Back on track

Supporting the development of a 21st century rail network

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Foreword

Making the shift to a 21st century rail network

When it comes to major developments in passenger transport, the next decade looks set to be the decade of rail.

The opening up of the market, the investments in high-speed rail infrastructure and increasing demand from travellers are fusing to create the conditions for rapid market growth. Combined with the vision set out in the EC whitepaper, Roadmap to a Single European Transport Area, the stage is set for rail companies to take pole position.

Nonetheless, the pace of market development requires a greater focus on how best to maximise the current and future opportunities and break down any barriers to fulfilment. From our discussions with rail companies, one area threatening to hold back progress is technology. Many rail companies are still reliant on legacy systems that are not able to support them in implementing operational changes as quickly as their commercial strategies demand.

It was recognition of this reality that prompted us to commission this paper.

This paper explores the role of technology and outsourcing in helping the rail industry to free itself from the constraints of outdated legacy systems. It explores what the new frontier of rail travel will herald and how advances in distribution and IT can facilitate the further globalisation of the sector.

Drawing on the insights and expertise of Professor James Woudhuysen, we hope that this paper promotes new thinking and stimulates discussion about how best to capitalise on the abundant opportunities present in the rail sector over the next few years.

While we recognise that none of us have all the answers, we encourage you to read this paper and we look forward to hearing your thoughts, perspectives and insights on many of the issues raised over the coming months.

Thomas Drexler
Director, Amadeus Rail.

About the author

James Woudhuysen, a physics graduate, is Professor of Forecasting and Innovation at De Montfort University, Leicester. In 1979, when editing Design magazine, he wrote a cover story on Glasgow's underground; when head of research for the designers Fitch, he ghost edited British Rail design (Danish Design Council, 1986); when he led consulting in IT at the Henley Centre for Forecasting, he contributed the first of 17 articles in a special issue of the Proceedings of the Institution of Mechanical Engineers devoted to rail ('Who are tomorrow's passengers and what do they want?', IMechE, 1993).

For clients including BA, BAA and British Rail, James helped lead a pioneering multi-client study on e-commerce in 1988, going on to be manager of worldwide market intelligence at Philips Consumer Electronics in the Netherlands from 1995 to 1997. More recently his clients have included ARINC, Brother, BT, France Telecom, Microsoft, O2, Sage and SAP. James is also the author of several books, including: Why is construction so backward? (Wiley, 2004); Energise! A future for energy innovation (Beautiful Books, 2009), and Big Potatoes: the London manifesto for innovation (Thinking Apart, 2010).

Taking the high-speed train from Sevilla to Cordoba on his last birthday, James confesses to enjoying the journey almost as much as the cultural and culinary delights of those two noble cities. Some of his favourite films are also celebrations of the railways, including Josef Von Sternberg's The Shanghai Express (1932), Alfred Hitchcock's The 39 steps (1935), The lady vanishes (1938), Strangers on a train (1951) and North by North-west (1959), and Sergio Leone's Once upon a time in the West (1968).

Note: This white paper draws on the author's earlier look at airline IT, It makes sense to share, Amadeus, October 2005. The views expressed here are entirely those of the author.

1 Executive summary

High-speed rail networks have grown, and airline users are mixing flights with rail more and more. For today's commercially complex, cross-border and intermodal rail, rail companies should adopt a more progressive approach to IT. That way they can focus on delivering a great rail service, not on the fundamentals of IT.

Certainly rail firms need to raise their game in IT if high speed and established rail are to become the method customers prefer for travelling. Done right, tomorrow's IT will raise productivity, cut costs, and give the whole customer experience of rail a new sense of romance and ease.

Done wrong, tomorrow's rail IT could have very negative consequences. As routes and rail companies multiply, passengers may feel overwhelmed by too many options, especially on multi-country rail trips. For rail to be coherent rather than chaotic, rail firms need carefully to reconsider their practices in IT.

Every rail company now needs to be able to compete creatively with every other rail company – and with airlines, too. At the PC, at the station and especially with mobile, the applications each rail firm offers and the interfaces each makes available promise to be key differentiators in the marketplace. So rail firms need to extract themselves from infrastructure IT, and focus on their main business: punctuality, ride quality, safety, and building their brands – in part, through the deployment of IT at the front-end.

Over the past 15 years, sharing an outsourced community IT platform has allowed many rival airlines to make this move. Obviously, rail IT is very different from airline IT. Nevertheless, the record in airlines strongly suggests that rail needs to look at, understand, anticipate and align its business strategies to customer habits.

Treating passengers as multi-faceted customers

The breakthrough for rail will be to organise IT not by journey, but by individual customer – identified by ticket, mobile device, credit card or loyalty card. Through comprehensive customer management systems, rail firms can understand all the customer's very personal travel habits, identify all the revenue opportunities on his or her journey, cut hassle, and improve the customer's experience of service and brand. In this way, rail firms can understand their evolving preferences, and so adopt a very precise approach to marketing and fares.

Whether it's booking tickets, baggage handling or interlining with airlines, rail IT must now offer complete customer journeys. The new IT will also help establish what Amadeus calls the Modern Station – railway terminals fit for the 21st century.

Time to move from legacy systems to a community platform

Often based on code written over 30 years ago, legacy systems have become complex and inflexible due to many hard-coded fixes over the years. This makes it hard and expensive for rail companies to fund or focus on innovation and thus evolve in a flexible and cost effective way compared to companies that have invested in a modular standardised system. The investment required to move over to proprietary open systems is enormous, and companies often don't have the in-house expertise to implement the complete overhaul that is needed.

In every industry, one of the earliest and simplest ways to outsource was to hand over computers and data processing to an outside supplier. After that, the next step was to give the supplier responsibility for the development of applications – a move that cut the number of in-house staff busy with apps.

With a community platform, outsourcing goes a step beyond the farming out of infrastructure and applications development. In the community approach, a third party expert develops and hosts applications which many companies share in common, so as to reap economies of scale and cut costs. For the rail industry, these new systems offer significantly enhanced integration and automation of existing functionalities – for both operations and distribution. The systems handle scheduling, availability, inventory, reservations, fare quotations, ticketing and loyalty programmes. Crucially, a community platform offers standards and interoperability between different rail companies, and through ticket sales with other transport modes. This in turn makes it easier for travellers to buy any rail product by smoothing out the complexity from each rail companies specific booking process.

It is by applying their own business rules that rail companies can handle passengers in ways that continually support their business needs. In this new paradigm, operational staff can change and amend those rules. That means that the system is able to respond rapidly to both customer and market demands.

With a community platform, rail firms don't just shrug off expensive legacy systems by outsourcing their IT to a third party. On top of that, they join their partners and rivals in using an IT platform which is hosted by a third party, but which they all help govern. They share some common functions – mainly, those around regulation and code sharing. Yet they also build their own, private applications.

Outsourced IT governed by a community of competitors may sound utopian. But in fact its success in practice contradicts those theorists who are too fearful of outsourcing. It's a riposte, too, to those sceptics who are too cynical about multi-firm cooperation. Finally, it's a challenge to those unable to see, or unwilling to admit, that perhaps as much as 90 per cent of the basic operations of two companies operating in the same sector are often very similar, even if they compete with each other.

Far from forcing all participants to be the same, a community platform frees each participant to focus on its own priorities. Companies using the system share the same tools – but they don't share the ways in which they use those tools.

Outsourcing has proven merits

With the rise and rise of globalisation, anxieties about outsourcing have receded. Experience has been gained. Lessons have been learned. Why, after all, should a railway company be expected to develop a core competence in, say, application software development? Planned and managed properly, outsourcing IT processes and basic applications frees up clients to be more innovative, not less.

Whatever you do about outsourcing IT, don't just work with a specialist in IT – work with an IT provider with genuine experience and understanding of your business and sector.

Shared services make for differentiation

With basic functions outsourced to a service shared by rival operators, there will be renewed pressure for those operators to differentiate their offers. In fact, the whole promise of a community platform in rail IT is to allow each rail company not just to collaborate with others on the building blocks of IT, but also to go its own way in how it interprets customer expectations, delivers the services – including IT services – to meet those expectations, and presents interfaces that really endear its brand to customers.

Uphold the potential in IT

Critics of IT now argue that it is dumbing us down, or that it is dividing us. Worse, a series of assaults on major computers at companies such as Lockheed and Sony has fanned fears about the security of IT. Finally fears about privacy look set to dominate debate about and action in IT for some years to come.

To the extent that difficulties around security and privacy really exist, they are best handled with the help of a common platform, with industrial-strength security systems and common rules on how to deal with problems. Yet something much more critical than security and privacy is all too easily forgotten: the underlying impetus that innovation in IT makes to the productivity of organisations, and to the convenience met with by customers. IT is much more a progressive force for modernisation than it is a dangerous threat to personal freedom.

Back on track

On the railways as elsewhere, executives spend much of their day controlling costs, worrying about risk, and fire-fighting. They do not always have the time they need to bring about genuine innovations – innovations that will have a durable impact in the long term.

The new generation of rail IT should help provide more of that time.

It's a moment for rail companies sloughed off the grisly bits of IT and focused on those bits, and on those uniquely railway competencies, that will make rail the preeminent means of travel in decades to come.

It's time rail companies got back on track.

2 Introduction

All over the world, high-speed rail networks have stretched out to reach new places. Also, millions of airline users now travel part of their journeys by rail. These two trends have made for new alliances between different rail companies, and new alliances, too, between rail interests and airlines.

This White Paper is about what needs go happen next. In a new world of commercially complex, cross-border and intermodal rail travel, firms in the field need to adopt a more professional and modern community platform in IT.

For decades, railways have lagged behind airlines in their use of IT. Tomorrow, however, things could turn out differently. Because of shake-ups in the world's rail business, and because also of advances in IT, rail companies now have the opportunity to surpass the airline industry's longstanding sophistication in booking systems, ticketing, boarding, passenger information, pricing, seating, baggage handling and services on the move.

It makes sense for each rail company to take advantage of the very latest hardware, firmware and software. But it also makes sense for each not to re-invent the wheel in IT. Through the adoption of a common, always-progressing platform in IT, rail companies can:

- **Overcome the barriers that the proprietary approach to IT always erects**
- **Offer customers the through ticketing that they want**
- **Ally with each other with relative ease**
- **Compete with and ally with airlines**
- **Meet the high expectations that customers now have of rail brands.**

Through a community platform, rail companies can jointly economise on IT. At the same time, such a platform fully allows each participant to develop its own branded, high-level and competitive tools in IT.

Above all, outsourcing IT to the providers of a common platform will allow rail companies to concentrate their innovation efforts on the business they are really in – the rail business, not the nuts and bolts of IT.

That way, they can get back on track and focus on the overall allure of rail travel.

Railways have lagged behind airlines in their use of IT. Tomorrow, however, things could turn out differently

3 Grounds for optimism about the future of rail-air journeys in one go

The moment has arrived for rail companies to raise their game in information technology.

Rail is expanding, and working more than ever in tandem with airlines and road transport. In fact, air travel for intercontinental journeys, supplemented by high-speed rail to and from airports and onward to major cities, will more and more be a typical sequence of events in future.

The important thing now is for customers to be able to book both multi-country rail trips and rail-air journeys in one go, so as not to have to separate legs of their journey on separate websites. Customers also need to be confident that their baggage will be properly handled from track to air and back again. Altogether, rail IT needs to grow up – fast.

That's a challenge, especially in today's economic climate. However, there is little choice but to think big in rail IT, for the grandeur of rail is increasing:

- Europe already has 5600km of high-speed track in operation, 3500km under construction and 8500km more planned. [1] An EU White Paper looks forward to a tripling of the length of the existing high-speed rail network by 2030, and to the maintenance, by that date, of 'a dense railway network in all Member States'. [2] And across both high-speed and established rail, the Brussels Commission hopes that the European Parliament will adopt, in 2012, proposals from transport ministers that aim to open up access, among newcomers and alliances, to rail-related services such as maintenance, terminals, passenger information and ticketing [3]
- China hopes to create two-day high-speed rail trips between Beijing and London. Though exact routes are still to be fixed, the main link to Europe may go through India, Pakistan and the Middle East. [4] Inside China, a $300bn high-speed train system will take more than another 10 years to complete. But the new high-speed Beijing-Shanghai line, opened as this document was written, now cuts journey times from 10 to five hours [5]
- Even in the US and Brazil, where budgets are very tight, hopes are high that major links will be built: Boston to Washington, Los Angeles to San Francisco, and Rio de Janeiro to São Paulo. In the US, 22 separate projects may, in 25 years, connect 80 per cent of the population to high-speed rail. [6]

> The important thing now is for customers to be able to book both multi-country rail trips and rail-air journeys in one go

1 Figures converted from miles to kilometres, from High-Speed Rail UK, 'On board with HSR: UK', on www.highspeedrailuk.com, and 'Connectivity & economic development', on www.highspeedrailuk.com/?page_id=95

2 European Commission, Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, 28 March 2011, p9, on http://ec.europa.eu/transport/strategies/doc/2011_white_paper/white_paper_com(2011)_144_en.pdf

3 European Commission, 'Transport: New rules to establish a more competitive rail market', press release, 16 June 2011, on http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/744&format=HTML&aged=0&language=EN&guiLanguage=en

4 Stephen Chen, 'China plans Asia-Europe rail network', South China Morning Post, 8 March 2010, and Zachary Shahan, 'China wants to connect its high-speed rail to Europe (largest infrastructure project in history)', CleanTechnica.com, 13 March 2010, on http://cleantechnica.com/2010/03/13/china-wants-to-connect-its-high-speed-rail-to-europe-largest-infrastructure-project-in-history/

5 Tania Branigan, 'China tests its high-speed rail link from Beijing to Shanghai', The Guardian, 27 June 2011, on http://www.guardian.co.uk/world/2011/jun/27/china-high-speed-rail-beijing

6 US Secretary of Transportation Ray LaHood, cited in Barton Eckert, 'Amtrak secures cash for high-speed rail between DC and Boston', Washington Business Journal, 9 May 2011, on http://www.bizjournals.com/washington/news/2011/05/09/amtrak-secures-cash-for-high-seed-rail.html

In many corridors, high-speed rail has already become the most convenient modal choice for a large segment of travellers. [7] Now, however, both high-speed and established rail could become the method customers prefer for moving long distances. First, rail has intrinsic attractions to customers – especially younger ones (see box on the next page). Second, alongside established intercity services, 'long-distance' journeys by rail could mean longer than the benchmark high-speed trip of the past: two hours in duration, or 300km in distance. Indeed that benchmark has been exceeded for years now:

High-speed rail: key characteristics, 2009 [8]

Line	Average speed	Journey duration	Distance
USA: Boston-Newport News	82 km/h	12h 35m	1034 km
Italy: Turin-Naples	157 km/h	5h 45m	900 km
France: Lille-Marseille	206 km/h	4h 40m	959 km
Spain: Cordoba-Barcelona	206 km/h	4h 42m	966 km
China: Wuhan-Guangzhou	328 km/h	2h 57m	968 km

Is it too much to hope that, with the ambitious rail networks of tomorrow, disparities between different regions in a nation may, over time, diminish or even disappear altogether? And, as passengers gain a taste for country-to-country rail journeys that, involving little stress, run to two hours/300km or more, is it too much to hope that greater understanding between nations will be facilitated?

In both cases, it probably is too much. Yet with the kind of IT that's now available, the world's railways can seriously raise their productivity – not just by cutting costs, but also by improving the whole customer experience.

This will be no mean feat, for it is harder to raise the productivity of a labour-intensive service like the railways than it is to transform, say, a branch of manufacturing. Yet thanks to IT, cuts in operating costs and improvements in the romance and smoothness of rail for passengers could deliver dramatic results. Indeed, IT's power to transform the railways could make them more user-friendly than airlines.

Of course the prospect for rail isn't all rosy. Alongside the inherent opportunities that exist, there are, as the management mantra has it, threats. As state budgets for rail decline, a typical rail company may find it doesn't have enough money for investment and marketing, leaving it vulnerable to larger rail rivals, or to competition from air and road.

It's true that rail passengers will likely welcome more competition in track, operations and rail IT – including competition from China. It's also true that, in the case of the EU, a first round of deregulation in January 2010, and a second, set for 2017, should make for a more competitive and innovative regime. However, the danger exists that, as routes and Train Operating Companies (TOCs) multiply, passengers will feel overwhelmed by what American social theorist Barry Schwartz described some time back as 'The paradox of choice' – simply too many options, especially on multi-country rail trips. [9] And there's another possible impetus to fragmentation, too. If it suddenly becomes a direct operating rival of TOC A, TOC B may stop helping TOC A in IT for distribution

Altogether, a more diverse range of rail company rivals, though welcome, could lead to bewilderment on the part of passengers, and difficulties between TOCs. Deregulation could unravel in a rather irrational way. After all, when other sectors have been deregulated, the results haven't always been pretty.

Today and tomorrow, for the railways to be coherent rather than chaotic, rail companies need carefully to unify their practices in IT. That way, there can be real grounds for optimism about the future of rail.

7 Javier Campos and Philippe Gagnepain, 'Measuring the intermodal effects of high speed rail', chapter 4 in Ginés de Rus, editor, Economic analysis of high speed rail in Europe, Fundación BBVA, 2009, p87, on http://www.fbbva.es/TLFU/dat/inf_web_economic_analysis.pdf

8 Adapted from Yonah Freemark, 'New Wuhan-Guangzhou rail route shatters average speed records', The Transport Politic, 17 December 2009, on http://www.thetransportpolitic.com/2009/12/17/new-wuhan-guangzhou-rail-route-shatters-average-speed-records. Since the high-speed rail disaster that it endured in July 2011, China has lowered the top speed of its high-speed trains from 350 to 300 km/h.

9 Barry Schwartz, The paradox of choice: why more Is less, Ecco, 2003.

A final factor pushing in favour of rail is what's happening with mobile phones, tablets and laptop computers

Why customers may gravitate to rail – and what that means for rail IT

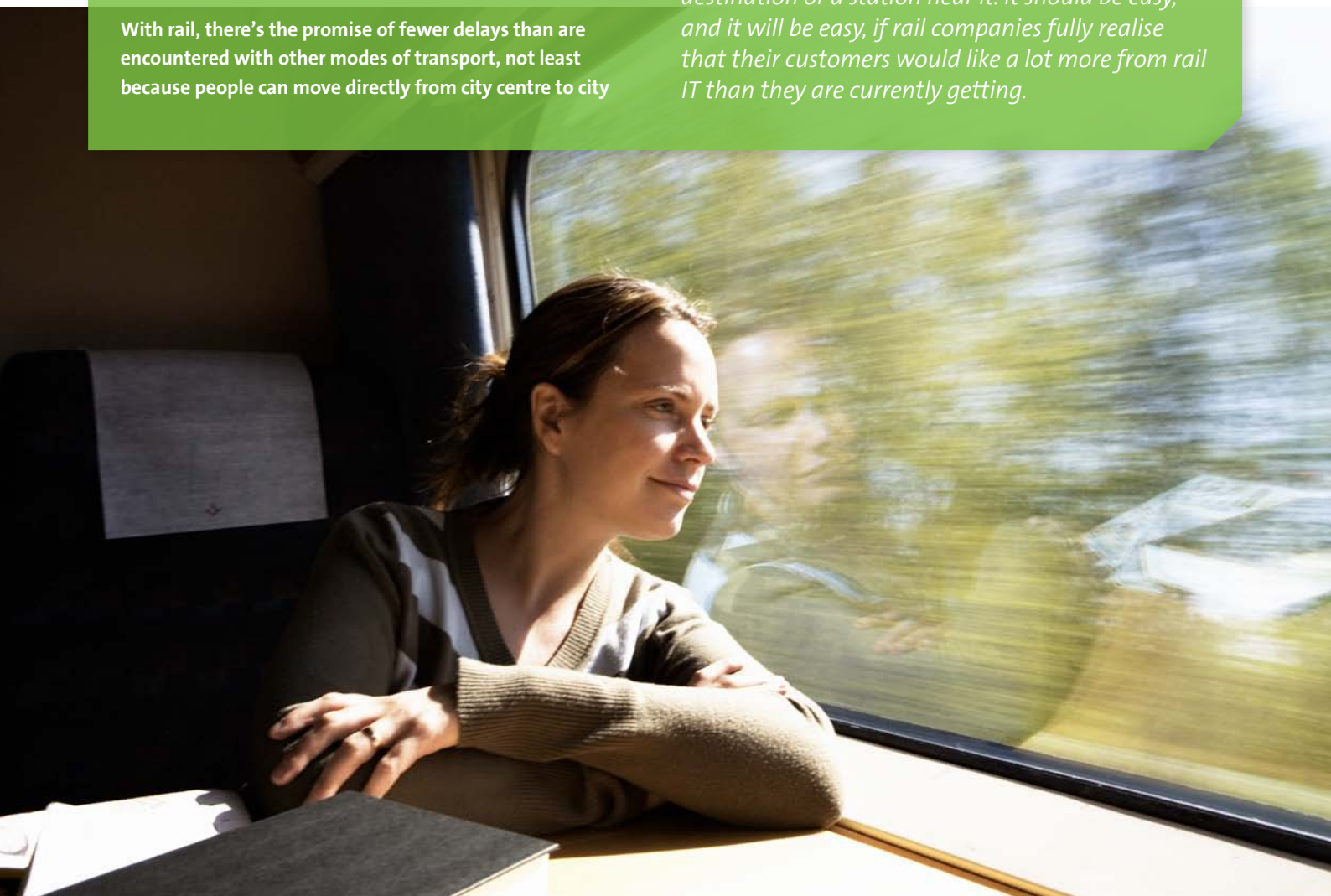
In an aeroplane, you rarely get a chance to admire the landscape below you. What's more, few airports invite gasps of delight. In a car, too, only passengers can really take in the scenery. Yet with the railways, one can share wonderful vistas, or photograph historic stations. Sometimes, on trains, one makes chance encounters whose conviviality flight and motoring are hard pushed to match. Work is also easier on a train than in a plane or in a car.

To the extent that they are environmentally conscious, young people are not enamoured of cars, or of air travel, the way they were 30 years ago. But they do tend to approve of rail as a way to move around. As this generation matures, there's a strong possibility that rail, and especially high-speed rail, could form the main means of transit for people who are out to make the most of long journeys.

With rail, there's the promise of fewer delays than are encountered with other modes of transport, not least because people can move directly from city centre to city centre. There are fewer security hassles with trains than there are with planes, and boarding is easier too. There's less likelihood of passengers suffering Deep Vein Thrombosis, because you can move around on a train more easily than on a plane.

A final factor pushing toward in favour of rail is what's happening with mobile phones, tablets and laptop computers. Every year these devices now boast display and telecommunications links that are bigger and stronger than in the past. On trains, therefore, mobile devices can and will more and more be consulted for timetables, or used as boarding passes, or as a means of making a payment.

The growing role of mobile devices in everyday life favours trains more than cars or planes, where customer use of IT is constrained for safety reasons. On trains, it should be easy to book extra journeys, or additional services – services delivered while you are still on the move, or for when you arrive at your destination or a station near it. It should be easy, and it will be easy, if rail companies fully realise that their customers would like a lot more from rail IT than they are currently getting.



4 More revenue, by treating passengers as multi-faceted customers

Topline summary

- Rail needs to concentrate on customer habits, and move on from outdated legacy systems
- The breakthrough now available to rail companies is to organise IT not by journey, but by individual customer, identified by ticket, mobile device, credit card or loyalty card
- Today's customers for rail, and especially for high-speed rail, are multi-faceted people – people who have talents, and not just needs. CRM typically provides data and insights on their evolving preferences, allowing a more precise approach to marketing and fares
- With a community platform, rail firms join their partners and rivals in using an IT platform which is hosted by a third party, but which they all help govern. They share some common functions, yet they also build their own, private applications
- A community platform offers clear benefits to rail customers, professional travel sllers, and rail firms.

Every rail company now needs to be able to compete creatively with every other rail company – and with airlines, too. At the PC, at the station and especially with mobile, the applications each offers, and the interfaces each makes available, promise to be key differentiators in the marketplace. At the same time the railways urgently need to develop a cadre of persuasive sales people, in, but also beyond, rail stations: people whom passengers find useful because of the value they add.

In short, rail companies need to extract themselves from the basic end of IT, and concentrate on their main business: punctuality, ride quality, safety, and building their brands – in part, nowadays, by putting the sophisticated end of IT in the hands of customer-facing staff.

Over the past 15 years, sharing an outsourced community IT platform, many rival airlines have managed to extract themselves from past ways of using IT. The Brazilian airline TAM is one example.

IT migration at Brazil's TAM

In 2010, TAM needed to upgrade its IT to join the Star Alliance, integrate its IT with Star, and maximise the benefits of membership. TAM also wanted to deploy a new generation of IT to lower total cost of ownership, modernise its sales channels, improve its management of inventory and revenue, and give customers better service.

Within just 12 months of signing a letter of intent with Amadeus, TAM successfully migrated data from 20,000 points of sale in Brazil, 6000 TAM terminals, 1.4 million passenger name records, three million e-tickets and 5.4 million customer profiles. Amadeus trained TAM's 5,000 staff to prepare for the migration, which was conducted without a hitch in just 22 hours.

In 2009, TAM made only 18 per cent of its sales online; right now, that figure is heading toward 40 per cent. Average revenue per e-booking has risen nine per cent, and TAM is able to run promotions and offers without overloading a system which successfully manages the boarding of 80,000 TAM customers daily at 60 airports across the world.

For customers, TAM has changed for the better. Self-service terminals, complete with multiple language options, speed up check-in. And if a passenger is missing, it's easier to find them in the system – which means fewer delays to flights and to customers.

> Every rail company now needs to be able to compete creatively with every other rail company – and with airlines, too

Airlines have used Amadeus' Altéa system to handle customer management processes, so as to be able to get on with the business they are supposed to be expert in – flying. That gives customers the best possible experience, from the moment they book their flight, to the moment they exit the plane upon arrival.

Now it's obvious that both the broad architecture and the detail of rail IT are very different from what characterises airline IT. Being more or less a public service, rail can only easily cut fixed costs not by dropping lines, but by streamlining IT – whereas airlines always have the option of abandoning unprofitable routes. On the other hand, English is the universal operating language in air operations, which isn't the case with rail.

Nevertheless, for rail companies the record in airline IT definitely suggests two things. Rail needs to look at, understand, anticipate, and align its business strategies to customer habits. In addition, rail needs to move on from out-dated legacy systems.

10 See Frederick F Reichheld and W Earl Passer Jr, 'Zero defections: quality comes to services', Harvard Business Review, September-October 1990; and also Reichheld, The loyalty effect: the hidden force behind growth, profits and lasting value, Harvard Business School Press, 1996.

Time to look closer at customer habits and align business strategy to them

During the recession of 1989-91, management thinkers defined a number of new, creative concepts that remain relevant today. One of those concepts was the need to retain customers for the long term. As manufacturers strove for zero defects in their products, so service providers began to seek 'zero defections' on the part of their customers. It was argued that revenues from repeat business, rather than the growth of market share, should become the main event. [9]

The 1990s therefore saw a drive, on the part of multinational firms and others, toward trying to retain customer loyalty. But that was not the only instance of them latching on to the immortal injunction made by Tom Peters' bestseller, In search of excellence (1982): to be 'close to the customer'.

Knowing the individual customer became important. Even today, many rail companies have a hard time distinguishing which customers generate most of their revenues. Yet rail companies need to understand:

- Every aspect of the rail passenger's complete journey – from searching and pricing trips, through to making a reservation (online/offline), getting hold of a ticket, and having it checked at departure and on the train
- The passenger's past history with the rail company, and thus his or her future revenue potential.

Most rail firms still use the legacy systems they have built up over decades. These help them build trains, run networks, establish fares, and, through distribution, give customers 'shop window' access to their databases, products and services. However, with legacy systems, the idiosyncratic demands of particular passengers require huge manual intervention, since both data and the identification of passengers is organised by journey.

The breakthrough now available to rail companies is to organise IT not by journey, but by individual customer – identified by ticket, mobile device, credit card or loyalty card. Indeed, by following general business practice and investing in Customer Relationship Management (CRM) systems, rail can complete its mental shift from treating people as faintly incidental passengers to absolutely central customers. Through CRM, rail can understand customers' very personal travel habits, identify the revenue opportunities that exist at each single step of the customer's journey, cut hassle and raise the customer's appreciation of service and brand.

Today's customers for rail, and especially for high-speed rail, are multi-faceted people – people who have talents, and not just needs. CRM typically provides data and insights on their evolving preferences, allowing a more precise approach to marketing and fares.

Whether it's booking tickets, baggage handling or ticketing/interlining with airlines, rail IT needs to be able to offer complete customer journeys, going as far as intra-city local destinations. In the case of service disruptions on such journeys, the new IT can make it clear which company is responsible for rebooking, baggage, and so on. On top of all this, the new IT will play a big role in establishing what Amadeus calls the Modern Station – international rail hubs fit for the 20th century.

The Modern Station: hub for international destinations, and for other modes of transport

Every passenger ends up at a station – but stations are not always the easy and enjoyable experience they should be. Rail firms have some way to go to improve the passenger's experience of stations – from reducing long queues to providing station staff with better means with which to deal with bookings. Travellers also have... them, and of the comfort and ease of their journeys. Last, now that so many travellers are expert in IT, people need more information on the go, so that they can update their itineraries and change their bookings wherever they are.

However, to become a reality, the Modern Station requires further actions from rail firms. These include:

- **To sell its services abroad and to compete with airlines over key city pairs, rail services need to be visible in existing sales channels**
- **Travel management companies need to supply the business traveler with documentation in advance of the journey – and they need fast processes for booking and back office management**
- **Online travel agencies need to provide travellers with choices that reflect popular preferences for 'green' travel – and popular frustration with waiting times at airports.**

To meet the needs of the modern rail traveler, the Modern Station must include:

- **Kiosks for pre-sales and self-help – allowing travellers to buy and collect tickets in the way they prefer, so cutting queues at the ticket desk**
- **On-the-go information for the traveller's mobile devices**
- **Mobile ticketing**
- **Cross-selling opportunities.**

By taking care of the basics, the new IT can help rail companies focus on and get rewarded for the work of clearly distinguishing business and first class travel from leisure. That should, as a result, raise margins. More lucratively still, the new IT can help rail firms offer three kinds of ancillary services – services that visibly fulfil every facet of the customer's needs:

- Unbundled ancillary services. Here, the price offered to a customer can be broken down, such as the cost of a special seat, extra legroom, extra bags, priority boarding and so on
- Services delivered on a 'third party' basis, including access to on-board meeting rooms, access to Wifi, or the chance to eat a business class meal in an economy seat
- Cross-sold services – the chance to book a valet for bags, a bus, a car or a hotel.

Time to move from legacy systems to a community platform

In 1982 the American pop futurologist John ('high tech, high touch') Naisbitt proclaimed:

> *'The combined technologies of telephone, computer, and television have merged into an integrated information and communication system.'* [11]

How wrong he was to use the past tense! Nearly 30 years later, however, with the advent of Voice Over Internet Protocols and of Internet TV, the merger that Naisbitt talked up has come about. It's time to recognise that.

You could say, about legacy systems, 'If it ain't broke, don't fix it'. However, the evidence from firms such as AOL is that history has been a harsh judge of proprietary systems. Rail companies face risks in jettisoning such systems – but in the age of high-speed, cross-border travel, they face much bigger risks in trying to press on with patching them up, or in engaging costly IT consultants to try to reconfigure them in their entirety.

For rail firms, legacy systems have major limitations in terms of functionality and maintenance. Often based on code written more than 30 years ago, they have become complex and prone to bugs, making it hard for rail companies to focus on and fund innovation. For even the largest firm, the investment required to move over to its own open systems is enormous. Nor are the barriers to investment just economic. Rail companies often don't have the in-house expertise required to implement the complete overhaul of the systems that is needed.

By contrast, airlines have clearly benefited from their adoption of new outsourcing services based around a community platform – the idea being that, instead of trying to manage customers with their own proprietary systems, they should together share common applications. Let's look more closely at this idea.

For all kinds of companies, one of the earliest and simplest ways to outsource was to hand over computers and data processing to an outside supplier. After that, the next step was to give the supplier responsibility for the development of applications – a move that cut the number of in-house staff busy with apps.

11 John Naisbitt, Megatrends: ten new directions transforming our lives (1982), Warner Books, 1984, p16.

With a community platform, outsourcing goes a step beyond the farming out of infrastructure and applications development. In the community approach, a third party expert develops and hosts applications which many companies share in common, so as to reap economies of scale and cut costs. For the rail industry, these new systems offer significantly enhanced integration and automation of existing functionalities – for both operations and distribution. The systems handle scheduling, availability, inventory, reservations, fare quotations, ticketing, loyalty programmes. Crucially, a community platform offers interoperability between different rail companies, and through ticket sales with other transport modes.

It is by applying their own business rules that rail companies can handle passengers in ways that continually support their business needs. In this new paradigm, operational staff can change and amend those rules. That means that the system is able to respond rapidly to both customer and market demands.

With a community platform, rail firms don't just shrug off expensive legacy systems by outsourcing their IT to a third party. On top of that, they join their partners and rivals in using an IT platform which is hosted by a third party, but which they all help govern. They share some common functions – mainly, those around regulation and code sharing. Yet they also build their own, private applications.

Outsourced IT governed by a community of competitors may sound utopian. But in fact its success in practice contradicts those theorists who are too fearful of outsourcing. It's a riposte, too, to those sceptics who are too cynical about multi-firm cooperation. Finally, it's a challenge to those unable to see, or unwilling to admit, that perhaps as much as 90 per cent of the basic operations of two companies operating in the same sector are often very similar, even if they compete with each other.

The nice paradox with a community platform is that, far from forcing all participants to be the same, it frees each up to strut its own stuff. Companies using the system share the same tools – but they don't share the ways in which they use those tools. After all, the millions of companies using SAP, Oracle, or Microsoft Office work in millions of different ways.

The benefits of a community platform for customers

For customers, a behind-the-scenes community platform offers two very evident merits. First, all the newly competitive options for multi-modal cross-border rail or rail-and-air journeys from A to B can be made visible, through whichever sales channel the customer prefers to use. With luck, today's and tomorrow's better display technologies will also help ensure that there need be little switching between different screens – since in principle, regardless of the countries traversed, different transport companies, modes, routes, fares, seats and baggage regimes will be all visible on the same display. So, too, will the kinds of extra services that we have described above.

Second, a dedicated, well-resourced community platform, run by some of the world's top specialists in IT, can ensure that the very latest developments in technology can be quickly incorporated to aid even the most demanding of customers. At a very simple level, a community platform will knit together the changing schedules, departure points and new lines offered by different rail companies and airlines. It can also coordinate the sending of alerts to mobile devices on trains, regardless of the national mobile network operator in use.

Above this, a community platform can quickly present customers with the latest maps – of their progress on a journey, of newly built rail networks, of large railway stations. Going a step further, a common platform can, if its members so wish, adopt and adapt new, third-party apps that are relevant to rail travel. For example, it could take Google Goggles,[12] which allows users of Android handsets or iPhones to identify particular landmarks, and work up useful information around them ('you've just passed X, so your destination is Y minutes and Z kilometres away').

Perhaps such tricks will only please the younger kind of IT user. But think about older travelers, too. In recent decades, many older people have gained much in terms of disposable incomes, physical agility, and willingness to explore international destinations – by train, especially. Yet although older people have also gained much in mental acuity, many prefer to get travel tickets and travel information through their voices, more than through their fingers. Here, one direction of an up-to-the-minute community platform would be to try continuously to apply the latest breakthroughs in speech recognition.

12 See http://www.google.com/mobile/goggles/#landmark

Benefits for professional travel sellers

As with customers, travel agents can access content through the channel they prefer. More broadly, a common platform ends the need to run a separate, dedicated rail department. It integrates rail into every customer's journey and thus ensures that all the agency's sales people can sell train journeys, so raising productivity and allowing them to cross-sell other products with ease. In addition, a common platform means that agents spend less time personally tweaking trips in line with particular passengers' requirements, since it anticipates most of the tweaks that might be asked for. Last, the professional travel seller can offer the buyer more choice of route, service and mode – with the option of cutting CO_2 emissions by selecting rail in place of air.

Travel agents move ahead: the example of Rail Plus, Australia

Rail Plus, an international rail specialist based in Australia, partnered with Amadeus to bring its extensive catalogue of rail content products to travel agents in both Australia and New Zealand. Today rail information from these two countries is integrated into a single, integrated PNR, streamlining processes, reducing errors, and complementing reservations with airlines, car hire firms and hotels.

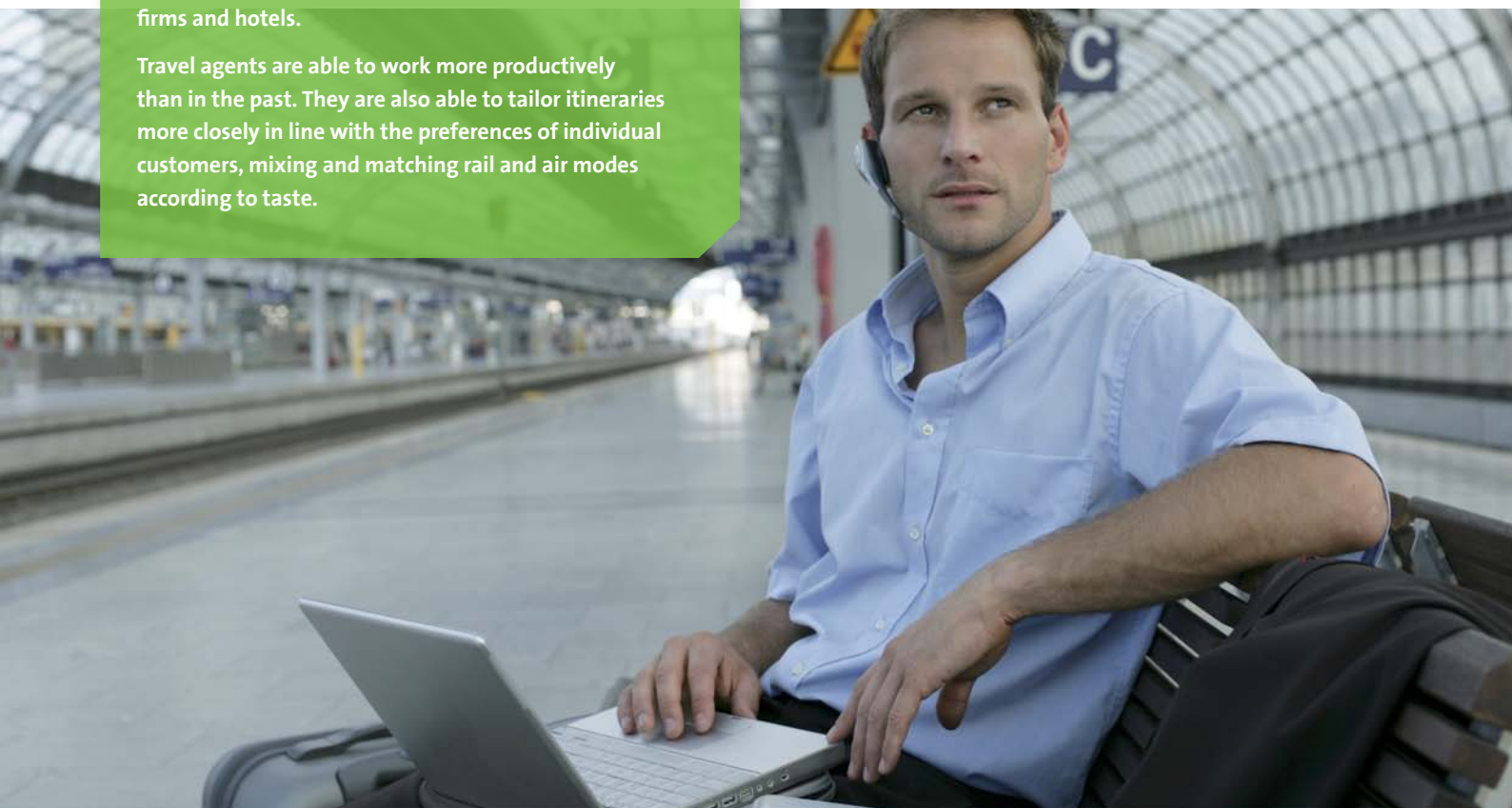
Travel agents are able to work more productively than in the past. They are also able to tailor itineraries more closely in line with the preferences of individual customers, mixing and matching rail and air modes according to taste.

Benefits for rail firms

We've already covered many of the benefits of a community platform to rail firms. However, there are other benefits to consider. First, because it is based on web services and standards agreed by its members, a community platform is modular and scalable, and provides easy access to every kind of sales channel. These things ensure that rail companies that are expanding fast can expand their IT capabilities in line with growth, rather than behind it.

Second, because ticket sales and interoperability with different railways, as well as through ticketing, are the basics of a community platform, partnerships between different rail companies can easily use such a platform to reap economies of scale. With one platform, TOC A can, with TOC B, directly share passengers, information, IT resources and the chance to develop joint applications together.

Last, in a world of shifting alliances and intermodality, a common IT platform makes it easy for rail companies to work with new partners – without having to rebuild proprietary IT systems from scratch. Once new interline arrangements are agreed and put in place between a rail company and an airline, any travel agent on the common platform can issue each passenger with a single ticket for an intermodal journey, as well as a single itinerary for that journey. Naturally, the travel agent views rail content and airline content on the same page of the same screen.



5 Outsourcing has proven merits

With the rise of globalisation, anxieties about outsourcing have receded. Moreover as Business Process Outsourcing has grown in sophistication, it has come to cover both back-office functions such as billing or purchasing, and front office ones such as marketing and technical support.

Differences of opinion about outsourcing are healthy.[13] For instance, there's a new popularity in repatriating to the developed world some activities, including those around IT, that were previously sent to countries such as India. Also, in the wake of the earthquake and tsunami in Japan in March 2011, there's also more debate about how to ensure the resilience of long-distance supply chains carrying key physical components. [14]

Nevertheless, fears about outsourcing are no longer as bad as they were. Experience has been gained. Lessons have been learned.

A little history is in order here. In a famous article published in 1937, the Swedish economist Ronald Coase explored why modern capitalist economies consist of firms that organise quite a lot of things themselves, rather than of individuals contracting with each other by the use of the price mechanism. Concerned to uphold economic planning, Coase, a moderate socialist, pioneered the idea that firms exist for good reason. 'A firm will tend to expand', he wrote,

> *'until the costs of organising an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market'.* [15]

In 1960, however, Theodore Levitt, one of the founding fathers of American marketing, unwittingly appeared to undermine the kind of confidence about the corporation that Coase had exhibited. In his seminal article 'Marketing myopia', Levitt insisted that corporations consider much more carefully what business they are in.[16] Then, in 1990, the US management gurus CK Prahalad and Gary Hamel went a step further. They suggested that the business a firm was involved in was not defined by its particular constellation of subsidiaries, or strategic business units, but rather by what it was an expert at. 'The collective learning in the organisation' became the criterion for success, rather than the price/performance ratios of products. [17]

Soon, it became mainstream wisdom that companies should stick to what they had called their 'core competences'. Why, after all, should a railway company be expected to develop a core competence in, say, application software development? Yet in practice things have not proved quite so simple.

In the decade that followed the end of the Cold War (1989-91), Western society experienced a rising sensibility toward risk. So it was hardly a surprise that, around outsourcing, commentators soon began to have serious doubts about the touching language of 'mutual, shared-destiny partnerships'. In 1995 The Economist announced, in bold type: 'More and more companies are forming cosy partnerships with their suppliers. Such relationships can be risky'. The newspaper pointed out that it could be hard to be consistently collaborative with all suppliers. The supplier might unfairly take advantage of shared data or personnel. The customer might unwittingly lose a core competence to its supplier. Other, cheaper suppliers might come along – but it would cost a lot to switch to them. The Economist concluded: 'Trust is good. But for many companies, hostility may still be more profitable'. [18]

13 See for example www.outsourcingprosandcons.info/, which lists arguments for and against outsourcing.
14 For some of the literature on outsourcing see Appendix.
15 Ronald Coase, 'The nature of the firm', Economica, New Series, Volume 4, Issue 16, November 1937, pp386-405, on http://www.ea.ufrgs.br/pos/home/turmas/esp2007/MBA2007/Download/ArquivoProfessor/Coase_%20The_Nature_of_the_%20Firm.pdf
16 Theodore Levitt, 'Marketing myopia', Harvard Business Review, July-August 1960, on http://www.casadogalo.com/marketingmyopia.pdf
17 C K Prahalad and Gary Hamel, 'The core competence of the corporation', Harvard Business Review, May-June 1990, on http://tle-inc.com/PDFS/FILES/resources/The%20Core%20Competencies%20of%20the%20Corp.pdf
18 'Holding the hand that feeds', The Economist, 9 September 1995.

...fears about outsourcing are no longer as bad as they were

In reality, there's a need to put these risks, and in particular the risks associated with outsourcing, in perspective. After all, with regard to innovation, Western managers have grown very averse to taking risks.[19] The cash now hoarded by many sound companies is also evidence of risk aversion – a sentiment that extends to many sectors beyond the railways. With this kind of cultural context, outsourcing has for some years come to be seen as coloured by risks that are, in fact, often exaggerated.

There are two main and contradictory risks in outsourcing – doing it, and not doing it. To some degree, when a firm outsources, it must take a leap of faith by opening up a part of its business operation to a third party. Fears can range from the loss of control and flexibility, to the depletion of in-house expertise. On the other hand, failure to pursue outsourcing can lock a company into mounting IT investments just to ensure that it is taking advantage of the most modern technology and management practices.

Fears, though, bring their own costs. The first task with outsourcing is to minimise the amount of management time spent on deciding whether to make or buy, and to minimise, too, the amount of time spent on drafting and redrafting the contracts that ensue.

Second, the outsourcing of IT processes or applications can, if it is planned and managed properly, free up clients to be more innovative, not less. By ridding itself of the need to give constant attention to the nuts and bolts of IT, top managers, from IT director to CEO, can devote more time to customer service, the brand-building that goes with that, and to business agility.

Of course, clients can make foolishly generous decisions in relation to outsourced suppliers foolish decisions occur all the time in business. Moreover, to outsource the generation and development of ideas and innovations – to start-ups, consultants and universities – is a move that deserves special care. But provided clear ground-rules are drawn up in advance about what can and should be done in-house and what can be sent outside, there is no need to get obsessed with risk.

Outsourcing, like anything else, is not a panacea. Anxiety about it may say more about other nagging doubts on overall corporate direction than it does about the pitfalls of contracts entered into. As in personal life, business relationships with partners can end in divorce. But again as in personal life, the level of successful marriage and re-marriage remains pretty high.

For many rail companies, outsourcing IT is a must. There is no alternative, but they have to do it right. There are no magic formulae for success in outsourcing IT, but there is one common sense option to take: don't just work with a specialist in IT – work with an IT provider with genuine experience and historic roots in the rail sector, with all its idiosyncrasies.

19 The general argument here is in James Woudhuysen, editor, Big Potatoes: the London manifesto for innovation, 2010, on www.BigPotatoes.org

6 Shared services: differentiate, and uphold the potential of IT

Topline summary

> With basic functions outsourced to a service shared by rival operators, there will be renewed pressure for those operators to differentiate their offers

> The agenda in IT should not start from unwarranted fears, but from upholding IT's potential to save time, money and hassle.

Shared services contain the promise of lower cost, which, in today's inflationary climate, are not to be sneered at. That is why, in central and local government and elsewhere, there's been a belated, but already successful drive to share services between different geographical areas.

Getting into a third-party bed in the form of a community platform with one's partners or rivals is supposed, if anything, to be worse than outsourcing. The view is taken that, in such arrangements, there are more people who could steal your secrets – and that they don't seek business from you, but rather to do you down.

Wait a minute, however. The phrase 'today's fiercely competitive commercial environment' is a cliché. There's more to inter-firm relations nowadays than naked competition. After all, the people who ridicule the possibility of competitors ever getting on are often the same people who point a finger at trade associations or industry lobbies as obvious evidence of cartels or conspiracy. As Wikileaks founder Julian Assange has shown, cynicism about conflicts of interest goes hand in hand with cynicism about collusion.

In fact both these accounts lack nuance and specificity. Right now there are plenty of factors that rail firms have in common: high electricity prices, and the historic difficulty of bringing about a real shift away from road and air, are among the most obvious common issues. Of course, in rail as elsewhere, an era of genuine competition generates both winners and losers. But we need to remember that:

- In commercial property and accounting, the same facilities management provider or audit firm often works for several rivals
- In telecommunications, a single wholesale provider can often group together a series of retail adversaries
- In financial services, a common, outsourced payment system such as VISA has long been used by all kinds of rival banks
- After more than 30 years of legacy systems, all airlines have begun to embrace e-ticketing around complete customer journeys
- Even in pharmaceuticals, a sector in which competition has been intense and direct, there are signs that outsourcing specialists in India are able to win favour from a variety of players for the way they can now conduct parts of the drug development process.

With the new generation of rail IT, the railway sector has an opportunity to match its geographical, revenue and profitability ambitions with modernity, accuracy and reliability in customer booking and information.

Every rail company has an interest in that.

> There's more to inter-firm relations nowadays than naked competition ”

Renewed pressure to differentiate

With basic functions outsourced to a service shared by rival operators, there will be renewed pressure for those operators to differentiate their offers. Sharing services, then, can lead to tougher, but also more fruitful rivalry around what matters to rail passengers: smooth rail journeys, and smooth IT processes. In fact, the whole promise of a community platform in rail IT is to allow each rail company not just to collaborate with others on the building blocks of IT, but also to go its own way in how it:

- Interprets customer expectations
- Delivers the services – including IT services – to meet those expectations
- Presents interfaces that really endear its brand to customers.

The modern discussion about alliances with partners and competitors begins with a famous and mostly balanced article published in 1989. With their title framed in the imperative – 'Collaborate with your competitors – and win', Gary Hamel, Yves Doz and CK Prahalad contended, quite rightly, that collaboration was a new form of competition.[20] It provided a way of getting close enough to a rival to estimate where he was better, faster or cheaper. This especially direct means of 'competitive benchmarking' ensured that, through collaboration but outside its formal terms, a firm offering to form an alliance could learn from its rivals.

The balance was there; but so, already, was a very evident nervousness about risk. Moreover, a subsequent, popular and more upbeat book about alliances, called Co-opetition, was overly exercised by John von Neumann and Oskar Morgenstern's post-war mathematical theory of games.[21] The book failed to consider the effect of cooperation on inter-firm competitive differentiation. That's the key issue, and here we still need to begin from the Hamel-Doz-Prahalad framework of cooperation as a new form of competition.

Cooperation does, as we have argued, bring common advance to different corporate interests. But it also ensures that competition itself is prosecuted in new and different ways. The advantage of this is that it can make more ubiquitous processes that are better and more efficient for everyone. By sharing the services offered by a common supplier, firms by no means leave themselves bereft of competitive weapons. A firm may still cut prices, demand more of its employees, or pay over the odds to a supplier in a different field. The firm may also choose to lavish funds on innovative marketing campaigns. In addition, it may disrupt markets with products that are small, inexpensive, 'good enough' in performance and convenient to use.

Why then do people think that cooperation must mean a failure to differentiate one's offer from those of others? Perhaps they are not really disturbed about cooperation, so much as the inability of firms to avoid being samey, period – even without cooperating with one another. In this sense, cynics sense what is often a genuine corporate failure to innovate, but insist that this can be laid at the door of inter-corporate cooperation. Mistake!

In the case of the railways, use of a common supplier is likely both to foster fresh competitive strategies, and to throw differences between such strategies into sharp relief. There will be renewed pressure to differentiate. Those rail firms with really distinctive directions will do well. As we have seen from the previous discussion of the community platform, far from imposing uniformity, this approach can liberate rail companies to focus on their core competencies and on how they can differentiate themselves in their approach to customers.

20 Gary Hamel, Yves Doz and CK Prahalad, 'Collaborate with your competitors – and win', Harvard Business Review, Jan–Feb 1989.
21 Adam M Brandenburger and Barry J Nalebuff, Co-opetition (1996), HarperCollins Business, 1997.

Uphold the potential in IT

Significant new challenges face the world's rail industry. The sensibility toward risk that we have described is unlikely to go away. After the events in Japan in 2011, one thinks about how rail will respond to fears about ground conditions and floods. Fears about migrants, and even the international spread of infection, may also rise, and rail will have to know what to say about these.

It is a similar tale in the world's IT industry. Behind all the media enthusiasm for new electronic gadgets, critics of IT have whipped up new fears: that it is dumbing us down (Nicholas Carr, The shallows: what the Internet is doing to our brains, 2010), or that it is dividing us (Sherry Turkle, Alone together: why we expect more from technology and less from each other, 2011). Worse, a series of assaults on major computer systems, including those run by Lockheed, Nintendo, RSA (a division of EMC) and Sony, has increased enormously popular and professional fears about the security of IT. Some now warn that cloud computing will mean more threats to security.

On top of this, one authoritative commentator insists that regulators prevent 'the cloud capitalists' – Apple, Facebook, Google and Amazon – from throttling competition, ensnaring consumers and 'looking over our shoulder, analysing our habits, nudging us in one direction or another'.[22] Along with fears about security, fears about privacy look set to dominate debate about and action in IT for some years to come.

Faced with such worries, the rail sector needs to get a grip. In practical terms, issues such as security and privacy are best handled with the help of a common platform, with industrial-strength security systems and common rules on how to deal with problems. More importantly still, the worries upon which the media and others feed are very often exaggerated. Something much more critical is all too easily forgotten in all of this: the underlying impetus that innovation in IT makes to the productivity of organisations, and to the convenience met with by customers. IT is much more a progressive force for modernisation than it is a dangerous threat to personal freedom.

Through a shared community platform in IT, railway companies can, finally, make the electronic dimension of rail travel as modern as that for every other mode of travel. The agenda in IT should not start from unwarranted fears, but from upholding IT's potential to save time, money and hassle.

22 Charles Leadbeater, 'A cloud gathers over our digital freedoms', Financial Times, 6 June 2011.

7 Back on track

Internationally, the rail sector has long been burdened with problems of parochialism, regulation, and complex customer transitions in time and space. But by confronting those challenges with the help of IT, it can now get its head up above glib slogans about 'seamless' service.

The truth is that, on the railways as elsewhere, executives spend much of their day controlling costs, worrying about risk, and fire-fighting. They do not always have the time they need to bring about genuine innovations – innovations that will have a durable impact in the long term.

The new generation of rail IT should help provide more of that time.

The entire rail sector, as well as society at large, has an interest in IT systems that are collectively developed and collectively applied. Coherent, accurate and single-source data, speedily acquired and transmitted, intelligibly displayed, will make a big difference to every passenger.

Rail companies will come to embrace shared systems that both enhance individual competitiveness and advance the interests of the sector more generally. In the process some of the needless hurly-burly of rail travel will be undone. The new generation of rail IT easily contains more potential than it does danger.

It's time that rail companies sloughed off the grisly bits of IT and focused on those bits, and on those uniquely railway competencies, that will make rail the preeminent means of travel in decades to come.

It's time rail companies got back on track.

Appendix: Further reading on outsourcing

Michael Weeks and David Feeny present four instances of outsourcing IT in their useful Harvard Business Review Case Study, 'Outsourcing: from cost management to innovation and business value', 1 August 2008, purchasable on http://hbr.org/product/outsourcing-from-cost-management-to-innovation-and/an/CMR406-PDF-ENG?Ntt=outsourcing. The question of outsourcing general support functions is treated by Cecily Raiborn and others in 'Outsourcing support functions: identifying and managing the good, the bad, and the ugly', Harvard Business Review Case Study, 15 July 2009, purchasable on http://hbr.org/product/baynote/an/BH337-PDF-ENG?referral=00505&cm_sp=baynote-_-featured_products-_-BH337-PDF-ENG.

The case for care in IT outsourcing is made in Joachim Ackermann and others, 'Better IT management for banks', McKinsey Quarterly, July 2007, on https://www.mckinseyquarterly.com/Better_IT_management_for_banks_2028. Still, McKinsey compatriots Matthias Daub and Ferruccio Lagutaine suggest that the insurance industry represents a positive case of ending legacy systems though IT outsourcing. See their 'The value in outsourcing legacy insurance products', McKinsey Quarterly, December 2010, on https://www.mckinseyquarterly.com/Operations/Outsourcing/The_value_in_outsourcing_legacy_insurance_products_2708

For the geographical discussion of 'onshoring' versus 'offshoring', see Michael Coxon and others, 'The onshoring option', McKinsey Quarterly, March 2005, on https://www.mckinseyquarterly.com/Operations/Outsourcing/The_onshoring_option_1585; Ajay Goel and others, 'Time to rethink offshoring?', McKinsey Quarterly, September 2008, on https://www.mckinseyquarterly.com/Operations/Outsourcing/Time_to_rethink_offshoring_2190, and Ian Finnemore and others, 'IT services: the new allure of onshore locales', McKinsey Quarterly, August 2010, on https://www.mckinseyquarterly.com/Operations/Outsourcing/IT_services_The_new_allure_of_onshore_locales_2661

For debate on international supply chains in the wake of the earthquake and tsunami in Japan, see for example Peter Marsh, 'Tsunami highlights danger to supplies', Financial Times, 12 April 2011, on http://www.ft.com/cms/s/0/e4d2e230-6520-11e0-b150-00144feab49a.html#axzz1OXdwOfxl; FT reporters, Global industries consider options on supply chains', Financial Times, 16 March 2011, on http://www.ft.com/cms/s/0/b7f76762-4fff-11e0-9ad1-00144feab49a.html#axzz1OXdwOfxl

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