

Real-time information & ETA

Workshop on Best Practice and Ongoing Developments



HaCon Ingenieurgesellschaft mbH

Hannover, Paris, London, Berlin, Brüssel, New York

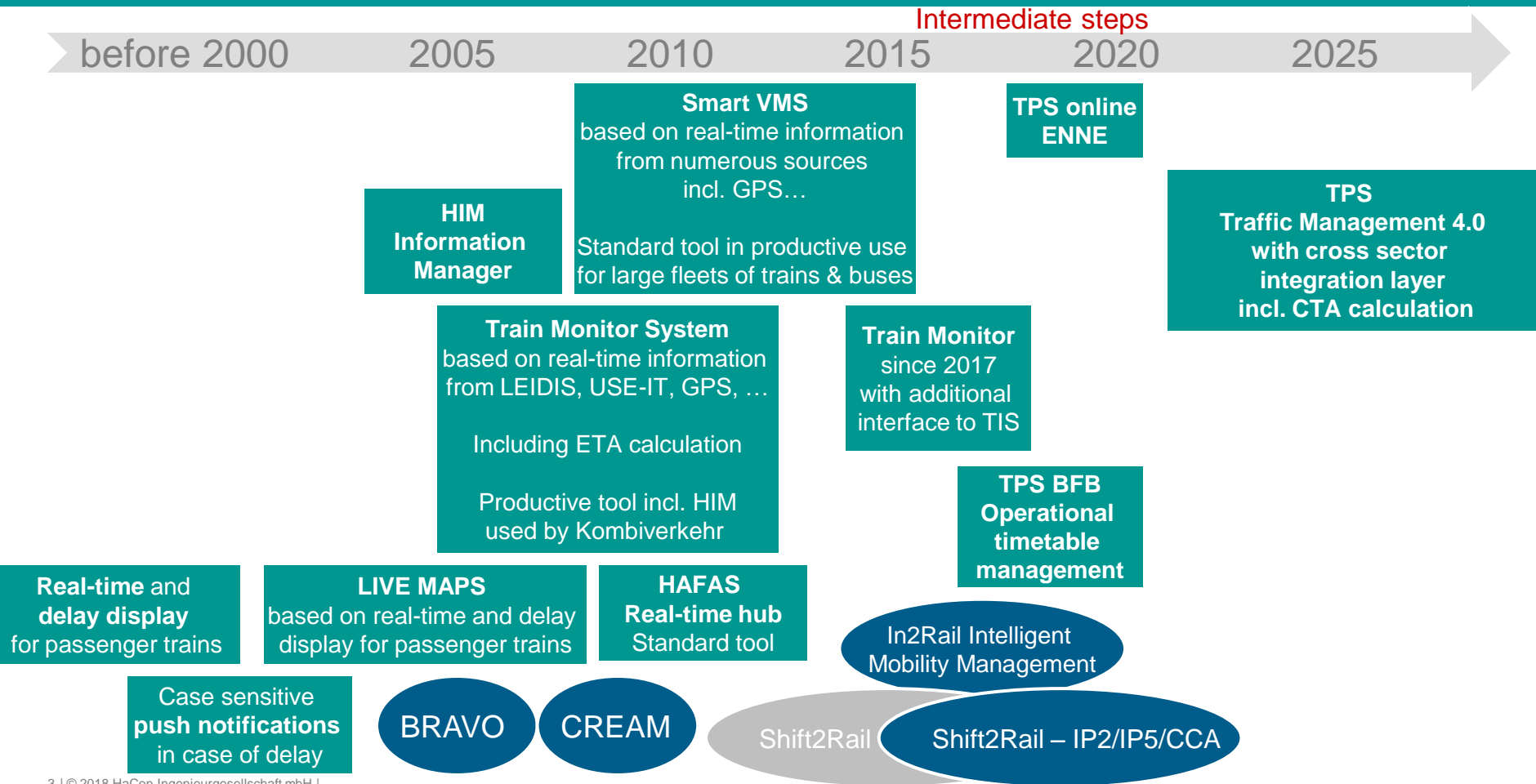
Content:

**1. Real-time & ETA
History → Future**

**2. Background information
Overview of relevant systems
and data sources**

3. Outlook (medium & long term)

1. Real-time & ETA History → Future



Content:

1. Real-time & ETA
History ⇒ Future

2. Background information
Overview of relevant systems
and data sources

3. Outlook (medium&long term)



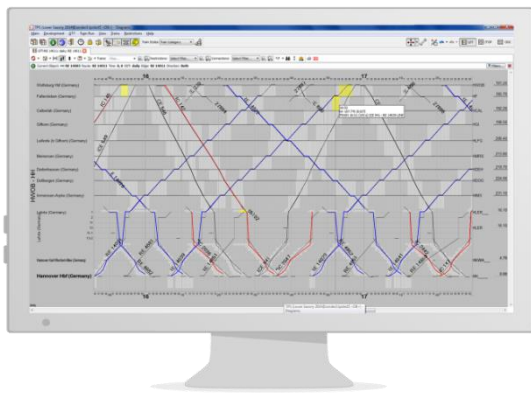
Traffic • Software • Service

Consulting	Software for timetables and mobility			Ticketing
IT and Projects Transport and Traffic	Train Planning System TPS	Timetable Management TPS Integrator, HIM, Smart VMS, RT Hub, xModeServer	Timetable Information HAFAS	EOS UPTRADE Bytemark
Intermodal Systems	Network Capacity and Construction Management	Integration and Maintenance Management	Information Management	Ticketing Management

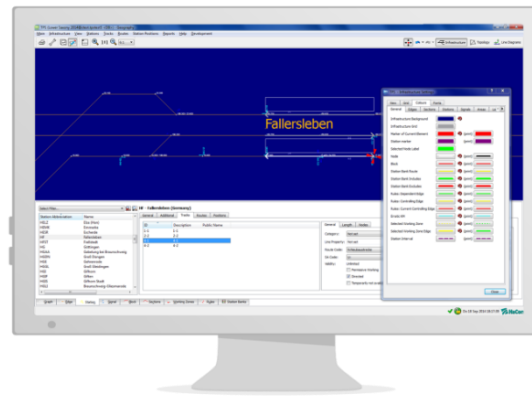
Since 2017 part of the Siemens Mobility Management family

.... leading the Business Division “Innovative Mobility Solutions”

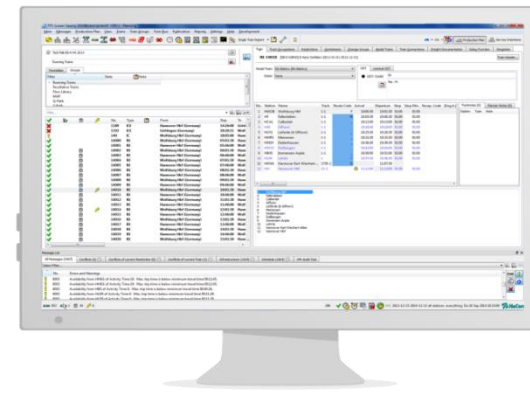
Graphical Editor



Infrastructure Editor



Timetable Editor

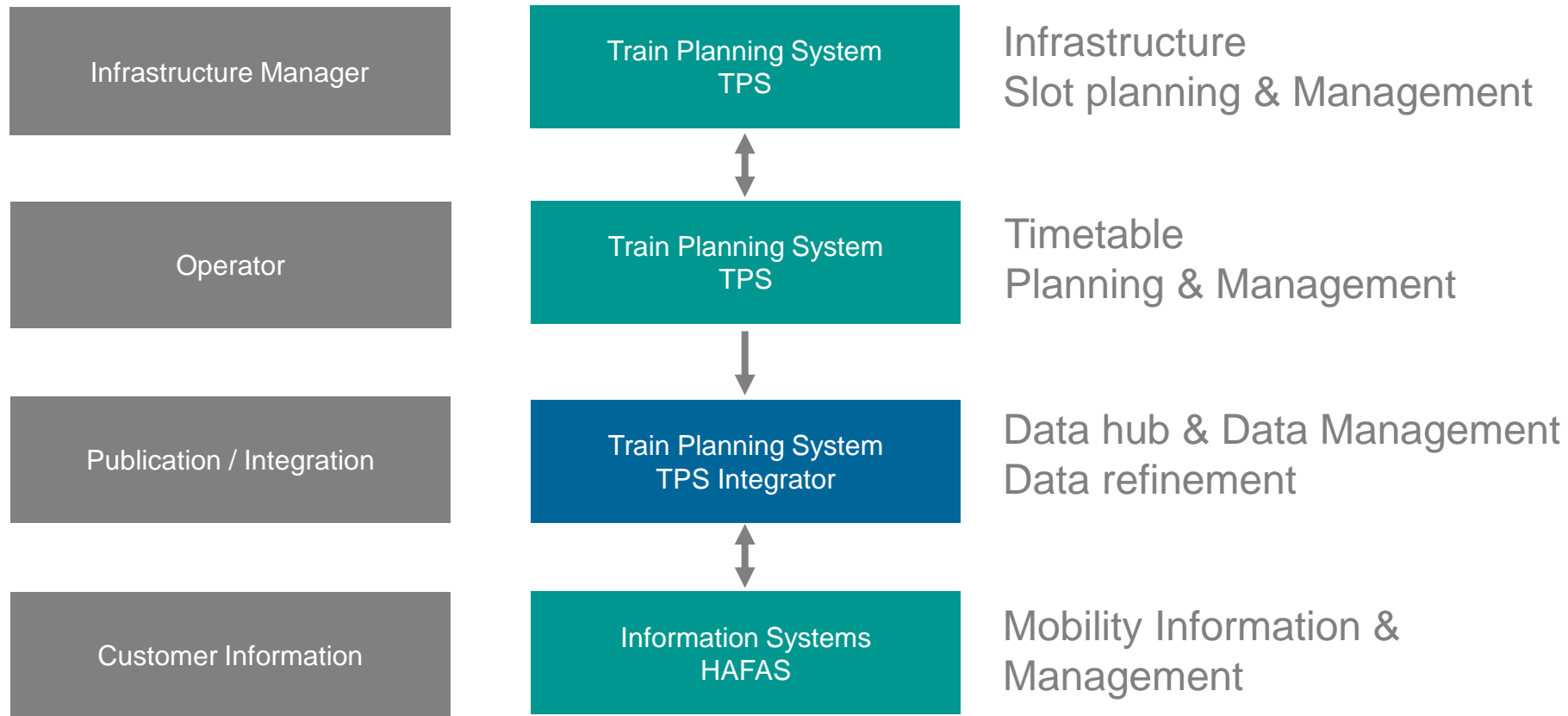


Customers



Features

- ❖ Multi-user system focused on train and capacity planning for railway networks
- ❖ Multi-screen support
- ❖ Oracle database for data management
- ❖ Suite of specialized applications and services
- ❖ Mature COTS product with high degree of integration and customization capabilities



Planned Information



up to once a day/week

long-term

Mo	Tu	We	Th	Fr	Sa	Su
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

TPS Integrator

Disruption Information



mid-term



HAFAS Information Manager HIM

Real-time Information



up to 120 minutes

short-term



HAFAS Real-time Hub



**Data needs to be integrated
and managed...**

Modular HAFAS Architecture

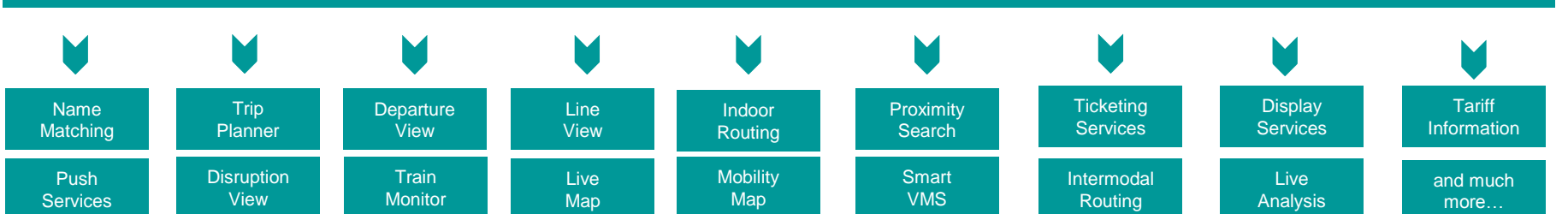
Content



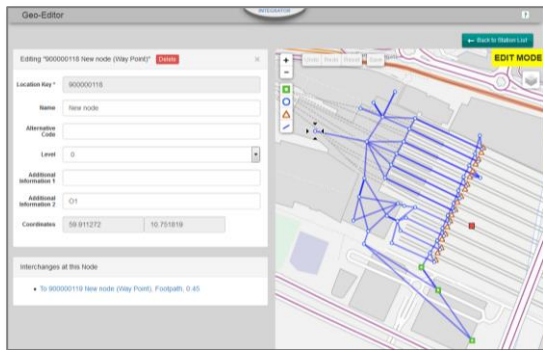
Integration



Services

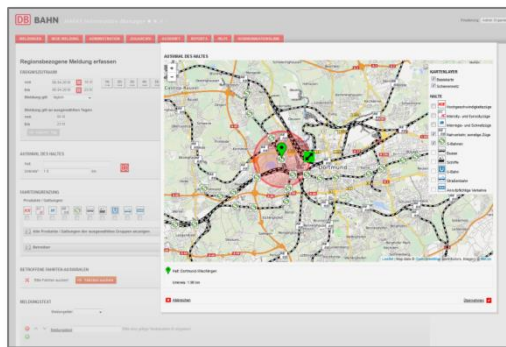


TPS Integrator



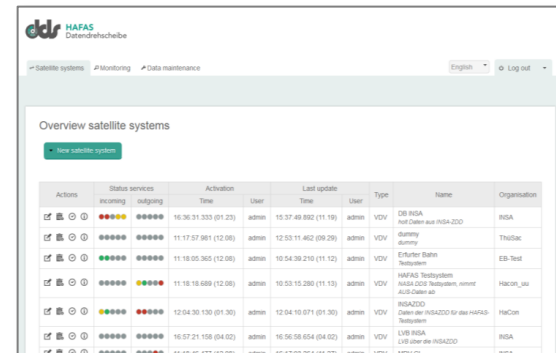
- Integration and harmonization
- Content from multiple sources
- Washing of “planned” timetables
- Adding data

HAFAS Information Manager HIM



- Editing disruption messages
- Rule-based service alerts
- Customer information
- Adding real-time content

HAFAS Real-time Hub



- Real-time message management
- Content from multiple sources
- Washing of “real-time” timetables
- Matching delays with other sources

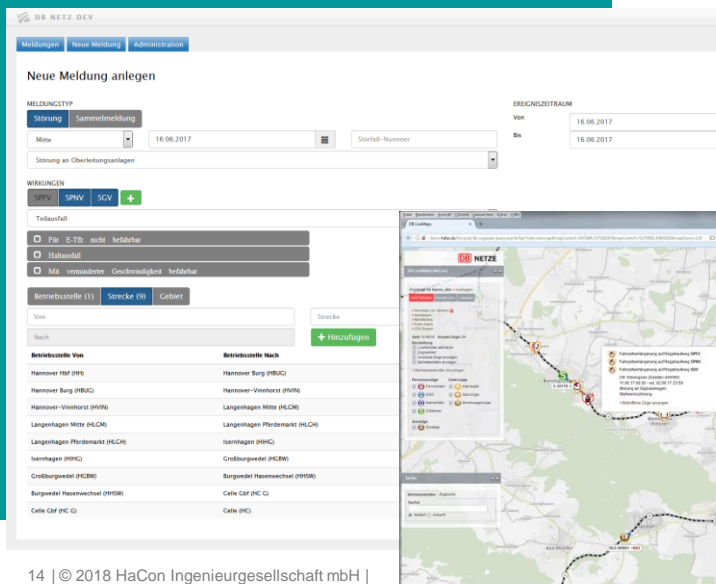
Connected with HAFAS solutions and HAFAS Driver



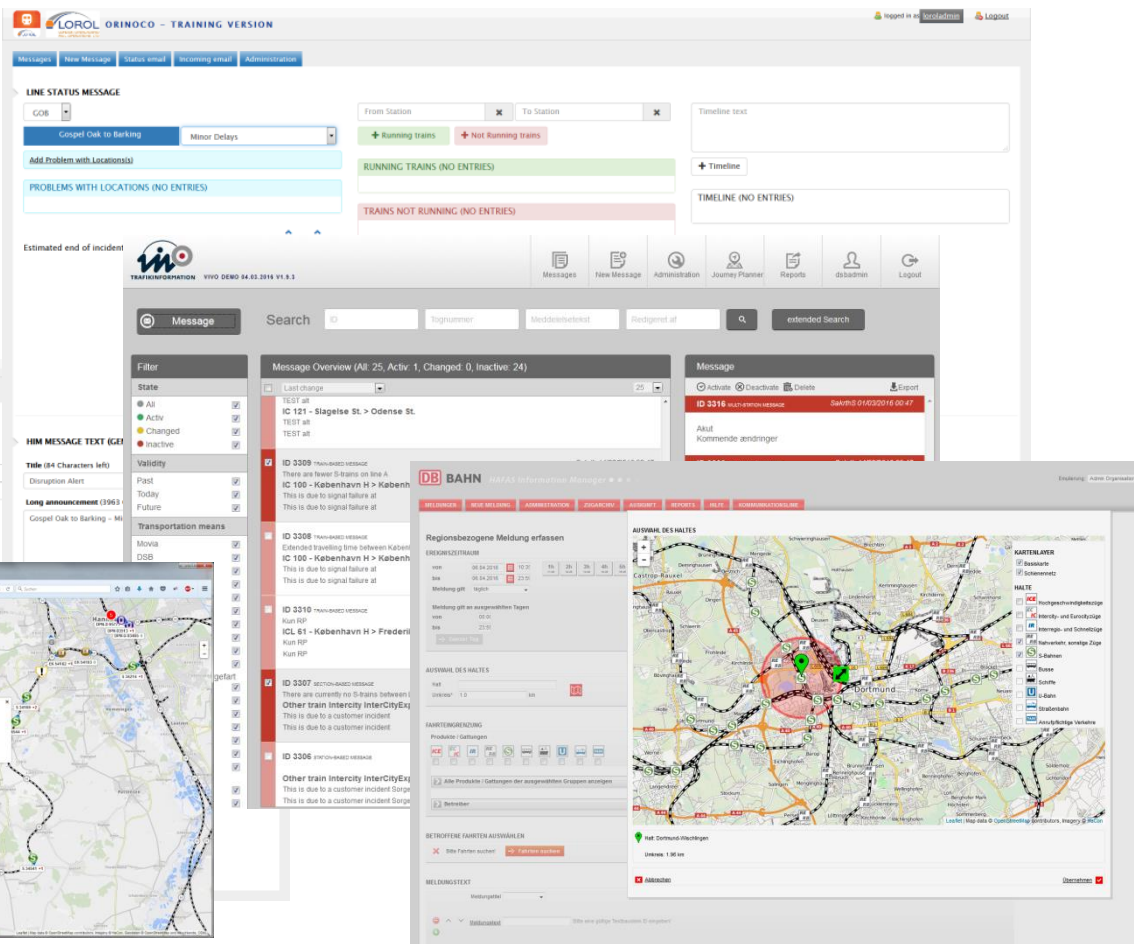
HAFAS Information Manager HIM

HAFAS Information Manager (HIM) profile

- Rule based content management system for disruption messages & more
- ~30 customers like DB Netz, DB, ÖBB, SBB, NS, SNCB, CFL, adif, Kombiverkehr, ...



The screenshot shows the 'Neue Meldung anlegen' (Create new message) form in the DB Netz HAFAS HIM. It includes fields for 'Meldungstyp' (Message type) with a dropdown menu, 'Ereigniszeitraum' (Event period) with 'Von' and 'Bis' date pickers, and 'Wirkungen' (Effects) with checkboxes for 'E-TÖ nicht befahrbar', 'Haltezeit', and 'Maßnahmen'. There are also sections for 'Betriebsstelle (1)', 'Strecke (0)', and 'Gebiet'. A map of the region is visible in the background.



The screenshot displays the HAFAS Information Manager (HIM) interface. At the top, it shows 'LOROL ORINOCO - TRAINING VERSION' and navigation tabs for 'Messages', 'New Message', 'Status email', 'Outgoing email', and 'Administration'. The main area is divided into sections for 'LINE STATUS MESSAGE' (with filters for 'GDB', 'Running trains', and 'Trains not running'), 'PROBLEMS WITH LOCATIONS', and 'Estimated end of incident'. A search bar and filter options are visible. The 'Message Overview' shows a list of messages with columns for 'Last change', 'State', and 'Validity'. A detailed view of a message (ID 3316) is shown, including its title, description, and location. A map of the region is also visible, showing the location of the incident.

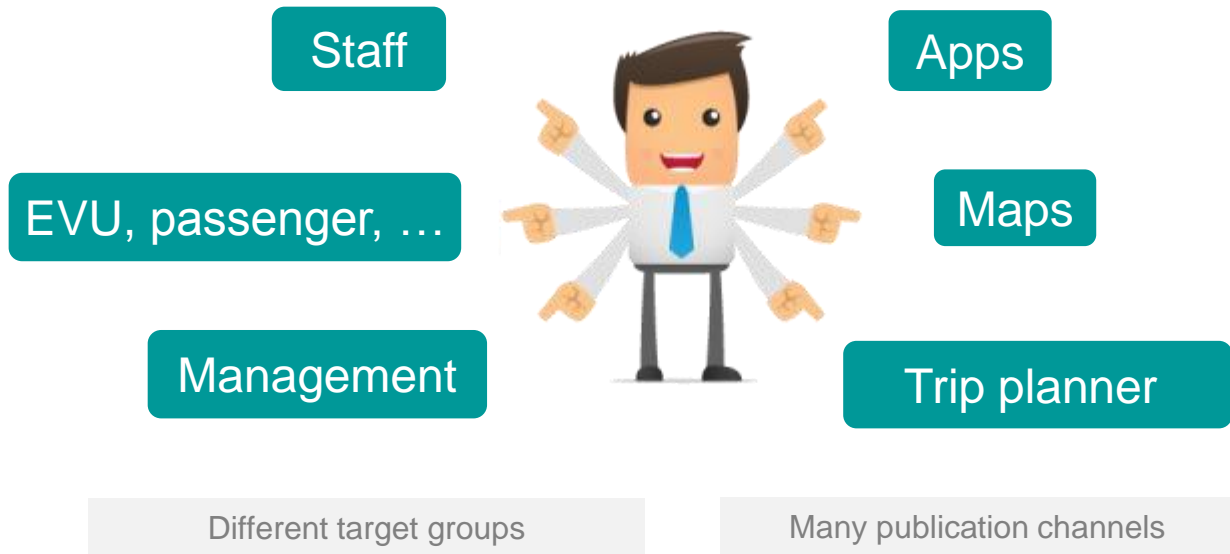


Cloud-based application



Manage information

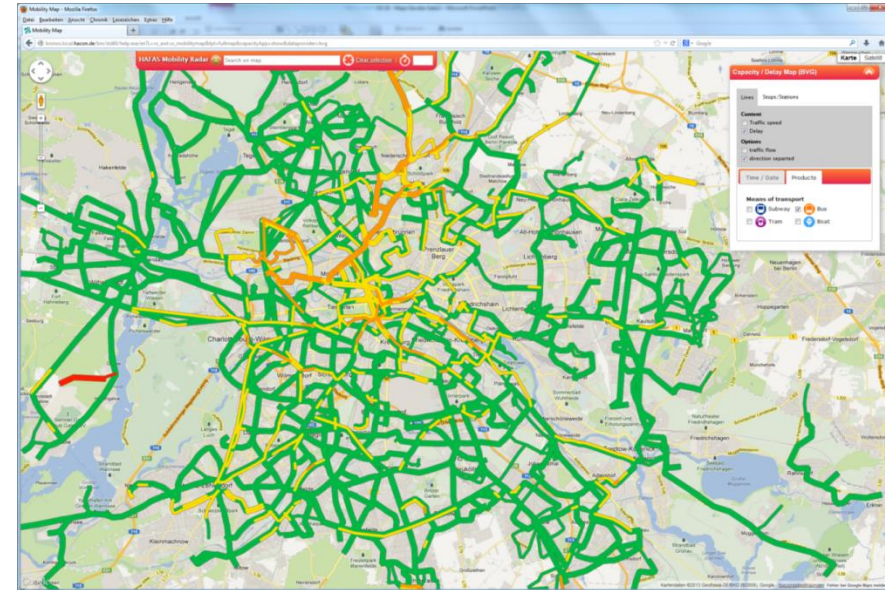
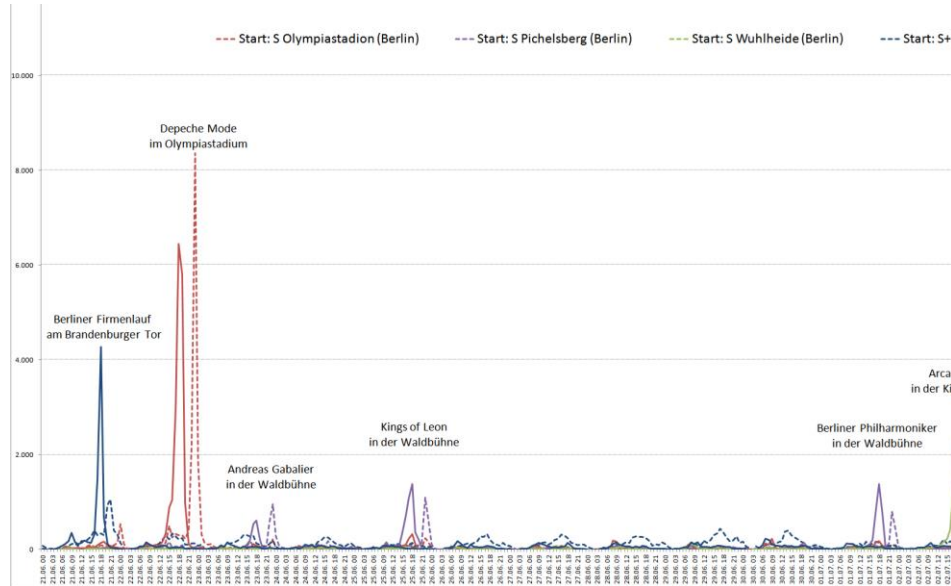
Distribute information





Big data

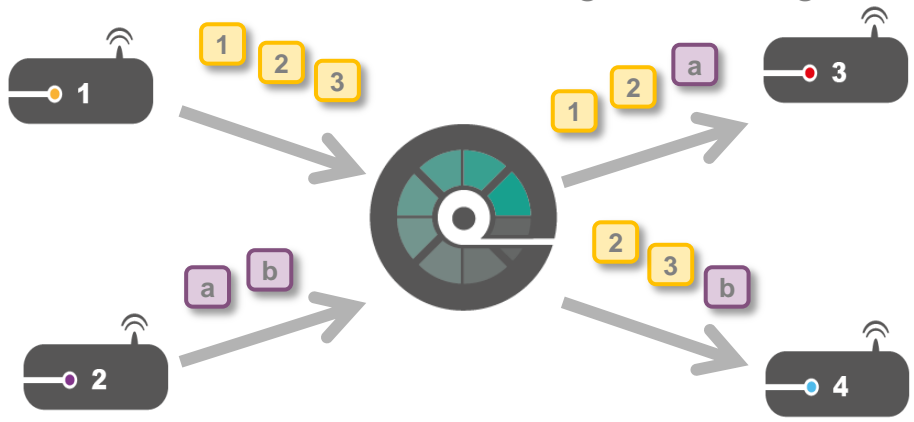
- Use your digital gold for building better networks and improve services
- Strong applications/Apps can help to keep your data
- Examples: Event detection Berlin, HAFAS Mobility Radar (Capacity/Delay)





HAFAS Real-time Hub

- Import and export of real-time information
- Control on data flow (multi-client / multi-user)
- Data washing, combining and enhancing
- Web-based configuration
- No limitation of connected satellite systems with totally different data structure and content (normally around 30 systems connected / several millions of messages exchanged daily)



ddr HAFAS Datendrehscheibe

Satellite systems | Monitoring | Data maintenance | English | Log out

Overview satellite systems

[New satellite system](#)

Actions	Status services		Activation		Last update		User	Type	Name	Organisation
	incoming	outgoing	Time	User	Time	User				
	● ● ● ●	● ● ● ●	16:36:31.333 (01.23)	admin	15:37:49.892 (11.10)	admin	VDV	DB INSA Hot Daten aus INSA-ZDD	INSA	
	● ● ● ●	● ● ● ●	11:17:57.981 (12.08)	admin	12:53:11.462 (09.29)	admin	VDV	dummy dummy	ThoSac	
	● ● ● ●	● ● ● ●	11:18:05.365 (12.08)	admin	10:54:39.210 (11.12)	admin	VDV	Erfurter Bahn Testsystem	EB-Test	
	● ● ● ●	● ● ● ●	11:18:16.689 (12.08)	admin	10:53:15.280 (11.13)	admin	VDV	HAFAS Testsystem INSA-ZDD Testsystem, nennt AUS-Daten ab	Hacon_sau	
	● ● ● ●	● ● ● ●	12:04:30.130 (01.30)	admin	12:04:10.071 (01.30)	admin	VDV	INSAZDD Daten der INSAZDD für das HAFAS- Testsystem	HaCon	
	● ● ● ●	● ● ● ●	16:57:21.158 (04.02)	admin	16:56:58.654 (04.02)	admin	VDV	LVB INSA LVB über die INSAZDD	INSA	
	● ● ● ●	● ● ● ●	11:18:40.877 (15.08)	admin	10:17:05.504 (11.37)	admin	LVB	INSA	INSA	

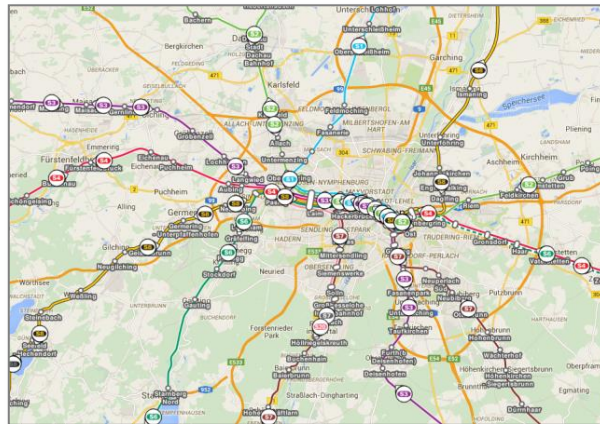
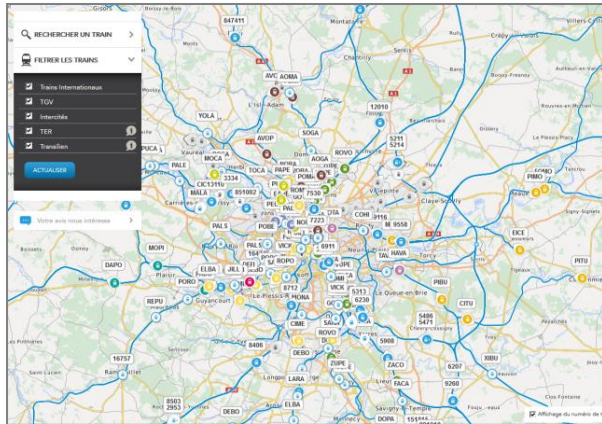
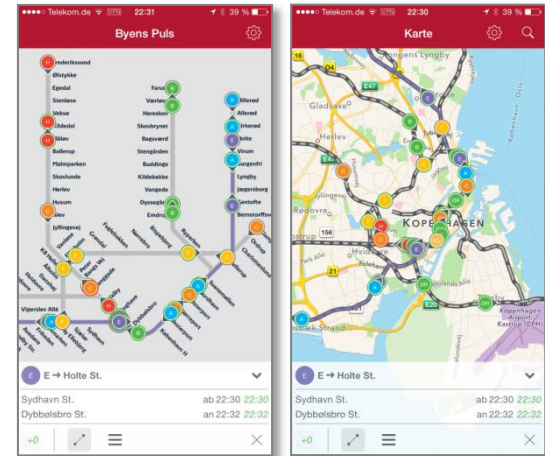
Customers



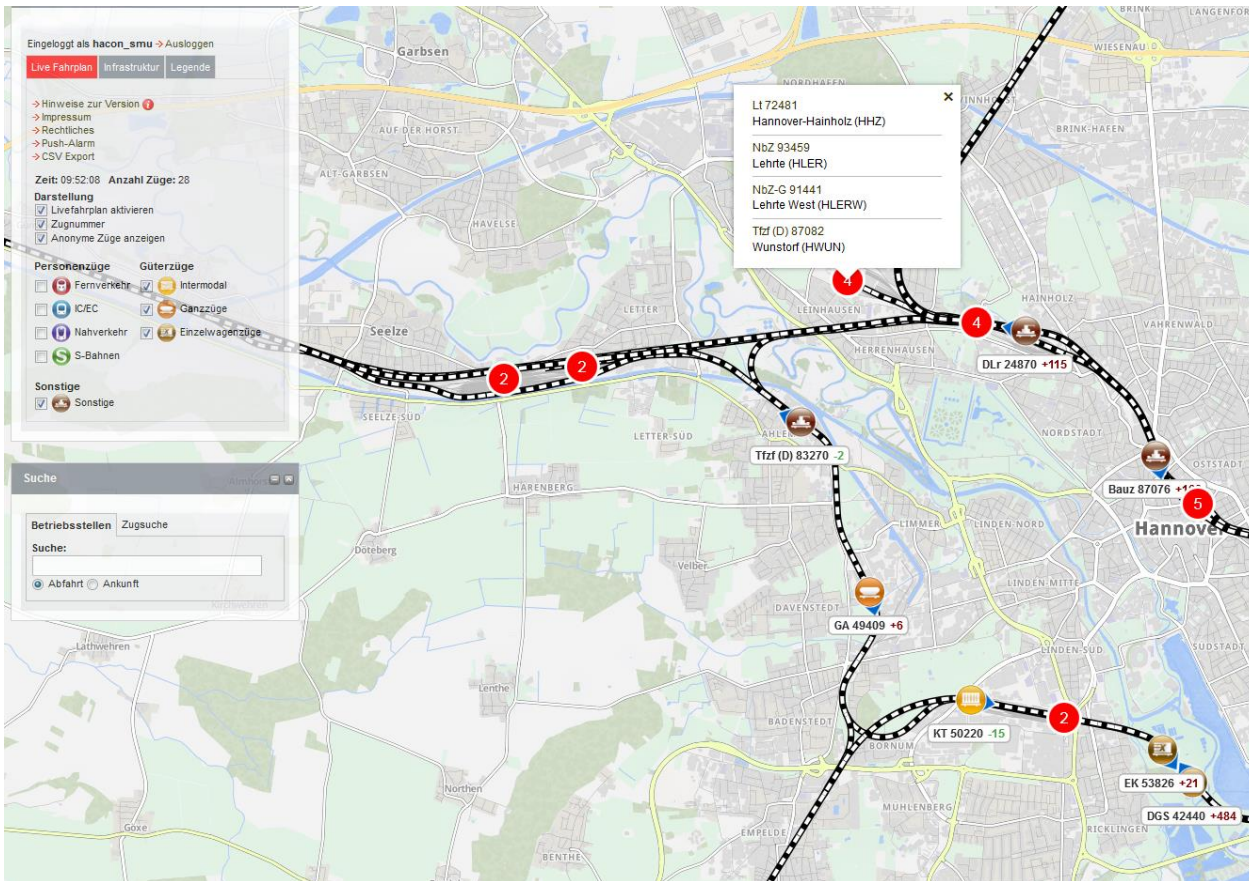
Live maps ...

Specific Services: HAFAS Maps with Animated Vehicle Positions

- public transport map
- animation of public transport vehicle positions
- for end customers and staff
- emotional access to timetables
- popular at DB, SNCF, ÖBB, SBB, DSB, ...
- popular in cities with all modes, e.g. BVG Berlin



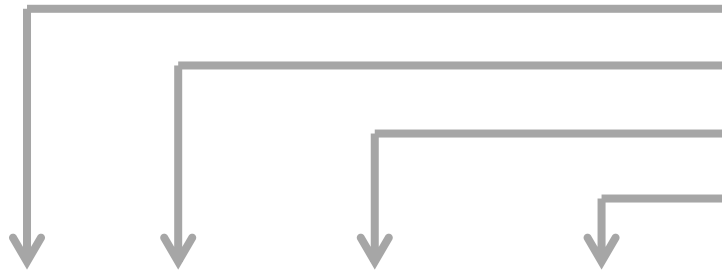
Example: DB Netz (IM) → DB Live Maps (“Zugradar”)



- Real-time operational data via LEIDIS interface
- Real-time data via HIM
- Integration of freight train data



Pushing real-time information ...



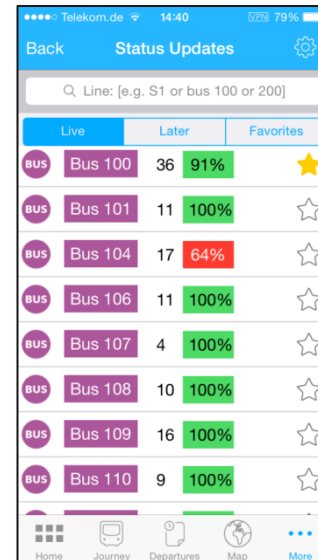
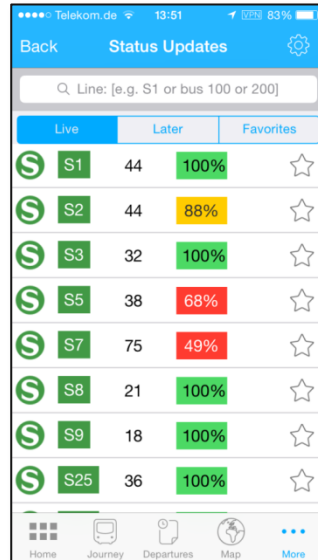
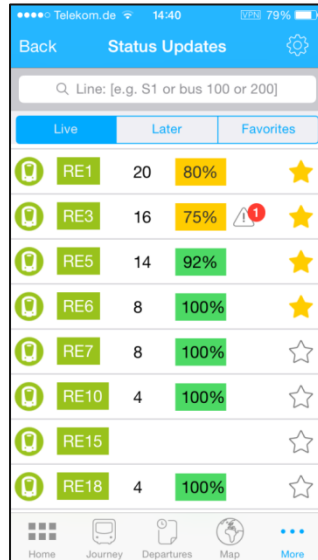
Line
trips now
Delay status
Disruptions? (HIM & more)

Linie	Fahrten bis 10 Min.	Störungen
Stammstrecke	16 88.0%	
S1	10 60.0%	! 1
S2	10 70.0%	
S3	7 100.0%	
S4	9 90.0%	! 1

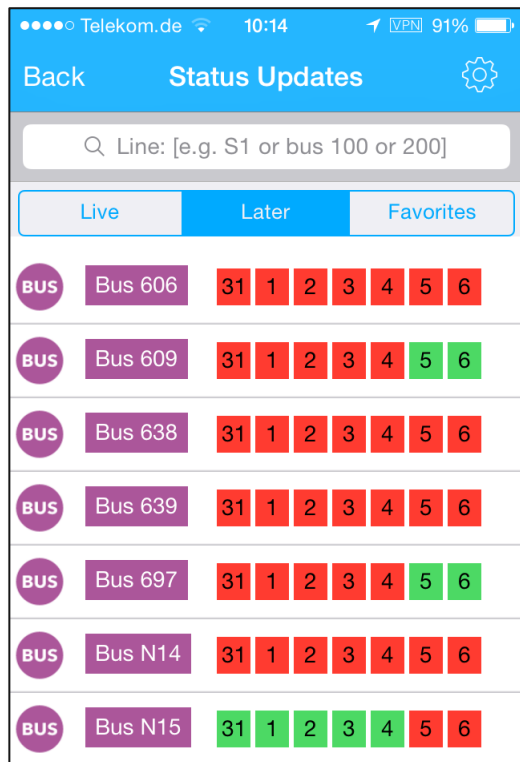
Good Trains **|||| IIII**
Bad Trains **||**
81%



- Status for real-time situation
- Status for disruptions now (HIM messages)
- Status for disruptions in the future (HIM messages)



Calendar of disruptions



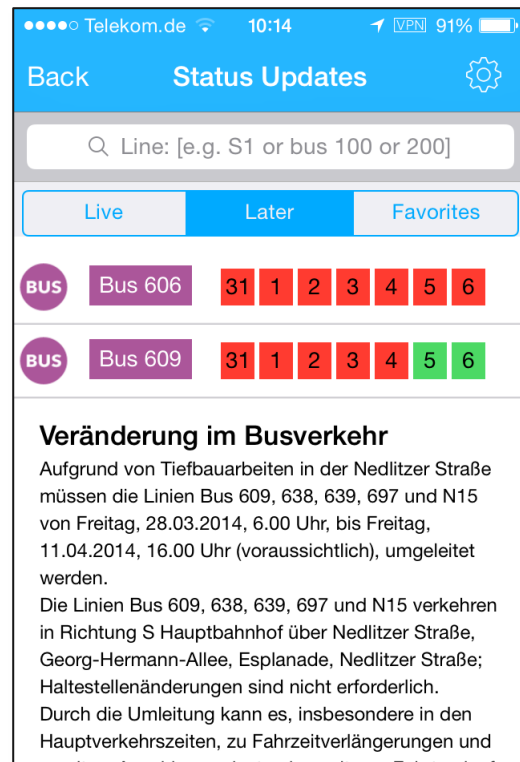
Telekom.de 10:14 VPN 91%

Back Status Updates

Q Line: [e.g. S1 or bus 100 or 200]

Live Later Favorites

Line	31	1	2	3	4	5	6
Bus 606	Red	Red	Red	Red	Red	Red	Red
Bus 609	Red	Red	Red	Red	Red	Green	Green
Bus 638	Red	Red	Red	Red	Red	Red	Red
Bus 639	Red	Red	Red	Red	Red	Red	Red
Bus 697	Red	Red	Red	Red	Red	Green	Green
Bus N14	Red	Red	Red	Red	Red	Red	Red
Bus N15	Green	Green	Green	Green	Green	Red	Red



Telekom.de 10:14 VPN 91%

Back Status Updates

Q Line: [e.g. S1 or bus 100 or 200]

Live Later Favorites

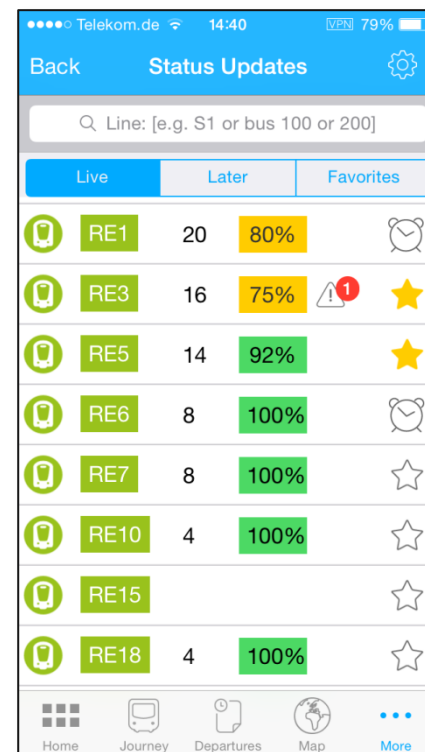
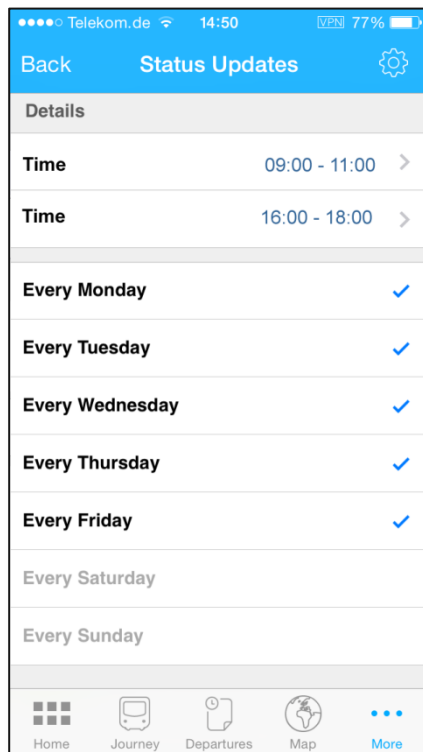
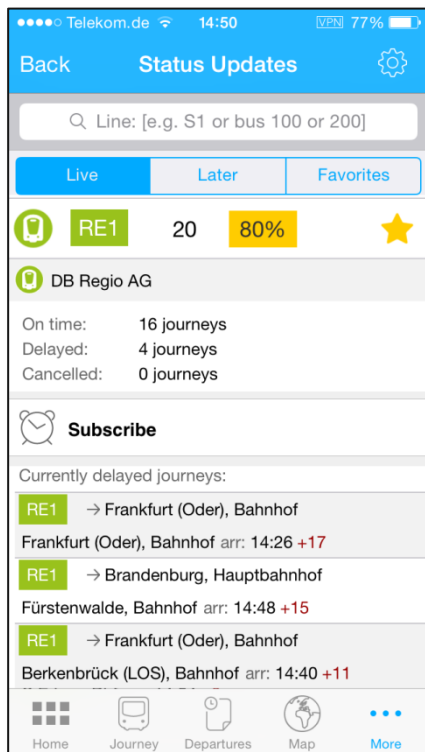
Veränderung im Busverkehr

Aufgrund von Tiefbauarbeiten in der Nedlitzer Straße müssen die Linien Bus 609, 638, 639, 697 und N15 von Freitag, 28.03.2014, 6.00 Uhr, bis Freitag, 11.04.2014, 16.00 Uhr (voraussichtlich), umgeleitet werden.

Die Linien Bus 609, 638, 639, 697 und N15 verkehren in Richtung S Hauptbahnhof über Nedlitzer Straße, Georg-Hermann-Allee, Esplanade, Nedlitzer Straße; Haltestellenänderungen sind nicht erforderlich.

Durch die Umleitung kann es, insbesondere in den Hauptverkehrszeiten, zu Fahrzeitverlängerungen und weiteren Anschlussverlusten im weiteren Fahrtverlauf kommen.

- Subscription for specific days and time, or services



Push Views



b2b
views

b2c
views

Planned
Information

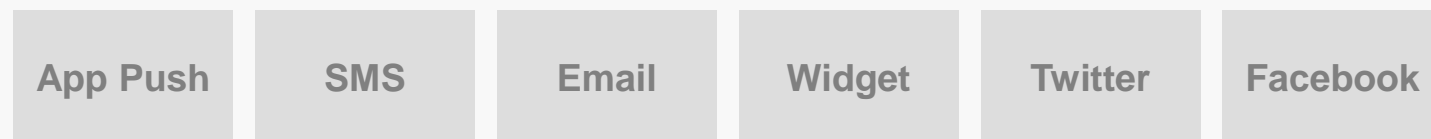
Disruption
Information

Real-time
Information

HAFAS Push

Storage – Trigger – Business Intelligence

Channels



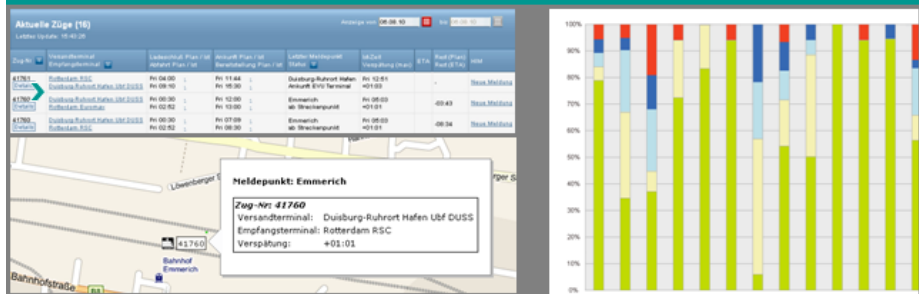


Monitoring solutions as basis for ETA calculation

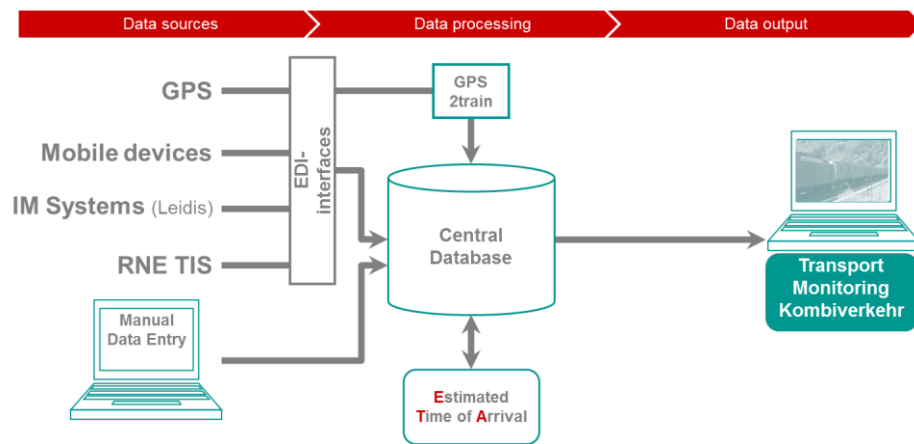
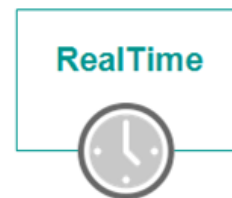
Reasons to develop Train Monitor more than 12 years ago

- One single monitoring system for all services (int.+nat.)
- Usage of various real-time data sources
- Different views on complex data
- Individual configuration possible
- Including „Cut-off time“ and „Availability“
- ETA calculation
- Irregularity messages can be exchanged, stored and pushed
- Reliable archive functions

Train Monitor – Integrated train monitoring system



Modules:



- Commercial/productive use
- National and international services
- Kombiverkehr and cooperation partners
- ETA calculations incl. information management (HIM)
- Combines data from different sources

Train overview including RealTime information

Overview on currently operated trains (list view)

2018 HaCon

+00:12 (+00:12)

+03:14 (+05:55)

Train no	Origin terminal Destination terminal	Cut-off time planned / real Departure planned / real	Arrival planned / real Availability planned / real	Last message point Status	Current time (Estimation)	Delay (max)	ETA	Remaining (scheduled) Remaining (ETA)	HIM
40539 Details	Ostrava-Paskov Verona Quadrante Europa	Mon 18:00 Mon 19:03	- Mon 18:00 Tue 23:30	Tue 18:10 Tue 23:30			Tue 20:31		New message
43257 Details	Köln-Eifeltor Ubf Verona Quadrante Europa	Mon 17:25 Mon 19:34	- Mon 17:25 Tue 17:00	Tue 16:22 Tue 17:00			Tue 17:46		New message
41858 Details	Trieste Campo Marzio Rive MOLO V/ Köln-Eifeltor Ubf	Mon 12:30 Mon 14:20	- Mon 12:30 Tue 11:45	Tue 10:45 Tue 11:45	Arnoldstein at message point	+00:12 (+00:12)			New message
41859 Details	Köln-Eifeltor Ubf Trieste Campo Marzio Rive MOLO V/ Köln-Eifeltor Ubf	Mon 10:15 Mon 11:15	- Mon 10:15 Tue 08:00	Tue 06:24 Tue 08:00	Süßen through at message point	+03:14 (+05:55)			New message
41856 Details	Trieste Campo Marzio Rive MOLO V/ Köln-Eifeltor Ubf	Mon 07:00 Mon 08:52	- Mon 07:00 Tue 05:30	Tue 04:21 Tue 05:30	Kirchseeon through at message point	+02:24 (+03:08)	Tue 05:08		New message
41860 Details	Ljubljana-Deutschland	Mon 14:00 Mon 17:25	- Mon 14:00 Wed 02:15	Tue 22:05 Wed 02:15	Jesenice Arrival transfer station	-01:26 (-01:07)	Tue 21:34		
41860 Details	Ljubljana KT Duisburg-Ruhrort Hafen Ubf DUSS	Mon 14:00 Mon 17:25	- Mon 14:00 Wed 02:15	Tue 22:05 Wed 02:15	Jesenice Arrival transfer station	-01:26 (-01:07)	Tue 21:34		New message
41860 Details	Ljubljana KT Köln-Eifeltor Ubf	Mon 14:00 Mon 17:25	- Mon 14:00 Tue 23:40	Tue 18:54 Tue 23:40	Jesenice Arrival transfer station	-01:26 (-01:07)	Tue 18:23		New message
41860 Details	Ljubljana KT München-Riem Ubf	Mon 14:00 Mon 17:25	- Mon 14:00 Tue 06:15	Tue 06:01 Tue 06:15	Jesenice Arrival transfer station	-01:26 (-00:39)	Tue 05:30		New message

Train identification

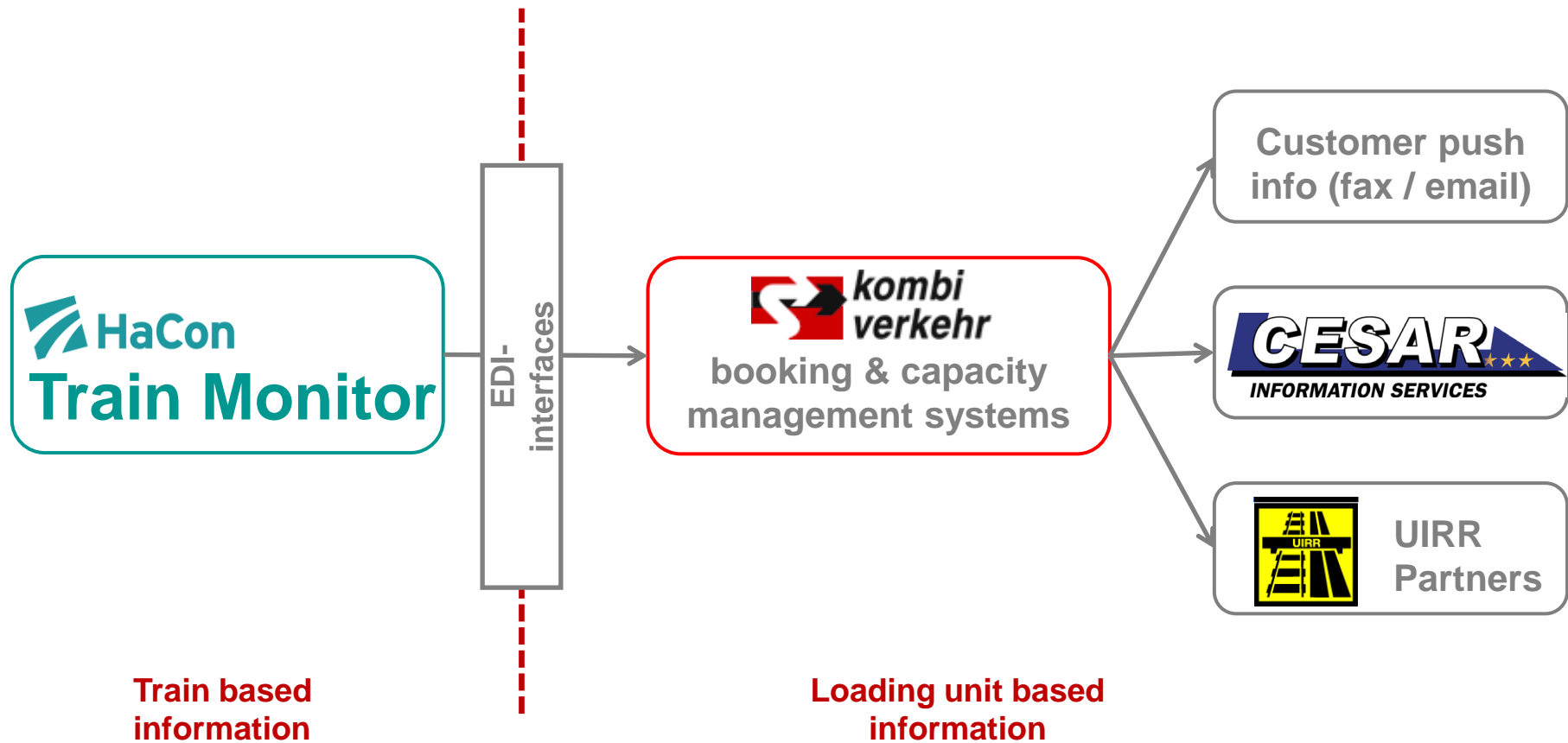
Train real-time status

Train ETA

Irregularity messages

- Status information of your current train operations at a glance;
- Colour classification for delay status (green – yellow – red);
- same classification in maps possible →
- Individual configuration possible (train filter / column sorting)

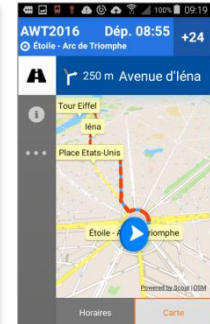
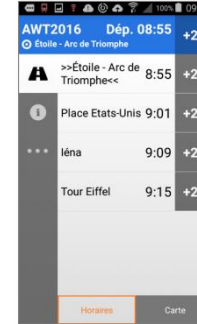
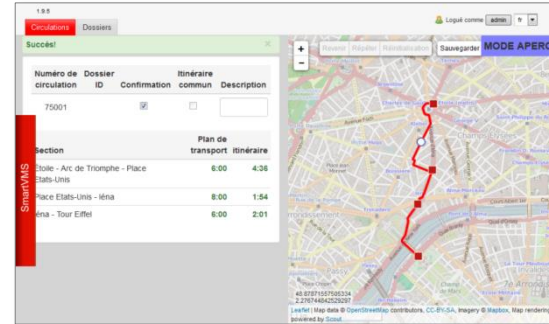




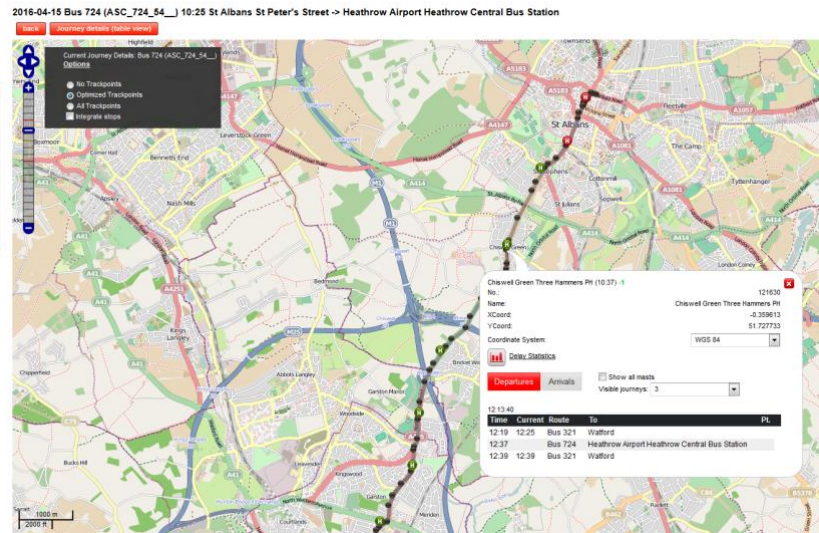
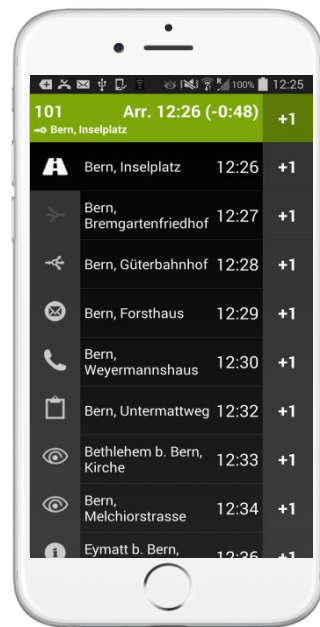


HAFAS Smart VMS

- Open system – platform-independent
 - Android smartphone and tablet
 - Windows and Windows CE units
 - iOS (limited functionality)
 - SDK with interface
- Multimodal usage
 - large bus operators like DB Regio Bus
 - train operators like Eurostar
 - buses as train replacement like SNCF Transilien
 - connection assurance
- Web-based control center
 - drag & drop route for detours
 - timetable editor
 - data warehouse for statistics



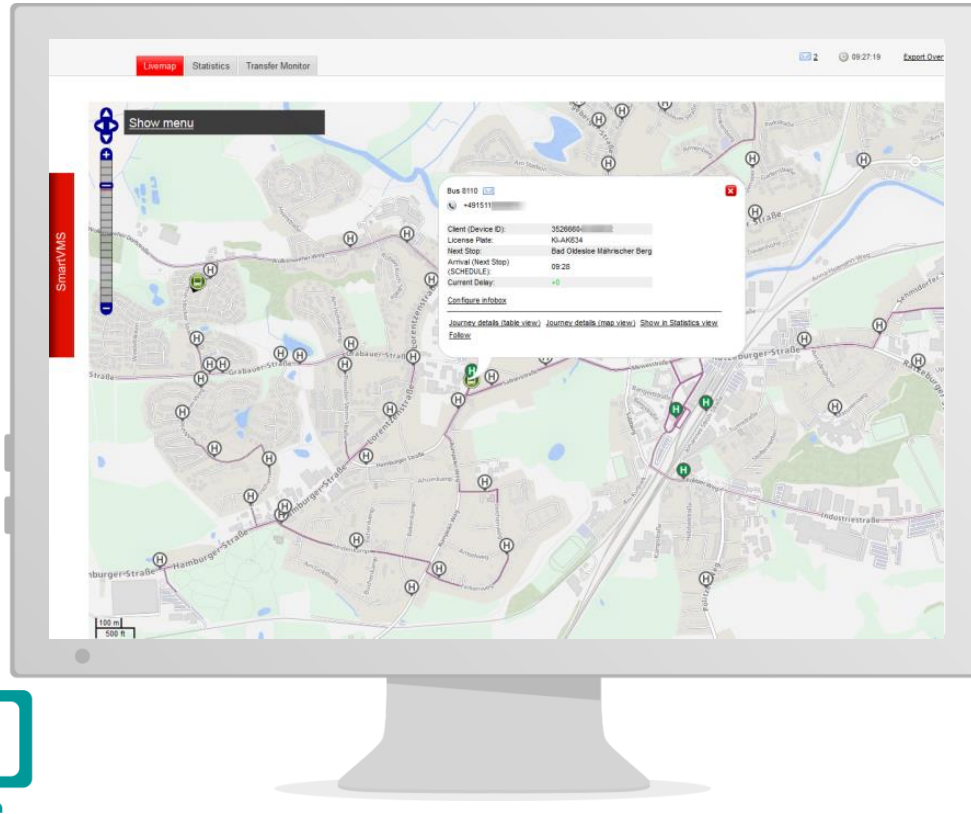
- Easy solution for generating real-time information
- Automated connection assurance
- Huge data archive
- Text communication
- Performance Monitoring and Alerts
- Trip Editor
- And much more...



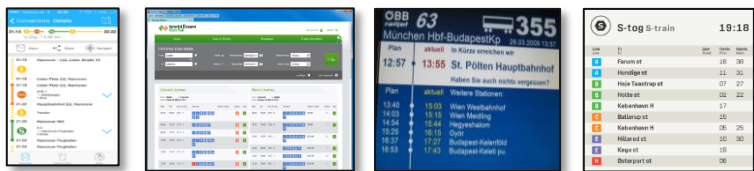
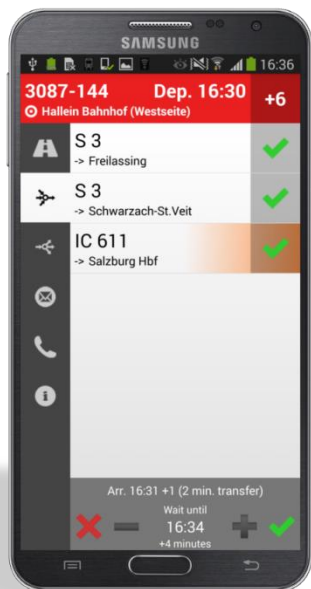
Driver app and web-based control center

Multi-client solution

- Real-time trip overview
- Vehicle/train management
- Historical data / Data warehouse for statistics
- Connection monitoring and assurance
- Online Performance
- Timetable editor
- Client specific access, roles and functions...



Client devices



optional

Crew Planning | **Vehicle Planning**

Crew/Vehicle Roster

GPS track

Real-time data
Connecting trips

Connection assurance

HAFAS Server

- Matching trips
- Calculating delays
- Service situation
- Data hub

HAFAS services

Real-time data

Viewer

**VDV
453/454**

others...

Line/route view

Journeys **Lines** Realtime data IDs

FILTERS (160/1878) Number of entries per page 50

Line **Reset all filters**

Realtime data ID

Maximum Delay to

Average Delay to

Line	Realtime data ID	Monitored Journeys	Maximum Delay	Average Delay	< 2 min	< 5 min	< 10 min	< 15 min	< 20 min	< 30 min	Time of last Report
Bus 886	BVO (2)	4	+6	+3	2 (50%)	2 (50%)	4 (100%)	4 (100%)	4 (100%)	4 (100%)	14:56
Bus 300	AK (4)	4	+5	+2	2 (50%)	3 (75%)	4 (100%)	4 (100%)	4 (100%)	4 (100%)	14:56
Bus 7550	AK (4)	4	+3	+1	3 (75%)	4 (100%)	4 (100%)	4 (100%)	4 (100%)	4 (100%)	14:56
Bus 740	WEB (3)	3	+2	+1	2 (66%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 350	WEB (3)	3	+14	+7	0 (0%)	1 (33%)	2 (66%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 900	WEB (3)	3	+11	+6	1 (33%)	1 (33%)	2 (66%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 094	BVO (2)	3	+0	+0	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 900	AK (4)	3	+6	+1	2 (66%)	2 (66%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 7600	AK (4)	3	+9	+3	2 (66%)	2 (66%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 8115	AK (4)	3	+5	+2	2 (66%)	2 (66%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 8810	AK (4)	3	+5	+2	1 (33%)	1 (33%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus S1	BVO (2)	3	+4	+2	1 (33%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus S6	BVO (2)	3	+5	+5	0 (0%)	0 (0%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	14:56
Bus 730	WEB (3)	2	+9	+6	0 (0%)	1 (50%)	2 (100%)	2 (100%)	2 (100%)	2 (100%)	14:56

Journeys Lines Realtime data IDs

FILTERS (228/2659) Number of entries per page 50

Journey Operator (SCHEDULE) [Edit](#) Client (Device ID) [Reset all filters](#)

Line Phone Number

Journey ID Vehicle ID

Current Delay to

Maximum Delay to

Next Stop

Journeys - early (Delay < -2 min)
 Journeys - on time
 Journeys - delayed (Delay > 2 min)

Realtime data ID	Client (Device ID)	Line	Journey ID	Last Stop	Maximum Delay	Current Delay	Arrival (Next Stop) (SCHEDULE)	Next Stop	Client (Software Version)	Journey Operator (SCHEDULE)	Pho
3	355994052336653	Bus 465	7465131	Osnabrück Hauptbahnhof/ZOB (platform 4)	+0	+0	14:57	Ostenfelde(Bad Iburg) Schevertorf	1.0.18	WEB Weser-Ems-Bus	+49
3	356708042986479	Bus 740	1740038	Bremen Hauptbahnhof (platform H)	+0	+0	15:02	Verden(Aller) Nordertor	1.0.18	WEB Weser-Ems-Bus	+49
3	353975054155565	Bus 440	6440525	Brake(Unterweser) Bahnhof	+0	+0	15:07	Oldenb für Ark			
8		Bus 7212	7212159	Hugstetten ZOB	+0	+0	14:57	Neuers			
1	358148042638198	Bus 176	5293537	Bissingen an der Teck See	+0	-1	14:58	Kirchh Industr			
1	358148042630039	Bus 389	5563019	Winnenden-Hertmannsweiler Bachener Weg	+0	+0	14:58	Walblin			
2		Bus 092	92026	Viersen Busbahnhof	+0	+0	15:17	Netteta			
2		Bus 094	94023	Kaarst Kaarster See	+0	+0	15:20	Viersee			

- Trip view
- Filters
- Configurable views for different users
- Rights & Roles

Details [Map View](#) [Export KML](#)

2017-11-03 Bus 200 (2200165) Wien Hbf (Busbahnhof Südtiroler Platz) -> Laxenburg Erholungszentrum (Scheduled) [Refresh](#)

[Use paging](#)

Stop Number	No.	Stop Name	Arrival (SCHEDULE)	Arrival (REALTIME)	Departure (SCHEDULE)	Departure (REALTIME)	Delay	Delay Info (arrival)	Delay Info (departure)
904050	1	Wien Hbf (Busbahnhof Südtiroler Platz) (platform N2)		2017-11-03 15:53		2017-11-03 15:56	+3		
910018	2	Wien Quellenplatz (Laxenburger Straße) [no deboarding]	2017-11-03 15:58	2017-11-03 15:59	2017-11-03 15:58	2017-11-03 15:59	+1		
910019	3	Wien Laxenburger Straße/Troststraße [no deboarding]	2017-11-03 16:01	2017-11-03 16:03	2017-11-03 16:01	2017-11-03 16:03	+2		
910020	4	Wien Laxenburger Straße/Raxstraße [no deboarding]	2017-11-03 16:03	2017-11-03 16:05	2017-11-03 16:03	2017-11-03 16:05	+2		
910009	5	Wien Sibeliusstraße [no deboarding]	2017-11-03 16:05	2017-11-03 16:06	2017-11-03 16:05	2017-11-03 16:06	+1		
923067	6	Wien Siedlung Blumental [no deboarding]	2017-11-03 16:07	2017-11-03 16:09	2017-11-03 16:07	2017-11-03 16:10	+2		
923023	7	Wien Laxenburger Straße/Heizwerkstraße	2017-11-03 16:08	2017-11-03 16:10	2017-11-03 16:08	2017-11-03 16:10	+2		
317081	8	Vösendorf Spitz	2017-11-03 16:12	2017-11-03 16:15	2017-11-03 16:12	2017-11-03 16:16	+3		
317051	9	Vösendorf Laxenburger Straße/Siedlung	2017-11-03 16:13	2017-11-03 16:16	2017-11-03 16:13	2017-11-03 16:17	+3		
317047	10	Biedermansdorf Siegfried-Marcus-Straße	2017-11-03 16:16	2017-11-03 16:19	2017-11-03 16:16	2017-11-03 16:20	+3		
317029	11	Biedermansdorf Ortsmitte	2017-11-03 16:17	2017-11-03 16:20	2017-11-03 16:17	2017-11-03 16:21	+3		
317030	12	Laxenburg Leopold-Figl-Straße	2017-11-03 16:19	2017-11-03 16:22	2017-11-03 16:19	2017-11-03 16:23	+3		
317031	13	Laxenburg Wiener Straße	2017-11-03 16:21	2017-11-03 16:25	2017-11-03 16:21	2017-11-03 16:25	+4		
317032	14	Laxenburg Franz-Joseph-Platz	2017-11-03 16:23	2017-11-03 16:27	2017-11-03 16:23	2017-11-03 16:27	+4		
317039	15	Laxenburg Erholungszentrum	2017-11-03 16:25	2017-11-03 16:29			+4		

[Close](#)

Connection monitoring

Transfer Monitor

Last data processing: 18.06.2013 15:02:07

[Refresh Data](#)

Auto Refresh

Number of entries per page 50

FILTERS

[Reset all filters](#)

Stop (Feeder)

Stop (Fetcher)

Journey Operator (SCHEDULE) (Feeder) [Edit](#)

Journey Operator (SCHEDULE) (Fetcher) [Edit](#)

Arrival (SCHEDULE) (Feeder) to

Arrival (REALTIME) (Feeder) to

Transfer Connection Status [Edit](#)

«» « 1 2 »»

Transfer Connection Status	Line (Feeder)	Stop (Feeder)	Arrival (SCHEDULE) (Feeder)	Delay (Feeder)	Line (Fetcher)	Stop (Fetcher)	Departure (SCHEDULE) (Fetcher)	Delay (Fetcher)	Minimal transfer time	Wait time
as planned	Bus 7920	Latendorf Abzw. Boostedt	13:48	+33	Bus 7915	Rickling An der Kirche	14:27	+37	5	0
as planned	RE 21021	Neumünster	13:41	+0	Bus 7915	Rickling An der Kirche	14:27	+37	5	0
as planned	Bus 7930	Rickling Doppeleiche*	14:16	+1	Bus 7915	Rickling An der Kirche	14:27	+37	5	0
as planned	Bus 373	Aschhausen(Bad Zwischenahn) Lönskrug*	14:43	+2	Bus 350	Haarenstroth	14:49	+14	2	0
as planned	RE 4423	Bad Zwischenahn	14:12	+8	Bus 350	Haarenstroth	14:49	+14	5	0
as planned	Bus 373	Aschhausen(Bad Zwischenahn) Lönskrug*	14:43	+2	Bus 350	Westerholtsfelde EDEKA	14:50	+14	2	0
as planned	RE 4423	Bad Zwischenahn	14:12	+8	Bus 350	Westerholtsfelde EDEKA	14:50	+14	5	0
as planned	RE 4423	Bad Zwischenahn	14:12	+8	Bus 350	Westerholtsfelde	14:51	+14	5	0

Real Time Archive

- Plan and actual trips
- GPS-coordinates
- Connections
- Operator messages
- HIM messages
- Development of Delay Built-Up
- Prognosis
- Trips w/o real-time
- Real-Time Messages matched/unmatched

SmartTCS

Date: 2016-10-26 to 2016-10-26 Client (Device ID): Client (Realtime data ID): <AB> Journey ID: Journey Operator (SCHEDULE): <AB>

Departure (First Stop) (SCHEDULE): Arrival (Last Stop) (SCHEDULE):

Details

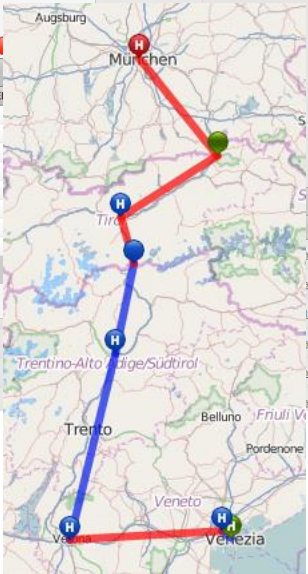
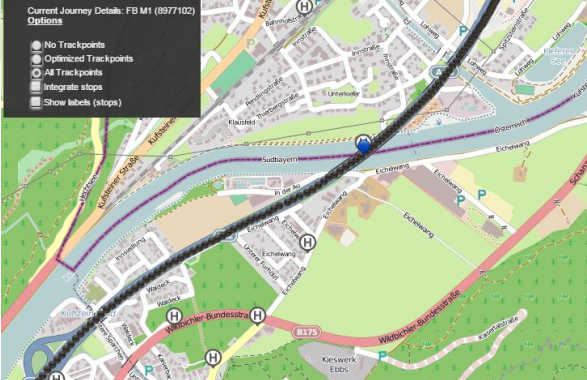
Map View Export: KML Export: PDF

2016-10-26 FB M1 (8977108) Venezia Tronchetto (Piazzale People Mover) -> München ZOB (Hackerbrücke) (Scheduled)

No.	Stop Number	Stop Name	Departure Time (SCHEDULE)	Arrival Time (SCHEDULE)
1	8385217	Venezia Tronchetto (Piazzale People Mover)	22:35	
2	8324253	Venezia Mestre stazione (Vale Stazione)	22:58	22:53
3	8389120	Verona Porta Nuova Stazione (P.le XXV Aprile)	00:44	00:34
4	8388084	Bolzano/Bozen Via Alto Adige	02:55	02:45
5	8181999	Tarifpunkt 82 Brenner Staatsgrenze [Transit stop]	04:07	04:07
6	791253	Innsbruck Hbf (Verladestelle)	04:47	04:37
7	8181997	Tarifpunkt 85 Kufstein Staatsgrenze [Transit stop]	05:51	05:51
8	8089317	München ZOB (Hackerbrücke)		07:00

Options

- No Trackpoints
- Optimized Trackpoints
- All Trackpoints
- Integrate stops
- Show labels (stops)



Live

Plan vs Actual comparison

SmartTCS

Date: 2016-10-26 to 2016-10-28

Client (Device ID):

Client (Realtime data ID): <AB>

Journey Operator (SCHEDULE): <AB>

CSV-Export

<Select profile>

Departure (First Stop) (SCHEDULE): **Details**

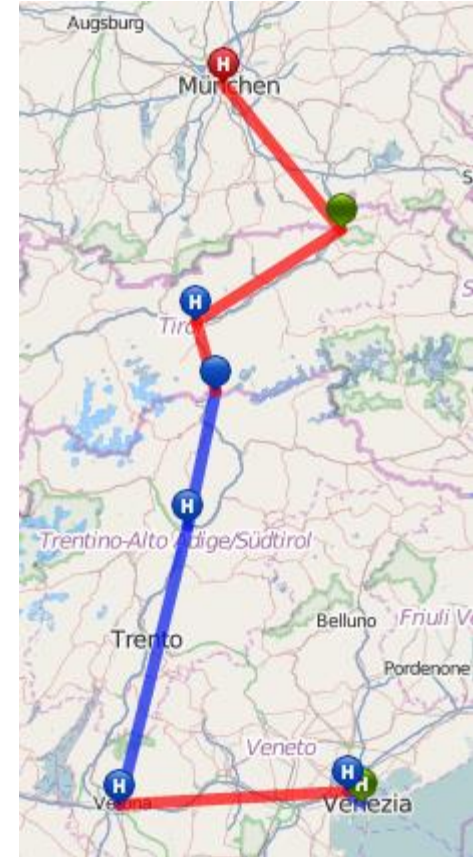
Arrival (Last Stop) (SCHEDULE):

Details

2016-10-26 FB M1 (8977108) Venezia Tronchetto (Piazzale People Mover) -> München ZOB (Hackerbrücke) (Scheduled)

No.	Stop Number	Stop Name	Departure Time (SCHEDULE)	Arrival Time (SCHEDULE)	Delay
1	8385217	Venezia Tronchetto (Piazzale People Mover)	22:35		+2
2	8324253	Venezia Mestre stazione (Viale Stazione)	22:58	22:53	-4
3	8389120	Verona Porta Nuova Stazione (P.le XXV Aprile)	00:44	00:34	-3
4	8389084	Bolzano/Bozen Via Albo Adige	02:55	02:45	-5
5	8181999	Tarifpunkt 82 Brenner Staatsgrenze [Transit stop]	04:07	04:07	-15
6	791253	Innsbruck Hbf (Verladestelle)	04:47	04:37	-9
7	8181997	Tarifpunkt 85 Kufstein Staatsgrenze [Transit stop]	05:51	05:51	+4
8	8089317	München ZOB (Hackerbrücke)		07:00	+24

Date	Line	Journey ID	First Stop (SCHEDULE)	Departure Time (SCHEDULE)	Arrival Time (SCHEDULE)	Delay	Report
2016-10-26	FB M1	8977108	Venezia Tronchetto (Piazzale People Mover)	22:35		+2	0/1 total 0
2016-10-26	FB W6	8973103	Wien Hbf (Busbahnhof Wiedner Gürtel)	07:40	07:40	-32	0/1 total 0
2016-10-26	FB W4	8971103	Wien Hbf (Busbahnhof Wiedner Gürtel)	07:51	07:51	+10	0/1 total 0
2016-10-26	FB W2	8972104	Frankfurt(M)Hbf (Pforzheimer Straße)	07:40	07:40	-32	0/1 total 0
2016-10-26	FB M1	8977107	München ZOB (Hackerbrücke)	06:25	06:25	+0	0/1 total 0
2016-10-26	FB W6	8973104	Venezia Tronchetto (Piazzale People Mover)	21:00	21:00	+1	0/1 total 0



„how did the delay develop over time“

Schedule	10:22	10:23	10:24	10:25	10:26	10:26
	Lyngby St.	Lyngby Storcenter (Klampenborgvej)	Firskovvej (Klampenborgvej)	Sorgenfrigårdsvej (Klampenborgvej)	Lundtoftegårdsvej (Klampenborgvej)	Helsingørmtor (Klampenbor
<u>10:25:05</u>		+2	+2	+2	+2	+2
<u>10:26:56</u>		+3	+4	+4	+4	+5
<u>10:27:18</u>		+4				
<u>10:29:20</u>		+4 ■	+5	+5	+5	+6
<u>10:30:01</u>			+5 ■	+5		
<u>10:30:56</u>					+5	
<u>10:31:18</u>				+5 ■		
<u>10:32:45</u>					+5 ■	
<u>10:32:57</u>						
<u>10:34:38</u>						+6 ■
<u>10:35:03</u>						
<u>10:36:18</u>						
<u>10:37:35</u>						
<u>10:38:19</u>						
<u>10:39:38</u>						

Operator reports are also archived

SmartTCS

Reports

2016-10-26 8977105 16:00 München ZOB (Hackerbrücke) -> Bolzano/Bozen Via Alto Adige

Disturbance reports

[+ New entry <Alt+1>](#)

Timestamp	From	To
2016-10-26 17:17:00	Tarifpunkt 85 Kufstein Staatsgrenze	Tarifpunkt 85 Kufstein Staatsgrenze
2016-10-26 19:16:00	Tarifpunkt 82 Brenner Staatsgrenze	Tarifpunkt 82 Brenner Staatsgrenze

** Reports in italic font are generated by the system. Please enter a reason to save the report permanently.*

Edit report

Date 2016-10-26 19:16:00 (Arrival (REALTIME) at stop "Tarifpunkt 82 Brenner Staatsgrenze")

From

To

Type

Reason

Creator



Editor

Save (<Return>)

Cancel (<Esc>)


Customers can get confirmation of delay based on Real Time Archive
























 Drucken  Fenster schliessen

Verspätungsbestätigung

Zug S 2 15234, mit der planmässigen Ankunft in Flamatt um 10:08 Uhr, ist am 01.11.16 mit 3 Minuten Verspätung eingetroffen.

 S 2 15234 01.11.16

Halt	Ankunft	Verspätung	Abfahrt	Verspätung	Gleis
 Langnau i.E.			09:07		2
 Emmenmatt	09:10		09:10		
 Signau	09:14		09:14		2
 Bowil	09:16		09:16		
 Zäziwil	09:19		09:19		2
 Konolfingen	09:25		09:26		3
 Worb SBB	09:32		09:32		
 Gümligen	09:37		09:37		3
 Ostermundigen	09:40		09:40		1
 Bern Wankdorf	09:43	+ 6 Min.	09:43	+ 7 Min.	1
 Bern	09:48	+ 6 Min.	09:50	+ 6 Min.	1AB
 Bern Europaplatz	09:53	+ 6 Min.	09:53	+ 6 Min.	3
 Bern Bümpliz Süd	09:55	+ 5 Min.	09:55	+ 6 Min.	2
 Niederwangen	09:57	+ 6 Min.	09:57	+ 6 Min.	1
 Oberwangen	09:59	+ 6 Min.	09:59	+ 7 Min.	1
 Thörishaus Station	10:01	+ 5 Min.	10:01	+ 7 Min.	1
 Thörishaus Dorf	10:03	+ 6 Min.	10:03	+ 7 Min.	1
 Flamatt	10:08	+ 3 Min.	10:08	+ 5 Min.	1
 Flamatt Dorf	10:09	+ 6 Min.	10:09	+ 6 Min.	1
 Neuenegg	10:11	+ 6 Min.	10:14	+ 3 Min.	1
 Laupen	10:21				

Create dynamic reports

Automatic creation

Create report

Type:

Operators:

Linenames (external):

Linenames (internal):

Journey IDs:

Stopnames:

Date: to

All day:

Time: to

Limit 'early': Minutes

Limit 'delayed': Minutes

Include journeys without realtime:

Respect projected values?:

Journeys with missing reports:

Reports: Types:

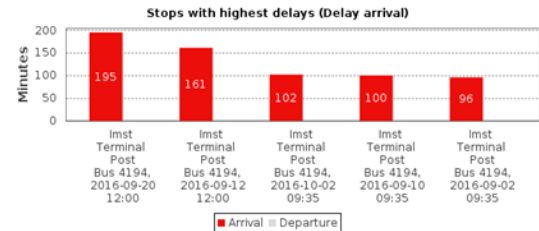
Visibility:

Stoplist

The following filter values were used:

Linenames (internal): 4194
Date: 2016-09-01 to 2016-10-07
Time: 00:00 to 23:59
Limit 'early': 0 Minutes
Limit 'delayed': 3 Minutes
Respect projected values? yes

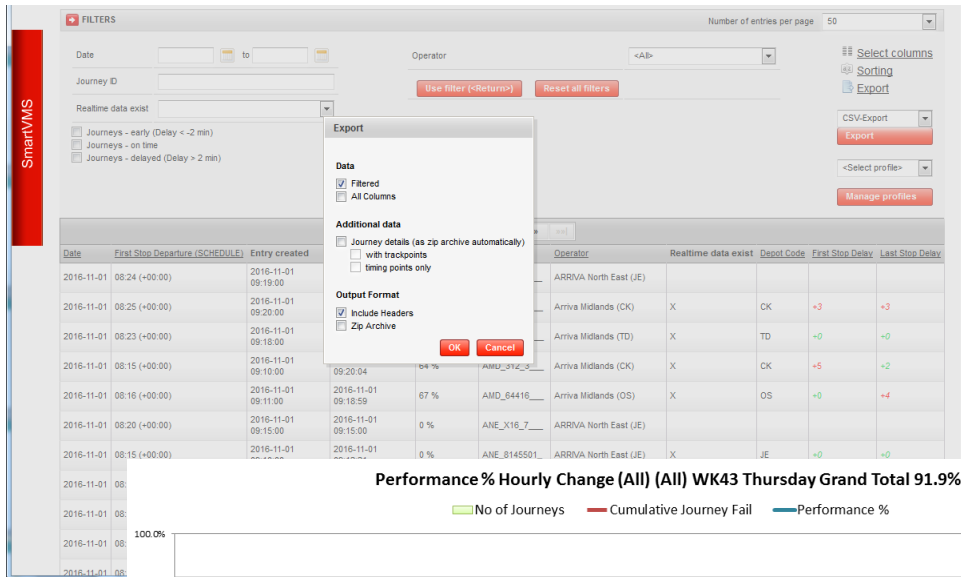
Created by RiederGünter at 2016-10-13 11:50, calculated at 2016-10-13 11:51.



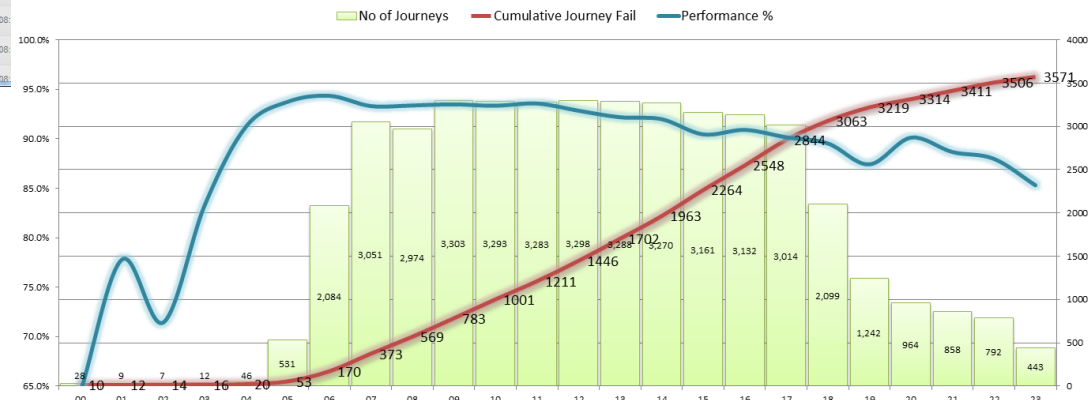
Internal linename	External linename	Journey name	Date	Stop index	Stop	Stop number	Coordinates (SCHEDULED)	Arrival (SCHEDULED)	Arrival (REALTIME)	Delay arrival	Depart
Bus 4194	Bus 4194	4194101	2016-10-07	0	Inst Terminal Post	792001	47,235446 / 10,740321				06:05
Bus 4194	Bus 4194	4194101	2016-10-07	1	Inst Langgasse/Hofer	792002	47,231797 / 10,74237	06:06	06:06	+0	06:06
Bus 4194	Bus 4194	4194101	2016-10-07	2	Inst Wolf	792003	47,227383 / 10,746676	06:07	06:07	+0	06:07
Bus 4194	Bus 4194	4194101	2016-10-07	3	Karres Wendestelle	792004	47,216407 / 10,778147	06:10	06:12	+2	06:10
Bus 4194	Bus 4194	4194101	2016-10-07	4	Roppen Trankhütte	792005	47,22101 / 10,814293	06:14	06:15	+1	06:14
Bus 4194	Bus 4194	4194101	2016-10-07	5	Roppen Inbrücke	792006	47,224039 / 10,823156	06:15	06:15	+0	06:15
Bus 4194	Bus 4194	4194101	2016-10-07	6	Ötztal Ötztaler Höhe	792210	47,231662 / 10,854025	06:19	06:19	+0	06:19
Bus 4194	Bus 4194	4194101	2016-10-07	7	Ötztal Bahnhof (Vorplatz)	792007	47,237883 / 10,859158	06:22	06:23	+1	06:23
Bus 4194	Bus 4194	4194101	2016-10-07	8	Ötztal Ötztaler Höhe	792210	47,231662 / 10,854025	06:24	06:26	+2	06:24
Bus 4194	Bus 4194	4194101	2016-10-07	9	Brunau im Ötztal	792010	47,220956 / 10,860785	06:27	06:28	+1	06:27
Bus 4194	Bus 4194	4194101	2016-10-07	10	Ambach im Ötztal	792011	47,216228 / 10,866574	06:28	06:29	+1	06:28
Bus 4194	Bus 4194	4194101	2016-10-07	11	Sautens Dorf	792012	47,20829 / 10,86668	06:31	06:31	+0	06:31

- Quality and Performance analysis
- Long time storage up to n years

SmartVMS

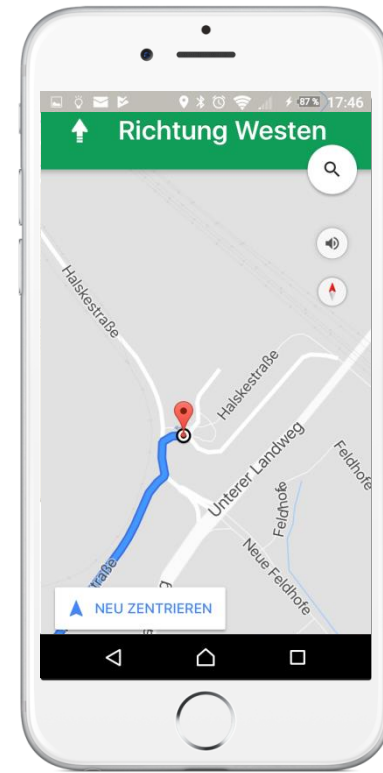
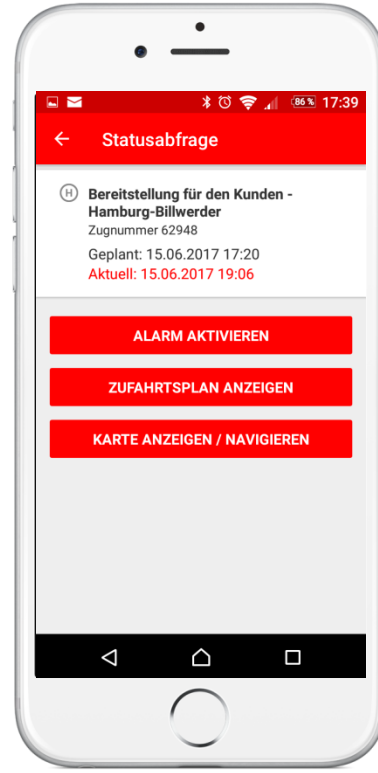
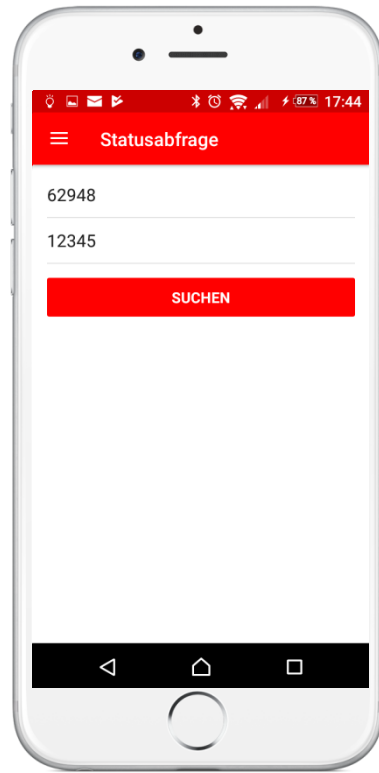
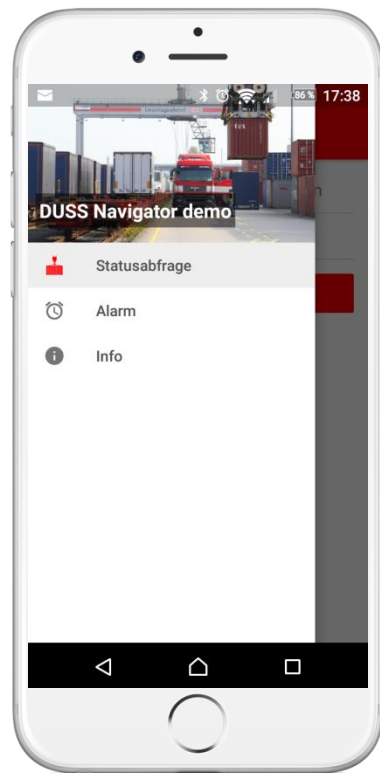


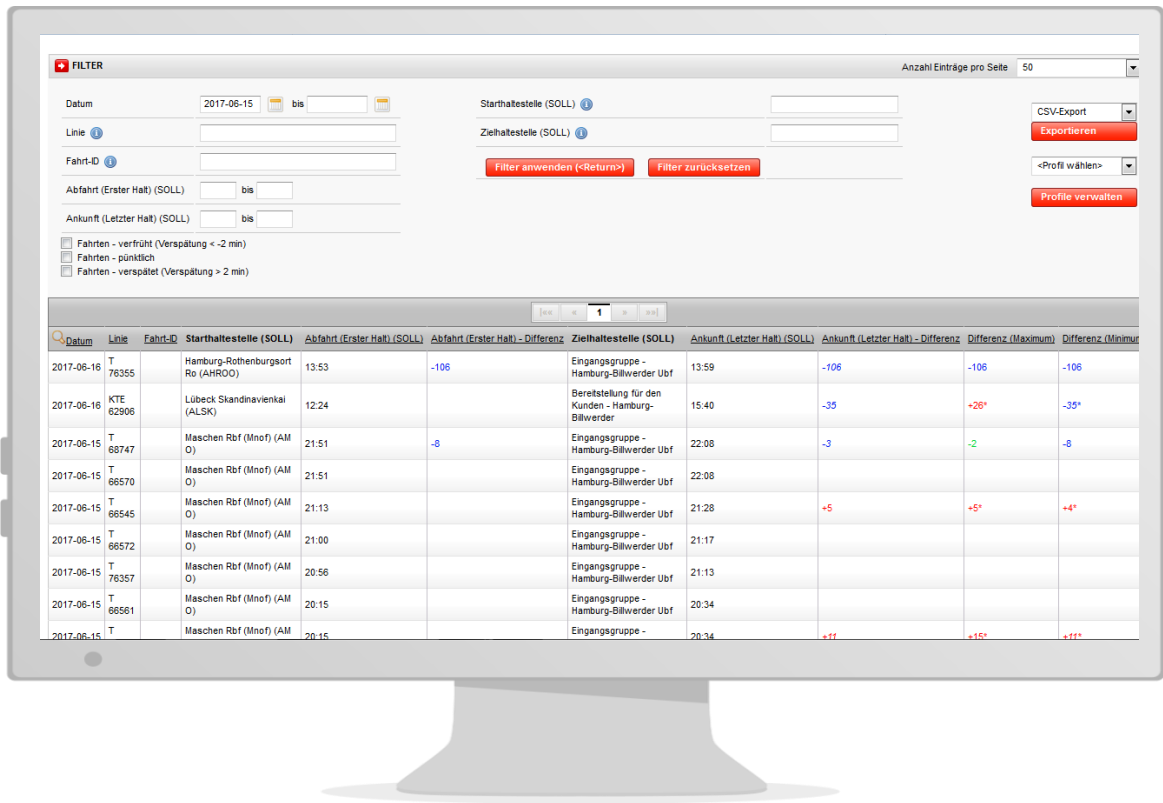
Performance % Hourly Change (All) (All) WK43 Thursday Grand Total 91.9%





Recent developments, pilots & potential input for the ETA calculation





The screenshot displays the web interface for the Pilot- DUSS Backend. It features a filter section at the top with fields for Date, Line, Trip ID, Start Station, and End Station. Below the filter section is a table of services with the following columns: Datum, Linie, Fahrt-ID, Starthaltstelle (SOLL), Abfahrt (Erster Halt) (SOLL), Abfahrt (Erster Halt) - Differenz, Zielhaltstelle (SOLL), Ankniff (Letzter Halt) (SOLL), Ankniff (Letzter Halt) - Differenz, Differenz (Maximum), and Differenz (Minimum). The table contains 10 rows of data, including trip details such as date, line, trip ID, start and end stations, and departure times.

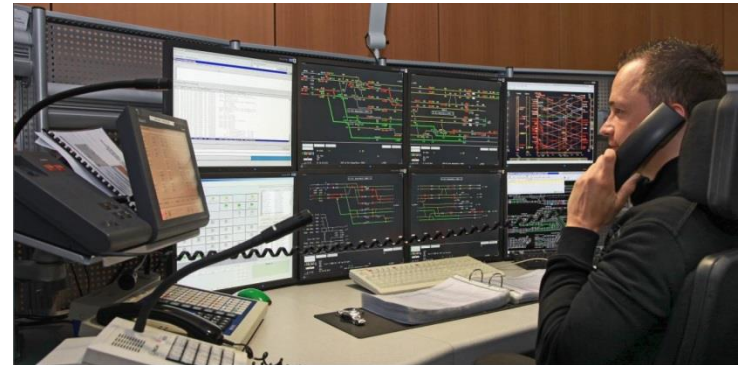
Datum	Linie	Fahrt-ID	Starthaltstelle (SOLL)	Abfahrt (Erster Halt) (SOLL)	Abfahrt (Erster Halt) - Differenz	Zielhaltstelle (SOLL)	Ankniff (Letzter Halt) (SOLL)	Ankniff (Letzter Halt) - Differenz	Differenz (Maximum)	Differenz (Minimum)
2017-06-16	T	76355	Hamburg-Rothenburgsort Ro (AHR00)	13:53	-106	Engangssgruppe - Hamburg-Billwerder Ubf	13:59	-106	-106	-106
2017-06-16	KTE	62906	Lübeck Skandinavienkai (ALSK)	12:24		Bereitstellung für den Kunden - Hamburg-Billwerder	15:40	-35	+26*	-35*
2017-06-15	T	68747	Maschen Rbf (Mnof) (AM O)	21:51	-8	Engangssgruppe - Hamburg-Billwerder Ubf	22:08	-3	-2	-8
2017-06-15	T	66570	Maschen Rbf (Mnof) (AM O)	21:51		Engangssgruppe - Hamburg-Billwerder Ubf	22:08			
2017-06-15	T	66545	Maschen Rbf (Mnof) (AM O)	21:13		Engangssgruppe - Hamburg-Billwerder Ubf	21:28	+5	+5*	+4*
2017-06-15	T	66572	Maschen Rbf (Mnof) (AM O)	21:00		Engangssgruppe - Hamburg-Billwerder Ubf	21:17			
2017-06-15	T	76357	Maschen Rbf (Mnof) (AM O)	20:56		Engangssgruppe - Hamburg-Billwerder Ubf	21:13			
2017-06-15	T	66561	Maschen Rbf (Mnof) (AM O)	20:15		Engangssgruppe - Hamburg-Billwerder Ubf	20:34			
2017-06-15	T		Maschen Rbf (Mnof) (AM O)	20:15		Engangssgruppe -	20:34	+11	+15*	+11*

- Display of services in real-time
 - tabular
 - grafical
- Adjustment of automatic prognosis by Terminal Manager
- Archive of services, availability and pick-up times

- Operational timetable management (*BFB*)
 - Provision of the daily Offline Production Plan for Traffic Management System (*LeiDis/LeiDa* today and the new *iDIS* system in the future)
 - Last-minute timetable changes (ad-hoc trains, changes related to possessions, ...)
 - Train runtime calculation (conflict detection / with potential conflict resolution)
 - Integration with the integrated standard operator station (*iSBP*) of the operational control centres of DB (BZn), replacement of *LeiDa-F*
- DB Netz as customer
 - 500 user (1000 expected)
 - Duration 2 years
 - Delivery based on TPS Standard Client
- TPS for large scale VSTP (very short term) planning
 - Link between planning (*RUT-K*) and dispatching
 - operational model enhancements (towards timetable automation)



© 2018 HaCon
Slide not for further distribution !
ELETA workshop only !



- Enne - forecasting and optimization system for railway traffic
 - Improved control for the Finish national railway network
 - Online conflict detection (based on real-time train position reports)
 - Manual, semi-automated, automated conflict resolution

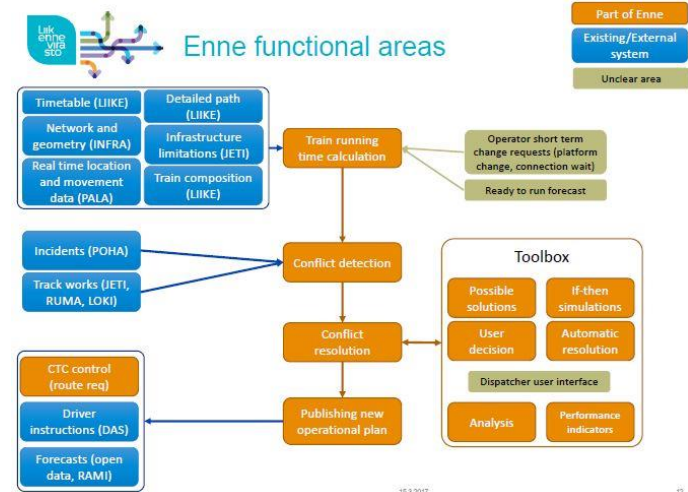
- Finnish Transport Authority (*Liikennevirasto*) as new customer

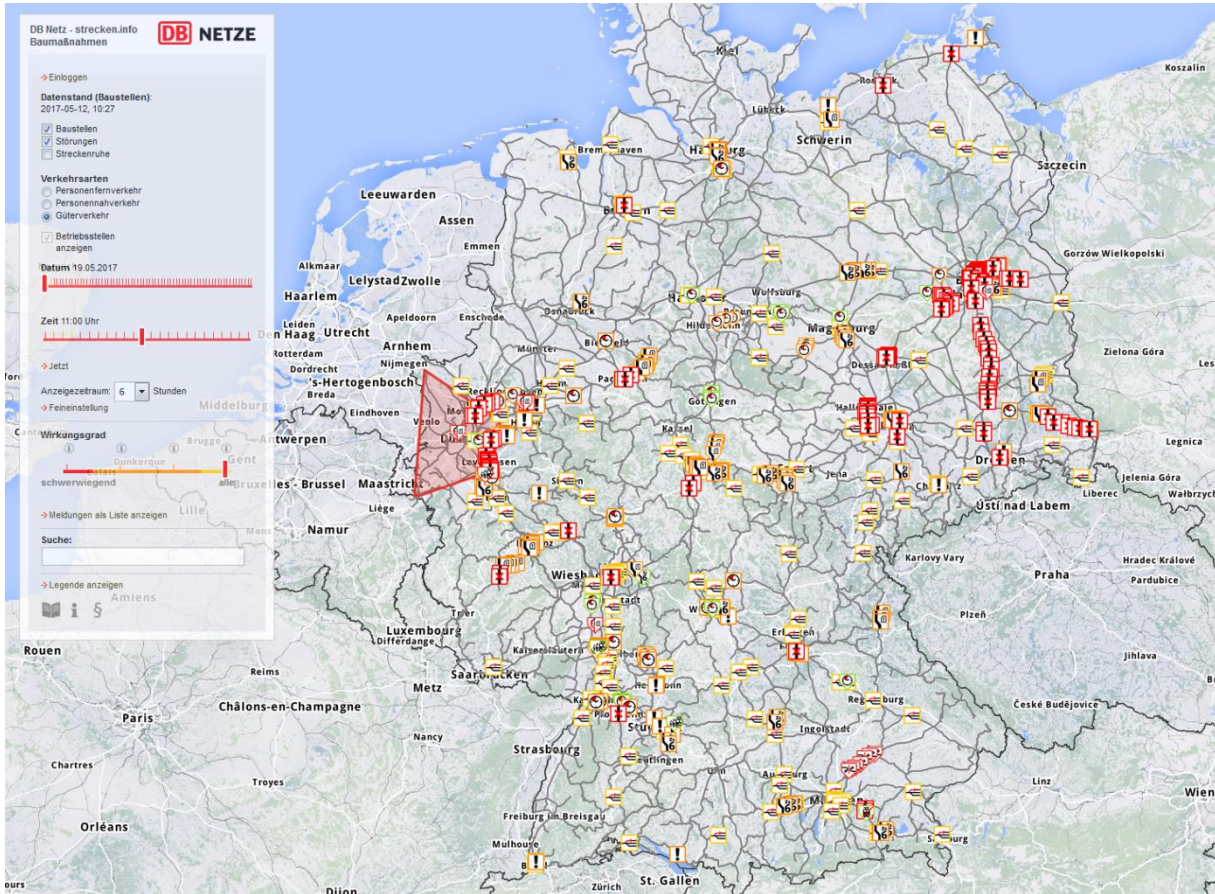
- 400 user
- Duration 1.5 years
- Development based on TPS Standard Client

© 2018 HaCon
Slide not for further distribution!
ELETA workshop only!

- > New TPS product *TPS Online*

- Online dispatching of railway operation
- Significant efforts for integration, operational model enhancements and algorithms





- Graphical presentation of construction works and disruptions for different time horizons

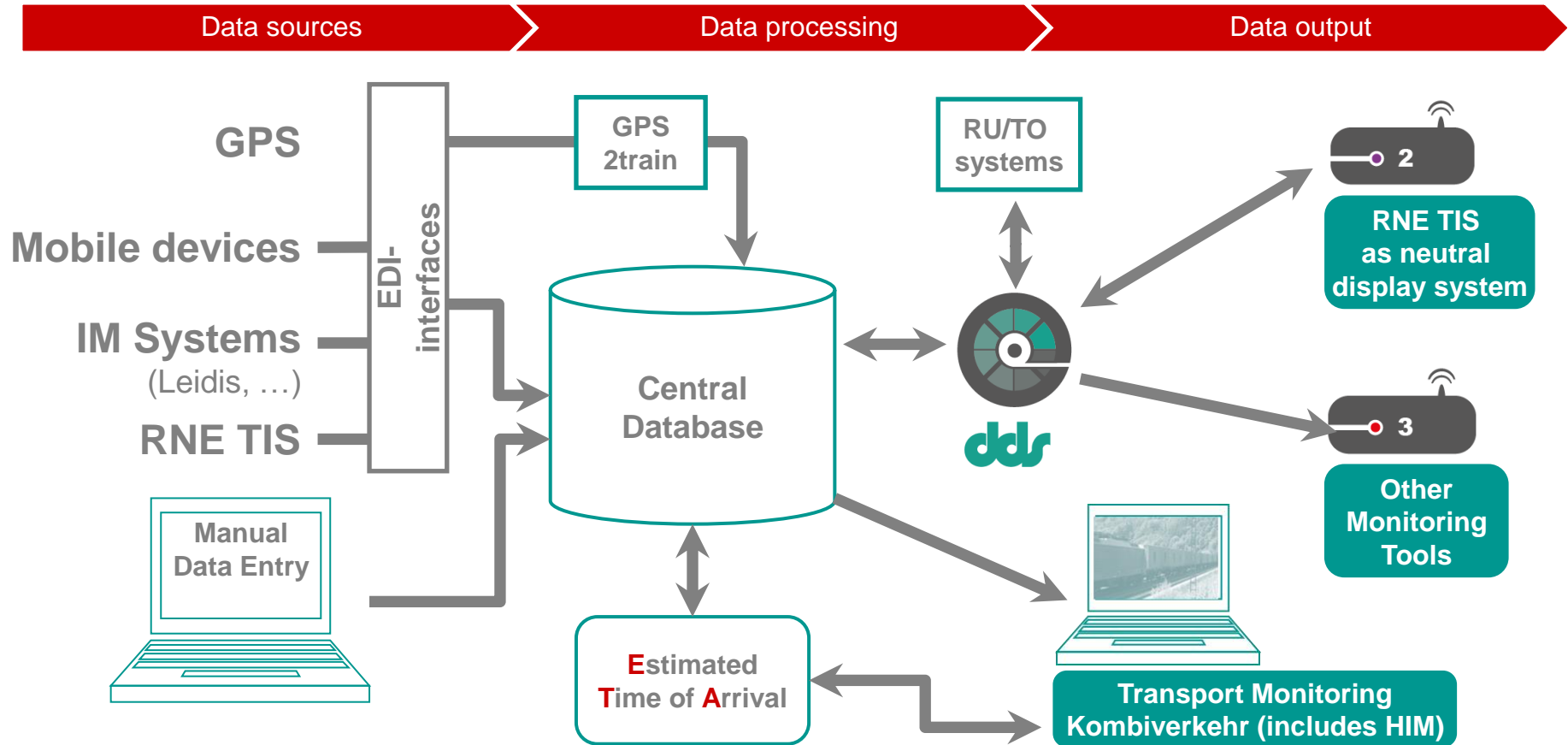
Content:

**1. Real-time & ETA
History ⇒ Future**

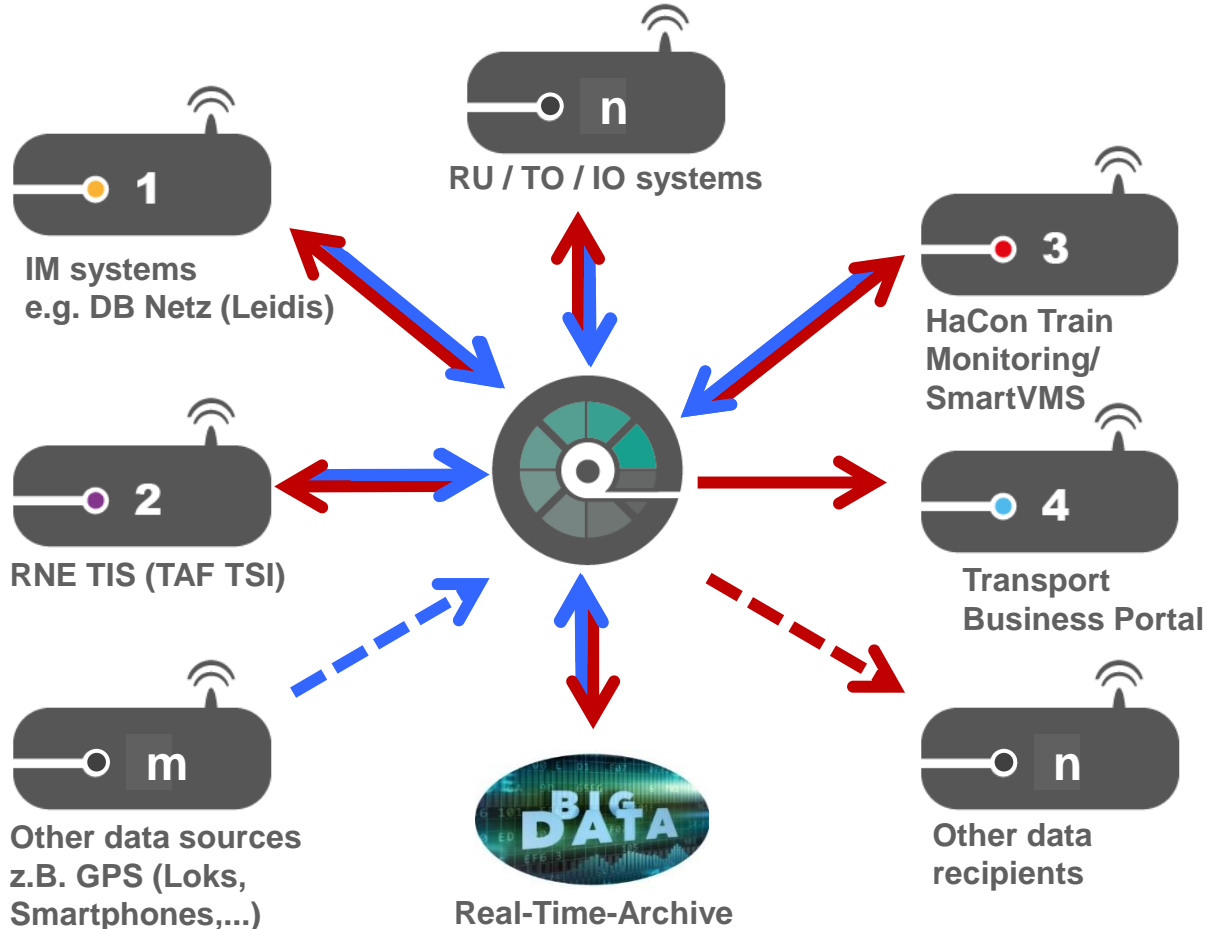
**2. Background information
Overview of relevant systems
and data sources**

3. Outlook (medium & long term)

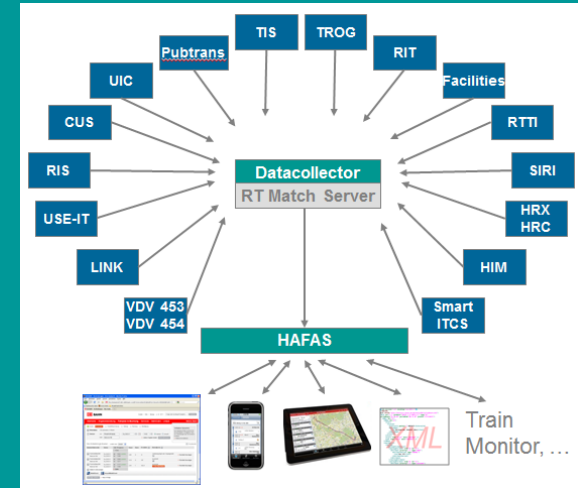
Short/medium term action – Connect proven existing systems



- Use existing and proven systems which are in productive use at IMs, RUs, IOs, and other operators (*e.g. TrainMonitor, SmartVMS, DDS, HIM, TIS*) for:
 - data gathering, managing, matching, validation, data washing
 - continuous data exchange in true real-time with numerous connected systems
 - live message generation, integration, exchange and distribution
- Avoid manual data transfer as it is never real-time, efficient or reliable
- Combine existing operator specific systems like TrainMonitor or SmartVMS (*operator specific layout, functions, archive, processing of IM and other data*) and general monitoring tools like RNE TIS (*standard layout and information, display of provided IM information*)



- Real-time data exchange
- Standard-Interfaces & Individual Interfaces
- Data flow control (selective/multitenant)



	TODAY	SHORT-TERM	LONG-TERM
Determination methods	<ol style="list-style-type: none"> 1) Forward projection 2) Calculation on the basis of historical data <ul style="list-style-type: none"> • stat. distribution • Algorithm 	<ol style="list-style-type: none"> 3) Consideration of planning decisions ... 4) ... Additional influencing factors ie. <ul style="list-style-type: none"> • Network- line capacity • Construction sites • Weather 	<ol style="list-style-type: none"> 5) Control centre IM / real-time simulation / taking into account RU,TO, IO, ... Input/exchange via integration layer (S2R developments started and ongoing)
Point of reference	<ol style="list-style-type: none"> 1) Arrival station (time of arrival) 2) Terminal, Unloading / transshipment point (time of availability) 	<ol style="list-style-type: none"> 3) Other relevant points on the way <ul style="list-style-type: none"> • Boarder stations • Loco change • Driver change • Deliveries • Handover (RU) 	<ol style="list-style-type: none"> 4) All operation & handling points
Data (Systems, Stakeholder)	<ul style="list-style-type: none"> • Timetable data • Actual train tracking data IM (Leidis, RNE TIS,...), • Plan-data Terminal, • Telematics (GPS, ...) 	as "TODAY" plus: <ul style="list-style-type: none"> • Plan-data Terminal • Actual Terminal data, • Telematics (extended), • Others (Partners, Apps, Influencing factors,...) 	as "SHORT-TERM" plus: <ul style="list-style-type: none"> • Data Control Center