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SBB in the influence of climate change:

Challenges and possible measures

I-AT-KBN-NNR
Department Nature and Natural Hazards

Florian Hofstetter
28.April.2017

Agenda

1. Round of introduction .
2. SBB
   - The company
   - Department: Nature and Natural Hazards
3. Climate Change at the SBB
   - Process
   - Conclusions
   - Further approach
4. Anthropogenic events

SBB – Swiss Federal Railways
Introduction

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→ **Florian Hofstetter**

- Msc of earth science ETH and applied geophysics, further education GIS
- SBB: Department Nature and Natural Hazards
  - Natural hazards specialist and GIS-requirements
  - florian.hofstetter@sbb.ch

SBB – Swiss Federal Railways

Organisation Chart

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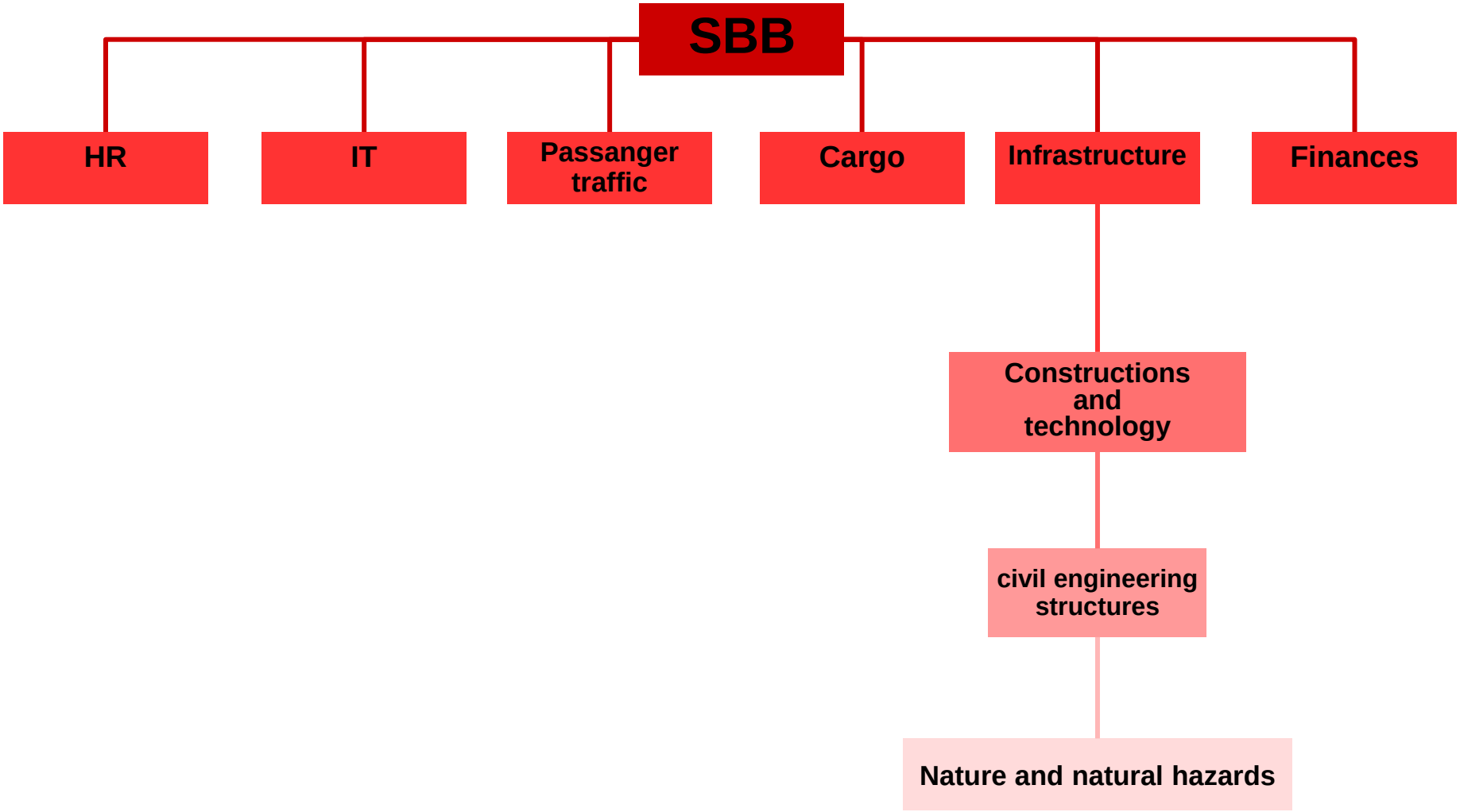
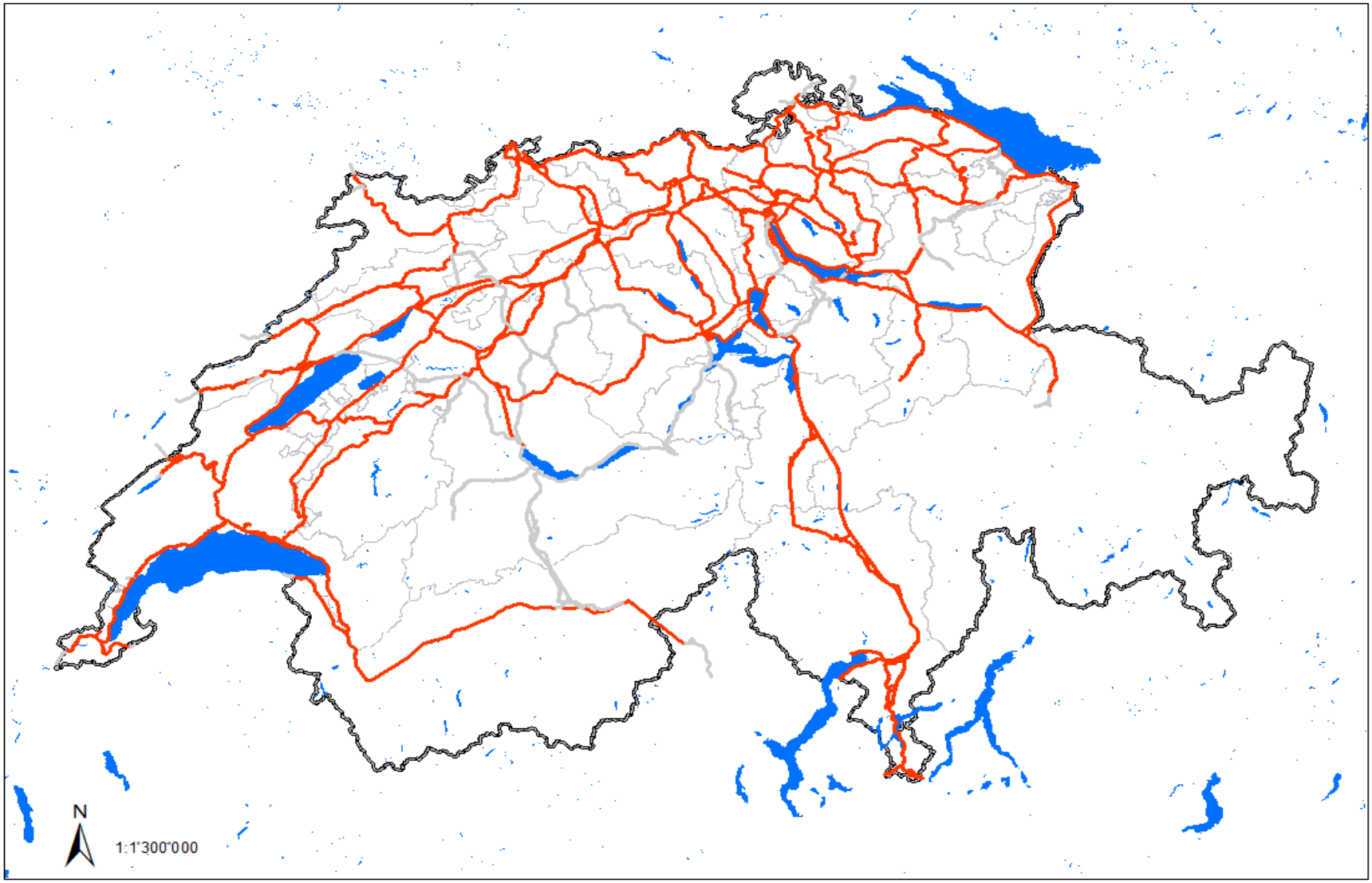


Overview - ~3100km tracks

SBB rail network without tunnels (red) [as at 27 July 2015]



Nature and Natural Hazards

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Natural Hazards

protection structures

natural hazards exposured sections

event management

Nature

Protection forest

woodland

no woodland

vegetation control

trouble plants (neophytes)

fences in the safty zone

Overview - nature hazards exposured sections

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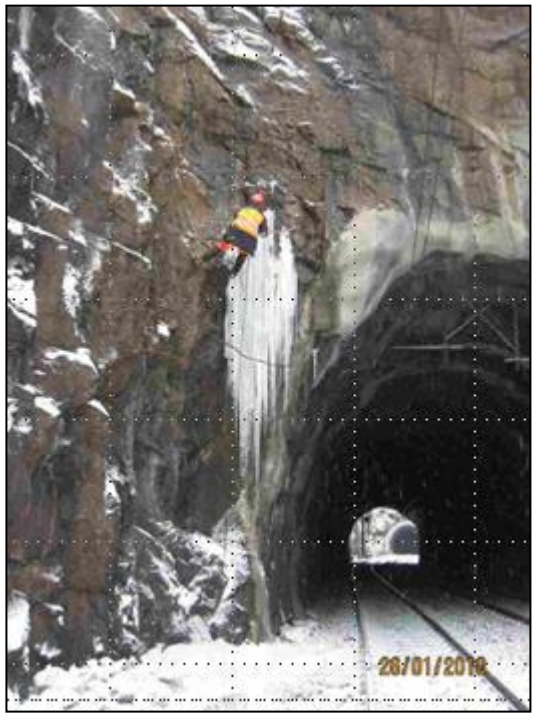
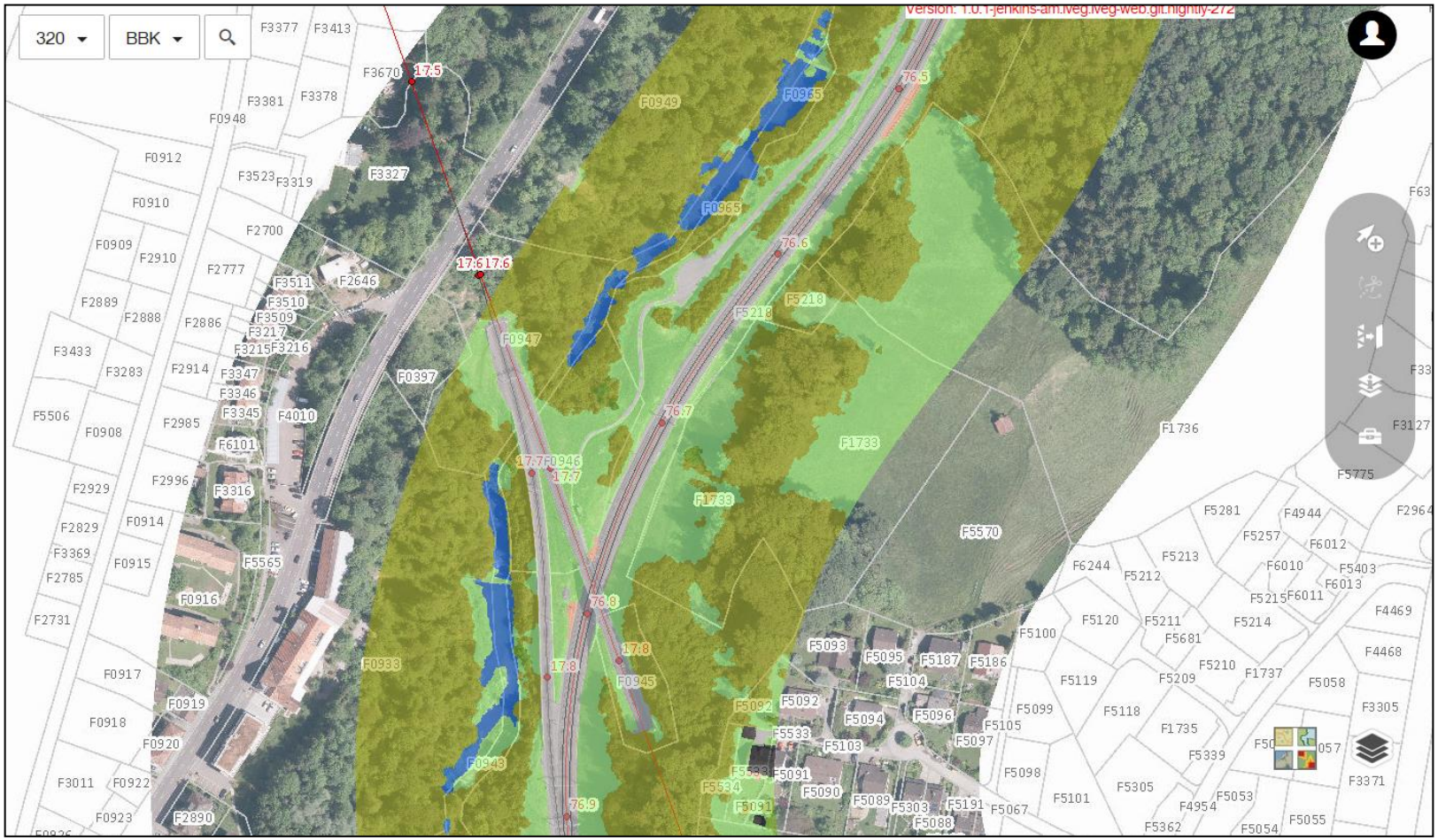


	Length [km]
Track SBB	~3100
Tunnels	~220
natural hazards exposured sections	~1170
- Landslides	~320
- Rockfalls	~115
- Avalanches	~16
- Water (inc. Mudflows)	~390
- Water rivers/lakes (100j)	~645

Nature

NEW:
WebGIS based End-to-End aintenance tool



Process

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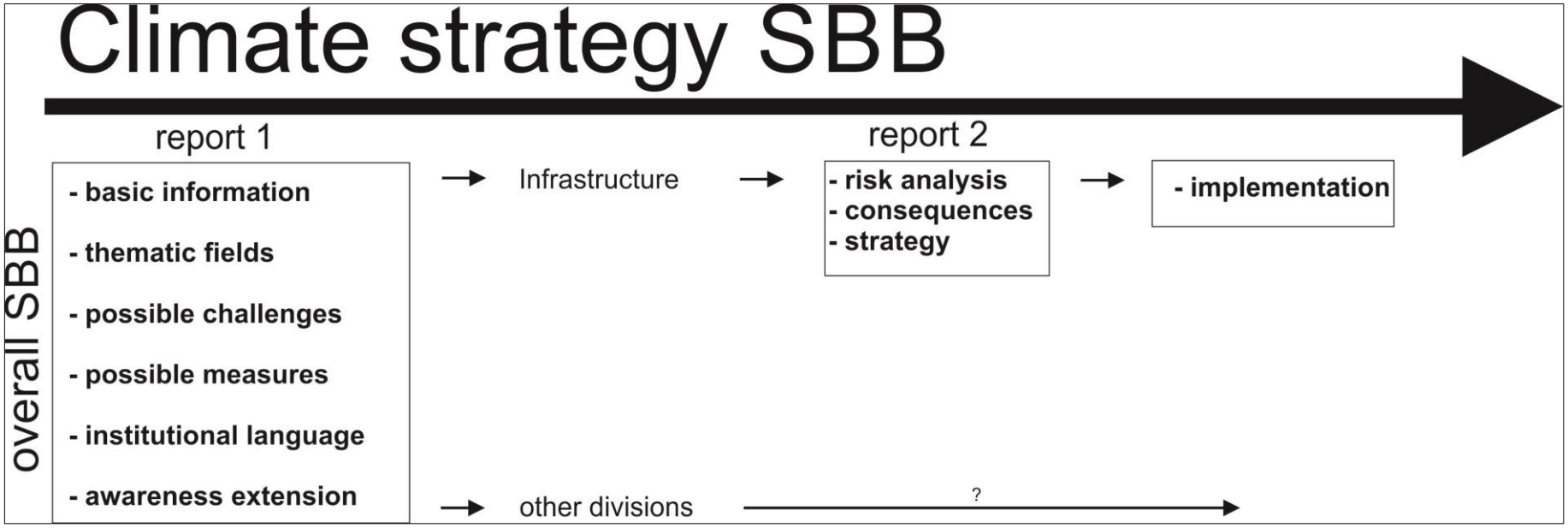

Gathering information

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- basic information
- thematic fields
- possible challenges
- possible measures
- institutional language
- awareness extension

+ a lot others reports..
Abroad / Inland

Challenges and possible measures

SBB CFF FFS

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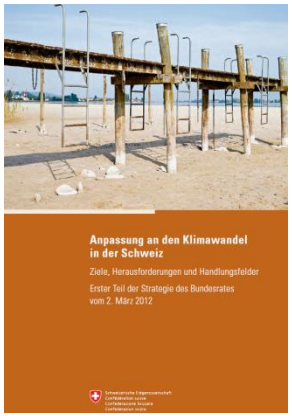

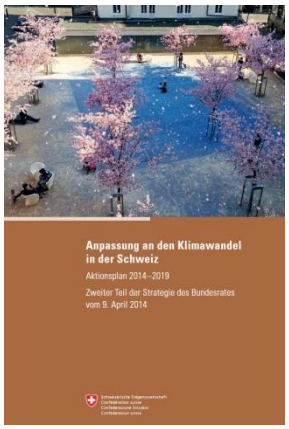

+ a lot others reports..
Abroad / Inland

- Gather railway specifc field of activies

+

- already known challenges and possible measures

→ adapt these for SBB needs

refine/improve challenges/measures

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- basic information
- thematic fields
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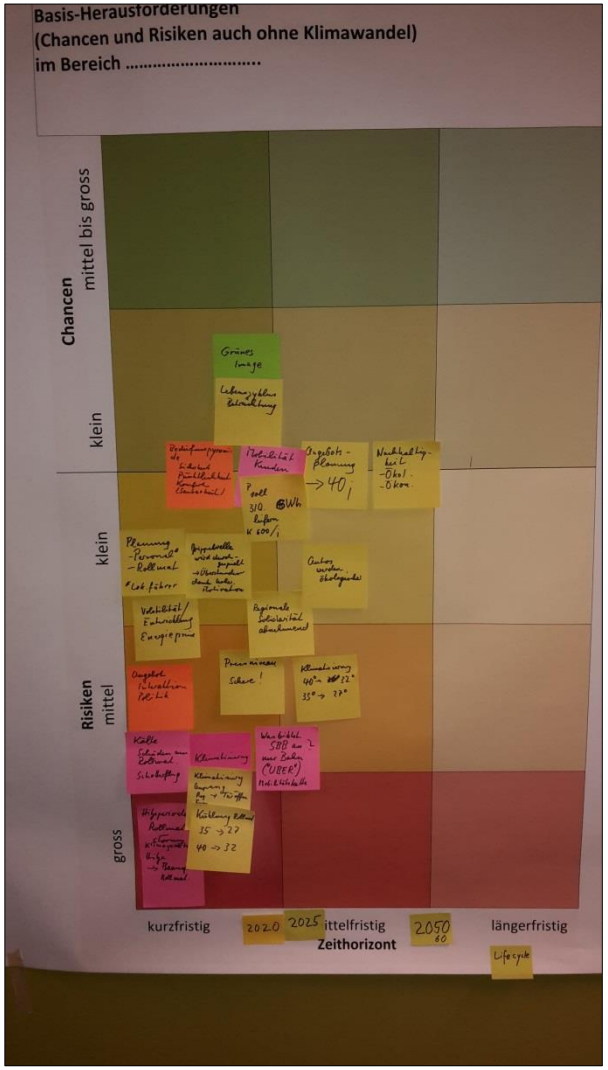
- Workshops
- Interviews
- Discussions



«basic research»

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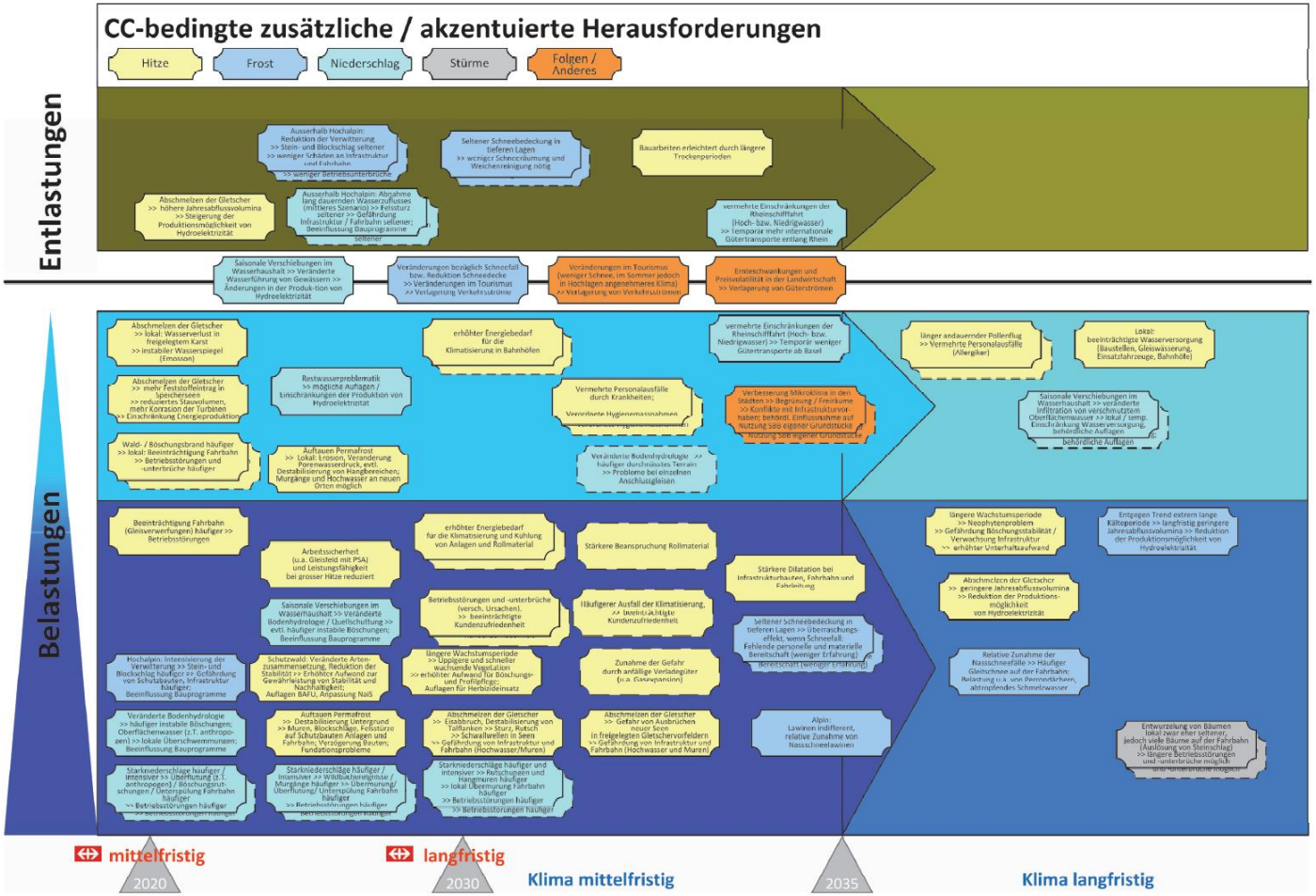

language

SBB CFF FFS

- basic information
- thematic fields
- possible challenges
- possible measures
- **institutional language**
- awareness extension

- Glossary
- Climate scenarios
- Risk / Chances vs. Load / Reliefs

awareness

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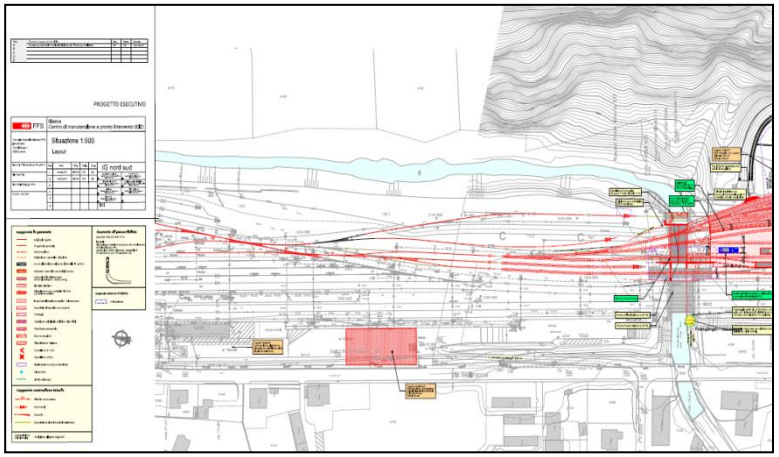
- basic information
- thematic fields
- possible challenges
- possible measures
- institutional language
- awareness extension

Overall strategy

- Costumer needs
  - Passanger frequency
  - Mobility change
  - Increase of population
- Obligations
- Automatisation
- Time
- Money
- ...
- *Climate change*

Actual state

Future state



report 1

SBB CFF FFS

- basic information
- thematic fields
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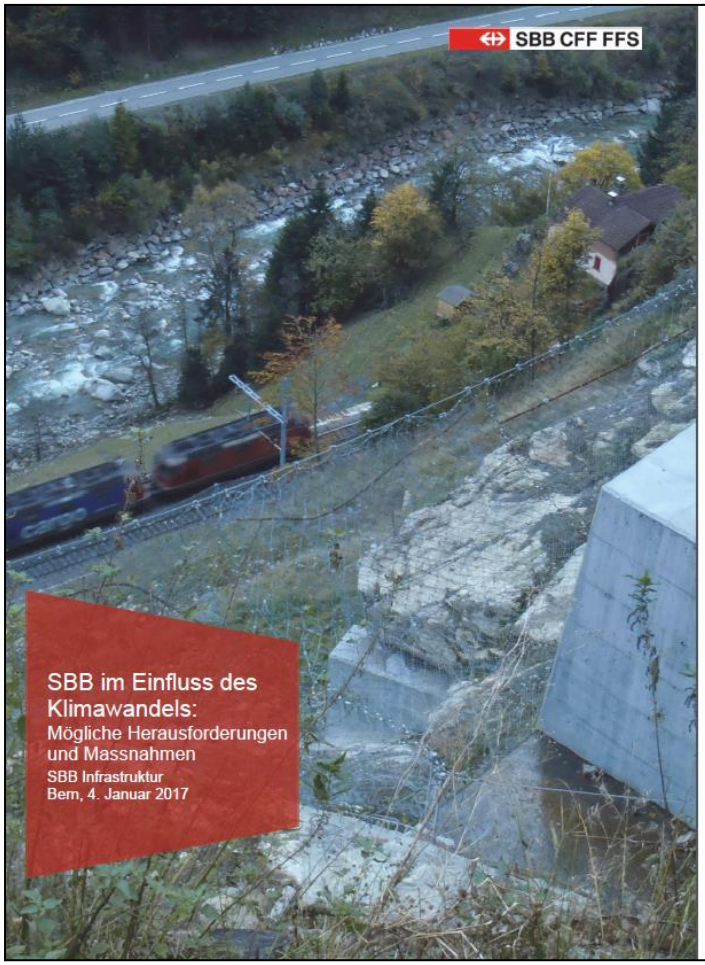

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SBB im Einfluss des Klimawandels:
Mögliche Herausforderungen und Massnahmen

Bericht I (Entwurf 04.01.17)

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Mitarbeit:

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Marc Hauser
Florian Hofstetter

report 1 - conclusion

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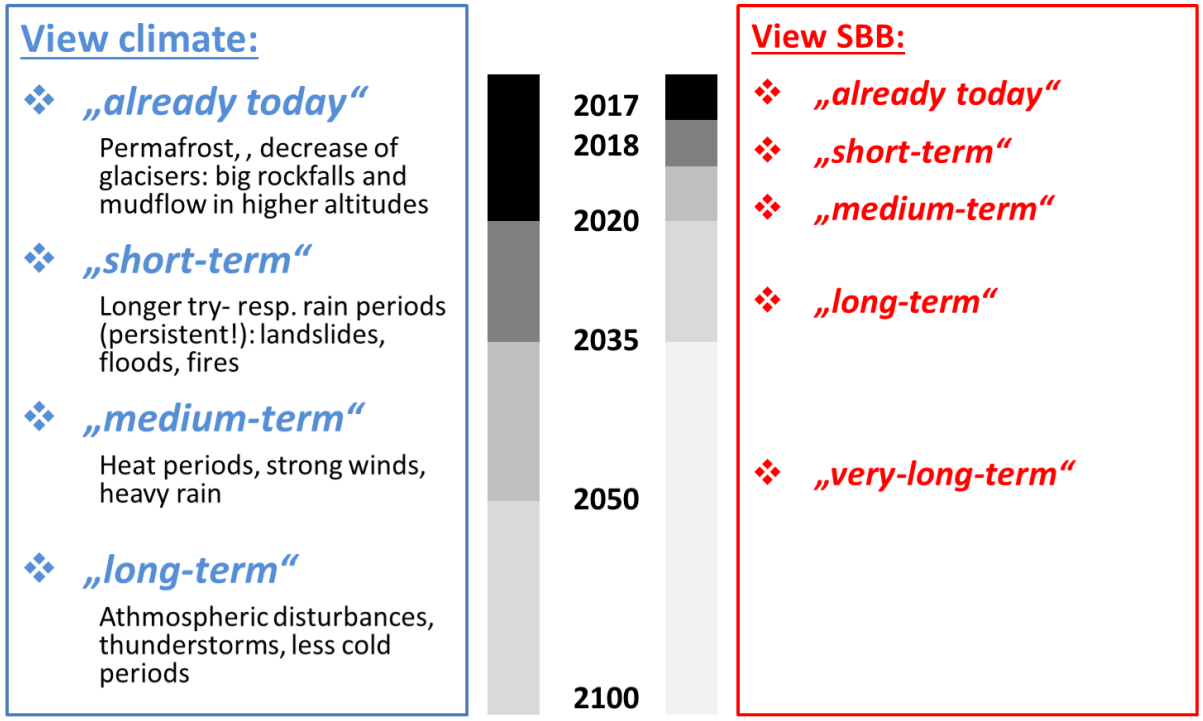
There will be new challenges due to the climate change!

Due to the different time view between the climate changes und the SBB, the realisation of the measures can be integrated within the normal planning process



report 1 - conclusion

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Not only new challenges but also new <u>opportunities</u>:

- Melting of the glaciers: higher production of hydroelectricity
- Longer try periods: faciliation of construction works
- Less snow covers in low altitudes: less snow clearing of the tracks

report 1 - conclusion

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Differentiate between operational level and strategy level

Impact of the climate change		
Primary impact	secondary impact	tertiary impact
Heat: more often and longer		

Challenges SBB	
❖ Heavier dilatation at the infrastructures objects; tracks and overhead contact line	2a

Possible measures SBB	
At the „front“ (operational level)	**Strategy level**
❖ Adaption of the expansion joints of the infrastructures objects	❖ Norm and specification adaption program for the interpretation of the infrastructures objects ❖ Participation for changes in SIA, and/or EU Norm etc.

further approach

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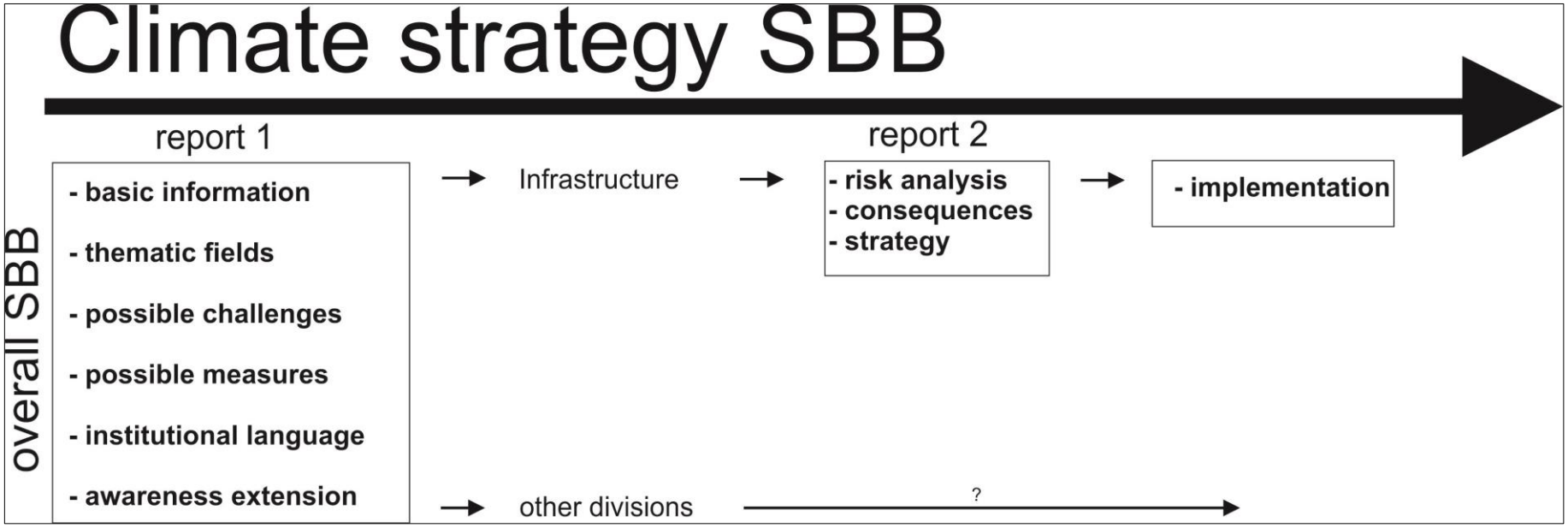

further approach
Example Nature and Nature hazards

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1) Prioritisation: define with which **fields of activity** should be furhter proceeded → cost/benefit
2) Elaboration/Verification of the **adaption goals** of the defined fields of activity
3) Elaboration/Verification of the **approach** to reach the adaption goals
4) Implementation of the adaption goals

further approach
Example Nature and Nature hazards

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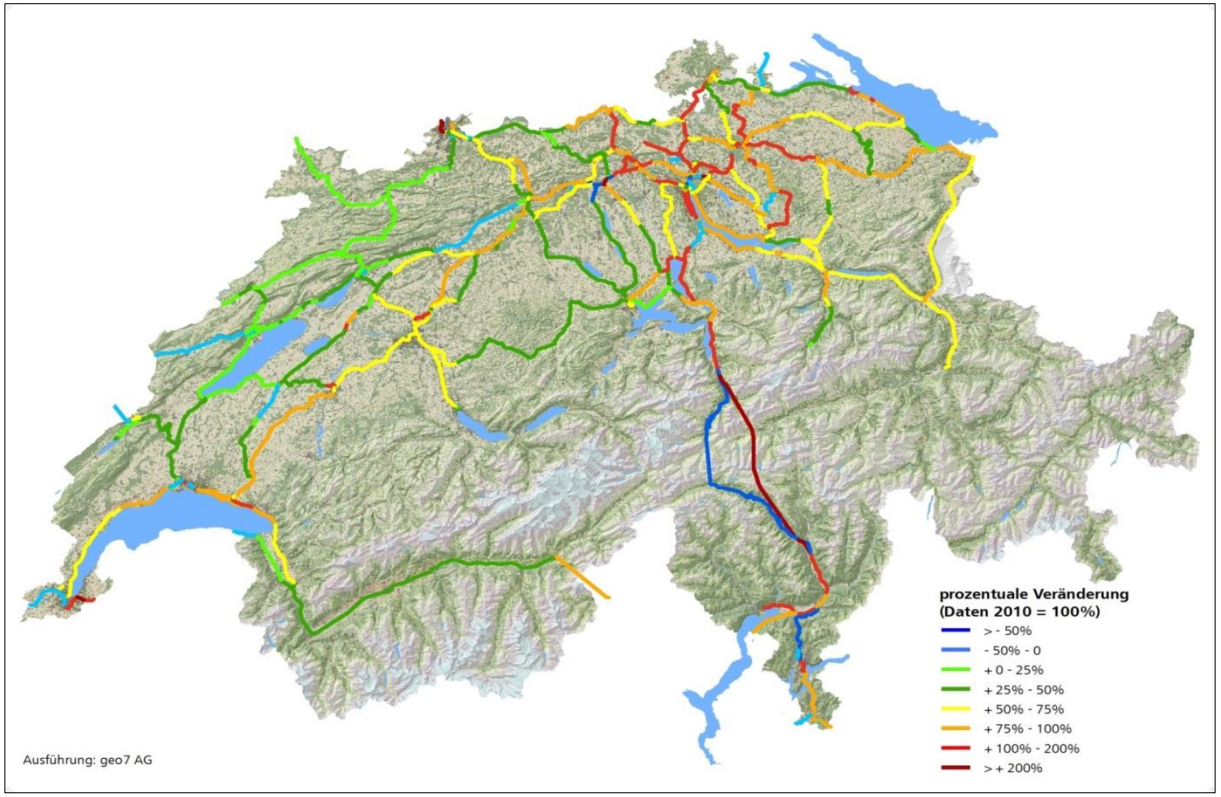
Refine the GIS risk development method



further approach
Example Nature and Natural hazards

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Automatic alarm instead of huge protection structures

Natural hazards

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Natural vs anthropogenic events

06.06.2013
Walchwil Rufibachtunnel
Linie 665 km 10.69

02.02.2013
Châtillens
Linie 251 km 29

Natural hazards

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Natural vs anthropogenic events

Trouble free journey!!!!

Thank you !!