

30 years of very high speed with 4 generations of Alstom trains : how the past can pave the way for the future

François LACÔTE
GRAZ CONGRESS, 12/09/2011

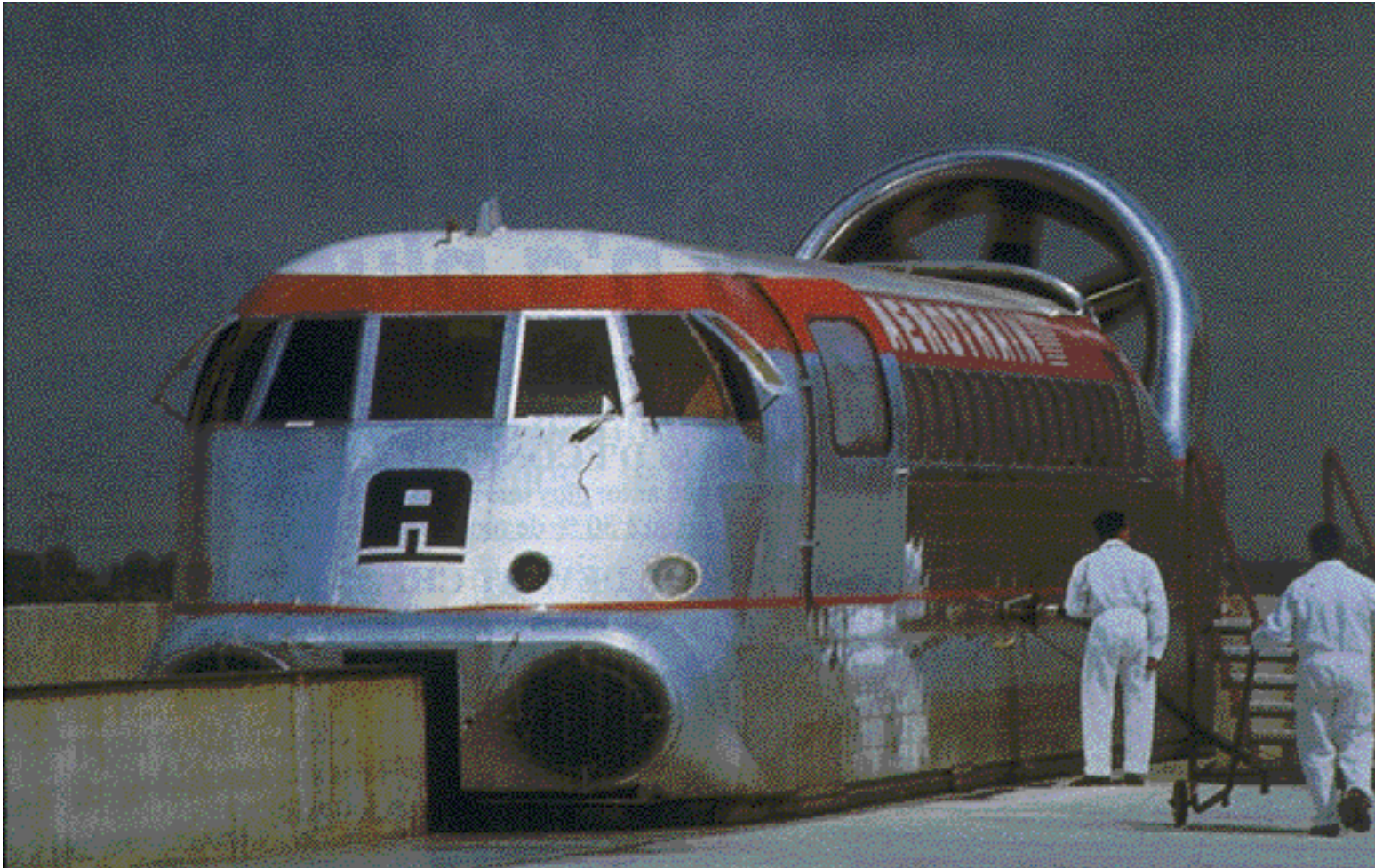
TRANSPORT |

ALSTOM

The origin



A vision in a sceptical environment



What was considered as the future of ground transportation



■ Aérotrain BERTIN




■ Maglev (MLU 002)



■ Transrapid (TR 07)



The TGV system : a cultural revolution

- 
- Infrastructure
 - Signalling
 - Commercial policy
 - Rolling stock

Driven by SNCF

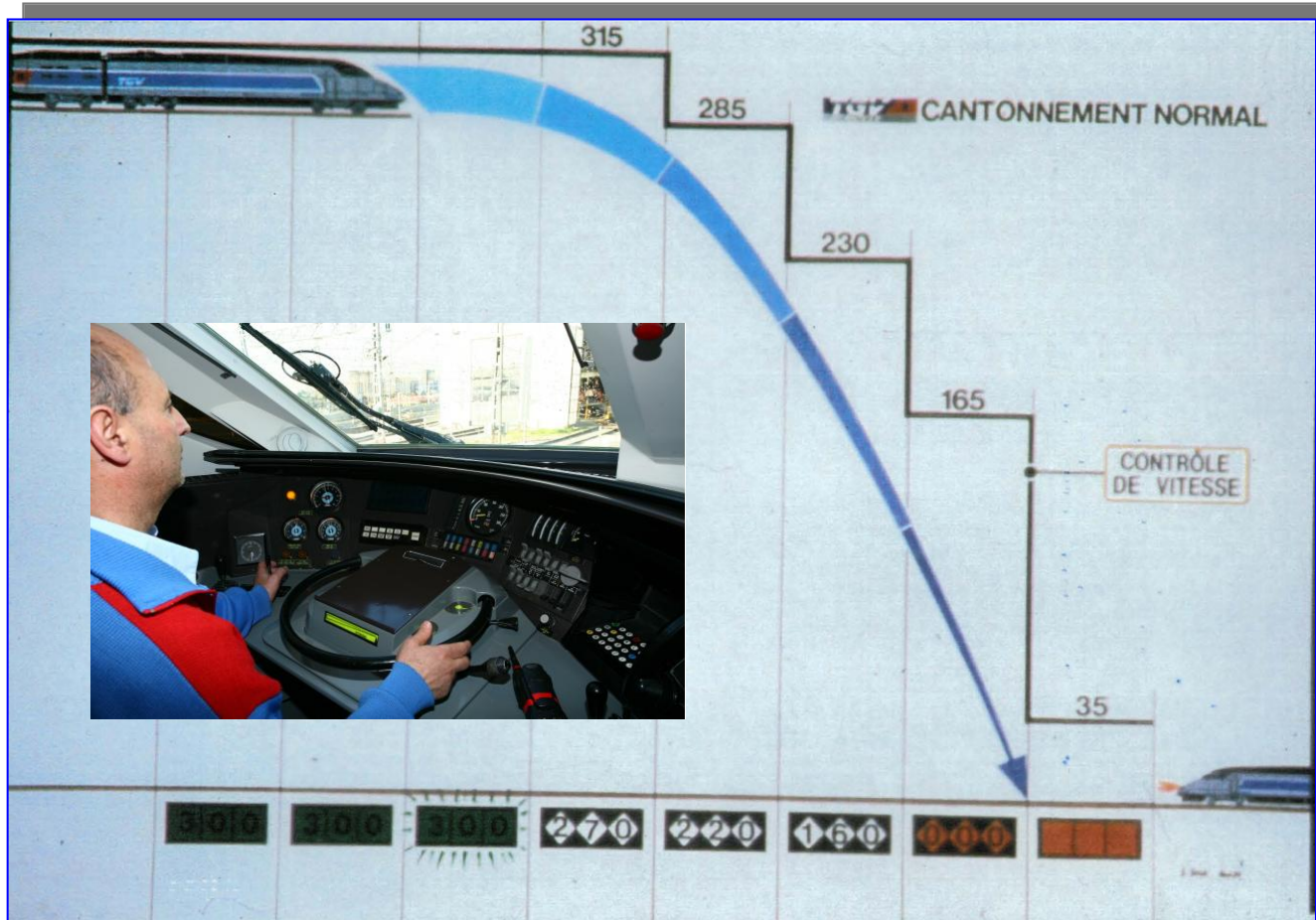
A new infrastructure optimised for high speed train only



Full compatibility with existing lines



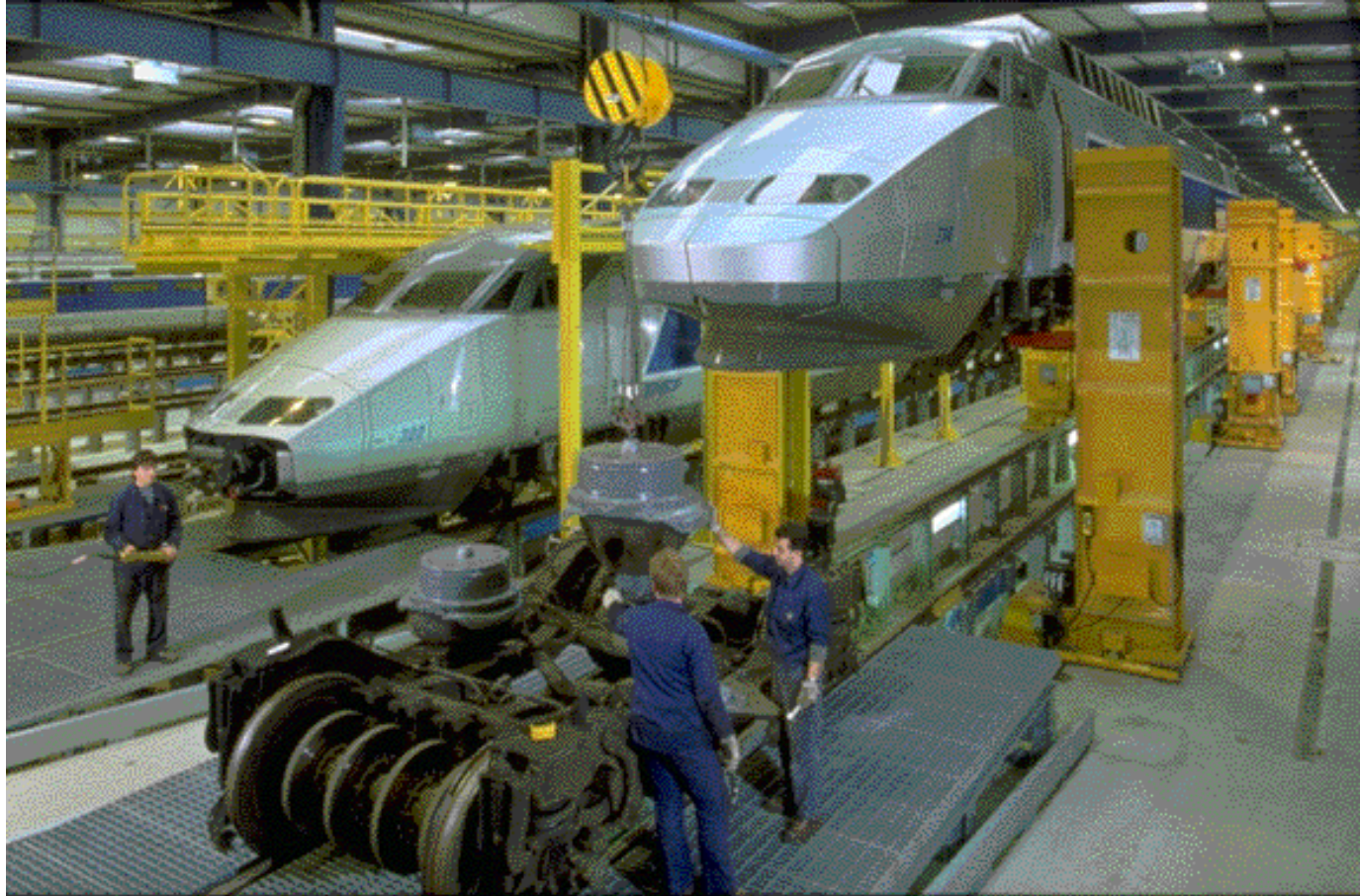
A new signalling system : on-board signalling



A new architecture for the train : articulated train set



Revolution for the maintenance of the train



Revolution in commercial approach and operation



Project driven by engineers, with precise commercial goals and a deep economic study

- **Motto : Travel-time of the plane for the price of a second class ticket**

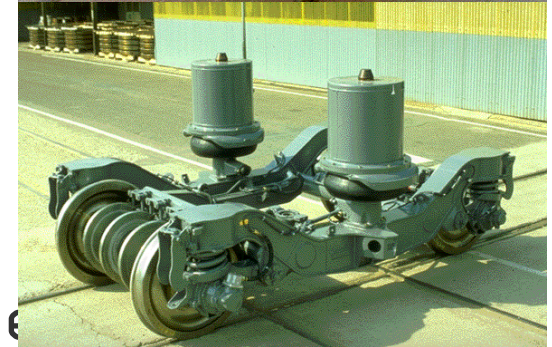
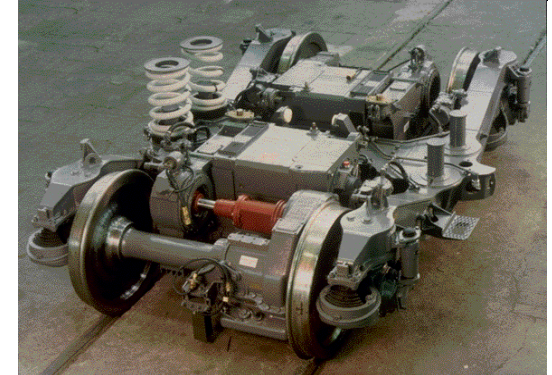
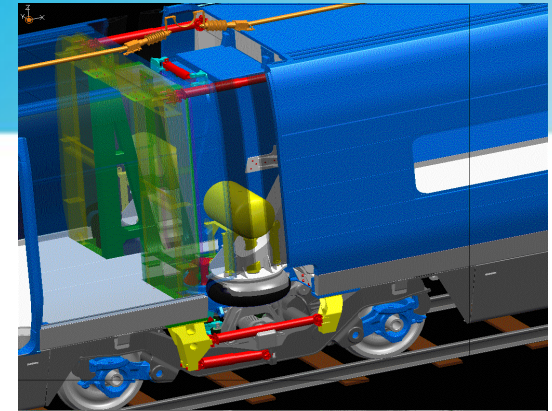


The TGV family



Constant principles

- Articulated train
- Bogie
- Reduction of overall trainset
- Reduction of LCC & Maintenance



Four generations

1st generation

TGV™ Sud Est



260 km/h
-> 300 km/h

2nd generation

TGV™ Réseau



300 km/h

3rd generation

TGV™ Duplex



320 km/h

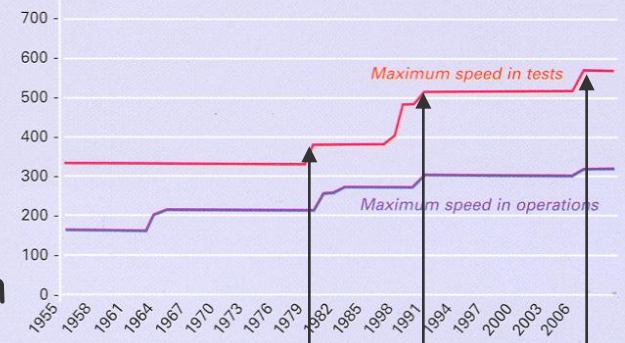
4th generation

AGV™



360 km/h

Development of rails for high speed operations



February

81

380 km/h

May 90

515.3

km/h

April 07

574.8

km/h

A complete product & service offer



- Record traveller capacity
- Up to 550 places over 200 m
- Commercial speed 320 km/h
- Flexible product (7 à 14 cars)
- Commercial speed 360 km/h
- Optimised operating costs

High speed and very high speed



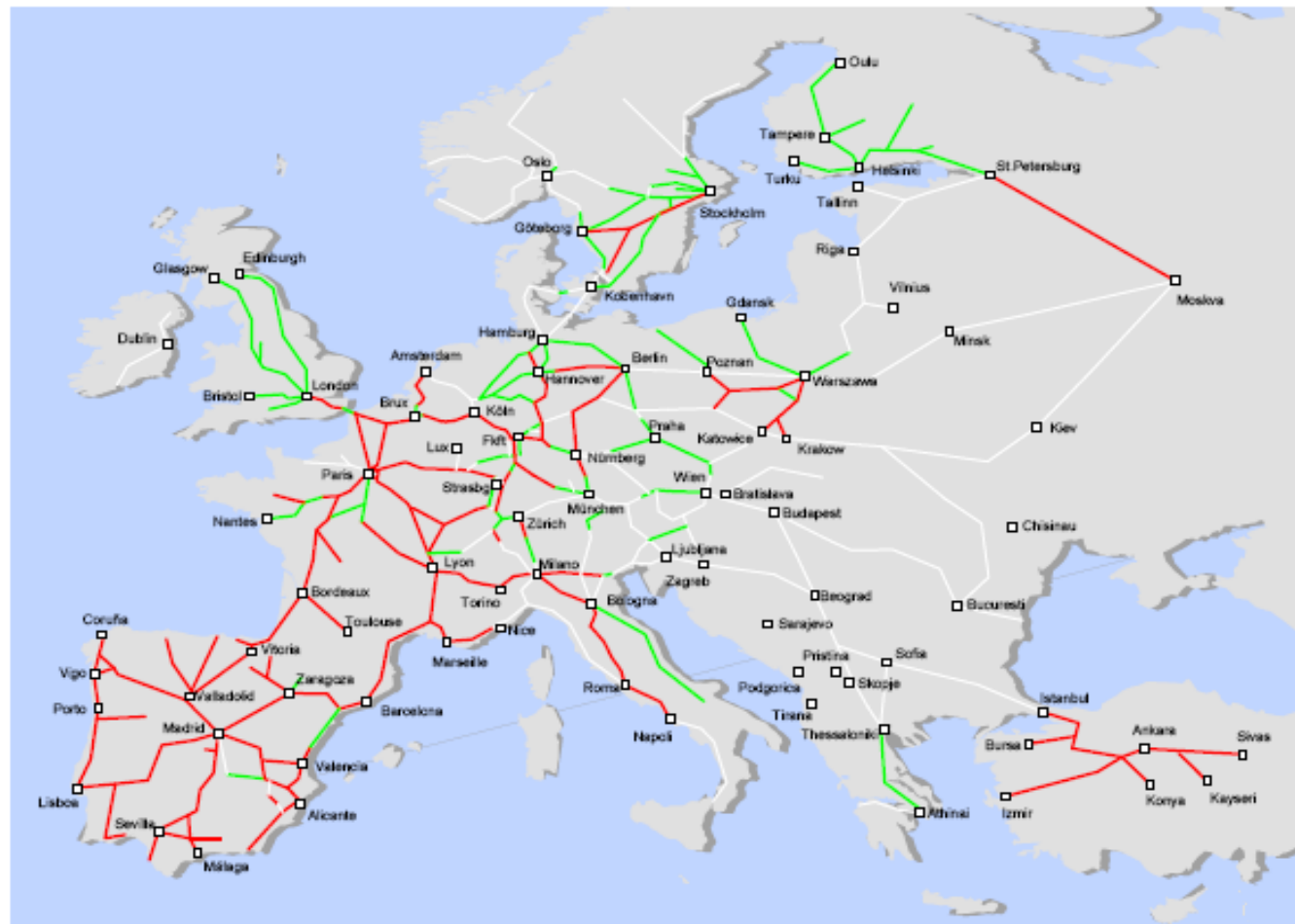
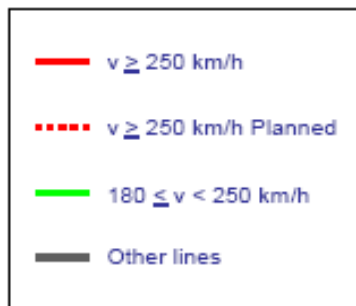
PENDOLINO

DUPLEX

The success : european network

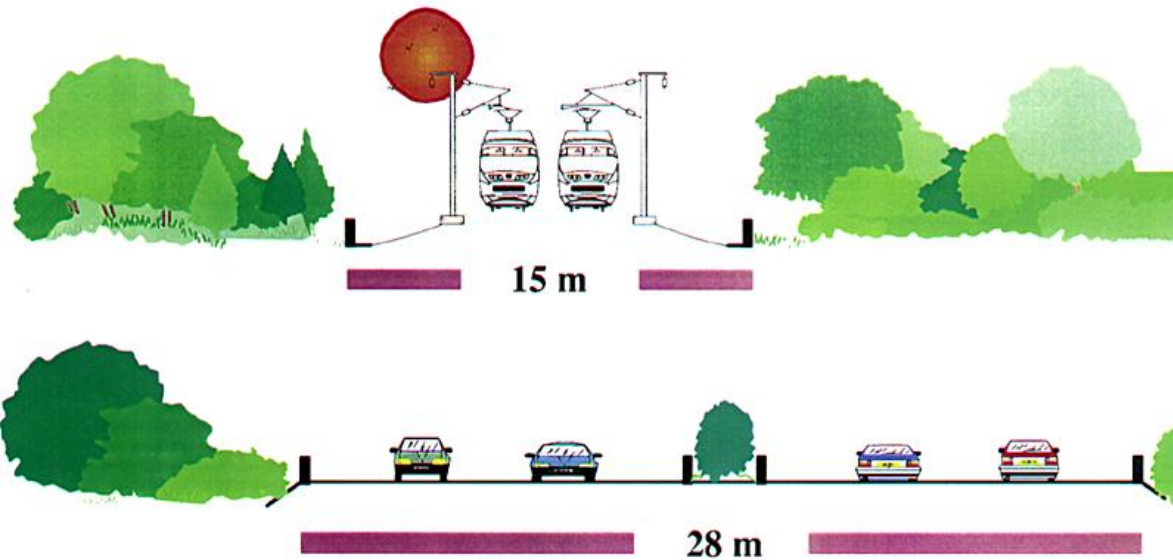
European HS Network

Forecasting 2025



High speed rail : the transportation system of the 21st century

Land requirements are smaller



System of the 21st century

AGV Automotrice Grande Vitesse



CO₂ EMISSIONS (per passenger per kilometre)



2,2 gr CO₂



30 gr CO₂



153 gr CO₂

Source: ADEME

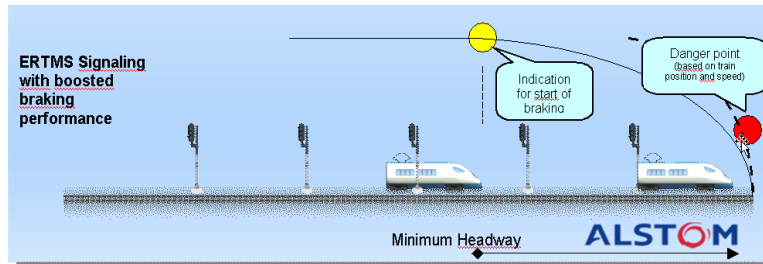
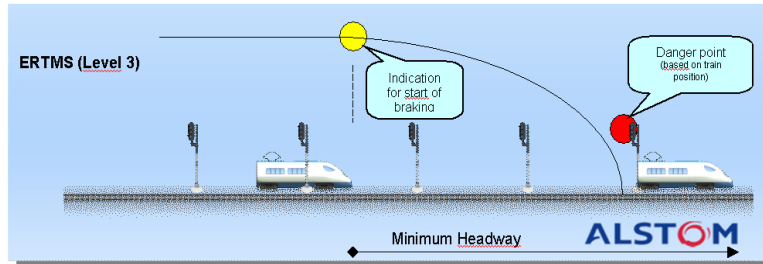
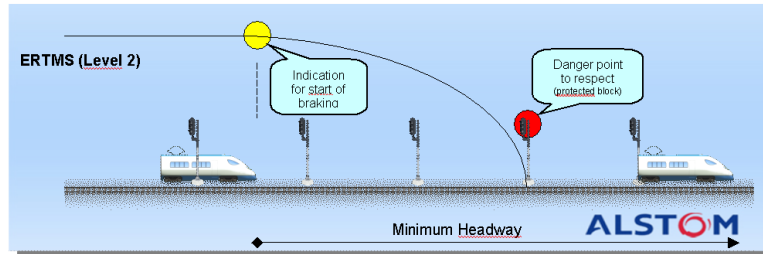
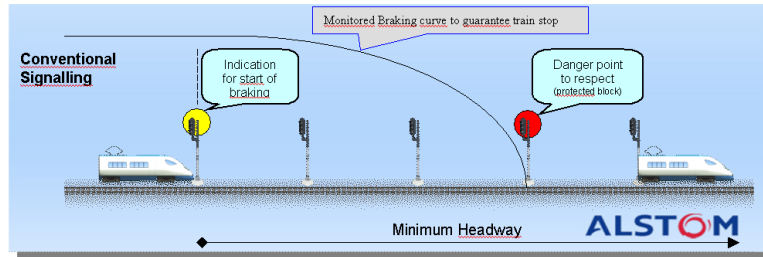
ALSTOM

Beyond ETCS for improved performances

One last cultural
blocking to kill



From conventional signalling to Boosted ERTMS



- Improved performances for very high speed lines
- Compatible with ERTMS
 - Interoperable
 - Open to future evolution of ERTMS
- Allows mixed operation
- No infrastructure changes required

What lessons for an engineer :

- Have a vision, stick to it
- Innovate... and don't innovate
- Keep margin for uncertainty
- Economy is key
- Accept challenges ... and to b

Create a team, manage, be passion

THANKS !

