

Avalanche warning services as an integrated part of winter road operations in Norway

Tore Humstad*

Norwegian Public Roads Administration, Brynsengfareet 6A, Oslo, NORWAY

**Corresponding author, [tore.humstad \(at\) vegvesen.no](mailto:tore.humstad@vegvesen.no)*

ABSTRACT

The Norwegian Public Roads Administration (NPRA) has been one of the partners in the Norwegian Avalanche Warning Service (NAWS) since the service was launched in 2013. NPRA's contributions include both financial support, field observations, scientific review, weather stations, traffic data and near real-time data from instrumented avalanche paths. The strategy for these contributions is the idea that well-executed and documented decision-making at all levels in the organisation, is much more beneficial for safety, accessibility and predictability than just being a passive recipient of a perfect written bulletin.

Since the regional avalanche bulletins became a daily product in 2013, NPRA has developed a number of other activities and processes that ensure seamless data flow between relevant entities and organisations. For instance, a mobile app used by NPRA's road contractors, now transfers data from the snowplow driver to the national team of avalanche forecasters. Local warning services also use the same tools and contributes with local data and hazard evaluations shared with forecasters who are concerned with larger NAWS regions. Radars, geophones and infrasound microphones along the roads are used to detect avalanches. These data are used to send warnings and alerts to road users and operators. Some roads even get automatically closed immediately when avalanches are detected in the release area. In addition, these data are also transferred to the NAWS.

This presentation will give an overview over tools and work processes developed over the last five years. We will focus on the elements that ensures better safety, accessibility and predictability for users of roads prone to avalanches.