

***ERTMS – Baseline 3
Implementation and experience from first
commissioned line at Nordjyske Jernbaner.
First mover in Denmark
or guinea pig?***

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Before Implementation.

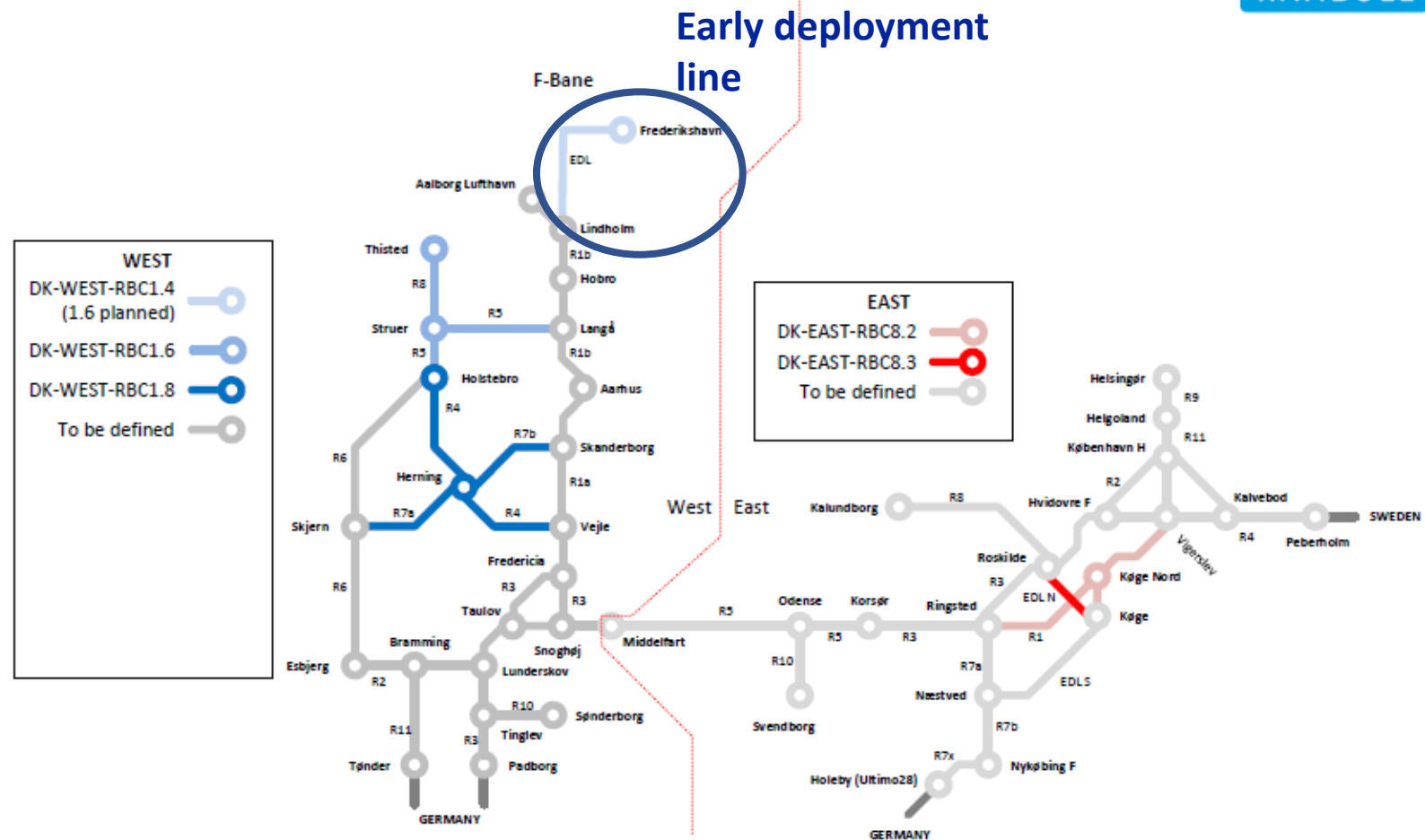
The road to the digital signal system in North Jutland

- Project launch in 2012.
- Official roll-out date in week 43 2018

Consequences after implementation

- No other rail operators in the ERTMS equipped area.

Overview of Roll outs on SP with RBC Baseline number.
Updated by XDCME, version 0.1 on September 23rd (to be formalized after QA)



Preparing the company for ERTMS L2

- SLS - Obtain new NSA Approval as the First RU in Denmark
- Rolling stock - Obtain new NSA Approval as the first RU in Denmark
- Trusted cooperation with the NSA



Level 2 Baseline 3, new Interlocking, and new TMS

Replace the wheels while driving

- The Signalling programme is a brownfield project
- Commissioning of the system should minimise impact on the line in operation

Interlocking elements were the biggest challenge for EDL

- 'Change over system' area allows for full functional test of generic system
- Point Machines and Level Crossings were not installed outside the COS area
- Virtual Balise Covers were used to allow for the ETCS tests



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Joint Test Lab, SIT

Joint Test Lab

- Development and external interfaces, more than 2 years of test

Site Integration Tests

- installation of components and connectivity test



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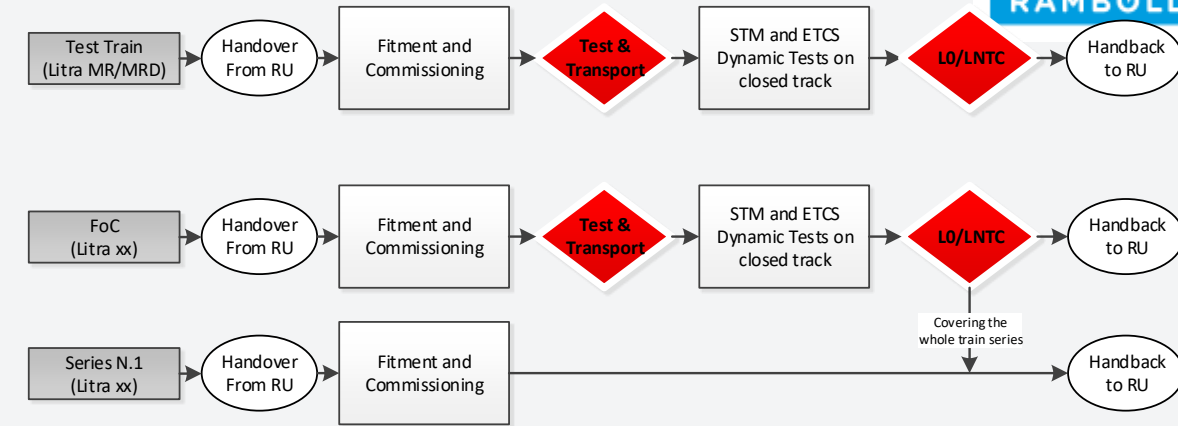
Onboard approval

- Few approval received for level NTC/level 0
- Work on the delta to obtain first approval for level 2

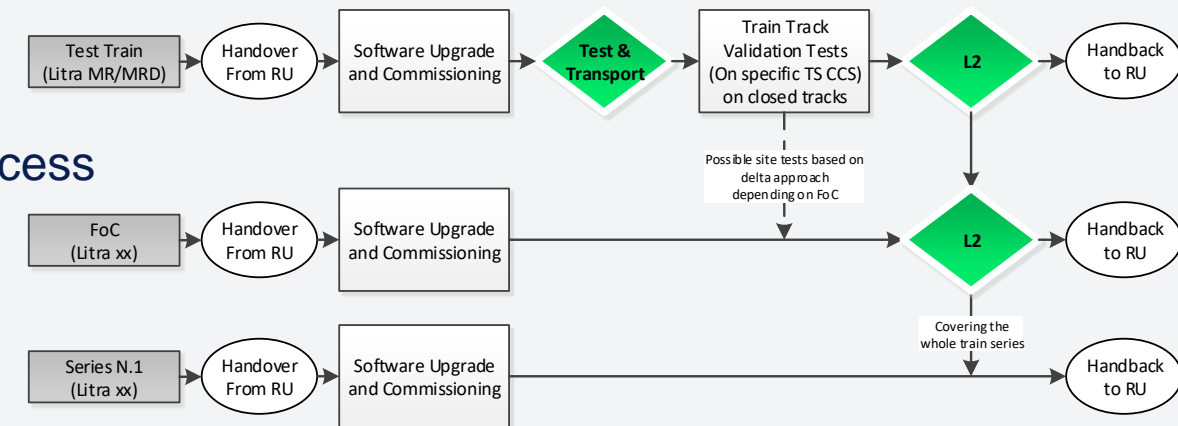
- ESC test report
 - ESC statement
- } new process

- Key aspects:
 - Collaboration with the NSA
 - Transparency with the RU's during entire safety process
 - Assessor, DeBo involvement

Approval Level 0 and Level NTC



Approval Level 2 (additional to Level 0 and Level NTC)





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During implementation.

During implementation.

- Line closed for 2 weeks
- 52 drivers to be trained.
- Onboard and supplier team present – key part to handle any findings

- **Consequences**

- 100% production are affected of the change to ERTMS.



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SAT, Trial Run, and Commissioning

Site Acceptance Test

- all external interfaces tested, final evidence to the safety documentation

Trial Run

- Evidence of operational readiness

Commissioning period

- Majority of Point Machines and Level Crossings installed and final day of training of the drivers



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After implementation.

Surprise and breaking news! - the press wrote:

Finally, good news from the trains.

The trains in North Jutland have increasing punctuality.



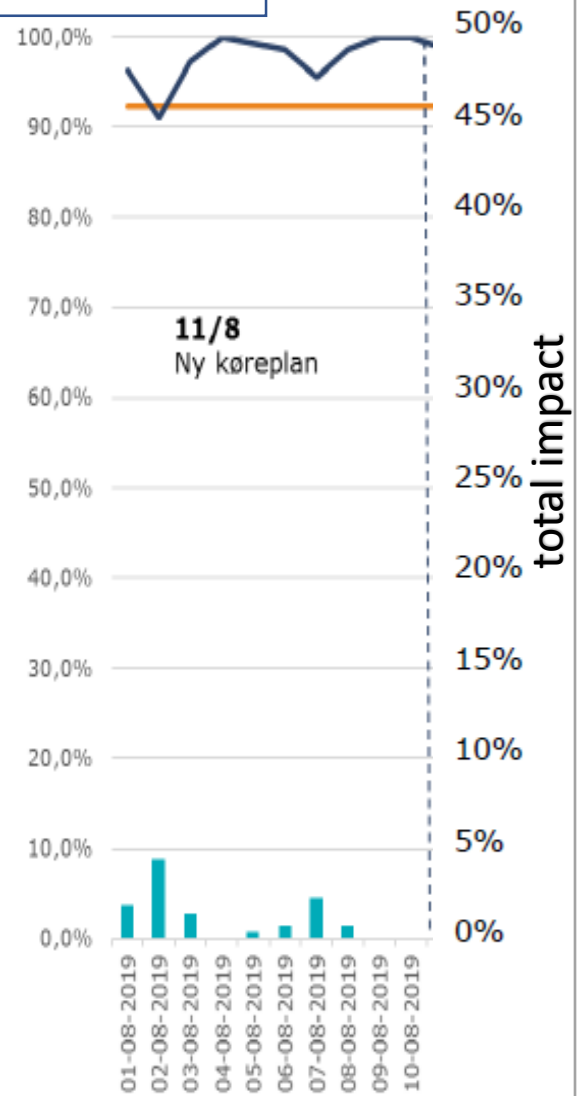
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NJ – Train punctuality August 2019

Train punctuality



■ ERTMS
 ■ overall impact
 - - - punctuality
 — Punctuality 2018

Future Challenges

Infrastructure

How to test and commissioning without impacting the already commissioned lines ?

How to implement track layout changes in the roll out plan ?

Onboard

Handling configuration changes correctly according to 2018/545 and IO

One stop shop

Update to MR1 3.4.0

Compatibility with two types of line – not done yet

Sharing of knowledge as
first mover.



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Lessons learned

- Share knowledge from NJ til other RU in Denmark. Do not built fence around knowledge that are accumulartet in the company.
- Retraining has to be taken into considertion while the system har a high performance.

- Share knowledge and best practice across railways



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Thanks for the interest

