Digital Technologies for the Maintenance of Rail Vehicles

Michael Fohrer

Lecture at MIIT University

24th November 2015

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Bombardier Transportation (1 of 2)
Overview

Bombardier Transportation
[Fiscal Year ended December 31,2014]

REVENUES	EBIT before special items	EBIT Margin[1)]
$9.6Mrd.	**$486Mrd.**	**5.1%**

CUSTOMERS IN	PRESENCE IN	ORDER BACKLOG[3)]
>60 countries	**41 countries[2)]**	**$32.5Mrd.**

EMPLOYEES[4)]: **39,700**
HEADQUARTERS
IN BERLIN, GERMANY

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1. EBIT margin before special items
2. Defined as countries with BT employees
3. As at December 31, 2014
4. Including inactive and contractual employees

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Bombardier Transportation (2 of 2)
Range of Products and Services

Rolling Stock

INTERCITY, HIGH SPEED TRAINS, AND VERY HIGH SPEED TRAINS

COMMUTER AND REGIONAL TRAINS

ELECTRIC AND DIESEL LOCOMOTIVES

LIGHT RAIL VEHICLES

METROS

Systems & Signalling

MASS TRANSIT AND AIRPORT SYSTEMS

TURNKEY MAINLINE SYSTEMS & OPERATIONS

MASS TRANSIT, MAINLINE & INDUSTRIAL SIGNALLING

Services

MATERIAL SOLUTIONS

FLEET MANAGEMENT

ASSET LIFE MANAGEMENT, COMPONENT RE-ENGINEERING AND OVERHAUL

Rolling Stock Components

PROPULSION AND CONTROLS

BOGIES

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BT is an established player in Russia

Today

- **SER for passenger coaches and locomotives**
  - TSG WLAB coaches converter overhaul
  - TSG spare parts supply
  - TMH-Service EP10 locomotive modernization

- **RCS opportunities through Elteza JV**
  - 50% minus 1 share in “Elteza”, a subsidiary of RZD
  - Largest Russian producer of electro-mechanical products

- **LOC opportunities**
  - Product development of double locomotive
  - Factory setup support

Focus

- Grow existing business with signaling, services and locomotives
- Capture key LOC projects with RZD and private operators
- Monitor and evaluate new business opportunities

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Digital Technologies

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Digital technologies for the maintenance of rail vehicles

BACKGROUND

- More than 100,000 rail vehicles made by Bombardier in operation worldwide
- Bombardier provides its customers with comprehensive support for the maintenance of their fleets:
  - Material supply solutions
  - Technical support, repairs and modernizations
  - Full maintenance solutions
- Bombardier provides full maintenance for more than 5,000 vehicles worldwide with contract periods of up to 30 years

„Seamless digitalization“
of maintenance processes is one of the main levers Bombardier is using to achieve best performance levels in fleet maintenance:

- Safety
- Fleet availability
- Maintenance costs
- Energy and operating costs
- Commercial risk

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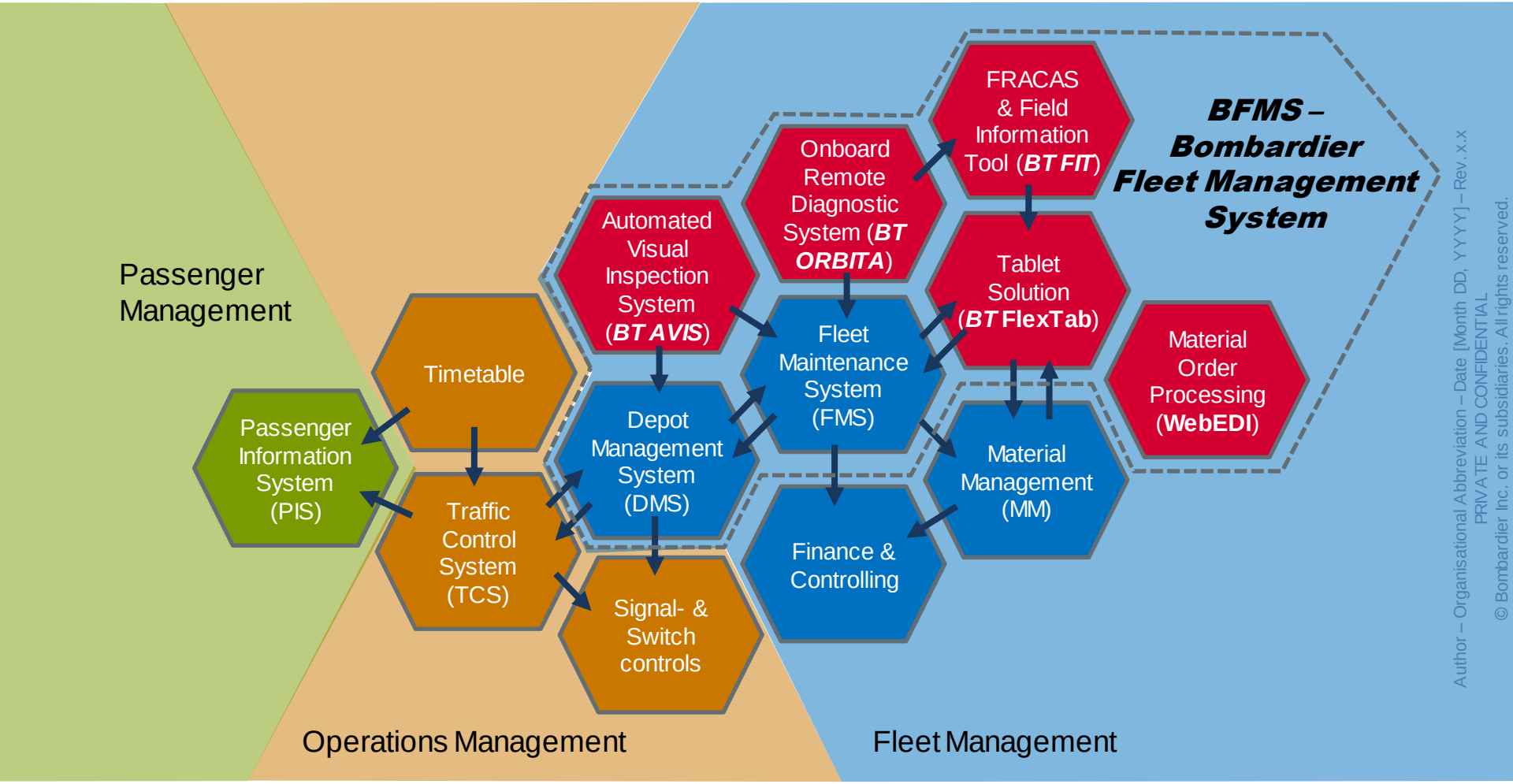
Maintenance of rail vehicles is often relying on complex IT structures



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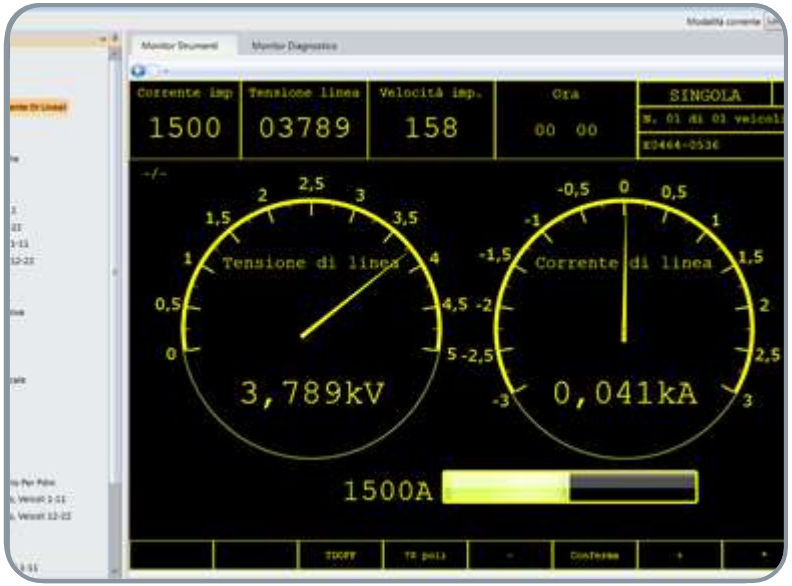
Bombardier's *ORBITA* remote diagnostics system offers powerful support for fleet maintenance …



- Improved reliability and reduced maintenance costs
- In use for several fleets in the UK as well as the Swiss and French railways (SBB and SNCF)

The ORBITA remote diagnostic system offers:

- Control of technical vehicle parameters
- Fault analysis on system level and prognosis of maintenance relevant events
- Vehicle localization and geographical mapping
- Rule based decision support for operating and maintenance items (incl. creation of work orders)
- Implementation of an HMI-Display at the drivers desk for support of experts during operation

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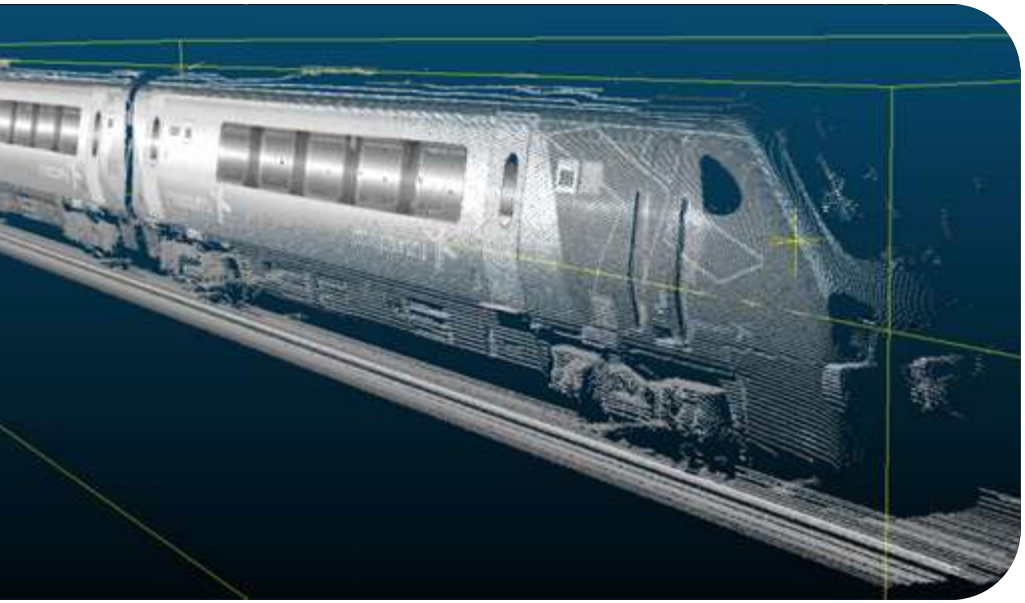
… which can be complemented by *Bombardier's AVIS* vehicle inspection system



***AVIS* is a fully automatic wayside inspection system made for:**

- Measuring the condition of critical components like:
  - Brakes
  - Pantographs
  - Wheel sets
- Visual inspection of the vehicle via lasers and video-scan when the vehicle is running through the AVIS station

- Improved Product Safety through higher frequency of inspections and consistency of data collection
- Enhanced vehicle component usage data and trend analysis: leading to improved maintenance decisions

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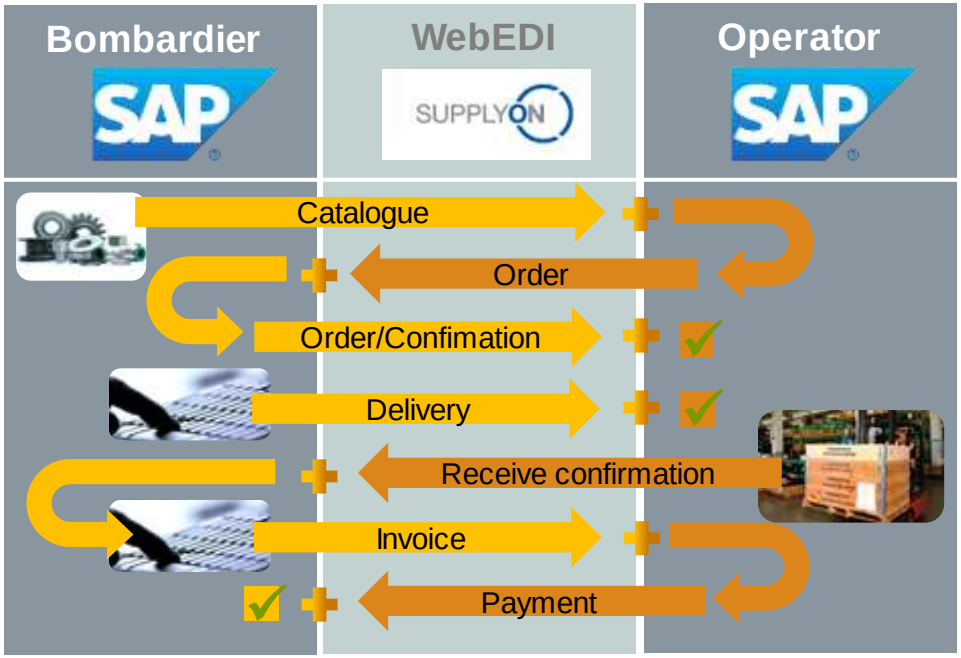
The workshop can order materials via the internet easily and fast directly from the vehicle manufacturer



- Electronic processing of material orders
- Seamless connection of ERP* systems on both sides via a powerful and web-based EDI** interface
- Integration of IT solutions from leading 3rd party suppliers
- Short implementation period with reduced risk due to experiences from several customer projects

- Simplified and accelerated material orders and deliveries
- Increased material availability
- Decreased transactional costs

*ERP - Enterprise resource planning
**EDI - Electronic Data Interchange

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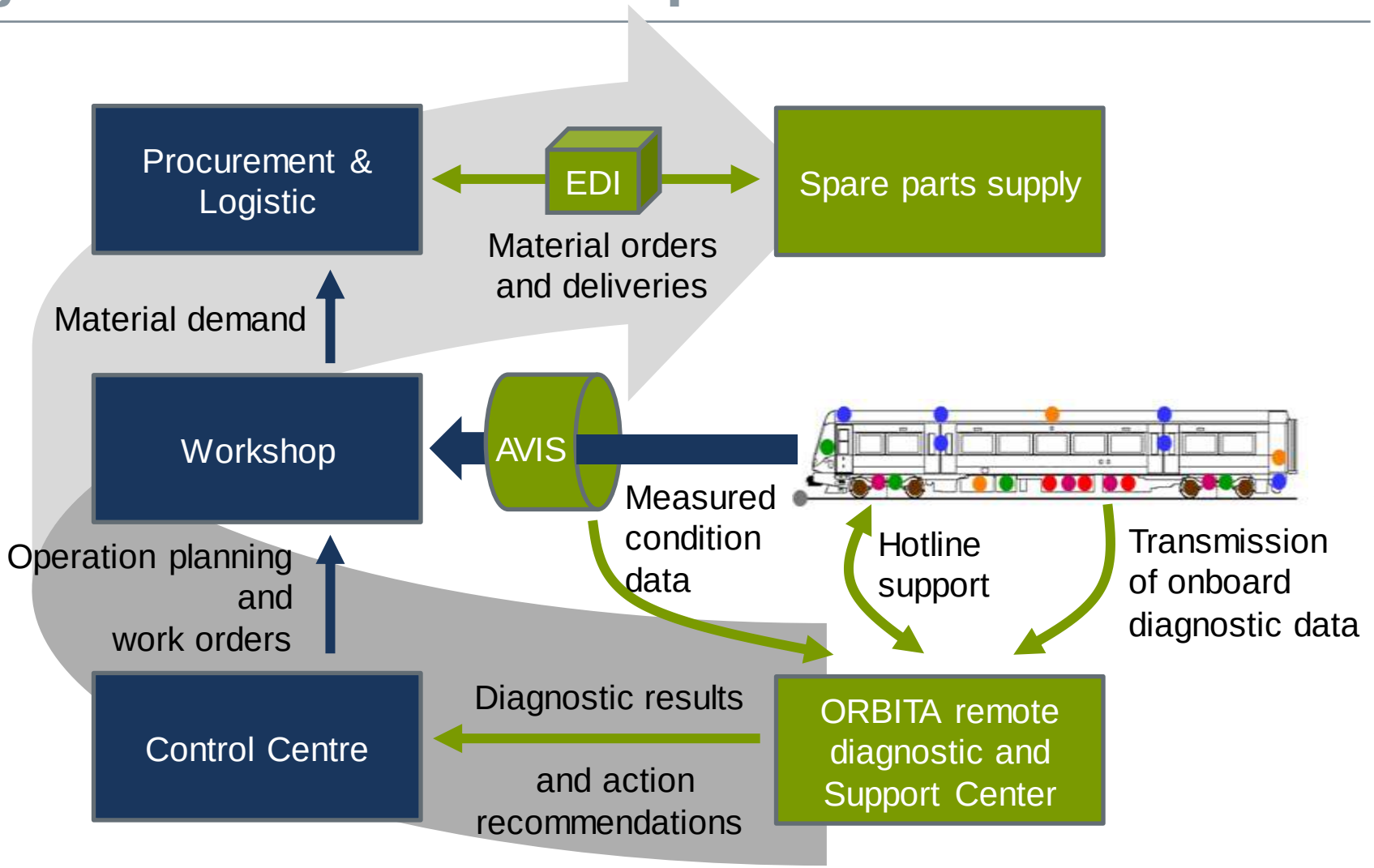
Optimal results can only be realized through „seamless digitalization“ of maintenance processes



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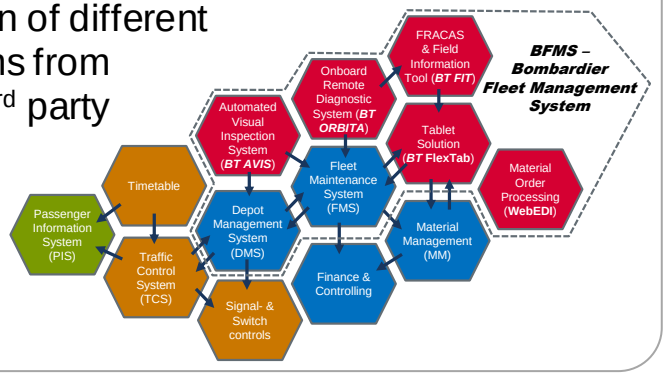
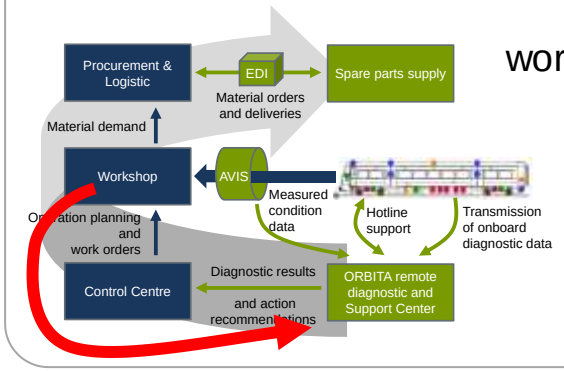
Bombardier‘s future-proof integration of processes and systems ensures best possible results

Connection and integration of different IT systems from leading 3rd party suppliers

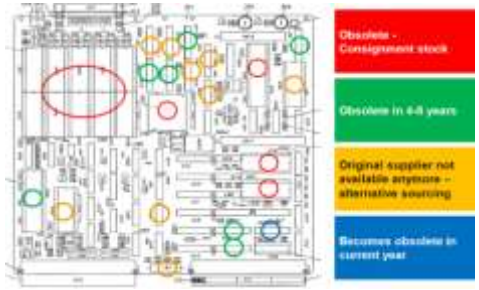


Information feedback loop between workshop software and diagnostic system for improved data verification and analysis



Effective „Cyber Security“ mechanism

Flexibility and strong obsolescence management over 25-40 years fleet life cycle



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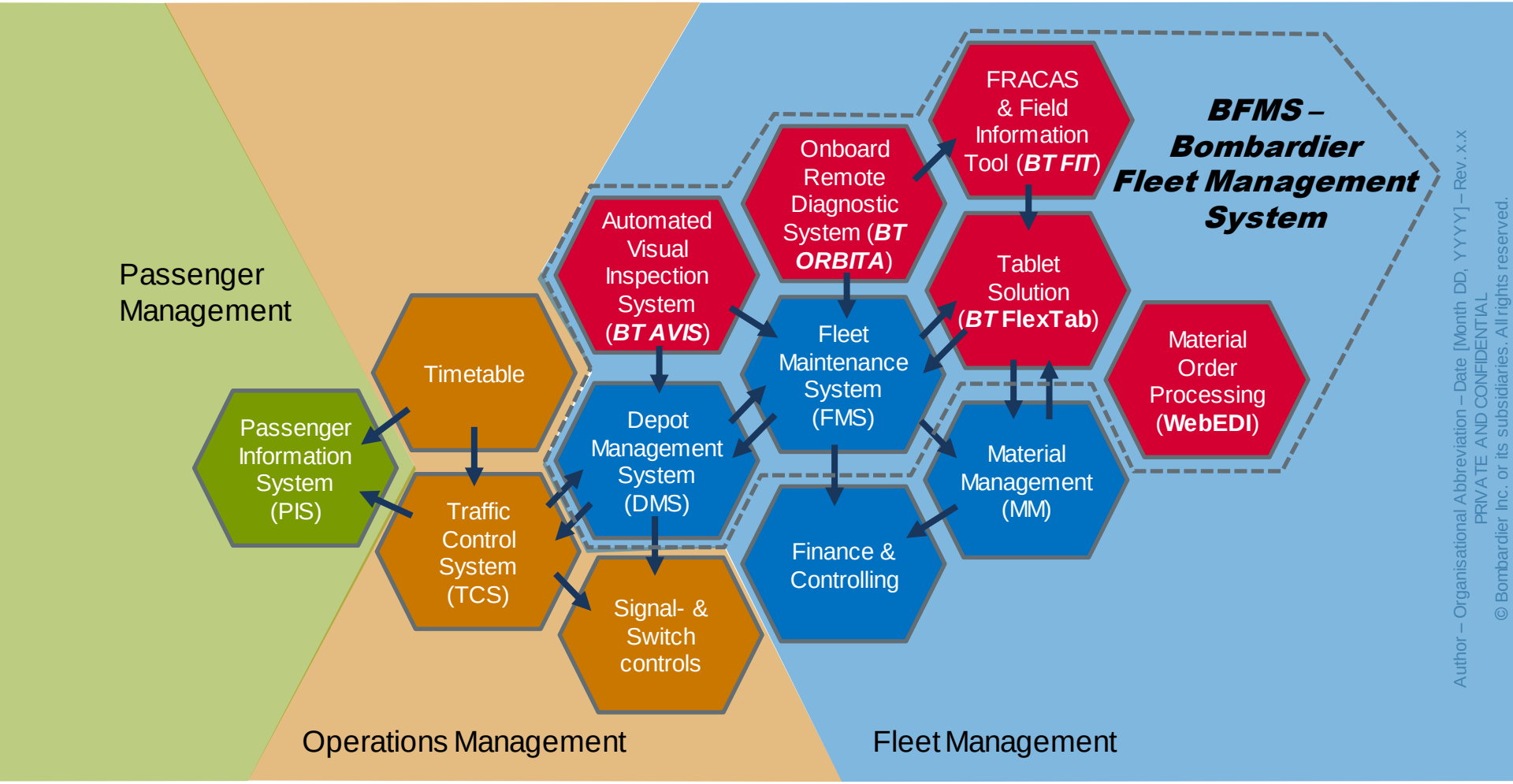

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Digital Technologies

„The Tool“

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MyBTfleet

Новые технологии управления парком локомотивов от Bombardier в России

Александр Шутко
Святослав Прохоров
Алексей Муливенко

02-05 сентября 2015,
ЭКСПО 2015, Щербинка

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Краткая история развития и совершенствования

MITRAC® Remote – технология, впервые примененная для локомотивов

1997

ReFIS (Remote Fleet Information Services) следующий шаг развития технологии

2001

MyBTfleet – современные технологии удаленного доступа к диагностике локомотивов

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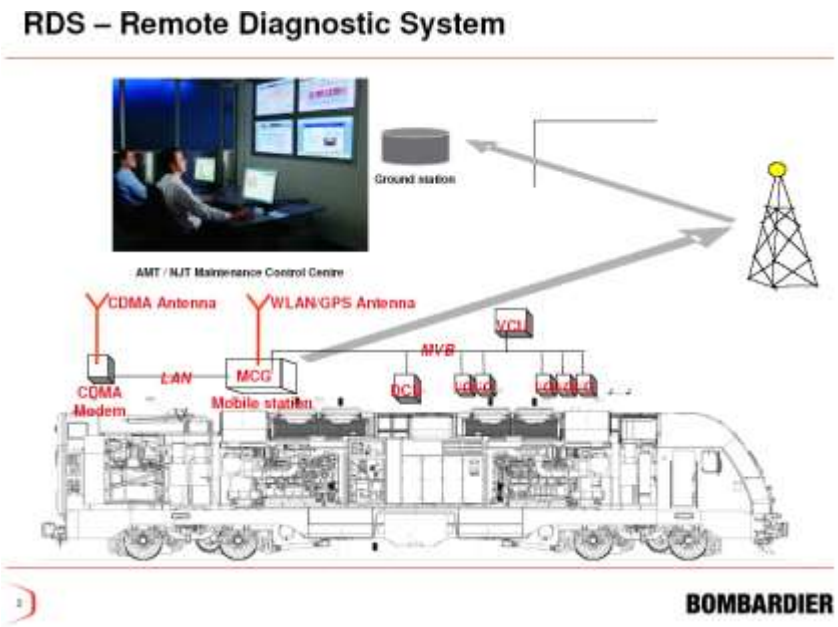
Результатом совершенствования системы ReFIS стали системы, применяемые в настоящее время компанией B для удалённого доступа к информации парка локомотивов для сервисного обслуживания.



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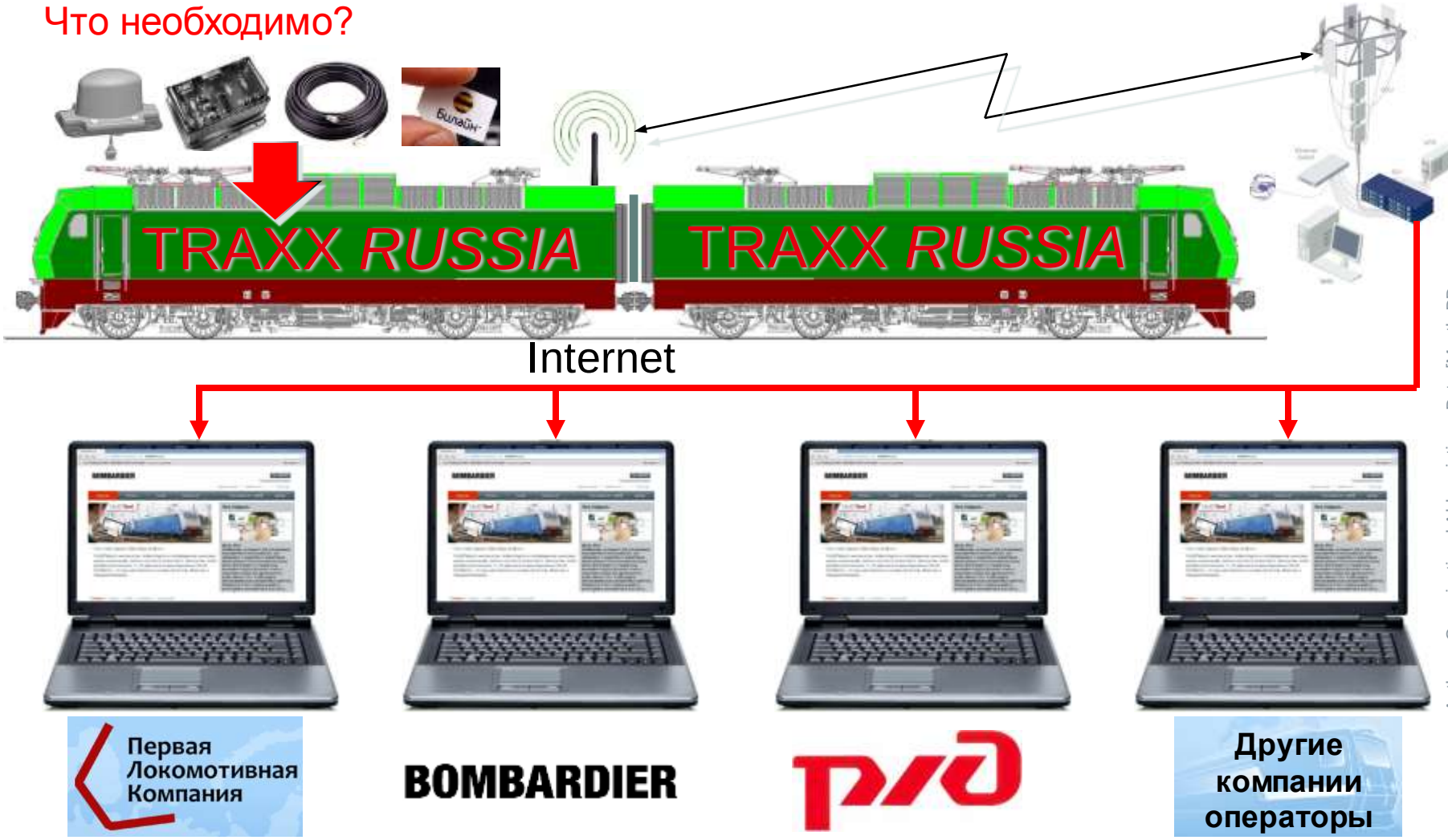
Что необходимо?



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Как подключиться?

Для подключения к серверу MyBTfleet необходим персональный компьютер, планшет или мобильный телефон

Необходима точка доступа в ***Internet***

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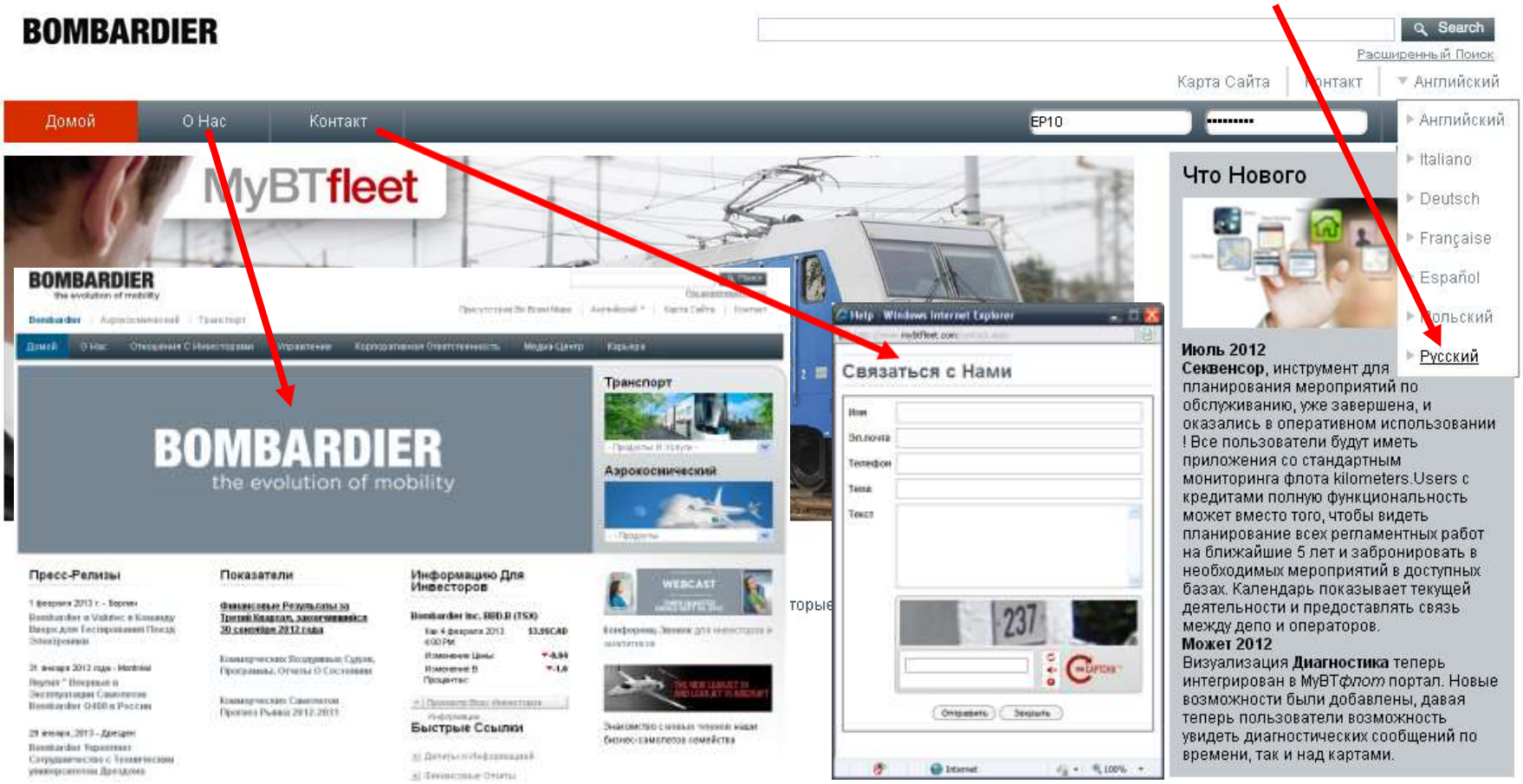
Главное меню MyBTfleet и язык

Для выбора языка общения необходимо подтвердить ▸ Русский



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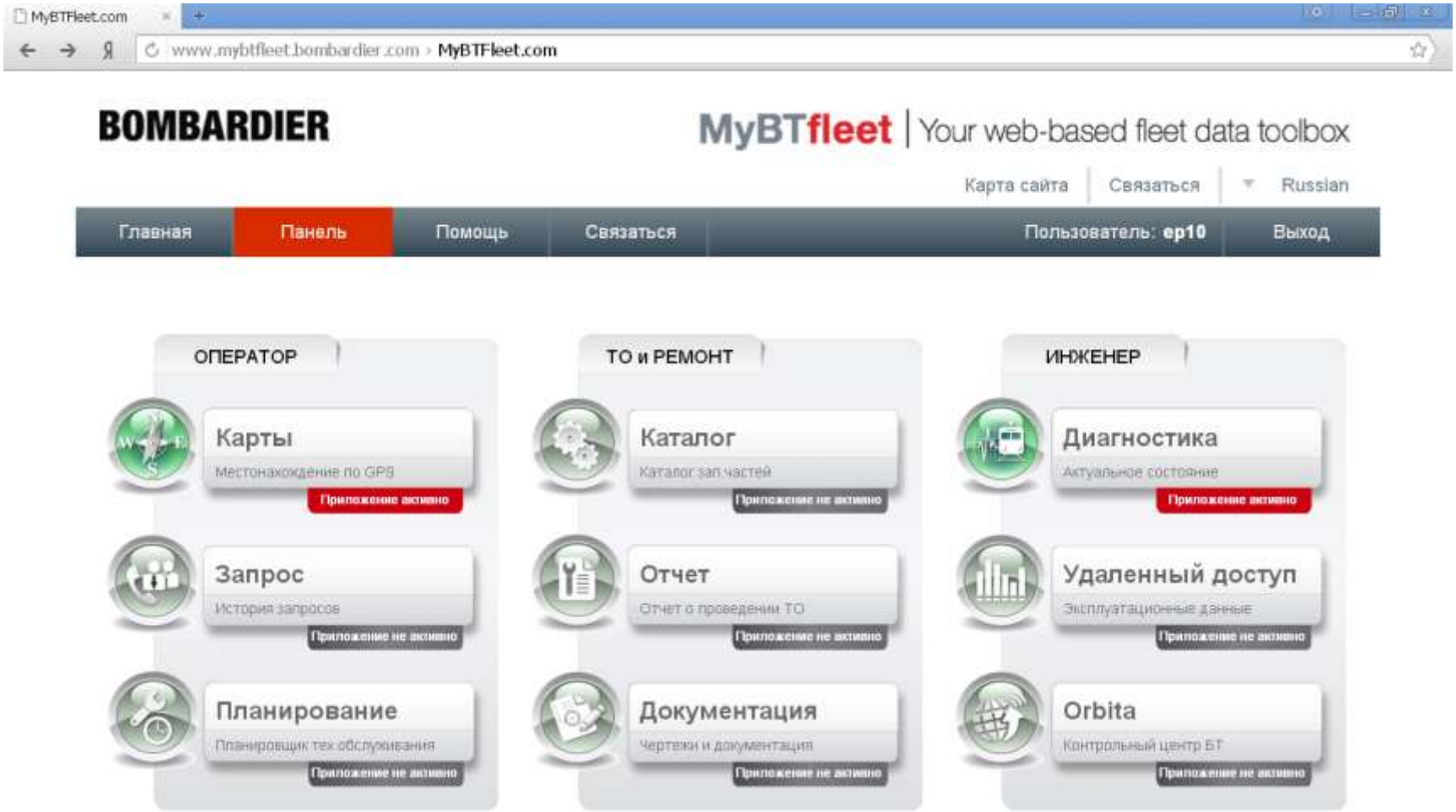
Панель инструментов MyBTfleet



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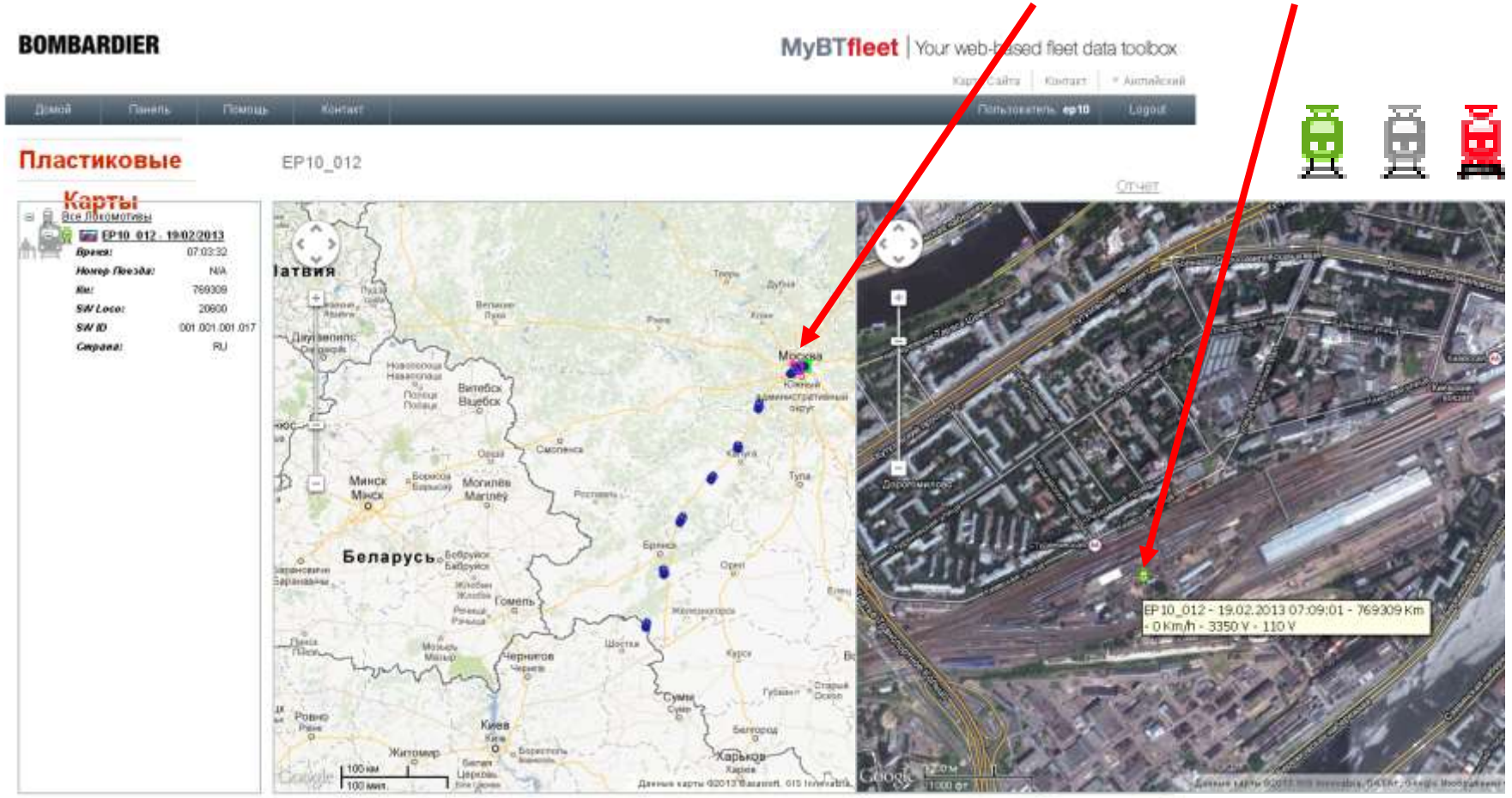
Место нахождения локомотива

Для просмотра необходимо выбрать меню Карта или Спутник



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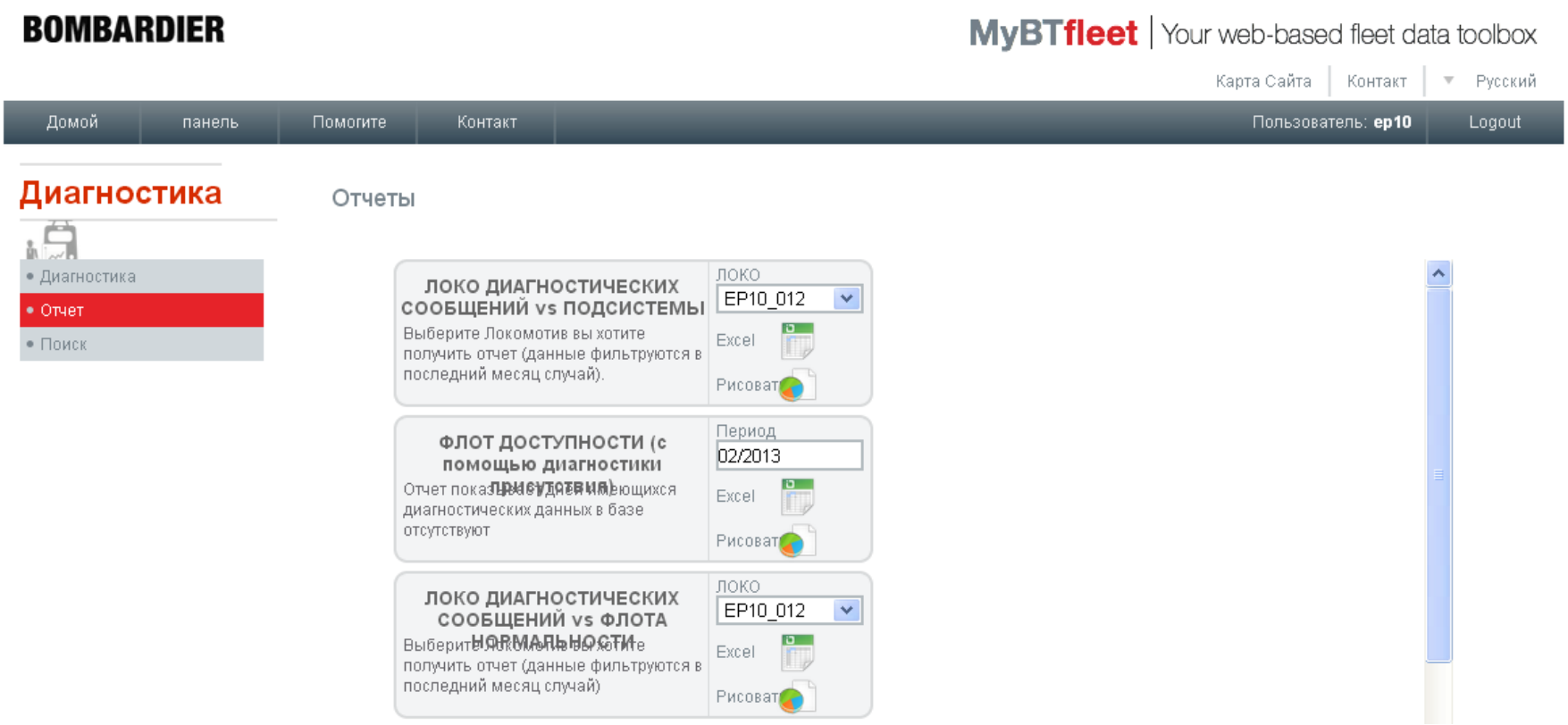
Отчеты диагностики состояния локомотива

Для просмотра Отчетов диагностики состояния локомотива необходимо выбрать один из вариантов



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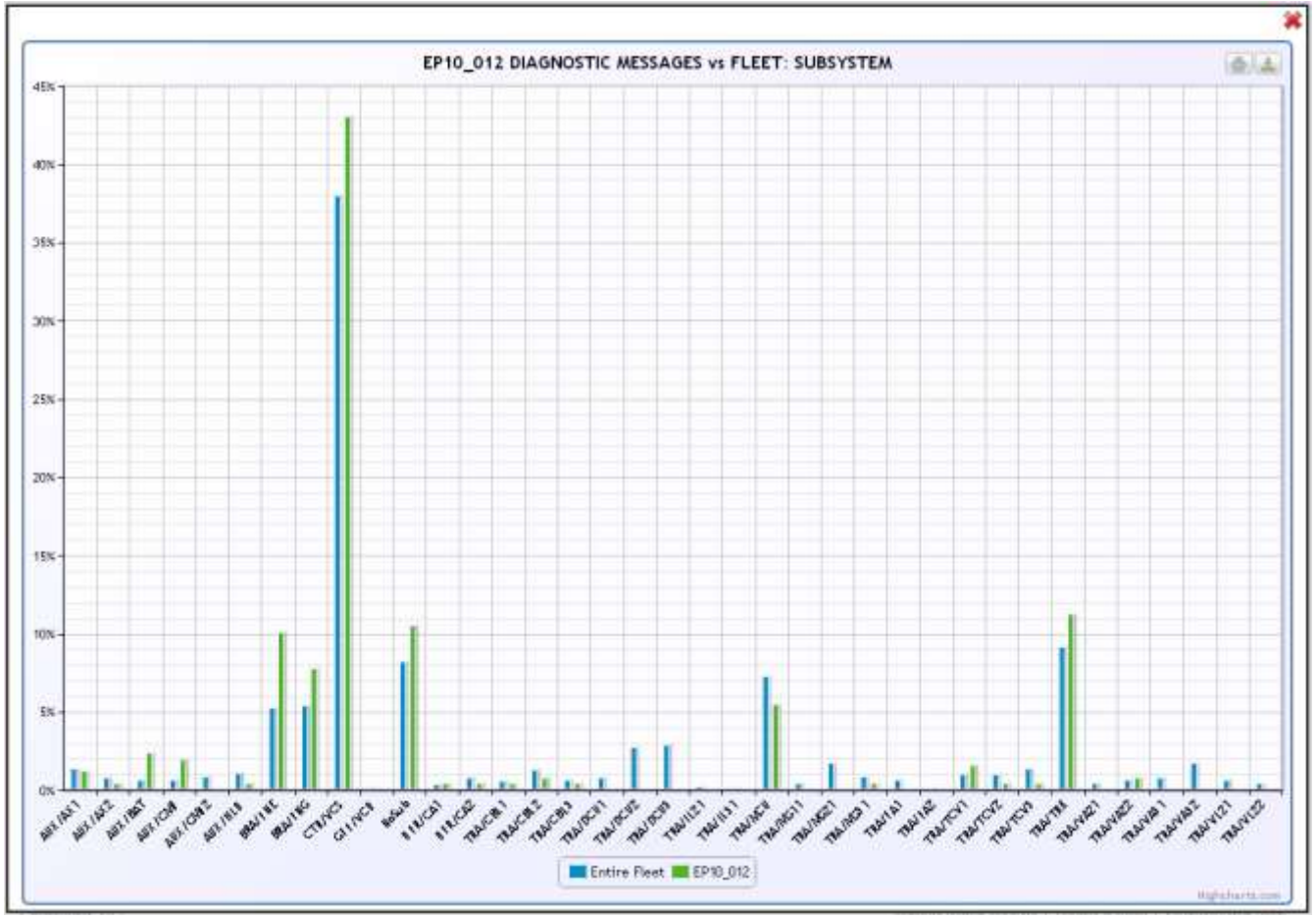
Графическое отображение информации диагностики состояния локомотива



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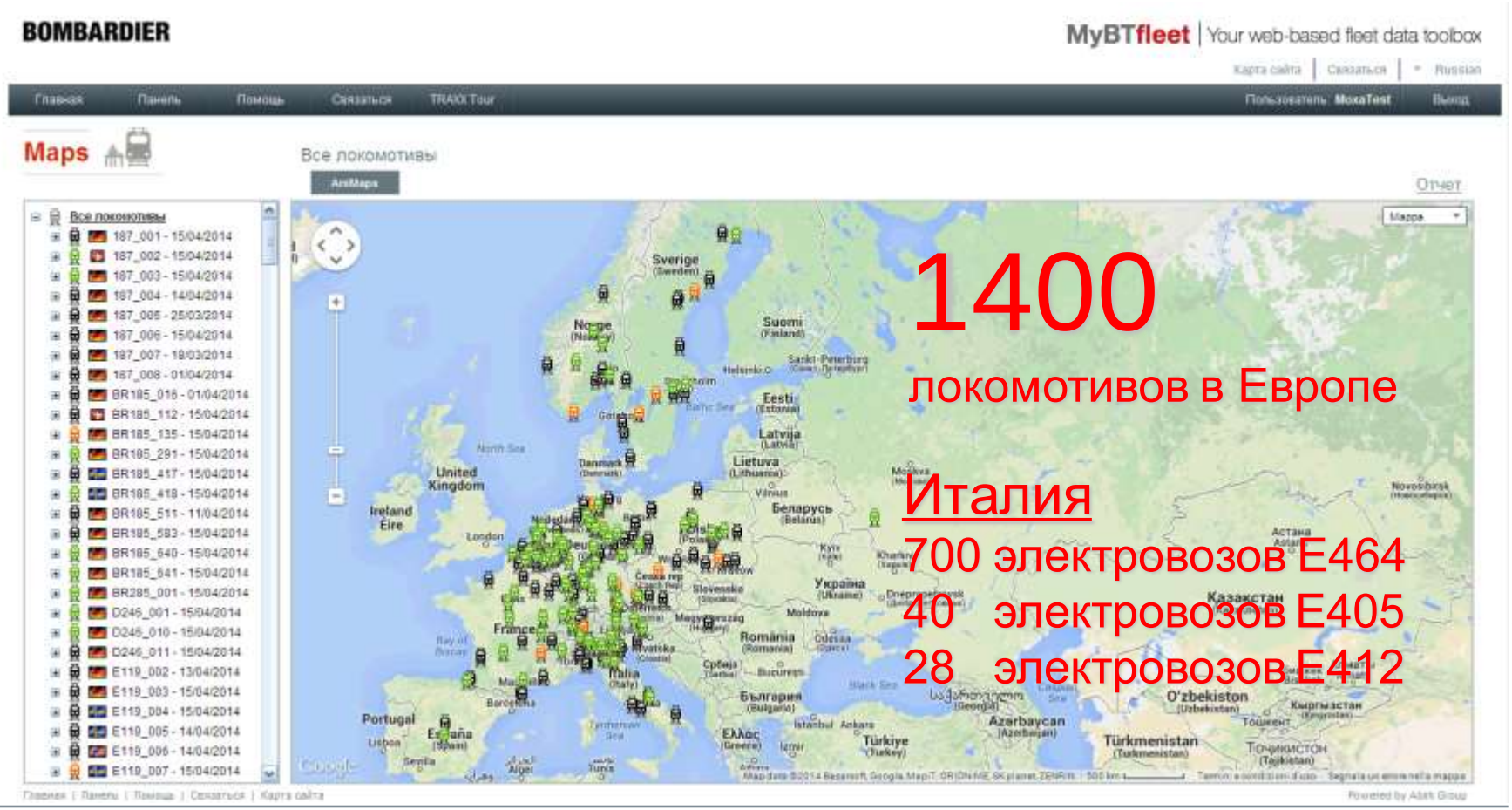
Online - состояние парка локомотивов B в странах Европы



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Ваша veb-база парка локомотивов. Пример – Италия

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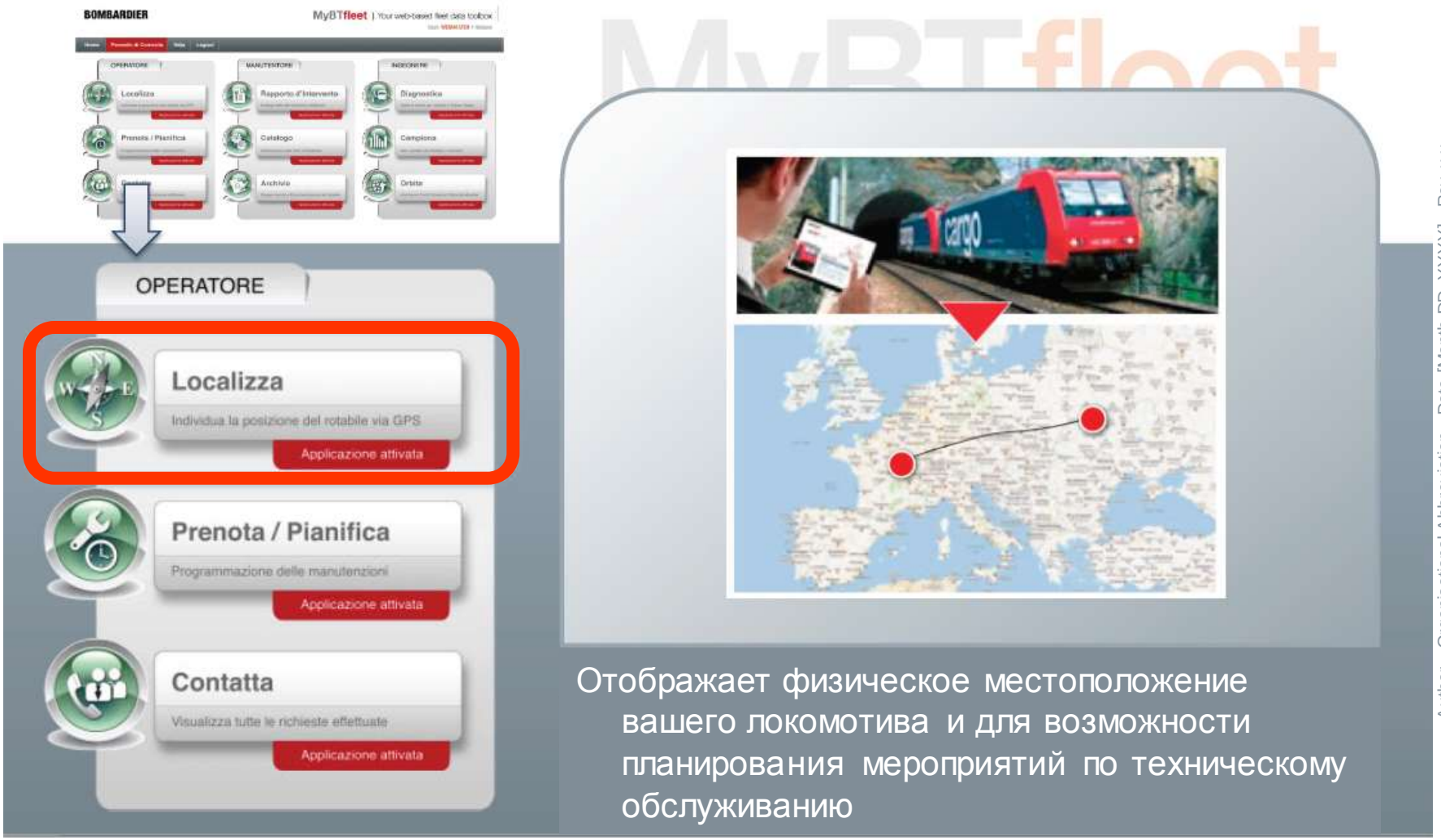

Отображает физическое местоположение вашего локомотива и для возможности планирования мероприятий по техническому обслуживанию

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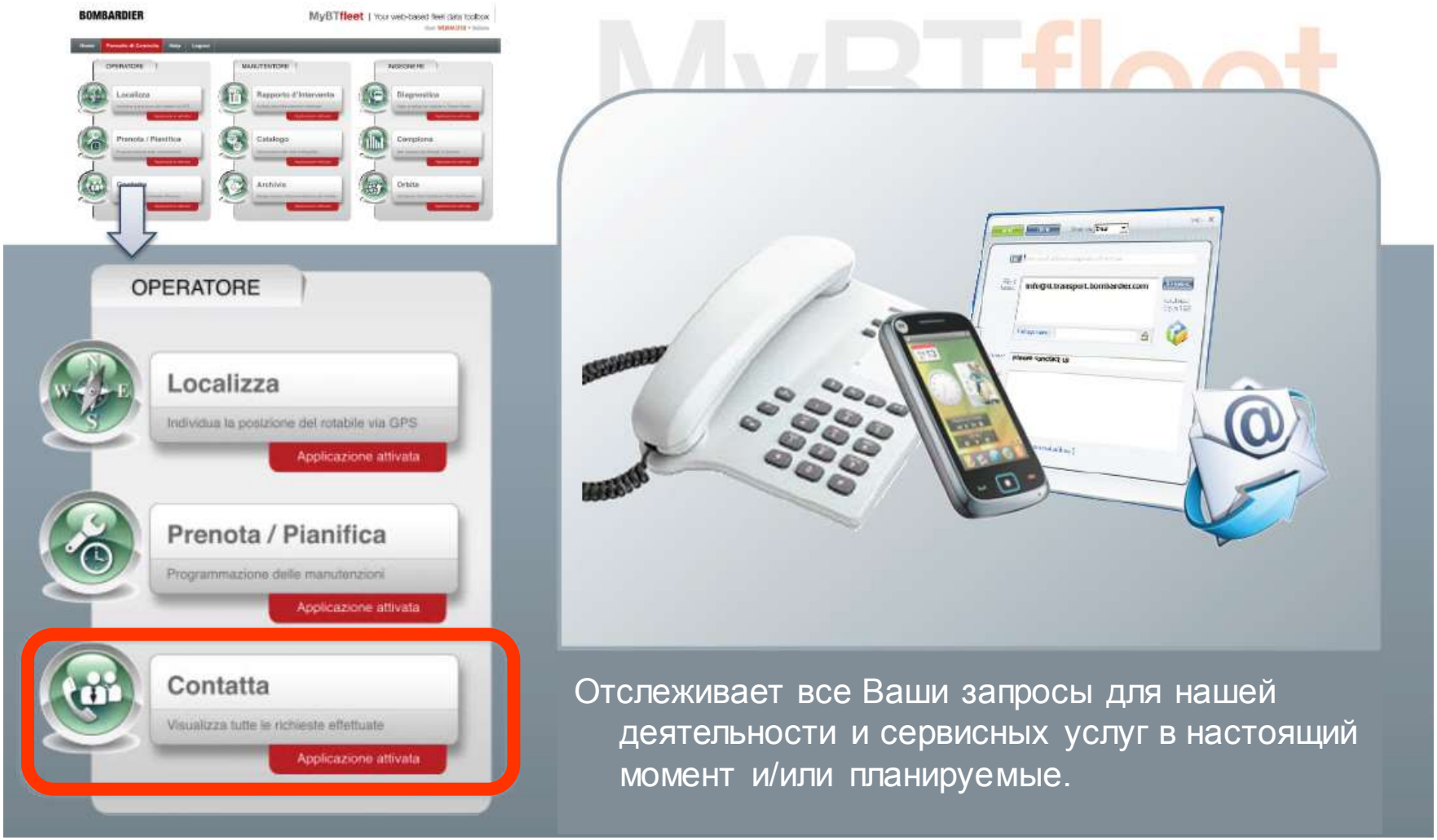

Отслеживает все Ваши запросы для нашей деятельности и сервисных услуг в настоящий момент и/или планируемые.

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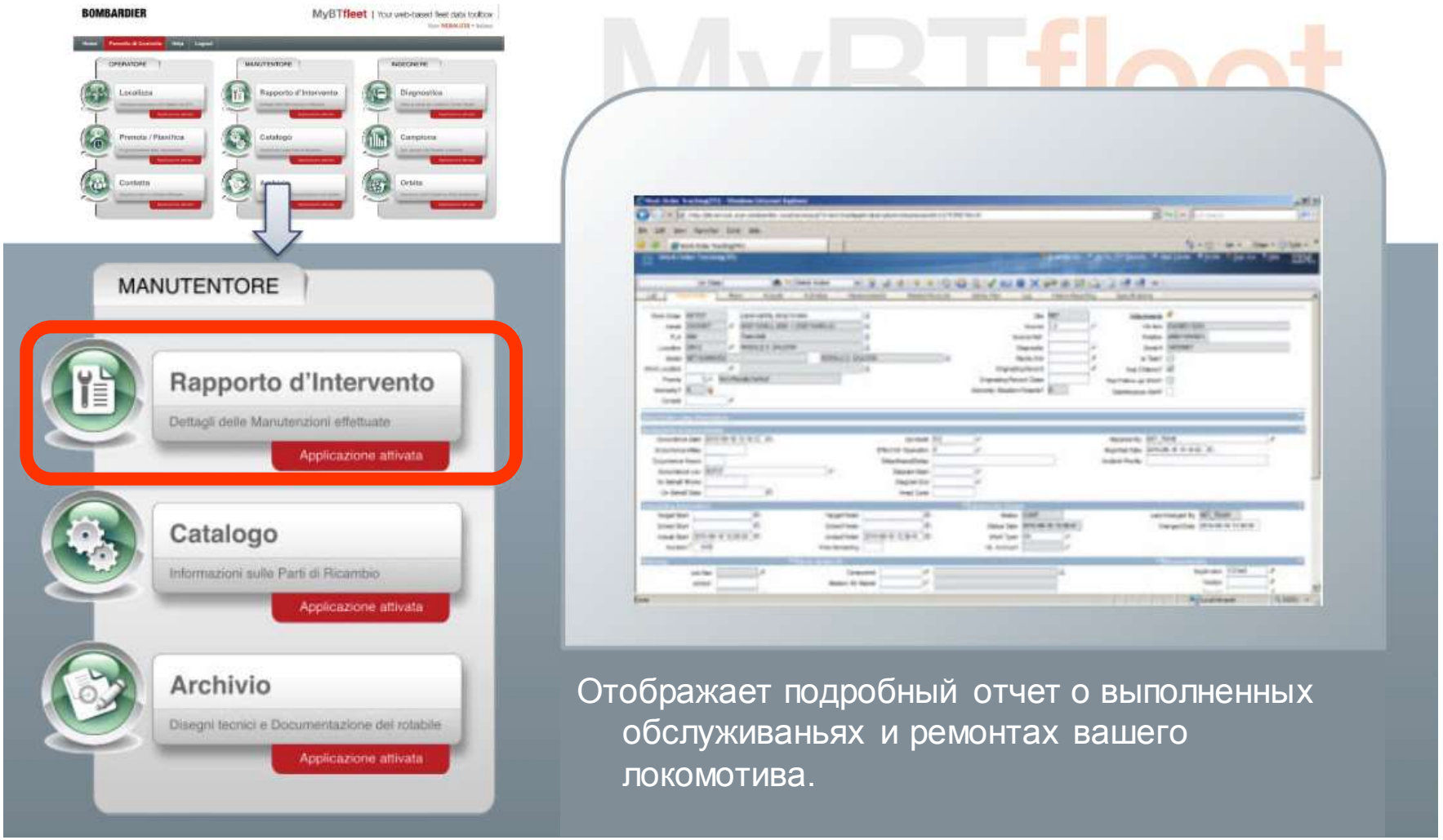

Отображает подробный отчет о выполненных обслуживаньях и ремонтах вашего локомотива.

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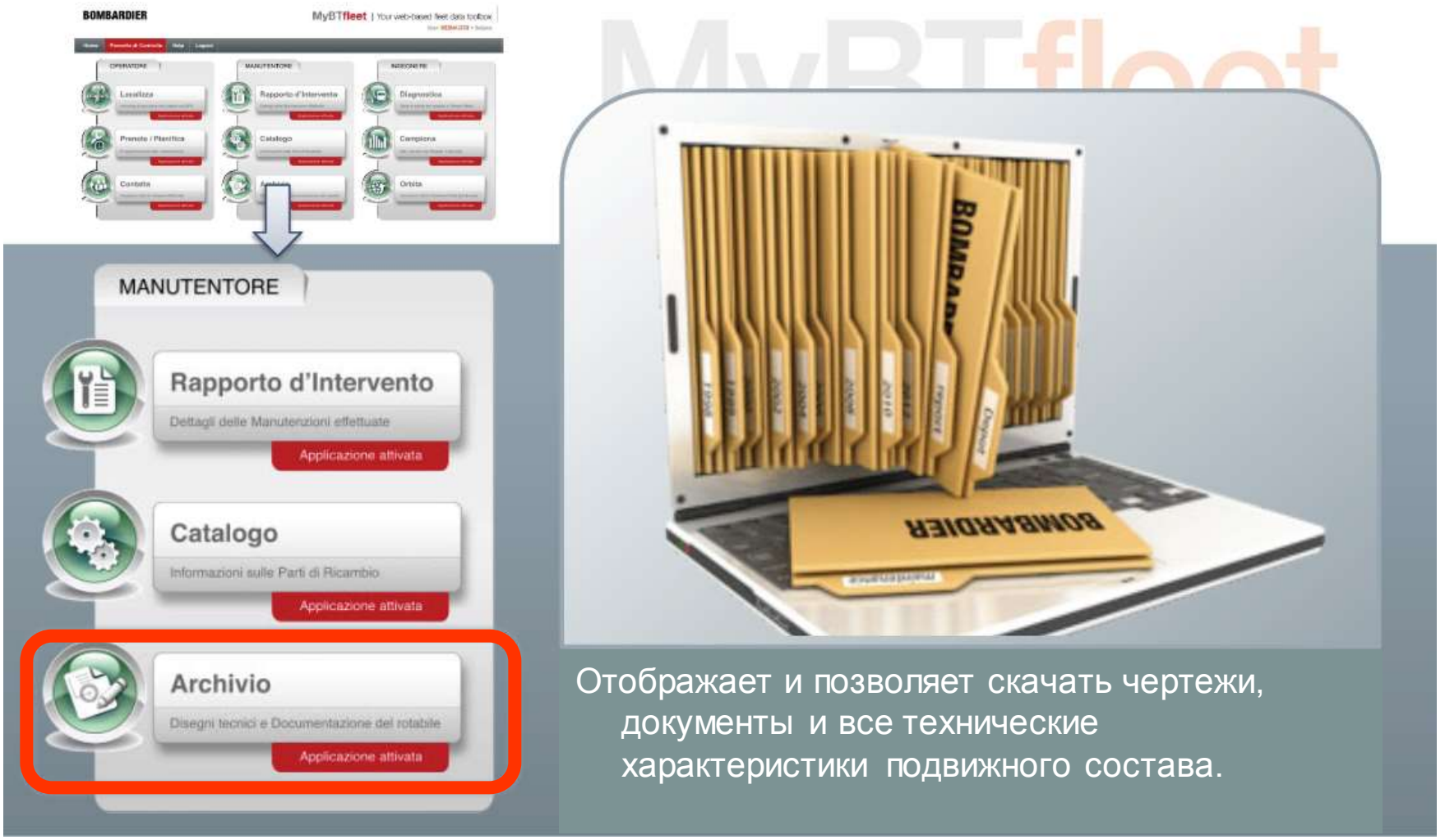

Отображает и позволяет скачать чертежи, документы и все технические характеристики подвижного состава.

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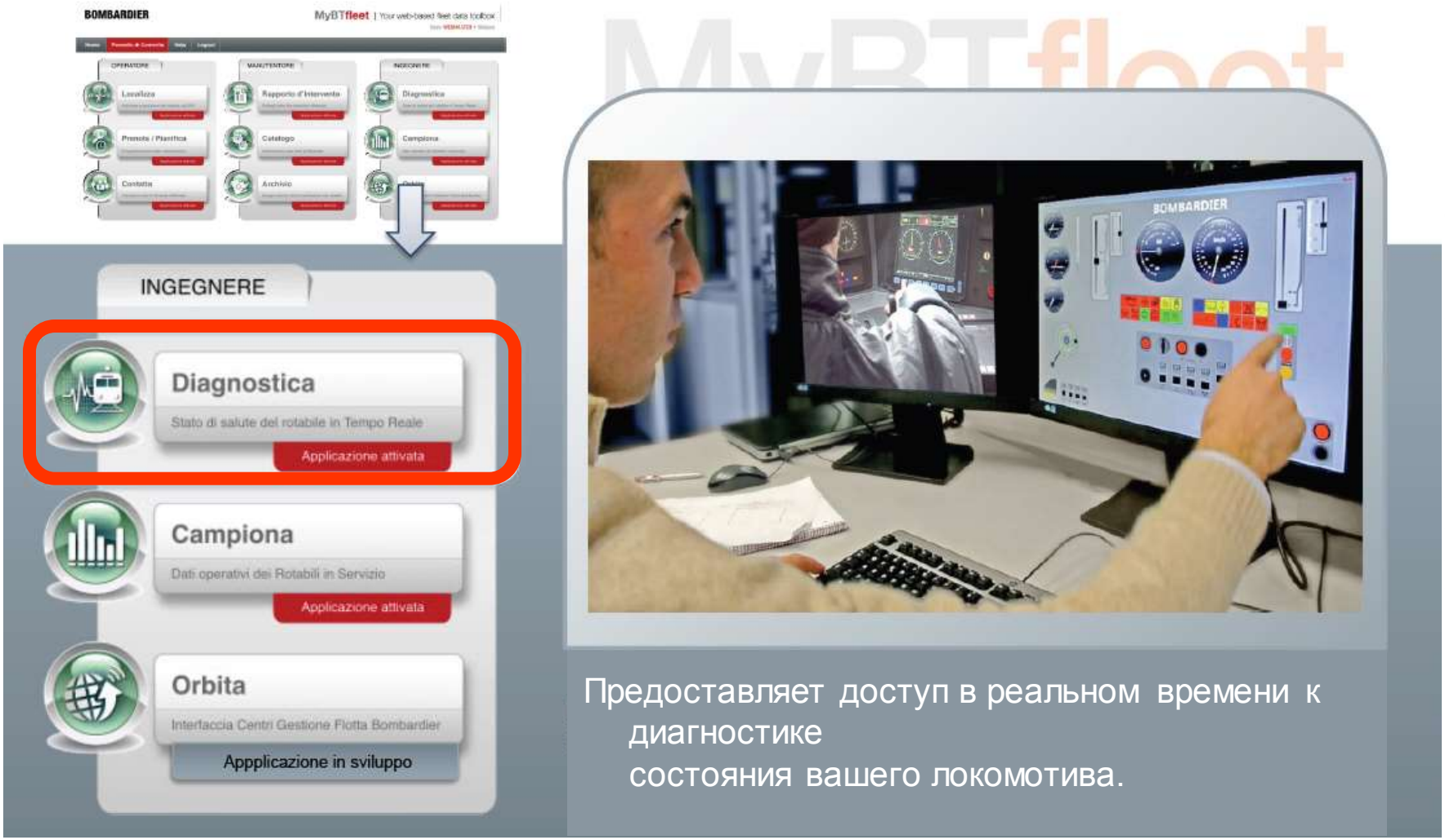

Предоставляет доступ в реальном времени к диагностике состояния вашего локомотива.

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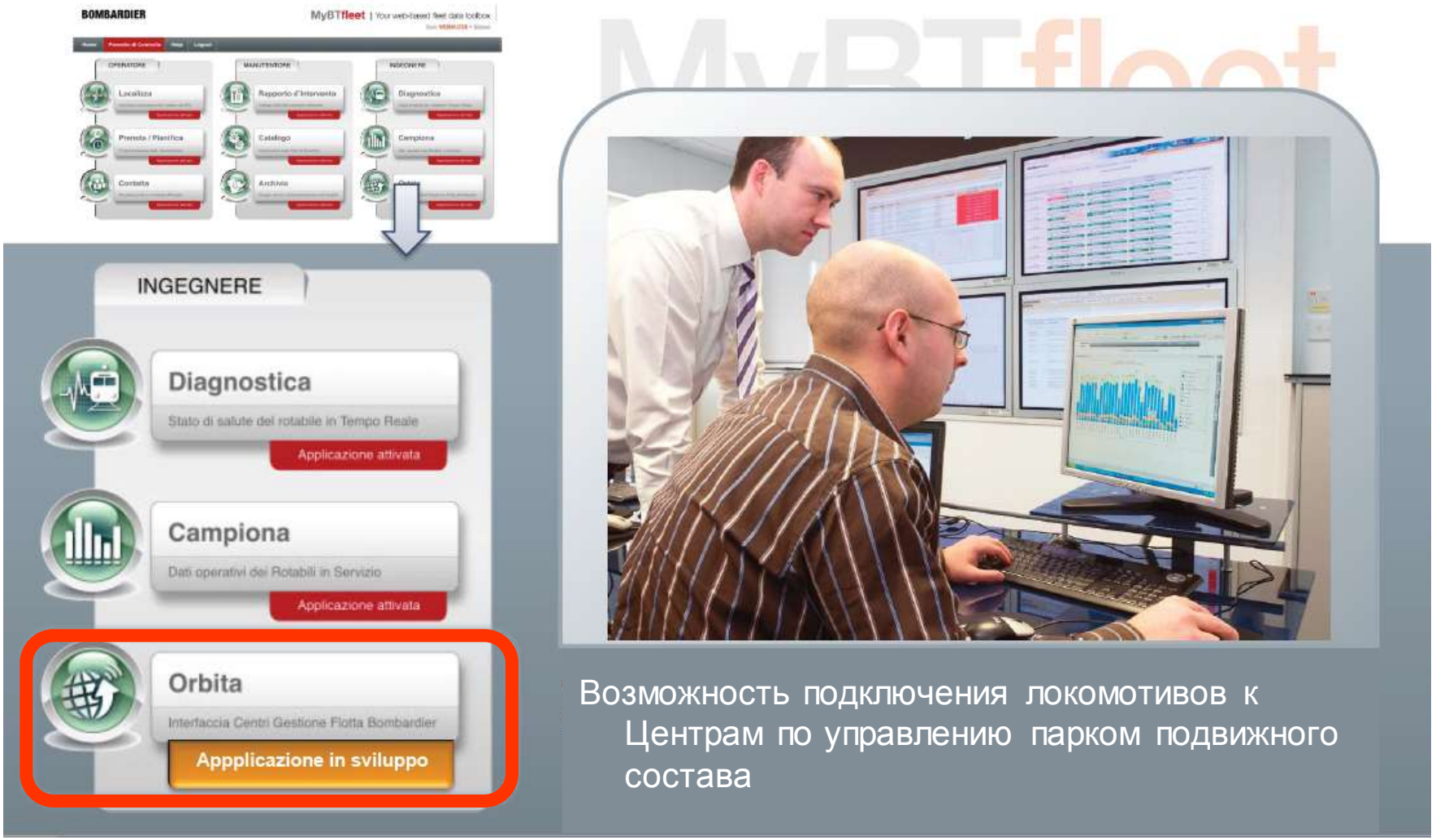

Возможность подключения локомотивов к Центрам по управлению парком подвижного состава

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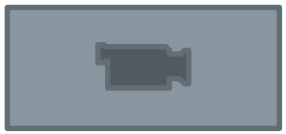

Video on Fleet Management

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Workshop/Homework

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Workshop/Homework on Digital Technologies in the Railway Industry

- Form teams of 10 members each and nominate one leader per team

- Each team to work on the following 4 tasks
  - written results to be handed in by 31st January 2016 (contact to follow)

- My second lecture in Q1/2016 will focus on reviewing and reflecting on your presentations

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Task # 1: Find and explain 3 best practises/showcases for digital technology success stories in the railway industry

Best Practise #	Detailed Description
1	
2	
3	

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Task # 2: Possible Use of Digital Technologies in Railway Industry/Fleet Maintenance

Possible Area of Use	Target/Reason of Use	Expected Measurable Results	Remarks

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Task # 3: Prepare a SWOT analysis of digital technology use in the railway industry/fleet maintenance

Best Practise #	Detailed Description
1	
2	
3	

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Task # 4: Digital technology in railway industry/fleet maintenance - what is MIIT University already doing today?

Detailed Description of past or current projects

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Thank you very much for your attention!

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Q&A

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