

# The Met Office's Forecasting Review

## Purpose and Principles



*“People with the right tools  
and the right skills, doing the right jobs”*

The debate over a forecaster's role in the forecast production process has raged for many years. Historically, forecasters have tended to demonstrate their worth by pointing to their ability to 'add value' to model-derived forecasts. But increasing accuracy and resolution of NWP output, in combination with rapidly improving

post-processing techniques, means that value added in this way is often marginal and will continue to decrease with time. The case for continued human intervention here is often weak from a cost/benefit perspective, though some customers – particularly those with high sensitivity to the weather - will still require human intervention of some form in the short term. In addition, many tasks for forecasters have been reduced to filling in boxes with numbers, or to routine document creation. Work of this kind is poor for staff morale and does not represent an effective use of an expensive and highly-skilled resource, the forecaster.

Over the coming years, it is accepted that many European public bodies, including NMSs, will have to deliver significant cost savings and efficiencies to their governments. This efficiency drive may represent an ideal opportunity to ensure our production systems make best use of resources while continuing to ensure quality of output.

During 2009, the Met Office's Forecasting Review was established to help align forecasting and science capabilities to the future requirements of our governmental and commercial customers. It will achieve this by setting a strategic direction for forecasting, and by providing working structures and resources which enable flexibility, continuous development and evolution in forecast provision. The Review has been, from the outset, a people-centred activity with a focus on clearly defining the future role of the forecaster. It has also endeavoured to be an inclusive and comprehensive activity, with input sought from science, IT and business staff, along with all forecasters.

It was quickly established that there was a vital future role for forecasters at the centre of a knowledge and advice-based organisation. But the emphasis of their roles will shift from production tasks towards activities which are best performed by a skilled forecaster: *interpretation, decision-making and communication*.

Some key themes of the Review are as follows:

- Defining how best to use the respective strengths of the forecaster and NWP models for each set of products and customers.
- Making best use of our forecasters, with increased emphasis on customer-facing expert advisory roles, and involvement in Met Office projects outside operational forecasting.
- Removal of 'routine' or otherwise inappropriate production tasks from forecasters, mainly via automation.
- Minimising the need for forecaster intervention on model data, by use of Business Rules and 'change once, use many' approaches.

- Making best use of our science, though increased automation, stronger links with operational forecasting, and development of advanced post-processing techniques.
- Exploiting new technology to deliver the new science, and to facilitate both new and traditional forecasting techniques.

## The Future of the Forecaster Roles and Responsibilities

The human and machine elements of the forecasting and forecast production process have their respective strengths and weaknesses. It makes sense to focus the activities of forecasters on what they do best, and what cannot be easily automated.

In the future, it will not be a forecaster’s role to ‘add value’ by intervening on model data to achieve improvements in accuracy. These improvements should be achieved by developments in model performance and post-processing.

*Production* processes should be automated as much as possible. For some services it will be appropriate to automate the process completely. For others, which are agreed to have vital input from a human forecaster, we can automate the rest of the process *around* this input (by providing ‘first guess’ model data, for example), and support the forecaster’s activity by ensuring they have appropriate tools and skills.

Given forecasters’ increasing use in expert advisory roles, we must develop or alter our production systems to allow ‘automation by default’; if the forecaster chooses not to intervene in the process then the product should be created and issued automatically. With these systems, it becomes simple to gradually decrease, and then completely withdraw, manual input as the automated output meets customer requirements for quality by itself. It also becomes much simpler to determine when this move to full automation should occur. To describe this temporary phase of forecaster intervention we have used the analogies of ‘safety nets’, or ‘stabilisers’ (on a child’s bicycle), which can be removed when they are no longer needed.

Such a move towards automation via a controlled, phased withdrawal of forecaster input is shown schematically in Fig 1 below.

Many production processes in the Met Office are now moving, or have plans to move, towards greater automation in this manner. And the common requirement for automated production systems has informed design of our new production platforms, along with tools such as automatically generated warnings and text forecasts.

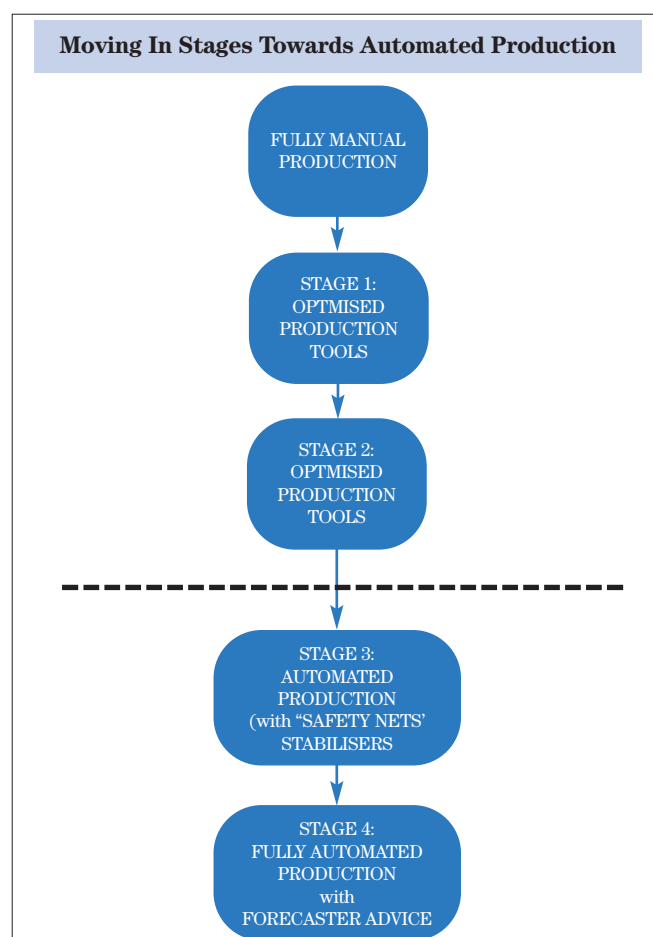


Figure 1: Moving in stages towards automation for appropriate products.

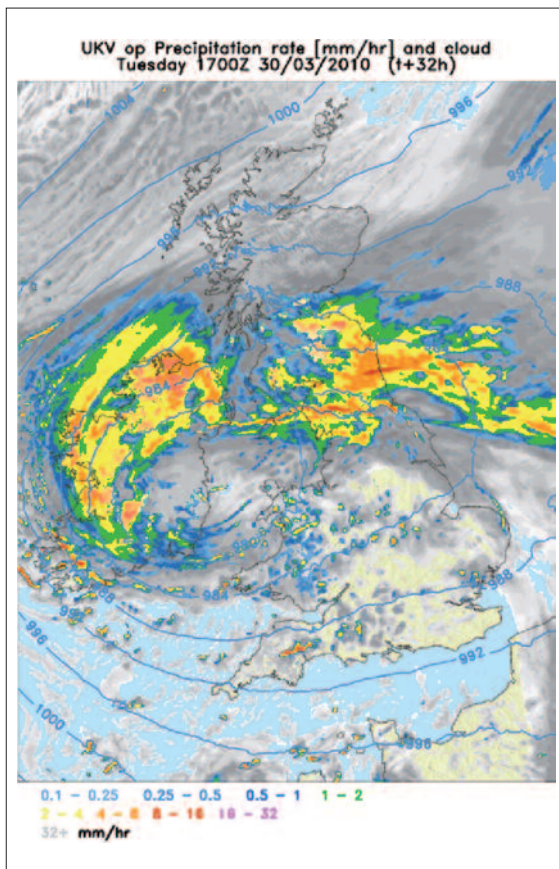


Figure 2: Sample output from the Met Office UKV model, which has 1.5km resolution across most of the UK. Increasing model detail means there is an increasing need for expert interpretation.

## Summary

The changed production process described here will deliver the following benefits to the Met Office:

- Reduced production costs.
- Best use of forecasters and science capability.
- Greater reactivity to changing customer needs and changing weather.
- A more flexible, multi-skilled forecasting staff actively engaged with customers and the rest of the organisation.
- Established systems on which to base new product development.
- Increased job satisfaction amongst forecasters.

## Developing Forecasters and Advisors

Forecasting advisor roles have already proven a highly effective means of communicating weather and its impacts to local government and civil protection authorities within the UK. Some of our commercial and military forecasting activities have also made use of deployed ‘on site’ forecasters to great effect, and there will be increased demand for forecasters to operate in this way in the future.

Our scientific capability has reached the point where our NWP data can be indistinguishable from real, observational data (see Fig 2). This level of detail allows opportunities for greatly increased forecast accuracy, but also brings an increased risk of misinterpretation. Forecasters and advisors add the often vital level of interpretation required for some customers, informed by in-depth knowledge of their requirements, operations and sensitivities.

In the coming years, advisor, rather than production, roles will become the norm. We must ensure that advisors have the skills and information available to them to be able to give rapid, authoritative guidance to customers based on their changing circumstances. This need has defined a coordinated programme of development, incorporating communication skills training, mobile information systems and new monitoring and forecasting tools.

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