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The human contribution to warnings and aviation weather forecasts

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About the forecaster's professional expertise

The nature of the forecasting job (*predominantly* thinking about nowcasting & very short range forecasting)…

- …is not necessarily very well-understood by us, by our managers, by the man in the street, by our national weather services, by the customers…
- Also the qualifications and practical demands for the forecaster are numerous (education, training, working environment, technical equipment…)
- There exist some job analysis, but we strongly recommend more research and *collegial musing.*

A simple sketch of ”a good forecaster” (influenced and inspired by e.g. Doswell[1]):

- A good forecaster is (simply) *enthusiastic* about the weather, is collegial and open-minded (but demanding) about new technologies
- Has certain mental & physiological characters (e.g. ability to work 24/7, to make decisions, to cope with uncertainty)
- Knows both the customer's needs and the forecasting system and therefore is able *to act as a key person in the forecasting service process.*

Aviation products – often warnings by nature

Traditionally, the term severe weather refers to strong winds, heavy rain, hail, tornadoes…

- …but equally very low ceilings and/or visibilities (C&V) can cause severe weather situations (”Bad Aviation Weather, BAW”)
- especially air & road traffic risks & delays in Northern Europe, Canada…

Short-term aviation weather forecasts (e.g. TAFs, SWCs, many military aviation products…

- …are sometimes considered as routine work (presumably due to the regularity of the service)
- …but meteorologically: they occasionally contain severe weather components and *frequently* low C&V components, i.e. in fact they are quite often *characteristically warnings*
- The forecasting and warning challenge is *significantly varied* in different parts of Europe, different seasons, times of day…
- The quality of the service and the benefit to the customer is obvious but *very demanding to measure* (a large amount of routine forecasts compared to one *crucial* warning?)

Human forecasters –
busy and necessary in the future?

Quite often a simple, axiomatic reasoning is made: a human forecaster is (only) needed as far as she/he is able to add value to NWP output…

- …but to think in depth: what is actually ”to add value”?
- There may exist several arguments for the human role to diminish, but are they *honestly meteorological*?
- Once again, collegial discussion is encouraged.
- If adding value simply and *only* means touching up or ”tinkering” of NWP values and fields, then the human role *will diminish*.

Human forecasters –
busy and necessary in the future?

A *more profound* definition of human ability to add value includes…

- …nowcasting with several *other* techniques than pure NWP (e.g. human monitoring and decision-making)
- … the existence of a forecaster with *high situation awareness,* which enables consultation especially in critical situations. An overloaded forecaster with constricted possibilities of actual weather monitoring is ”blind” and unable to help the customer: ”modern form of meteorological cancer”
- … an operational forecaster with quite good understanding of the forecasting process *as a whole,* from the basics of NWP to the needs of the customer. Then (and only then) she/he can *act as a key person in developing the forecasting service process further,* as we already mentioned.
- …finally: the NWP development itself suggests the human role to remain or even grow: *“High-resolution model output cannot be interpreted the same way as a coarser-resolution model output…you cannot just send raw model output to users and expect them to use it…This ensures jobs for good forecasters in the future.” (Schultz et.al ([2]))*

Conclusions & for further discussion

- The nature of our work and the qualities demanded of a professional forecaster are unsatisfactory understood. Research and collegial discussion is encouraged.
- Forecasting very low ceilings and/or visibilities (C&V) is a demanding *warning challenge* rather than routine work. To measure the benefit to the customer is not a simple task.
- Sometimes the human ability to add value to forecasting process is without thoughtful criticism (only) seen as touching up of NWP fields. But this image of necessarily diminishing human role is *clearly insufficient* for numerous reasons:
    - Nowcasting and short-term warnings are extensively founded on *several other techniques than pure NWP.*
    - Consultation and decision-making require the existence of *a forecaster with high situation awareness.*
    - A competent forecaster is able to act as *a key person* in developing the forecasting service process further.
    - High-resolution model output *cannot be interpreted the same way* as a coarser-resolution model output.

References:

- [1] Doswell C.A. III, 2003: What does it take to be a good forecaster? (http://www.flame.org/~cdoswell/forecasting/Forecaster_Qualities.html)

- [2] Schultz, D., M. Ramamurthy, E. Gregow and J. Horel, 2007: Numerical Weather Prediction and Data Assimilation, (http://testbed.fmi.fi/course/data-assimilation-nwp-schultz.ppt)