USE OF A METEOROLOGICAL WORKSTATION IN A CHANGING OPERATIONAL ENVIRONMENT

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1. INTRODUCTION

In the past five years a meteorological workstation has been introduced and integrated in the operational service of KNMI. During this time the system has been extended and customized in order to fulfil as much as possible the needs of the operational user. Also in parallel a production system has been set up to generate standard products that are used in end user products.

Currently our production process is in a phase of redefinition: the process will be automated as much as possible while the role of the forecaster is reconsidered. The future role of the process oriented forecaster will be a monitoring one and, if needed, he will intervene. To be well equipped for this task he needs new tools for interaction with NWP modeloutput. The meteorological workstation will remain the vital system where this interaction takes place.

2. CURRENT STATUS

2.1 **System**

The KNMI Meteorological Workstation System (MWS) has been developed in close cooperation with the software provider Spatial Software Solutions Inc. (3SI), Marlton NJ, USA. The developped software, Metlab has been written in C and X-windows. It is running on DEC-Alpha workstations. It is a client-server system, where the data-ingest processes and databases are running on the servers while the interactive display software is running on the clients. Currently 19 clients along with 6 servers has been installed at 7 locations. Because the hardware is at the end of its lifetime during 1998 it will be replaced. This will also support an upgrading of the system performance.

2.2 **Program Status**

The following dates mark some important milestones in the MWS project.
June 1992: contract signed with software vendor

June 1993: system pre-operational

July 1995: complete system acceptance

January 1997: first major functional extension accepted

December 1997: second functional extension accepted

September 1998: hardware replacement

October 1998: major functional extension

March 1999: major functional extension

2.3 **Current use of workstation**

The main functions of the current MWS application include the following.

- integrated presentation: almost all operational data sources (observations, imagery, modeldata) are available for presentation and manipulation (zooming, panning, overlaying and whatsoever);
- diagnosis tool: the system is primarily used as a diagnosis tool for the forecaster; this function is supported by a drawing package that is used to insert meteorologically defined symbols, lines etc. (fronts, weather symbols etc.). Moreover there is an annotation functionality that is used to append texts to identified phenomena;
- guidance production: using the drawing and annotation capabilities the system is used to produce guidance material for regional and special duty forecasters;
- graphics production: a separate station is used to produce graphical products that are part of endproducts for clients;

Currently, except for some graphical products, the link with downstream production is limited.

3. HOPWA PROJECT

3.1 **Objectives**

In 1996 KNMI started a project called HOPWA which is dealing with the reorganization of the whole production process. For this reason also the future role of the forecaster and the future use of an interactive workstation have been discussed. The main objectives of HOPWA include:

- rationalization of the production process;
- efficiency improvement: work should not be duplicated; products should be generated as efficiently as possible;
- automation: processes should be automated as far as automation is cost effective;
- avoid inconsistencies: forecast for different customers and with a different scope should be consistent with respect to their overlapping parts;

- modularity, flexibility, standardization etc.

3.2 **HOPWA project: contents**

The HOPWA projects consist of three main streams which can be sub-divided in this way:

- automation of observations: this project deals with the automated production of all observations. Currently only part of the observations has been automated;
- redefinition of production process
    - upstream production
        * NWP models: new development in the direction of meso-scale models has been started;
        * NWP postprocessing (incl. MOS): experiments with MOS statistics on model field level are anticipated;
    - base forecast production: more about this project in the next paragraph;
    - downstream production
        * product assembly and enhancement: this part of the production process that deals with the assembly of end products will be automated as much as possible;
        * product distribution: a new flexible distribution platform will be implemented;
- reorganization of staff functions: along with the above projects a reorganization of a number of staff functions will be necessary.

4. FORECAST DATABASE

4.1 **Base Forecast Production**

The part of the production process that is most related to the interactive use of a workstation is what we call the base forecast production. In this part of the production process the automatically produced model fields may be manipulated in a way that all suspect model output can be corrected. The corrected fields are stored in a database that has been designed specially for the purpose of monitoring forecast products. The main components of this database include:

- model fields, whether or not corrected (data)
- graphical interaction on model fields (function): different methods may be used; these are discussed in a working group on graphical interaction of a European project COST-78 on Nowcasting;
- graphical products produced at the workstation (data);
- timeseries production (function);
- timeseries, derived from model fields (data)
- text generation (function)

- forecast text fragments, derived from timeseries (data);

A schematic overview of the HOPWA production process is given in figure 1 below.

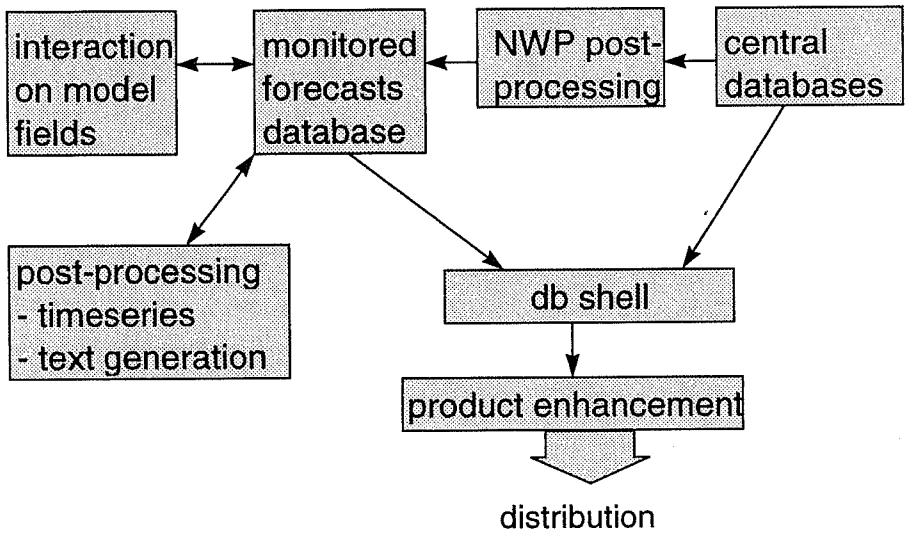

Fig 1. Forecast Database

A general database shell around all central databases forms the interface to all downstream production processes.

4.2 **COST-78: graphical interaction**

Within the COST-78 action not only interaction with model fields is discussed, more in general graphical interaction is subject of possible cooperation projects. The whole field has been divided into six sub-fields:

- interaction with analyses
- interaction with gridded fields
- automatic pre/post-processing
- generation of products & text generation
- interaction with model timeseries & TAF
- patterns for handling meteorological problems

For some of these subjects proposals for cooperation will be formulated.

5. EXTENSIONS TO WORKSTATION

5.1 **Future use of workstation**

From the preceeding paragraphs it is clear that a shift of use of the workstaion may be expected. Except for the familiar functions like presentation, diagnosis tool etc. as listed in paragraph 2.3 the function as

monitoring and graphical interaction tool is anticipated. This graphical interaction will be performed on model output, primarily on gridded fields, be it that graphical interaction on time series also in future may be necessary.

5.2 **Functional extensions**

The functional system enhancements of the workstation for the next year include the following issues.

- new observation types
  - lightning data
  - wind profiler data
  - aircraft data (AMDAR)
- enhanced configuration and macro abilities
- enhanced crosssection abilities, for models and observations
- profile overlay functionality
- alarm settings
  - for observations
  - for model output
- field modification
  - 2D with time-interpolation
  - short range
  - simple editing functions
  - simple relations between parameters should be taken care of

6. CONCLUDING REMARKS

The Meteorological Workstation is ***the*** forecaster's interface with the production process. As such it has four functions:

- presentation
- monitoring
- model output modification
- interactive graphical production

In this way the down stream production process will be coupled to the base forecasting process.