Feedback from NMHS's and their users on communication, weather warnings and probability information

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EUMETNET

- European Meteorological Services' Network originally created at the <u>end of 1995</u> by informal agreement

- More formal structure achieved through the agreement for the establishment of the economic interest grouping EUMETNET (EIG EUMETNET) signed in <u>2009 by 21 Members</u>

- In the meanwhile it is a grouping of **31** European NMHSs

- Assembly, and advisory committees (PFAC, STAC) to oversee all of EUMETNET's undertakings

- Framework to organise <u>cooperative programmes between</u> Members in various fields of meteorological activities

„Networking allows Members to work together to achieve objectives which they could not realise by working alone."

EUMETNET

- Funding: Each Member pays a share of the collective cost where their share is calculated based upon the Gross National Income of their country

- Members who participate in funding a programme will share both the costs and the benefits of the programme

- Delivery of a programme is entrusted to a Coordinating Member through decision by Assembly.

- In total: 26 E-NWC members

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EUMETNET

- Activities

  - Observations Capability Area: 7 Programmes related to meteorological observations: observations from e.g. aircraft (E-AMDAR), national radar networks (OPERA) and many others are processed and made available to the EUMETNET community

  - Climate Activities: EUMETNET supports Members in improving their Climate operations and services

  - Aviation: EUMETNET supports its Members and other service providers in adapting to Single European Sky (SES)

  - Miscellaneous: EUMETNET has its own RadioFrequency management Programme. EUMETNET runs the AutoPollen Programme which endeavours to aggregate pollen detection networks and quality control their data

  - **Forecasting Capability Area: 6 Programmes related to forecasting** to

    - issue weather and hydrological warnings (Meteoalarm: EMMA, EMMA-H),

    - provide training to the forecaster (EUMETCAL),

    - coordinate the NWP consortia, very short range forecasting and nowcasting (EPS II, C-SRNWP, **E-NWC**)

A brief history of EUMETNET Nowcasting activities

2012: 'Nowcasting' one of the EUMETNET key priorities

2013-2014: Nowcasting Activity
- Feasibility of nowcasting cooperation in Europe
- Preparation of 2nd phase

2015-2018: ASIST (Application oriented analysis and very short range forecast environment)
- Cooperation in nowcasting & VSRF

2019-2023: E-NWC
- Seamless prediction
- New observation techniques
- End user aspects

Describe end user groups with their needs and requirements concerning weather prediction

Decided to undertake two surveys, one to NMHS and one for their USERS.

The surveys contained questions about the following topics:

- probability products (e.g. 30% chance of rain),

- deterministic forecast information and impact forecasting,

- nowcasting and seamless prediction,

- weather warnings,

- communication and visualization, and

- training.

It means that **all Working Areas of the E-NWC Programme have been covered**, and we gained lots of interesting results.

Administrative details about the two surveys (SurveyMonkey)

Number of answers:

Country	
Andorra	1
Austria	9
Belgium	1
Croatia	8
Estonia	37
Germany	5
Hungary	28
Italy	1
Luxembourg	4
Netherlands	4
Norway	32
Poland	26
Portugal	22
Serbia	7
Slovenia	1
Spain	4
Sweden	29
United Kingdom (UK)	2

NMHS Survey (National Meteorological and Hydrological Services)

- Distributed by Working Area 4 (end user aspects) team

- 25 Points of Contacts (PoCs = NMHSs participating in the E-NWC Programme)

- 47 questions (25 questions were mandatory)

- 14 filled questionnaires (some of them only partly) – OBS – lack of representability

USER Survey

- Distributed by PoCs

- Translation to the respective national languages

- 39 questions (22 questions were mandatory)

- 232 filled questionnaires from 18 countries (some of them only partly)
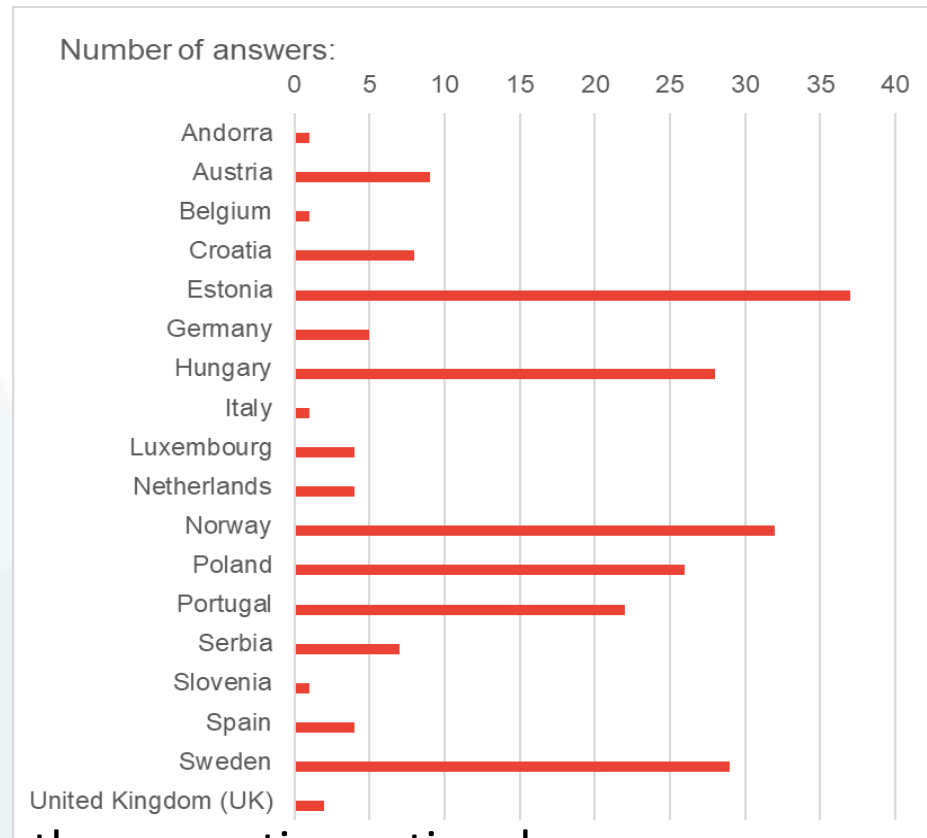
Recommendation: Make the surveys shorter and more focused on few topics. Don't use so many free-text questions, unless you really know the value of the information you might get.

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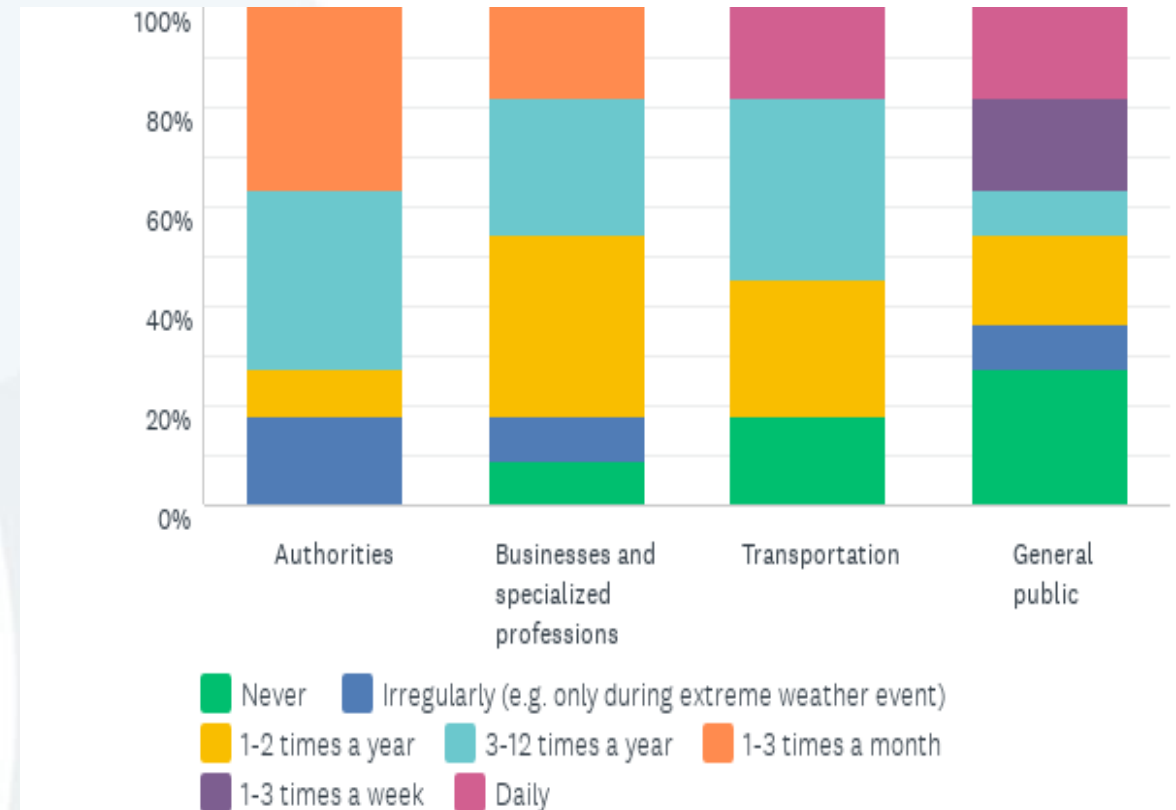Which user group do you belong to? (USER, 232 answers)
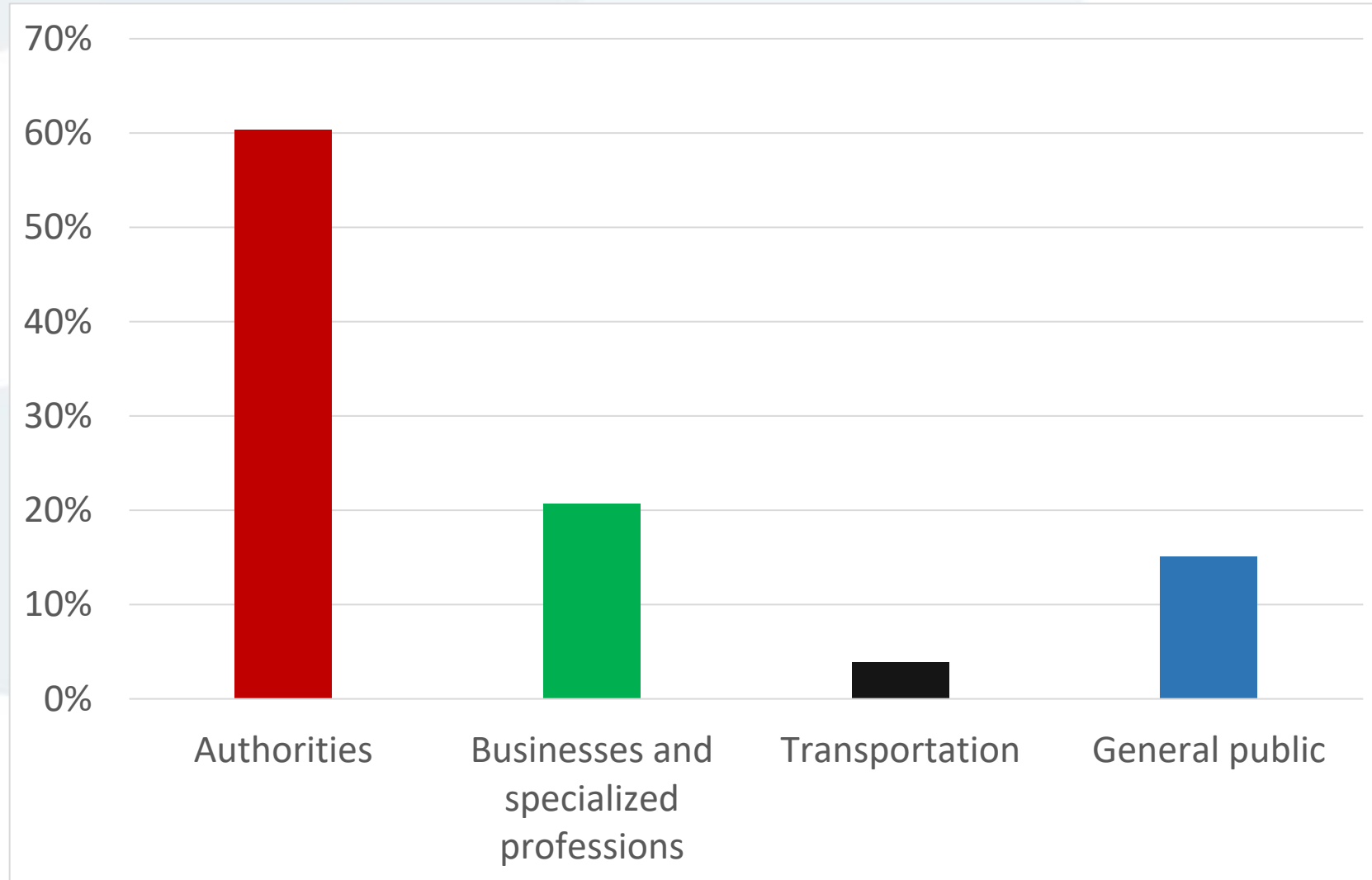
How often do you meet face-to-face with your users? (NMHS, 11 answers)

Nearly **30% of NMHSs never meet face-to-face with users from the general public, 20% never meet with users from transportation, and 10% never meet with businesses and specialized professions.**
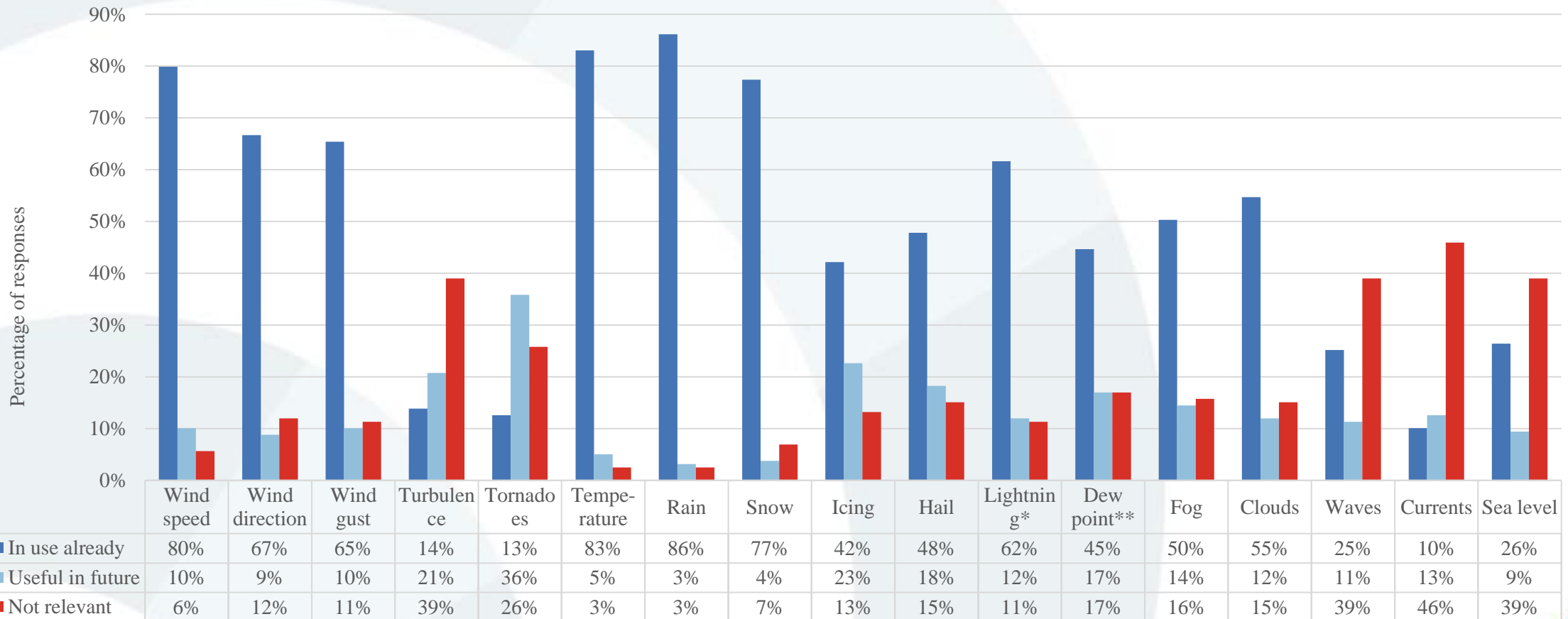
Around 30% of the NMHSs **do not provide forecasts suited** to user group's needs.

<u>Recommendation</u>:

Nowcasting information should be more specifically suited to the needs of the respective users.

What parameters are in use on a short time-frame (1-12 hours?) (NMHS, 12 answers)


	Wind speed	Wind direction	Wind gust	Turbulence	Tornadoes	Tempe-rature	Rain	Snow	Icing	Hail	Lightning*	Dew point**	Fog	Clouds	Waves	Currents	Sea level
■ In use already	80%	67%	65%	14%	13%	83%	86%	77%	42%	48%	62%	45%	50%	55%	25%	10%	26%
■ Useful in future	10%	9%	10%	21%	36%	5%	3%	4%	23%	18%	12%	17%	14%	12%	11%	13%	9%
■ Not relevant	6%	12%	11%	39%	26%	3%	3%	7%	13%	15%	11%	17%	16%	15%	39%	46%	39%

Recommendations:

Improvements should focus on nowcasting of convection (heavy precipitation and gusts).

Which severe weather event is causing most of your "taking action"?" (USER, 124 answers)
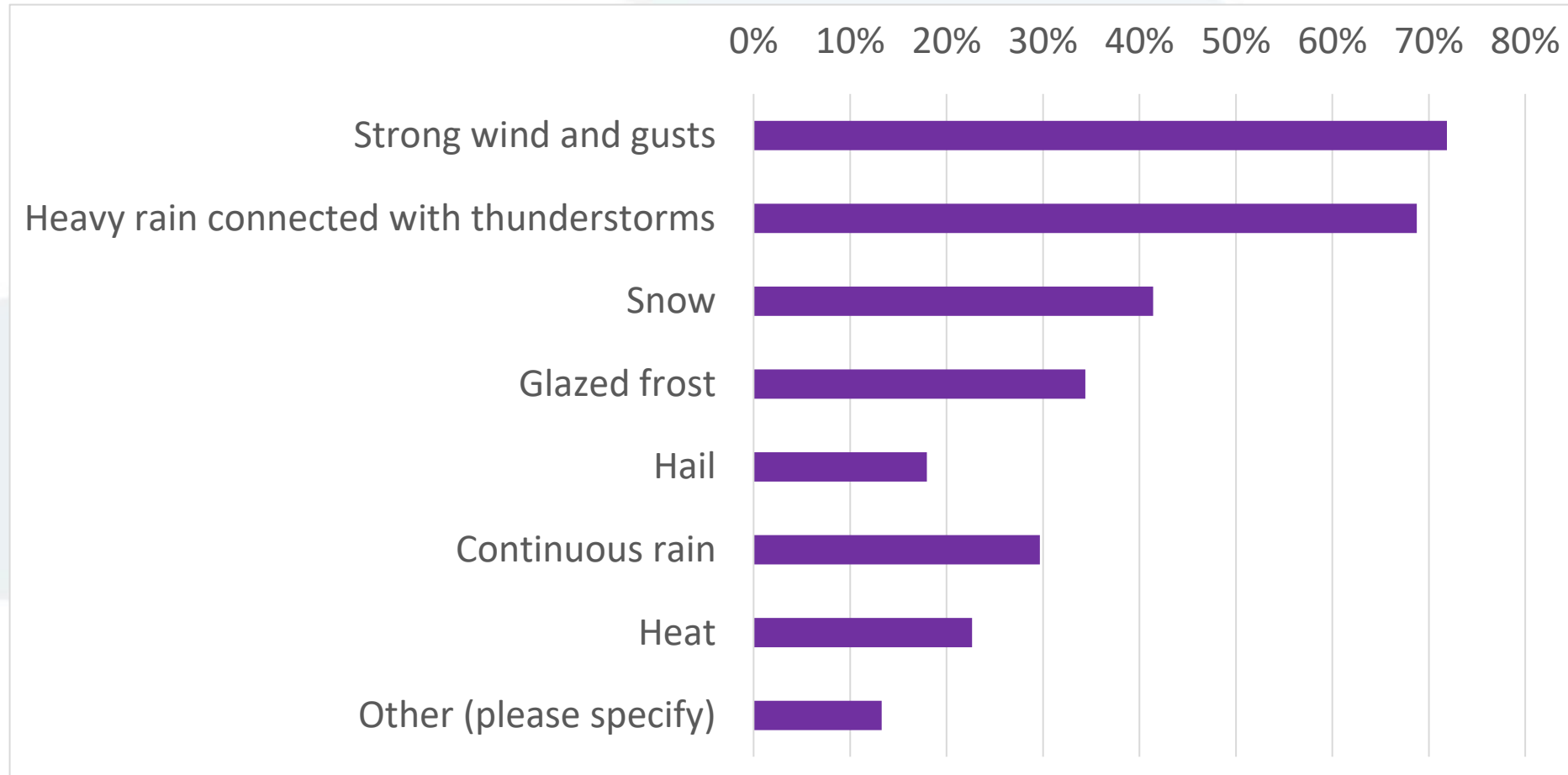
# How much time in advance (lead time) do you need to start with preparatory measures?" (USER, 126 answers)
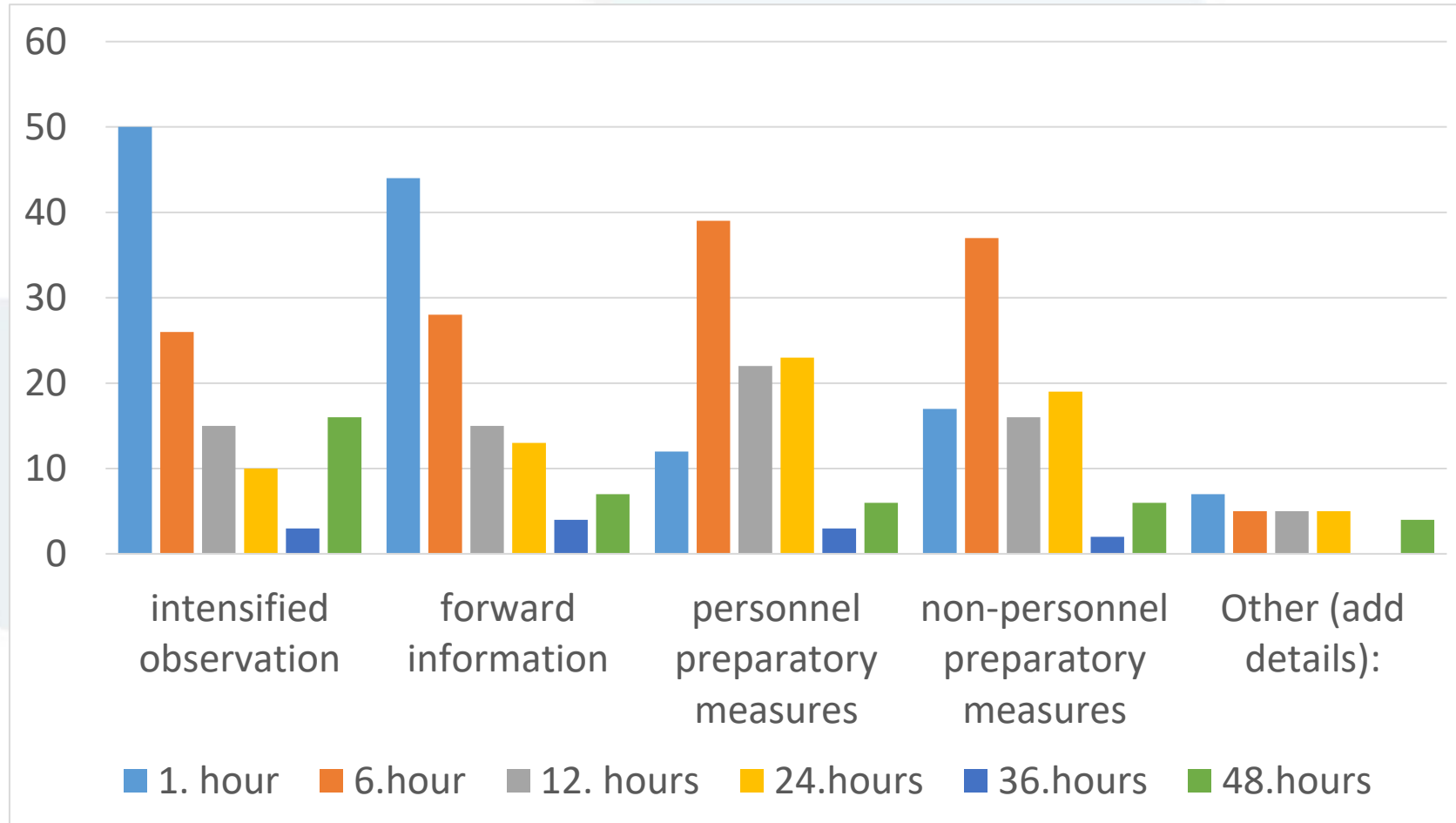
q34-36 (user survey) A storm is forecasted for the next day. On which probability (%) would you or your department/agency/organization start with preliminary measures?
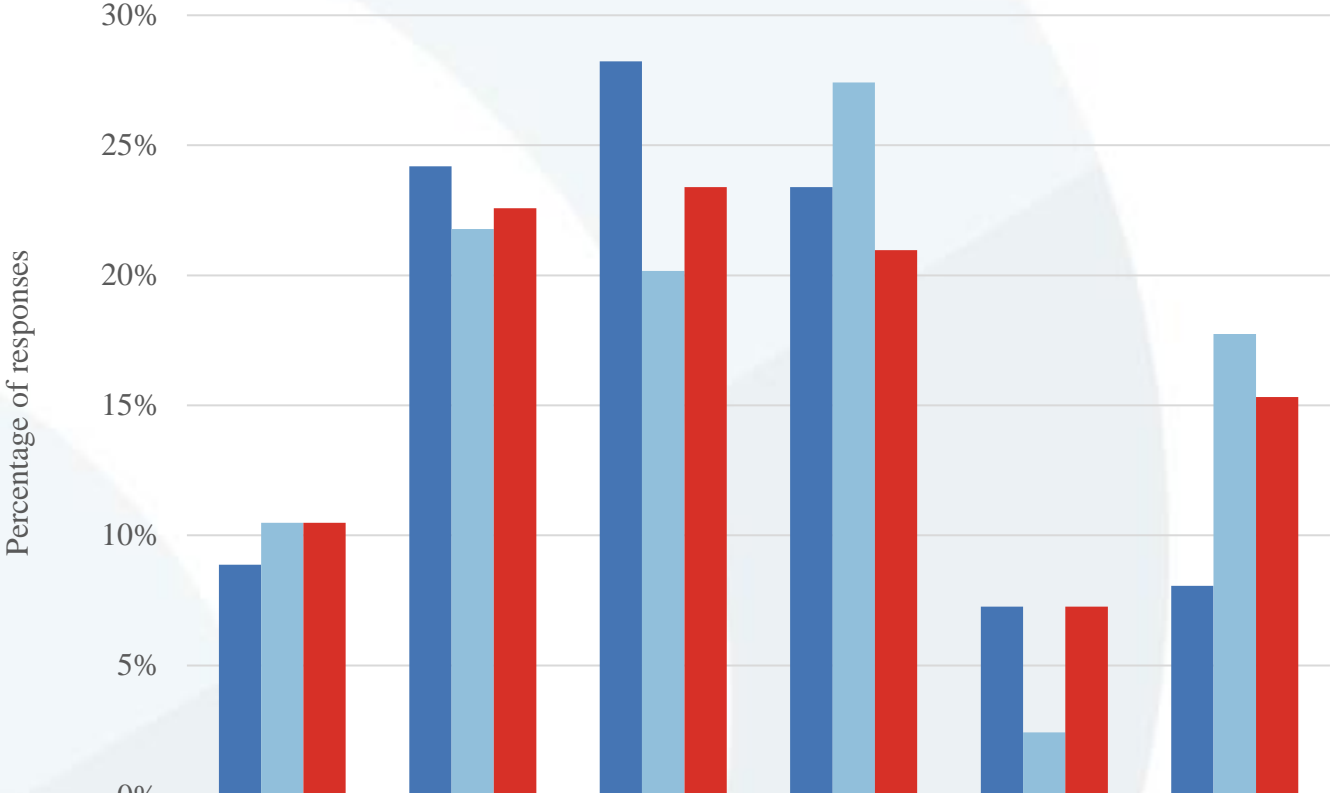
|	20 %	40 %	60 %	80 %	100 %	Other (please specify)
q34 - in general	9%	24%	28%	23%	7%	8%
q35 - when in countryside	10%	22%	20%	27%	2%	18%
q36 - if populated	10%	23%	23%	21%	7%	15%

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Indications of possible/likely/very likely. Probabilities associated with a forecast for an upcoming storm in your region? Scale: 0%–100%; e.g possible: 20 (*lower*) – 40 (*upper*) (USER, Q13)

Indication of probability in percent for possible, likely and very likely
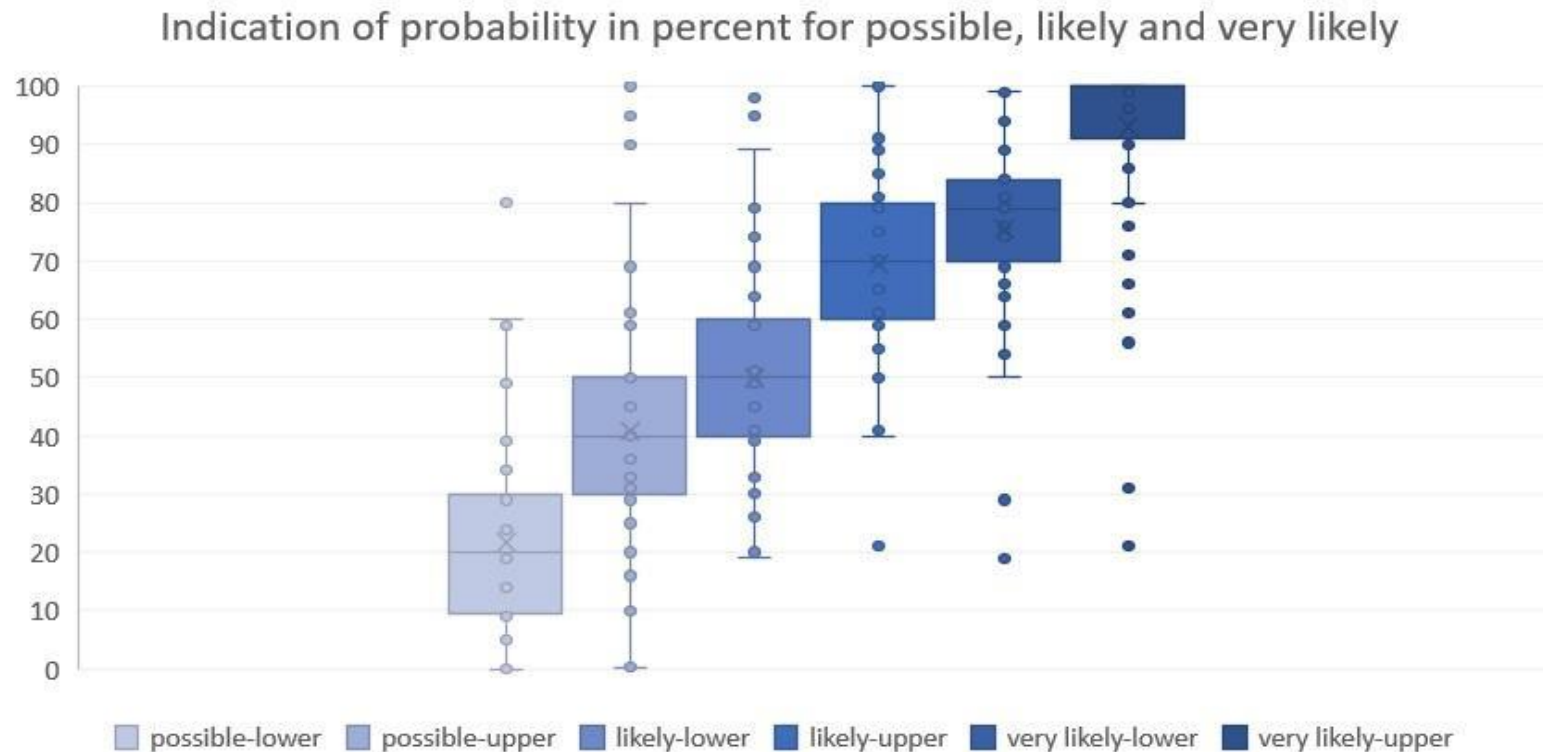
Recommendation:

It must be emphasized that the user's notion of probability is different compared to the notion of probability by meteorologists. Links should be found between these two notions to provide correct interpretation, which should be a subject of further research. (from USER's survey)

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And how do you present probabilistic product(s) to the user? *(NMHS, 9 answers)*
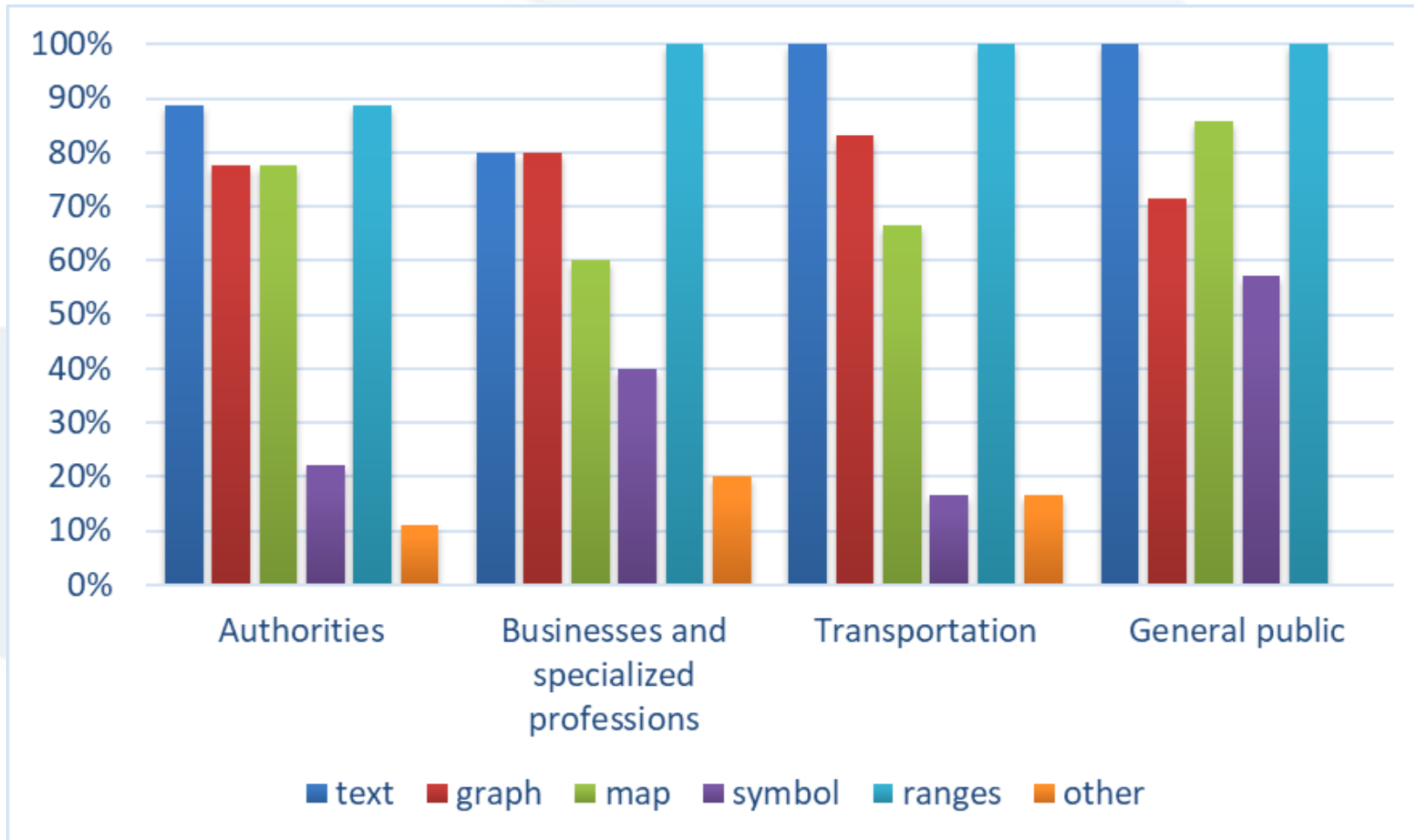
Probabilistic forecasting at the NMHS's

75% of the NMHS respondents (in total *12 answers*) answered that they **will provide probabilistic information on nowcasting products to their users**.

Only about **11 %** of the NMHS respondents confirm that their probabilistic products are **based on user requirements**, but nearly 80% say *to some degree* (*9 answers*).

More than **30%** of the NMHSs *do not know* **how the users like or use the probabilistic weather products**. On the other hand, nearly 45 % of the NMHS respondents confirm that the user feedback of probabilistic weather products is good, and about 10% even say that it is very good, but about 10% say that it is not good at all (9 answers).

Recommendation:

Develop extended ensemble forecasting system to give users added value with probability products.

Probabilistic forecasting: How do you ensure that you provide information of forecast uncertainty that is understandable to the users? (NMHS,11 answers)
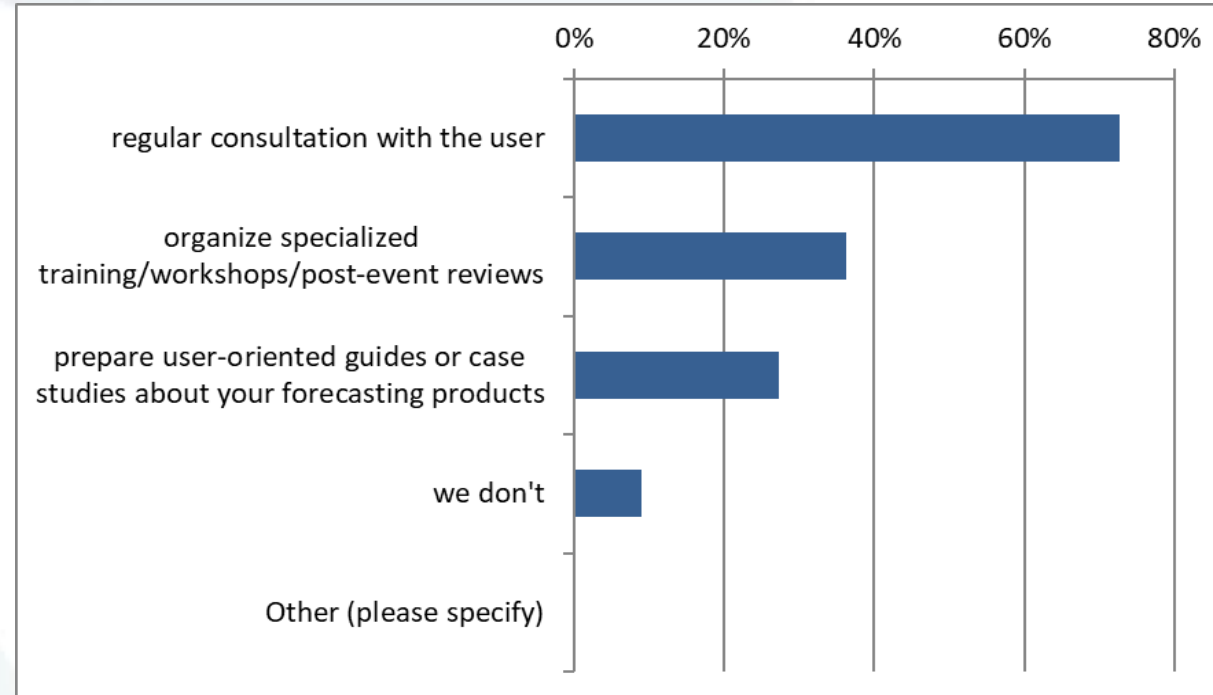
Recommendation:

More intense communication with the users is recommended by regular consultation, but also developing and using efficient explanatory tools.

If you use nowcasting and probabilistic information already, which are the benefits compared to standard single value weather forecasts presented in media, on websites, inferred from numerical models, etc.)?" Weighted answer=3,1 (USER, *140 answers*)
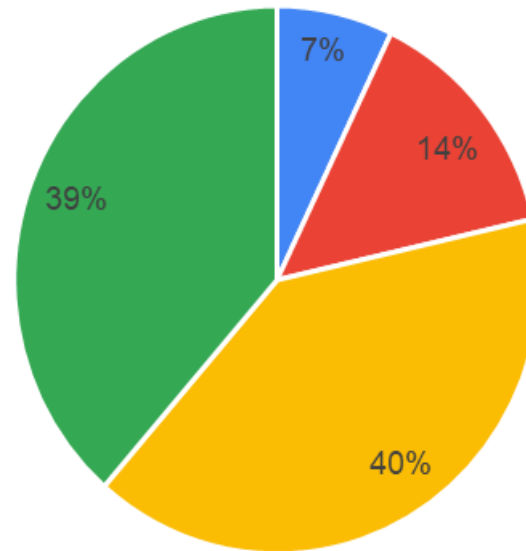
- 1-no benefit or even more confusing because of too much information
- 2-little benefit compared to single value forecast
- 3-more detailed and accurate information in time and space
- 4-faster, better, easier decisions about taking actions

Take away messages from the two surveys

- Always answer surveys! Important information can be gained

- Similarly to earlier studies, many users would take measures for severe weather at a probability level of 60%.

- Probability information is valuable for the users

- Probability terms are interpreted in different ways (meteorologist and user)

- More contact with the users are needed

Way further

- Contact with South America to compare results of the NMHS survey

- Article available in a couple of days in «RMetS Meteorological Applications»

RESEARCH ARTICLE | OPEN ACCESS

Use and perception of weather forecast information across Europe

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