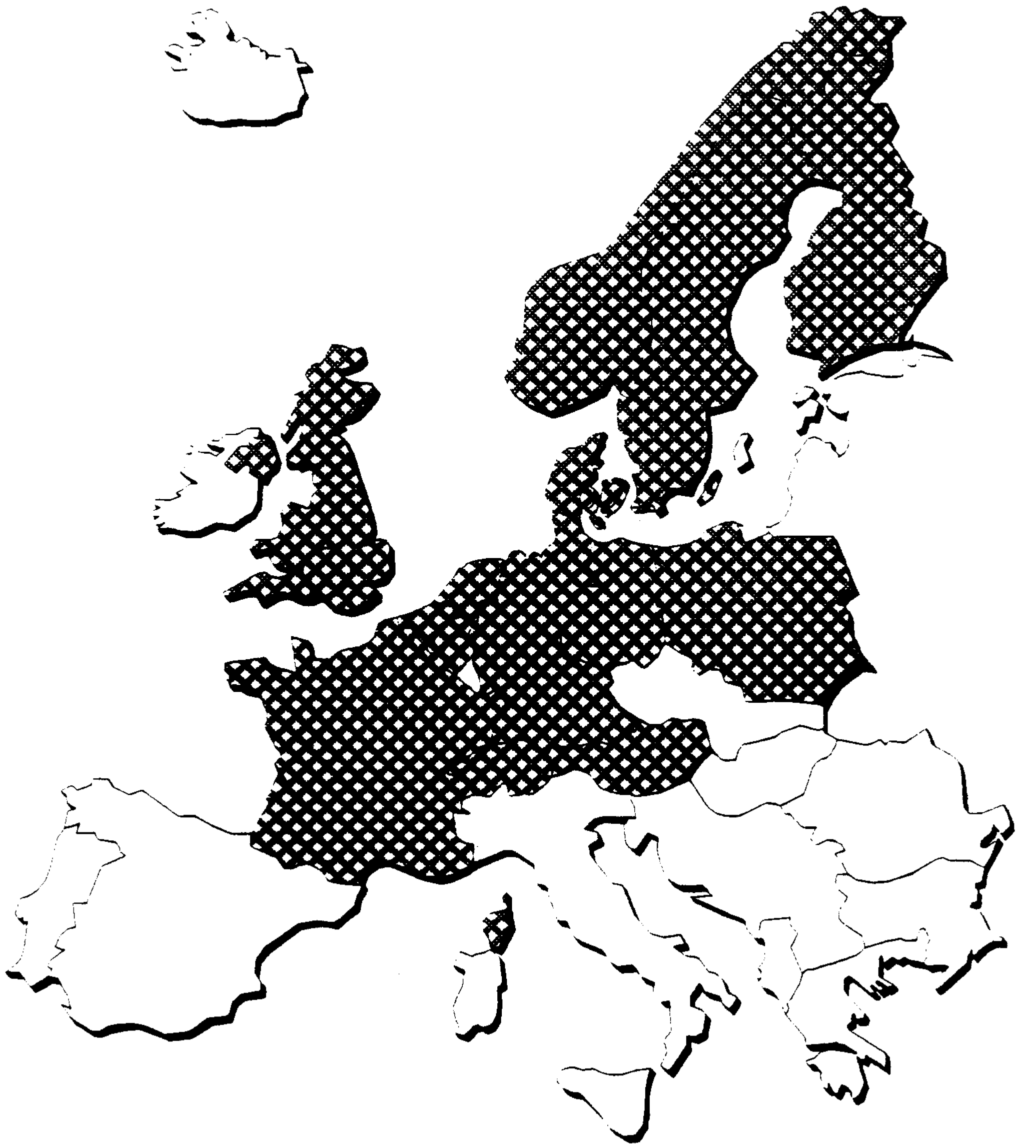
THE EGOWS 2 MEETING
PARIS, FRANCE, 18-22 JUNE 1991

COLLOQUE EGOWS 2
PARIS, FRANCE, 18-22 JUIN 1991



- METEO FRANCE -

TOULOUSE, DEC.1991

SUMMARY

FOREWORD

I have the pleasure to introduce here the second EGOWS meeting report, which summarizes the evolution of the activities of several meteorological centres in the framework of meteorological workstations. I also apologize for the late issue of this report, owing to disturbances related to the move of the operational service of METEOFRANCE from Paris to Toulouse.

The number of people who attended this meeting shows the interest of the meteorological community in this topic. The presentations as well as the demonstrations which took place during this meeting allowed to hold a fruitful dialog between people who have to cope with the same problems and to exchange a lot of informations. I thank once again all the contributors and express my wisches for the success of the various national projects concerning workstations. Finally I am confident that the next meeting will continue to play its part for exchanging ideas and experience.

Jean Coiffier

SECOND EGOWS MEETING

Paris 18 - 20 June 1991

List of participants

Josef CHARVAT (Austria)

A QUINET (Belgium)

Jacob BROCK (Denmark)

Kurd CHRISTENSON (Denmark)

Jens DAABECK (ECMWF)

Sylvie THEPAUT (ECMWF)

Paul COWLEY (U.K)

Lars WINBERG (Finland)

Gerhard SCHMIDT (Germany)

Wolfgang KUSCH (Germany)

Rund IVENS (Netherland)

Anstein FOSS (Norway)

Stanislaw KOZLOWSKI (Poland)

Przemyslaw IGNATOWICZ (Poland)

Gunnar BERGH (Sweden)

Bo LINDGREN (Sweden)

Roland MUHLEBACH (Switzerland)

Peter ROTH (Switzerland)

Isabelle SCHMIDELY (France)

Marie-Françoise VOIDROT (France)

Claude BERTHOU (France)

Jean COIFFIER (France)

Alain FOIDART (France)

Geir AUSTAD (Norway)

Robert GOURIOU (Lannion)

PRESENTATION OF THE EGOWS GROUP

The french meteorological service METEO-FRANCE organized in Paris from the 18th to the 20th of June the second EGOWS annual meeting. According to the resolutions which were taken during the Oslo meeting, it was decided to propose to participate to all the ECMWF member states. Owing to the interest that all the services take to develop meteorological workstations a lot of countries sent representatives in Paris : Austria, Belgium, Denmark, Finland, Germany, Norway, Sweden, Switzerland, U.K.. ECMWF was also represented. Ivens Rund from Netherland could not attend the meeting but proved his interest by sending a contribution which is enclosed here. Following an unformal contact between the directors of our national services, Polish representatives were able to attend this meeting.

On behalf of the Director of METEO-FRANCE, J.P. Bourdette, deputy director of the SCEM welcomed the participants. After approving the agenda and the way to organize the demonstrations J. Coiffier, acting as chairman for this meeting recalled the creation of the EGOWS group and its objectives as follows.

The participants of the Oslo meeting (Finland, France, Norway, Sweden and ECMWF) have agreed to a common concept of Meteorological WorkStation MWS allowing several functions.

- Access to all types of meteorological data and their visualization : messages, plotted observations, satellite and radar images, fields from NWP, elaborated maps, climatological databases.

- Postprocessing and display of the results : interpolation from NWP fields, derivation of additional parameters, trajectories, image manipulation, dynamical or statistical interprétation, verification procedures.

- Dissemination to end users of the products : this function might be included in a MWS but was not discussed.

Several recommendations were formulated about the expected functions of operational MWS :

- Importance of a short response time (less than two or three seconds) ;

- Interactive diplay of observations and other sources of meteorological information ;

- Interactive postprocessing and display of all the products issued from NWP (including cross-sections and meteograms)

- Image manipulation (superimposition, animation, zooming)

- Two-dimensional graphical display is the main purpose of operational MWS but extensions toward three dimensional one are welcomed ;

- Need to give to the forecaster an easy user interface based on icon representation and mouse or equivalent equipment for interactions ;

- The importance of a modularity with clear separation between data handling, graphics and user interface.

No recommendations were formulated concerning the hardware platforms whose characteristics rapidly evolves but there was a total agreement on the need to develop MWS software based on firm standard among with can be mentioned :

- GRIB and BUFR WMO codes for data representation ;

- SQL to access to organized databases shoud be investigated;

- UNIX which is the most common operating system on workstations ;

- FORTRAN ANSI-77 and C languages (C++ for object oriented applications) ;

- X-Window system for visualization ;

- Standard products like MOTIF/OPEN LOOK as toolkits to develop user interfaces.

The participants of the Oslo meeting decided to form an unformal working group EGOWS (European working Group on Operational meteorological WorkStations) to promote development of MWS for weather monitoring and forecasting .

The objectives of this group are the following :

- Promoting cooperation between meteorological organizations in Member States of ECMWF in the field of MWS ;

- Serving as a medium for exchange of information between the participating organizations.

In order to fulfill the objectives it was decided to focus on the following activities :

- Meetings to favor the exchange of information between people who tackle the same problems in a rapidly changing technical environment ;
- Exchange of computer code ;
- Exchange of people working in this field ;
- Establishment of projects between two or more countries.

NATIONAL CONTRIBUTIONS

Austria

At the Austrian weather service we received in January 1991 two SunSparc IPC colour Workstations for test purpose. We installed a prerelease of the UNIX Version of MAGICS 3.0 and adapted it to our Databaseformates (ECMWF direct modeloutputs and derived quantities from our postprocessing, Synop-, GTS-database) as a starting point for visualization of forcastefields and surfacecharts.

The next step is to develop a Sun GKS based interactive applikation that enables the forceaster to display , superimpose and animate various fields and surface charts. The possibility to overlay the fields with satellit or radar images and a feature for drawing fronts and symbols with the mouse are also strong requirements. First tests with the new SunGKS implementation on XVIEW (Sun's X Toolkit with OpenlLook as Userinterface) have shown, that it is possible to do the animations in GKS by using the doublebuffering feature of SunGks . For the development of a OpenLook style userinterface for a GKS application is also possible to use the graphical userinterface builder GUIDE , a great help for tailoring the Userinterface interactively without writing code. Overlaying fields with satellite-images in GKS , that means mixing a GKS display with an Sun- rasterfile , caused troubles due to the different colour lookup-tables .

Plans for 1992 :

1) solve the problems and try an operational version of the application

2) planning how to port our databases from NOS/VE (Cyber 860) to a UNIX environment (taking in consideration the metereological standards GRIB and BUFR.)

Demo : display , zooming, superimposition and animation of forecastfields was demonstrated on a SunSparcstation 1 (made available by METEO France)

The use of Meteorological Workstations at The Danish Meteorological Institute

as per end of June 1991

Jacob Brock

On the 1st of January 1990, the Danish Meteorological Institute was formed by joining the three previous meteorological services; the ordinary, the civil aviation and the military aviation meteorological offices. Each of these had their own set of computers, based on the concept of one or more central machines with terminals attached. Also a few PCs had found their way into the collection, but they were mainly used for specialized purposes in dedicated equipment.

Once the three organizations had been joined, a common development trend had to be found. The prerequisites on the hardware front was, amongst others, a Convex supercomputer running Unix, a VAX cluster running VMS and a number of dedicated display systems for the display of satellite images, radar images, synops, other kinds of observations and so on. In the new configuration, the supercomputer was intended to run numerical models, the VAXes to take care of all external communication, and a number of small computers to take the part as front-end towards the users.

The aim was to get a simple system, based on few hardware platforms and operating systems with which it would be easy to get output on an interactive screen or as hardcopy. The main intensions were to avoid some of the "paperwork" by limiting the large number of plots generated every day, and to unify the user interface by having one system with all applications instead of a different machine for every application.

The requirements to the new machines were comprehensive. They would of course have to support interactive graphics. They would have to be sufficiently powerful to display animated sequences of images from Meteosat, handle the vast amounts of data from NOAA, have fast graphics for displaying models outputs, and be able to operate in multiuser mode for fast access to different sources of data. In short, the new machines should be able to cater for the combined functionality of all the existing, dedicated systems.

The change to new hardware was also seen as a possibility for achieving some standardization in a number of areas such as programming language, communication, data formats and user interfaces. Especially the possibility of getting away from hardware dependent implementations was an important issue.

X-terminals, large PCs and workstations were considered to be used as the new machines. Ease of system administration was in favour of X-terminals, but they were the first to be left out, mainly for network load reasons. Price and knowledge of the machines worked in favour of PCs whereas performance and ease in networking was in favour of workstations.

In the spring of 1990, a SUN workstation was bought for testing by the research department. As this machine turned out to have a reasonable capacity for displaying graphics and doing some number crunching, some more were purchased and one of them was put into the weather service, where a very urgent storm surge warning program was implemented on it.

Somehow a decision was taken in favour of workstations, and by the end of the year, some twenty workstations were in use.

Next step was to make a decission on which user interface to choose. Motif and XView were the two possibilities, and from a standardization point of view, Motif would probably be the better. But XView was readily available for the SUNs, and it was possible to buy an interface builder. So on the grounds of fast development, XView won this race. One rather big disadvantage of XView is though, that it is not compatible with GKS.

A development scheme for software was put up, and roughly it contains three steps:

1. Porting existing systems to look-alikes on the Workstations
2. Standardization of data formats, file transfers, process control and management
3. Improvement and redesign of products, capabilities for overlaying different products and in other ways use results from different programs in a combined way.

This scheme is a little back to front in delaying a proper system analysis, and hence a definiton af dataformats and -flow, until after doing quite some coding. But the real world is often cruel to system designers. The purchase of more than twenty workstations is quite an investment. This in turn implies that they will have to be used in the operational weather service as soon as possible, as this is the most evident place of production at a meteorological office.

So we jumped straight into an implementation phase, and even here sorted applications according to which ones would be the quickest to get running.

The status of the workstation project from an operational weather service view is as follows:

Existing programs:

- Analysis and prognosis display (fixed) from HIRLAM and ECMWF on a fixed number of fields. Programs based on PostScript and NeWS (Network extendable Window System).

- Animated, qualitative display of reprojected Meteosat images
- Storm surge program for the prediction of high water levels in the North Sea coastal areas.
- Simple textual access to synops and metars
- Simple trajectory program

In development:

- Precipitation radar images with animation
- Weather maps for newspapers
- NOAA satellite image display
- Road condition prediction

Planned:

- Improved storm surge program
- Lightning strike detection

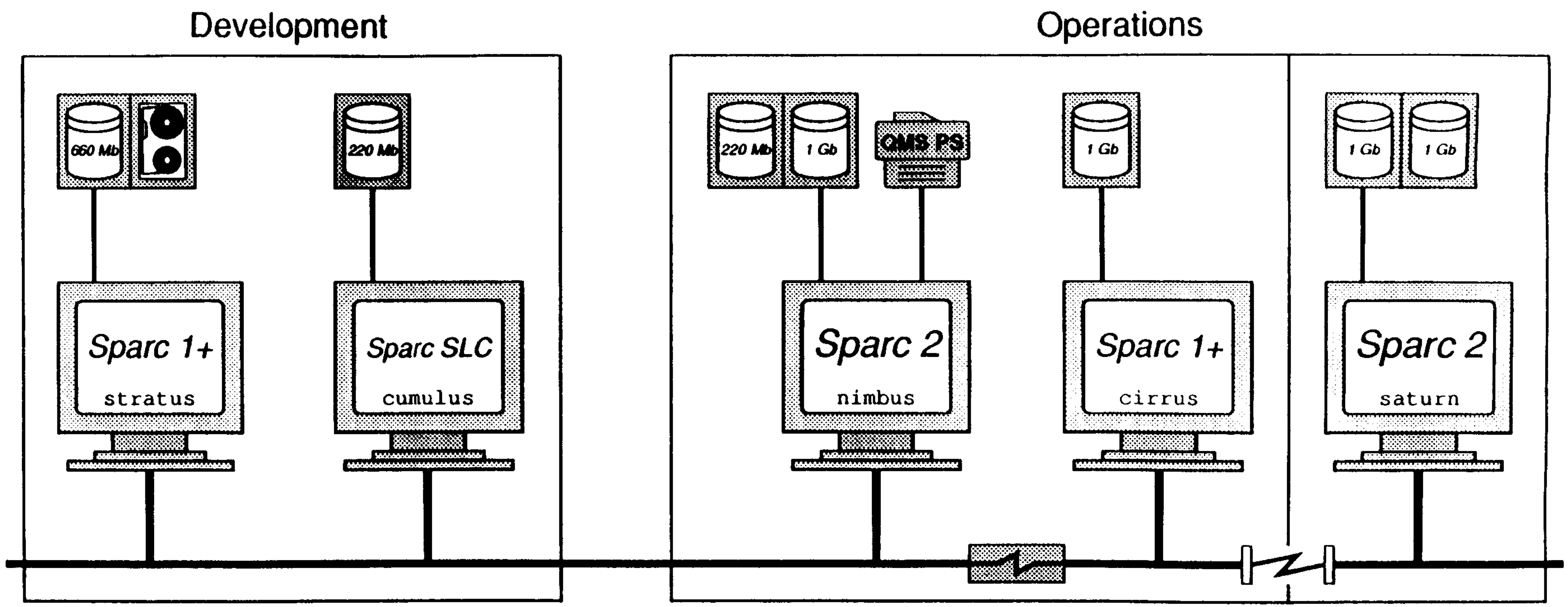
At the moment, there are two major exceptions to the objective of keeping to standards. One is the use of GKS in the Storm surge program, which is therefore running under SunView. But as this program was developed before XView was chosen as user interface, it is hardly a break of rules, and an upcoming revision of the program will eliminate the use of GKS. The second is the use of NeWS in the display of numerical models. NeWS, which is a superset of PostScript, is only implemented on SUN workstations. But as we had to develop PostScript files for printing anyway, it was too tempting, not to skip several weeks of development work and use these files on the screen as well. Apart from this, we are sticking to X and XView, and PostScript for hardcopies. C and Fortran are used as programming languages.

Three machines are running operationally, two at the main office in Copenhagen and one hooked up on a 64 kbit permanent line at Kastrup (Copenhagen Airport). (See the configuration plan attached). Very shortly two more will be going into the central office operational weather service and a third into the ship routing service department. Later on a number of work stations will probably be placed at regional offices in the same way as the Kastrup machine. Apart from these, there are two workstations used for development work in the weather service, and nearly 20 workstations in the EDP-department and the Department of Reasearch and Education.

To get a maximum of operational security, all current data are copied onto each operationel workstation, and it should be possible to run any dataproducing

SUN software on any workstation. This ensures a great deal of insensitivity to the breakdown of a single machine.

At the moment, we are in the middle of a turbulent development phase. Our goal is not to develop "The Ultimate Meteorological Workstation" - at least not at the moment - but to develop a number of good tools for the forecaster to use. And although there is a long way to go, we are on the move, and hopefully in the right direction. Late autumn we plan on going into phase 2 of our development plan, doing an analysis of the work done so far, and not too far into next year, we will hopefully be starting on phase 3.



SUN configuration
Weather Service
June 1991

FINLAND

General

The meteorological workstation project was started at FMI in winter 1986/87 by studying some potential hardware. DEC's GPX workstation was selected as platform for the project. When Turku regional centre was established in June 1987 the first production version with a limited set of functions was installed there. In June 1991 the MWS was running at

- the national meteorological centre
- 7 regional meteorological centres
- the University of Helsinki
- the Radiation and Nuclear Safety Centre
- the Scientific Centre

Most of the MWS's are VAX 3100 workstations but a few are still of the older GPX model. The VMS operating system is used. All applications have been developed by FMI staff. The user interface is programmed using DEC's graphical UIS library (incl. windowing). This nonstandard solution restricts the portability. The programming language is VAX Fortran.

The presentation of meteorological data on the screen is controlled by the mouse. Typically a descriptive icon is clicked with the mouse to show desired data or to change some presentation aspect. Different functions are dedicated to each of the three mouse buttons. Some functions use hierarchially organized icons. No command language is needed. The intention was to make the interface as user friendly and as easy to learn as possible. For example, a context sensitive on-line help facility in one of three languages can be activated for most windows.

Data

Conventional observational data is available 24h backwards and numerical forecasts 10 days onwards. For trajectory calculating also objective analysis for the last 10 days are stored. The screen is automatically updated when new data arrives. The data base includes

- surface SYNOP observations
- upper air soundings
- METEOSAT IR images
- NOAA IR and VIS images (not an integrated part of the MWS)
- weather radar images from three Finnish radars

- numerical forecasts from ECMWF and HIRLAM (within a few months also Bracknell, Offenbach and Washington):
    - classical direct model fields
    - interpreted fields (cloudiness, significant weather etc.)
    - computed images (pseudo satellite etc.)
    - manual analysis from other regional centres

Functions

- superimposing of all data categories in different scales
- scanning through time for various displays
- any combination of SYNOP parameters:
    - colour coded when only one or two parameters chosen, all stations shown
    - traditional plotting when more than two parameters chosen, observation density depends on presentation area
- subjective drawing (analysing) on the screen by mouse:
    - different line thicknesses, colours and shading patterns
    - possibility to start from numerical forecasts as first guess, the contours of which can be replaced
    - distribution of analysed charts to other workstations incl. regional offices
- 3D trajectories from or to a given geographical point
- up to 10*10 subwindows for numerical fields (comparison of different models):
    - definition of products (parameter combinations) from screen and storage for future quick use
- presentation of individual SYNOP reports as
    - standard WMO drawing models
    - plain language texts
    - one day graphs
- presentation of TEMP reports as
    - diagrams with optional adiabats
    - plain language listings
- paper output of the presentations (incl. own analyses) on pen plotter, colour ink jet or laser printer

Future development

In connection with the MWS development a project has been started which aims at providing the users with easy and standardized accesses to the various services. The work has begun with programming the interface surface to the data acquisition. The structure of the functions is modular and clearly separated from other services, such as graphics. Figures 1-3 show how the end-user, the application developer and the system developer, respectively, will be interfaced to the system. The new modules have been programmed in C language and the developing work is performed on different platforms (VMS, PC, Mac). Also object oriented coding in C++ has been considered.

All numerical products are currently stored in GRIB format. The BUFR code is planned to be used on the MWS for at least new forms of observational data. The ORACLE relational database system has been installed for climatological data.

There are plans to rewrite the MWS modules to use standardized windowing practices (X-windows) but no decisions have yet been made. It is also possible that FMI in the future will make use of UNIX workstations as MWS's. The converting job will, however, be a major task, because the VMS expertise is so dominating at the institute.

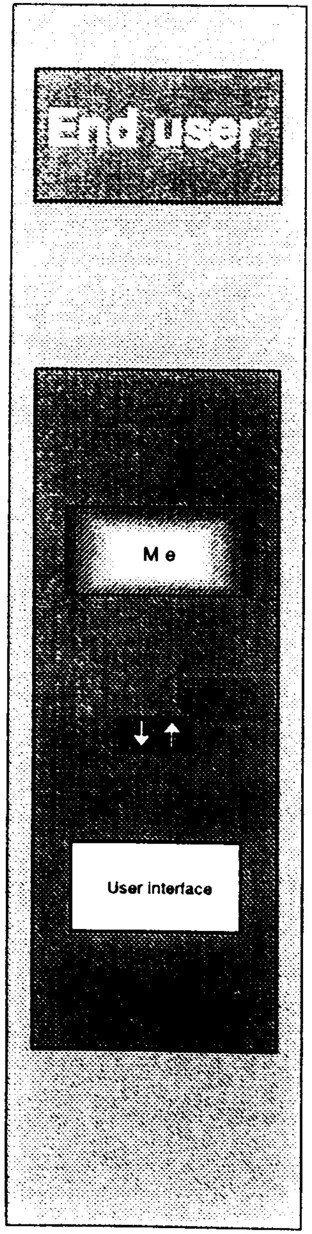


Figure 1

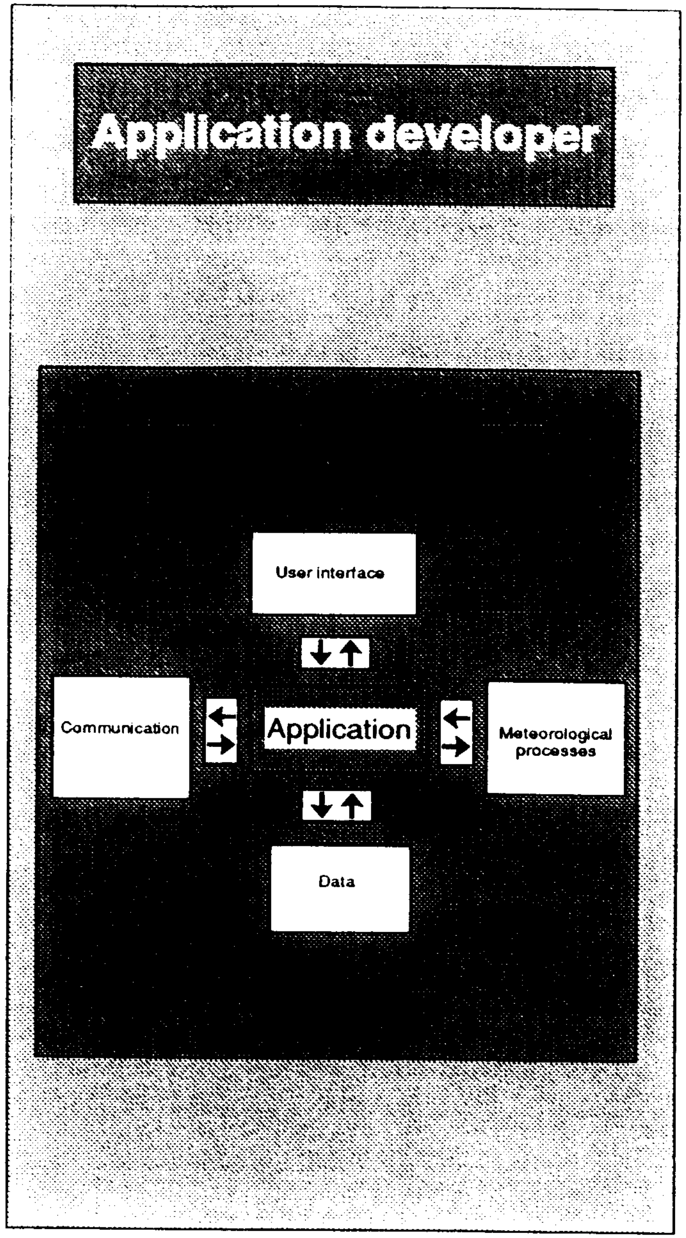


Figure 2

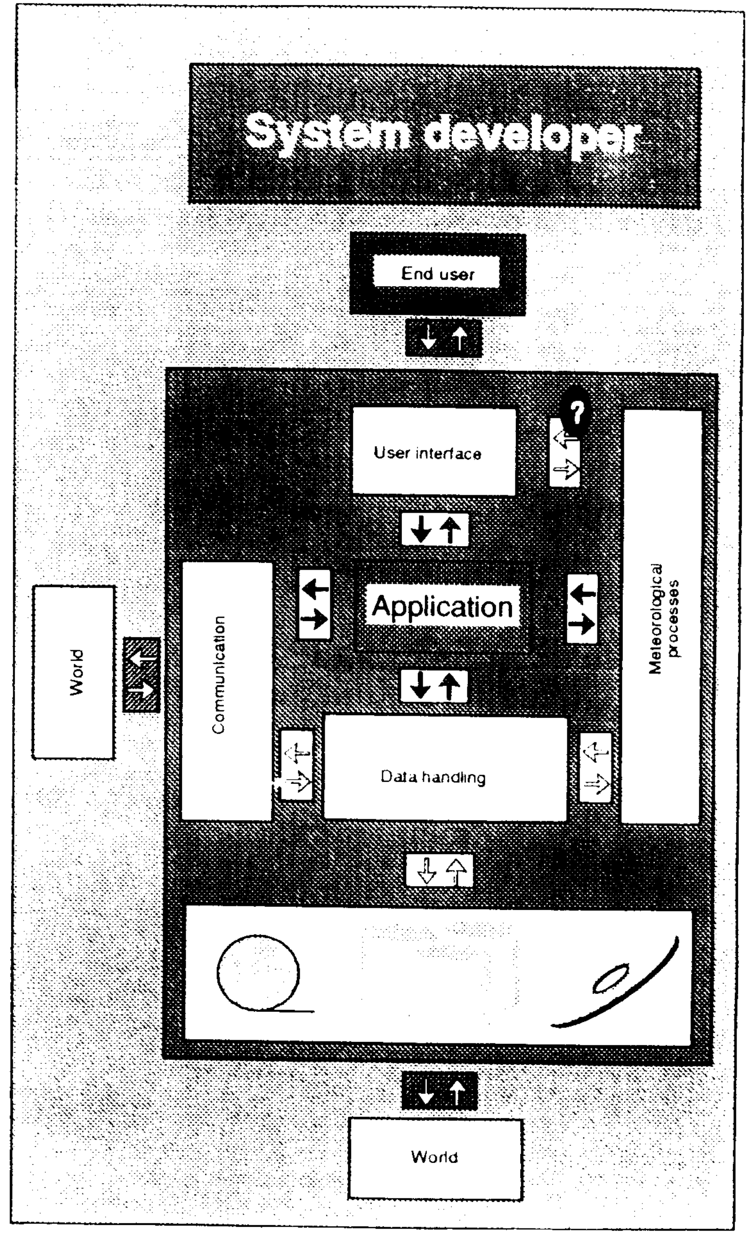


Figure 3

SYNERGIE : A WORKSTATION FOR OPERATIONAL WEATHER MONITORING AND FORECASTING

Marie-Françoise Voidrot-Martinez
Claude Berthou
Isabelle Schmidely
Meteo France
Toulouse, France

Summary : Synergie is a French project of meteorological workstation for weather monitoring and forecasting.
The goal of the Synergie project is to provide forecasters with the whole available information (particularly any kind of graphical images), to help them to select, display and combine the various sources of information, to assist forecasters in producing final products (charts, messages) and to facilitate the man-machine communication through a friendly user interface.
The first step of the project, called Synergie_0, was to implement a reduced set of functionalities in order to replace old systems in the regional centers and to begin a concrete dialog with forecasters. We hope this step will help our end-users to learn how to use a modern workstation, to understand what they can expect from a machine and what they cannot, and that it will maybe start a graduated evolution in their working habits.
This sub-project is planned to end in december 91.
For the present, forecasters can display observation plotting, vertical profiles, chronological evolutions for one parameter and very soon model outputs. We also implemented an alarm system to inform them in case of special phenomena.
From a technical point of view we use UNIX, C, ORACLE for data base management, MAGICS as often as we can, X-Window and Motif for the user interface.

1. INTRODUCTION

During the last few years, forecasters were the witnesses of an explosion of the amount of data they have to deal with due to many technical innovations. Forecasts improved already a lot but we reached a new locking because of the strict constraints of time forecasters have to respect. Recent hardware improvements make it possible now to design, at a very reasonable cost, a system able to help forecasters in their daily work, without requiring from them to be computer science specialists or to memorize magic formulas.
Several projects in this way emerged from different national services, Synergie is the name of the French one.

2. SYNERGIE

2.1. Objectives of the project

The aim of Synergie is to provide forecasters with an integrated interactive workstation.

Integrated because it will allow forecasters to accede to all types of information : observations, output fields from numerical weather prediction models, satellite and radar images, messages, charts or graphics issued from foreign meteorological services, climatological databases and mail.
It will offer classical functionalities of superimposition, animation, panning and zooming and some assisted drawing tools. It will allow local postprocessing, reprojection and emission to end users.
Interactive because we think the user interface has to be very friendly and the response time very short. The purpose is not to make a computer science gadget with a long string of menus to change colors or line types but to provide forecasters with what they really need for their daily work. Of course they should be able to customize for instance their graphics but the user interface has to be designed in a hierarchical way according to the usual activities of the users. At last, the forecast departement staff is numerous (because it works 24 hours a day), it has a big turnover and so the training has to be as short as possible.

2.2. Strategy

We chose to use standard software :

- UNIX as operating system,
- C, Fortran and maybe C++,
- TCP/IP protocols for files transfers,
- X-Window and Motif for the user interface.

We decided to use meteorological standards too, such as GRIB and BUFFER codes and to use MAGICS as often as possible.

At last we will use a DBMS to manage data.

In order to facilitate the dialog between forecasters and the development team, we decided to implement as soon as possible some basic functionalities and to install a machine at the forecast departement. We call this sub-project Synergie_0.

The whole project is planned to finish at the end of 1993.

2. SYNERGIE_0

2.1. Objectives of the sub-project

The goal of this sub-project is to provide forecasters with a reduced set of functionalities but with real time data in order to involve them in the development of the Synergie project.
The functionalities are :

- Observation plotting,
- Vertical profile display,
- One parameter chronological graphs,
- Alarms,
- Model output display,
- Messages display.

This subproject is planned to end in december 1991.

2.2 Development state

We installed a Sun sparc 1+ machine at the forecast department at the beginning of October with observation plotting on a restricted-area around France, vertical profiles all over the world, and one parameter chronological graphs over the world too, for up to 10 day graphs.
We hope to implement very soon model output display and alarms.

The user interface is based on Motif but is still rough because we offer for the present too poor functionalities to design a really sophisticated interface. It was designed with an interface generator called X-Designer.
At a given time, only one board of document definition is visible on the screen but several documents can be displayed. The user is responsible for cleaning the screen (of the documents he asked) the same way he is responsible for cleaning his desk. He can minimize the size of the documents or iconify them if he wants to keep them for a while or he can destroy them just as he throws papers to the dustbin.

Each time he asks for a document the application generates a process and he can ask something else while the first document is being elaborated. As soon as a process is created a small window appears on the screen with a clock as cursor to confirm that the command is in progress.

The data are managed with the data-base management system Oracle. All the data we receive are completely decoded and put away in the data base.
The strategy should be different of course for imagery. For GRIBs, we will test two strategies depending on the choice between keeping them coded or decoding them.
Our tries revealed that the performances of Oracle depend greatly on the customisation of the DBMS relatively to the data structures. Hopefully the DBMS offers tools that help a lot for this work.
Up till now response time is still suitable.

2.3. Users feedback

We let a grievance notebook near the workstation, and we consult it very often in order to debug, upgrade the application or just answer to the remarks as quick as possible in order to encourage forecasters to go on giving their impressions.
Until now there were 3 types of remarks :

- some about the windowing system always more or less about the same point : How to grab a document which is under a stack? The problem in fact is that the desk metaphor has some limits : one can have up to thirty or fourty documents on a large desk, it is hard to manage such a number of windows on a screen, all the more that the user is more patient to look for a paper with his hands than he is to look for a window via the mouse.
It could be possible to give tools to help the user to find more quickly a window (put all the windows of the same type in piles or grep windows with hints...). But the solution would rather be to train them to clean their screen very often. If the response time to get a document is good, it will be easier to create it again than to look for it across the screen.
That is maybe the first evolution in the forecasters way of working we can expect from Synergie_0.

- The second type of remarks is about little graphics options (like fonts or colors) : this is the type of upgrade we try to make very fast.

- At last they ask for new functionalities and we think that this is a good point.

We let a user guide of five pages near the machine and presented the system only once to the forecasters that were on duty at that time ; nobody else asked us how the system was working and they seem to use it : it is a proof of the "plus" of graphical user interfaces.

3. FUTURE DEVELOPMENTS

Until January 1992 we plan to finish the Synergie_0 sub-project and to make the global analysis of Synergie.
1992 and 1993 will be dedicated to the detailed analysis and coding of the project. The integration will be made by the end of 1993 and the beginning of 1994.

An

Interactive Graphical System

at

Deutscher Wetterdienst

Offenbach/Main

W. Kusch, G. Schmidt

June 1991

1. Introduction

More than 10 years ago, in 1979 at the center at Offenbach, the first attempt was made to use graphical terminals as a display-system to show meteorological output to forecasters. During this year observational and forecast data were displayed in graphical form on a Tektronix terminal. No interaction was possible.

During that time a satellite data receiving and processing system was installed.

With this first experience, the following years were used to specify a new system. Within 1987 the first modules for an interactive production of "Significant Weather Charts (SWC)" were designed. The basic software (meteorological contents) was written by own staff, the graphical part by contractors.

Two workstations for the synoptic department arrived in early 1989, during 1990 the next two systems. Since that time all four workstations are fully in operational mode.

2. Target

- reduction of extensive use of paper
- presentation of observations and numerical model output, depending on weather situation
- computerized methods for monitoring, nowcasting and short range (e. g. computation of sounding parameter, instability indices, T-max forecasts)
- numerical model monitoring
- automatic and fast preparation of complex forecast charts (SWC)

3. The IGS-System

The so-called "interactive graphical system" (IGS) will be used for displaying and manual interaction with all kinds of meteorological data. That means observations and forecasts, satellite images, agricultural and climatological data. There are currently 14 workstations in use at the meteorological center at Offenbach/Main, 4 systems at regional offices. The following table shows the distribution within the departments:

4 Workstations	Dept. Synoptic
2	Regional Forecastcenter
3	Dept. Climatology
2	Dept. Research
1	Dept. Agriculture
1	Development
1	File Server, system monitoring
1	Regional office at Potsdam
1	Regional office at Hamburg
2	Development at Potsdam

All Systems are connected via ethernet, links to mainframes (Cyber, Cray) are available. In addition the satellite system and a plot spooler are accessible within this network. TCP/IP is the common media for data transportation.

3.1 Workstations

After checking the available systems a decision was made to use Control Data's Cyber 910, its manufacturer is Silicon Graphics (Personal Iris). Some technical highlights are:

computation power 1.6 MFLOPS
memory 16 MB RAM (32 Bits)
54 bit planes for images and overlays
resolution 1280 x 1024 Pixel, 19 inch color monitor
animation 10 frames/sec
disk subsystems 3 x 380 MB SCSI
streamertape 150 MB

3.2 Standards

- GKS, with an extension for fast pixel output
- UNIX (operating system IRIX)
- Fortran and C (Programming Language)

- only for special presentation of satellite images, especially for animation purposes, the silicon graphics library has been used, due to lack of speed when using pure GKS.

3.3 The IGS Concept

Due to the fact, that the same GKS-Version is installed on all computer systems within the meteorological office, every system may produce GKS-metafiles. Those files, after a pre-selected distribution, will be displayed on various workstations. With a first step, the metafile will be interpreted and stored as a single segment within the graphics system. Therefore, for any reuse this segment can be manipulated as a whole. For other products, like the significant weather chart or the surface pressure chart, the source data will be computed on mainframes, distributed as gridpoint files, and after interpolation on workstations, kept in memory as single segments. For displaying purposes therefore only segments will be switched on or off.

3.4 Satellite Receiver

When starting with the new IGS system, the old receiver has been replaced by two Microvaxes, including bit/frame synchronizer, disk subsystems and an archive tape. Datastreams from the two satellites (Meteosat and NOAA) are received and stored on disk. After transmission of a single image, the postprocessing starts. Only NOAA data will be manipulated on mainframes. Meteosat images are processed on microvax and workstation. Images - ready to display - are sent to various workstations on a time based schedule via fileserver. Those images are then ready to display within the IGS, using the GKS extention. Terminals dealing only with satellite images have a special program to do all the nessecary tasks for image manipulation. That means producing histogramms, enhancement curves, color editing, zooming/panning and doing animation to support televison service. Only for this task, GKS has not been involved, due to speed problems.

3.5 User Interface

All user interaction can be performed by using a mouse equipment, only for text input the user has to change to typewriter. Due to the fact, that most phrases and values are predefind within the menue box, the use of a keyboard will be the exception. Offering a submenue with data fields, only the available data will be shown. Therefore the choice is limited to the actual data pool.

3.6 Output Facility

GKS driver programs are available for various output devices, mainly laserprinters and electrostatic plotters. Those devices are connected to the network and accessible from all workstations.

4.0 Mainframes

A short overview for the available mainframes is given as an appendix. The Cray supercomputer (YMP4) is currently not used for IGS production, only numerical models are running on this system. The abbreviation "AFSV" stands for the connection to the GTS-Trunk, "SAT" refers to the satellite receiver.

5.0 Meteorological Software

At present the workstations are used for:

- displaying and interactive revision of satellite images
- interactive revision of thematic charts (significant weather charts, surface pressure forecast, newspaper charts)
- interactive evaluation of vertical soundings
- displaying of synoptic surface observations
- displaying of upper air data
- numerical forecast monitoring (BKF, GM, EM)

Image processing of satellite data will not be discussed in the following.

5.1 Significant Weather Chart

The SWC supplies information on enroute weather phenomena. The automated SWC is based on the output of the forecast model BKF. Stratiform and convective cloud tops and layers are calculated at every grid point. The construction of areas of similar significant weather is done by using a clustering algorithm. These areas are characterized by their appropriate labels, e. g. the average values of cloud tops, cloud bases, icing and turbulence intensities. In addition the chart contains tropopause heights, height of freezing level, jet-core and areas of clear air turbulence. The computing of the automated SWC is running on the mainframes. Data which are intented to be modified or revised interactively is sent to the workstation as a grid field. After interpolation all data, labels and significant features are displayed on the workstation. Generated on mainframes, analysis- and forecast fields, observations and satellite images are available as GKS metafiles on the IGS-system. These files are processed via GKS commands and can then be used as overlays. After the graphical presentation of the automated part, the interactive revision of this product starts. This process allows the user to modify, to move or to create and/or delete single elements of this map. Frontal systems will be included using the graphical editor. This editor enables the user to create and modify position and type of those items. The final SWC map will then be sent to a raster plotter and distributed to endusers. Since summer 1990 this product is in operational mode.

All these software modules are written in modular form and can be easily used for different kinds of thematic products.

5.2 Surface Pressure Forecast

For the construction of surface pressure forecast most of the above mentioned moduls are reused. The map includes the pressure field, frontal systems and area of cloudiness exceeding $^5/_8$ cloud coverage. The contouring of this field will be done on the work-station, so the forecaster is able to interact with the database by entering or changing "bogus" values. Modification of cloud areas and frontal systems is the same as in the previous mentioned SWC construction.

5.3 Newspaper Weather Map

Again, all previous components will be used to produce these maps for newspapers. In additon to pressure field and frontal systems it is possible to create and position temperature labels and pictographs, which characterize the type of weather. Both types of maps will be in operational mode until end of summer 1991.

5.4 Evaluation of Radiosonde Data (AUTOTEMP)

The software package AUTOTEMP was developed first for personal computers (XT/AT, MSDOS, IBM-GKS). After implementation of workstations at the center this system has been converted to UNIX and GKS (GTSGRAL). Since spring 1990 this version is operational at the regional forecast center Frankfurt and at the central office in Offenbach. It replaces the timeconsuming manual evaluation of vertical soundings. The output possibilities are the following:

- list of actual temps (soundings)
- height of pressure levels, extremes and vertical profile of the pseudopotential temperature
- precipitable water, LCL, CCL, surface and associated surface temperature, instability indices
- inversions
- freezing level and snow line
- danger of icing within clouds
- tropopause heights, clear air turbulence
- course of temperature starting with sunrise
- buoyant energy
- range and diurnal variation of convection
- temp lifting
- graphical output:
    - Stüve Diagram
    - Skew T-Log P Diagram
    - maps of non-interactive computed elements
    - Hodograph analysis

5.5 Diagnostic System

In this context one unterstands this feature as an open system. Since the beginning of 1990 it is in operation and development. Normally it should be called "Display- and Informationsystem", for historical reasons it was named "diagnostic system" (the first version was limited to compute diagnostic parameters only). At present the following data are included:

- observations
- analysis- and forecast fields (various models)
- diagnostic fields, e. g. vorticity advection
- satellite images
- trajectories
- meteograms (operational phase in preparation)
- cross sections (operational phase in preparation)

It is possible to superimpose satellite images and other products and to do animation on forecast fields.

6. Future Development

It is planned to equip regional offices with workstations and PC's. It is assumed that hardware prices will decrease and computing power increase, so it will be possible to adopt more mainframe tasks to those small systems. At this stage one is able to run local models on workstations to improve short range forecasting.

By adopting existing software moduls on regional sites, local requirements have to be incorporated. Especially for weather monitoring a local data base has to be provided.

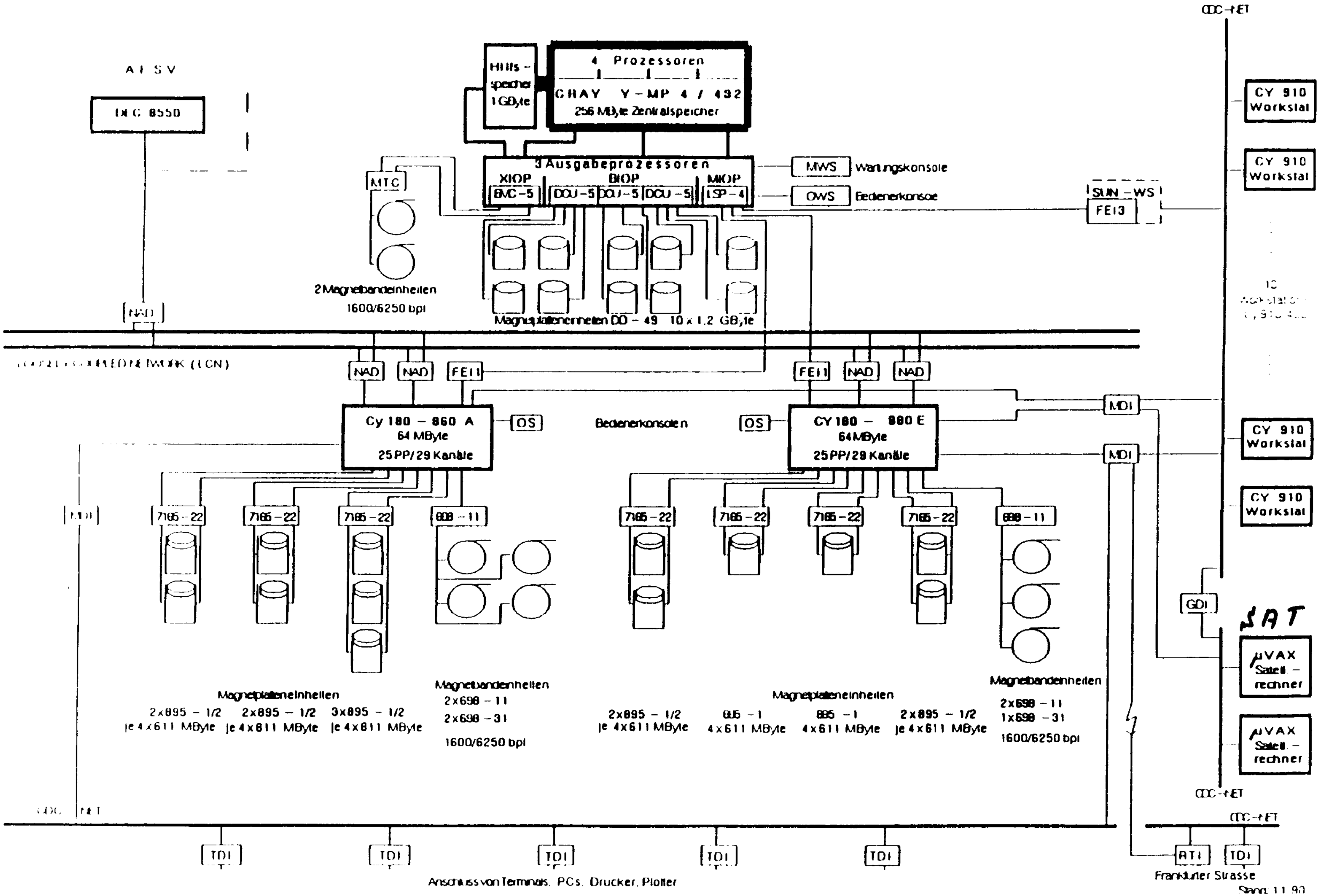
The basic concept for equipment at regional offices is:

- local network
- file server (backup for one workstation)
- two workstations
- PC's, depending on tasks at regional sites
- output devices (printer, plotter)

Data transfer will be done by using telecommunication networks, like Datex-P, private lines, highspeed networks for limited user groups. Data types will be WMO-bulletins, metafiles, CGM-files and satellite images (instead of local satellite receivers, PDUS).

Generally it is planned to extend the construction and revision of thematic maps. Further projects are concerned with automated low level SWC and the display and information system.

METEOROLOGISCHES RECHENZENTRUM



Summary of the Presentation at the EGOWS-Meeting in Paris on 19th of June 1991, Given by P. Roth from the Swiss Meteorological Institute

HARDWARE

At present, a meteorologist at the Swiss Meteorological Institute (SMI) receives his information from a mainframe computer - a SIEMENS 7.570 XS computer, running the BS2000 operatingsystem - and from some stand-alone systems (e. g. satellite and radar images, plots form MicroMAGICS, etc.).

Between the years 1989 and 1991, an office automation system based on SUN-workstations (SUN-WS) has been developed. This system became a general platform for office automation and meteorological applications. It is realized as a client/server system, linked by a LAN to the mainframe computer. At present, three servers (two SUNserver 490 and one SUNserver 330) and 81 workstations (different types such as SPARCstations 1+, SPARCstations 2, IPCstations and SLCstations) are installed. Finally, we will have more than 100 workstations.

Until 1996, the mainframe system will be detached in its single components and will be integrated together with the stand-alone systems in a large network. Particulary, there will be:

- the data acquisition system ANETZ (the computer-contolled data acquisition system for the Swiss meteorological observation network)
- the data acquisition system ENET (a new system, in addition to ANETZ)
- a communication-computer (GTS, MOTNE, ECMWF)
- a short-time database (up to 48 hours) as an information system for the weather forecast
- a long-time database with an archive system (disc array, tape robotor)
- a receiver for satellite images (Meteosat and NOAA)
- a receiver and composite-computer for radar images (actually there are two Swiss radars, later we will have three)
- the SUN-WS system, including a server for general applications (e. g. MAGICS)

These systems will be linked by a LAN (ETHERNET or, if necessary, FDDI) and running the TCP/IP protocol. The network will be located at the main office of SMI at Zurich and the regional offices will be linked to the system by a WAN.

One goal of this plan is to get only one platform for the users, the SUN-WS. Therefore, all our applications - new ones as well as old ones - will have to be installed on the SUN-WS. The working places for the forecasters will be equiped with a workstation which will serve two or three colour monitors. One of these monitors will be equiped with a high performance grafic-accelerator (e.g. for an animation of satellite images). For hardcopies, black/white printers as well as colour printers will be available.

SOFTWARE

In a first step, a software for visualizing satellite images on our SUN-WS will be developed by an external company. As soon as it will be delivered, the SUN Version of MAGICS will be installed and some applications will be written with this software (among other things an animation program). The further steps are not defined yet (in some cases, it depends on the date of the realization of the hardware installations).

At present, we are running our programs under the grafical user interface SunView as well as OpenLook, but in the future, we will use OpenLook only. Today, the following software is installed on the servers to solve our tasks:

- Operatingsystem SunOS 4.1.1
- Programming languages: FORTRAN 77, PASCAL and C
- SunGKS (Version 3.0)
- Some modules of the UNIRAS-library
- Program UNIGRAPH + 2000, a 'Point and Click'-program from UNIRAS (DK) for visualizing a large amount of data (2D-, 3D- and 4D-figures)
- Database system INGRES
- FrameMaker (software for electronic publishing)
- Wingz (a spreadsheet)

THE UNITED KINGDOM

The UK delegate started by explaining that the person originally nominated to attend, Heather Tellam, was unfortunately indisposed and he was attending in her place, although he was not directly involved with developing operational workstations. His area of interest was the use of graphics on Personal Computers (PCs) to provide very cost effective imagery to the forecasters. He outlined the range of computer graphics being used operationaly as well as the workstation project that was in an early stage of development.

The United Kingdom Meteorological Office (UKMO) has a hierarchical structure of forecast offices, with differing graphical support to each type of office. The Central Forecast Office (CFO) at Bracknell is provided with IBM 5080 systems as the main soft copy graphics facility. These terminals are channel-attached to the IBM mainframe. The 5080 graphics routines were written in Assembler and are called from FORTRAN applications programs; a substantial range of products is now available. Applications include aerological diagrams, animated forecast wind fields, fine mesh forecast contour charts and satellite imagery. It is possible to overlay satellite pictures with NWP output. IBM AT-GX PCs are also used to display NWP products.

In contrast with the interactive systems mentioned above, a PC-based graphics system has been introduced to CFO. This Image Creation and Routing System (ICARUS) gives each forecaster the facility to switch instantly between up to 16 channels of simultaneously generated computer graphics video. Each forecaster has a colour monitor and channel selector keypad connected to a central video router. The inputs to the router are provided by a variety of computer systems, principally a series of PCs, each of which can generate one or two pictures simutaneously. The pictures include a METEOSAT N Atlantic IR sequence running at 4 frames per second, a radar rainfall sequence for the whole of the British Isles, SIG WX, and surface wind reports plotted as temperature-coded wind arrows. The PCs are linked together by a local area network (Invisible Network) to 2 communications PCs that are also connected to the UKMO Central Data Network. This thick wire DECnet links together most of the UKMO computer system. Slides were shown of screen-shots.

The Principal Forecast Offices (PFOs) at RAF Headquarters Strike Command (HQSTC) and London Weather Centre (LWC) are provided with a rather old system called OASYS. this comprises a pair of closely coupled DEC PDP 11/60 minicomputers that share two hard disk drives. The main function of OASYS are the generation of automatically plotted charts and the display of graphical information using the Dowty Graphics Supervisor 214 controler. The OASYSs are now satured with tasks and a replacement system known as OASYS 2 (and also Horace) is now being planned. The first OASYS 2 system will be installed in PFO HQSTC, followed by one for the CFO. It is too early to give information of the technical details of OASYS 2, but the Operational Requirement being discussed with potential suppliers includes 6 graphics workstations running off a local file server; these will be used by the forecaster. Monochrome and colour hard copy facilities will be included. Data for the system will come from a communications processor that is directly connected to the Communications Centre at Bracknell.

The UKMO is requiring that the OASYS 2 will use internationally accepted open stantards;these include UNIX, GKS, CGMs,X-Windows and Motif Open Look. Applications will be written in ANSI FORTRAN. Benchmark testing of possible solutions are being carried out at the present time. It is recognised that the OASYS 2 project is a major undertaking, and there will be tight project control, covering software development, documentation and system design for which CASE tools will be used.

The Outstation Display System (ODS) continues to be installed at a large number of airield forecast offices and provincial weather centres. This is based on a DEC Micro Vax 3300/3400. The minicomputer has a custom-designed data base which receives data from Bracknell over a dedicated ODS broadcast. The graphics displays and controllers were supplied by Sigmex. The user interface for the ODS graphics system comprises a series of selection on-screen menus; items are selected with a puck and graphics tablet. The complication of a windowing environment has been successfully avoided through very careful design. Forecasters were consulted throughout the development period and upgrades to the software reflect feedback from the outfield forecasters. It is thought that applications code written for ODS should transfer with little difficulty to OASYS 2, as it has been written in FORTRAN, using Sigmex's GKS implementation. Photographs of screen-shots were circulated at the meeting.

The final computer graphics system described was the Meteorological Information System (MIST). The purpose of MIST was to demonstrate the potential use of cheap computing equipment and serial communications lines to provide dispersed RAF squadrons with a remote briefing facility. A demonstration system was installed at RAF Marham in 1990 after a development taking around 9 man months. All the software was written in Borland Turbo Pascal running under MS-DOS v3.3, using the Turbo Pascal Database toolkit and Blaise Asynch Plus to control communications. The software has undergone development since then and another MIST was installed at an RAF airfield this year; it is planned that MIST will be used by some British Forces in Germany and also by the Offshore Industry based at Aberdeen, Scotland. The MIST system was described, with slides of screen-shots. At the forecast office there are 2 PCs a communications PC that receives the same data stream as ODS systems, and a forecaster PC. Each remote user is provided with a PC and sometimes a printer as well. the remote PCs receive a selection of data from the communications PC along with information supplied through the forecaster's PC. The data are held in the PC's local data base. As with ODS, the user may select what information (colour states, radar rainfall, satellite images, tabulated METARs, TAFFs, and so on) from an on-screen selection menu. The pointing device comprises a mouse. No keyboard is supplied to te user.

ECMWF

EGOWS' 2ND Workshop Report

ECMWF

In additions to the developments mentioned in last years repots:

MAGICS

The MAGICS package now supports symbol plotting, contouring with solid shading, based on Conicon 3, and observation plotting from BUFR files. Recently, plotting of curves and bar charts have been added (see also ECMWF Newsletter Number 55, September 1991). The WMO GRIB Edition 1 is now supported and the BUFR decoding is being replaced with a more efficient version.

At ECMWF, MAGICS is used on Cray/UNICOS, VAX/VMS, SUN SPARC and DECstations/ULTRIX.

MicroMAGICS

MicroMAGICS/PC 2.0, developed by CPTEC/INPE in BRAZIL, is undergoing final testing at ECMWF. It supports visualization of meteorological fields stored in GRIB format and satellite image data stored in the extended GRIB format. Currently, the support for observations in BUFR format is being added to MicroMAGICS/PC by INPE/CPTEC.

A version of MicroMAGICS has been developed for the sun workstation. It has capabilities similar to MicroMAGICS/PC 1.1 with exception of support for animation loops.

Xsection

Xsection is an interactive application to select, calculate and display vertical cross sections. It runs on SUN workstations and has an X-based graphical user interface. Xsection has been developed with assistance from Météo France.

Xsection interfaces to MAGICS/SUN and the interface to XLIB is made via GKX. GKX has been developed by INPE/CPTEC and is GKX call-compatible with support for output only.

Metbatch and METVIEW/batch

METVIEW/batch is an application, running in batch mode on Cray/UNICOS, wich has a number of modules to retrieve, manipulate and display meteorological data, e.g. operational maps, verification, scores etc. METVIEW/batch interfaces to MARS and MAGICS and has a command line interface.

Metbatch is an interactive interface to METVIEW/batch. Metbatch has an X-based graphical user interface and runs on SUN workstations. It generates a batch job text in an interactive fashion and submits the job to UNICOS.

METVIEW/ws

The METVIEW/ws 0.1 prototype has been developed by INPE/CPTEC. It supports the visualisation of GRIB fields and satellite images in extended GRIB format. Animation loops are also implemented. The prototype supports the Cylindrical, Mercator, Polar Stereographic and Satellite projections. METVIEW/ws runs on SUN workstations and uses the Open Look graphical user interface.

At ECMWF, work has started to replace the Open Look interface by Motif and to adapt the applications in METVIEW/ws to the Centre's requirement.

K N M I : actual situation

* **conventional weather maps**

* **alfa numeric data base**

  applications :

  -- several display modes for data (SYNOP, METAR, TEMP, forecasts, etc)
  -- convenient tabels, simple graphs
  -- monitoring/warning module for severe weather or other intersting phenomena
  -- about 20 simple forecast tools

* **weather radar display**

  -- PC based
  -- update every 15 minutes
  -- composite picture (De Bilt and Schiphol)
  -- movie loop consisting of 8 subsequent pictures

* **satellite display**

  -- VAX/VMS (VCS)
  -- contains METEOSAT and NOAA/HRPT images
  -- looping/zooming
  -- colour enhancements
  -- hard copy facility

* **display for numerical model output** (experimental)
  (models running on CONVEX 220)

  -- HP 9000/345
  -- standards : UNIX, X-WINDOW, GKS metafiles (MAGICS), TCP/IP
  -- display of forcast fields, meteograms for about 40 locations in The Netherlands en the Northsea
  -- hard copy facility

* **display for loop presentation of numerical model output**
  (experimental)

  -- PC (486)
  -- especially developed for loop presentation of the <u>hourly updated</u> limited area model (VIMOLA)
  -- uses microMAGICS

* **research and development** (numerical modelling)

  -- SUN workstation
  -- Silicon Graphics workstation

Project **Meteorological WorkStation**
(MWS)

Objectives :

* the MWS has to become the centre of the interactive part of the operational production process

  - display of various meteorological data
    (including looping, zooming, etc.)
  - integration of meteorological data
  - manipulation of meteorological data
  - numerical and manual analysis
  - editing of products (text and graphics)

* very user-friendly operation
  - essential user instruction not exceeding two days
  - very clear and straight forward applications menu
    (joining the meteorological conventions)

* standardization

  - following the international standards for software and data handling
    (UNIX, X-WINDOW, CGM/GKS/MAGICS, GRIB, TCP/IP, etc)
  - uniformity in operation at all KNMI locations

* if possible : to buy a ready for use system

  - meeting at least 80% of our requirements
  - already tested and in use at any operational forecast office

PLANNING :

* definition study : ongoing now, ready in october 1991

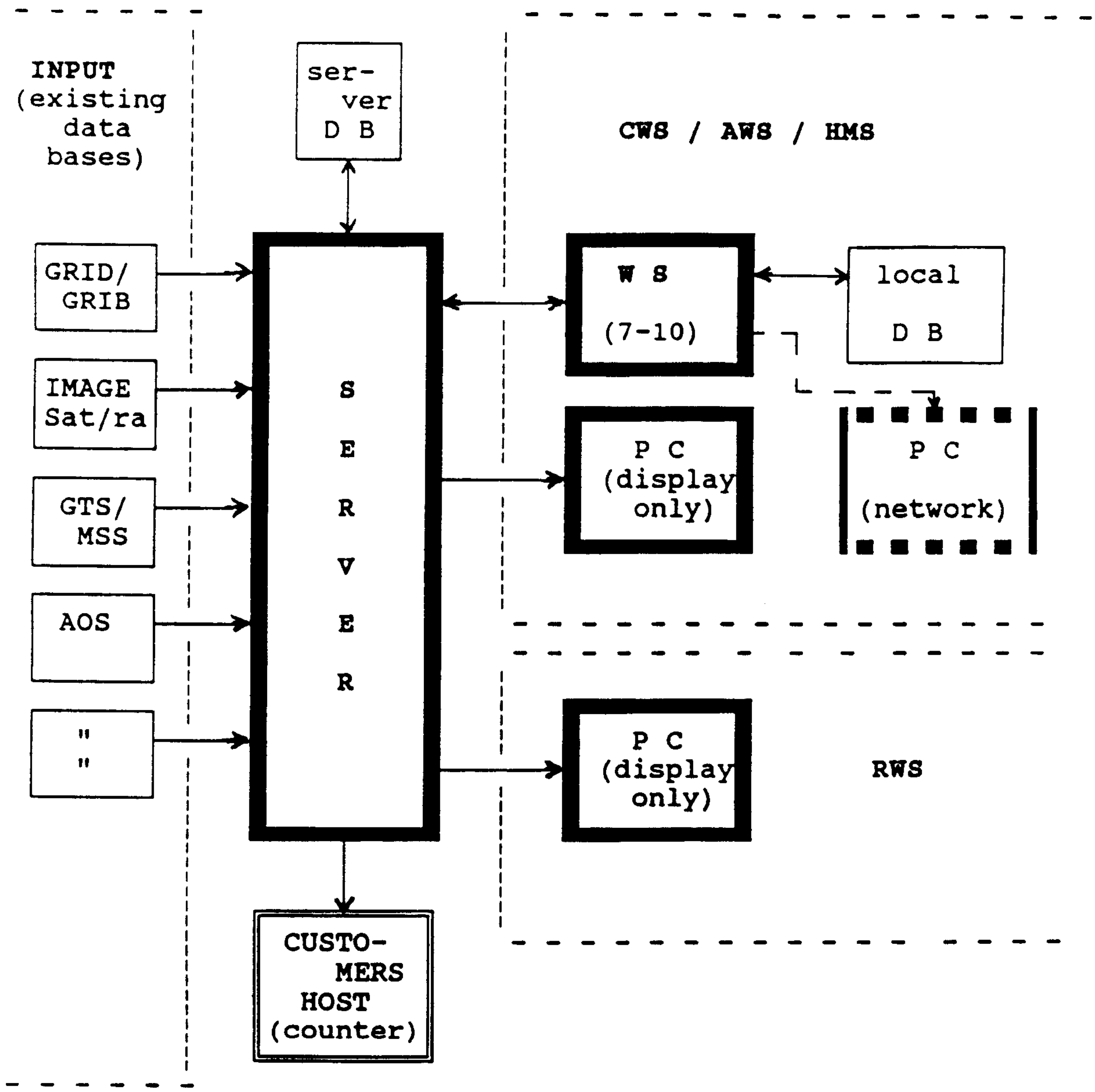
  - analysis of the meteorological production process
    ---> operational requirements
  - development of a rough system design
  - collecting information about available operational MWS's
    (meteorological offices, system suppliers)
  - indicating the best choice for our situation

* decision about the system selection : end of 1991

* installation, including "tuning" of applications to our own needs : during 1992

* operational implementation : begin of 1993

M W S : configuration concept



CWS : Central Weather Service

AWS : Aviation Weather Service

HMS : Hydro Meteorological Service

RWS : Regional Weather Service

WEATHER-90

AUTOMATIC WEATHER FORECASTER

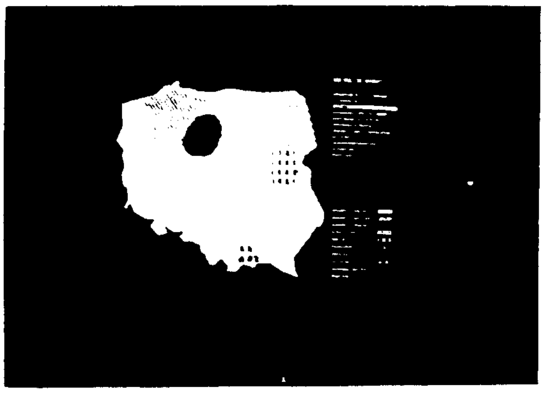
SUPPORT SYSTEM

INSTITUTE OF METEOROLOGY AND WATER MANAGEMENT

CENTRAL WEATHER FORECAST OFFICE

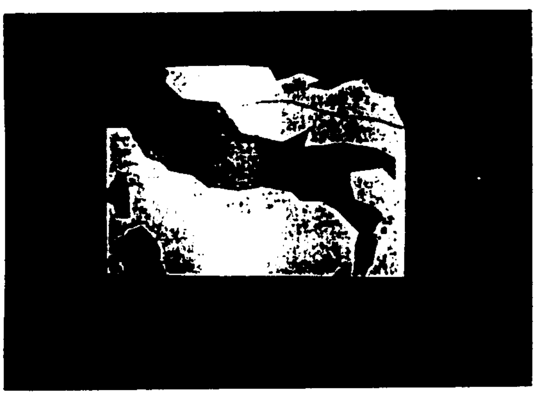
PRODUCTS OF WEATHER-90 SYSTEM

Final products of WEATHER-90 system can be displayed or printed in the form of commonly used meteorological symbols or isolines.



SYNOPTIC CHARTS FROM POLAND – every hour

- pressure, pressure tendency;
- isobars;
- actual weather (visibility, atmospheric phenomena, six hour precipitation);
- wind gust;
- air temperature, dew-point temperature;
- extreme temperatures (maximum temperature, minimum temperature, ground temperature);
- cloud cover;
- synoptic chart containing 63 Polish meteorological stations;



EUROPEAN SYNOPTIC CHARTS – every 3 hours

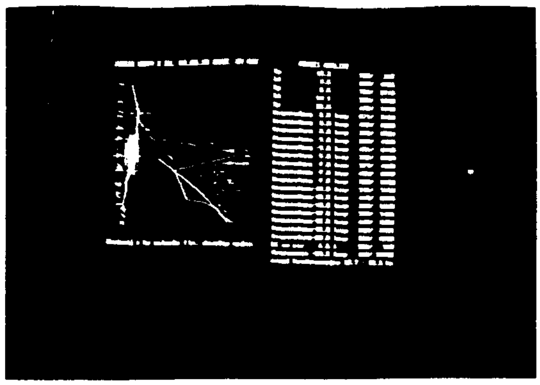
- synoptic chart review (718 European meteorological stations);
- isobars;
- isotherms;
- isallobars;
- atmospheric phenomena.

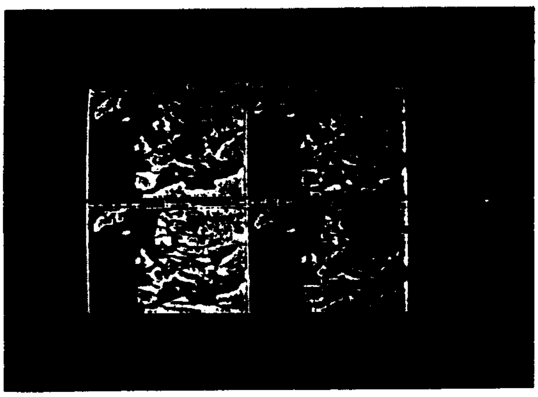
AEROLOGICAL CHARTS – every 12 hours

- aerological chart review;
- isophypes;
- isotherms;
- saturation isolines.

AEROLOGICAL DIAGRAM – every 12 hours

- diagram analysis;
- inversion level;
- convective condensation level;
- convective cloud development analysis;
- maximum temperature computation;
- instability energy computation;
- air temperature, dew-point temperature, relative humidity, mixing ratio computation.





ANALYSIS AND PREDICTED FIELDS FROM:

OFFENBACH (West Germany) – every 12 hours:

- pressure (analysis and prediction);
- geopotential (analysis and prediction).

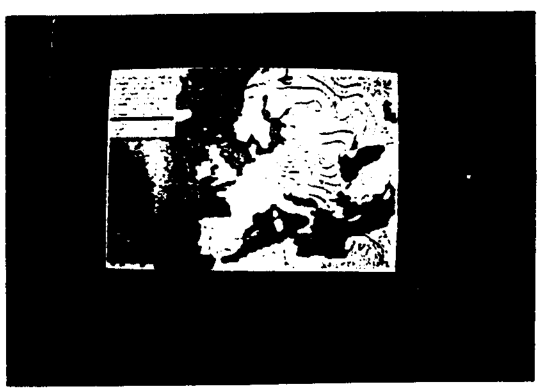
BRACKNELL (Great Britain) – every 12 hours:

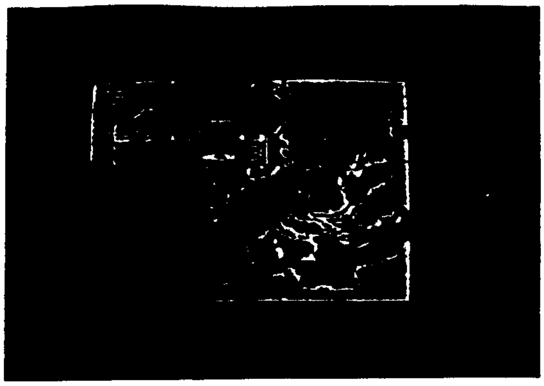
- pressure (analysis and prediction);
- geopotential (analysis and prediction);
- temperature (analysis and prediction).
- wind (analysis and prediction);
- relative humidity (analysis and prediction).

DIGNOSTIC PARAMETERS – every 12 hours

Graphic presentation of hydrodynamics parameters in form of isolines:

- relative vorticity;
- vorticity advection;
- vertical motions;
- divergence;
- frontal parameter;
- temperature advection;
- relative humidity;
- advection of relative humidity;
- Whiting thunderstorm index;
- precipitation;





TRAJECTORY based on GRID data from Offenbach.

DIURNAL COURSE OF AIR TEMPERATURE CLOUD GENERA, CLOUD COVER AND OTHER ATMOSPHERIC PHENOMENA
- displaying daily cross section of air temperature, cloud genera, cloud cover and atmospheric phenomena for any Polish meteorological station.

STATISTICAL COMPUTATIONS
Using The Perfect Prog Method the system WEATHER-90 enables the user for the following statistical computations:
- extreme temperature;
- speed wind gust;
- fog;
- thunderstorm;
- hail;
- precipitation.

ONE-DIMENSIONAL BOUNDARY LAYER MODEL with parameterization of surface energy balance, radiation and condensation in the atmosphere.

USING THE SYSTEM
The system WEATHER-90 is user-friendly. The system of succesive menus is used for displaying or printing requested meteorological information.

ADDRESS:

INSTITUTE OF METEOROLOGY AND WATER MANAGEMENT
CENTRAL WEATHER FORECAST OFFICE
01-673 WARSAW PODLEŚNA 61 POLAND

HOW DOES THE SYSTEM WEATHER-90 WORK?

As it follows from figure 1 the system WEATHER-90 consists of several parallel running processes. These programs communicate with each other using common memory areas and files. The first process receives teletype-like meteorological data from telecommunication center via RS-232 interface. The data are stored in memory buffer. When the end sign of weather report is sent into the memory buffer the second process is activated. It decodes the information and appends it to The Raw Data Base. Since the information from Polish meteorological stations is received every hour, the checking and analyzing data process is executed accordingly. When the checking and analyzing data process is finished successfully, i.e. at least 55 from 63 in operation Polish meteorological stations sent the information, the interpolation process follows. The interpolation to rectangular grid is necessary to plot isolines. If the checking and analyzing data process is finished improperly, the process is repeated after 5 minutes. Similar data processing is used in relation to synoptic information from European meteorological stations (every 3 hours), aerological (TEMP) and GRID (Offenbach) information and Bracknell (2 times per day). The next process prints charts automatically. The processes mentioned above are run in the background, so the user has no access to them. In the first foreground process user decides which charts (Polish synoptic charts, European synoptic charts, aerological charts) should be printed automatically. The chart, which has not been ordered earlier, can also be printed. In the second foreground process user can display meteorological information prepared in the background.

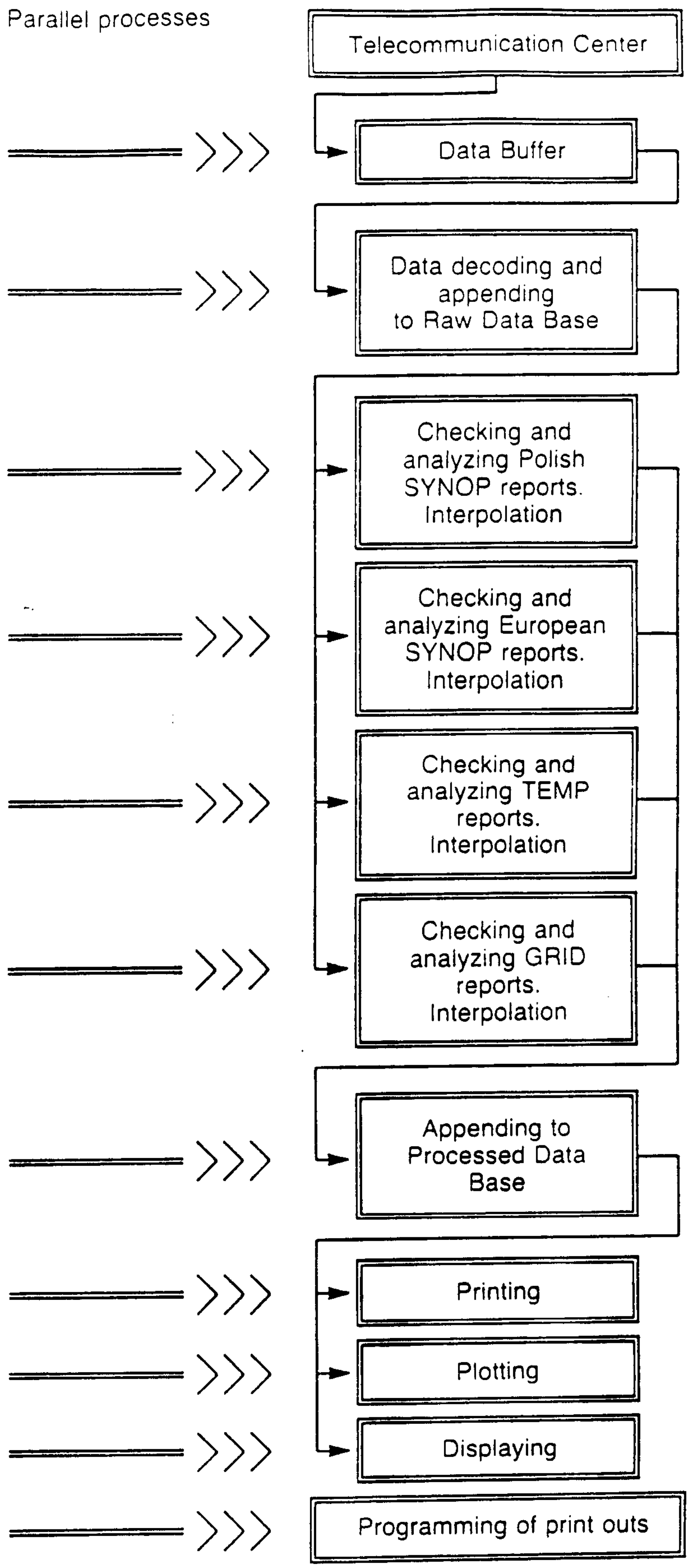


fig. 1 Scheme of WEATHER-90 system

SYSTEM DESCRIPTION

In 1989 The Polish Central Weather Forecast Office implemented the so called Automatic Weather Forecaster Support System, which is used operationally. The idea of such a system orginated in 1986. During these 3 years we had studied methods of receiving, processing and graphical presentation of synoptic (SYNOP) and aerological (TEMP) information, and predicted fields of meteorological variables (GRID – Offenbach).

Although the system was developed for Polish Central Weather Forecast Office, it can be easily adapted for use in weather service offices in other countries.

The purpose of the system is to present current and predicted weather situation at any place in Europe in 24 hour range. The required meteorological information includes:

- cloud genera, cloud cover
- precipitation
- pressure, temperature, humidity, visibility
- speed and wind direction, wind gust
- conditions of ground surface: snow depth, soil temperature, ice conditions, state of the sea and others.

The information about the vertical profile of temperature, humidity, speed and wind direction is also necessary.

The information from any place should be presented in the form, that it can be used easily by a weather forecaster.

The low cost has been a significant requirement for the system, so we decided to implement the system on IBM AT compatible microcomputer and write the software ourselves in Central Weather Forecast Office. Those requirements were met in our system.

The WEATHER-90 is a fully automatic meteorological data processing system. It enables receiving, decoding, analyzing, displaying, printing or plotting SYNOP, TEMP and GRID (Offenbach) information. The system consists of 21 programs interacting with each other. It can be easily expanded and adopted to users requirements. The programs have been written in PASCAL, FORTRAN and C programming languages. The system has the following capabilities:

- access to meteorological data base;
- displaying synoptic information received from Polish synoptic stations in the form of charts containing separate weather elements, isolines or a complete synoptic chart;
- printing (or plotting) synoptic charts every hour for Poland and every three houre for Europe;
- displaying aerological information;
- printing on demand aerological charts;
- displaying, analyzing and printing aerological diagrams;
- displaying synoptic information received from European meteorological stations;
- displaying diurnal course of air temperature, cloud genera, cloud cover and atmospheric phenomena;
- displaying analyzed and predicted (depends on level: H+12, H+24, H+36, H+48; H+72) pressure and geopotential fields (1000 hPa, 850 hPa, 750 hPa, 500 hPa, 300 hPa) from Offenbach (West Germany);
- displaying the following diagnostic parameters: relative geostrophic vorticity, geostrophic temperature advection, thermal frontal parameter, relative humidity, divergence, vertical motions, Whiting thunderstorm index, Showolter index and precipitation;
- computations of extreme temperature, speed wind gust, fog, visibility, precipitation cloud cover, alternative forecast of thunderstorm and hail using The Perfect Prog Method.

MINIMUM HARDWARE REQUIREMENTS

IBM AT compatible microcomputer with multitasking Microsoft OS/2 operational system installed:

MINIMUM:

processor 80286;

- 2.5MB RAM;
- hard disk 20MB;
- EGA card;
- monitor;
- floppy disk drive 1.2MB;
- serial port RS-232;
- parallel port;
- printer;

RECOMMENDED:

processor 80386 or 80486;

- 4MB RAM;
- hard disk 40MB;
- coprocessor;
- plotter;

DEMONSTRATION PLATFORMS

During the Paris EGOWS-2 meeting we could see six demonstrations by Germany, Norway, Sweden, Poland, Austria and France. We regret Finland couldn't present his software (probably the most advanced in Europe) because we could not get a machine to host the demonstration.

We thank Mister Scano from Control Data Company for having lend us a Control Data workstation able to host the two first demos.

The German software runs on a SILICON GRAPHICS Personal IRIS (cyber 910-400) with the operating system IRIX 3.2 and is based on GKS.

The Norwegian system runs on a SILICON GRAPHICS, PERSONAL IRIS 4D/25G or 4D/25 and is based on FIGARO PHIGS. It is written in Fortran and C.

The Swedish software runs on a PC/AT 386 or 486 with a MATH coprocessor (387), a VGA (or EGA) screen and a hard disk, under DOS.

The Polish system runs on a PC/AT compatible, intel 386 based microprocessor (preferably 386 SX with minimum 4MB of RAM, VGA color display 40 MB hard disk and numerical coprocessor) under OS2 system version 1.1, 1.2 or 1.3..

The Austrian software runs on a SUN workstation with SUNGKS.

The French software runs on a any workstation with X-WINDOW and MOTIF.(some experimental software run on a SUN workstation with Xview).It is written in C and Fortran.

For his demonstration the Finish representative would have need a VAX-station with 100 Megabytes of disk space and 50 Megabytes for data storage.

DISCUSSION

1 - Comments on EGOWS-1 recommendations

Concerning the statement that UNIX should be the operating system it is noted that :

- a common platform of development could be X-Window instead of UNIX, but UNIX still seems to be the system adapted to the future.
- it is more to change the windowing system than the operating system (polish representatives).

2 - New recommendations

Several new recommendations were formulated.

For the data, the exchange format is should be uniform (following WMO guidelines) but each country should be able to keep its own internal storage format.

Concerning graphics, it would be necessary to define a graphic standard but owing to :

- the existing GKS-based software,
- the availability of several GKS printing drivers,
- the feeling that if we choose standards it is for long sight purpose while GKS is getting old,

no clear decision was taken.

For printing purpose, PostScript could be a good solution ; the problems of slowness should be improved with new versions of PostScript and by paying attention to the connexion line. Encapsulated PostScript should solve the problem of incompatibility between the different PostScript versions.

No recommendations were made about MOTIF or OPEN/LOOK for the User Interface Design because none of them is a clear standard.

The problem of 3D graphics was evoked again but still looks out of the possibilities of investment.

3 - Further cooperation

EGOWS-1 stated that cooperation could be fulfilled by :

- exchanging information,
- exchanging persons,
- defining, if possible, restricted common projects.

The chairman of the meeting asked each country their opinion and possibilities concerning these three propositions.

In general everybody agreed to exchange software but noting a need of documenting it in English. The general impression was that this will be done if this cooperation starts because it implies an overhead of time that could be harmful in restricted teams.

Exchanging staff seems more problematic because of the lack of people but it seems very often possible to do that for short time periods.

At last several participants agreed to support the future ECMWF's project METVIEW as a common project because the organization of other projects would suppose an overhead of time for their management.

The definition a Meteorological User Interface Style Guide could be the purpose of a common reflexion.

NEXT MEETING

We agreed that the third meeting should be a bit longer in order to have time enough for technical lectures : people having even a small experience about a point of interest (databases, C++, Phigs, Unix, portability, outputs...) could propose an abstract before the meeting. This kind of lecture is not supposed to provide an exhaustive information but to be a starting point for exchange of experiences and ideas.

Three possibilities were proposed for EGOWS 3 : Finland, Germany and Sweden ; Finland confirmed that they will be able to host the next meeting, so EGOWS 3 will take place in Helsinki.

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