

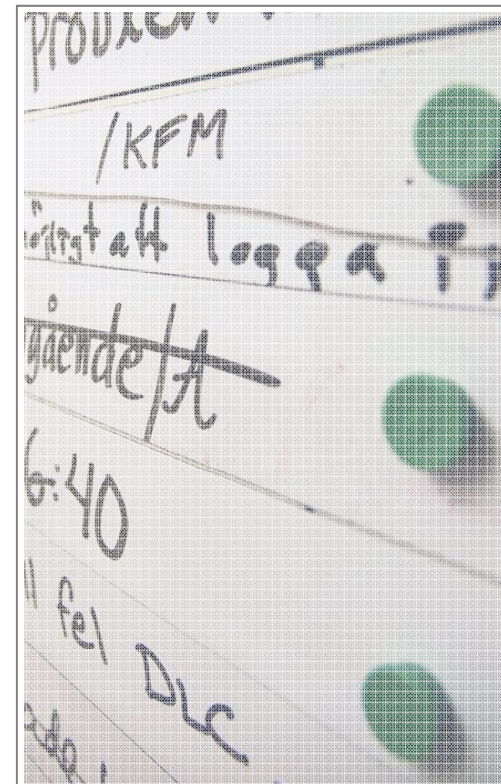
Using simulators in railway education...

Jerker Sundström

Swedish Railway Training Centre
Swedish Transport Administration
Ängelholm

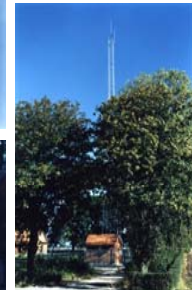
Points

- ▶ **Why simulators?**
- ▶ **Different needs**
- ▶ **Demo projects**
- ▶ **Research**



The Training Centre in brief

- ▶ **Funded 1955**
- ▶ **Part of the Transport Administration**
- ▶ **60 employees**
- ▶ **6 000 students/yr**
- ▶ **YH-Railway technicians**
- ▶ **YH-Train drivers**
- ▶ **Railway engineers (180 p)**



Technical Areas

- ▶ **Permanent way**
- ▶ **Signalling, telecom, traffic control**
- ▶ **Electrical power technology**
- ▶ **Vehicle / Driver education**
- ▶ **Environment / Working env.**
- ▶ **Non-technical courses**



Simulators in Education

- ▶ **Effective**
- ▶ **Safe**
- ▶ **Complex situations**
- ▶ **Situation awareness**
- ▶ **Correct handling**
- ▶ **Appropriate behaviour**



Scale

ERTMS-simulator (ERSA)



Full scale simulator: cabin and motion

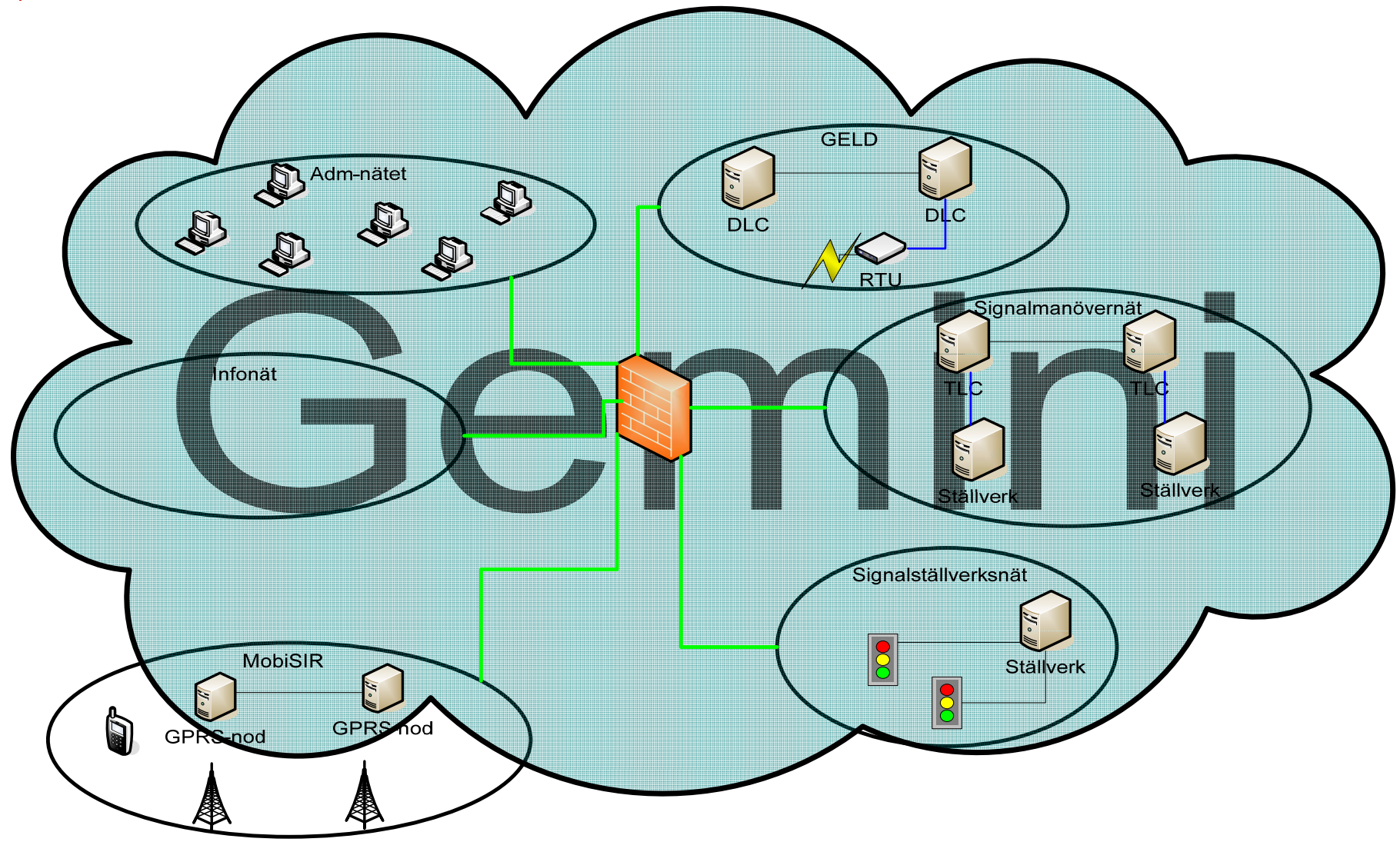
Driver simulator

”Mjölby-simulator”

- ▶ **Rc cabin**
- ▶ **ATC (ATP)**
- ▶ **Traction & Power**
- ▶ **Motion system**
- ▶ **Instructor / Dispatcher**

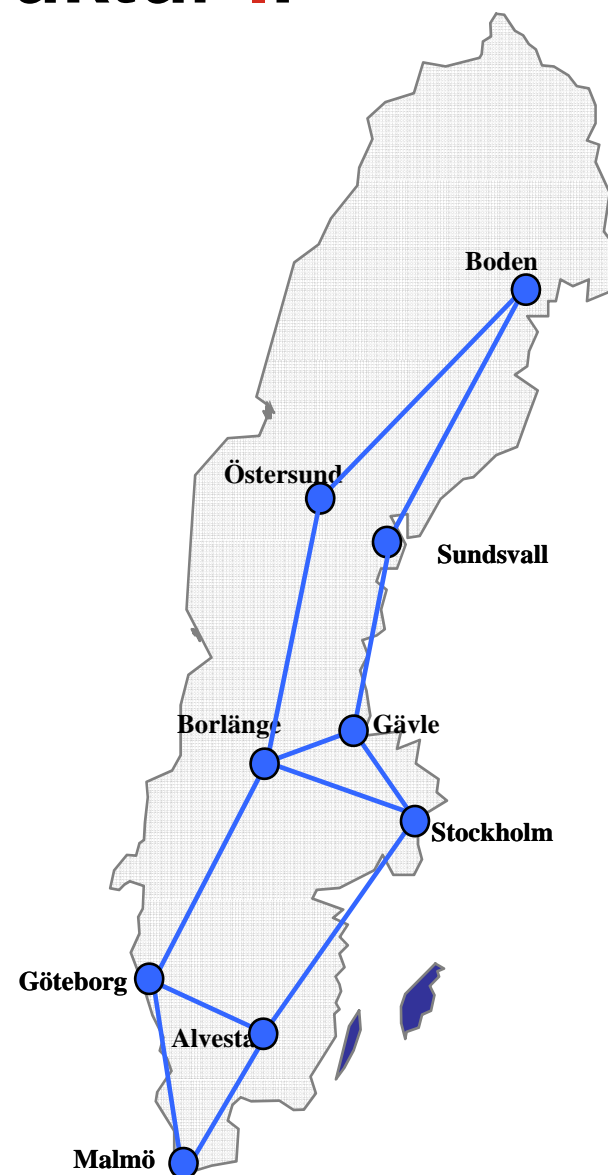


Transmission net



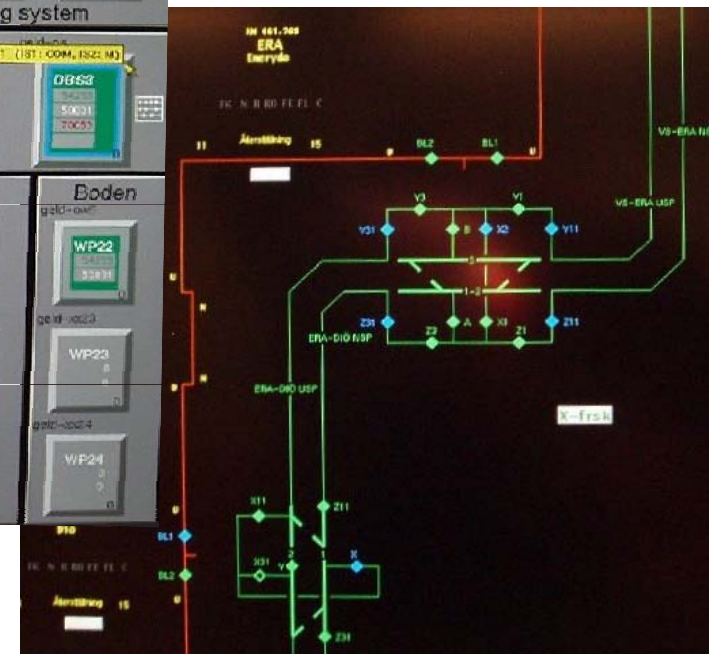
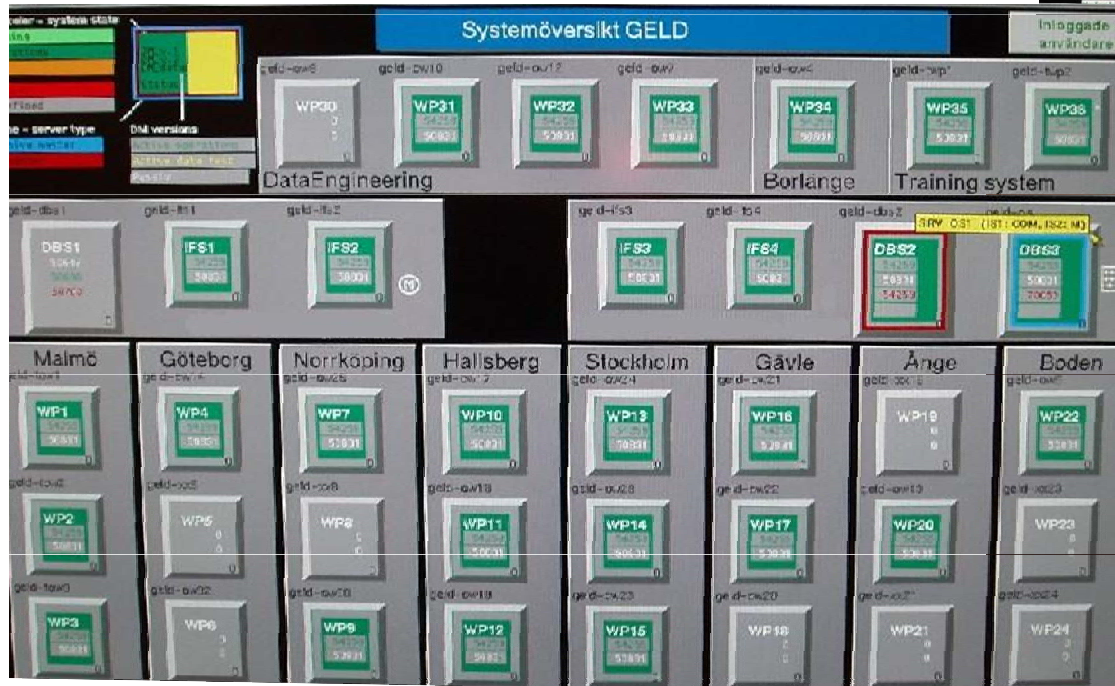
GEMensam INfrastruktur IP

- ▶ Nodes, 9 pl
- ▶ Distribution net, 100 pl
- ▶ Access net, 900 pl



GELD

► **Power distribution**



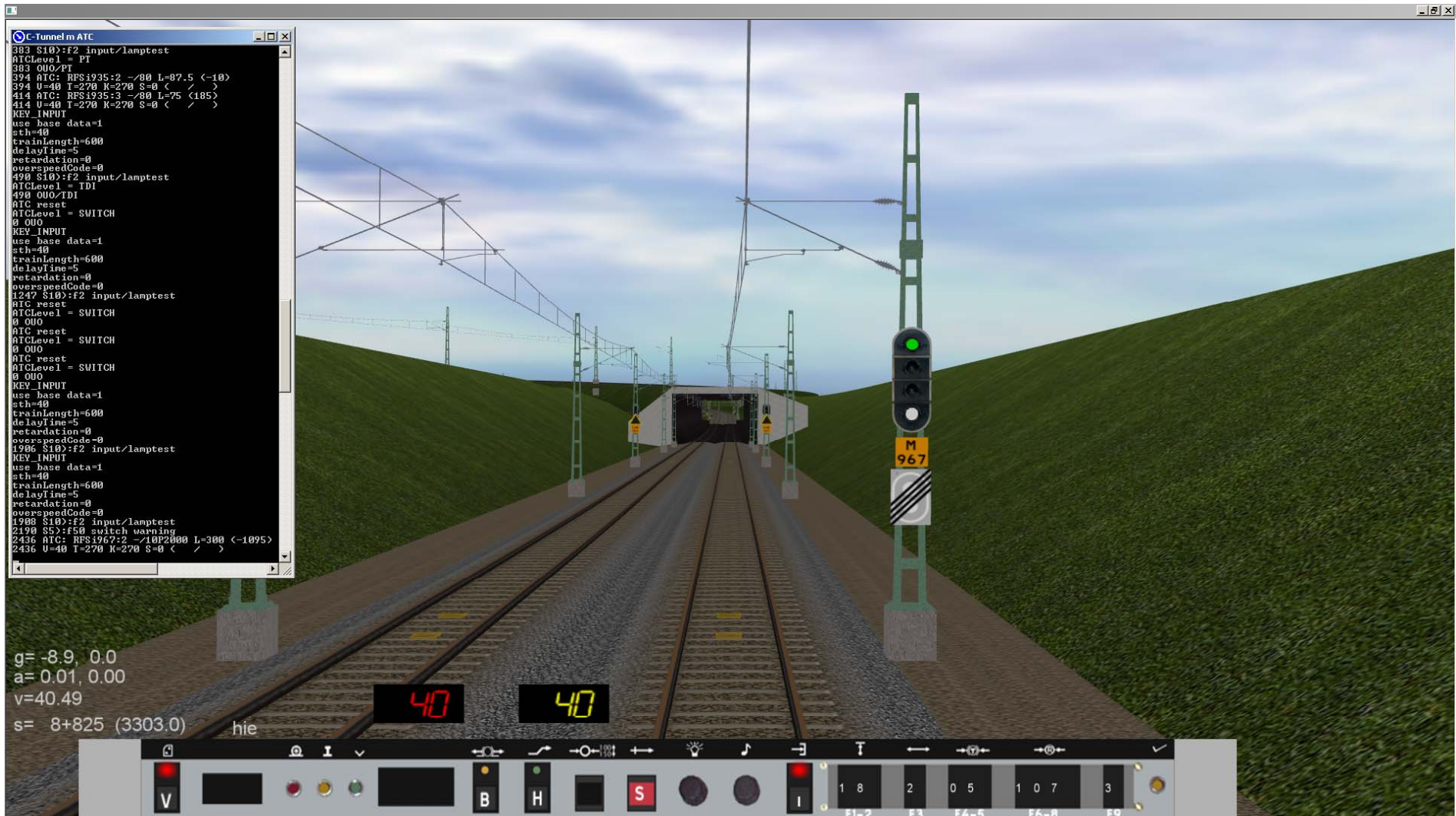
Driver simulator

”Malmö-simulator”



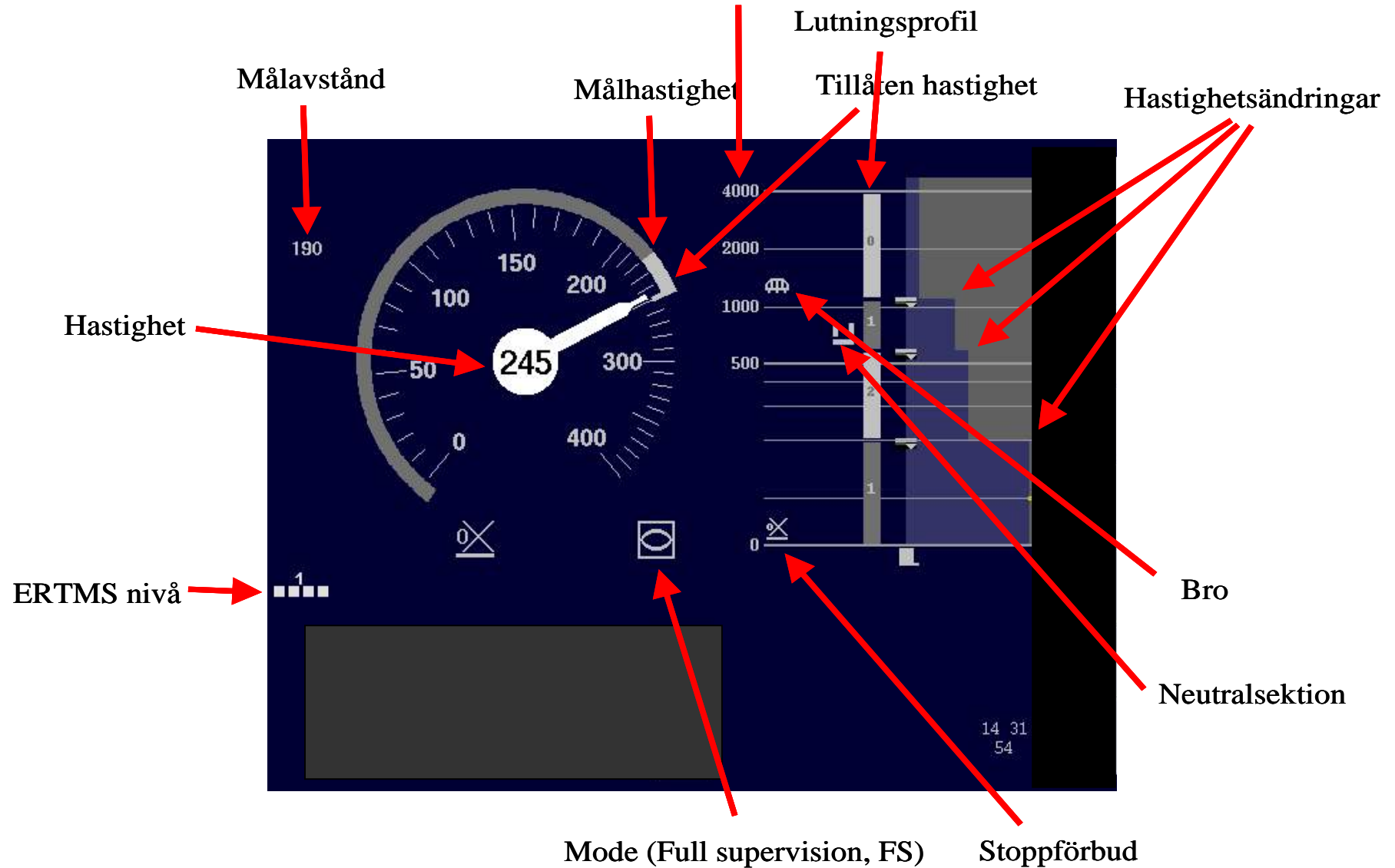
Signalling simulator

”Malmö-simulator”



ERTMS

Avståndsskala



Research

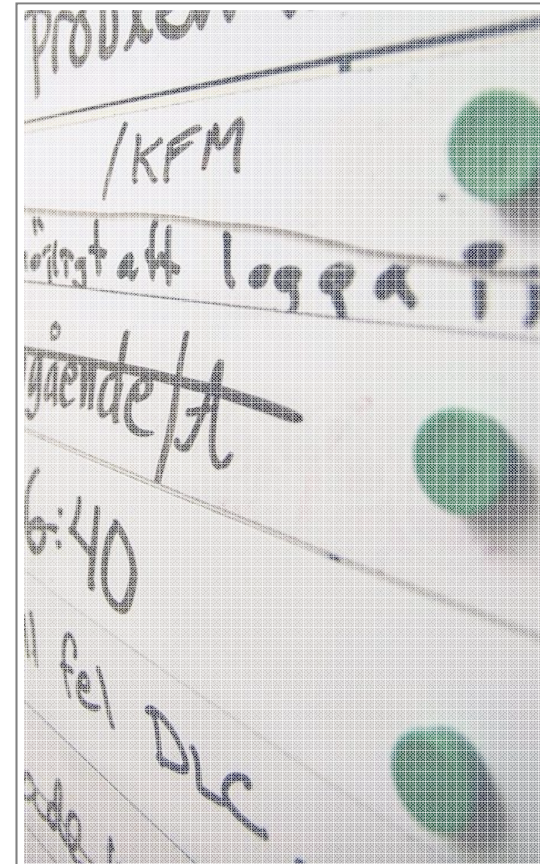
ERTMS-simulator

- ▶ **Trafikverket (FUD)**
VTI , Linköping
MTO Säkerhet, Stockholm
- ▶ **From ATC to ETCS/DMI**
- ▶ **Teaching methods**



Summary

- ▶ **We believe in Simulators**
- ▶ **Efficient**
- ▶ **Flexible**
- ▶ **Modern**
- ▶ **Not always advanced**



The best simulator
is the one that fools you
in a simple way
without You knowing the difference!