EXPLOSKI - AN EXPLOSIVES ACCOUNTING SOFTWARE FOR SMARTPHONES AND DESKTOP COMPUTERS

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ABSTRACT: Safety officers of ski resorts and areas at risk from avalanches must have the correct amount of explosives quickly on hand during critical situations. To maintain an overview of the stock levels, explosives accounting is necessary. With ExploSKI, an explosives accounting software for smartphones and desktop computers, it is possible to record changes in the stock of explosives with just a few clicks. Booking explosives in or out takes only a few seconds by scanning the barcode on the explosives case using the smartphone/tablet camera. ExploSKI has been used successfully in several ski resorts for over three years.

KEYWORDS: Explosives, Smartphone, Tablet, Detonation Control, Offline Map

1. INTRODUCTION

Safety officers of ski resorts and areas at risk from avalanches must have the correct amount of explosives quickly on hand during critical situations. They must therefore ensure that sufficient explosives are available in each depot. To keep track of the stock levels, explosives accounting is necessary. But to maintain this accounting system with a team of safety officers, often working under time-pressure, the system must be very efficient.

With ExploSKI, an explosives accounting software for smartphones and desktop computers, it is possible to record changes in the stock of explosives with just a few clicks. Booking explosives in or out takes only a few seconds by scanning the barcode on the explosives case using the smartphone/tablet camera. Explosives cases may be moved between depots and explosives may be transferred between cases or combined into a prepared explosives package, all with little effort. The app works completely offline, which is especially important in the explosives depots, which are often bunkers. An internet connection is only necessary after the assignment is complete, in order to synchronize the data with the database via a secure connection.

Following synchronisation, individual assignments can be viewed on the computer and the stocks in the depots can be checked. Detailed reports can be created and saved as PDFs at any time at the touch of a button.

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2. MOBILE DATA MANAGEMENT

2.1 *Managing movement of explosives*

Every morning, before deployment, the skipatrols synchronize their iPads with the database. In one click they store the latest stock levels of the explosives on the device and can set off on their way to the depots. After synchronization, ExploSKI no longer needs a connection to the internet, hence it can be used anywhere, even in the bunkers where the explosives are stored.

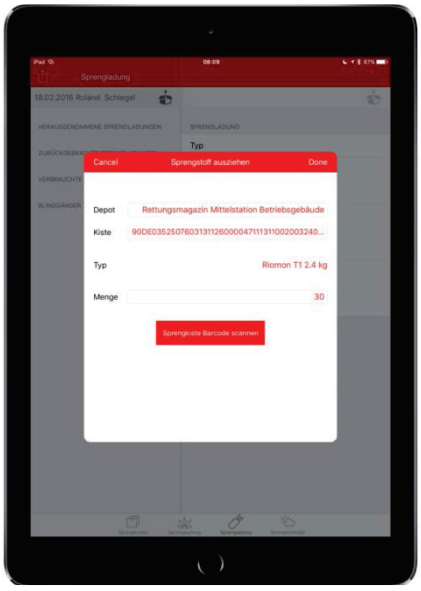

Figure 1: ExploSKI can be used to scan the barcode of an explosives case using the tablet/smartphone camera. This eliminates the need to search for the correct explosives case number in dropdown lists.

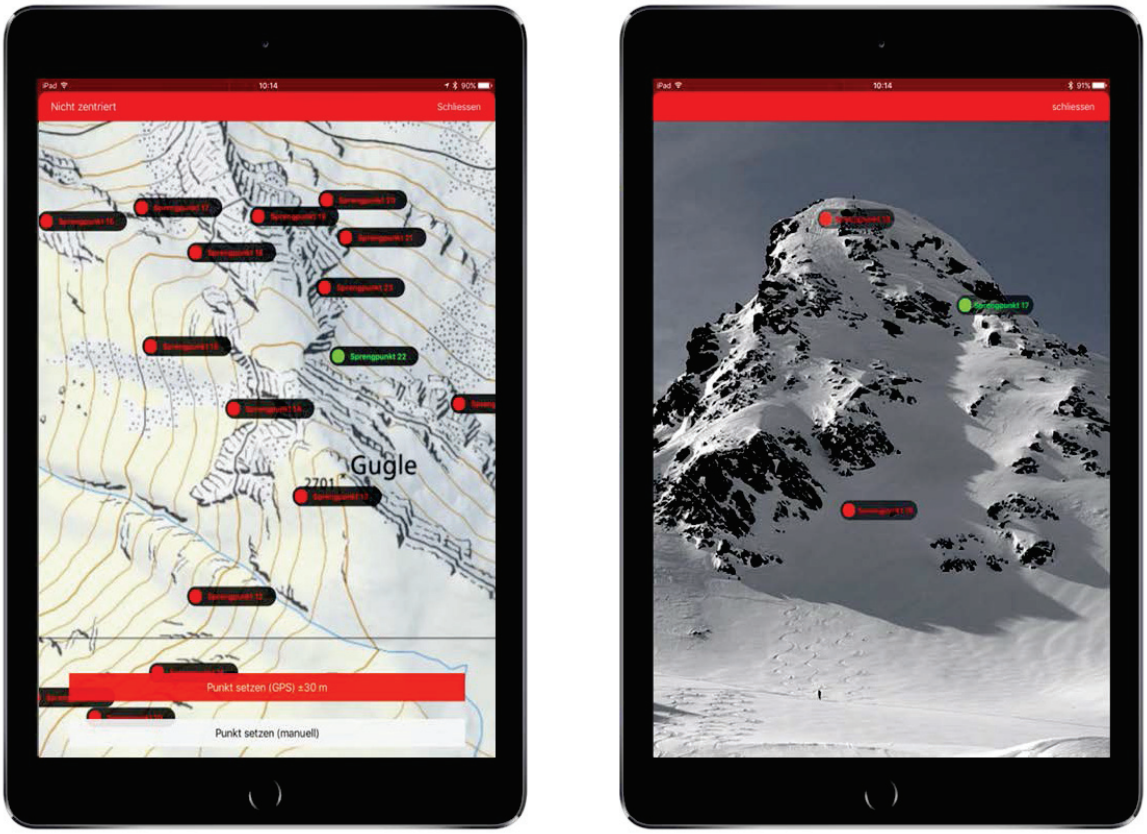

Figure 2: Reporting detonations on the map using GPS or on photos

The cases in which the explosives were delivered are supplied with a barcode. The patrols can scan these barcodes using the device's integrated camera. The ski-patroller then only needs to enter the number of charges taken from the case. The reference of the explosives is already stored in the system.

ExploSKI can also be used to combine explosives from the database. Whilst scanning the charges taken out of the case during explosives preparation, the patroller can already define that the charge and the fuses will be detonated together. This means that all charges and fuses are debited at once with a successful detonation. Once defined, the charges are stored combined both physically and in the database.

Once the patrols have secured all the slopes, they may return unused explosives to a depot. There the cases into which the charges are returned, can again be scanned with the tablet to speed up the return process. The patroller then enters how many charges have been returned and how many were detonated. After synchronizing the data to the database, the accounting system will be updated with the correct explosives stock levels.

2.2 *Detonation report*

ExploSKI can be used to generate the detonation report whilst detonating. It has been built to require minimum interaction during detonation, with the ability to add more contextual information later. Only the locations of the detonations must be added whilst the patroller is otherwise busy with detonation. There are two ways to locate the detonations: they can be marked using the integrated GPS of the devices; or by clicking on the offline map (scale 1:10'000). The detonation location can also be easily identified on photos (e.g. drone images). Shortly after the detonations have taken place, by clicking on each of the locations, the patroller can define whether the detonation was successful or a dud and whether an avalanche was triggered and its size. Further information on the snow and weather conditions can be added at a later time. These parameters are all stored for future information.

3. OFFICE-BASED LOGISTICS

The person responsible for the ski area can use the desktop PC software to call up all detonation tasks and check whether all charges are accounted for. If the values booked in and out do

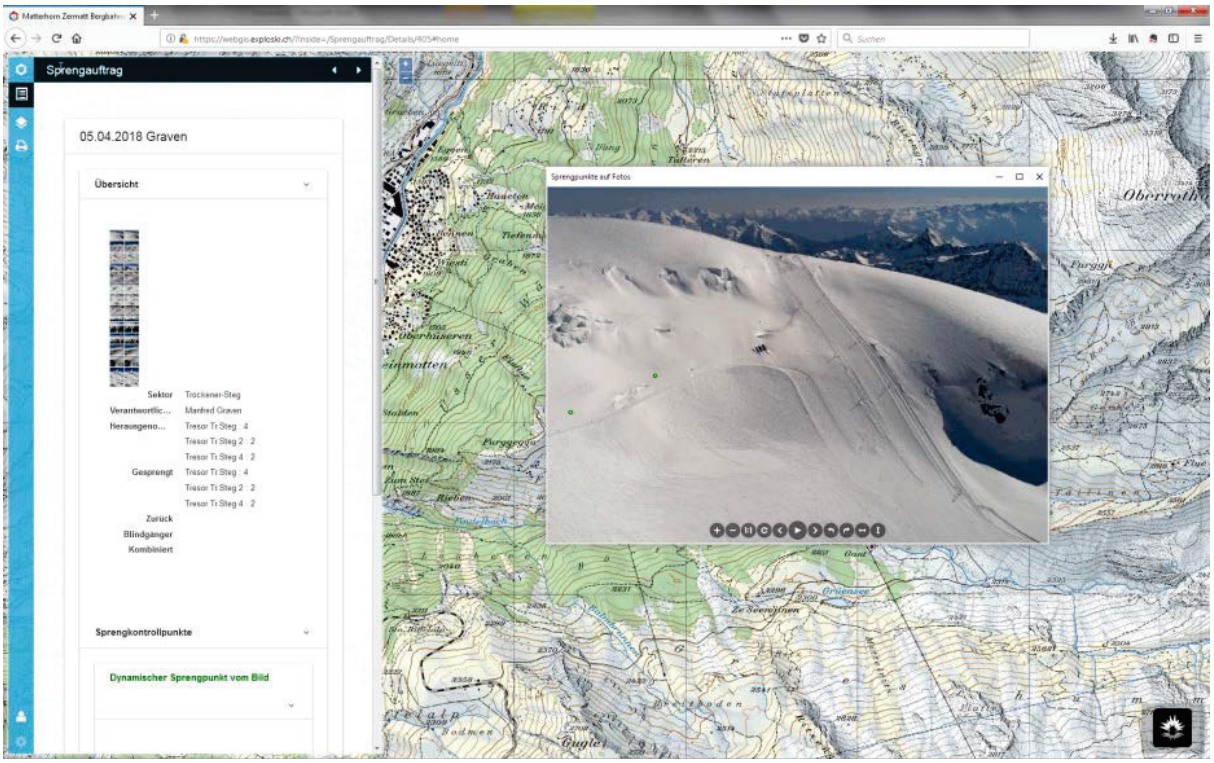

Figure 3: In the WebGIS, the detonation reports can be viewed in the web browser at any time.

not match, the detonation task appears red in the user interface, a sign that something is incorrect.

In addition, they can call up the stock levels of explosives from individual depots, check consumption and automatically generate reports, which provide an overview of all information in PDF format.

3.1 WebGIS for visualization of detonations

Detonations added to the map or image views in the mobile app can be viewed using a WebGIS. The WebGIS may be accessed using a web browser and is only available to authorized persons by password. This allows patrols to check their data on their computers without installing additional software. For security reasons it is not possible to edit the data in the WebGIS, to prevent abuse of the explosives.

4. EXPERIENCE WITH EXPLOSKI

ExploSKI has been used successfully in multiple ski areas since 2014. The system has proven itself in both small and large ski areas, such as Zermatt or Lenzerheide. the system has been continuously expanded over the years through intensive interaction with the responsible persons as well as the patrols. ExploSKI has proven to be very useful not only for ski resorts but also for community officials who need to protect their area from avalanches.

Even in very severe winters, such as 2017/18, when more than twice as many explosives were detonated in Valais as in average winters, ExploSKI supported those responsible for detonation without interruption.

It has been shown that even users who have never had an iPad in their hands before can very quickly use ExploSKI to update the detonation logs. We regularly receive feedback that these people could no longer imagine explosives accounting without ExploSKI.

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