Rail industry survey:
Major challenges facing rail operators, maintainers & owners and the role of ICT

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A recent survey conducted by Nomad Digital amongst rail operators, maintainers and fleet owners shows that operational and maintenance costs, and providing high quality service and information to the passengers, are the biggest concerns for rail operators at present. These do not necessarily correspond with challenges of each individual business area, but highlight the awareness on various levels of the organisation of the overarching organisational goals and ambitions. Presenting a viable business case for new technical solutions to address many of the current challenges and obtaining management support is seen as the most significant internal challenge within rail companies. It also seems that stakeholders need further support in understanding the benefits of new technologies that can solve many of the organisations issues, perhaps as they are less directly connected to the cost drivers.

Nomad Digital believes that “connectivity” and on-board networking of the many on-board systems is key to solving many of the challenges. Nomad calls it the “Nomad Networked Train”. Thanks to its common communications platform supporting multiple on-board applications, and hence enabling ‘digitally connected fleets’, previously disconnected on-board systems can report in real-time on their operational state and enable a wide variety of operational and passenger applications. By enabling an improved information flow, it allows the operator to manage fleets more efficiently, make informed decisions and react more quickly, resulting in cost savings, improved service performance and higher customer satisfaction.

The survey confirms the view that certain technologies and applications, such as remote online condition monitoring (ROCM, but also known as CBM), energy efficiency, passenger WiFi or real-time passenger information systems, will become commonplace in the near future. As the market matures, operators will start to leverage unifying connectivity platforms to include more and more operational and passenger applications to operate more efficiently, with greater knowledge, stay profitable and remain competitive.

To better understand where the greatest challenges for rail operators stood and what steps were being taken to employ connectivity, digital IP technology, networking and new IT solutions (which we will refer to for simplicity as “ICT”), Nomad Digital conducted a survey of rail industry stakeholders from throughout 2014. The objective of the survey was to see if any particular themes and prioritisation stood out. Over 60 rail industry stakeholders* responded and ranged from rail operators to maintainers, fleet owners and other rail related organisations, from all parts of the globe, but with the majority coming from Europe. Whilst some results were not surprising, others showed a degree of interest or prioritisation that was not expected.

In parallel, as “connectivity” becomes ubiquitous in virtually every home and industry, transport operators are also starting to recognise the value this can bring by connecting vehicles both to operations centres but also the large number of on-board systems. The benefits of undertaking such activity are wide-ranging and include access to on-board systems data to provide a far more up-to-date, granular and intelligent view of how their fleets are operating, to provide passengers with far better information about their journeys. These can in turn lead to significant operational efficiencies, costs savings and greater passenger satisfaction – all key metrics for modern rail operators. Hence the attention such activities are receiving within the industry, by operators and regulators alike, and the current trend of adopting new connectivity solutions on fleets.

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*Page 14 provides more information on the respondents.
3 What are the biggest challenges facing your company at the moment?

Response summary:

- **Operational and Maintenance Costs** is #1 concern closely followed by Operational Efficiency which reflects similar concerns.
- **Improving Information for Passengers** ranked second equal, highlighting the growing sentiment that more can be done to reduce passenger anxiety when travelling and hence improve satisfaction.
- The next tier of challenges are mostly related to **Operations** in terms of rolling stock availability and how to improve traffic on the rail system, but **Energy Costs** scores highly, undoubtedly driven by the focus of regulators to see greener fleets in operation.
- Operations and cost-related challenges account for 70% of the scores.
- Organisational and Market challenges make up a small part of the overall score.

![Figure 1: Biggest Challenges Facing Rail Operating Companies (% of responses). Multiple responses allowed.](image)

![Figure 2: Problems Faced by Rail Operating Companies (% of responses). Multiple responses allowed.](image)

4 Within your specific area, what are your three biggest challenges?

Response summary:

- **Cost Control** is the biggest challenge for respondents by some margin.
- Thereafter, there is not a direct correlation to the company priorities shown in the previous question.
- **Service Quality** is #2. This could be both passenger and operations related, but shows that "quality" is clearly a key metric within the respondents’ organisations.
- Passenger WiFi, Introduction of New Technologies and Train Comms indicates selection and implementation of “connectivity” solutions are a current focus.
- Project planning and delivery is a recurrent theme.
5 What actions are required to overcome your three biggest challenges?

Response analysis:
• 4 of the top 6 actions relate to business support. A lack of management understanding or acceptance of the required actions and finding a suitable business case are clearly the most significant barriers to overcome.
• Technology and support for identifying suitable solutions including for legacy systems accounts for 33% of the total score. The challenge here is to find the right solution to the problem and not necessarily that a technical solution does not exist.
• Other barriers such as obtaining train owner permission is not seen as significant.

6 Your plans: connected train (& WiFi)

Response analysis:
• By 2016, 65% of respondents plan to provide WiFi to passengers. This will rise to 75% by 2019. 60% expect to provide content over WiFi within 5 years.
• Similarly, e-ticketing will soon be part of everyday passenger experience on over 50% of respondent’s fleets by 2016.
• By 2016, 40% plan to implement a "universal LAN" compared to 35% for "vehicle LAN management", but the latter scored more highly in terms of it being part of its business vision.
• Whilst only 22% of respondents planned to implement "operational application hosting" by 2016 a highly significant 33% had it as part of their business vision.
• Automated passenger counting scored surprisingly high with 55% planning to implement it within the next 5 years.

Key
Planned = committed investment in the next 1-2 years
Business Vision = expecting to invest in the next 5 years
Strong Business Case = only likely to invest with a strong business case
Desirable = defined but yet to discover a viable business case

Figure 3: Actions Required to Address Main Challenges (% of responses). Multiple responses allowed.

Figure 4: Perception of WiFi and Communications Solutions among Railway Operators.

Rail industry survey
7 Your plans: passenger information (PIS) & infotainment

Response analysis:

- Unsurprisingly, Passenger Display and Audio Announcement solutions are the most prevalent today.
- Real-time PIS/infotainment either via displays or via WiFi scores highest as planned and desired implementations, including the provision of “content”, showing a notable shift in the market from more traditional solutions.
- The proportion of PIS projects seeking a viable business case, whilst low, is higher than we expected. Clearly funding for such solutions is not as high a priority for these TOCs or the pressure or support from regulators is not as great as we expected.

8 Your plans: telemanagement* solutions

Response analysis:

- Data loggers are the most widespread existing telemanagement solutions today.
- Remote Online Condition Monitoring (ROCM), data abstraction and live on-shore data analysis are the most committed to solutions for future implementation.
- ROCM, energy metering and driver advisory solutions also rank highest in terms of respondents’ business keen to implement but unable to find a suitable business case.
- This indicates the seriousness by which operators view ROCM as a major tool to overcome poor reliability, process inefficiencies and hence cost savings.
9 Your plans: CCTV

Response analysis:

- Only 43% of respondents have CCTV on board their trains today and 28% have connected forward facing cameras.
- 15% plan to implement connected (i.e., live) CCTV and 15% plan to implement automated download of recorded CCTV by 2016. Furthermore, for both, 10% stated it was part of their business vision.
- 30% of respondents are looking for a suitable business case or state it as desirable to have real-time CCTV access.
- Of the 4 surveyed technology areas, CCTV showed the highest score for "no interest."

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10 Budgets & primary influences for investment

Response analysis:

Budgets

- From the survey results, it is difficult to generalise what proportion of the budget is allocated to the three types of costs - fleet operations, management, and energy - as, clearly, budget allocations depend on the nature of the operator and fleets in operation.

Influences for Investment

- Unsurprisingly, passenger satisfaction is the main innovation driver among railway operators. 60% of respondents name it the strongest influence for investment in technology in their companies.
- Cost savings and limited budgets, operational efficiency, regulations and executive vision were all evenly scored at circa 40% as the trigger for innovation.
- Interestingly, "meeting company KPIs" was the lowest influencer, but perhaps this is seen as purely an output.
11 Summary

By 2016 only a few technologies exceeded 50% scoring for implementation likelihood, but unsurprisingly these were mostly PIS (notably incl real-time PIS), WiFi and cctV. Data loggers was the only telemanagement technology at this level of priority.

By 2019 the story is considerably different with over 23 of the 28 listed technologies planned at 50% or higher. telemanagement dominates this list of new technologies being implemented indicating a growing emphasis on addressing maintenance costs.

Of the technologies where a suitable business case was still being sought or was desirable, connected/real-time cctV, implementation of a universal LAN and real-time/connected PIS/infotainment via passenger WiFi, topped the list.

In summary, the survey shows that focus on addressing passenger needs is the number one operator concern today, but that the importance of operational efficiency and cost savings will dominate their investment programmes.

12 About Nomad survey: Respondents background

The Nomad survey was conducted via an online survey in May and June 2014 among the management of railway carriers, train builders and maintainers, and supporting organisations in order to get first-hand insights into the challenges facing modern train operators, actions taken to address them, operators’ technological needs, budget allocation and current technology priorities.

Respondent background

- Company. Out of the total of 63 respondents, more than half (56%) work at a Train Operating Company, a third (33%) at a rolling stock maintainer and 11% at Train Owners or Other.

- Area of work. Most of the respondents (39%) work in engineering and 27% in a commercial or marketing function. The majority of the respondents (39%) work in engineering which may account for a strong focus of the responses towards operational savings, although it should be noted that Executive Team respondents also supported such a focus.

- Location. Majority of respondents (79%) work in Europe – a third of all in the United Kingdom. 6% of the respondents come from North America, another 6% from Asia Pacific (Australia and Japan), and 2% from Africa. We were unable to classify 6% of the respondents.
13 The networked train philosophy

The rail market today is made up of a vast array of vehicle types, ranging from aging analogue vehicles to extremely complex new high speed trains. Sometimes irrespective of age there still exists a large number of disconnected devices and systems on-board, which operators have no visibility of.

Nomad’s vision is built around the concept of a single communication platform shared by all non-safety critical systems – we call it the “Nomad Networked Train”. Nomad believes that all systems whether analogue, digital, legacy or new, should be able to share data, self-analyse and trigger events that are relevant and share this with other systems, operations centres and maintenance depots to allow operators to make intelligent decisions and optimise their operational activities, ranging from maintenance practices, to dynamic passenger information and lowering energy consumption.

Every solution that Nomad implements is build around this connectivity platform, so that it is easier to scale and add new applications and features as demands change.

These applications could include:

- **Real-Time Passenger Infotainment Systems:** shows passengers the status of their journey in real-time, informs of any disruptions to their trip and keep them entertained
- **Telemanagement:** lowers operating and maintenance costs
- **Ecodriving & Energy Monitoring:** optimises driving techniques and reduces energy consumption, even when trains are not in service
- **Real-Time CCTV:** enables live management security events and the internal and external train environment
- **Automated Passenger Counting:** indicates train load dynamically for passengers and operations centres
- **Passenger WiFi:** connects passengers to the Internet, rail operators to their customers and used to convey travel information.

THE NETWORKED TRAIN

Internal CCTV
Passenger information & infotainment
Passenger WiFi (internet) & portal
Application hosting

External CCTV
Passenger loading /counting
Automated location mgt

Unified data presentation
Back-office system interfacing
Data processing analysis & mgt
Robust off-train comms

Condition Based Maintenance
(CBM), integrated with Reliability Centered Maintenance (RCM) methodologies
Remote Online Condition Monitoring (ROCM)

Managed LANs
Safety critical system interface
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