

Customer oriented warning systems

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COWS Customer oriented warning systems Abstract ECAM 2011

A theoretical analysis of the relationship between a warning organisation and the users of the warnings issued by this organisation is presented. The warning organisation is usually a weather service. Users might be for example farmers, hydrological services, airport authorities or management boards of power plants. The warning organisation is referred to as the issuer, the user of the warnings as the addressee. They will be referred to as "the actors" when considered together.

The methodology is inspired by developments that occurred during the last decades in finance engineering, inspired by mathematical game theory, and aimed at providing investors with optimal decisional schemes.

The programme is realised by establishing a clear distinction between both actors. The addressee is characterised by a risk profile and an economic profile. His risk profile is composed by the risks his business is confronted with (e.g. lost of a harvest in case of precipitation), as well as by the climatology he is exposed to (e.g. the probability of occurrence of extreme precipitation). Both risk and climatology are finally merged in the relative operating characteristics of the addressee. His economic profile is inspired by the classical work of D. S. Richardson, [1]. It is defined by the triad of the loss resulting in an unpredictable event for which neither mitigating nor protective actions were taken, the cost induced by the protective actions taken in case of occurrence as well as in case of non occurrence of an event, and finally the residual cost occurring in the case of a well predicted event for which protective measures were (adequately) taken.

These various risks and economic factors being fairly entangled, an objective of the presentation is to provide, at least at theoretical level, some clarity in that matter. The issuer is expected to base his warning on probabilistic forecasts emanating from an Ensemble Prediction System (EPS), or on any system delivering a diagnostic expressed in term of probabilities. The performance of the issuer is then characterised by a dedicated Relative Operating Characteristic (ROC). The adequate tuning of the warning system enables the maximisation of the addressee's benefit through the determination of optimal warning thresholds. The dualistic approach provides a quantitative relationship between the performance objectives having to be reached by the issuer and the monetary outcome being expected by the addressee.

Enabling the assessment of the issuer's performance impact onto the addressee's efficiency, the proposed methodology satisfies requirements formulated in the realm of New Public Management projects undertaken in several weather services. It allows the settlement of service level agreements between both actors. Furthermore, an accurate knowledge of the addressee's exposure facilitates the elaboration of specifically customer-tailored products, in the same vein as structured products modified the financial realm decades ago.

Reference: http://www.meteoschweiz.admin.ch/web/de/forschung/publikationen/alle_publicationen/veroeff_84.html