

Rescue Compass – a decision making tool for avalanche rescue

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ABSTRACT: During avalanche rescue operations rescuers can face considerable risk, while the degree of risk a rescuer should take to save a life is open to debate. Several accidents in the European Alps over past years have resulted in fatalities among rescue teams, and indicate that additional risk assessments during rescue operations are crucial to reducing risk.

Therefore, the International Commission for Alpine Rescue ICAR has supported the development of a decision support tool for managing risk during avalanche rescue operations. In collaboration with international rescue experts, we developed the Rescue Compass consisting of a handbook and dial. Both aim at supporting rescue teams in the field but also represent an education tool. We present the concept and the content of the Rescue Compass, available in German, French, Italian, Spanish and English (both for European and US avalanche scale).

KEYWORDS: avalanche rescue, avalanche accident, decision support, risk management

1. INTRODUCTION

Alerting avalanche rescue teams has become much easier in past years since freeride skiers and ski mountaineers now carry mobile phones as standard equipment. In the past ten years the number of avalanche accident related alerts to the Swiss Air Rescue Organisation (REGA) has increased (REGA, 2012). Each rescue operation can pose considerable risk for the rescue team. There are numerous cases where members of rescue teams have died during a rescue operation due to secondary avalanches or other site specific hazardous situations. For example in January 2011, a REGA paramedic and several other mountaineers were killed by a secondary avalanche during a rescue operation in Diemtigtal, Switzerland.

Kristensen et al. (2008) argue that the dictum 'Risk a life to save a life' should be qualified and that the collective risk of the rescue mission should be balanced against the collective survival chances of buried subjects, allowing for transparent and objective decisions. They suggest a quantitative risk/benefit approach to compare the survival chances of buried victims with the internal and external risks of the rescuers to minimise the overall risk.

In response to fatal accidents during rescue missions in the European Alps and worldwide, we developed a decision support tool for managing risk during avalanche rescue operations, the Rescue Compass. It has been developed in collaboration with international rescue experts and supported by the International Commission for Alpine Rescue ICAR. The goal of the Rescue Compass is to provide a decision support tool assisting rescuers in assessing the specific risks of their decisions in a rescue situation. We based the Rescue Compass on the principle of the 3x3 matrix (Munter, 2009) placing the focus on applicability in the field. It is targeted at experienced rescuers, providing a risk assessment checklist. Additionally there is a training and education handbook for less experienced rescue teams. In the following sections we present the key components of the tool.

2. STRUCTURE OF THE RESCUE COMPASS

The Rescue Compass is composed of two elements:

- a) The dial, serving as an easy readable checklist; which is integrated in

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- b) the handbook, which includes an extended version of the checklist and additional information and forms.

The term 'Rescue compass' encompasses both, the dial and the handbook, and is available in German, French, Italian, Spanish and English (www.wsl.ch/eshop/).

2.1 The dial

The dial is a handy checklist, which reminds the user of the most important points to consider before and during avalanche rescue. It consists of two layers: The upper layer titled 'Mission', addresses the operative details of a rescue mission assigning them a risk tendency (Fig. 1, upper part), low risk (green) and high risk (red). The turnable layer below (lower part in Fig. 1) includes three fields:

- environment: weather and avalanche,
- terrain,
- human factors and resources.

The concept of the turning dial is to permit only one field at a time to be viewed. This allows the user to focus on all the points in a field before assessing the next. All three fields can be consecutively assessed while turning the dial comparable to a parking disc.

The mission field on the front side is designed to assess:

- the complexity,
- the extent of a mission,
- the access to the accident site, and
- the potential (mass) media attention

the accident could attract. All these points have several implications for mission preparation or specific precautionary actions to be taken. The field 'environment: weather / avalanche' assesses the weather and avalanche situation and their influence on the risk of the mission. The topic 'terrain' prompts an evaluation of the avalanche starting zone and specific terrain characteristics. The third field 'human / resources' concentrates on human factors like condition of the rescue team, available time, equipment and communication and the transport situation for person and material.

For each of these fields predefined questions, which must be answered, have corresponding answers helping to qualify the risk tendency as either favourable (low risk, indicated in green), or unfavourable (high risk,

indicated in red). Going through these questions, helps the user gather the necessary information to assess whether their specific situation tends to be safe or risky. Since questions and answers are very brief, users should be familiar with the extended version in the handbook. The dial is therefore a quick field check and reminder of points an experienced rescuers should also know.

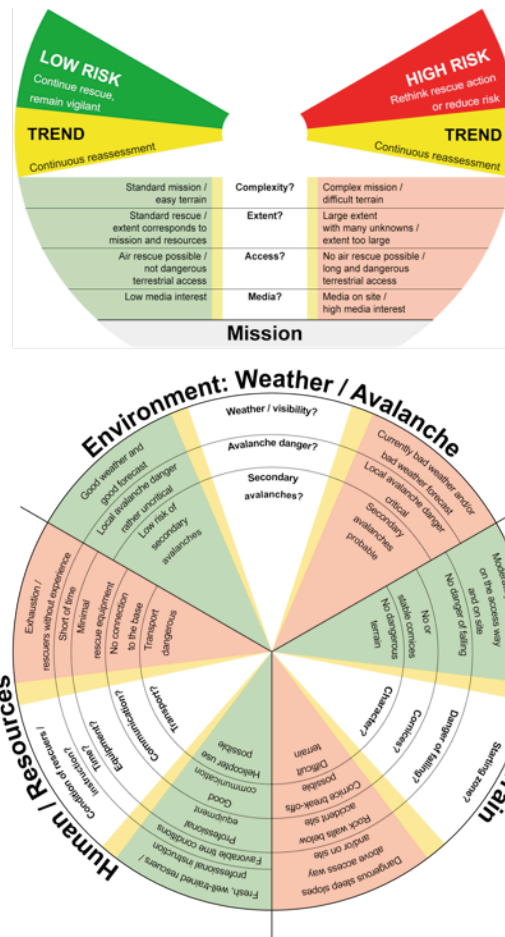


Figure 1: Rescue Compass (dial). The upper figure shows the front dial and the lower figure the dial which is mounted below. With the two dials connected together it permits one field to be focused on at a time.

2.2 The handbook

The 12.5 by 17 cm handbook, printed on waterproof paper, includes an extended version of the checklist described in section 2.1. Each of the four fields 'mission of an operation', 'environment: weather and avalanche', 'terrain', and 'human factors and re-

sources' contains a long version of the questions and answers with additional questions (Fig. 2). It is recommended that users become familiar with the content and assessment method by studying this handbook during education and training. Checking the dial before or during a rescue operation serves then as a refresher for the user. The handbook is intended to support education and training of avalanche rescue teams.

Figure 2: Extract from the handbook, part 'environment avalanche'.

Environment: Avalanche		
Avalanche danger forecast		
Green	White	Red
Forecast correct.	Forecast correct?	Danger higher than forecasted.
Personal assessment		
Green	White	Red
Small or medium-sized avalanche, triggered by person.	Extent of the avalanche?	Large or many avalanches. Other spontaneous avalanches observed.
No secondary avalanches to be expected / accident site made safe by blasting.	Secondary avalanches?	Natural and/or remotely triggered secondary avalanches possible. Blasting not possible.
No "Whumpf" sounds.	"Whumpf" sounds?	Frequent "whumpf" sounds.
No cracks visible.	Cracking in the snowpack?	Clearly recognizable cracks.
Trend		
Green	White	Red
No new snow / new snow amount without influence on the avalanche danger.	New snow?	Significant new snow amount with influence on the avalanche danger.
No or uncritical new wind loading.	Wind loading?	New, critical wind loading.
No risk of moistening.	Wet snow?	Wet snowpack.

The next section, after the risk assessment, shows the avalanche danger scale and their interpretation. There are two English versions available: one with the European danger scale and one with the North American danger scale. The following sections contain various forms and lists relevant for avalanche rescue:

- checklist with the main points of main focus during avalanche rescue;
- a figure illustrating how to mark an accident location;

- an avalanche report form;
- an equipment and a crew list;
- a witness list;
- a list for witness and survivor interrogation, and on the backside an avalanche rescue flow chart.

3. DISCUSSION AND CONCLUSION

More than 500 copies of the Rescue Compass were sent out to rescue organisations and single persons between November 2011 and June 2012. Initial feedback from users indicate that the Rescue Compass was primarily used for education. Since the organisation 'Alpine Rescue Switzerland' have developed a comparable checklist a few years ago (ARS, 2008), the Rescue Compass does not replace existing practices in Switzerland but serves as an additional tool. In most European countries, alpine rescue organisations have developed similar tools with the same purpose in the past (e.g. OEPRD, 2003). The assistance, knowledge and inputs from representatives of these organisations was invaluable during the development of the Rescue Compass.

The main target groups for the Rescue Compass are organisations in countries where no or only unstructured guidelines and tools for risk management in avalanche rescue are existing. It is widely acknowledged that decision making supported by checklists helps to reduce human error in hectic situations where people are under stress and pressure (e.g. Hales and Pronovost, 2006; Piniella and Fernández-Engo, 2009). In this respect the Rescue Compass contributes to a structured assessment of the risk to rescuers before and during a rescue mission.

Kristensen et al. (2008) suggest a method for quantitatively assessing risk and comparing it with the benefit of a rescue mission, i.e. the probability that buried victims can be rescued alive. We think that a qualitative risk assessment supported by a checklist like the Rescue Compass is an important step in building awareness among avalanche rescue teams to consider their own risk before and during rescue. In addition to supporting the decision making of rescue leaders, it is important to gain more experiences of how decision support tools like the Rescue Compass can support rescuers during their work. Therefore, we hope that users of the Rescue Compass will provide specific feedback on the application of this tool in the forthcoming years.

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