

## UNISDR Scientific and Technical Advisory Group Case Studies - 2015 UK Met Office – Impact based warnings & regional advisors

### The Problem

As the United Kingdom's National Weather Service, the Met Office has warned and informed the public, government and emergency responders of hazardous weather through the National Severe Weather Warning Service (NSWWS) since 1988<sup>1</sup>. Warnings were based on meteorological thresholds, with fairly detailed forecast criteria required for each warning, and often included technical jargon.

In 2004, the UK Government introduced legislation called the 'Civil Contingencies Act' which established a new framework for civil protection and imposed a clear set of roles and responsibilities on organisations with a role in preparing for and responding to emergencies. These 'emergency responder' organisations were prime users of the NSWWS.

At this stage, the application of science by the Met Office was limited to the production of the hazardous weather forecast, which was then transmitted directly to the user. While users recognised the accuracy of the information, its value was diminished because it did not take account of the decisions that they had to take. As a result it was not used to the extent expected.

### The Science

The Met Office uses its Unified Model to generate weather forecasts for the UK. At long lead times a global configuration is used to allow for influences on UK weather from distant locations, while for short lead times, a local configuration with a 1.5km grid length is used<sup>2</sup>. Further information on forecast sensitivity is obtained using ensemble versions of these models, in which multiple forecasts are generated from slightly perturbed initial conditions and with perturbed model parameters<sup>3</sup>. The outputs of the ensemble are presented to operational meteorologists after processing into first guess warnings<sup>4</sup>.

In response to the 'Civil Contingencies Act', the Met Office introduced the role of Public Weather Service Advisors<sup>5</sup>. Four Advisors were given the task of engaging with the Civil Contingencies community, and assessing how the Met Office could help the organisations involved in preparing for and responding to emergencies. The Advisors generally found organisations with little trust in the Met Office, and its warnings or forecasts. Despite recognition of the value of the science, the Met Office was viewed as remote, unresponsive and unaccountable. There was clear evidence of 'warnings fatigue': many viewing the frequent warnings as unnecessary, with a reluctance to take action on any warnings issued through the NSWWS.

The Public Weather Service Advisors built personal relationships with contacts in government, emergency services and other authorities through regular emergency planning meetings, workshops and exercises held throughout the UK. They also took up opportunities to educate contacts, and communicate and interpret warnings for the emergency responders in the lead-up to, and during severe weather. The routine contact was, and remains, extremely important in building trust in the Met Office and the NSWWS.

In the summer of 2009, the Met Office held a series of public surveys and emergency responder workshops throughout the UK, with the aim of seeking out requirements for weather warnings. The feedback from all users

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clearly indicated that for the warnings to be useful there had to be an assessment of potential impacts within the warnings process.

### Application to policy and practice

It was clear that, while the Met Office was using world leading science to produce the forecasts, there was a need to communicate it in a more effective way so that the public, government and emergency responders could understand and be more confident in taking appropriate action. The language had to be simpler, with no scientific jargon, and it was recognised that the Met Office needed to engage with NSWWS users in a different way, and produce weather information that focussed on their needs. It became clear that there would be great value if the Met Office could link severe weather to generic impacts in different parts of the UK e.g. 70mph wind gusts would cause severe disruption to transport, power supplies and public safety in London, but minimal impact in northern Scotland.

Initial linkage of hazards to weather thresholds was achieved using local expertise, weather records, and input from experts in sectors such as transport, power, health etc. Work continues, with partners, to explore the use of impact models, e.g. to estimate the prevalence and consequence of vehicle over-turning on major highways.

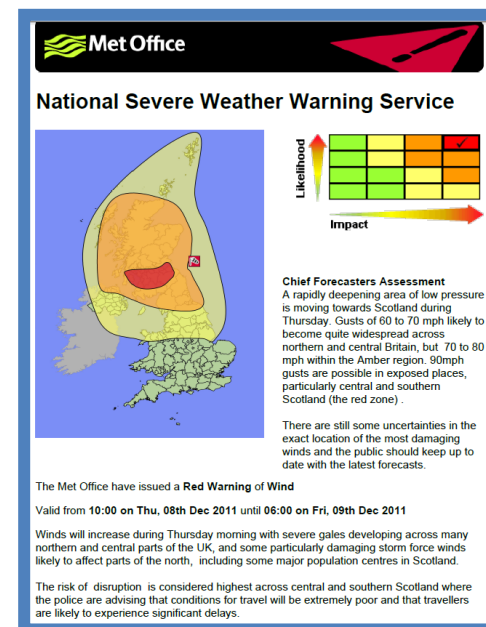
In March 2011, the Met Office launched the impact based NSWWS. Each warning within the new service is given a colour based upon the likelihood and levels of impacts that may be expected from the forecast severe weather. The change of process has required a lot of training, much of this provided by the team of Public Weather Service Advisors, which now totals 15. However, feedback indicates that the local authorities, emergency services and other responders operating under the Civil Contingencies Act have realised considerable benefit through the targeted and precise warnings provided.

The primary route for delivery of Impact based warnings to emergency responders is through the Met Office's Hazard Manager service<sup>6</sup>, which provides headline information on the hazard probability and expected impact and then offers a series of map layers of additional supporting information.

### Did it make a difference?

By listening to user feedback on the kind of information they need, and acting upon it, the Met Office addressed many of the concerns expressed by users of the NSWWS, and has become an accepted part of the resilience community across the UK. In addition, the team of Advisors, who have regular personal contact, provide face to face advice, and raise awareness within the Met Office of local issues around the UK, helps to engender trust in the advice provided.

Case study: an Atlantic storm was forecast to hit northern areas of the UK on Thursday 8th December 2011, with the strongest winds across Scotland, Northern Ireland and northern England. On Monday, the Met Office issued a Yellow Alert for wind across a large part of the northern UK. This highlighted the prospect of unusually stormy conditions on Thursday, giving responders time to check staffing and resources. The Public Weather Service Advisors briefed multi-agency meetings on the potential severity of the weather. Following discussions on potential impacts with officials from government, transport agency and police, the Met Office issued a Red



Warning on Wednesday – the highest warning level – to highlight likely travel disruption and structural damage (see figure). This was accompanied by high-profile joint media messaging, and clear advice to the public on what actions to take. The Scottish Government took the unusual step of advising local authorities to close schools. Exceptional wind speeds were observed, resulting in widespread power and telecommunications outages, and closure of the main bridges for several hours, confirming the occurrence of the forecast hazards. The trust of government and other agencies in the accuracy and relevance of the warnings, enabled clear, high profile media messages to be issued, with the result that everyone was well prepared, disruption was minimised and no serious casualties were reported.

#### References

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