

PWS Workshop on Warnings of Real-Time Hazards by Using Nowcasting Technology

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**A Pilot Project on Nowcasting Techniques for PWS Applications
(Concept Paper)**

Background

1. Nowcasting systems are usually used as tools to generate prognostic information with lead times of no more than several hours for internal reference by operational forecasters, particularly for use in the operation of time-critical warnings against severe weather. As such, the linkage between nowcasting technology and PWS is indirect at best, often involving the forecaster acting as an intermediary to interpret the nowcast output before dissemination to the public and users, either implicitly in the form of weather warnings or explicitly in more quantitative terms in relation to location and timing of severe weather.

2. The rapid advance of computing and information technology in recent years means that increasingly in many parts of the world, nowcast products, either in text or graphics format, can be readily and speedily sent to individuals for operational use. Under WMO, forecast demonstration projects have been organized or planned to test and verify the usefulness of nowcast applications for high profile events of public interest (e.g. the Olympic Games in Sydney 2000 and Beijing 2008). These show that nowcasting applications are now mature enough to be translated into PWS products for general consumption.

From Forecasters' Bench to PWS Domain

4. The objective of the current initiative is to go one step further, pushing nowcast output and information into the public domain as a form of new weather services to support decision making by users. Possible PWS applications of potential interests are:

- (a) Quantitative precipitation nowcast (QPN) for hydrological applications and flood mitigation;
- (b) thunderstorm and lightning nowcasts for power utility, air traffic managers and swimming pool operators; or
- (c) gust alerts for container terminals, traffic controllers and motorists on highways and

bridges.

5. In view of the typically short lead time in nowcasts and the perishable nature of the generated information, the PWS nowcast products need to reach the public and users in good time. The challenges therefore are:

- (a) high degrees of automation, with minimal checking and value-added processing tasks by forecasters;
- (b) accuracy, timeliness and consistency of nowcast outputs;
- (c) public or users' readiness to digest nowcast products and information meaningfully; and
- (d) consistency and coordination with prevailing warnings if the PWS nowcast products involve information on the occurrence or likelihood of severe weather.

Pilot Project - Objectives and Formats

6. The challenges faced are thus more than just forecasting and technical issues. A collaborative medium needs to be established through which nowcasting system designers, operational forecasters, PWS product developers, disaster managers and target users can readily interact and explore ways forward. To this end, a pilot project is one possible solution to test the idea in a real-time or near real-time operational environment.

7. The objectives of the pilot project are to:

- (a) evaluate the usefulness and relevance of nowcast information in PWS products;
- (b) resolve operational and technical issues in the course of delivering the PWS nowcast products;
- (c) identify the necessary ingredients for effective formulation and conveyance of PWS nowcast products; and
- (d) gauge users' demands or expectation, and provide feedback to nowcasting system designers, operational forecasters as well as PWS product developers.

8. The proposed pilot project can take one of the following formats:

- (a) location-focused; i.e. to identify one suitable test site (most likely to be hosted by a NMHS) with a wide range of potential PWS applications. Nowcasting systems with different capabilities can be set up at the test site, or run remotely if technically feasible, to generate PWS products for respective applications of interest. The pilot project would establish a test bed for exploring ideas and discovering possibilities of nowcasting applications; or
- (b) application-focused; i.e. to concentrate on one specific application of one Member NMHS (e.g. PWS products for landslip forecasting of a selected area). Nowcasting

systems can be set up and run in the target country to generate PWS products for specific users with assistance from an advisor/consulting team from one of the NMHSs with experience on the relevant nowcasting application. This approach enables a thorough examination of the whole end-to-end process.

9. Both approaches, if successful, can lead to technology transfer between interested parties. However, to keep things manageable, it is proposed to start with one pilot project with either one of the above approaches. From the experience gathered, more pilot projects using different formats can be initiated at a later stage.

Organization and Funding

10. Participation in the proposed pilot project is on a voluntary basis. Participating NMHSs are expected to cover the hardware and software costs in setting up their nowcasting systems, as well as any incidental expenses that may arise from implementing the project. Occasional workshops/seminars with funding support from WMO are desirable for the purpose of sharing experience and promoting the initiative for interested parties other than those directly involved in the pilot project.

11. Because of the cross-cutting nature of the pilot project, it is proposed that the Chief, PWSP be requested to oversee the planning and implementation of the pilot project, with support from the CBS/PWSP ICT and relevant expert team(s). Links to CAS/WWRP can be maintained via the nominated PWS representative in the Nowcast Working Group.

12. The intended beneficiaries of the pilot project are the developing countries and in particular, the LDCs who normally have to bear the largest economic setbacks as well as loss of life as a result of severe weather events especially flash floods, and who do not have access to the technology or the resources required to benefit from the results of advances in Nowcasting. It is intended through the pilot project to team up developed countries with the developing countries and LDCs to work together to build up the necessary capacity in the recipient countries for detecting, disseminating and communicating warnings of very short time scale