Report to the EAWS members
prior to General Assembly in Oslo
12-14 June 2019

Summary of results, **Working Group #2 «Towards best practices in avalanche forecast operations»**.

The EAWS Working Group (WG) #2 entitled «Towards best practices in avalanche forecast operations» was proposed and established at the 2017 EAWS GA in Tutzing. The goal of this WG was to provide a platform for initiating exchanges about avalanche forecasting operations within EAWS members, in order to identify commonalities, discrepancies, best practices, which could result in overall benchmarking, improvements and harmonization of avalanche warning operations in Europe. The WG included the following members :

- MORIN Samuel (lead)
- BISKUPIC Marek
- BLANCO Alberto
- DIGGINS Mark
- GOBIET Andreas
- MITTERER Christoph
- PALMGREN Petter
- PIELMEIER
- RASTNER
- ROMEO Vincenzo

Following the first meeting of WG2 members in Innsbruck in October 2017, the following lines of action were identified :

Action 1: Identify current practices in terms of use of use of information by avalanche forecasters (observations, forecasts etc.)

Action 2: Identify current practices in terms of initial and continuous training of avalanche forecasters in EAWS members

Action 3: Assess snow observation practices in Europe and identify opportunities for harmonization

Here we review the state of play of the 3 actions above, as of May 2019:

Action 1: Identify current practices in terms of use of use of information by avalanche forecasters (observations, forecasts etc.)
Work on this item was initiated in Fall 2017. It was decided to develop and send a questionnaire to all EAWS forecasters, in order to obtain a picture of information use by the forecasters themselves in the most direct way, i.e. not relying on what *should* be used (from managers) but what *is* actually used and related issues/comments. A draft questionnaire was designed and shared within the group. Because of lack of time, the questionnaire was not finalized nor, a fortiori, sent out to the forecasters. Outstanding issue is the fact that, in order to be comprehensive and useful, the questionnaire could end up being very long and detailed, with issues both for the preparation (realized), the response rate, and the analysis. This issue was discussed at a TAB/WG meeting in October 2018 in Innsbruck (ISSW), and while it was agreed that the questionnaire should be as short as possible and focus on open questions, time lacked to implement this proposal. Although the work did not materialize as much as planned, there was great interest in the group for moving forward with this question, so it is believed that the topic deserves being further explored in the future. Probably, help from experts in ergonomics/workflow

and survey designers would be helpful and make it possible to concretely advance this field, perhaps through a specific project.

Action 2: Identify current practices in terms of initial and continuous training of avalanche forecasters in EAWS members

It was quickly recognized at the 2017 Innsbruck meeting that initial and continuous training exhibited major differences between EAWS members : the academic level for recruitment is very different, in terms of background and initial level of expertise. Initial curriculum within EAWS members is also very different, and continuous training varies greatly. It was decided, in order to initiate the work and obtain a picture of the training aspects of avalanche forecasters, to prepare a survey and have it filled by EAWS members representatives (no need to ask each forecaster individually). Unfortunately, the survey has not materialized within the WG term.

Action 3: Assess snow observation practices in Europe and identify opportunities for harmonization

Snow observations are critical for avalanche forecasting. Various global and European initiatives occurred over the past years in terms of assessment of existing snow measurement protocols and ways forward in terms of harmonization. Although the WG did not formally participate in such initiatives, it served as a liaison between EAWS members and on-going work on snow observations (e.g., to request feedback from EAWS members on ongoing activities).

- In December 2018, the WMO released the final report of the Solid Precipitation InterComparison Experiment (SPICE), which reports on snow precipitation and snow cover observation methods. Several EAWS members were involved in this project. Link to the WMO SPICE final report : Nitu et al., 2018, WMO Solid Precipitation Intercomparison Experiment (SPICE) (2012 - 2015), https://library.wmo.int/index.php?lvl=notice_display&id=20742#.XM17YKTgrIU
- From 2014 to 2018, a COST Action of snow (HarmoSnow) has taken place, including several EAWS members. This has resulted in the consolidation of several syntheses about snow observations in Europe, for example the European Snow Booklet, which provides a synthesis of in-situ snow depth, water equivalent of snow (SWE) and presence of snow from operational networks in Europe, including those devoted to avalanche forecasting. The ESB has not been published at the time of writing. Another document published is a synthesis of snow observations methods employed in Europe : Pirazzini, R.; Leppänen, L.; Picard, G.; Lopez-Moreno, J.I.; Marty, C.; Macelloni, G.; Kontu, A.; Von Lerber, A.; Tanis, C.M.; Schneebeli, M.; De Rosnay, P.; Arslan, A.N. European In-Situ Snow Measurements: Practices and Purposes. *Sensors* **2018**, *18*, 2016 (https://www.mdpi.com/1424-8220/18/7/2016)
- The WMO has revised its guidelines for snow cover observations, and the next version of the so-called CIMO guide now features a « snow cover » chapter, currently under revision : http://www.wmo.int/pages/prog/www/IMOP/publications/CIMO-Guide/Prelim_2018_ed/Preliminary-2018-edition.html

These activities are often relevant to avalanche warning services, yet they do not cover exchanges of observations, which remain a key issue for effective transboundary avalanche forecasting activities.

Summary. As shown above, the results of the WG#2 lie below original expectation, mostly due to lack of time of its members. Nevertheless, material is available for progressing further, given that the topics remain relevant and critical for collective progress in the field of avalanche forecasting in Europe.

S. Morin, May 2019.