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1. INTRODUCTION

The Products of a Weather-Radar-Network undergo several quality checks and -procedures before they are used. Here is described, what quality management is done in the German Weather Service (Deutscher Wetterdienst = DWD) before the products leave the site and are distributed in the DWD-Data-Distribution-System.

The DWD operates a network of 16 C-Band-weather radar systems, from witch 11 are doppler systems. The operation, data-processing and product-transmission is completely automated, i.e. the users have no on-line-influence on radar-data and -product generation on site. The products are sent to numerous users with sometimes quite different requirements. Because such a multi-purpose radar network cannot satisfy all user-wishes, there must be an agreement between the operation-facility and the users what is done with the systems and what not.

The main goal for the On-Site-Radar-Product-Quality-Management in the DWD is:

To guarantee that the single user gets the products in manner that is agreed upon.

The DWD uses various methods to guarantee that the right products are generated in the right way and delivered within a maximum time after raw-data-reception.

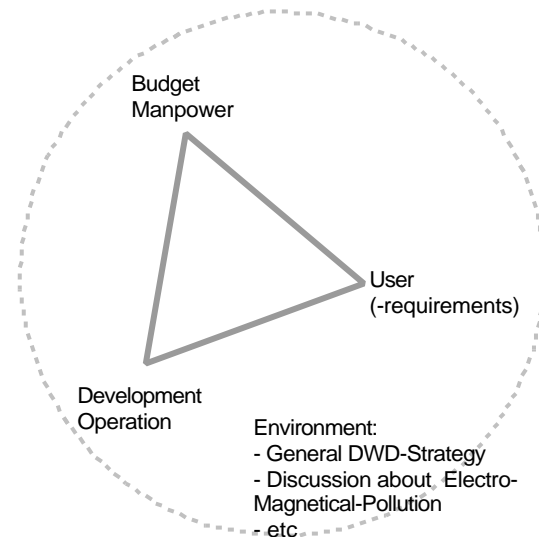
1. DEFINITION OF THE OPTIMUM OPERATIONAL MODE FOR THE RADAR-NETWORK

The way, Weather Radars are run can be set by numerous Variables of the software, used software modules, technical Adjustments and modifikationen. There are requirements and restrictions from different fields, that have impact on the optimum operational mode of a radar-network, see Graphic 1. All demands must be taken into account when defining the parameters for operation.

There is a group of experts (users and technicians) who make suggestions for changes in the operational mode due to new requirements, new developments, etc.

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Then authorized people decide whether the operational mode is changed or not. If changes have to be done, there are testing- and acceptance-procedures to ensure, that realization corresponds to the decisions. The new parameters are defined in way, that it is easy to check them during operation and serve as measures for Quality-Control.



Graphic 1

2. QUALITY-PRESERVATION DURING OPERATION

During operation it must be guaranteed, that all systems run in the well-defined mode. Several methods and procedures are used for this task

2.1 RADAR-SERVICE

The radar-service has to guarantee, that in the well defined manner and all products are generated and distributed as agreed.

2.1.1 Education

The service-personnel has to be well educated, i.e. every member of the staff must be trained for his special job. This is done by trainings at manufactures and on yearly meetings of all radar-staff members, where people can exchange special knowledge and the development-departments informs about new modules.

2.1.2 Preventive maintenance

Because a failure always results in missing products the preventive maintenance plays an important role for a maximum availability.

At monthly services among other things the antenna performance, all mechanical parts and the timing of the thyatron is checked. The timing must be adjusted to the AFC and indicates the remaining live time of the thyatron.

The antenna-motor-drives are overhauled yearly.

2.1.3 Calibration

All Systems in the Network must have an optimum absolute calibration to give good rainrates and homogenous composites of more than one system. Therefore the receiver (from Low-Noise-Amplifier to Signal-Processor) is calibrated monthly with a Test-Signal-Generator better than 0.5dB. Also transmit-power, pulsewidth etc are recorded.

At yearly services a complete calibration of all waveguides, rotary joints etc is done to update information about the whole signal-path. This includes a check and if necessary adjustment of the spectral performance of transmitter, waveguides, filters and receiver.

2.1.4 Repairing

To keep the time of failure short, the service uses:

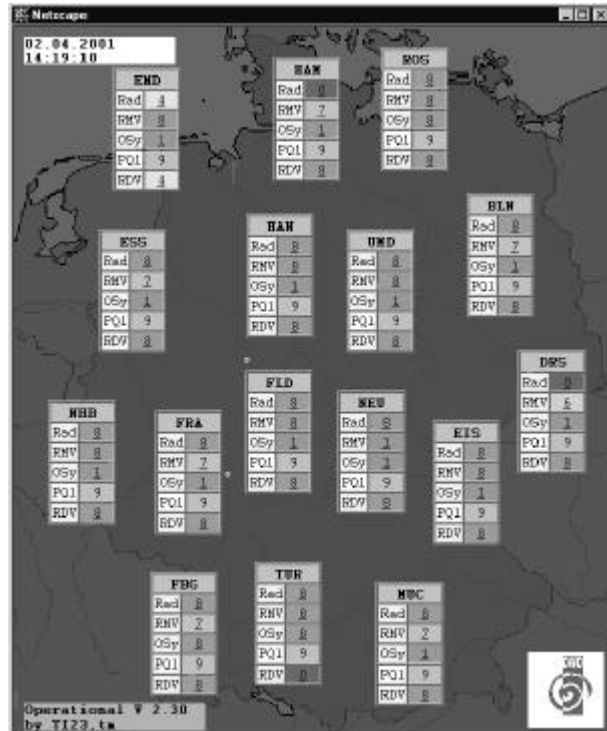
- well trained staff
- complete and comprehensible Documentation
- suitable measuring-devices
- logistics for spare parts

2.2 Extended automated self-control of the systems

A proper operation of the radar systems is given when all hardware parameter are within their limits, all used software parameters are proper, all software modules run and the products leave well in time. In the DWD an automated self-control of the systems was implemented and will be improved continuously.

The TEMONRA-System (TEchnical-MONitoring-RAdar) consists of daemons on the radar systems, that gather information, an evaluation-software package and a HTML-based visualization. The

daemons take radar information from the BITE-System (Built-In-Test-Equipment), pull the used software parameters out of the shared-memory, gather information from operating-system-level and generate every 15 Minutes a configuration-product. This KF-Product is sent via the standard DWD-AFD-System (Automated-File-Distribution) to a central server. Here the evaluation software compares the incoming data with reference-values. The results are presented as HTML- Documents, where all values are given and the result of the comparison is color-coded from red to green. For a network-overview the results are grouped and displayed in small tables on a map of Germany, see Graphic 2.



Graphic 2

The KF-Products can be archived like normal products. So for any off-line data-processing it is always well known with what parameters the products were generated.