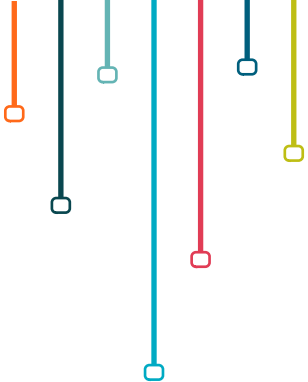




LIGHT RAIL & TRAMS
FOR A SUSTAINABLE,
CARBON-NEUTRAL TOMORROW

ADVANCED INSPECTION AND MAINTENANCE STRATEGIES FOR NOTTINGHAM TRAM INFRASTRUCTURE

Presenting: Marek Szwej, MSc, GMICE, Track Asset Manager at NTL / Keolis

14/11/2024



General overview of NET

Operational & Organisational Facts



Nottingham Express Transit
NET - brand name



Nottingham City Council
Public Transport Authority



Tramlink Nottingham Ltd
Concessionaire / Operator



Nottingham Trams Ltd / Keolis
Operator & Maintainer

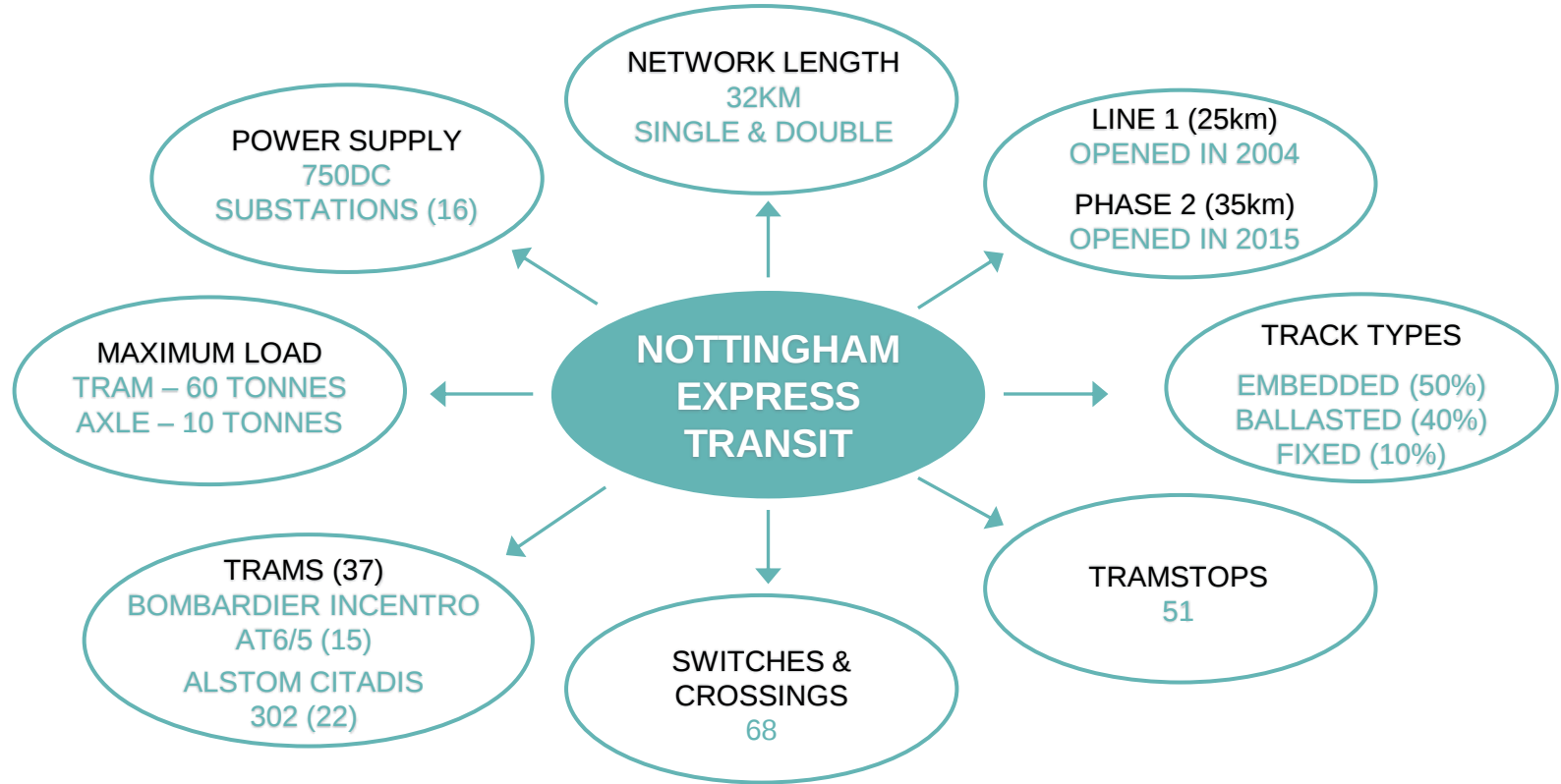
THE RAILWAYS AND OTHER GUIDED
TRANSPORT SYSTEMS (SAFETY)
REGULATIONS 2006 (ROGS)

GREATER NOTTINGHAM
LIGHT RAPID TRANSIT ACT 1994

PFI CONTRACT
FROM NCiC to TRAMLINK
FROM 2012 UNTIL 2034.

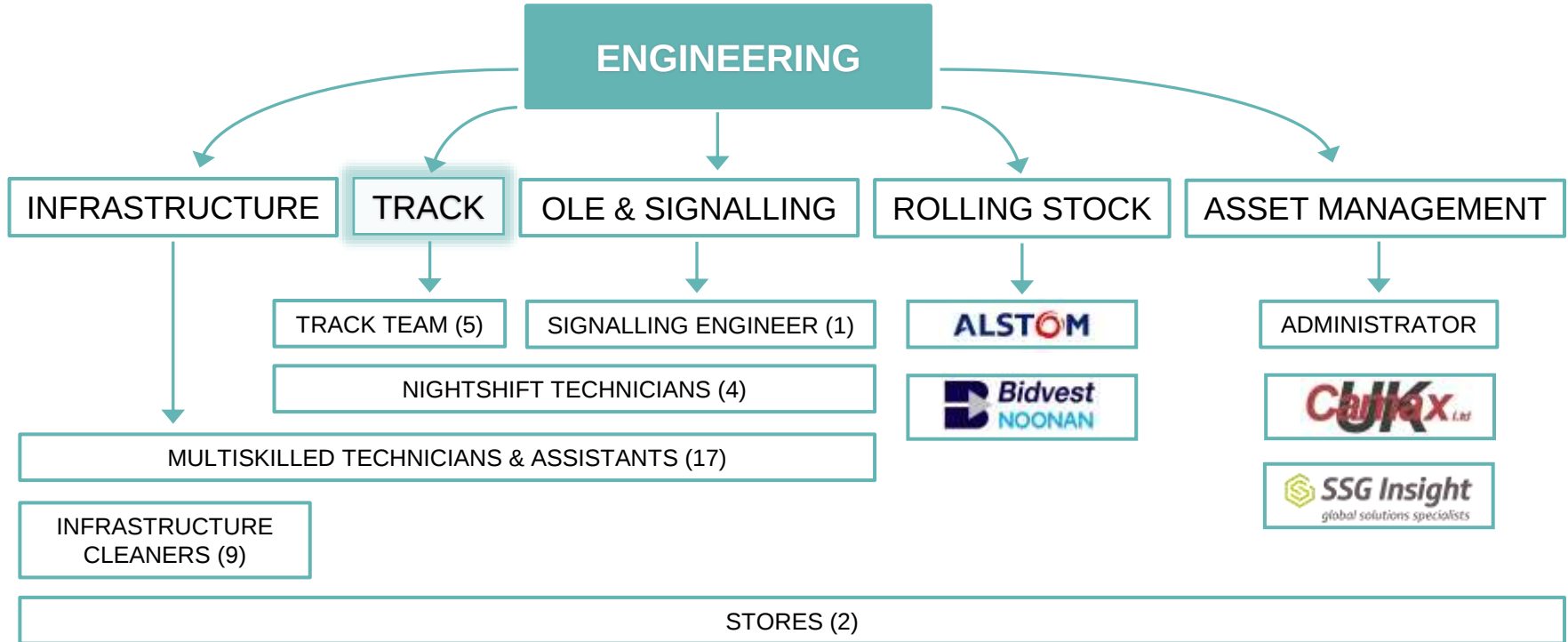
General overview of NET

Technical Statistics



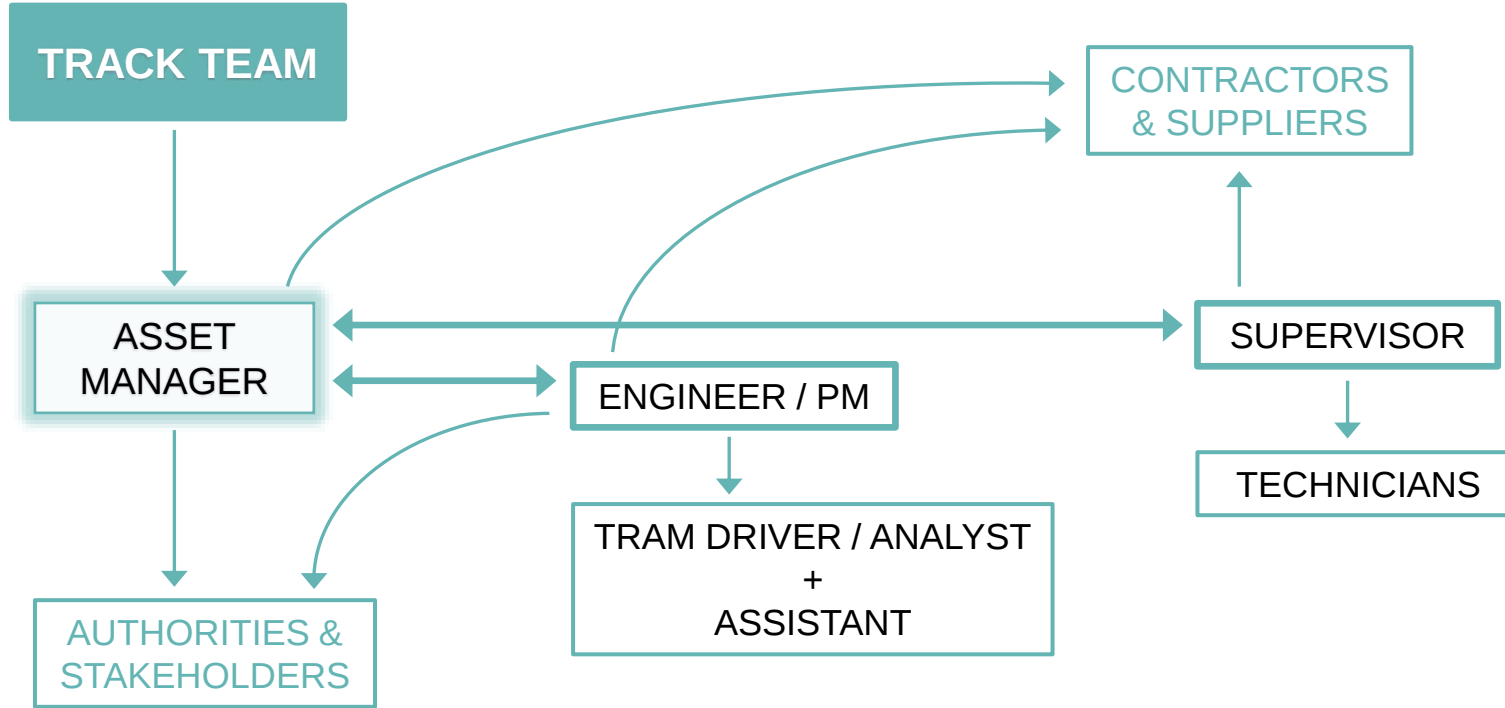
General overview of NET

Engineering Department Structure



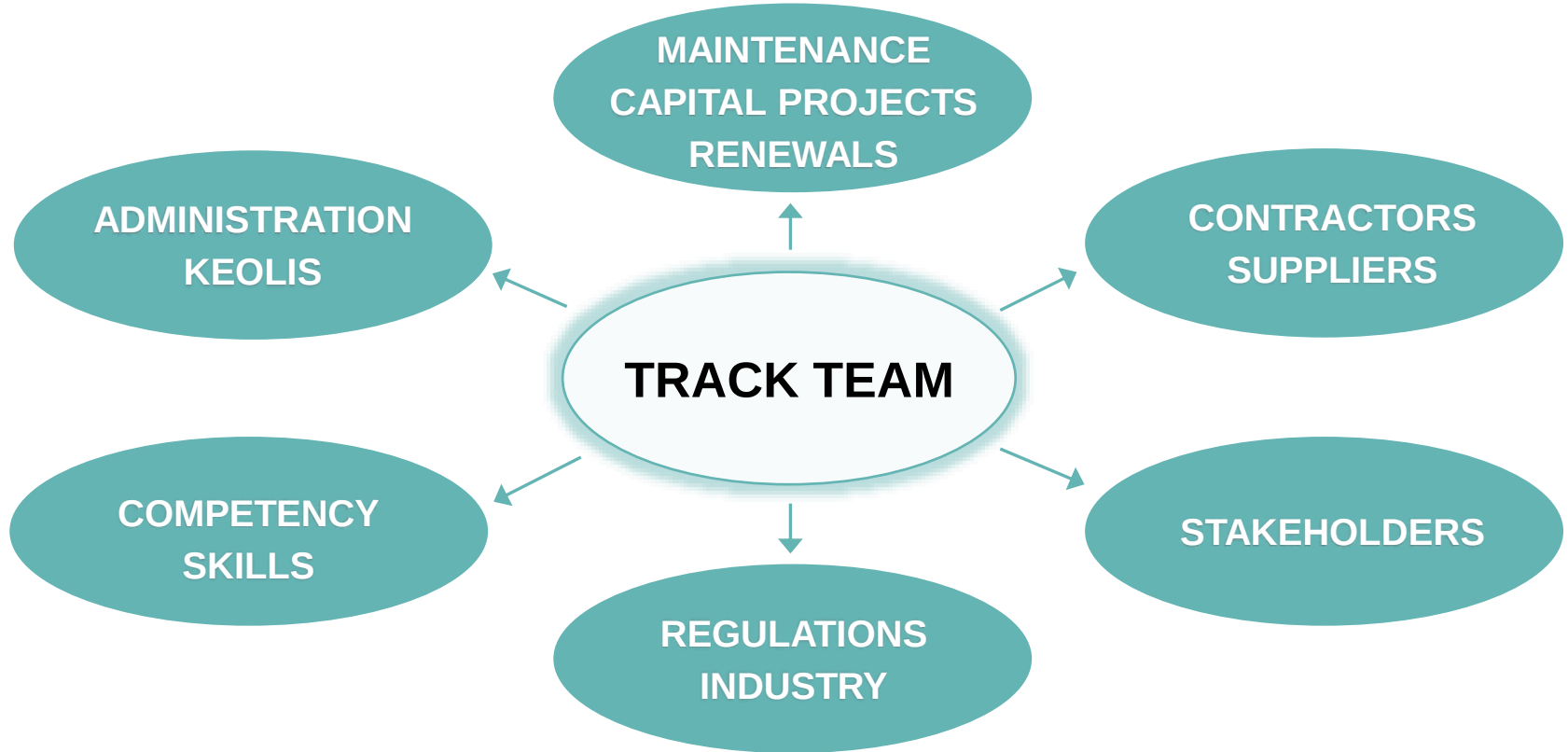
General overview of NET

Track Team Structure



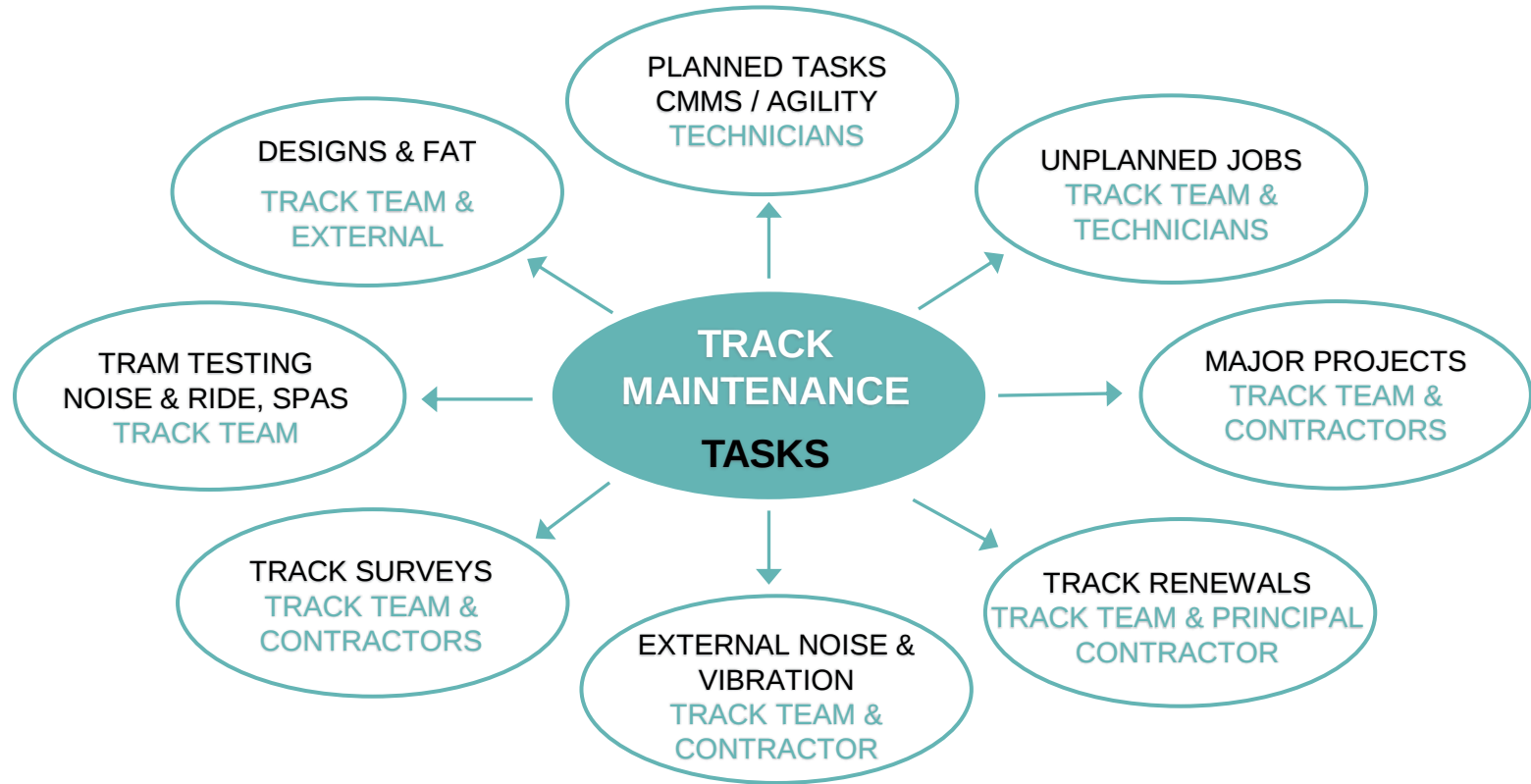
General overview of NET

Track Team Responsibilities



Inspection and Maintenance Fundamentals

Track Team Tasks



Inspection and Maintenance Fundamentals

Preventive & corrective maintenance

PREVENTIVE

REGULAR CHECKS AND INSPECTIONS

RAIL AND S&C GRINDING

RAIL LUBRICATION

TECHNICAL IMPROVEMENTS

BALLAST TAMPING

TRACK AND EQUIPMENT CLEANING

CORRECTIVE

TRACK RENEWALS

ASSETS OVERHAUL

RAIL GRINDING / MILLING

WELD REPAIRS

LIFT & PACK / TAMPING

DEFECTS REMOVALS

Inspection and Maintenance Fundamentals

Key track assets

TRACK / RAILS



EMBEDDED TRACK
GROOVED RAIL
55G2 / 41GP

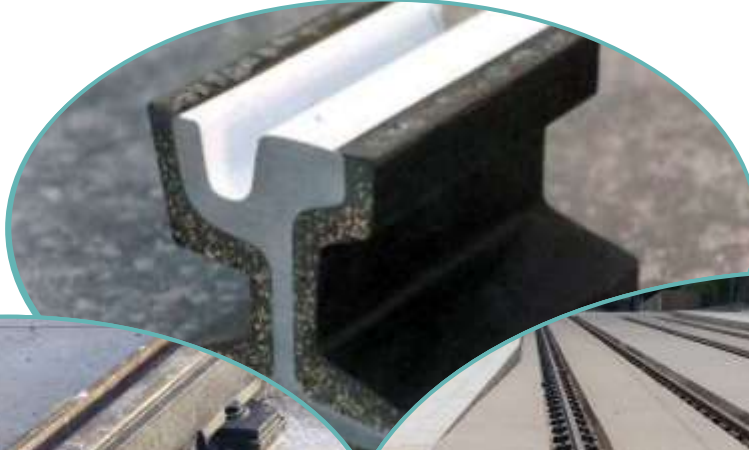


BALLASTED / FIXED TRACK
VIGNOLE RAIL
(BS80A / 39E1)

Inspection and Maintenance Fundamentals

Key track assets

EMBEDDED
TRACK



NON-EMBEDDED
TRACK



Inspection and Maintenance Fundamentals

Key track assets

SWITCHES &
CROSSINGS



GROOVE



FLANGE RUNNING
DIAMOND CROSSING



EMBEDDED POINTS



BALLASTED POINTS

Inspection and Maintenance Fundamentals

Key track assets

TRACK
INFRASTRUCTURE

LEVEL

SPECIAL N&V TRACK FORMS

ADJUSTMENT SWITCHES (BREATHERS)

Inspection and Maintenance Fundamentals

Key track assets

TRACK
INTERFACES

NETWORK RAIL



Resources and Technology

Equipment and tools

- ST
- S
- F
-
-
-
-
-
-
-

TRACK TOOLS

RAIL PROFILE

TRACK GEOMETRY

RAIL STRAIGHTNESS

TRACK GEOMETRY

SKID RESISTANCE

TRACK GAUGES

MINI

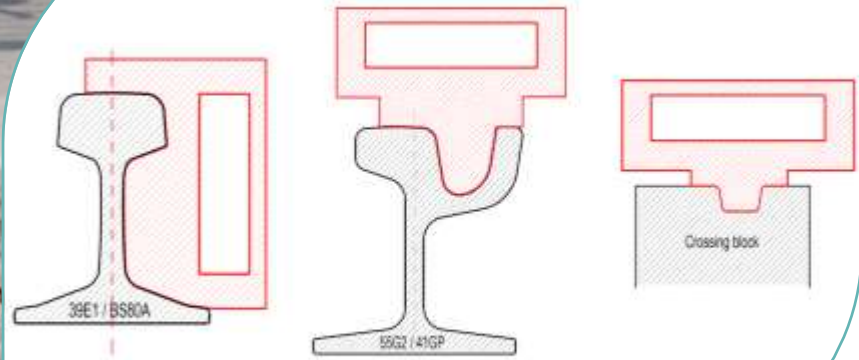
TRA

RAILS

DYNA

PEND

3-D PRINTED



Resources and Technology

Work planning systems

TRACK SCHEDULES

- WORK PRIORITY MATRIX
- JOBS PERIODICITY
- SCOPE FOR EACH SECTION
- LONG TERM PLANNING / LOOKAHEAD
- MINI-PROF LOCATIONS
- TRAM TESTING SCHEDULE

COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM



CERTIFIED ISO 55001



ASSET MANAGEMENT

PROJECT MANAGEMENT



MICROSOFT PROJECT, PLANNER, EXCEL

ANNUAL MAINTENANCE PLAN



Resources and Technology

Technology development in inspection and maintenance

AUTOMATED INSPECTION SYSTEMS POINT MACHINES AND CONTROLLERS

HANNING AND KAHL



- CONTINUOUS MONITORING
- ETHERNET OR SIM CARD
- RETROFIT TO EXISTING UNITS
- H&K TECHNICAL SUPPORT
- DIAGNOSIS OF FAULTS



Resources and Technology

Technology development in inspection and maintenance

AUTOMATED INSPECTION SYSTEMS

RAIL TEMPERATURE & RAIL VERTICAL MOVEMENT REMOTE MONITORING

Railsense.co.uk

RAILSENSE



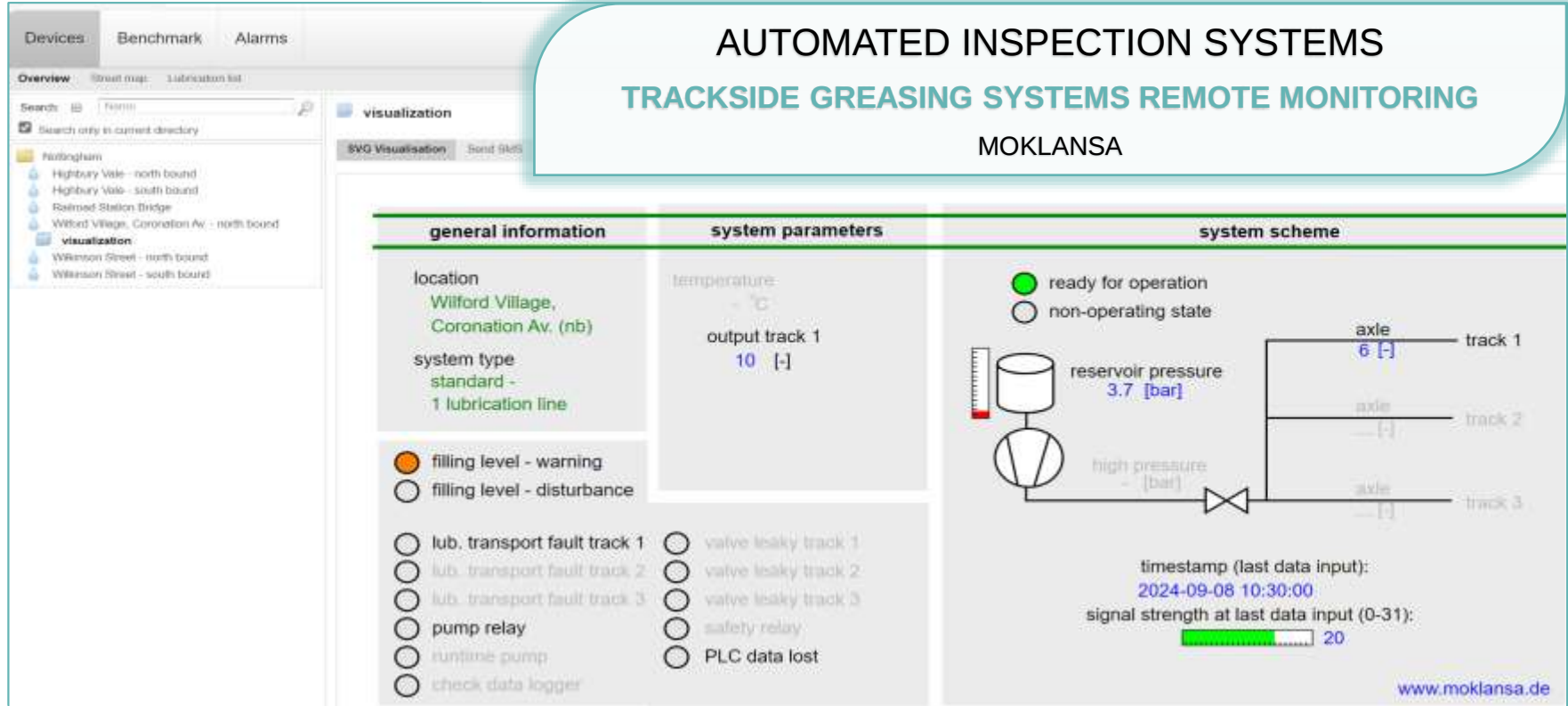
Resources and Technology

Technology development in inspection and maintenance

AUTOMATED INSPECTION SYSTEMS

TRACKSIDE GREASING SYSTEMS REMOTE MONITORING

MOKLANSA



Overview Street map: Lubrication list

Search: Form

Search only in current directory

visualization

SVG Visualisation Send SKOS

general information

location
Wilford Village,
Coronation Av. (nb)

system type
standard -
1 lubrication line

☒ filling level - warning
☐ filling level - disturbance

☐ lub. transport fault track 1
☐ lub. transport fault track 2
☐ lub. transport fault track 3
☐ pump relay
☐ runtime pump
☐ check data logger

☐ valve leaky track 1
☐ valve leaky track 2
☐ valve leaky track 3
☐ safety relay
☐ PLC data lost

system parameters

temperature:
- °C

output track 1
10 [-]

system scheme

☒ ready for operation
☐ non-operating state

reservoir pressure
3.7 [bar]

high pressure
- [bar]

axle 6 [-] track 1
axle - [-] track 2
axle - [-] track 3

timestamp (last data input):
2024-09-08 10:30:00

signal strength at last data input (0-31):
 20

www.moklansa.de

Resources and Technology

Technology development in inspection and maintenance

AUTOMATED INSPECTION SYSTEMS TRACK GEOMETRY AND RAIL PROFILE → CADD-E

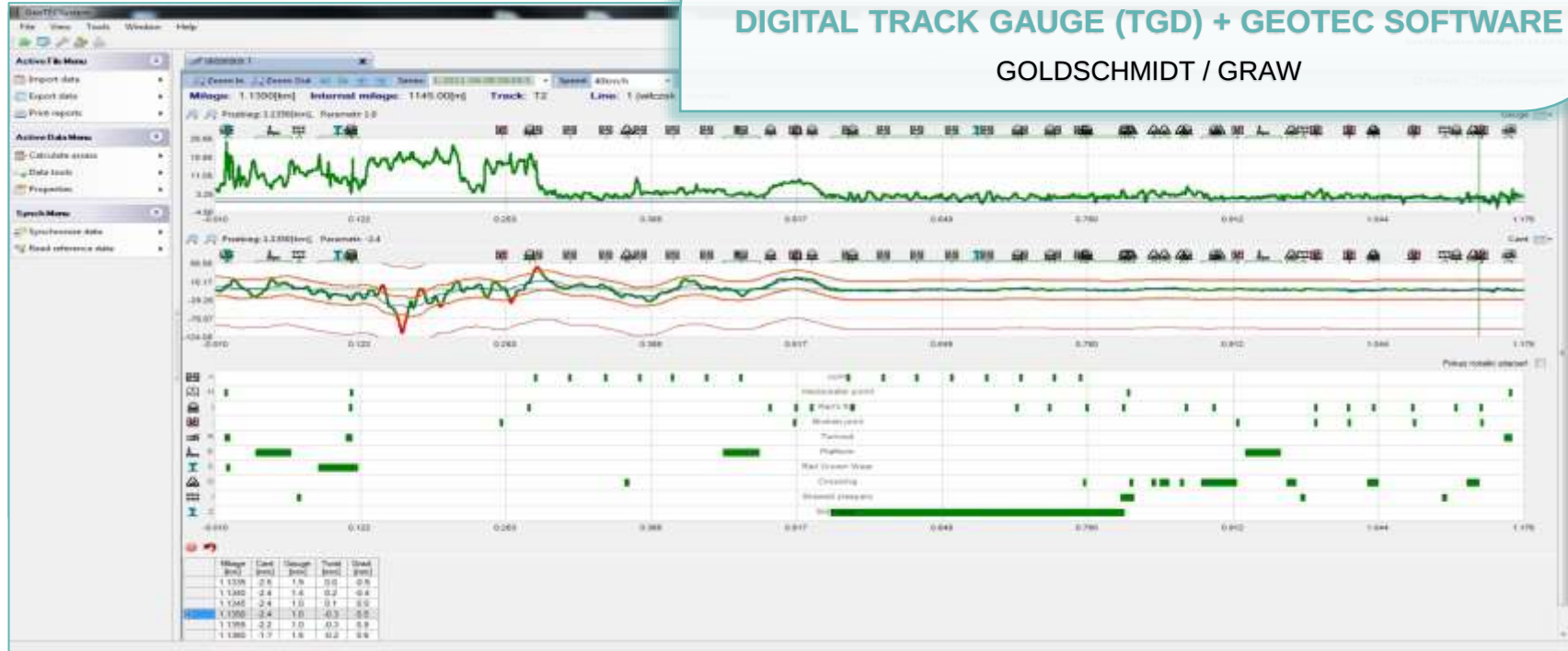
GOLDSCHMIDT / GRAW



Resources and Technology

Technology development in inspection and maintenance

AUTOMATED INSPECTION SYSTEMS
DIGITAL TRACK GAUGE (TGD) + GEOTEC SOFTWARE
 GOLDSCHMIDT / GRAW



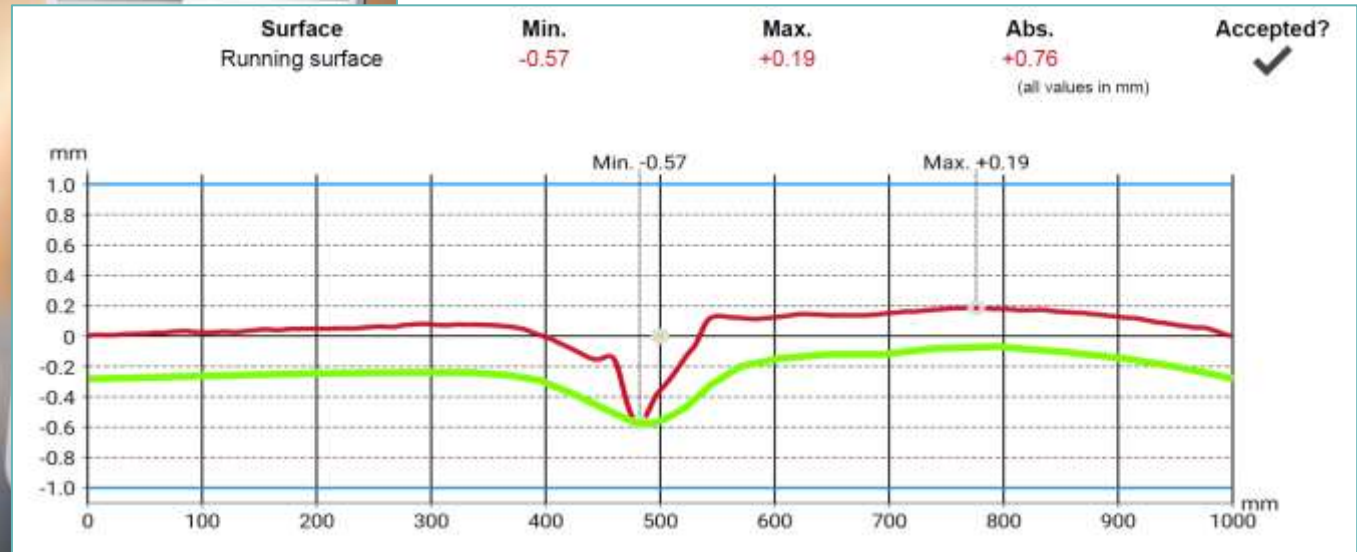
Resources and Technology

Technology development in inspection and maintenance

AUTOMATED INSPECTION SYSTEMS

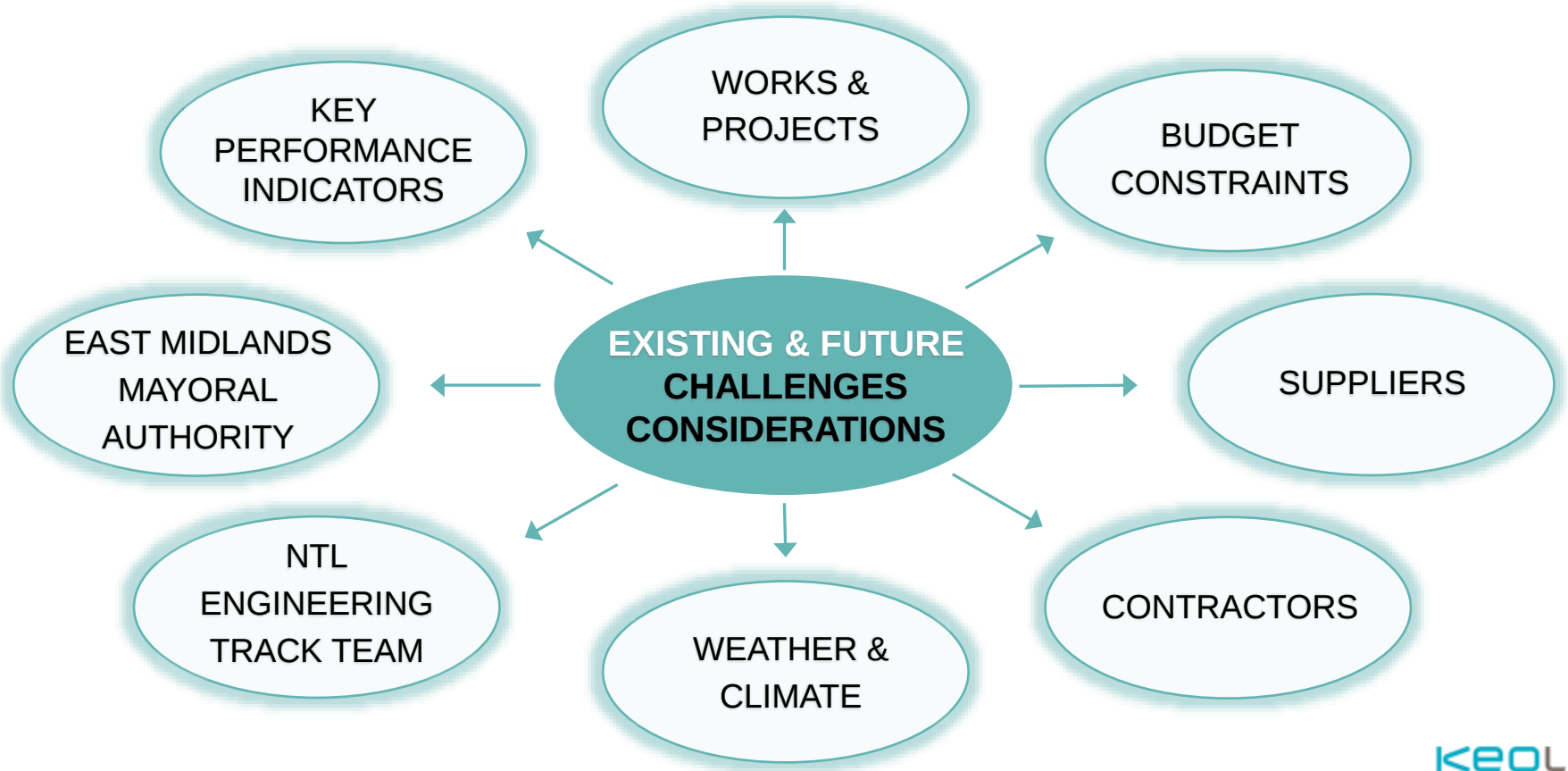
RAILSTRAIGHT WAVE

GOLDSCHMIDT



Performance, challenges & future

Challenges & Considerations



THANK YOU FOR YOUR ATTENTION

more ways —————
————— more life

KEOLIS
NOTTINGHAM