

Presentations Commission for Terrestrial Rescue

Place: Toblach, Südtirol

Date: 20. Oktober 2023

Time: 08.00

Present: Delegates of the Commission for Terrestrial Rescue all day long

Delegates of the Air Rescue commission and the Doghandler Subcommission from 08:00 to 09:00

Delegates of the Doghandler Subcommission from 09:30 to 10:00

Delegates of the Avalanche Rescue Commission, and the Air Rescue Commission from 10:30 to 11:00

Delegates of the Alpine Emergency Medicine Commission and of the Doghandler Subcommission from 11:00 to 12:00

Delegates of the Avalanche Rescue commission, Alpine Emergency Medicine Commission and the Doghandler Subcommission from 13:30 to 14:30

Chair: Gebhard Barbisch, Kirk Mautner

Minutes: Fabienne Jelk

What are the ICAR community expectations regarding the popping up of new technologies-based tools:

- **Mobile phones detection systems,**
- **Mission management applications,**
- **Onboard embarked new devices..**

How can we, ICAR, work out requirements specifications and put our operational experience to support an efficient development of this tools, adapted to the

needs of the rescue teams?

Renaud Guillermet / AIRCOM

Group from France: Technologies are constantly growing and are part of our lives. Rescue by helicopter has been greatly advanced in the last 66 years.

The topics were dealt with in Workshop 1 on the practical day. 77 delegates took part in 3 working groups.

WG 1: Technology und Rotor-Visualisation

Main-Rotor-Contact: 100 percent have already experienced it. 50% horizontal, 50% vertical.

OPS limitation: Pretty bad. SOP's: Seems to be ok.

Results of the WG 1:

- A technology-based solution must be found. This technology must be adapted, a head-up concept and must be 100% reliable
- Development of a standardized procedure (SOP, Standard Operation Procedure) and training is the first step to achieve safety.

WG 2: Tracking and localizing prior to rescuing – Results of the WG 2:

- Key points: Cooperation with manufacturers is important. This can be initiated by the rescue services or the manufacturers. The manufacturers are more than open for that.
- Correct use of this tools is essential.
- All Rescuers must know this new technologies and they must be able to use it.
- This tools must provide rescuers with contextual data relating to the activity carried out by the person to be rescued.

Friday's TERCOM/AIRCOM working group added the following:

- ICAR should draw up a list of the most important information that these tools should provide.
- We should not forget the coordination with our Emergency Call centers.

Questions / Answers:

Gebhard Barbisch: It needs to be clarified to whom the emergency call that is made using these emergency call and tracking tools goes. We need to work together with the emergency call centers.

Delegates:

The people who have such a tool (tracking and localization) need to know what kind of device it is. The family and friends of this person must also know that this person has such a device, what kind of device it is and that the person can be found with it.

The support of the technologies must be taken into account.

There must be a minimum standard for these technologies. There is a recommendation from AVACOM: Be Searchable. This must be adapted and discussed in all committees.

A list must be drawn up with the information that these devices should provide.

It is proposed that an ICAR working group be formed on the topic of "Tracking and localizing prior to rescuing".

A meeting with the manufacturers should be held during the 2024 Congress.

ICAR should make contact with UIAA Safecom to gain a common approach.

The TC will come next year with a list of its own Geolog apps.

File: 20231020-09-AIRCOM-New-Technologies.pdf

Dyneema Incident at Swinica in February 2023 – Andrzej Marasek, Andzey Gorka / TOPR

On March 4, 2023, at 8:11 p.m., an emergency call was received that two climbers were blocked on the north face of Mt. Świnica. A rescue team started from Zakopane. The weather was not good, the temperature was around -10 degrees. It was windy and visibility was poor.

The rescuers were able to get close to the blocked climbers, above them. A stand was set up there and a rescuer was lowered down to the climbers on two Dyneema ropes. The weather conditions during the descent were still poor. The rescuer reached the climbers. It was decided to pull the two climbers and the rescuer up to the belay. The reason for this decision was the risk of avalanches at the base of the wall. In addition, the topography at the base of the wall was difficult and the distance between the climbers and the belay was relatively short. The rescuers set up a pulley system (ratio 1:4). The main rope was a blue rope, with a white rope serving as a backup.

The distance to the stand was approx. 70 m. The rope was taut. When the climbers were raised and the rescuer was still on the ground, the blue rope suddenly became slack. The climbers fell about 50 cm.

A rescuer then climbed down from the belay and saw that the blue rope had broken.

In the days that followed, a search was made for the reason why the rope had broken. A stone was found on which the remains of the rope could be seen. The rope broke because it had passed over a sharp rock. This led to a discussion about the resistance of Dyneema ropes.

As a result, scientists from the AGH University of Science and Technology in Krakow carried out various tests. The rope used in the rescue had a diameter of 8 mm. The Dyneema rope that broke was compared with an older Dyneema rope that was no longer in use. The old rope became thicker over time. Both ropes consisted of 12 strands.

Various tests were also carried out in the Tatra Mountains. The results are shown in various diagrams.

The following conclusions were drawn from these tests:

- Uncontrolled swinging of the rope over a sharp edge can cause it to be damaged or break.
- Semi-static ropes made of polyamide generate less force on the anchor system and the load, but are not as resistant as Dyneema ropes.
- Special structures and diameters in semi-static ropes can prevent them from being cut on sharp edges, but high cut resistance can only be achieved with a dense braid and an aramid cover.
- Dyneema ropes with untreated yarns do not have a high tensile strength compared to ropes with the same diameter and additional treatment.
- Dyneema ropes generate very high forces on the anchor system and the load. The use of absorbers is mandatory in the case of a dynamic event such as swinging.

Files:

20231020-11a-dyneema_incident_TOPR.pdf

20231020-11b-TOPR-testy lin 202305-06-filmy_1A-12A_bezNazw.mp4

20231020-11c-TOPR-testy lin 202305-06-filmy_1C-17C_bezNazw.mp4

20231020-11d-TOPR-testy lin 202305-06-filmy_seria18C_bezNazw.mp4

Lost person behaviour – Robert Köster/MRA

How do missing/lost people behave?

The science of search and rescue is shown.

What means “Lost Person Behavior”?

- A book or an app.
- The results of a big database (ISRID).
- The development of individual behavioral profiles.

- The development of general topic categories.
- A series of statistics, markings on maps and behaviors of lost people.
- A analysis of scenarios.

A distinction is made between missing persons who have run away due to illness, forced marriage, etc. and missing persons who have strayed into the terrain (avalanches, crime, lost person).

Cases of missing/lost persons are recorded in a database. This is the ISRID (International Search and Rescue Incident Database).

Data and information on missing persons cases are collected. The data is recorded in a reporting system that includes various categories, such as the area in which the person is missing (mountains or city), the presence of external violence such as kidnapping, age groups, seasons, activity practiced (runner, climber), illnesses such as dementia, means of transportation (bicycle), etc..

Missing persons behave similarly, regardless of whether they are missing in America or in Europe.

The example of an 81-year-old person with mild dementia and obesity who does not know the area where the person get lost. Where is the most likely place the person could be?

There are different phases that you go through when you get lost. First you start, at some point you make a wrong decision, finally you realize that something is wrong and you try to find your way back yourself. The missing people have different strategies (going back the same way, staying where they are). The missing persons also show different physical reactions such as panic, higher pulse rate, etc. All this is taken into account and different scenarios are developed for the search.

What do you want to achieve in the future? Better data, better models, better decisions, better results.

Questions/comments:

Question about the app: Is it relied on and how often is it used by the rescuers?

The app is in regular use. Those who know the app also use it.

File: 20231020-12-Koester 2023.pdf

Interdisciplinary Drone Workgroup – Development of proposal for presentation Saturday (Dr. Will Smith, Chair, ICAR interdisc. Drone WG) (Follow-up session to develop recommendations for next steps)

Best Practices for Deconflicting UAS/Drones in SAR Operations

How can conflicts with drones in search and rescue operations be avoided?

The IDWG was formed in 2020 and consists of the following members: Will Smith is the chair, Diarmaid Scully and Matt Ellingham from AIRCOM, Claudio Artoni and Mark Hebison from AVACOM, Peter Paal and Giacomo Strapozzon from MEDCOM and Filip Biocic and Martin Gurdet from TERCOM.

As a drone pilot, how can you avoid conflicts with manned aircraft such as helicopters, with other drones, with other flying objects such as birds and with other obstacles such as high-voltage power lines and trees?

The topic was also covered on the practical day on October 18, 2023. The following insights were gained:

- One issue is communication: active communication via radio (dedicated frequency for air operations) and communication with the air traffic coordinator as well as passive communication (ADS-B, FLARM etc., these must be standardized). Well-functioning communication is essential..
- Crew Resource Management: 2 to 3 team members are needed for a fully functioning drone team, trust between pilots, cooperation, coordination and practice are important.

- A flight plan must be drawn up: Create geo-fences, define where the drone will fly and where the helicopter/manned aircraft will fly. This space is defined horizontally and vertically. The flight space of the drone and helicopter is separated. A plan must be drawn up in the event that communication is lost and the airspace is occupied, in which case the drone will land immediately.

What was missing:

- case Commander, who is responsible for nothing but communication and organization..

What are the next steps:

- Strategic and tactical UAS operations, planning, creating checklists, determining qualifications.
- A paper has to be published: "Current Status of use of Uncrewed Aerial Systems (UAS)/Drones in Search and Rescue - a scoping review" (Current status of use of unmanned aerial systems (UAS)/drones in search and rescue operations review).

Legal principles of qualification of products as medical devices – Paul Pisconi EU, Head of MDRG - Nathalie Hölzl

Natalie Hölzl:

The question is when a product qualifies as a medical device.

It is about the distinction between products that fall under the MDR (European Medical Device Regulation (EU 2017/745) or whether they are products that fall under Regulation (EU) 2016/425 of the European Parliament and of the Council of March 9, 2016 on personal protective equipment.

The 'Rescue Bag' per se fulfills the criteria to be classified as a medical product. Whether a specific rescue bag product is classified as such or not is up to the manufacturer.

What are the consequences for mountain rescue services and manufacturers if a product is qualified as a medical product?

Paul Piscoi (online Presentation):

This shows the new Directive EU 2017/745 (Medical Device Regulation). The directive came into force on March 20, 2023:

Regulation (EU) 2017/745 of the European Parliament and of the Council of April 5, 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC

According to the preamble (8), Member States must decide on a case-by-case basis whether or not a product is covered by this Directive:

Preamble (8) reads as follows:

'It should be left to Member States to decide on a case-by-case basis whether or not a device falls within the scope of this Regulation. In this context, in order to ensure uniform classification decisions in all Member States, in particular in borderline cases, the Commission should have the possibility, after consulting the MDCG, to decide on a case-by-case basis, on its own initiative or following a duly justified request from a Member State, whether a particular device or category or group of devices falls within the scope of this Regulation (...)".

One example is the rescue bag for patient transportation. This rescue bag is used to transport patients during rescue operations. According to the manufacturer, it is designed to protect the patient from mechanical impact, but also to provide thermal protection.

The European Borderline and Classification Working Group (BCWG) has produced a manual that provides guidance on the demarcation and classification of medical devices in accordance with the new MDR and IVDR regulations. The BCWG has developed the document to support a harmonized interpretation of the regulations in the EU member states.

The rescue bag has been classified by the Borderline & Classification Working Group (BCWG) as a medical device in accordance with the MDR, or this has been recommended.

How obligatory is this?

This question was asked on behalf of the ICAR of the MDCG (Medical Device Coordination Group).

The answer from the German Federal Ministry of Health was as follows:

This classification is aimed at manufacturers and the competent supervisory authorities and is not obligatory for an individual decision. It is at the discretion of the manufacturer to determine the intended use of the products.

Questions/comments:

It is possible for one manufacturer to say one product is a medical device and another manufacturer to say the same product is not.

What if you have two products, one is a medical product and the other is not? The questions have not all been answered yet.

If you have any questions, you can send Paul Piscoi an e-mail.

File: 20231020-13-Medical Devices Presentation.pdf

A revolution in prevention of asphyxia in avalanche burial? The SAFEBACK study, Giacomo Strapazzon / EURAC (Sorry – no presentation available)

This lecture deals with the pathophysiology of critical, life-threatening avalanche burial, the Safeback Study and the results for mountain rescue.

Complete burial in an avalanche can lead to asphyxiation due to a decrease in oxygen and an increase in CO₂. As a preventive measure, you can prevent complete burial (Airbag), prevent oxygen deficiency (Avalunge) or work on a quick rescue (better avalanche transceivers, improve rescue techniques).

What can you learn from the survival curve?

The probability of survival decreases rapidly as the duration of the burial increases. After 15 minutes, the probability of survival begins to drop significantly. After 30 minutes, the survival rate drops to below 50%, and after 2 hours it is very unlikely to find survivors due to asphyxiation..

The depth of burial also plays a decisive role in asphyxiation-related deaths. Victims who are buried deeper in the snow have a higher risk of suffocation and their chances of survival decrease significantly. For example, the chance of survival for victims buried at a depth of less than one meter is around 90 %, while the chance of survival for victims buried at a depth of more than two meters drops to less than 30 %.

Safeback: This is intended to improve oxygen supply in the event of burial. Safeback (SBX) is a system that actively supplies the breathing zone with fresh air if you are buried in an avalanche, without the need for a mouthpiece. SBX can be integrated into backpacks and vests.

The Safeback was tested on various people. It was seen that the supply of oxygen decreased as soon as the device was switched off. The device was therefore able to improve the supply of oxygen to the victim.

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Next avalanche survival curve, Hermann Brugger & Simon Rauch / EURAC (Sorry – no presentation is available)

Presents the new survival curve. The first curve was valid from 1981 to 1991. Up to 18 minutes after burial, the survival rate is greater than 90 percent. After 35 to 130 minutes there is a kink from 28% to 7%. After 130 minutes, the survival rate in the first curve was 7% in the presence of a breathing cavity.

New curve: based on data from 1998 to 2020, collected by the SLF. With a burial time of over 120 minutes, the survival rate remains the same and does not fall as in the first curve. The survival curve has not changed significantly in recent years. Rescue has become faster. The overall survival rate increased from 42.9 % to 58 %. This is due to the development of avalanche transceivers, better training and better information as well as faster rescues.

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First RESponder-Centered support toolkit for operating in adverse and infrastructureless EnviRonments – The case of mountain rescue scenario – Vassileios Dovas/HRT

The aim is to develop a toolkit for first responders, equip them with it and make their work easier. The aim is to improve the localization of victims and the rescuers themselves as well as the rescuers' situational awareness and information gathering. The tools that are being developed focus on rescues in difficult circumstances and/or where there is a lack of infrastructure. Devices are being developed that the first responders carry themselves. The aim is to improve the efficiency and safety of first responders, especially in difficult conditions.

HERO (enHanced nEw eRa first respOnder) is a concept that provides devices that improve perception, allow precise localization of rescuers, offer them cognitive support and ensure ad-hoc communication within the team (verbally and via data exchange).

Several countries are participating in the consortium. The project was scheduled to run for 36 months (2021 to 2024). It is now in Phase III.

The technologies developed cover three areas: Infrastructure-based communication, ad-hoc communication and internal communication.

Various tests and field trials were carried out. In Vavdos/Chaldiki Greece, a radar sensing tool (radar imaging device) was tested on June 18, 2022, with which people can be found in smoke-filled rooms.

Rescue equipment and technologies were also tested in various scenarios: Earthquake with collapsed buildings (23 to 27.11.2022 in Weeze/Germany), tunnel accident with fire (27 to 31.03.2022 in Modane/France) and mountain rescue (23 to 27.01.2023 in Navacerrada/Spain). In the mountain rescue scenarios, tests were carried out in 6 different rooms and in the field. Further tests are planned.

The following areas were tested:

Smart helmet, robust vision (in poor conditions, e.g. fog), visual self-localization, enhanced hearing, enhanced sense of smell, radar sensing and remote touching, life sign detection, data exchange orchestration, INERTIO, Galileo-assisted localization, biosignal monitoring, augmented reality interfaces, wireless

finder, E888, WANET, seamless communication with C2, C2 interface (including mission recorder).

The results of the tests: 100% of rescuers rated the toolkit/devices as useful, 87.76% of rescuers rated the devices as useful in their entirety, the rest rated parts of them as useful. 35% of rescuers said that the safety of their work was greatly improved and 51% said that the devices made their work more efficient.

File: 20231020-16-RESCUER_ICAR_Toblach2023_v3.pdf

Climbing Ropes – do diameters matter? – Stefan Blochum – Bergwacht Bayern

Talks about equipment and the consequences of using it.

Does the diameter of the ropes play a role? Sharp edges and the braking force (given in kN) play a role.

There were two accidents in connection with edges that are looked at more closely, namely an accident in Italy/Gran Paradiso, in which the DAV was involved, and an accident on the Nesthorn/Switzerland on a mountain guide course.

In the first case, two people got lowered on a rope with a diameter of 8.7 mm over a rounded edge with a small slight sideway. The rope broke. As a consequence the swiss mountain guide association introduced a minimum rope diameter of 9.5 mm for single ropes in guiding two clients. Does this mean those ropes loaded with two climbers are safer than others? Tests were carried out with different ropes with different loads. The cut length (cm) in relation to the pretension (kg) was examined for different rope types.

Conclusions for single ropes:

- increasing the preload from 80 kg to 160 kg reduces the cutting strength by approx. 600 %.
- Increasing the diameter by 1.1 mm from 8.9 mm to 10 mm improves the cut resistance by approx. 10 %.

- The cut resistance of Dyneema ropes is 200 to 300 % higher, Kevlar 130 to 160 % higher compared to polyamide.
 - The cut resistance of a 6 mm Dyneema rope corresponds to the cut resistance of a 9 mm single rope.
- The diameter does not matter.

More conclusions for a single rope:

- Do not lower down two people over a sharp edge.
- Dyneema ropes work well when lowering down for rescues in open terrain.

It should be noted that a rescuer with equipment weighs 80 to 120 kg.

Two people need two ropes. Is this also necessary for a rescuer with equipment?

There was a near-accident when using two 8.5 mm ropes, half rope technique, a tuber and a fall.

Tests were carried out on braking force and when a fall can be held. If the braking force is less than 2 kN, it is impossible to hold a fall. With a braking force of 2 to 2.4 kN it is possible, with a braking force of 2.5 to 3.5 kN it is not a problem.

Tests were then carried out with different ropes, different hand forces on the rope and belay devices. The diameter of the rope plays a role here!

Conclusions:

- Tubers are made for single ropes, but not for thin ropes.
- Alpine tubers are good for thin ropes.
- Soft ropes have higher braking forces.
- Low hand force, a small rope diameter and a munter hitch is a critical combination!

Conclusion: With a single rope with tube:

- A second carabiner is a must for low hand force.
- A larger rope diameter means a greater braking force if the rope is not too hard.

Challenges:

- Diameter?
- Low or high manual force?
- Braking device?
- If the rope is hard, soft, frozen, wet?
- 1 or 2 carabiners used with a tube?
- Munter hitch?

Who can answer all these questions when they are on a rescue mission?

Maybe you should just leave out small diameters for ropes...

Questions/comments:

How was the change in edge controlled between tests, at what intervals?

Were there specifications that can be followed to allow others to perform the same tests?

The edge only seemed to last for about 10 tests before it had to be replaced. A control rope was used to see if the edge changed between tests.

There are no specific specifications for the sharp edge.

What kind of carabiners were used?

We went back to the rounded ones.

File:

20231020-17-Blochum-ICAR Diameters V2.1.pdf

20231020-17-Schnittfestigkeit_Swift 8.9 mm_80_160.mp4

The importance of stay flexible – Analysis of a complicated rescue operation – Andrea Dotta – Swiss Alpine Rescue

Shows two aspects of the rescue service:

- Part one: The important need to remain flexible.
- Part two: New technologies to be faster and better in a rescue mission.

First shows a case that occurred in Switzerland. The alarm was received by the HEZ (helicopter operations center) on 13.12.2022 at 20:15. Normally, a key word such as evacuation, avalanche is used at the start of a rescue. They didn't have that here. The alarm consisted of a photo that a colleague sent to the alarm center. It was a post from the victim on Facebook. The photo showed a power line pole and forest/snow. It was not known exactly what the victim's problem was and where he was.

The possible area where the victim was located was extensive (Meiental and Val Bedretto). Andrea Dotta was in Airolo and drove through one of the possible areas (Val Bedretto) in his vehicle. At 8.45 p.m. he found the victim's vehicle.

The procedure for an operation is normally as follows: Identify the problem, analyze the situation, make decisions, plan the operation, issue orders. Many points have to be taken into account: Weather, day/night, safety of the rescuers, terrain, equipment and health of the victim.

The avalanche danger level was 2 and a missing person report was received. A young person was freeriding and was now missing.

What was decided? Search flight with helicopter at 21.23 hrs, pre-alerting of the rescue team from Airolo and avalanche dog handler, search flight with REGA IR/EOS-IMSI 22.50 hrs to 00.15 hrs. The search was carried out with two helicopters.

The IMSI signal was finally located about 100 meters away from where the person could be found. The victim was located at 02.00 hrs.

Conclusion: Ideally, there is a straight path to the goal. But in reality, there is no straight path; operations and decisions have to be constantly adapted.

Teil 2: Claude Cavillet, Rescue Team Leader in Montreux, ARS :

How can new technologies help rescuers to become faster, make better decisions and be safer during operations? This can be done using new software: www.surevive.ch, via the Momentum app.

The first step is to locate the person who made the emergency call and gain an overview of the situation. After receiving an alarm, the victim is contacted via a short message. The victim must then give their consent to open a link, after which information is transmitted. The search areas are then defined.

Rescuers are alerted via an app (ARMC - Alpine Rescue Mission Control). The rescuers receive information on exactly what has happened where (e.g. avalanche near Tomlishorn). They can use the app to indicate whether they are available or not. During the rescue operation, the rescuers can be localized (track) and a situation on site is transmitted. The app can also be used to communicate with other rescuers. Information can be added on an ongoing basis.

Files: 20231020-18-ARS_The importance of stay flexible_Versione 2.pdf

Liaison – Collaborative Efforts of Central European Alpine Rescue Service – Martin Gurdet/ÖBRD, Tobias Vogl/BWB, Thomas Mair (Bergrettung Südtirol), Harald Frenner (C.N.S.A.S. Südtirol)

Tobias Vogl:

Tobias Vogel and Martin Gurdet presented the tool "Wissensbox" at the ICAR in Montreux 2022. This is an online tool that contains knowledge for search and rescue operations. It is an online academy and encyclopaedia for all mountain rescues.

The main conclusions of 2022: everything is becoming more complex and more expensive. That's why it's important to work together. Sometimes methods and behaviors need to be changed. All organizations are struggling with the same challenges and trying to solve them. This costs a lot of money, requires personnel, knowledge; resources that are only available to a limited extent in the individual

organizations. That is why cooperation is important. Together we can achieve more.

For training, everyone now needs the same platform (videos, e-learning).

Martin Gurdet:

There was a meeting in Admont from 29.09. to 01.10.2023. Various topics were discussed.

The conclusions of this meeting are:

The use of a common digital platform and international cooperation offer numerous advantages.

Collaboration 2.0: achieving more together in less time. The focus is on joint action in the common interest and the resulting collective benefits.

The aim is to ensure maximum safety and quality for all volunteers. This can be promoted by creating and using content across organizations and countries.

Joint investment - multiple benefits/added value: Sharing and developing content optimizes efficiency, saves resources and maximizes financial benefits.

As soon as all organizations use the same platform, there are numerous new opportunities for collaboration (Smart Cooperation 2.0).

One example of cooperation is the training center in Bad Tölz. This is used by 4,000 members of the Bavarian Rescue Service and 2,000 other people from various organizations such as police helicopter squadrons, military helicopter squadrons, etc..

Tobias Mair:

Only if the various organizations work together can the optimum be achieved in terms of training and the results of rescues. The organizations need the same platform (WissensBox.media). The manufacturers of rescue equipment such as Recco and Tyromont are also integrated. This means that the manufacturers do

not have to train all organizations individually. For example, how the Recco is used is recorded on the platform.

Work smarter, not harder!

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End of our meeting: 17.00