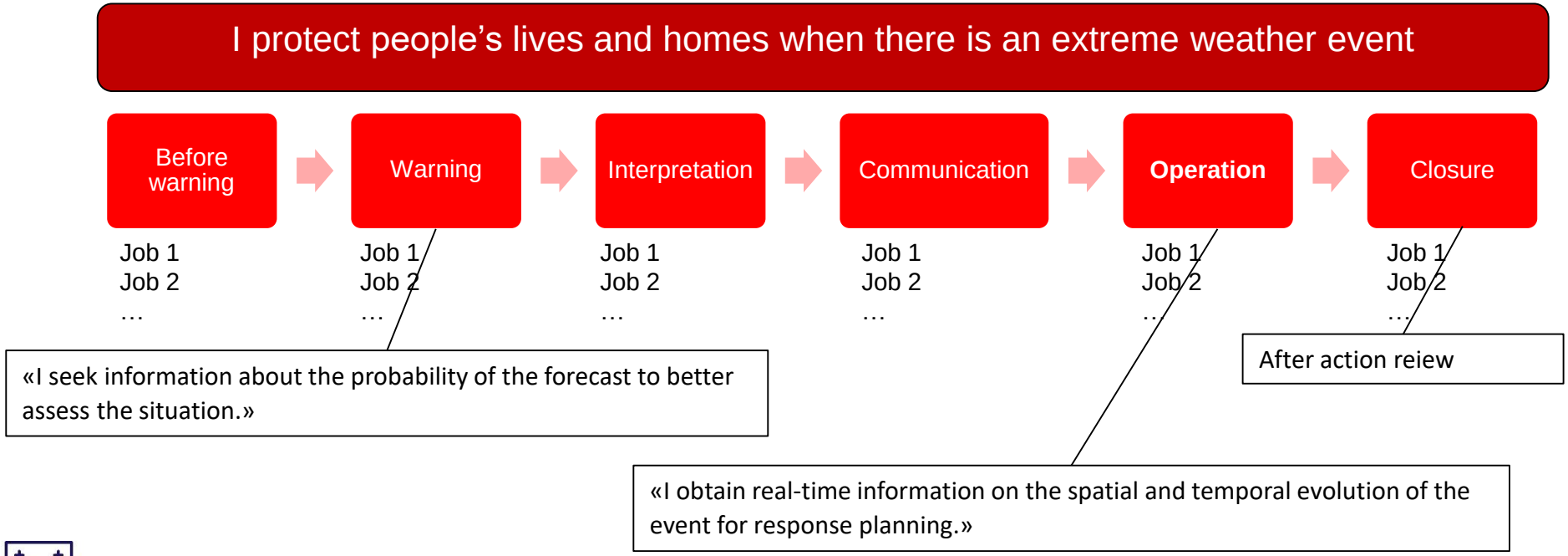
Before warning	Warning	Interpretation	Communication	Observation of event	Closure
Job 1 Job 2 …	Job 1 Job 2 …	Job 1 Job 2 …	Job 1 Job 2 …	Job 1 Job 2 …	Job 1 Job 2 …

«I proactively obtain weather information on a regular basis in order to be informed about impending dangers in my canton.»

«I create tailor-made assessments for the regions in my canton to understand where there may be what impacts.»

SCREEN CAPTURE WELCOME

Interviews results – fire brigades



Quantitative survey: Method

- ~20 job statements + statements about channels and obtained information + demographic and job-specific questions
- Rate each statement on *importance* and *satisfaction*

SCREEN CAPTURE WELCOME

Quantitative survey: Method

«I seek information about the probability of the forecast to better assess the situation.»

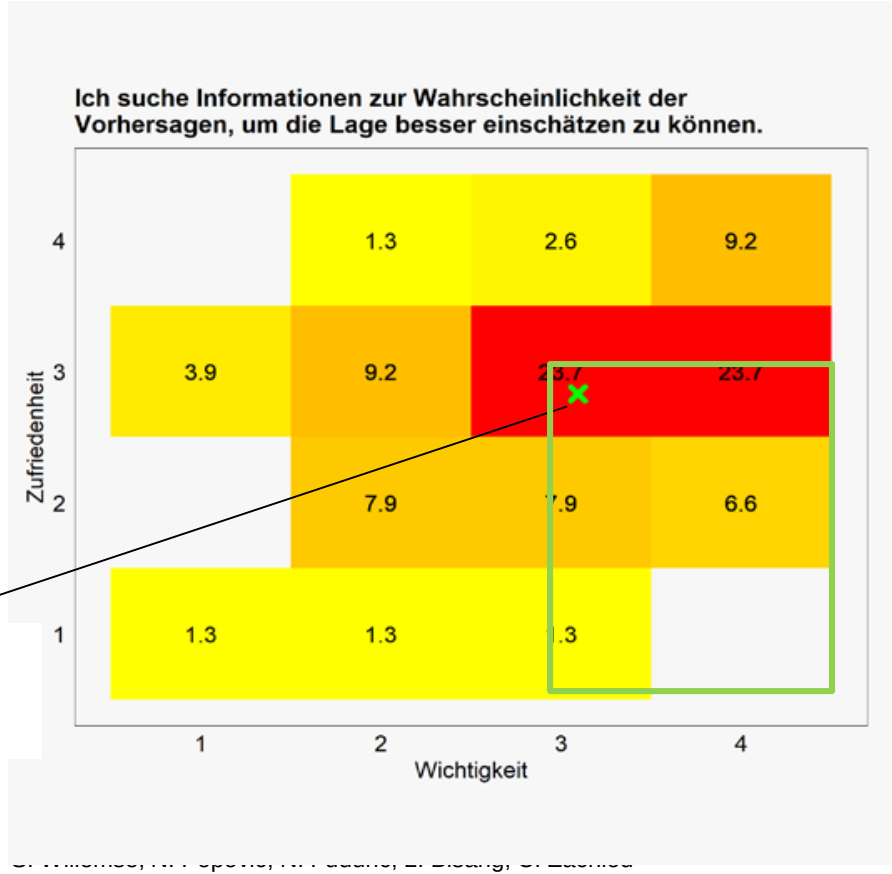
Importance ☆ ☆ ☆ ☆

unimportant very important

Satisfaction ☆ ☆ ☆ ☆

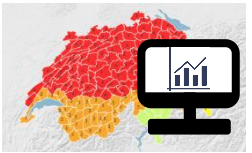
very dissatisfied very satisfied

Relevant quadrant:
satisfaction < 3, importance > 3



Quantitative survey: Results

Important jobs, not satisfactorily completed



Natural Hazard Experts

1. I proactively obtain my weather information from **GIN***.
2. I obtain information on the **impact** of the event.
3. I obtain information on the **amplifying factors** (e.g. locally higher precipitation amounts due to embedded thunderstorms).
4. I look for information on the **probability** of forecasts to better assess the situation.
5. I receive notifications for impending severe weather with **low probability of occurrence** in order to be prepared in time.
6. I create **tailored assessments** for regions in my canton to understand what impacts may occur and where.
7. I obtain my information in tabular or graphical form to get a **quick overview**.
8. I create **documentation** about the event.
9. I archive the documentation to have **access to it in the future**.
10. I check if the event occurred as predicted to **learn** from it.

SCREEN CAPTURE WELCOME

* GIN: Information platform on natural hazards for the authorities

“I need to be able to react quickly and it always takes time to look into the details in GIN. Especially with the MeteoSwiss report, it would be nice to have more tables and charts instead of prose, and additional info on temperature trend and the snow boundary, so we don't have to look for the information on GIN because we need to decide quickly."

* GIN: Information platform on natural hazards for the authorities

SCREEN CAPTURE WELCOME

“For documentation we need simple information like the warning level, and amount of precipitation. I like the e-mail with PDF attachement, because I can save it directly. It is important that we can access to past events.”

Quantitative survey: Results

Important jobs, not satisfactorily completed

Fire brigades

1. I obtain information about the **duration** of the event.
2. I obtain information about the **location** of the event.
3. I obtain information on the **physical values** (e.g. amount of rain, wind strength
4. I obtain information on the **amplifying factors** (e.g., locally higher precipitation amounts due to embedded thunderstorms).
5. I seek information on the **probability** of the forecasts to better assess the situation.
6. I receive **short-term warnings about local thunderstorms**.
7. I subscribe to **personalized alerts** for my local hazard areas.
8. I obtain real-time information on the **spatial and temporal evolution** of the event, for response planning.

*“For us it is **very** (emphasis made by fire commander) important what the tendency of the event is...how long it will last, how much precipitation and how severely affected the region will be. I have to do the planning around equipment and personnel.”*

"For us it is difficult to estimate where there will be problems or not, we do not want to know how many millimeters of rain will fall, instead we want to know what can happen."

Quantitative survey: Results

Important jobs, not satisfactorily completed

Fire brigades

1. I obtain information about the **duration** of the event.
2. I obtain information about the **location** of the event.
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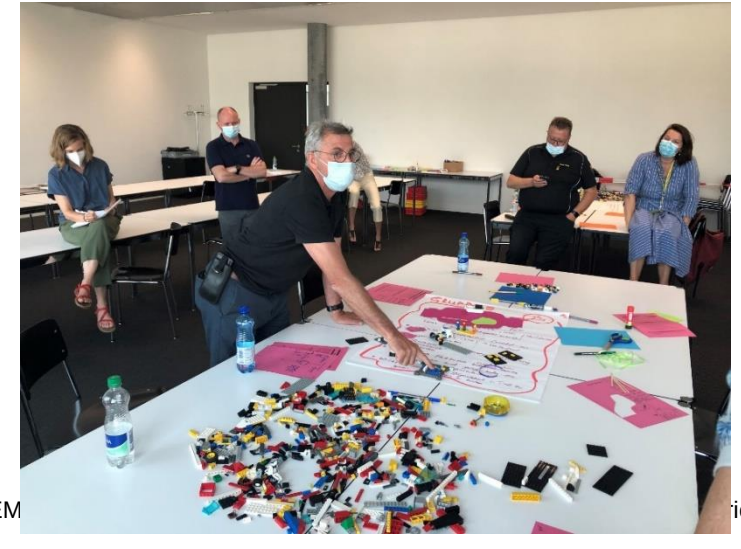
Design-Thinking-Workshops: Method

- MeteoSwiss experts + individuals from cantonal user groups → groups of 4-5
- 2 design sprints: develop first, creative solutions for important but not satisfactorily completed jobs, no feasibility considerations

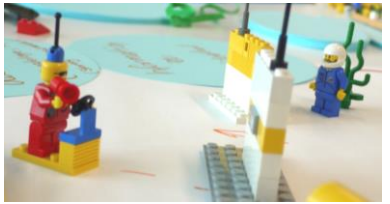


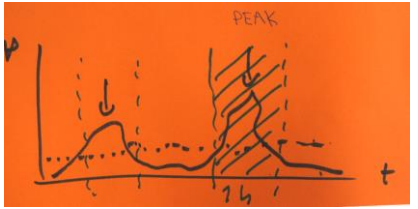
Design-Thinking-Workshops: Results

Design-Thinking-Workshops: Ideas for optimization

Natural Hazards Experts

- Video conference of meteorologists for cantons to improve understanding of event.
- Clear presentation in warning of the most important parameters (e.g. meteogram). Time slider to easily detect trends and event history.
- Data for self-defined regions, e.g. catchment areas
- More information on relevant antecedents, amplifying factors and uncertainty
- Easy access of raw data that can be integrated into own platform and models.
- Knowledge database: Information on past events (climatology, impact, …)

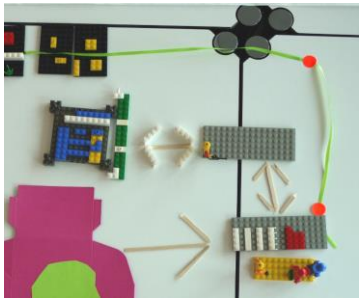


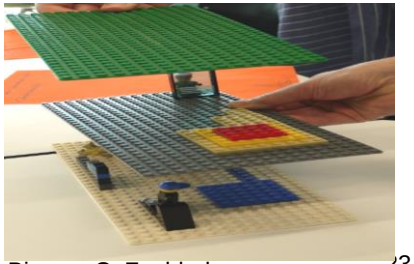


Design-Thinking-Workshops: Ideas for optimization

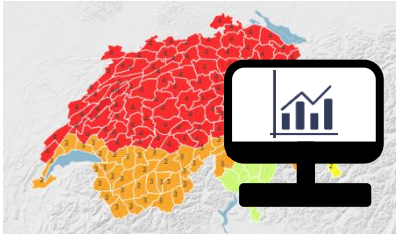
Fire brigades

- Simple visualization, everything at a glance
- Probability for median and for maximum ("worst case"), with time slider --> how probability develops over time
- "Fire brigade mode" in weather app: information can be individualized according to role (Self-defined warning region, threshold values, lead time, and probability of occurrence).
- Contact with meteorologists for interpretation help and training (already implemented in one Canton in the south)
- Feedback culture (oral and written, after action review).
- Collaboration on data integration (e.g. layering of different GIS data, e.g. on surface runoff, precipitation, operational data)





Summary



Natural hazard experts

Main task: Tailor-made assessment of the hazard situation for their canton in order to inform emergency managers and municipalities and support them in decision-making**.**

Motto:

"Everything at a glance"

Weather hazards:

Channels for warning:

VULPUS

E-Mail MeteoSchweiz

Timing: Interest in information on events with low probability of occurrence. Desired lead time very variable (from max. 4 days to 14 days in advance).

Important but not satisfactorily completed

- Means to create a tailor-made assessment for the canton
- Clear presentation of the most important information for a quick overview (no need to search for everything on GIN)
- Information on amplifying factors and impacts
- Information on uncertainty
- Documentation of the warning & access to past events

Solution ideas & visions:

- Video conference by meteorologists for cantons to improve understanding of event
- Clear presentation in warning of the most important parameters (visualization, table, time slider)
- More information on antecedents, amplifying factors and uncertainty
- Easy access to raw data that can be integrated into own platform and models
- Knowledge database: Information on past events

Main task: Protect and save lives and buildings. Operational rather than preventive organization. Always ready for action quick decisions simple information

Motto:

«Less is more»

Weather hazards:

Channels for warning:

Fire brigades

Timing: Interested in warnings with a high probability of occurrence and short lead time.

Important but not satisfactorily completed

- Simplicity and visualization of the most important information
- Duration & location of the event
- Physical values and amplifying factors (e.g. precipitation total over time)
- Probability of occurrence / uncertainty
- Personalized warning message: self-defined warning region, threshold values, lead time, and probability of occurrence.
- Support for translation of physical values into local impacts

Solution ideas & visions:

- "Fire brigade mode" in app: information can be individualized according to role - fire brigade or private person.
- Contact with meteorologists and feedback culture: meteorologists provide interpretation assistance before and during the event, fire brigades provide feedback after the after-action review, training by meteorologists.
- Data integration in the sense of layering of different GIS data, e.g. surface runoff, precipitation, operational data.

Participant of a design-thinking-workshop:

“I am very satisfied with MeteoSwiss. They do their job very well with good quality. It’s about making something good even better.»

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