# Risk Analysis explained

## A safety tool for skating on unknown and unprepared natural ice

Rob Mulders, HLSK, 2020, v2.0

# Why risk analysis?

- HLSK has had two major incidents: Visingsö en Mjøsa
- Lesson learned Visingsö: thinking that skating in Sweden and Holland is comparable, leads to underestimation of the risks
- Lesson learned Mjøsa: excellent ice conditions make leaders go into tunnel vision and ignore risks
- We also experienced some serious injuries during HLSK multi day trips in the years 2012 - 2017

Want to read more about Visingsö and Mjøsa? Visit www.hlsk.nl/gidsen and scroll down.

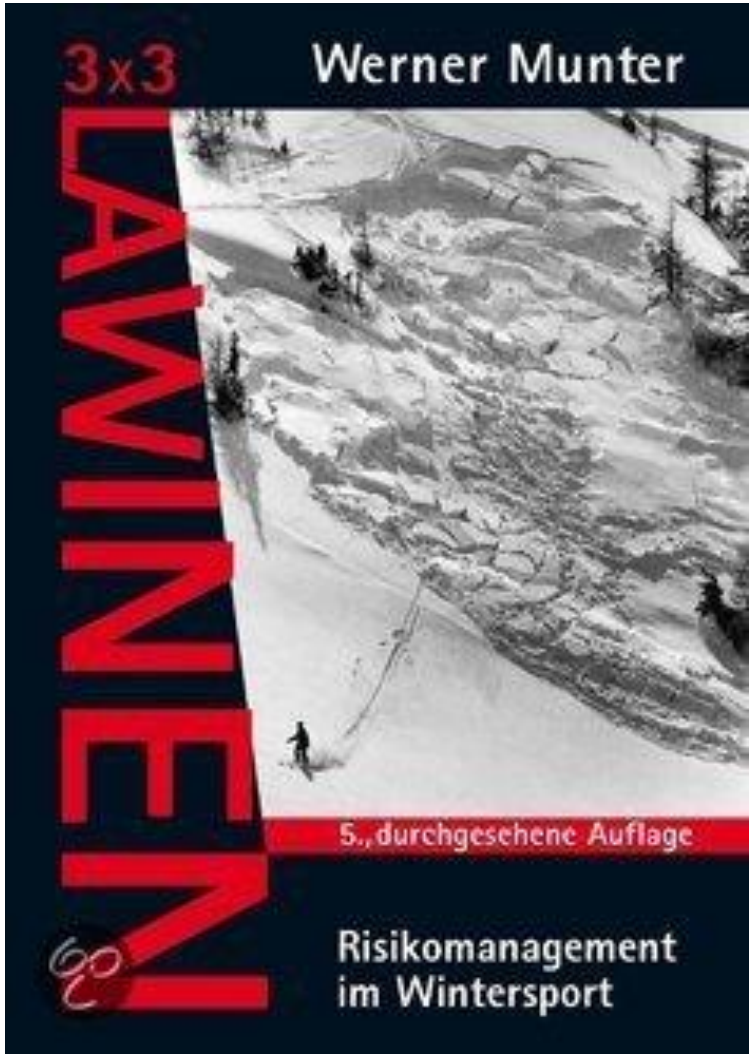
# Multiple incidents before doing something

- In 2011, a HLSK-group was rescued by helicopter from drifting ice on lake Vättern. Rob and Wim wrote the incident report and started to investigate risks in Nordic skating.
- In 2012, Rob and Tom were on drifting ice on IJsselmeer in Holland. The ice moved towards land so nothing serious happened, but Rob started to think about prediction models for ice drifting.
- In 2015, two combined LLK- and HLSK-groups were rescued from an icefloe on Mjøsa. Rob was watching from land and helped the rescue. Krister investigated afterwards.
- Four days after Mjøsa, Rob skated with Valter on Siljan. Valter got called by Sten, who was on drifting ice more to the west. Valter and Rob started to make a list of signals you might get before the ice starts to drift.
- In 2016, HLSK realized something needs to be done about risk management. Wim and Rob formulated the 4x4 risk analysis. Krister reviewed and feedback was processed. Tom added the 4x4 to the HLSK reference card.

Siljan, 11 February 2015

# Starting point

- Literature: Werner Munter risikomanagement im Wintersport
- Incidents: all major incident reports in Nordic skating
- Skridskonät: avvikelserapportering
- Experience from: Wim Willemse, Krister Valtonen, Valter Lindén, Tom Nieuwenhuijsen, Rob Mulders

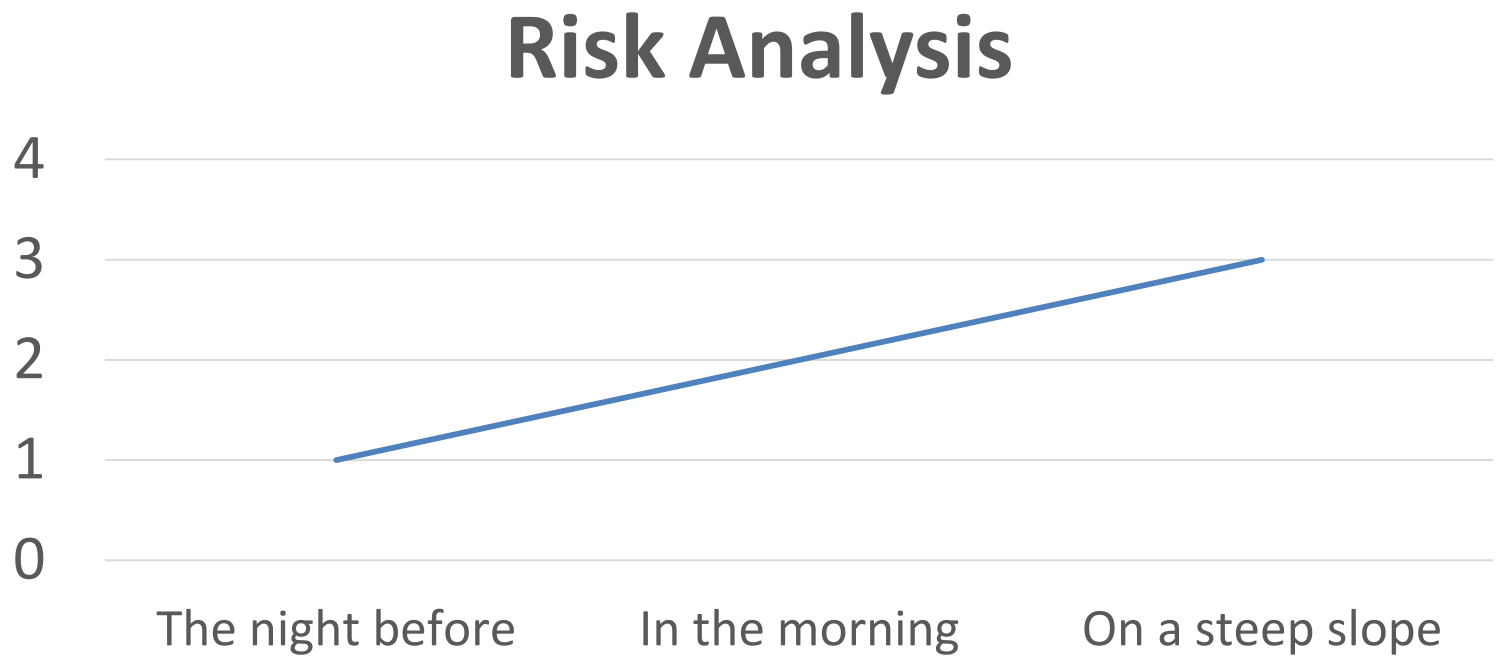


# Werner Munter: how does it work?

Example: you are tour skiing with two newbees. The planned route seems easy. The weather forecast is fine and the snow dry, but after wake-up the wind is stronger and the snow became wet at night. You decide to do a shorter route, but while skiing it turns out that the new route has a steep descent.

| | Weather and snow | The human factor | Terrain |
|---|---|---|---|
| The night before | 0 | 1 | 0 |
| In the morning | 1 | 1 | 0 |
| On a steep slope | 1 | 1 | 1 |

# Increasing or decreasing?




The graph belongs to the skiing example of the prior sheet. When the risk level is increasing, your conclusion should be that the risk is even higher than the absolute level you are on. When the risk level is decreasing, your conclusion should be that you should try to stay in that decreasing mode.

# Adjustment for Nordic skating: 4x4

| | The evening before your tour | At breakfast on tour day | On the ice before departure | During fika and after a change |
|---|---|---|---|---|
| Terrain | | | | |
| Ice | | | | |
| Weather | | | | |
| People | | | | |

# Addition of ‘normal’ and ‘risky’

Below the analysis of the risk factor ice. The green column mentions the normal situations you encounter during a day tour. The red column mentions the risk increasing factors. Judge the risk factor (in this case ice) by comparing the situation you encounter to the reference 'normal' day tour described in the green column.

| | Normal conditions | Increased risk conditions |
|---|---|---|
| **Factor** **Ice** | **thick kärnis; hard stöpis/snöis with stable kärna under; ice not degenerated; snow/rimfrost on the ice < 1cm; water on the ice <1mm; normally placed upp/nedråkar; few vindbrunnar; generations of ice easily visible** | **thin ice; weak structured ice; spring ice; loose from shore; connected to open water; ice floes; (newly formed) signs of recent ice drift; signals of tension; (refrozen) släppråker; ice broken near shore due to traveling waves; råk following shoreline; stöpis/snöis without stable kärna; double ice; reduced visibility by snow/water on the ice; underfrättning; many vindbrunnar; vrakis; many torrsprickor; plurrnings reported** |

# Example: risk analysis Mjøsa (Norway)

| | The evening before | At breakfast | On the ice before departure | After the warm föhn (a change) | After the first crack (a change) |
|---|---|---|---|---|---|
| Terrain | 1 | 1 | 1 | 1 | 1 |
| Ice | 0 | 0 | 0 | 0 | 1 |
| Weather | 0 | 0 | 0 | 1 | 1 |
| People | 1 | 1 | 1 | 1 | 1 |

BIG lake →

Two clubs →

← Loud ‘BANG’ + crack

← Föhn


Group 4A
Widening crack
Group 3A

# Zooming in on Mjøsa

- On Mjøsa, the groups didn’t realize they were at start already on risk level 2: people and terrain.
- Once the föhn came, only a few people realized the risk increased.
- One of the four groups went to land because of the föhn, but forgot to warn the other groups.
- Once the ice started to break up, everyone knew the risk was too high to continue.
- But two groups were already cut off from land and had to be rescued.

**Exercise 1** – find one of your old tour reports on Skridskonet and perform (in hindsight) a risk assessment. Follow the 4x4 guidelines and take the moment of the highest risk situation. Put the score and short explanation in a comment below the tour report.

## Risk levels

| Level | Description | Result |
|---|---|---|
| 0 | Normal risk | go skating according to your plan, taking normal precautions |
| 1 | Increased risk | add risk reducing measures to mitigate the increased risk |
| 2 | High risk | add strong risk reducing measures to mitigate the increased risks |
| 3 | Very high risk | take very strong risk reducing measures or choose another location |
| 4 | Extreme risk | don't go, retreat, choose another location or date/time |

# Next step

- HLSK is evaluating the current risk analysis, by doing the risk analysis in club tours
- **The “high over” experience (so far) is rewarded as very good: the main value is to stay out of tunnel vision and underestimation**
- The “detailed columns” are used less and less, but the awareness of the leaders seem to increase

- HLSK wants to add risk reducing measures, corresponding to the risk factors, to the reference card

# Examples of risk reducing measures

| When | Then |
|---|---|
| You don’t know at what time of day the ice degenerates fast because of incoming sunrays | Shorten your tour; Make short circles from the starting place; Stay very close to land at all times; Check the ice very frequent; … |
| The forecast says the wind will increase and/or change in direction | Stay away from large open areas; Stay on the side where the wind goes in land; Ask your group if wind is increasing; … |
| You skate on stöpis and the kärna might be eaten away on some places | Check the ice very frequent; Stay close to land at all times; Keep more distance in the group; Analyze all places where current is possible; … |
| You don’t know if there is any överis on your route | Lower your speed; Keep more distance; Ask your group about recognition of överis; Stay on today’s type of ice with lowest överis chance; … |
| You don’t know the level of equipment experience of your participants | Check them on SN; Ask them about their experience; Start with exercise(s) on your day tour; …. |
| Your planned route will use all the available time | Shorten your tour; Do the expected difficulties first and save the easy route for the afternoon; Have plan B with public transport ready; … |

# Reducing measures by category (draft)

| Terrain | Ice | Weather | People |
|---|---|---|---|
| Smaller/shallower lake | Check more frequent | Choose proper starting/ending time | Less ambitious plan, less distance, more breaks |
| No sea, no river | Don’t leave the side | Choose other location | Start with practicing equipment |
| Lake without narrow passages / islands | Lower speed | Skip the day | Discuss procedures |
| Early lake | Keep more distance | Choose location with wind to land | Repeat briefings |
| Lake known not to have open water | Stay on shadow side | | Choose strategic starting point to return fast |
| Skip certain parts of the lake | Do one safe bay multiple times | | Step on land and call taxi |
| | Pass thin ice one by one | | |

**Exercise 2** – for the tour report you assessed in exercise 1, decide with risk reducing measure(s) would have been suitable. Put the measure(s) in a comment below the tour report.

# Take home question

What would be the best way for HLSK to visualize the risk reducing measures, in combination with the risk analysis?

For instance: transfer the risk analysis to HTML, make the risk increasing factors clickable, leading to a listing of corresponding risk reducing measures.

We welcome all suggestions!


# Questions? Feedback?

Very welcome at rob@fire.ly