MIND4 CHANGE

INTERNATIONAL UNION OF RAILWAYS

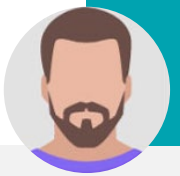
STAFF WORKSHEET

Signaller

Operations management

Ops management

Signaller



Railway signallers operate the signals and points on rail tracks to keep trains running safely and on time.

Today

Current ways of working

Human

H1: Generation/Age
Different age groups.

H2: Educational Background
- *Technical University diploma or job diploma by the train company,*
- *Bachelor's degree for senior signaller and trainer.*

H3: Employer (internal vs portage)
Externalisation of jobs and impact on the commitment of workers.

H4: Physical and psychological constraints
Mobility, attentional level, visual acuity

Activity / Tasks & Processes

A1: Supervision
Monitoring of train and rail activities

A2: Decision-making
Capable of making decisions in every situations (optimal & non-optimal)

A3: Regulation and traffic signalling
Applying rules ang regulations for train signalling

A4: Safety protocols
Safety as major challenge for railway. Always prioritising safety solutions.

A5: Railway maintenance
Key issue in railway to be monitored in time. E.g., varying rail-track interaction when comparing different train types and adjusting signalling appropriately.

Organization & Culture

O1: Safety and security
Passengers' safety in decision making. Prioritising more loaded train at intersection.

O2: Relationship with competing companies
Considering high priority train of different companies on tracks.

O3: Leadership and Management

O4: Compliance and regulatory

IT Systems & Tools

I1: Communication Tools
Phone, PC, Tab

I2: Supervision screen
Interface to display interaction of trains on the network

Competencies & Training

C1: Railway Safety & Security

C2: Operations knowledge

C3: Track knowledge

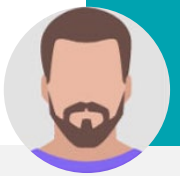
C4: Maintenance

C5: Communication skills
Able to understand and communicate briefly and clearly to someone having no context on the on-going situation.

This is a tentative analysis following the methodology agreed within MIND4CHANGE Working Group as described in How-to Guide Staff worksheets.pdf.
MIND4CHANGE Working Group encourages railway operators to do this exercise internally.

Ops management

Signaller



Drivers of transformation:
DT1: Opened market and more competition with varying business strategies
DT2: Significant high number of wage portage staff.
DT3: Research assistance solution for predictive maintenance
DT4: Transition to supervision role in the job of signaller

By 2030

New ways of working

In BLUE the changes that will have the biggest resistance to change

Human

H1: Generation/Age
Different age groups.
H2: Educational Background
- Technical University diploma or job diploma by the train company,
- Bachelor's degree for senior signaller and trainer.

H3: Employer (internal vs portage)
Externalisation of jobs and impact on the commitment of workers ; more wage portage staff
H4: Physical and psychological constraints
Mobility, attentional level, visual acuity
H5: Team interaction
Variation in staff (fewer permanent members, less cohesiveness among co-workers)

Activity / Tasks & Processes

A1: Supervision
Monitoring of train and rail activities becomes a transposable asset to other railway jobs
A2: Decision-making
Capable of making decisions in different contexts, sometimes unexpected. This becomes more challenging with external staff.
A3: Regulation and traffic signalling
Applying rules ang regulations for train signalling
A4: Security protocols
Security as major challenge for railway. Always prioritizing security solutions. Reinforcement in security level in external staff.
A5: Railway maintenance
Key issue in railway to be monitored in time. E.g., varying rail-track interaction when comparing different train types and adjusting signalling appropriately. An expertise that may weaken with time and the need to find better technological assistant solution to cope for it.

Organization & Culture

O1: Safety and security
Passengers' security in decision making. Prioritizing more loaded train at intersection. Can be assigned to a supervision role.
O2: Relationship with competing companies
Considering high priority train of different companies at specific junction. With the business strategy involved, the prioritization can vary further.
O3: Leadership and Management
Managing varying staff members and relationship between different passengers' rail companies will start to become a challenge.
O4: Compliance and regulatory

IT Systems & Tools

I1: Communication Tools
Phone, PC, Tab
I2: Supervision screen
Interface to display interaction of trains on the network.
New interfaces, probably for research and data collection by 2030 to better understand the different expertise at stake in the signaller job. This would help to develop by 2040 a virtual assistant for the signaller for predictive maintenance.

Competencies & Training

C1: Railway Security
C2: Operations knowledge
C3: Track knowledge
C4: Maintenance and predictive maintenance knowledge

T1: Research-action comprehension in daily work process
Video and demonstration of real-life research protocol

T2: Expert vision in AI data annotation

T3: Supervision
How to supervise different scenes efficiently

T4: Decision-making in complex context
The complexity of work environment keeps on increasing and it is important for signallers to train their decision-making skills in such a context.

Learning Lab scope of study

CH1: Commitment of wage portage staff
CH2: Safety training awareness for fixed-term and wage portage staff
CH3: Integration of new technologies related to predictive maintenance, in everyday work
CH4: Evolution of job function to supervision

E1: Standardisation of safety training for external staff
E2: Technology evangelist and scientific mediation for research programs and technologies to help staff understand the use and outcomes of the process.

MIND4 CHANGE

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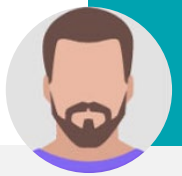
MIND4CHANGE Working Group encourages railway operators to do this exercise internally.

Ops management

Signaller



Drivers of transformation:
DT1: International market and oligopoly market
DT2: Privatisation of passenger rail market and monopoly market for infrastructure
DT3: Technological assistance solution for predictive maintenance
DT4: Supervision role in the job of signaller
DT5: Workload reduction and hours transfer to other jobs

By 2040

New ways of working

In BLUE the changes that will have the biggest resistance to change

Technologies: Predictive maintenance and Edge computing, GNSS

Human

H1: Generation/Age
Different age groups.
Younger age groups due to workforce turnover and new technologies jobs creation
H2: Educational Background
- Technical University diploma or job diploma by the train company,
- Bachelor's degree for senior signaller and trainer.
- Diploma in technological and AI assistance

H3: Employer (internal vs portage)
Externalisation of jobs and impact on the commitment of workers ; more wage portage staff
Not relevant anymore.
Staff mostly internal due to privatisation of passenger rail market and redirection of budget in infrastructure rail market.
H4: Physical and psychological constraints
Mobility, attentional level, visual acuity
Mental underload due to digitalisation and assistance
H5: Team interaction
Variation in staff (fewer permanent members, less cohesiveness among co-workers)
Interaction is back

Activity / Tasks & Processes

A1: Supervision
Monitoring of train and rail activities becomes a transposable asset to other railway jobs
It is a must-have competence in the future of railway
A2: Decision-making
Capable of making decisions in different contexts, sometimes unexpected. This becomes more challenging with external staff.
Robust decision-making with aided AI (data collection checked by experts)
A3: Regulation and traffic signalling
Applying rules ang regulations for train signalling
Fewer possible scenarios and more predictable – AI aided function
A4: Security protocols
Security as major challenge for railway. Always prioritizing security solutions. Reinforcement in security level in external staff.
Cybersecurity process becomes more important
A5: Railway maintenance
Key issue in railway to be monitored in time. E.g., varying rail-track interaction when comparing different train types and adjusting signalling appropriately. An expertise that may weaken with time and the need to find better technological assistant solution to cope for it.
Covered by predictive maintenance

Organization & Culture

O1: Safety and security
Passengers' security in decision making. Prioritising more loaded train at intersection. Can be assigned to a supervision role.
Automated TMS regulation
Cybersecurity
O2: Relationship with competing companies
Considering high priority train of different companies at specific junction. With the business strategy involved, the prioritization can vary further.
Oligopoly market – New EU regulations required for train priority on track
O3: Leadership and Management
Managing varying staff members and relationship between different passengers' rail companies will start to become a challenge.
Relations between government and external companies extended – transversal management
O4: Compliance and regulatory
EU and national regulations

IT Systems & Tools

I1: Communication Tools
Phone, PC, Tab
Connected working
AR glasses
12: Supervision screen
Interface to display interaction of trains on the network. New interfaces, probably for research and data collection by 2030 to better understand the different expertise at stake in the signaller job. This would help to develop by 2040 a virtual assistant for the signaller for predictive maintenance.
Human Machine Integration system

Competencies & Training

C1: Railway Security
C2: Operations knowledge
C3: Track knowledge
C4: Supervision
How to supervise different scenes efficiently (becomes a competence)
C5: Maintenance and predictive maintenance knowledge
C6: English proficient for everyone
C7: Coding 101
C8: Expert vision in AI data annotation (becomes a competence)
T1: Research-action comprehension in daily work process
Video and demonstration of real-life research protocol
T2: Decision-making in complex context
The complexity of work environment keeps on increasing and it is important for signallers to train their decision-making skills in such a context.
T3: Cybersecurity and associated risks

Learning Lab scope of study

Main challengers for cultural change:
CH1: Commitment of wage portage staff
Not a challenge anymore
CH2: Security training awareness for fixed-term and wage portage staff
Security training oriented to cybersecurity
CH3: Integration of new technologies related to predictive maintenance and automated TMS, in everyday work
CH4: Evolution of job function to supervision. Supervision is a must to be recruited

Enablers to facilitate the change:
E1: Standardisation of security training for external staff
E2: Technology evangelist and scientific mediation for research programs and technologies to help staff understand the use and outcomes of the process.
E3: Cybersecurity knowledge
E4: EU norms and standards

MIND4 CHANGE

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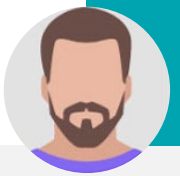
Ops management

Signaller



Drivers of transformation:
DT1: International market and oligopoly market
DT2: Privatisation of passenger rail market and monopoly market for infrastructure
DT3: Technological assistance solution for predictive maintenance
DT4: Supervision role in the job of signaller
DT5: Workload reduction and hours transfer to other jobs
DT6: New market for railway (road and energy)

After 2040

New ways of working

In BLUE the changes that will have the biggest resistance to change

Technologies: Quantum computing, 6G, fully automated TMS, Generative AI, Cryptography

Human

H1: Generation/Age
Different age groups.
Younger age groups due to workforce turnover and new technologies jobs creation
H2: Educational Background
- Technical University diploma or job diploma by the train company,
- Bachelor's degree for senior signaller and trainer.
- Diploma in technological and AI assistance

H3: Employer (internal vs portage)
Externalisation of jobs and impact on the commitment of workers ; more wage portage staff
Not relevant anymore.
Staff mostly internal due to privatisation of passenger rail market and redirection of budget in infrastructure rail market.
Crisis between rail, road and energy rail staff
H4: Physical and psychological constraints
Mobility, attentional level, visual acuity
Mental underload due to digitalisation and assistance
H5 : Team interaction
Variation in staff (fewer permanent members, less cohesiveness among co-workers)
Interaction is back
New interaction crisis due to agile working staff between road/rail/energy

Activity / Tasks & Processes

A1: Supervision
Monitoring of train and rail activities becomes a transposable asset to other railway jobs
It is a must-have competence in the future of railway
Cross-supervision between train and road
A2: Decision-making
Capable of making decisions in different contexts, sometimes unexpected. This becomes more challenging with external staff.
Robust decision-making with aided AI (data collection checked by experts)
Fully automated AI aided system through Generative AI and 6G telecommunication
A3: Regulation and traffic signalling
Applying rules ang regulations for train signalling
Fewer possible scenarios and more predictable – AI aided function
A4: Security protocols
Security as major challenge for railway. Always prioritizing security solutions. Reinforcement in security level in external staff.
Cybersecurity process becomes more important
A5: Railway maintenance
Key issue in railway to be monitored in time. E.g., varying rail-track interaction when comparing different train types and adjusting signalling appropriately. An expertise that may weaken with time and the need to find better technological assistant solution to cope for it.
Covered by predictive maintenance
Quantum computing – game changer in railway research

Organization & Culture

O1: Safety and security
Passengers' security in decision making. Prioritising more loaded train at intersection. Can be assigned to a supervision role.
Automated TMS regulation
Cybersecurity
Cryptography for data protection
O2: Relationship with competing companies
Considering high priority train of different companies at specific junction. With the business strategy involved, the prioritization can vary further.
Oligopoly market – New EU regulations required for train priority on track and hybrid vehicles on road.
O3: Leadership and Management
Managing varying staff members and relationship between different passengers' rail companies will start to become a challenge.
Relations between government and external companies extended – transversal management
O4: Compliance and regulatory
EU and national regulations
Regulations on cybersecurity for the country

IT Systems & Tools

I1: Communication Tools
Phone, PC, Tab
Connected working AR glasses
I2: Supervision screen
Interface to display interaction of trains on the network. New interfaces, probably for research and data collection by 2030 to better understand the different expertise at stake in the signaller job. This would help to develop by 2040 a virtual assistant for the signaller for predictive maintenance.
Human Machine Integration system
I3: BCI

Competencies & Training

C1: Railway Security
C2: Operations knowledge
C3: Track knowledge
C4: Supervision
How to supervise different scenes efficiently (becomes a competence)
C5: Maintenance and predictive maintenance knowledge
C6: English proficient for everyone
C7: Coding 101
C8: Cybersecurity 101
C9: Expert vision in AI data annotation (becomes a competence)
T1: Research-action comprehension in daily work process
Video and demonstration of real-life research protocol
T2: Decision-making in complex context
The complexity of work environment keeps on increasing and it is important for signallers to train their decision-making skills in such a context.
T3: Cybersecurity menace detections

Learning Lab scope of study

Main challengers for cultural change:
CH1: Commitment of wage portage staff
Not a challenge anymore
CH2: Security training awareness for fixed-term and wage portage staff
Security training oriented to cybersecurity
CH3: Integration of new technologies related to predictive maintenance and automated TMS, in everyday work
ChH4: Evolution of job function to supervision. Supervision is a must to be recruited
CH5: New markets for the railway (road and energy)
CH6: Long awaited technologies reaching Plateau of Productivity (Gartner)

Enablers to facilitate the change:
E1: Standardisation of security training for external staff
E2: Technology evangelist and scientific mediation for research programs and technologies to help staff understand the use and outcomes of the process.
E3: Cybersecurity knowledge
E4: EU norms and standards
E5: Climatic change and scarcity of resources

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MIND4 CHANGE

Thank you for your attention

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