


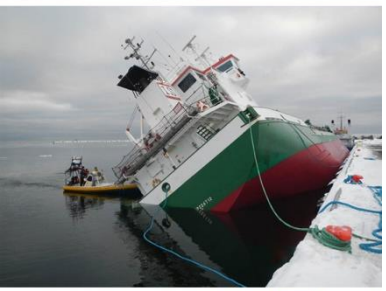


Risk management of Operators Interpretation of Information from New Technology

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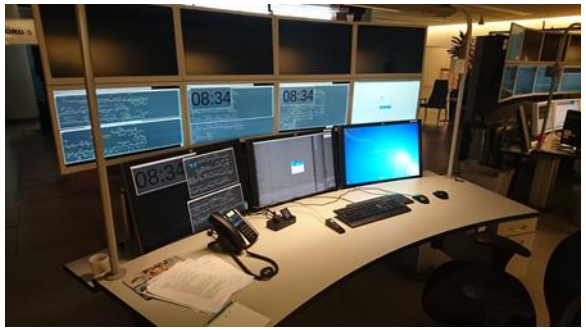
Statens haverikommission
Swedish Accident Investigation Authority

Introduction

New innovations and technology make our every day life and work life easier, inspiring and more efficient.

It enables operators to develop innovative, high-tech operational systems, vehicles and safety barriers.

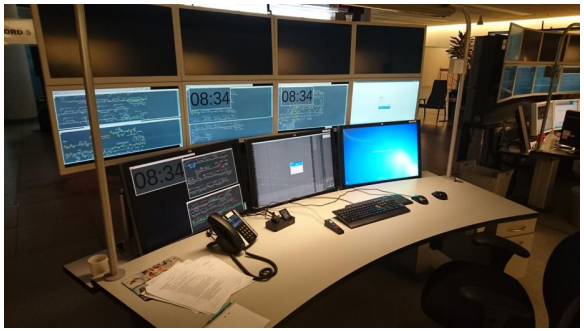


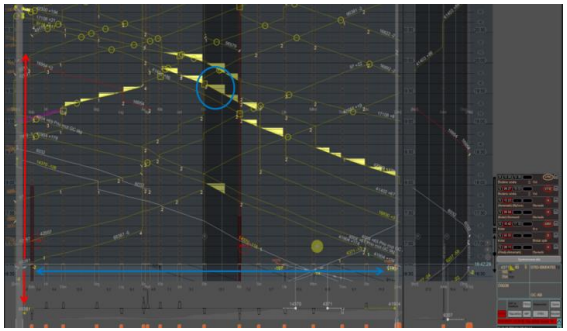
Challenges

- How do we ensure and demonstrate safety in new technology?
- How do we make sure that risk management keep up with the pace in innovation?
- Do the users have the competence to use the new technology in a safe manner?

Lessons learned from an accident

- The accident occurred despite of a well thought through implementation of a new computer-based planning and documentation tool.
- Developed in collaboration with a University.





- What was lacking in the risk management process?

The accident

- Two freight trains collided on a single track line.
- At the moment of impact, train 6032 had come to a standstill, while train 9207 was still moving at 50 km/h.

The accident

- Train 9207 was proceeding under clear signals at normal speed (90 km/h).

- Train 6032 was travelling under speed restrictions (max 40 km/h), after being permitted to proceed past signal at “Danger/stop” when leaving the station Piteå.

Permission to pass signal at ”Danger/stop”

- Some technical errors can cause a signal to display “Danger/stop”.

- For practical reasons, the traffic controllers must be able to allow trains to pass signals under these conditions, after certain checks.

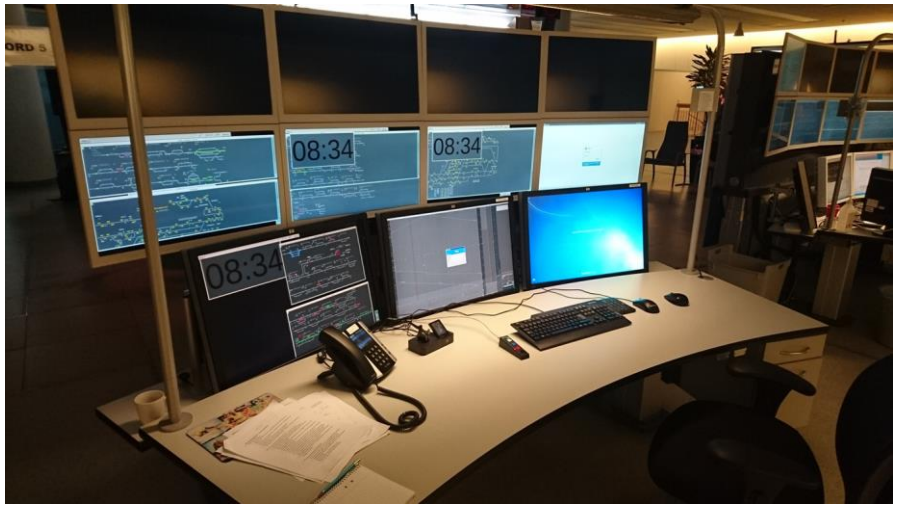
The checks include, but are not limited to:

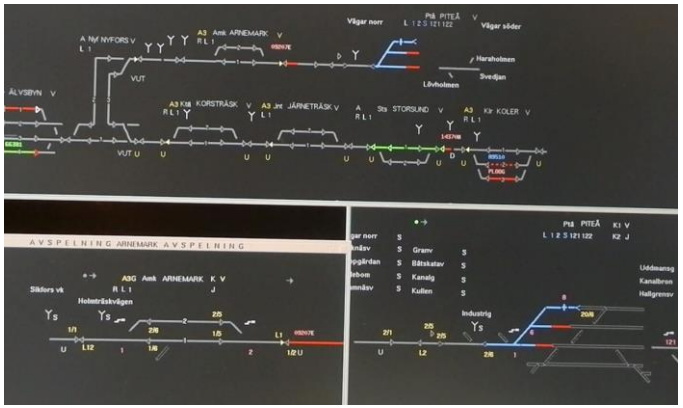
a) Ascertaining which train was on the line section last, and

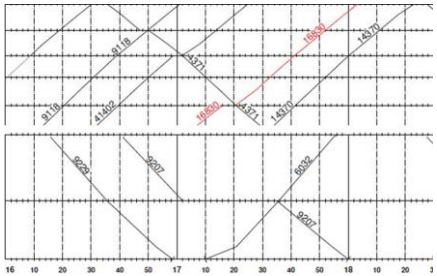
b) where is that train now, and

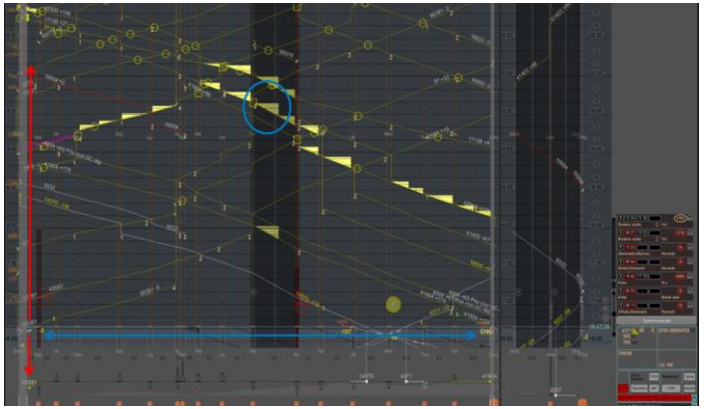
c) making sure that signals at the station in the other end of the line section are locked in the “Danger” aspect.

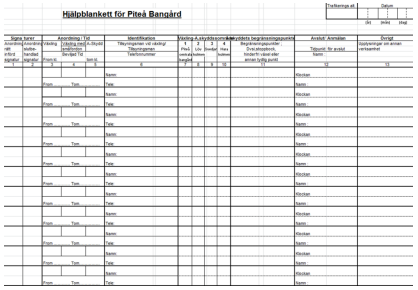
Traffic monitoring and documentation



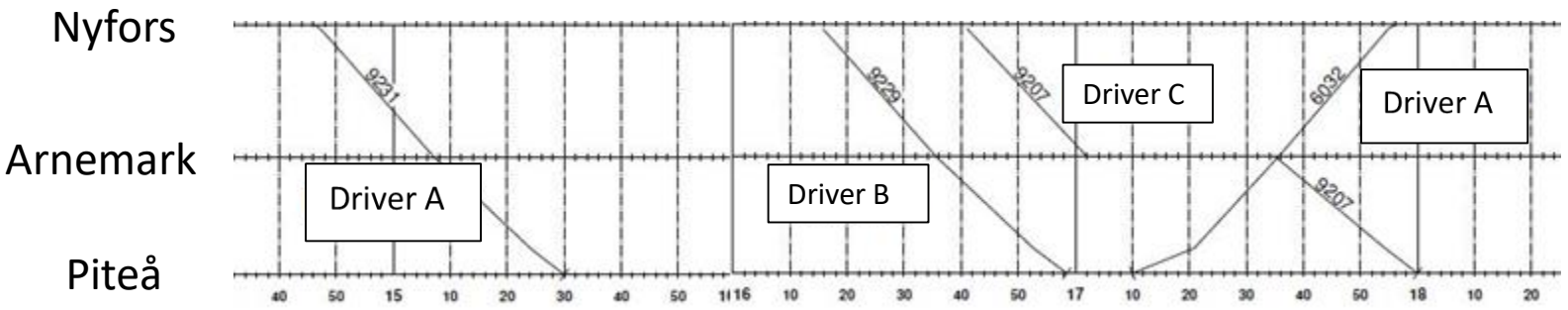








Planned train order



Piteå - Arnemark: 9231 (south), 9229 (south), 6032 (north), 9207 (south).

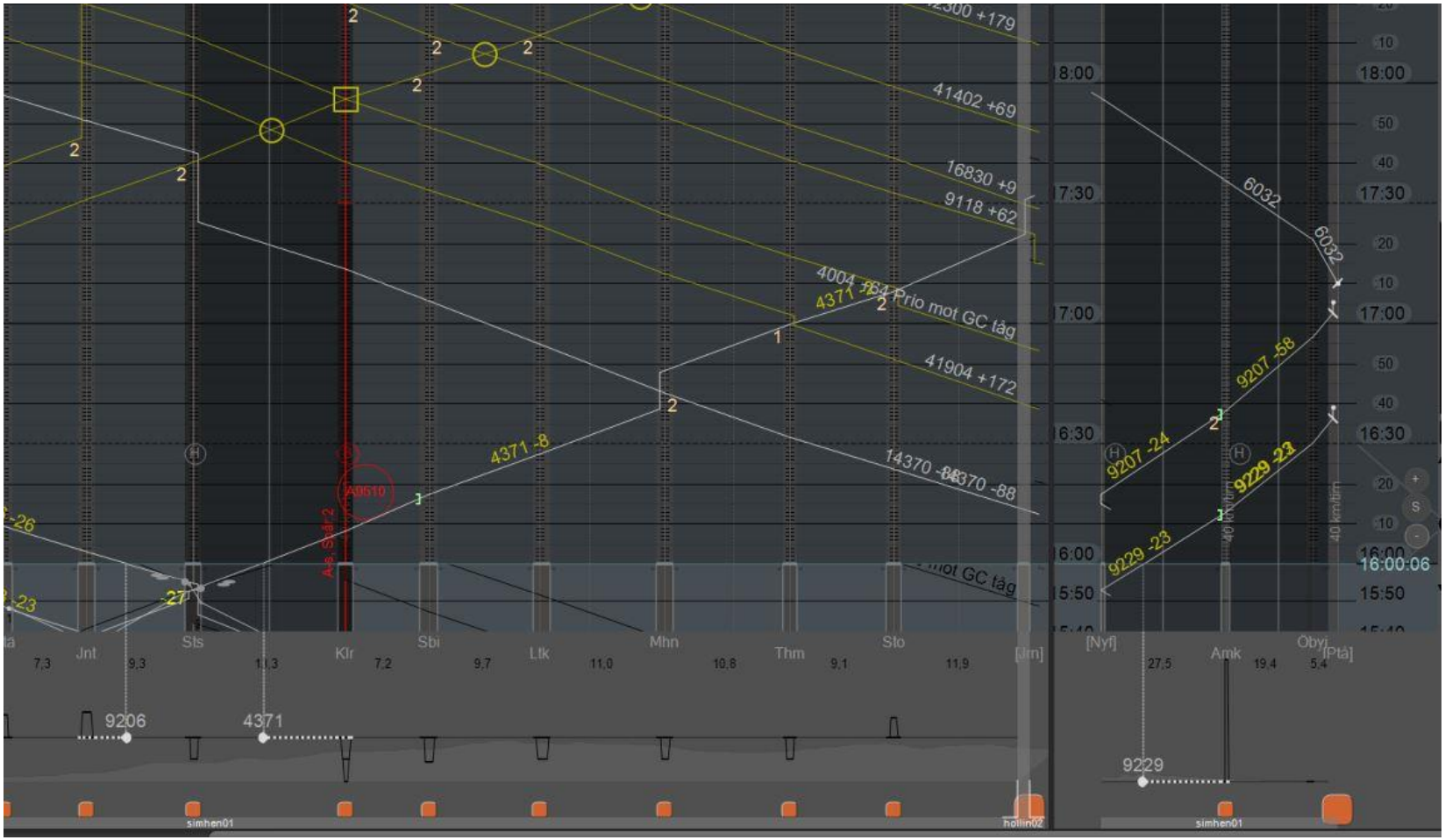
Train 9207 planned to wait for train 6032 in Arnemark before proceeding to Piteå.

Changed train order

- Train 9207 was initially some 20 minutes early and was re-planned to proceed all the way to Piteå before train 6032 could depart from Piteå .

- New train order: 9231 (south), 9229 (south), 9207 (south), 6032 (north).

The changed train order in the computer-based planning and documentation tool STEG

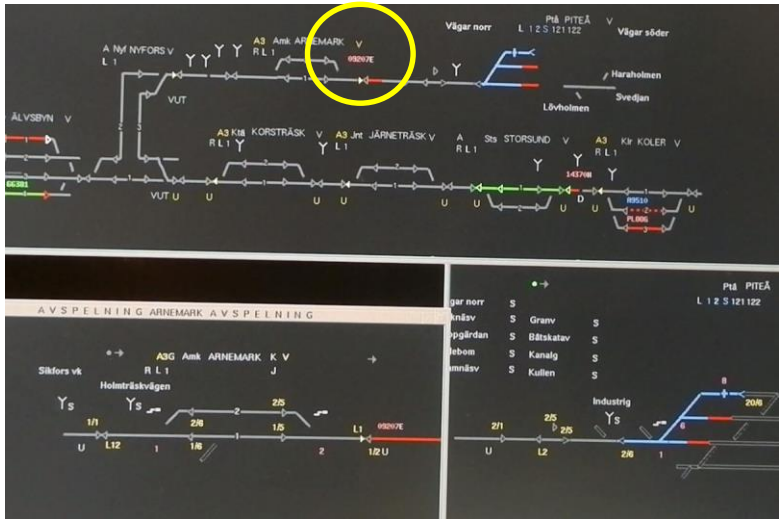


Train 9207 delayed

- Train 9207 ran into technical problems between Nyfors and Arnemark and was delayed.
- The driver informed the traffic controller.
- No actions were taken.
- When train 9207 finally ran through Arnemark, it was almost 20 minutes late in respect to the replanned situation.

Train 6032 ready for departure

- The driver of train 6032 contacted the traffic controller to prepare for departure.
- The traffic controller noted on the Argus screen that the line section between Piteå and Arnemark was occupied.



Train or technical error?

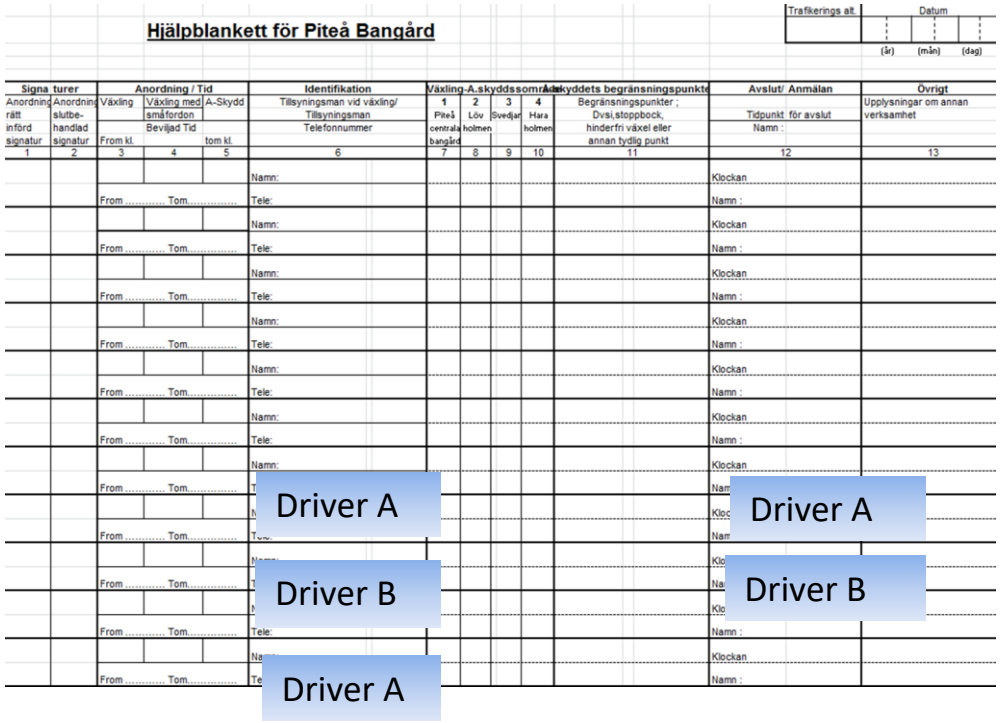
- The traffic controller concluded that the situation was due to an improperly occupied track circuit and that train 9207 had in fact arrived in Piteå.

- Train 6032 was given clearance to proceed past the restrictive signal.

Why did the traffic controller come to the conclusion that train 9207 had arrived in Piteå?

Based his conclusions on:

1. A paper note for shunting. No train nr, only drivers names.
2. Information from the planning and documentation tool STEG.



What kind of support did the newly introduced, planning and documentation tool give the traffic controller?

STEG

- The purpose behind the STEG-system was that the traffic controller by planning further in the future could solve conflicts in time and follow and monitor that the plan was executed.

- Such a one-sided focus on what lies ahead in the future, however, can lead to a possible distraction of what actually happens and has happened.

Planning vs. monitoring

- From the logs of STEG it is clear that the traffic controller the hour before the accident was focused on what would happen later.

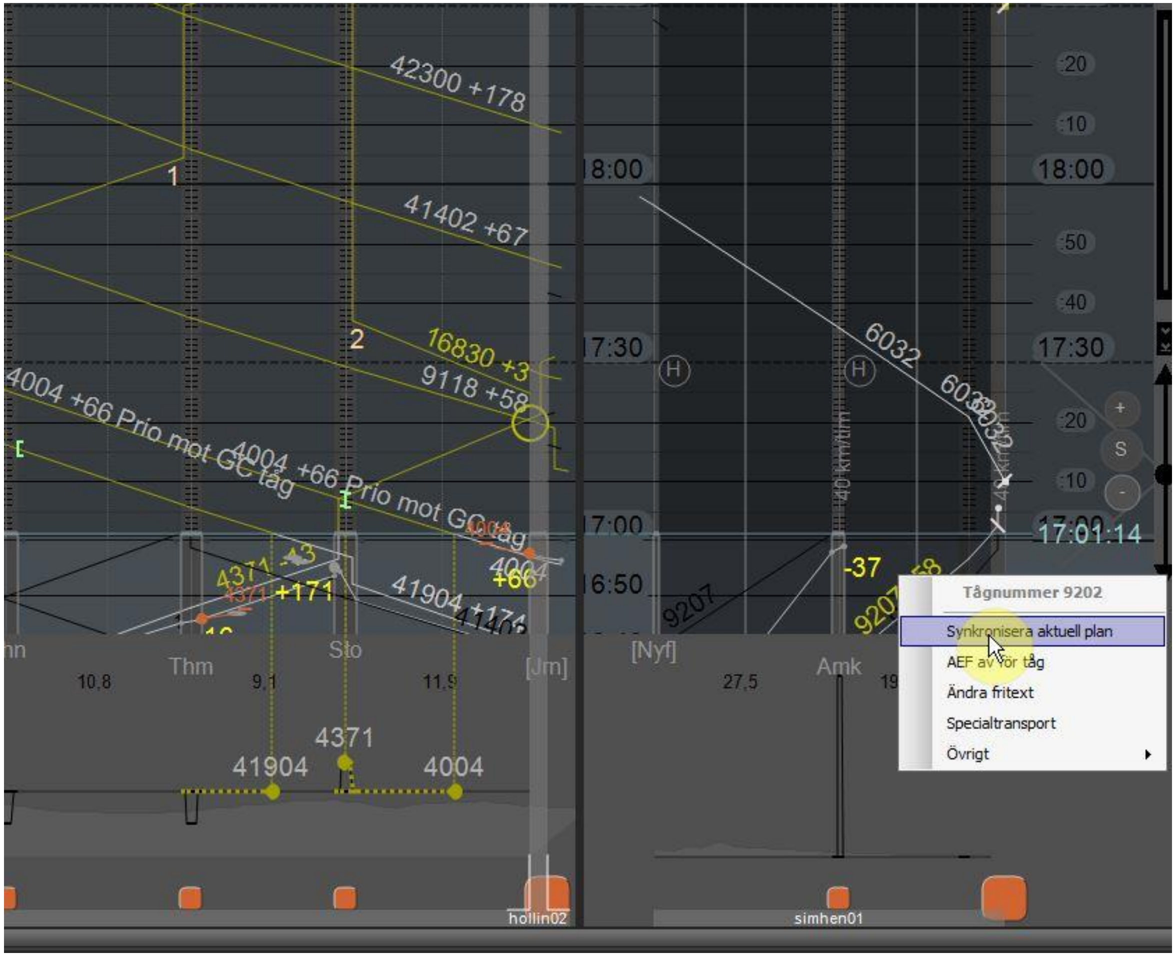
- The traffic controllers strong focus on planning ahead to solve conflicts can thus have caused the monitoring part of the tasks to suffer.

Not used as intended

- The researchers behind the system has emphasized that the benefit of a planning focus is best if you use the automatic execution function that automatically performs in Argus what you planned in STEG.

- This function was seen as technically unreliable in Piteå and was not used in this case.

STEG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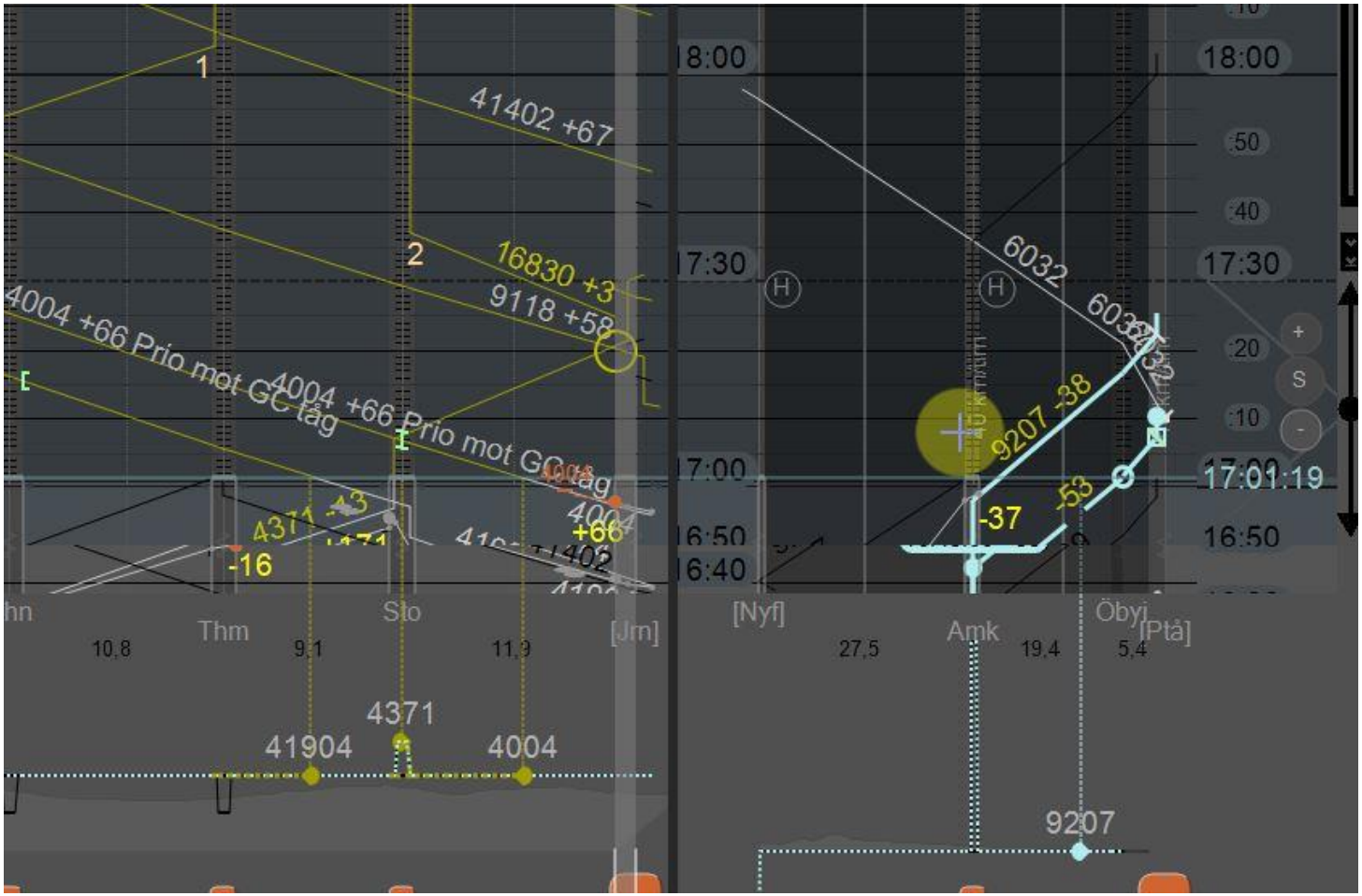
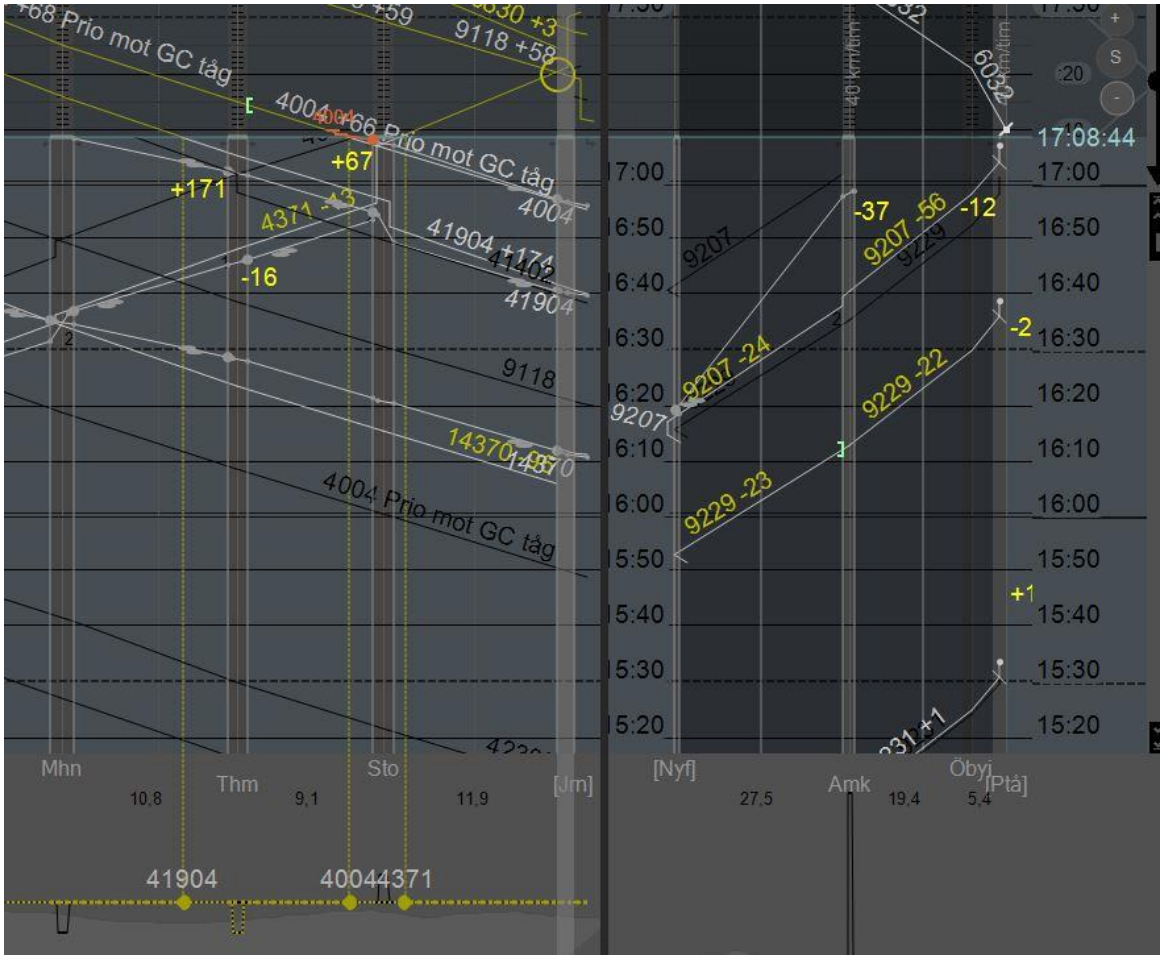
Adjusts back train 9207 manually



The screen before admitting 6032 to pass signal at ”Danger”



What was lacking in the risk management process?

Conclusions

- Unforeseen aspects when the tool was used in a local context.
- Risk assessments are often focused on one particular tool or new system. Lacking the perspective of how other tools might affect or be affected by the tool.
- The new tool only tested on experienced traffic controllers.
- Planning vs. monitoring.

Thanks for your attention!