McKinsey&Company

Disruptive digital technologies and implications for Rail

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Market disruption

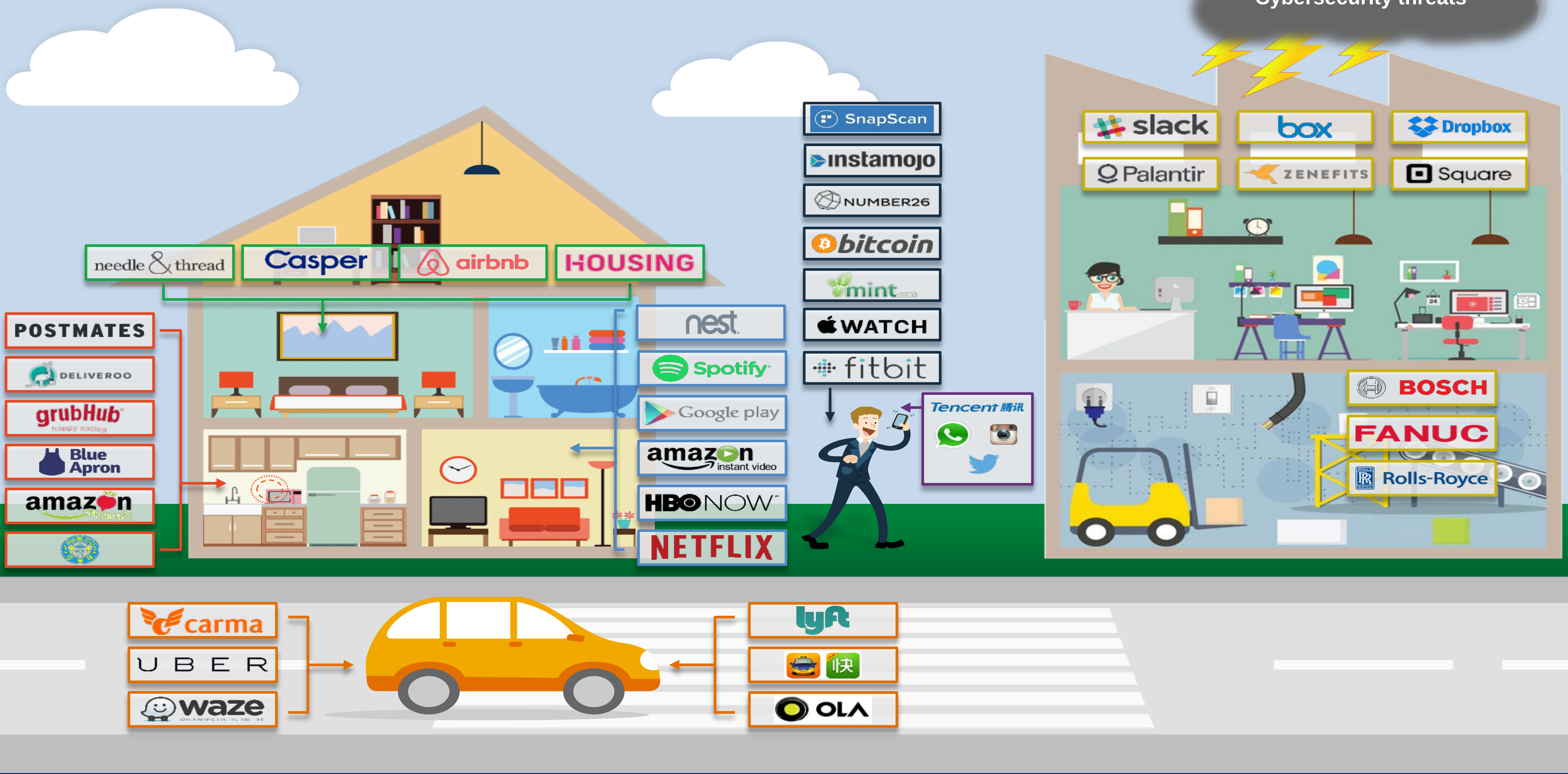
Implications for rail and transportation

How to adapt and capture the opportunity

The next 15-20 years will see unprecedented change

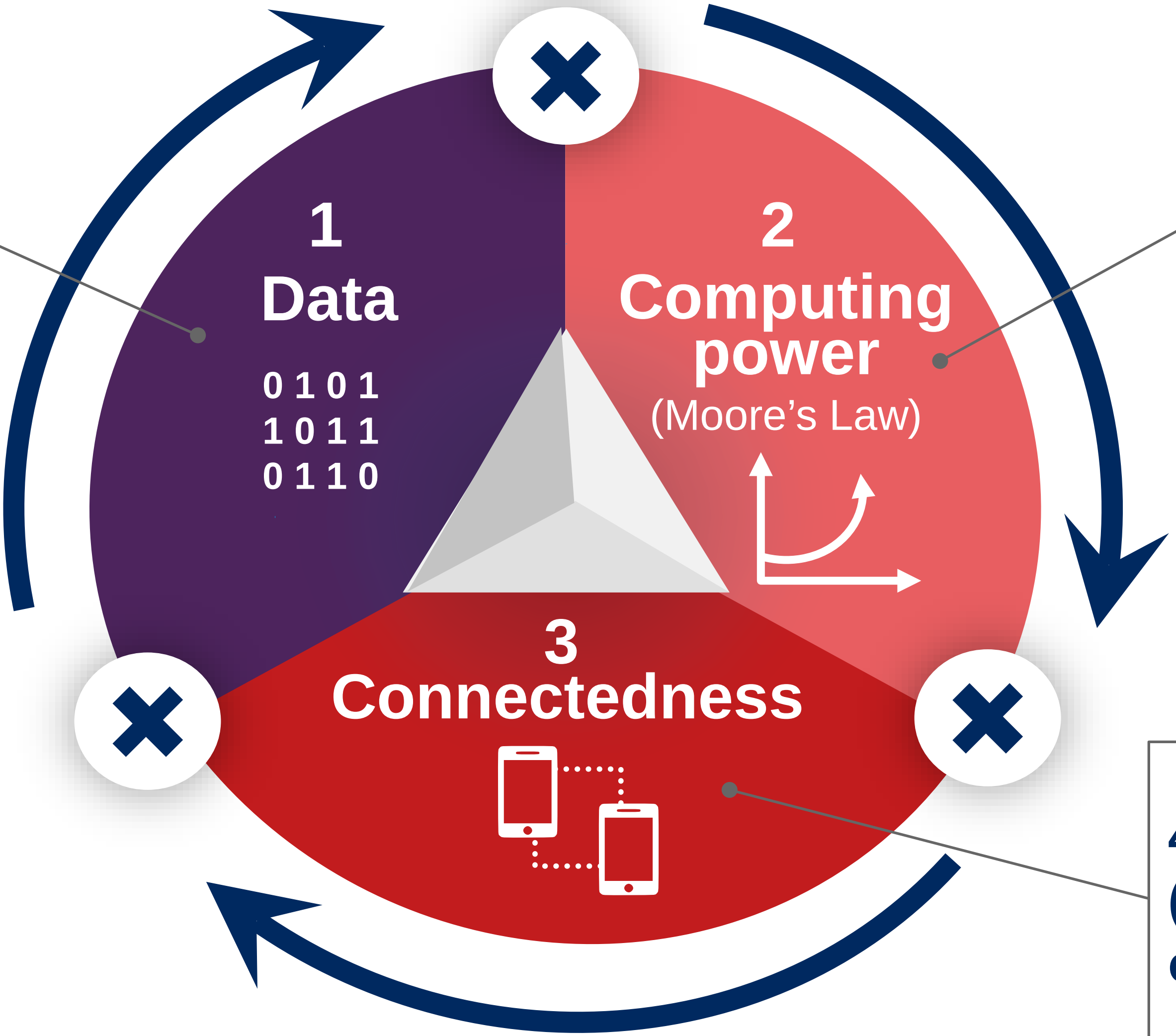
1. The rise of emerging markets
2. The power of disruptive technologies
3. The aging of the global population
4. The changing nature of capitalism
5. The return of (geo)politics

Technology is disrupting every aspect of our lives



3 major drivers of digitization

Every 2 days, we create as much data as we did from the dawn of time to 2003

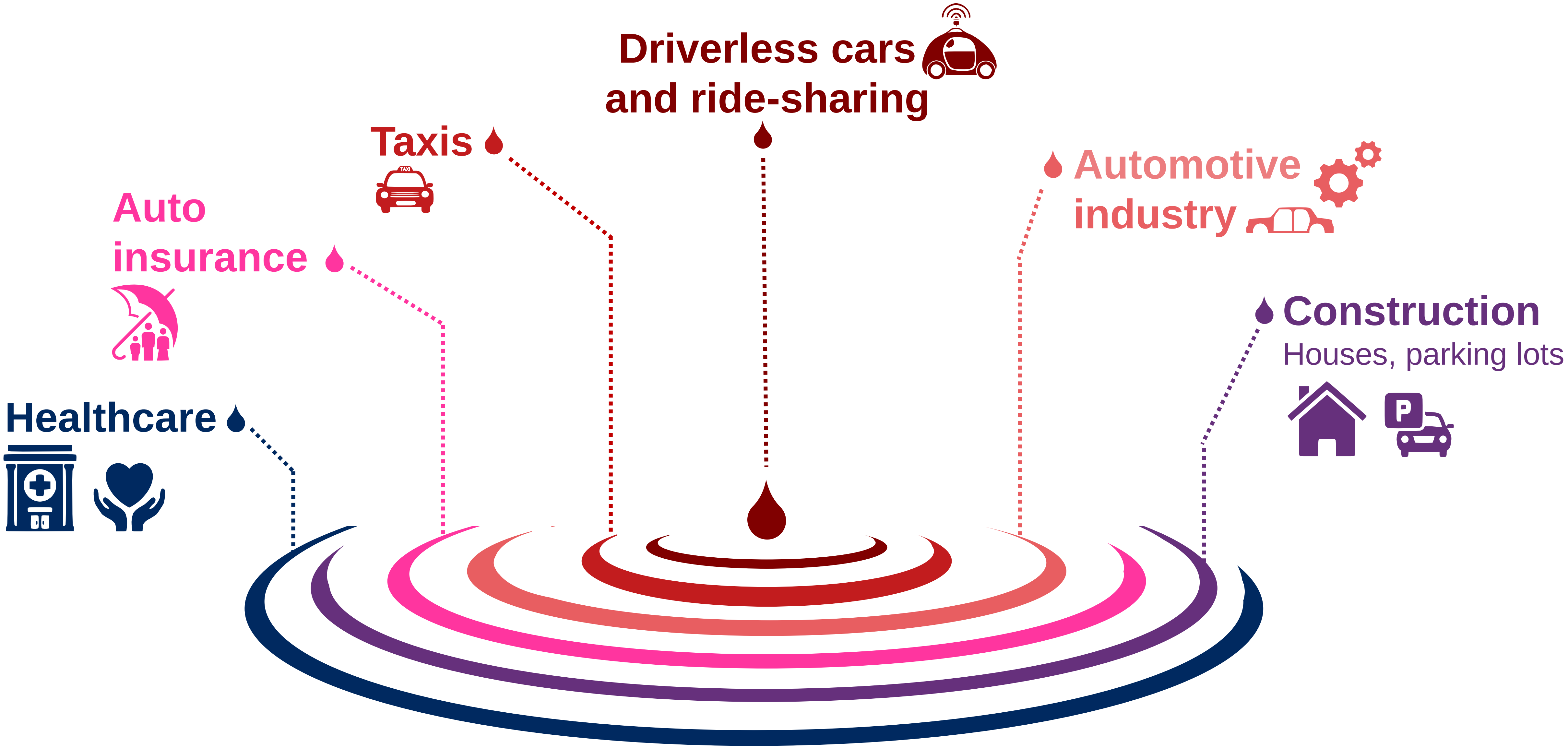


A modern washing machine has more computing power than Apollo II

40% of the world (3.2B people) are online

Digitization has significant ripple effects

DRIVERLESS CARS EXAMPLE



New technologies are upending some "fundamental truths" of business

Disrupting companies:

What we used to believe:

What we used to believe	Disrupting companies
Need to own assets to leverage their value	airbnb
Marginal costs > 0	
Core services need to be delivered by own employees	UBER
Competitors take years to emerge and scale	Spotify
Disruption comes largely from within your industry	TESLA

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Digital technologies offer big opportunities to improve existing businesses

BANKING EXAMPLE

Automation and new work flows	**100% digitalized acquisition of new customers with simple products**
New channels	**More than 3.3 million Swedes have tested the mobile service Swish**
Involvement of and adaptation to customers	**Over 50% of sales and customer support is being done online, with real-time feedback**
Increased predictive knowledge through ”big data”	**Banks can predict when a customer is in need of advice regarding, e.g., loans**
Increased transparency	**Transparency on internal cost structures**

SOURCE: McKinsey Global Institute

Digital technologies offer big opportunities to improve existing businesses

WHAT IT MIGHT MEAN FOR TRANSPORTATION

Automation and new work flows	**Step-change in efficiency of work- and information flows**
New channels	**Omni-channel access to information across all modes of transportation**
Involvement of and adaptation to customers	**Real-time information on traffic- and shipment status accessible by all end-users**
Increased predictive knowledge through ”big data”	**Predictive maintenance across all asset types based on real-time sensor data**
Increased transparency	**New data sources provide much better cost and quality data** (from automated workflow tools, new channels, remote monitoring tools)

SOURCE: McKinsey Global Institute

Real-time monitoring and predictive maintenance are setting a new standard for cost efficient rail reliability

DIGITAL IN RAIL

Siemens EUR 560' 14-year maintenance contract for 26 Velaro E high-speed trains between Madrid and Barcelona sets new benchmark in terms of punctuality of trains:

- **>99.9% on-time rate (10 min)**
- **Ticket refund if train is +5 min delayed**

State-of-the art predictive maintenance leads to:

- Extremely high reliability and availability of trains
- Cost efficient service delivery from optimized utilization of staff and extended lifetime of parts

Realtime monitoring of operating conditions (e.g., bogie vibrations, temperature data) – with 66 sensors/train

Codified **data transfer** via GSM

Computerized maintenance management system (CMMS)

E.g., tempera-ture based anomaly detection

Proactive ordering of **spare parts**

Demand-oriented management of **personnel** and **sites**

Prolonging repair intervals based on current condition of vehicle

When booking a Thalys ticket, various door-to-door options can be integrated

DIGITAL IN RAIL

THALYS

Connecting rail travel

The **"all Belgian train stations"** (ABB) fare makes it possible to continue travel with any Belgian train or to travel from any Belgian station to a Thalys station for a small surcharge. This fare can be booked on the Thalys Web site

Rental car at destination stations

Using **ThalysDrive**, travelers can rent a car from Europcar at their destination stations for EUR 49. Rental is limited to 5 hours, but can be extended by the hour

Taxi at destination stations

First-class passengers can order a **taxi** on board the train (only possible in Paris or Brussels).

Passengers are picked up from the train in the Paris or Brussels station and brought to the taxi

- The traveler receives information **and booking opportunities for follow-on travel** via all Thalys sales channels
- In recent years, Thalys has established **cooperations with various transportation providers**
- The focus of most offerings is demanding **business travelers**

Qixxit is a information portal for multiple transit companies, providing real-time info and ability to book travel

DIGITAL IN RAIL

Qixxit

Objective

Qixxit recommends an optimal mix of all types of transportation in line with the user's preferences (e.g., "fast," "inexpensive") along with current circumstances

Current offering

- Qixxit is available on its own Web site and smartphone apps
- Users can eliminate certain transportation options from search results
- Real-time information on rail and road traffic
- Booking requests are forwarded to partners

Future improvements

- Additional transportation types and partners
- More convenience and support functions
- Friends feature
- Planning for group and business travel

Partners (selection): DB, AVIS, StadtRAD Hamburg, FlixBus, Sixt, BetterTaxi, berlinlinienbus.de

Digitalization of customer interface can also optimize internal processes

	Customer pain points:		Digital improvement opportunities:
	Toilet not working, heating/cooling not working, trash in the carriage, graffiti, etc.	❯	Real time feedback from customers and potentially possibility to solve on the spot with “mobile cleaning crew”
	Over-crowded trains	❯	Potential to monitor people in trains and suggest alternative options ahead of time for other traveller Use big data to better predict peak travel and increase number of train carriages/sets
	Unforeseen changes in schedule	❯	Based on actual starting point and destination, provide new time table and best route to reach destination Limit number of significant delays (+30 min) to avoid paying out refunds by modeling number of people on each train and the optimal economical actions

SOURCE: McKinsey

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How companies can adapt

1. **Prepare for disruption**
   Create full “map” of opportunities; study the environment broadly; drive efficiency aggressively

2. **Think deeply about strategic control points and new business models**
   Take an attacker’s view of your business; reflect on potentially new industry boundaries

3. **Experiment and innovate at speed**
   Crowd-source ideas; focus on “minimum viable product”

4. **Redesign the organization**
   Cross-functional innovation processes; more agile ways of working; two-speed IT

5. **Invest more in talent and capability building**
   Re-think recruiting; subsidize up-skilling programs for employees; instill culture of lifelong learning

6. **Anticipate and manage risks**
   Incumbent business loss; cybersecurity

Questions to bring home…

Do you have a good understanding of how you can leverage digital – and are you proactively shaping your industry?

Do you have the management, capabilities and culture required to succeed in a digital world?

What changes do you need to make in how the company operates?

How can the board be a challenging and value-adding partner to management on this journey?

Thank you

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