# Introduction: Forecasting tools made by forecasters

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Normally operational forecasters at National Meteorological Services ( NMSs) are so engaged with and tied to the operational schedule that it is impossible for them to directly contribute to operational R&D developments.

However the best knowledge of required developments and optimized interface ergonomics is within the forecaster himself. Recently we were able to ease the practical restrictions of the working schedule in order to let forecasters perform R&D, having them build tailor-made user input interfaces needed within forecasters' operations.

Nowadays we have a team of about four well educated and skilled forecasters, able to develop and build nice IT solutions directly for operational needs.

Our new "on call" schedule strategies, in which we put meteorologists in daytime shifts during days on which they are on call but need not be in operations, offers time needed to perform this work.

In this way recently several operational tools were developed:

- Preflits (by Haklander, Forecasting if a convective cell is likely to grow to a thunderstorm)
- Lightning monitoring tool (by Boonstra, Presenting the number of lightning strikes within the radar imagery)
- Rain radar accumulation tool (by Boonstra, Presenting within radar imagery the accumulated amount of rain within a user scalable time frame)
- Winter weather tool (by Boonstra, Presenting the development of road surface temperatures combined with Radar and/or Satellite imageries)
- Rain and cloud advection tool (by Brinkhorst, Presenting out of observations in a Google maps environment the arrival time of boundaries of areas with low clouds/visibility and precipitation)

All these developments are very important to operational forecasting. For each of the developments mentioned above I will give you an example:

1. Fuelling policy at airports is restricted by nearby lightning. Warnings should not be too early but certainly not too late

2. The TS-Lightning warning criteria in The Netherlands are linked to the number of expected lightning strikes. Showing the intensity and development of lightning upstream makes the prediction job easier.

3. During Chemical and Nuclear accidents the calculations made by dispersion models are combined with identifying the "hot spots" of accumulated rainfall during chemical or nuclear cloud passage. This helps adequate measurements of deposition and thus of soil and crop contamination, to be able to plan appropriate action.

4. The understanding of the development of road surface temperatures in combination with advection of clouds and precipitation is an important issue for road traffic warnings. The winter weather tool addresses this combination in order to better nowcast relevant developments

5. The arrival time of severe weather boundaries within the domain of responsibility is always a challenge. Models often give inadequate information, and the advection tool helps to add information from real observations, such as synops, radar and satellite imagery, and in future from model information.

The developments mentioned above are more broadly explained within this article. Many of these applications are probably also easily applicable within other NMSs, and KNMI is very willing to share its knowledge and help in doing so. Please contact the authors below for more information on this.