

Simulation Training

A tool for forecasters and staff

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Introduction

Simulation is extensively used for educational purposes, most frequently by way of adaptive hyper-media. It is often used in the training of civilian and military personnel. This usually occurs when it is prohibitively expensive or simply too dangerous to allow trainees to use the real equipment in the real world. In such situations they spend time learning valuable lessons in a "safe" virtual environment yet living a lifelike experience (or at least this is the goal). Often the advantage is to permit mistakes during training for a safety-critical system. Simulation training can also be useful in the case of forecasting the weather.

content and their working methods/routines. Furthermore human factors such as communication and decision-making can be monitored. The large benefit of this way of training is the creation of a zero-measurement: All forecasters operate under the same conditions in the same environment.

Set up

In the schematic below the set up of the simulator is simply shown. To maintain pressure during the training, time runs twice as fast as in real life. Higher speeds are also possible but have not

The Concept

The learning process can be divided into three phases:

- 1) The Education phase: gaining knowledge
- 2) The Training phase: transforming knowledge into skills
- 3) The Practice phase: applying and reinforcing skills in near real-time situations under a lot of pressure

Obviously, the third stage is a phase in which simulation training could be helpful. At KNMI a wish had risen to examine all three stages of the learning process. Previously, education had tended to get stuck in phase 1 and 2. This article will briefly discuss the third phase.

With use of a simulator, the goal is to examine two aspects of forecasters' work, namely the meteorological



▲ Image 1: Schematic overview simulator's set-up

Set up



► Image 2: The testing environment of the forecaster

proven to be comfortable. The forecaster works in a separate room with the simulator and a system to issue forecasts as would normally be done. Also a telephone is present where incoming questions from customers are brought into the training. In the control room the student is monitored and time of action and kind of action are registered. The control room is also the place where all the incoming information (injections) originates.

Technical details

The ‘Meteo-Simulator’ at KNMI is an update of Cloudy Camel (Pelkewijk, Higgings, Mills)

Initially it was designed specifically for KNMI, but now it is also usable for other institutes. It is based on php/jquery&javascript and adaption to php requires a webserver (local or company webserver), some of which can be taken freely from the internet.

Experiences

At KNMI we have developed experience in simulation training over the last few years. In 2014 the training was evaluated with the use of the newly designed Meteo Simulator.

The subjects for training were shift leaders and senior forecasters:

- Analysis & guidance
 - Understanding of the situation
 - Recognition of uncertainties
- Procedures
- Products
- Dealing with unexpected situations (chemical accidents)
- Handing over to the next shift (presentation)

The chosen meteorological situation was not a trivial case, the main issues were:

- Model analysis of the position of a low was wrong (about 30-40 nm, image 3)
- Winds and precipitation prediction were very uncertain. (image 3)
- A chemical accident had occurred in an industrial area with questions about the dispersion with an uncertain wind-forecast.

Evaluation and recommendations

We realise that this method of training is still in an early stage at KNMI, and we expect to develop further in the coming years. The first results are promising and satisfying in many ways. Participants’ feedback was very good. Also the above-mentioned fact that a zero-measurement can be made gives a quite good impression of the variation of skills within the group tested. This helped very much in finding out strengths and weaknesses and where the focus for further education should be. Also the use of a realistic setting within the simulator was very much appreciated. However, objective assessment is rather difficult and should better be done by a third party.

Sources/references:

http://en.wikipedia.org/wiki/Simulation#Simulation_in_education_and_training

► **Image 3: Screenshot of the Meteo Simulator.** In the left upper corner the simulation time is running twice normal speed. In the upper row, data sources can be selected. The sources are refreshed automatically as ‘simulator time’ progresses. In this screenshot the main models used at KNMI are shown. The forecast isobars and wind speed at a certain time (selected in orange in the left column) for Hirlam and Harmonie are shown.

