

Operational Traffic Control Centres.

December 02nd, Patrick Michaud



Reason why.



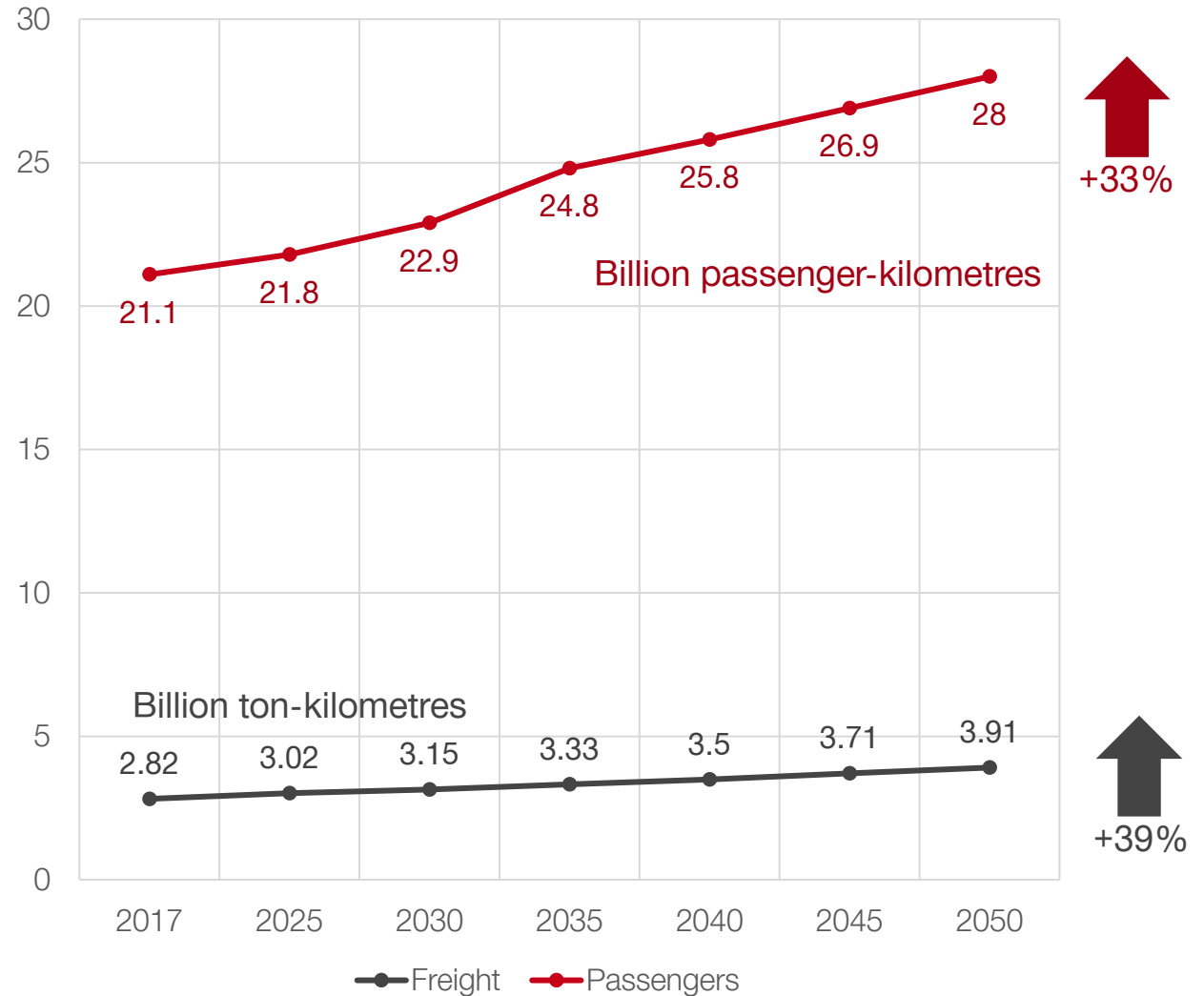
Expected Growth of Demand.

The demand for mobility is expected to further grow in the future.

Many social and economical trends, like more home office hours, increasing urbanisation and a growing population influence the demand for mobility services and logistics. However, the Swiss Government expect that the demand will increase substantially in the coming years.



2017 - 2050



SBB's Strategy for Handling the Increasing Demand.



New infrastructure
or expansions



Denser traffic on
existing infrastructure



Better processes
and organisation



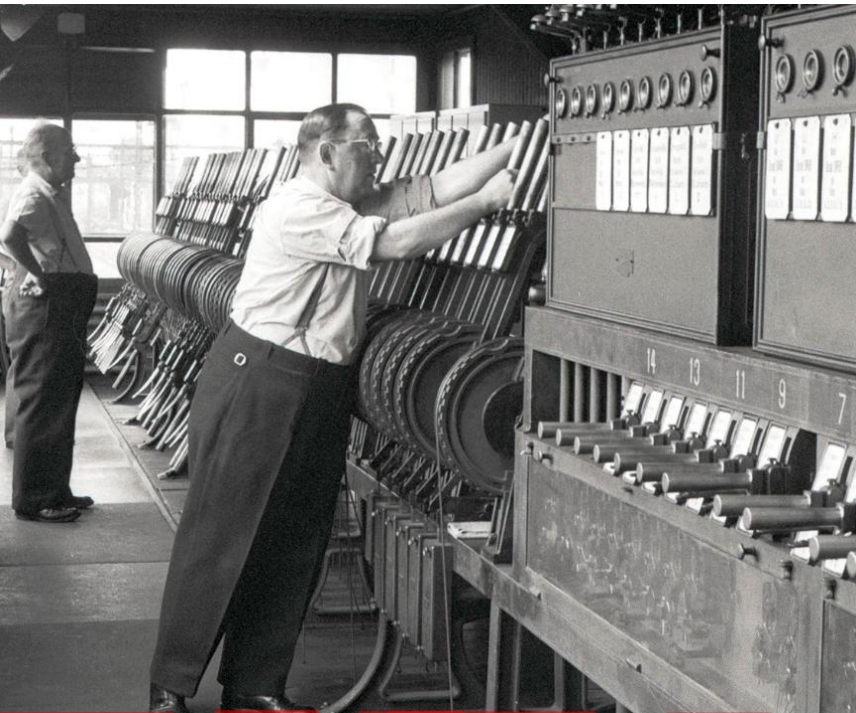
More capacity





Evolution towards OC

Technological Advancement and Automatization.



1900

1960



1990



2010

2025

3 Network Control Centres
100 Remote controlled stations
750 locally controlled stations

3 Network Control Centres
700 Remote controlled stations
130 locally controlled stations

4 Operation Centres
20 Locally controlled stations

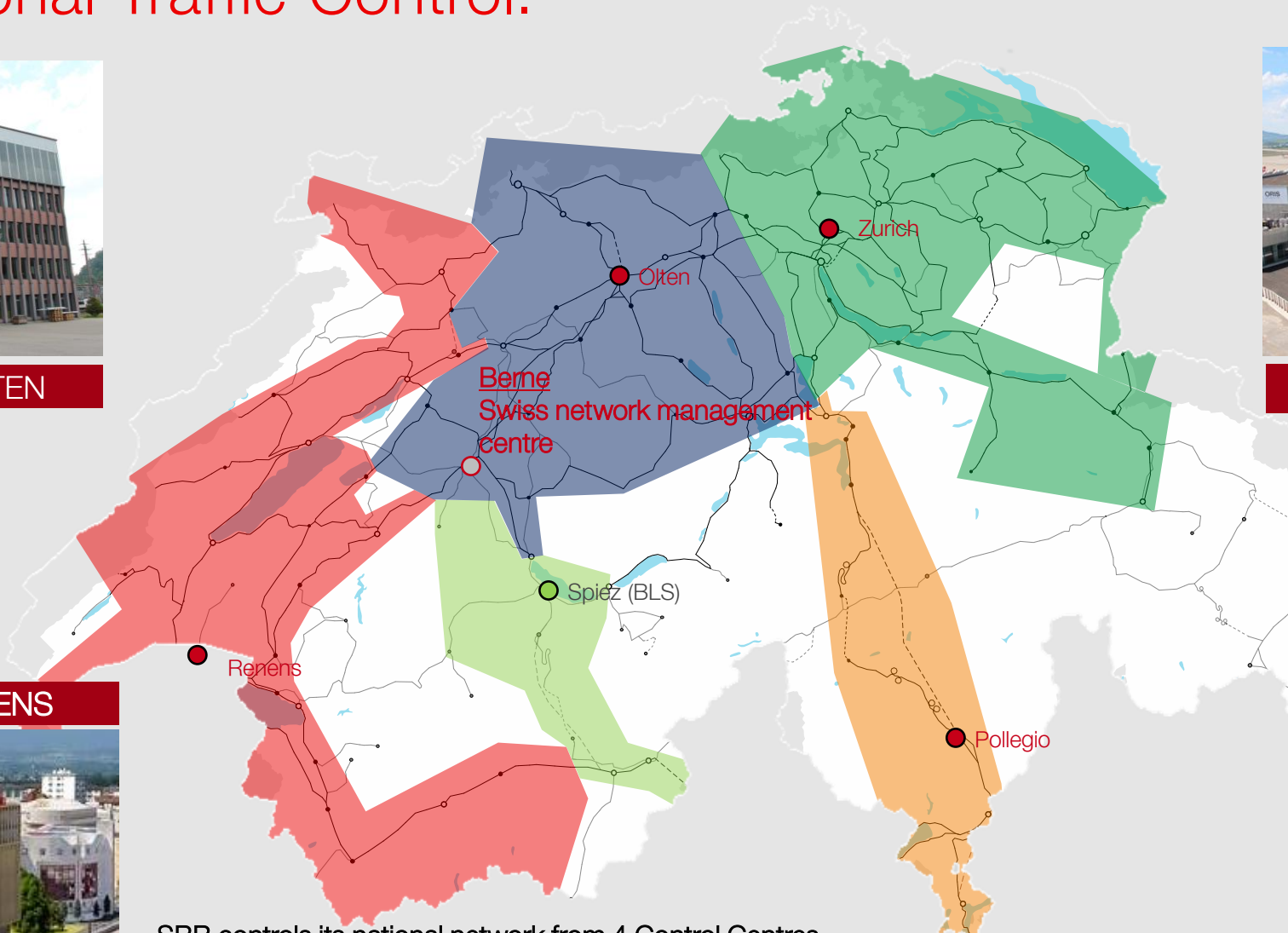
Operational Traffic Control.



OC Central, OLTEN



OC East, ZURICH Airport



OC West, RENENS



OC South, POLLEGIO



SBB controls its national network from 4 Control Centres.

The network management Centre in Berne provides the national coordination in case of emergency and supervises the standardisation of the rules in all four regions.

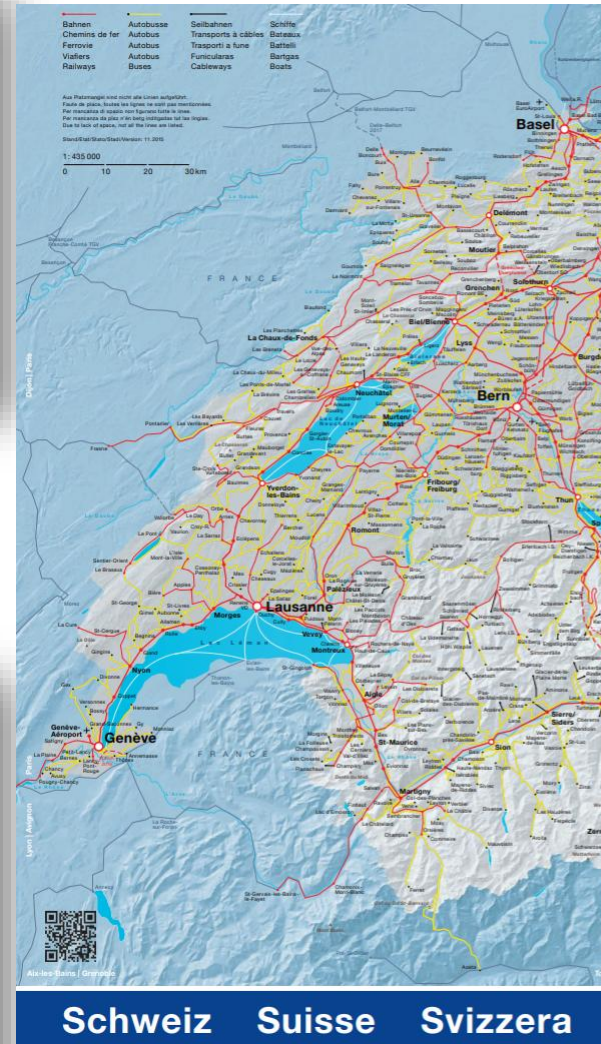
The four Operation centres are built redundant.



The Operation Centre West Renens, Facts and Figures.



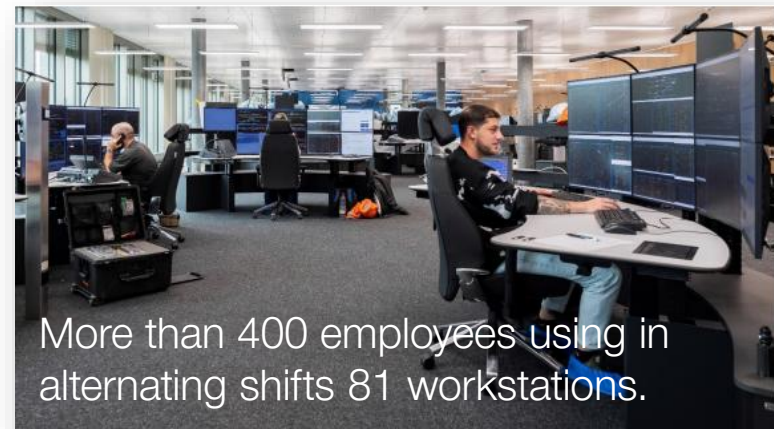
More than 880 km lines



More than 8000 daily loudspeaker announcements to passengers on stations



2500 trains per day



More than 400 employees using in alternating shifts 81 workstations.

All Relevant Roles in One Room.



Signallers

Control the interlocking and are responsible for safety.



Dispatchers

Plan the train traffic in real time and take care of incident management.



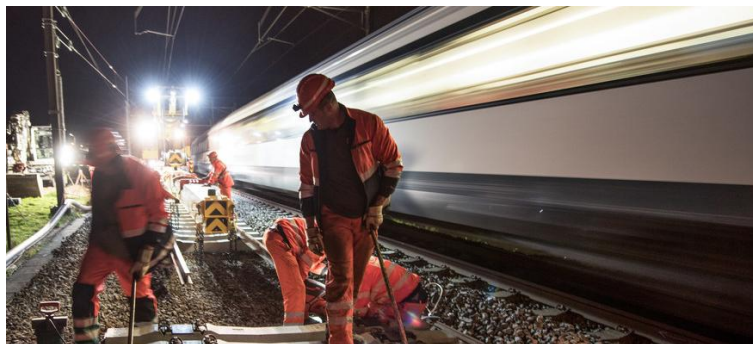
Customer Information Specialists

Inform the customers on stations with automated announcements and screens.



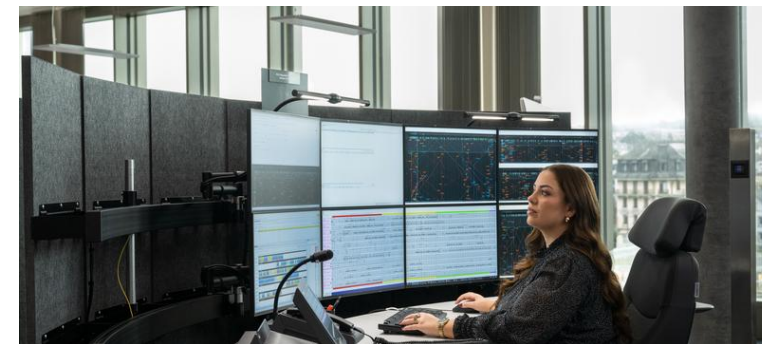
Technical Facilities Operators

Supervise the technical systems and control catenary lines.



Short-term planning staff

Analyse operations and determine potential for improvement.

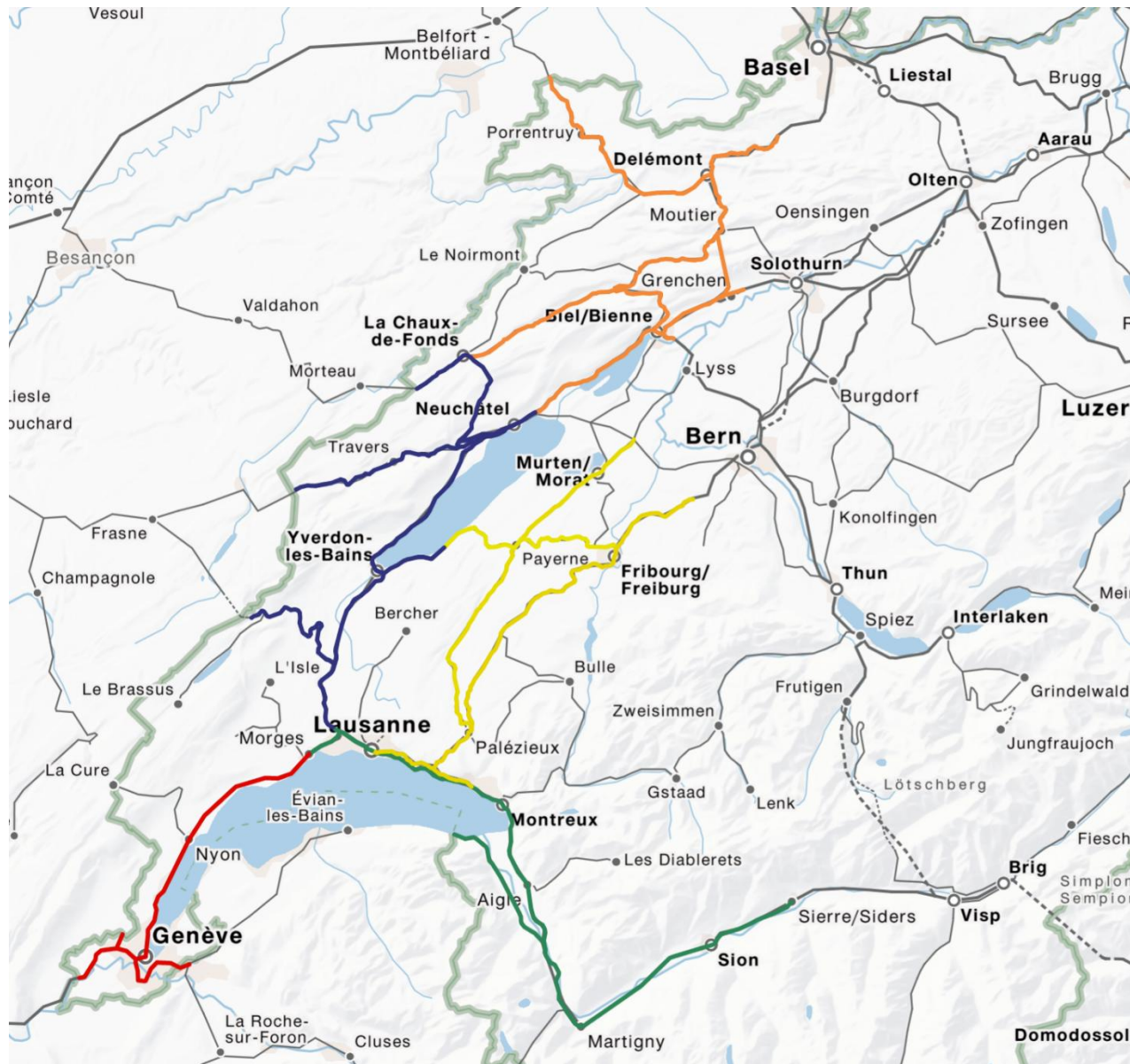


Dispatchers of RU

Plan rolling stock and locomotive drivers. Inform the customers on trains.



Operation Centre West - Dispatching Sectors Map.



- Operation Centre West is organised in 5 sectors:

- Genève

- Rhône

- Fribourg/Freiburg

- Neuchâtel

- Jura



The Sector Team.



Signallers

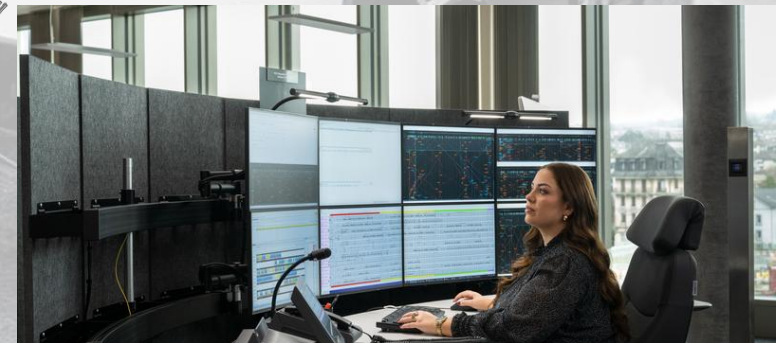


Customer Information Specialists



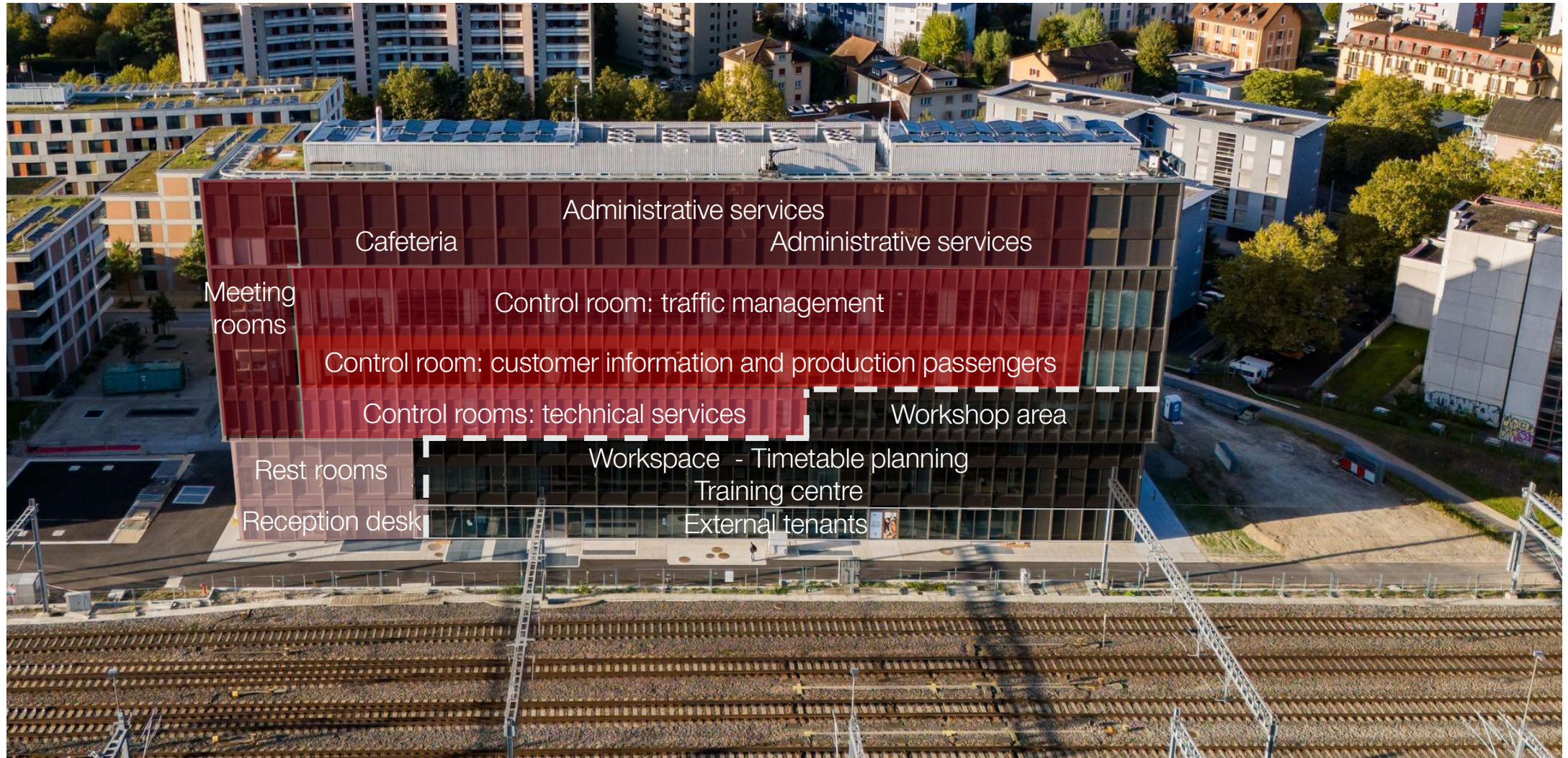
Dispatcher

RU dispatcher



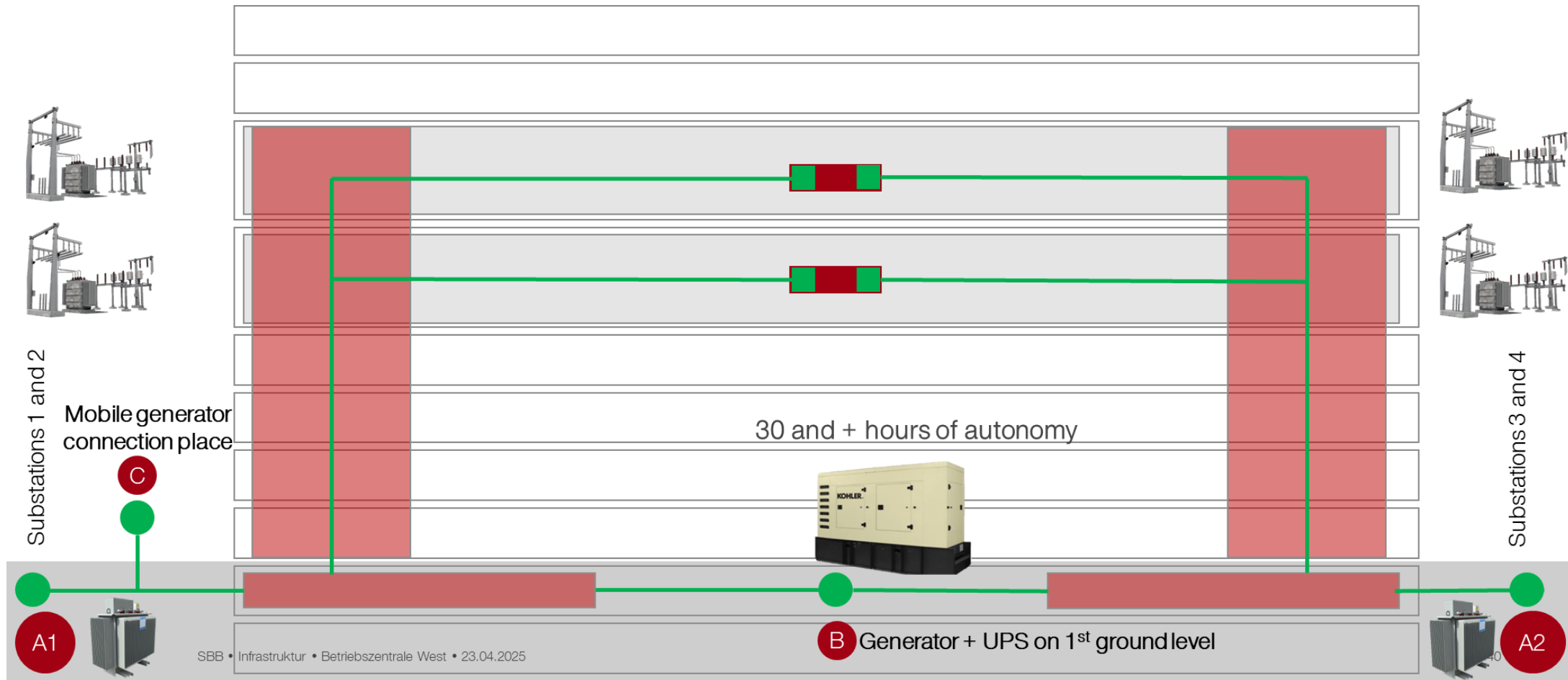
OC West – Building Layout.

OC West is constructed with a reinforced core which houses all vital systems and installations and protects against natural hazards.



OC West – Power Supply.

Multiple power entry-points connect the OC to power sub-stations. In the case of a power failure, a built-in backup generator feeds a stack of batteries which then provide electricity to all vital systems.





Traffic Management System.





Signallers Work Desk

Traffic Control -
ILTIS

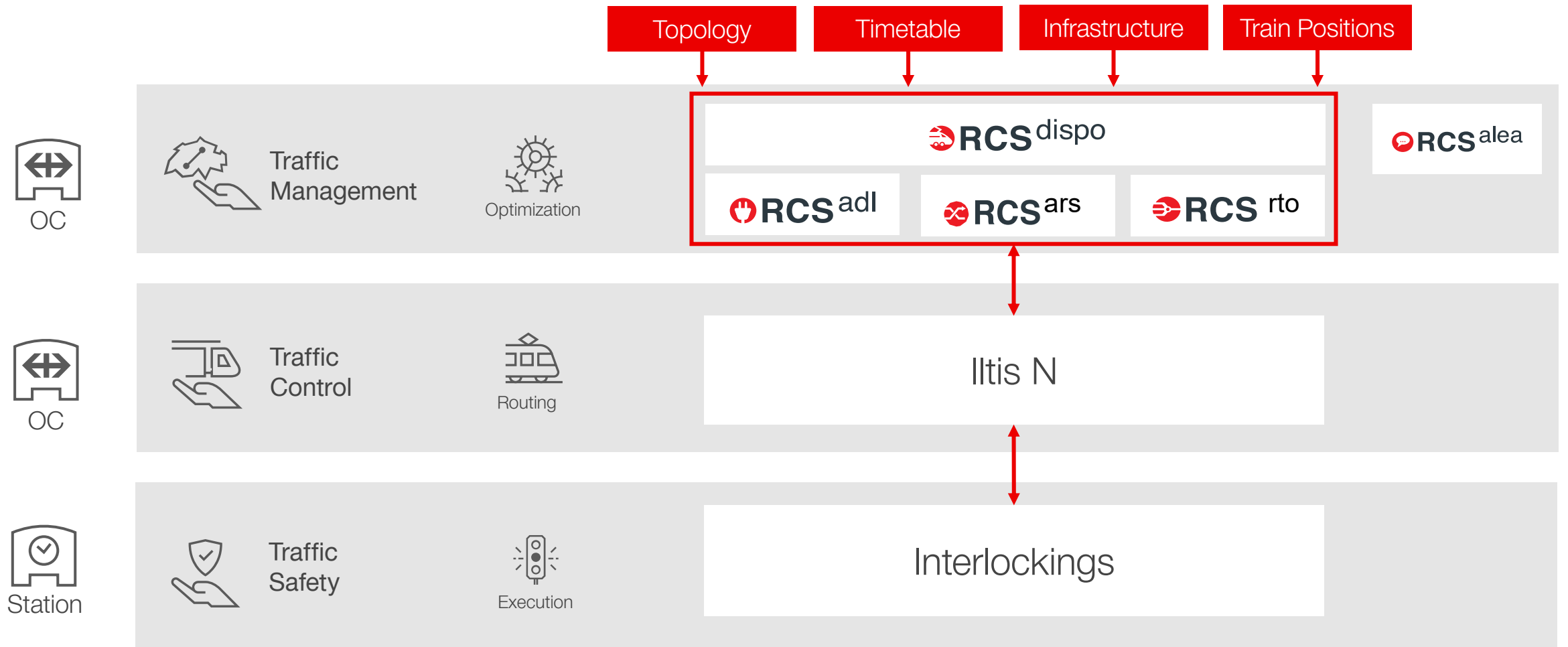
This workstation is dedicated to Traffic Control (ILTIS). It consists of a grid of nine monitors. The top-left monitor shows a detailed track diagram with various colored lines representing different routes. The other monitors display various data feeds, including status indicators, signal states, and possibly real-time train positions. A tablet is positioned on the desk in front of the monitors, displaying a grid of blue buttons or indicators.

Traffic Management
RCS (Dispo, Alea, ...)

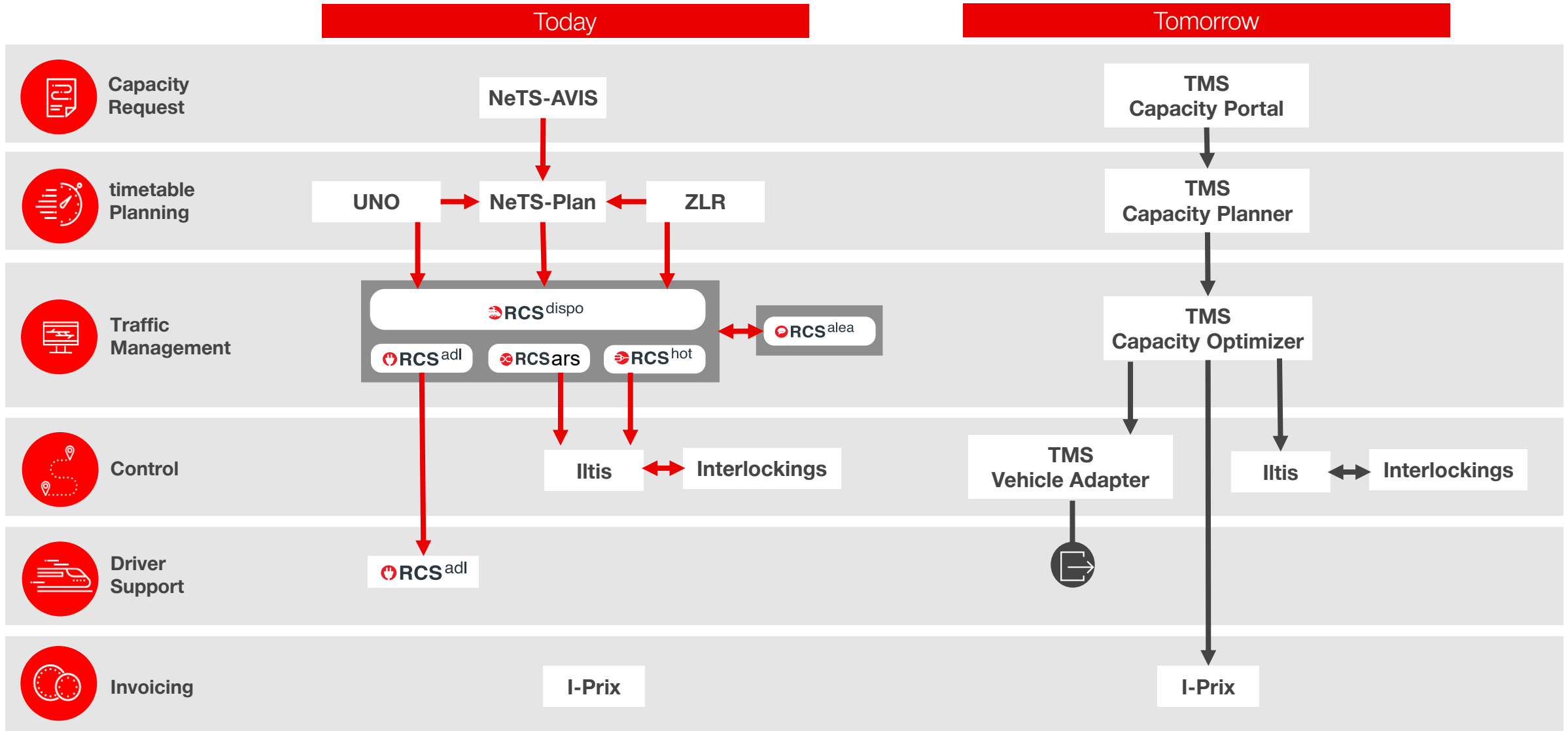
This workstation is dedicated to Traffic Management (RCS). It features a grid of four monitors. The top-left monitor shows a network diagram with a central clock face. The top-right monitor displays a large table with multiple columns and rows of data. The bottom-left monitor shows a complex network diagram with many nodes and connections. The bottom-right monitor displays another table or data visualization. A keyboard and a mouse are on the desk in front of the monitors.



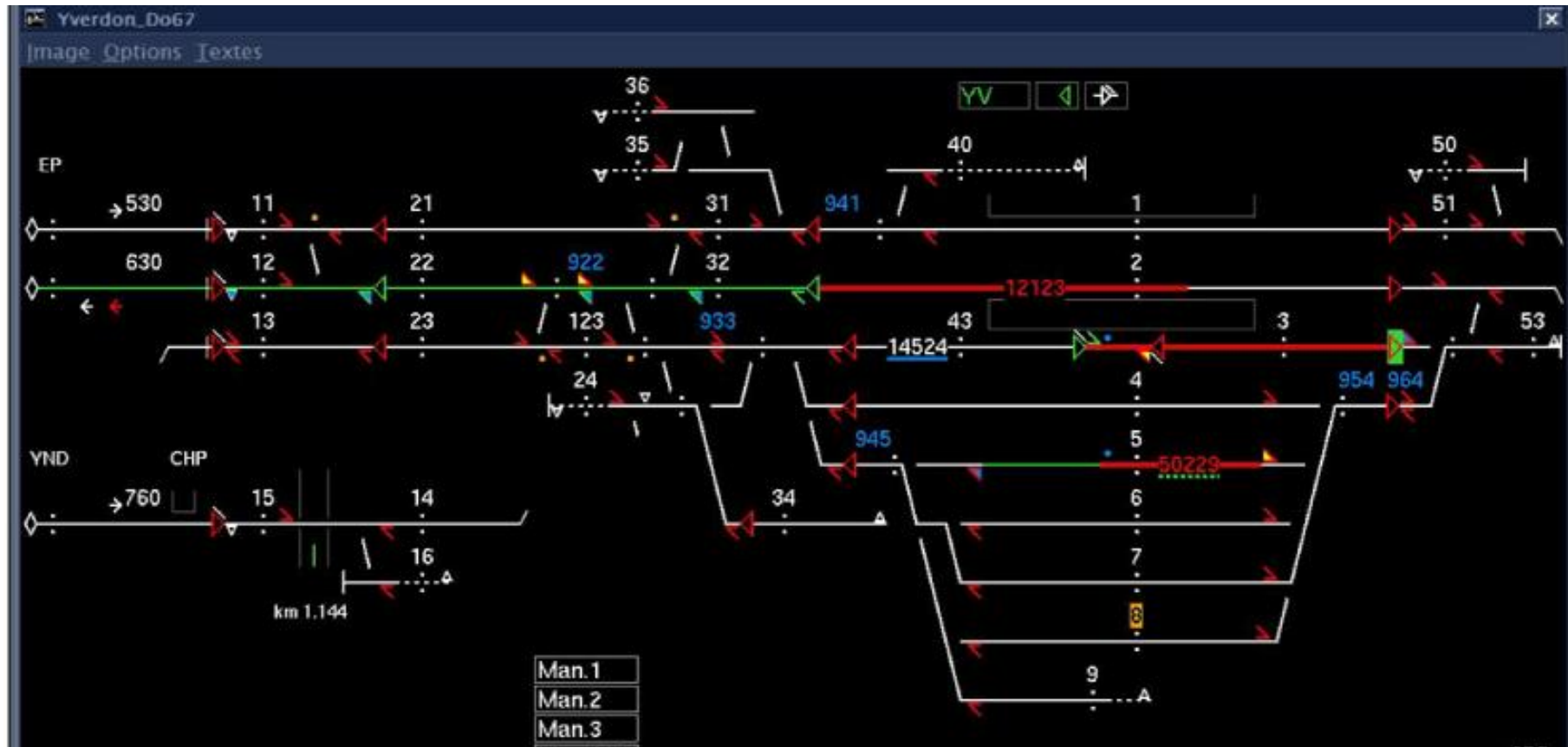
The 3-layer Swiss Traffic Control System of Today.



SBB's Traffic Management System Today and Tomorrow.



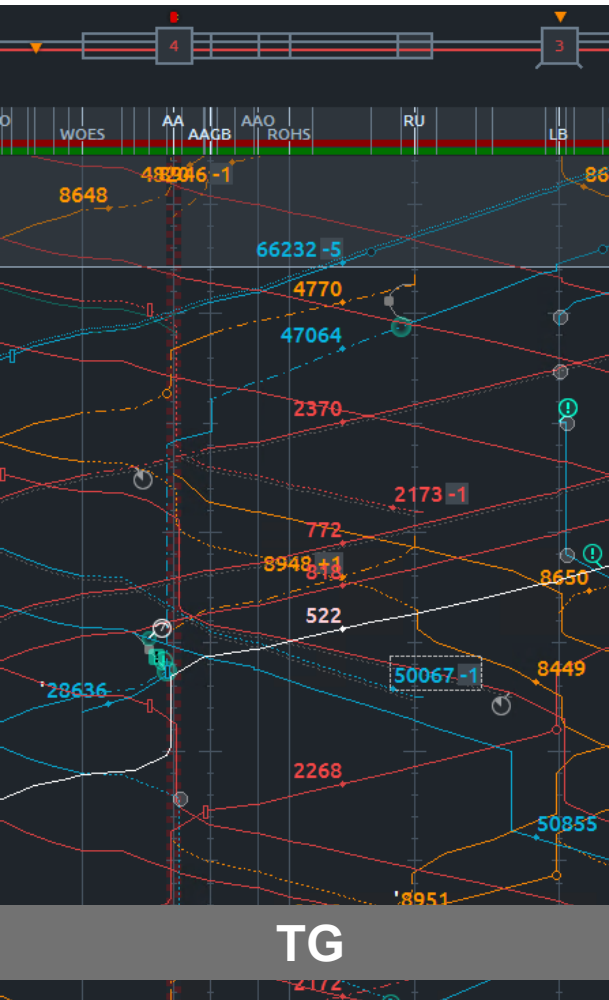
Traffic Control Tools: Signalling system (ILTIS).



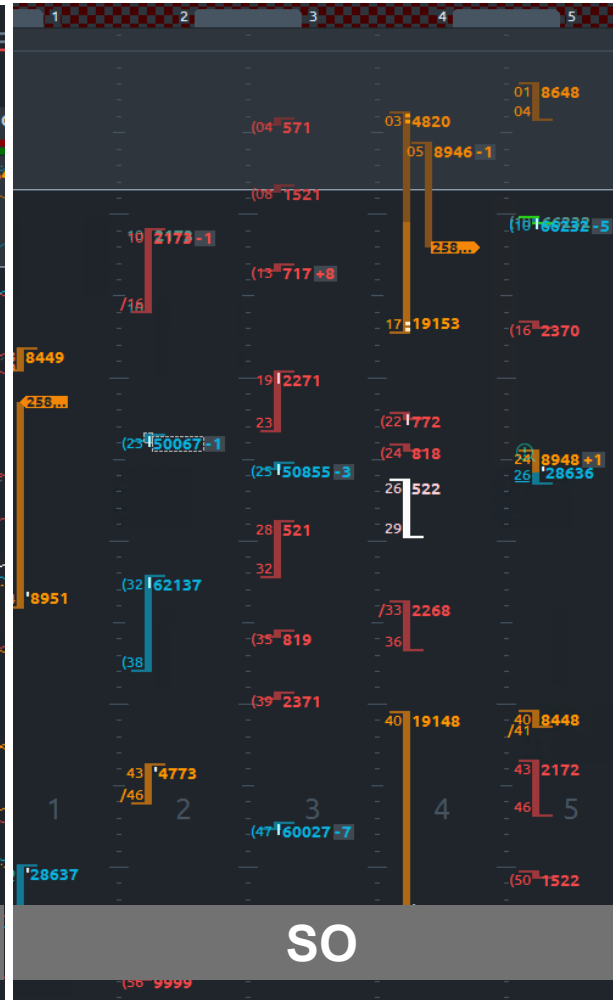
- The signalling system controls signals and points automatically and correctly for all trains based on pre-programmed train routing data.



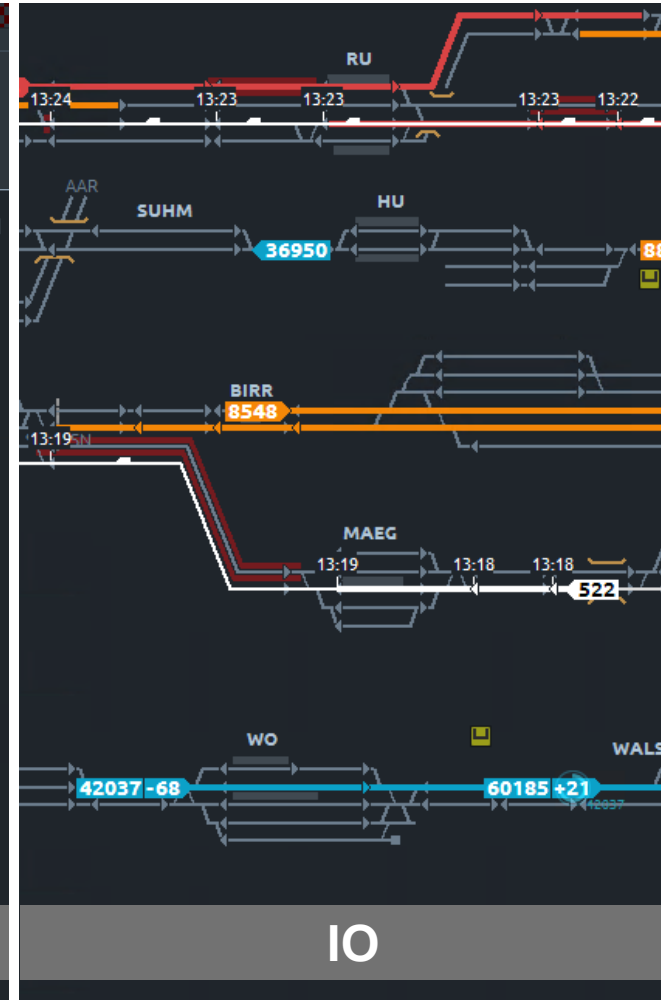
SBB Rail Control System : One System – Lot of Tasks.



TG
Traffic Management



SO
HUB Planning



IO
Infrastructure Overview



CM
Connection Management



RCS ALEA: The Tool for Communications Between All Partners.

The screenshot displays the RCS-ALEA software interface. The main window is titled 'Recherche de cas' and shows a list of train incidents with columns for 'Lieu', 'Train', 'Evénement', 'N° ErZu', 'Créé', and 'Modifié'. Below this, there is a 'Mesures' section with a table of measurements and a 'Messages' section with a list of communication messages.

Lieu	Train	Evénement	N° ErZu	Créé	Modifié
GA	61236	Difficultés d'acceptation - Annahme Siders	1817972	09:11	09:53
SIE	68740	Préparation train - Attente données CIS	1817972	09:23	09:58
GEPR	11033	Dérangement véhicule - Reset	1817971	09:23	09:39
SM	6111	Dérangement à l'enclenchement - Travaux, dgt isolation	1817969	09:25	09:38
FR	40234	Disposition personnel - Pause Lf	1817965	06:58	09:55
BS	1063	Dérangement véhicule	1817959	08:32	09:22
BI	1613	Dérangement véhicule - ne peut pas crocher	1817951	08:26	10:07
MELH	193	Dérangement véhicule	1817948	08:42	09:19
BDF	16625	Dérangement véhicule - Luftverlust	1817944	08:18	08:36
BR	50782	En retard - Manöverrückstand	1817938	06:25	08:16
BR	40126	Divers - keine Fahrbereitschaft	1817919	08:43	09:13
VI	1708	Dérangement véhicule	1817916	07:05	08:49
LZ-BN	2508	Intempéries - Adhäsion	1817892	06:39	08:31
SM	64102	Retard antérieur - du 60704		05:18	08:34

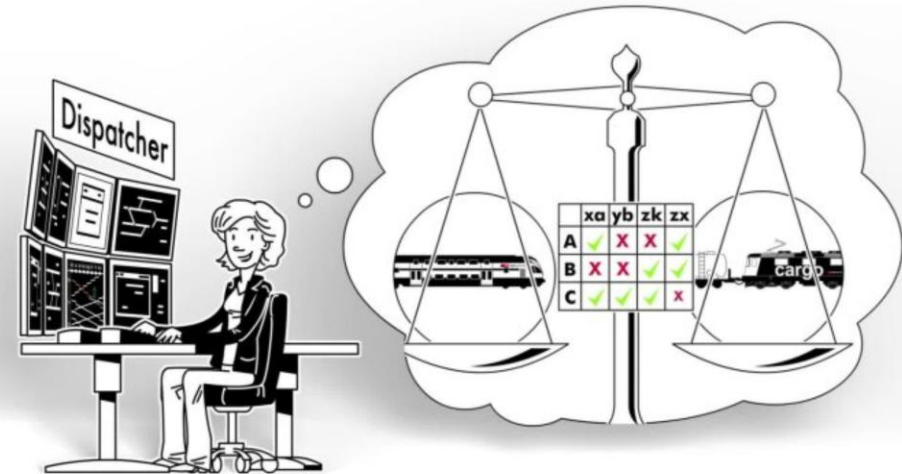
Train	Mesure	Lieu	Description	Remarque	He...rt	Fin	LS	OL	Méc.	AT
1616	Autre mesure	BS	En retard	+1'	10:03	10:03				
Q 1613	Modification de roulement	BS	utilisé pour Q 1630	ICN 500 013: ...Q1613 nach E10 für Q1630... ICN 500 023: ...T1613 auf 1616...	09:53	09:53				
T 1613	Modification de roulement	BS	utilisé pour 1616	ICN 500 023: ...T1613 auf 1616... ICN 500 013: ...Q1613 nach E10 für Q1630...	09:53	09:53				
7615	Autre mesure	BI-SO	En retard	+7'	08:54	09:21				
1613	Autre mesure	BI-DMT	En retard	+5'	08:49	09:23				

Message	Lieu, domaine	Train	Emetteur	Heu...on
Gem. ZP WR im Q ist Offen, WR im T geschlossen.		1613	OCP Koo Zug West	08:57
em. ZP Q bereit ausgebucht, T noch freie Plätze		1613	OCP Koo Zug West	08:55
train parti de BI			CE Ouest - RTF Jura	08:54
manoeuvre toujours en cours. Retard au départ à prévoir			CE Ouest - RTF Jura	08:49
gem ZP ist erst 1 ICN am Perron		1613	OCP Koo Zug Mitte	08:44
Gem. Lf an Helpdesk - Versuch umgekehrt zu kuppeln.	BI	1613	OCP Dispatcher Mitte	08:33
Frequenz gem. Plabe: BI-DMT 60/230 DMT-BS 70/260		1613	OCP Spezialist Kunden West	08:29
Keine Gruppen / Handicap bekannt.		1613	OCP Spezialist Kunden West	08:28
méc annonce un dérangement d'attelage côté NE. Ne peut pas crocher la 2e rame.			CE Ouest - RTF Jura	08:26

Adaptive Regulation (ADL).



FR



EN



Railway Production.



Our Goals.



Guarantee a safe railway traffic.



Provide punctual trains.



Ensure customer information.

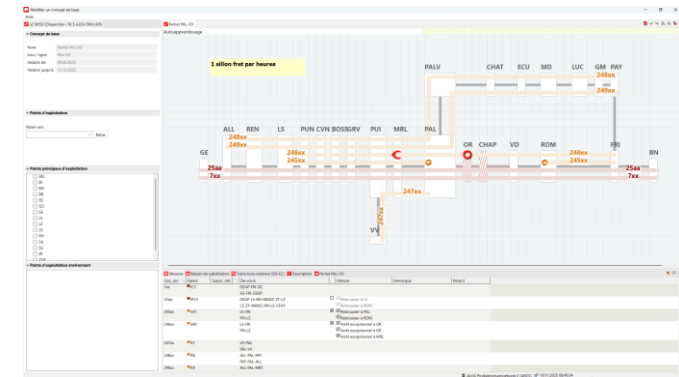
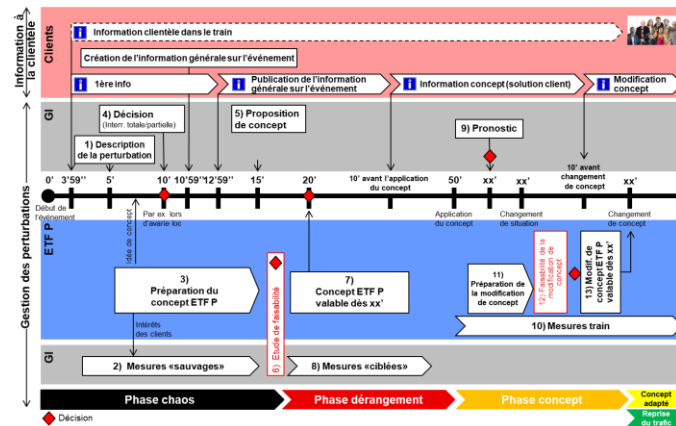


From Timetable to Performance Analysis



Incident Management.

We handle more than 500 incidents per day, being transparent with our customers.



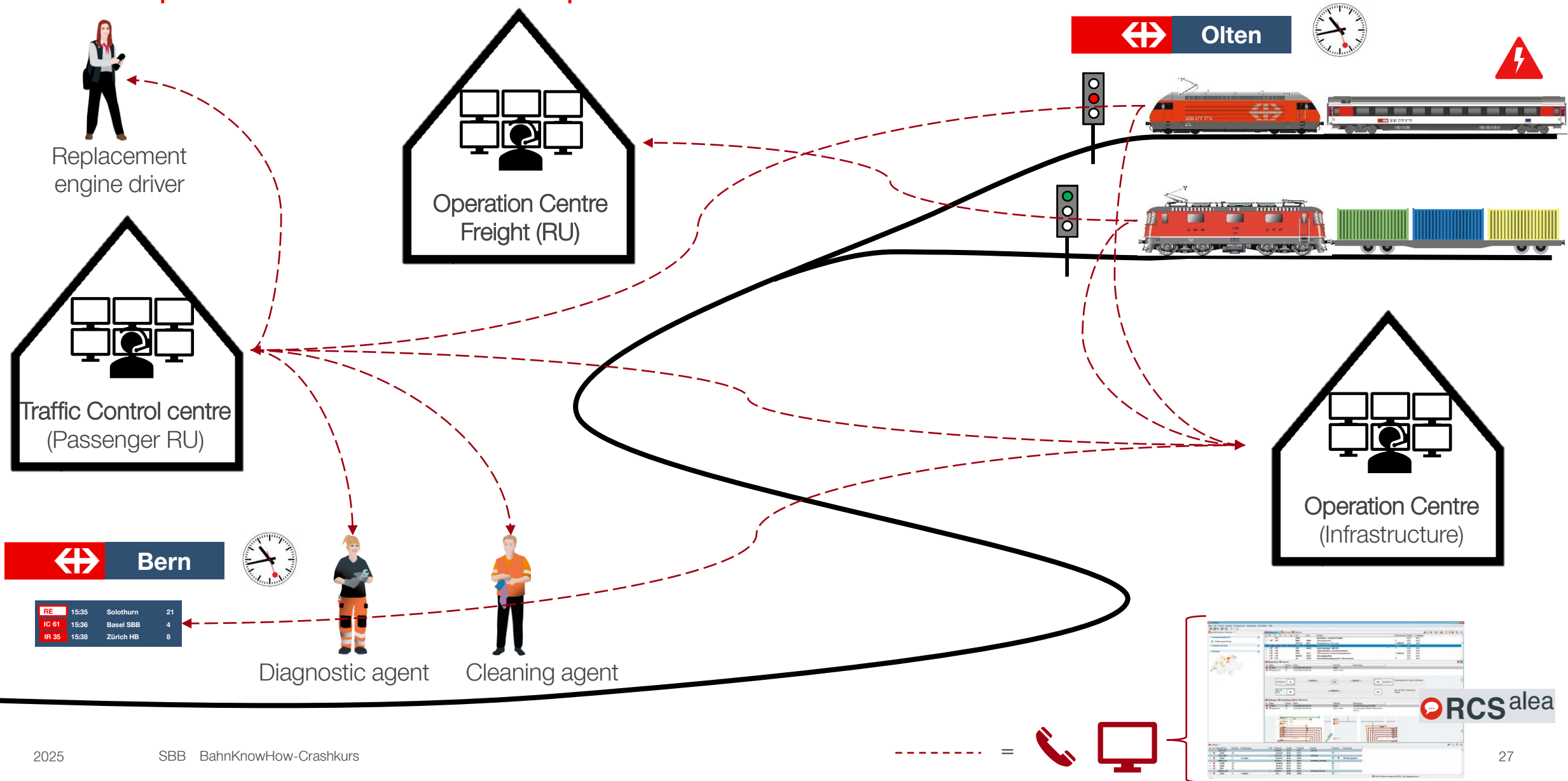
- The main role of the operation centre is to minimise the consequences of operational hazards.
- Incident affected trains are separated to maintain a stable remaining network.

- For major disruptions, a clear process is set with milestones for the work of all actors among the railway production.
- Other milestones to achieve are defined in terms of customer information.

- In order to achieve these ambitious milestones, 655 interruption concepts are prepared and available at any moment.
- These concepts are adapted at every timetable change or in case of construction works or events.



A Simple Overview on Impacts.





IR 15 08:27 env. +4'
Genève-Aéroport
✈

Romont FR
Palézieux
Lausanne
Genève

A	B	C	D	E	F	G	H
1	2	3	4	5	6	7	17 18 19 20

Icons: wheelchair, stroller, bicycle, etc.



D 2

C 2



Travellers Information.



Travellers Information.

Google



Big Data



Seeking for the best alternative solution.



The Railway Undertaking (RU) is in charge for the voice announcements on board of the train.

The Infrastructure Manager (IM) is in charge for the voice announcements at the stations.



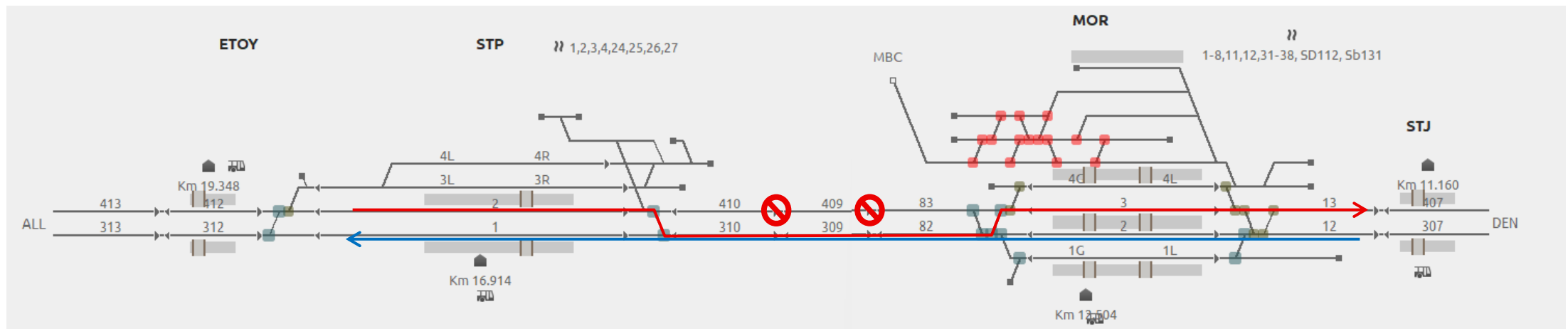


Case Study.



Incident Lausanne – Geneva.

- The main track sections 409 and 410 between St-Prex and Morges are no longer available.
- Your job is to define an operating concept based on the timetable shown on the following slide.
- An operational concept (without measures to be taken) is available to help you.
- Please explain your choices keeping in mind the aspects of transport capacity and network stability.
- A matrix with the train numbers, the passenger frequency and the line numbers is available. Observe the station-stopping/calling policy ;-).



Incident Lausanne – Geneva.

Train number	Line number	Route	Passenger frequency
7xx	IC1	Genève-Aéroport – St. Gallen	1500 PAX
25xx	IR15	Genève-Aéroport – Luzern	800 PAX
17xx	IR95	Genève-Aéroport – Brig	1200 PAX
18xx	IR90	Genève-Aéroport – Brig	1200 PAX
184xx/184yy	RE33	Martigny/St-Maurice - Annemasse	1300 PAX
248xx	R8	Allaman – Payerne	300 PAX
249xx	R9	Allaman – Murten/Morat	300 PAX
«Blue» train paths	---	Freight trains or empty rolling stock transfer	0 PAX



Incident Lausanne – Geneva.

