

First results from the OPERA user

requirements survey

Uta Gjertsen¹ and Heikki Pohjola²

1) Norwegian Meteorological Institute (met.no)

uta.gjertsen@met.no

2) Finnish Meteorological Institute (FMI)

(1) Introduction

Weather radar networks provide data to many user groups with different needs. What a certain user expects from the weather radar data depends always on the application. For example an air traffic controller prefers detailed volume scans to frequently repeated measurements of lowest elevations. An important basis for the proper design and use of radar networks is therefore a good understanding of the user needs. Their requirements can direct decisions, such as radar configuration issues of radar data providers.

In the EUMETNET OPERA programme, work package 1.3 is dedicated to a survey on user requirements. The survey was carried out in 2005/2006 in several European countries. The work builds also on the achievements of COST 717 and CARPE DIEM (Bruen, 2004, Rossa et al., 2005). While the focus of COST 731 and CARPE DIEM was on the use of radar data in the hydrological and NWP communities, the users interviewed for OPERA represent also from operational communities such as civil aviation authorities, road and railway authorities, agriculture, and hydropower companies.

(2) Methods

Many users receive highly processed radar products, where for example the background maps and resolutions are fixed. Many of these users are not aware of the full potential of radar measurements. They could use radar data more efficiently if they were aware of the strengths and weaknesses of radar data. This survey was carried out in direct contact with the users, being aware of this gap between the data providers and the users.

The interviews were based on a questionnaire containing real examples of radar products as in Fig. 1. Based on these kind of examples and a set of questions, both general level and customer-related points were covered in discussions. It was seen as an important element in this user survey that the "radar experts" visited the users at their institutions. In many cases this meant that a group of people from the institution participated in the meetings and that all aspects of use of radar data could be covered. The radar users appreciated this approach, since it is often difficult for them to reply to a written survey or it may take extra resources to travel to a workshop. The results are based on the replies from 32 users from Belgium, Finland, France, Germany, Norway, Spain and Sweden. The number of interviews in the different user groups and countries are shown in Table 1.

Tab 1. Number of interviews in different user groups and countries.

	Belgium	Finland	France	Germany	Norway	Spain	Sweden	
Aviation		3	1		1			5
Hydrology		1	1		1	3		6
Forecasters		2			5			7
Road maint.		1			3			4
Agriculture	1	1			1			3
Railway					1			1
Hydro power				1	2		1	4
NWP modelers	1	2		1	14	3	1	32

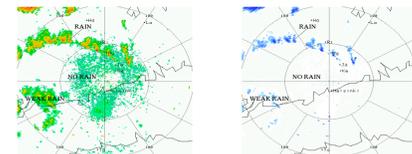
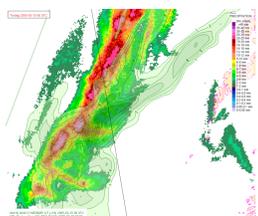


Fig 1. Example from user questionnaire on the degree of clutter filtering required

(3) Results – the main requirements

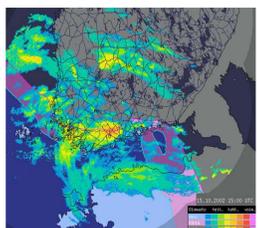


NWP verification :

- QPE accumulations
- Overall quality per pixel
- High availability

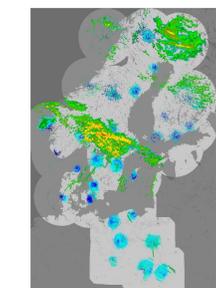
Assimilation:

- Reflectivity
- Radial winds
- VAD- and VVP-wind profiles
- Large composites and single site polar volumes
- Real time international exchange of the data
- Good filtering of errors, quality information eg. probabilities



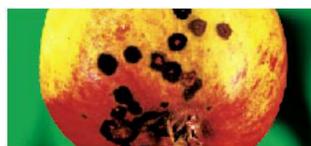
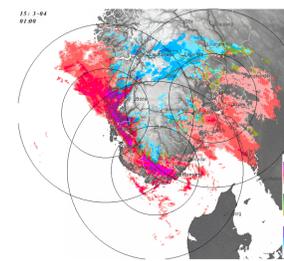
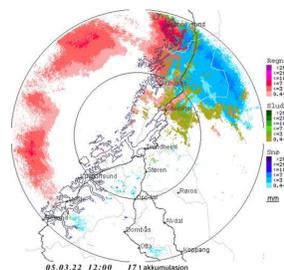
Weather forecast:

- Radar composites with high update rate
- Processed data containing the main information, to be displayed together with other information
- Good error removal and/or overall quality
- High quantitative accuracy



Aviation:

- Important role in air traffic control and runway maintenance
- High temporal resolution
- Good error removal
- Quality information
- European radar composite



Hydrology and hydropower:

- QPE accumulations
- High quantitative accuracy, high availability
- Quality information is required
- Minimum delays
- High resolution in time and space (catchment dependent)
- Radar data with multi-sensor-systems
- European composite for large catchments and international standards
- Improved data access, need of software to process the data

Road and railway maintenance

- Images with "best available quality", user-oriented processing
- High update rate and availability
- Composites
- Precipitation phase information
- Radar-based forecasts
- Large precipitation amounts
- Super cooled water
- Extreme weather, landslides, floods etc.

Agriculture

- Leaf wetness estimation for plant disease warning systems: rain/no rain at ground level during growing season, also low intensities
- Data archive
- Quality information, for example overhanging precipitation
- Hail information

(4) Summary

The user requirements survey showed that most users are "looking at radar images", but there is an increasing use of the data, especially in meteorology and hydrology. Users like road authorities require customer-oriented processing. For data providers it is therefore more and more important to understand the different needs. All users agree that high accuracy and availability are important. There is also a strong demand for a European composite, improved standardisation and data exchange. With the increased use of the data, also quality information is becoming more important. With more powerful computers it is possible to produce different products for different end users. Anyway, demands for dialogue between the end users and the data producers will increase as radar data is becoming more and more specific and even more widely used.

Bruen, M. 2004: 2nd CARPE DIEM End-users Workshop, Extended summary report

Rossa, A., M. Bruen, D. Frühwald, B. Macpherson, I. Holleman, D. Michelson, S. Michaelides, (ed.) 2005: COST 717 Final Report. working document WDD_200505_1 on <http://www.shmi.se/COST717/>



EUMETNET

The Network of European Meteorological Services