



# Statistical Analysis on Worldwide ABS Application and Current Steps in the Development

Manuel Genswein

# ANALYSIS ON WORLDWIDE USE OF AVALANCHE BALLOON SYSTEM (ABS) FLOTATION DEVICES

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Worldwide, a total of 200 cases (caught subjects) in 167 avalanches are known and registered in the database of the Swiss Institute for Snow and Avalanche Research, Davos

## **Flotation device completely inflated: Total 180**

Completely inflated balloons, backpack properly fixed to the body until avalanche came to standstill

## **Flotation device not or not completely inflated: Total 20**

**Human failure: Total 16**

**Technical failure: Total 4**

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## **Flotation device not or not completely inflated: Total 20**

### **Human failure: Total 16**

- Case 1: Equipment incomplete
- Case 2: User did not realize that there was an avalanche or was unable to pull the trigger handle due to mental or mechanical / physiological reasons
- Case 3: User did not trigger the release mechanism on purpose

### **Technical failure: Total 4**

# PROBLEM ANALYSIS OF ABS APPLICATION CASES WITH NO OR PARTIALLY INFLATED BALLOONS

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## Technical failures: Total 4

- 1x Only one of two airbags inflated
- 1x Seams failed on mono airbag system
- 2x Neither of two balloons inflated

# PROBLEM ANALYSIS OF ABS APPLICATION CASES WITH NO OR PARTIALLY INFLATED BALLOONS

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## Human Failures failures

12x Release handle not triggered (6% of total incidents)

1x Release handle missing

2x Pressure container used & empty

1x Release handle torn off during fall

} Lack of system check!  
(2x deadly consequences)

## ANALYSIS ON CASES WHERE THE VICTIM FAILED TO TRIGGER THE ABS SYSTEM

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### **Statistically, the relevance of this group is:**

60% of all cases with no or partially inflated balloons

75% of all cases where the system has not been effective due to human failure

## ANALYSIS ON CASES WHERE THE VICTIM FAILED TO TRIGGER THE ABS SYSTEM

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- Did not recognize the avalanche or recognized it too late
- Recognized the avalanche, but panicked and forgot to pull the release handle
- Recognized the avalanche, but was unable to pull release handle
- System not triggered initially on purpose, then unable to pull release handle during the later state of the avalanche

## HIGHER PROBABILITY OF ABS RELEASE BY FORMING A “RELEASE COMMUNITY”

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Remote triggering from group members who are not caught or still capable of pulling the release handle of the system

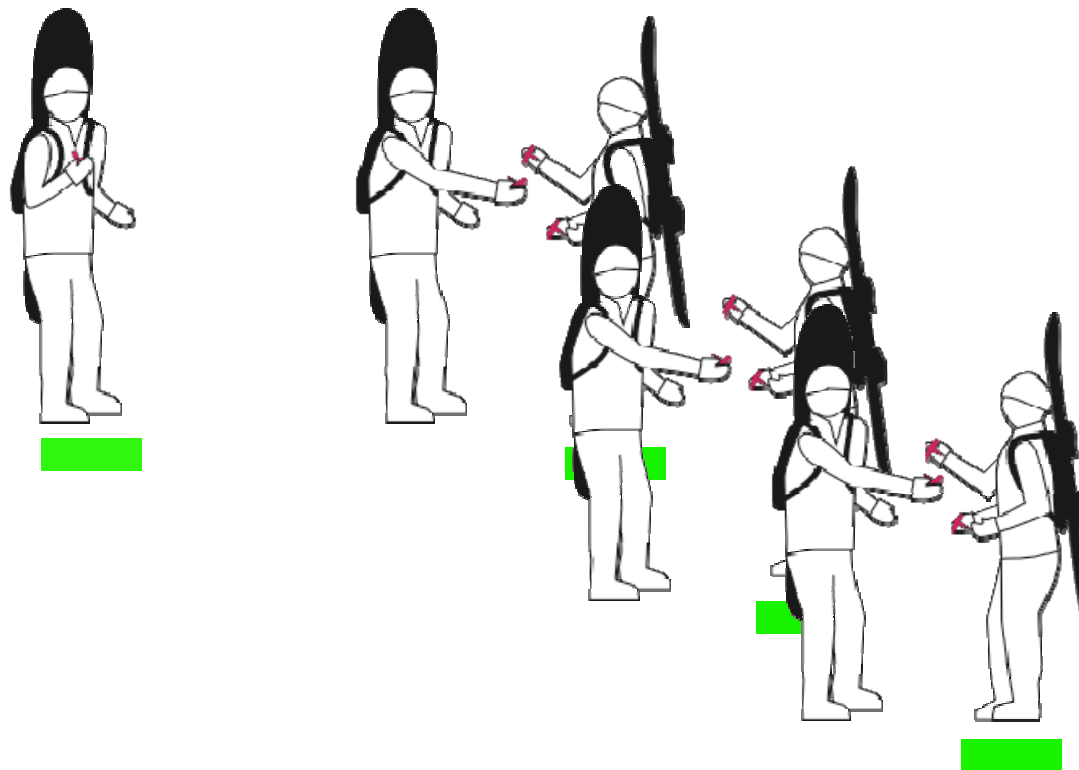




## FORMATION OF A “RELEASE COMMUNITY”

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One member of the “release community” pairs all group members

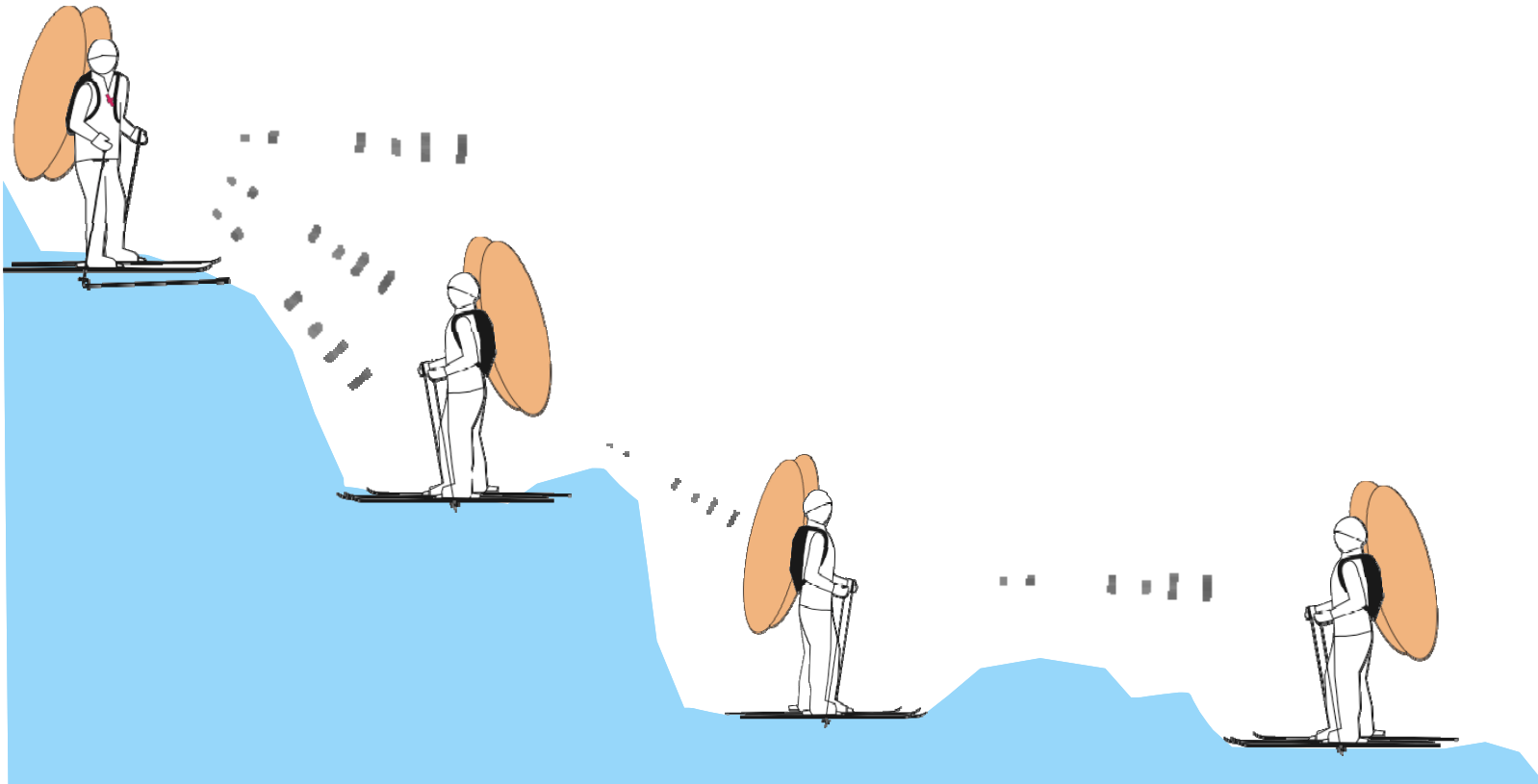


## VALUE OF A REPEATER FUNCTION WITHIN THE “RELEASE COMMUNITY”

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The repeater function minimizes consequences of terrain shading and increases the effective range within a “release community”

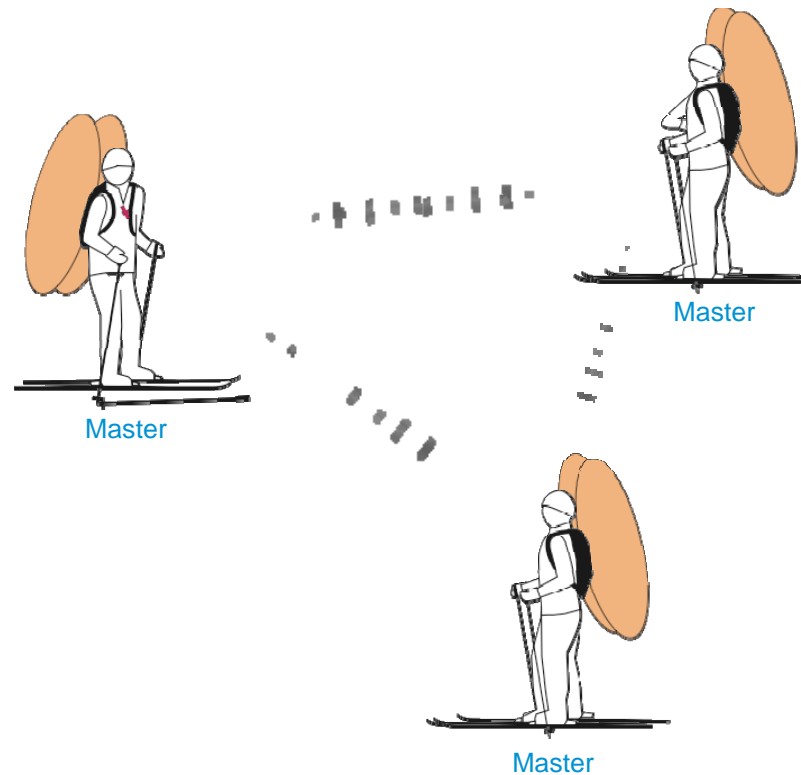


## A “RELEASE COMMUNITY” IN MASTER / MASTER CONFIGURATION

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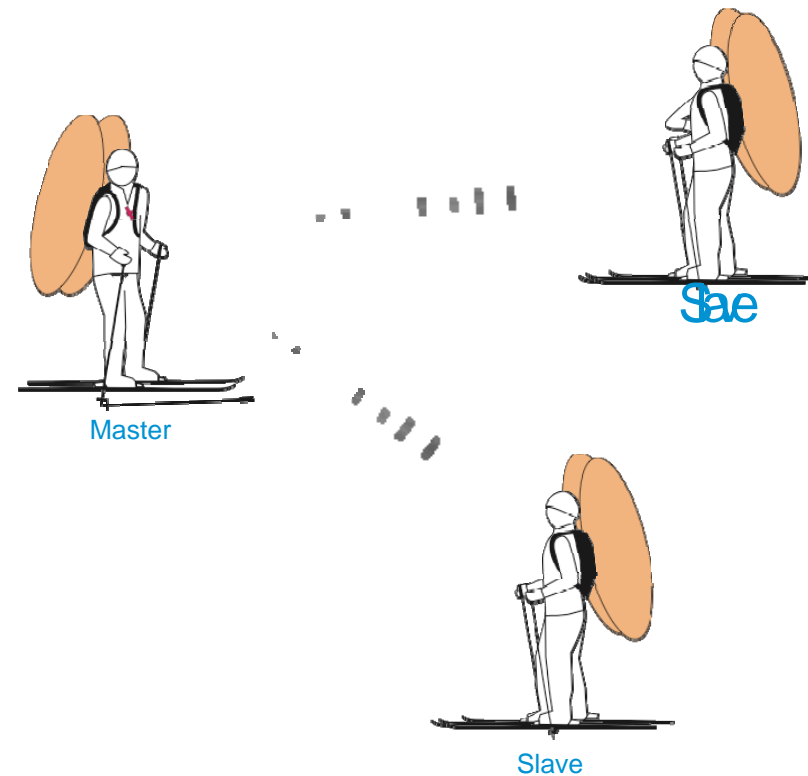
Every group member may remotely trigger all group members within range



## A “RELEASE COMMUNITY” IN MASTER / SLAVE CONFIGURATION



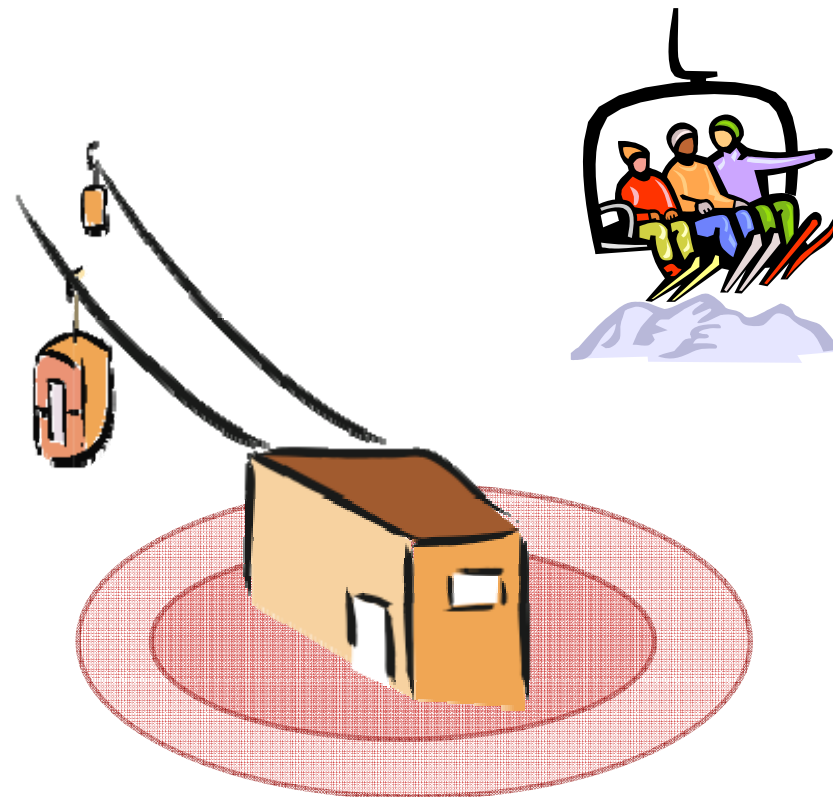
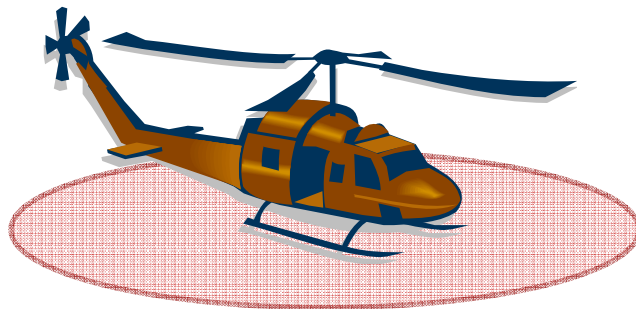
- Selected group members may remotely trigger all group members in range
- All group members may trigger their own system and act as repeaters



## REMOTE RELEASE BLOCKING TRANSMITTER

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Remote release may be suppressed in safety critical zones



## LOCAL TRIGGERING: PYROTECHNICAL TRIGGER RELEASED BY MECHANICAL PULL

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### Triggering of your own system is as well possible when:

- No batteries or batteries empty
- System did not join a “release community”
- System is part of a “release community” it is not skiing with
- Defective electronics

## BACKWARD COMPATIBILITY WITH ALL ABS SYSTEMS WITH PYROTECHNIC TRIGGER MECHANISM

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- Trigger handles with and without remote triggering available
- Remote triggering system upgradable by the user



THANK YOU FOR YOUR  
ATTENTION!

QUESTIONS?