Some Experience on Designing and Using a Meteorological Workstation (a Slide and Video tape presentation)

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Some Background History: WHY a Workstation...

During this decade computers have invaded meteorological offices: there are terminals for satellite and radar information, for data communications (weather messages), word processing etc. Different data is viewed on paper, on different terminals, in different scales and with different user interfaces. An idea about a single workstation, capable also for new ways of representing data, evolved at FMI.

Start of the Project:
In June 1987 a new regional office was to be established in Turku. This office became the test ground for a meteorological workstation, because it had no previous technical infrastructure. During winter 1986/87 some workstations were studied and tested. As the results were promising and because no commercial software fulfilling our needs, schedule and budget, was available, it was decided to program such a workstation in house.

Goals:
The long term goal was to develope "The Meteorological Smelting Works", a tool to handle all kind of meteorological data. New system should be easy to use, flexible and fast.

As a first short term goal the system was to handle Meteosat images and synoptic data and to provide some word processing facilities. An early version of the software was tested at a technological fair in May 1987 and in June the first production version was running in Turku.

Present Status:
The software is used daily in four regional offices and at Headquarters. User interface and data handling parts are rewritten, software is much larger (still developing). The present version of the software, running on the same hardware, is almost 100 times faster than the first version.

About the Software: HOW FMI did it...

The basic concepts in designing the softwere were maximum flexibility in data presentation, minimum responce times

and nice user interface, which all are demonstrated with
slides and video (unfortunately not within this paper).

Independent Parameters:
All parameters (Time, Area and Meteorological ones) are
independent: if you change one, it does not affect the
rest.

Data Selection:
There are no predefined standard products in the system.
A duty meteorologist may freely choose parameters (within
the available ones) and geographical area he/she wants to
study, depending on the current weather systems. Thus the
forecaster can concentrate on essential parameters.

Use of Colours:
Colour is used heavily to make data more easily readable.
For instance, synoptic values are plotted from all
available stations, which makes the screen look rather
messy when a large area is selected: it is not possible to
spot individual values in crowded areas, but due to the
use of colours, larger scale temperature analysis is seen
with one glance. Some colour workstations have the
capability of showing only 16 different colours. With
such a hardware it is not possible to combine different
data: one runs out of colours!

Responce Times:
In duty work responce times should be as fast as possible.
We achieved this by keeping all data in memory, using
special type of programming (traps), finding out the
fastest graphics routines (specially for pixel data and
zooming) and not using any extra software layers (e.g.
GKS). With a faster CPU the last item is not essential.

Real Time:
Basically the software does two things: it displays data
on the screen and keeps the data (in memory) up to date.
If user wants to do something else with the workstation,
he/she can make the program to "fall asleep": most of the
windows are closed, only small real time clock stays in
one corner. While the program is sleeping, it still
updates the data as soon as new data are available, and
when forced to "wake up" it is ready to display the latest
data.

User Interface:
The user interface is done with mouse only. There is no
command language and the present version does not use
keyboard at all, except for word processing. There are
several windows on the screen (plus some pop-up windows),
each having it's own function. (The first version of the
software used pop-up menus, it was much harder and much
much slower to use.)

Parameters:
     The present software version makes use of Meteosat and
     radar images, synoptic and Temp data and some ECMWF
     forecasted data in the form of pseudo satellite images,
     produced with a slightly similar procedure as that
     described in (1).

Future Visions:
     Animated images (using radar, Meteosat and ECMWF data),
     NOAA images and more forecast data are under development
     and will be available for duty meteorologists in early
     1989.

Finally Some Minor Technical Details...

     Hardware within FMI workstations are mikroVAX II/GPX with 8 plane
     graphics memory; not very powerful but good work horses. All data are
     gathered into one computer node in the FMI local area network and
     transmitted to regional offices via dedicated Decnet lines.
     Traditional synoptic plottings are done with small A3 size pen
     plotters. Workstation software is mainly in Fortran and, for
     efficiency reasons, uses directly Digitals own windowing and graphics
     library (UIS), so the present version is not portable. We do have
     plans to test the new X-WINDOWS standard, hoping to make the software
     more portable.

References:

(1)   Kukkonen P., Nieminen R. and Nurmi P.:
      "Report on the Application and Use of ECMWF Products in
      the Finnish Meteorological Institute".
      (In "Report on the Application and Use of ECMWF Products
      in Member States, Including Verification Results", 1986)