



48 YEARS OF EXPERTISE IN PUBLIC TRANSPORT

RULES TO COPE WITH RISKS **BOSTRAB** FOR SCANDINAVIA

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Dr. Jürgen Kappus
Hamburg-Consult GmbH
Hamburg, Germany



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SUMMARY

HAMBURG-CONSULT GMBH

- **COMPANY**

founded in 1967 as a subsidiary of Hamburger Hochbahn AG, now in private hands and in close partnership & co-operation with HOCHBAHN

- **EXPERIENCE**

48 years of experience in Europe, Asia, South America and Africa

- **TEAM**

about 40 members of staff, additional experts available from Hamburger Hochbahn and external sources for project purposes

- **CLIENTS**

public transport operators, associations and authorities, investors, transport industry, the EU Commission as well as international banks
[e.g. KfW Entwicklungsbank, World Bank, Asian Development Bank]

THE LECTURER

DR. JÜRGEN KAPPUS

Dr. Ing. (PhD), Dipl.-Ing. Electrical Engineering
Government-approved Operations Manager
for LRT and metro (Betriebsleiter BOStrab)



- Director, Senior Consultant of HAMBURG-CONSULT
- Responsible Expert at the Technical Supervisory Authority for LRT of the regional government of North Rhine-Westphalia
- Manager “Technology and Quality” of the vehicle division of the public transport company of the City of Bremen (Bremer Straßenbahn AG - BSAG)
- Project Manager at Rhein-Consult GmbH, Dusseldorf

THE TASK

I AM A PASSENGER WHO WANTS A SAFE JOURNEY ON A TRAM

How do I know whether:

- the track/infrastructure is safe?
- the vehicle is well built and well maintained?
- the driver is skilled and fit?

In most countries safety of public transport is a task of the state.

*But there are different **ways** to do it ...*

THE **BOSTRAB** WAY

SET OF REGULATIONS

- Federal Law for urban public transport (Personenbeförderungsgesetz - PBefG)
- *Based on PBefG*: Related safety regulations for construction & operation of Tramways, LRT & metro systems (Verordnung über Bau und Betrieb von Strassenbahnen - BOStrab)
- *Based on BOStrab*: Rules & Procedures issued by the Operations Manager (Dienstanweisungen des Betriebsleiters)

TECHNICAL SUPERVISORY AUTHORITY (Technische Aufsichtsbehörde – TAB)

- Responsible for technical acceptance and issuing of safety certificates for
 - New or amended infrastructure
 - New or amended vehicles
- Supervision of Operation and Maintenance of the public transport companies

THE **BOSTRAB** WAY

OPERATIONS-MANAGER (BOStrab)

Needs certification (engineer, at least 3 years experience in public transport, 1000 h of preparation, state exam on vehicles, infrastructure, operation and law)

- Issues rules & procedures (Betriebsanweisungen) to cover all safety related topics and ensures their execution, supported by the employer (who is obliged by BOStrab to do so)
- Supports the employer (“safety counterpart towards the employer”)

OPERATIONAL PERSONNEL

- Must be reliable, old enough and fit
- Executes the rules & procedures (Betriebsanweisungen)
- All safety related tasks must be done by them

THE **BOSTRAB** WAY INSERTION: FUTURE PROSPECTS

REVISION OF BOSTRAB

- Slight modifications and clarifications (it's over 25 years in place)
- Guideline for certification

SET OF STANDARDS FOR URBAN TRANSPORT

- Overcome non-fitting railway standards

“NEW APPROACH”, maybe modified, under discussion

- Defined set of rules/standards
- Independent assessors for technical issues
- Authorities mainly for administrative duties

THE **BOSTRAB** WAY SUMMARY

- A supervised organisation of public law within the commercial public transport company
- New vehicles and infrastructure certified by an authority
- Operation and maintenance executed after rules & procedures (Betriebsanweisungen) by the operations-manager (BOStrab-Betriebsleiter)

Key items

- Safety is maintained based on regulations, standards, rules & procedures
- The duties are executed by people with personal responsibility

OTHER POSSIBILITIES

THE **BRITISH** WAY

- A commercial public transport company with a safety organization, supervised by an authority
- New vehicles and infrastructure are assessed by an independent entity (and in some cases formally certified by an authority)
- Operation and maintenance executed after rules & procedures to fulfill safety requirements as a result of an ongoing safety process. The process is assessed by an independent entity.

Key items

- Safety is maintained mainly based on a process
- Rules and standards used to fulfill safety requirements
- Risk acceptance criteria MEM oder ALARP preferred (numerical approach) –

Technical systems kill you with the same probability as daily life without them.

OTHER POSSIBILITIES

THE **FRENCH** WAY

- A commercial public transport company with a safety organization, supervised by an authority
- New vehicles and infrastructure are assessed by an independent entity (and in some cases formally certified by an authority)
- Operation and maintenance executed after rules & procedures to fulfill safety requirements as a result of an ongoing safety process. The process is assessed by an independent entity.

Key items

- Safety is maintained mainly based on a process
- Rules and standards used to fulfill safety requirements
- Risk acceptance criteria GAMAB (Globalement Au Moins Aussi Bon) preferred (comparative approach) –

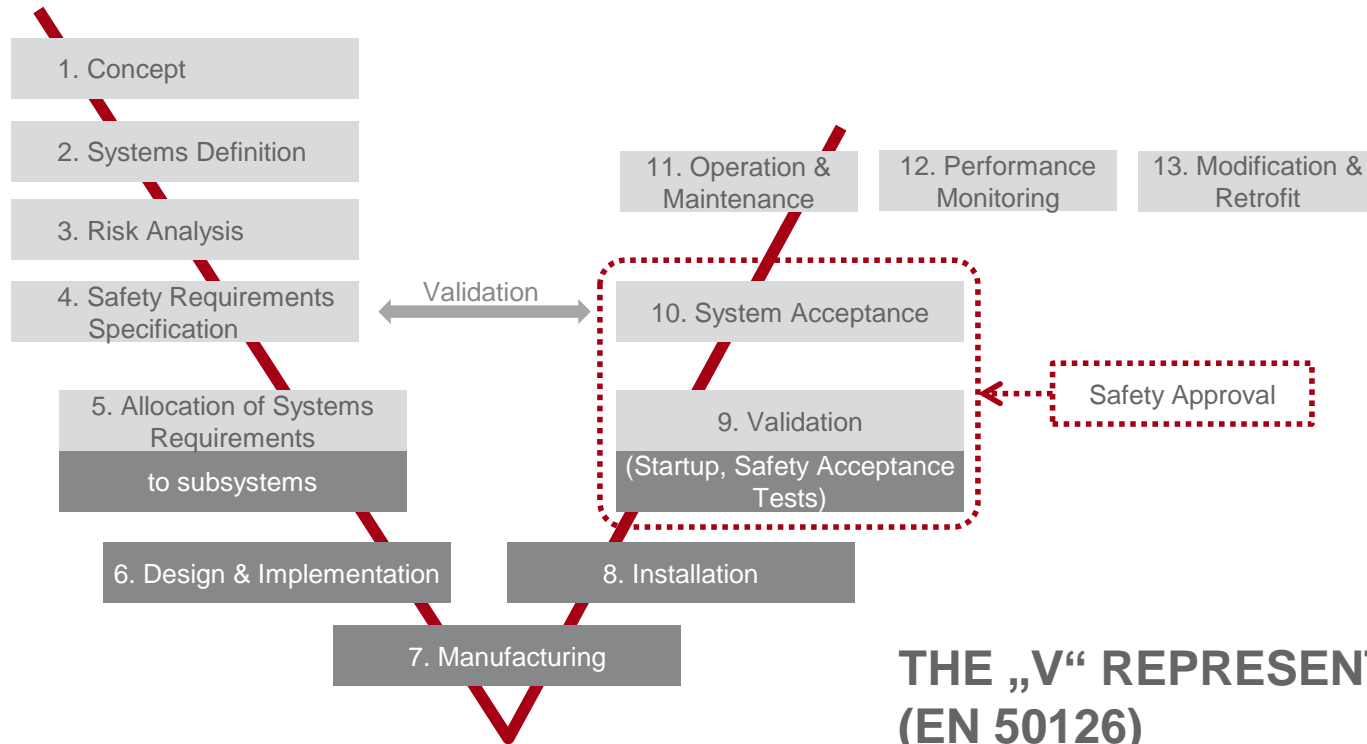
Safe, like the tram in Marseille

A LOOK AT **EN 50126** RAILWAY APPLICATIONS — THE SPECIFICATION AND DEMONSTRATION OF RELIABILITY, AVAILABILITY, MAINTAINABILITY AND SAFETY (RAMS)

- Make a **plan**, update, detailize and modify frequently according to the process
- Fill the **hazard log** – what may happen?
- Define **risk acceptance criteria** (e.g. MEM, ALARP, GAMAB, law or experts opinion)
- Distinguish **subsystems**, make an apportion and clarify relations up and down
- Work out **safety requirements** (If things are too risky use appropriate mitigations – check against safety criteria)
- Upon **system validation** do review, analysis, testing, data assessment to close all hazards – check if all done fine!
- Collect data, do spot-checks, write it all down and call it **Safety Case** (maybe better an independent person does this)

Note: Lots of small experts decisions covered by a lot of paperwork

A LOOK AT EN 50126



THE „V“ REPRESENTATION
(EN 50126)

EXPERIENCES WITH **BOSTRAB** AND **EN 50126** INDEPENDENT SAFETY ASSESSMENT (ISA) OF THE JERUSALEM LRT SYSTEM

- **Client:** TÜV Nord for Jerusalem Transportation Masterplan JTMT
- **Activities:**
 - Assessment of Safety Documentation
 - Assessment of supporting documents from Operation and Maintenance
 - Assessment insertion process of the new LRT system into the urban environment
 - Statements on different issues in relation with Rolling Stock and Infrastructure
 - Assessment of the maturity of the system and O&M-organisation for the start of passenger services
 - Issue of the Operating Certificate



EXPERIENCES WITH **BOSTRAB** AND EN 50126 CERTIFICATION MANAGEMENT MUNICH AIRPORT INNOVIA APM 300

- **Client:** Bombardier Transportation GmbH,
Berlin / Germany
- **Activities:**
 - Support and moderation of the certification process according to legal regulations (BOStrab)
 - Identification of shortcomings of documentation and potential mismatch with rules and regulations (BOStrab)
 - Advice for modifications and changes of documentation in order to comply with legal regulations (BOStrab)



EXPERIENCES WITH **BOSTRAB AND EN 50126** **MY EXPERIENCE**

- EN 50126 may be in front of the process; in terms of content **it's not leading – it's tracing**. Expertise needed. Example from a Hazard-Log:
 - Deal with earthquakes
 - Overlook derailing
- EN 50126 approach sometimes seems to be **huge effort to reinvent the wheel**
- It shows it's **benefits to cope with new risks** (guidebeam instead of rail) and special situations (steep slope and a level crossing with frequent traffic jam below)
- **BOStrab is nice to close hazards** as it offers recognized mitigation measures. But **associated guidelines, VDV-Rules and EN standards have to be added** for the gaps and details
- **Technical and operational expertise is mandatory** for operation and maintenance – procedures can not replace it
- It's difficult to implement an **operations manager** according to BOStrab in a commercial company **without giving him the power by a legal framework** to stand up against the money to fight for safety.

SUMMARY

BOSTRAB GIVES ANSWERS TO COPE WITH RISKS

- It is not an exhaustive rulebook, guidelines and standards have to be added
- Skilled people are needed
 - to adapt the rules for the different local conditions
 - to assess and decide in special cases (accident, malfunction)

EN 50126 GIVES PROCEDURES AND DOCUMENTATION

- and helps to cope properly with special local conditions
- is used to satisfy doubtful authorities (and – in case - judges)

BOSTrab for Scandinavia – take the best of it, add your own flavour!

THANK YOU FOR YOUR ATTENTION!

Dr. Jürgen Kappus
Hamburg-Consult GmbH
Spohrstraße 6
22083 Hamburg, Germany
P +49.40.271 66 500
infohc@hamburg-consult.de
www.hamburg-consult.de

