SMART RAIL WORLD

JANUARY 2017
ISSUE #21

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LILEE SYSTEMS

KEEPING PACE WITH THE DEMANDS OF THE DIGITAL PASSENGER

FIVE KEY TECHNOLOGY TRENDS shaping the journey for the digital passenger.

HOW the innovative use of gamification is aiming to boost ridership in Italy.

RESEARCH: How do rail passengers really feel about their journey?

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SMARTRAIL WORLD

Dear colleague,

Many thanks for downloading **'Keeping Pace with the Demands of the Digital Passenger'** the latest, and 21st digital guide from the team at SmartRail World.

There's an old saying in the rail industry that since the first journey, passengers have only ever really wanted three things – the train to be on time, to find a seat and the ticket to be inexpensive. This is still true today, but the digital passenger of 2017 demands more. Much more. In a few short years, on-board connectivity has moved from a rare but welcome (though sometimes costly) addition to a journey to being an essential and expected part of any trip.

For the modern passenger, there's a growing expectation that they can easily book the cheapest possible ticket online, which is then sent to their phone, will be alerted to any changes or delays to the service prior to arrival at the station, and then when on-board will be able to work or be entertained with a high-speed Wi-Fi connection on their own device. They may also like to take advantage of special offers sent directly to their phone and seamlessly book onwards travel, whether on other public transport, or using app based transport services like Uber.

For rail and metro operators, this digital revolution offers a huge opportunity to boost ridership – to use but one example studies have proved that operators that offer Wi-Fi are viewed more positively than ones that don't. An enhanced on-board passenger experience improves customer loyalty, and gives trains a stronger position against other forms of transport, in particular the car. Ticketing sales can be more dynamic, targeted and better connect with passengers. Digital platforms also offer exciting new commercial opportunities from innovative advertising to paid on-board content and services and fresh partnerships with tech companies.

So to further help the industry take advantage of the opportunities and the demands of the digital passenger we have spoken to leading experts and practitioners from around the world from both transport agencies and solutions providers.

This digital guide wouldn't have been possible with our sponsor, LILEE Systems your global partner for total operational excellence. Founded in 2009 by industry leaders with extensive backgrounds in wireless communications, networking and software defined radio (SDR), LILEE is the rail industry's leading innovator in solutions that deliver an integrated communications and controls network.

Thanks also to our guide partners, COMLAB for lending their expertise to this publication, the Swiss company has been a specialist in high-frequency technology in the railways sector for 40 years.

Many thanks to all the contributors for sharing their time and helping make this guide happen.

Regards and thanks,

Luke Upton
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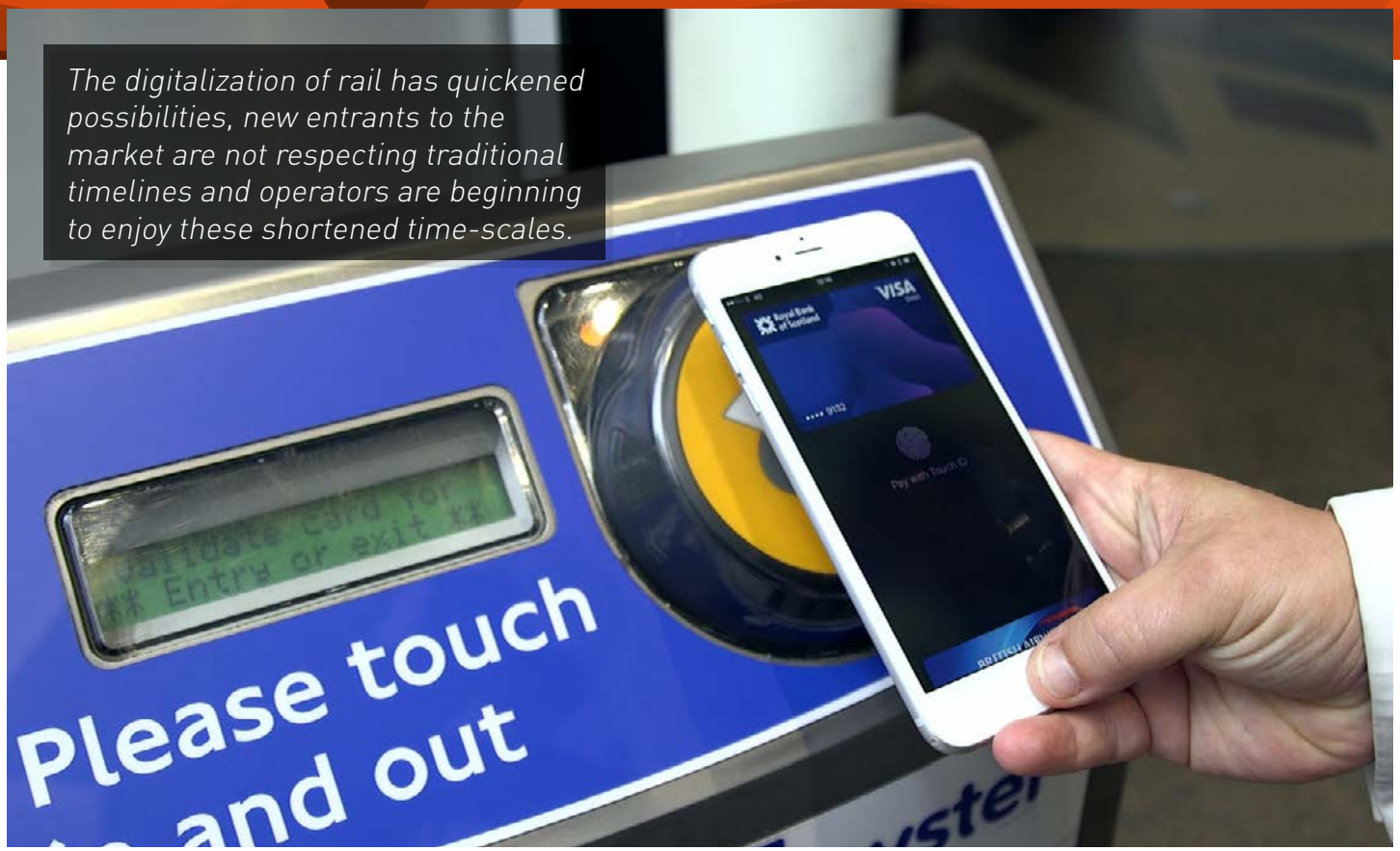


The digitalization of rail has quickened possibilities, new entrants to the market are not respecting traditional timelines and operators are beginning to enjoy these shortened time-scales.

Five key technology trends shaping the journeys of the future.

One thing that always astounds when looking at recent developments, is not just the change but the pace of the change. The digitalization of rail has quickened possibilities, new entrants to the market are not respecting traditional timelines and operators are beginning to enjoy these shortened time-scales. Start-ups are shaking-up what has been considered an at times conservative industry, while larger companies are adapting and consolidating in response. If they don't, they risk going out of business. So what do we expect from the new year? 2016 did much to damage the prediction business (Trump, Brexit, Leicester City, the Chicago Cubs, etc.) but our Editor Luke Upton, is going to give it a try. There's a myriad of rail technology trends that he's watching, but here's seven that he thinks you should keep an eye on...

1. Mobile ways to pay

London's reputation for transport innovation was further enhanced when Transport for London (TfL) became the first transport network to accept Apple Pay when it launched last year. Like the Oyster Card, London is leading the way when it comes to ticketing (contactless bank cards also became enabled last year). October 2016 saw New York follow suit and accept Apple Pay on its subway. And this growth is an indicator of where the future of ticketing lies – on your smartphone.

For passengers, there's an attractiveness for mobile ticketing – no more waiting in line, you are far less likely to lose damage or forget it. The app can also be used to plan your optimal route and receive live travel information, reducing stress for riders and speeding up journey times. Whilst for transport operators, the capital expenditure for rolling out mobile ticketing is relatively low and once installed can not only increase revenue but also help limit reliance on ticket vending machine. In 2017 and beyond we are likely to see a larger shift towards mobile ticketing around the world.

2. Intelligent Apps.

The world already loves apps. In 2009, approximately 2.52 billion were downloaded globally, this year the number is expected to reach 268.69 billion. And now apps can be built that use both historical and real-time data to make predictions and decisions and deliver a personalized experience for users. This new category of apps includes technologies like virtual personal assistants and has a clear link to rail and metro when it comes to booking tickets, organising travel and making the user aware of changes or delays to schedules. They could also operate on-board for both passengers and staff offering a real time and accurate view (thanks to our old friend Big Data) of the journey and improving customer experience.

Five key technology trends shaping the journeys of the future. *[cont]*

3. More cyber-security breaches.

Almost all industries suffered from cyber-crime and high-profile hacks in 2016. Perhaps, most prominently the Russian hack of the Democratic National Committee and ensuing leaked e-mails, which some saw as helping sway the election towards Donald Trump. And our industry was no different, with the ransomware attack on the San Francisco Municipal Transport Agency in November, which took all the network's ticketing systems offline on one of the busiest shopping days of the year a stark reminder of current vulnerabilities. Rail and metro operators are susceptible on two fronts to cyber threats; losing control of the operational aspect of the trains themselves and of the increasingly large data they harvest be it of a technical, passenger or financial nature.

Network Rail, the owner and operator of most of the UK rail infrastructure acknowledged the threat stating; "We know that the risk [of a cyber-attack will increase as we continue to roll out digital technology across the network." And these vulnerabilities are coming from a wide variety of sources. It's estimated that 90% of IoT devices are unsecured, and one industry insider recently told me that a UK train had been accessed through an unsecured coffee machine on-board. The battle to keep ahead of the cyber-criminals will be a big part of 2017 and beyond.

4. The station as the destination.

Once upon a time at a major station, you could buy a newspaper, a coffee and perhaps if you were lucky a copy of the latest bestseller or tourist trinket. Now however, many stations at aiming to take advantage of the huge footfall they experience (and help pay for their investments) by developing a dazzling area of retail and catering outlets to serve every taste (and pocket). Around 25 million people use the London Tube each week - that's a lot of potential customers.

To give one example, the growing reputation of St Pancras in London as a shopping mall "with a station attached" St Pancras was once a dreary terminal for services from the Midlands of England. But it has been transformed into one of Europe's most glamorous transport hubs — with its longest champagne bar — since Eurostar services to Paris and Brussels moved there from Waterloo in 2007. Around 48 million people use the station each year — of which a quarter do not travel but come to shop or eat! Going to a train station but not catching a train? That would have been hard to believe a few years ago!

5. Disruptors that keep on disrupting.

To quote a popular meme seen almost daily on LinkedIn: "Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate. Something interesting is happening."

High profile companies like Uber, Lyft, Ola, Gett and their ilk, have in a short period already shaken up the personal transport landscape. At their heart (along with that of Airbnb) is an ability to leverage spare capacity, monetize it and then expand quickly without large investment. Capacity and investment are two of the biggest challenges in public transport. What will emerge this year to further aid this challenge... or damage public transport? The cost of an Uber is sometime already comparable with public transport. What happens when it becomes cheaper to be chauffeur driven than hop on the train?

Let us know what you think! if you agree, disagree or want to suggest some more please let us know – Editor@GlobalTransportForum.com or Tweet us @SmartRailWorld

Capacity and investment are two of the biggest challenges in public transport. What will emerge this year to further aid this challenge... or damage public transport?

Choosing the right technologies to keep the digital passenger happy.

"Our clients are telling us that their passengers, are expecting an 'at home experience' while on-board and they have to deliver."

The rapid development of digital technology this past decade, has changed our lives considerably. Take a minute to think of your typical day and the role your smartphone and computer plays. Hard to imagine a day without them right? And one of the biggest effects is the huge amount of choices that we face each day. According to researchers at Cornell University it's estimated than an adult now makes about 35,000 decisions a day. Most are modest and relatively insignificant. But what about those really important decisions, those made in businesses that can cost millions and whose results can reverberate for years. Getting these right isn't easy.

And for rail and metro bosses, the digitization of their passengers' lives has given them plenty of important decisions to make. How do they ensure the technology that they choose to invest in matches the demands of their passengers both today and tomorrow. What's the best way to avoid obsolescence? And how can their on-board connectivity continue to match the rapid changes seen in the wider world? This decision making is at the heart of successful investment, so to learn more about this, our Editor **Luke Upton,** recently sat down with **Paola Realpozo (@paolarealpozo) Director of Rail Strategy** at **LILEE Systems.** The Silicon-Valley based company with extensive experience across the rail sector, and a host of global clients really put connectivity at the core of their business, so Paola is the perfect guide to some of the key developments in this area and how best to make those crucial decisions.

We begin with perhaps the most common important and in demand on-board offering, Wi-Fi. We live in a connected world, where rail and metro passengers now expect to be able to use their time on-board to work or be entertained digitally. And for this service to not only have high bandwidth but to also be free. In the space of a few years, on-board Wi-Fi has moved from being an unexpected but normally costly bonus, to a default expectation.

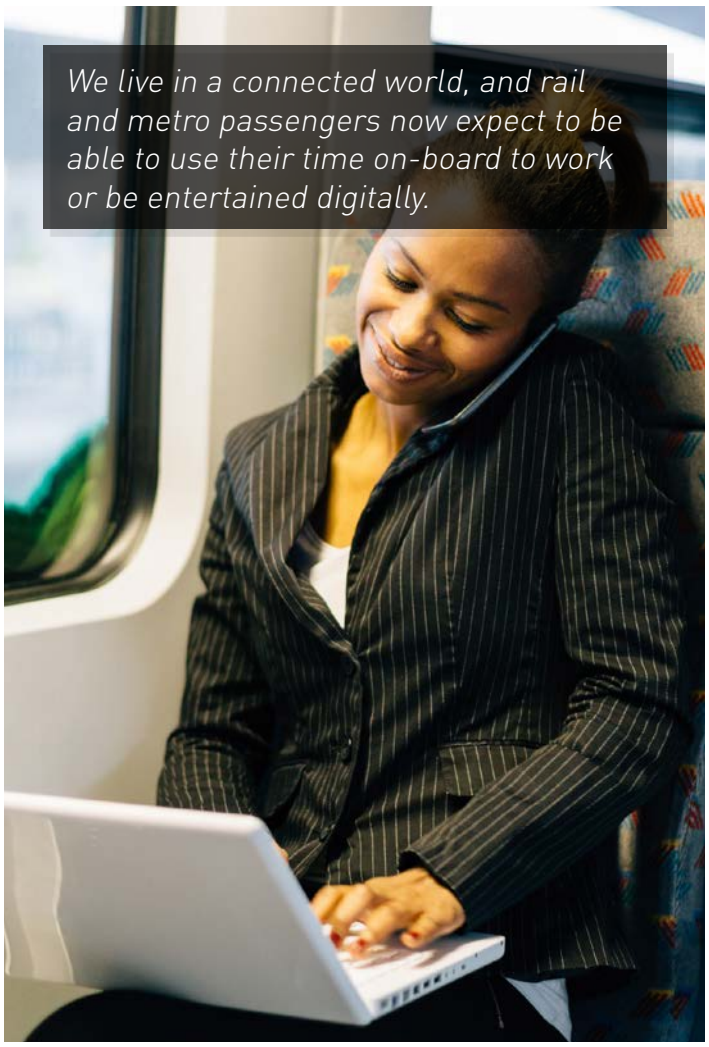
I asked Paola just how big a part of their work is focussed on the passenger experience: "Passenger Wi-Fi is a big yes for our rail clients. There's a strong business case for it, especially when combined with other operational and safety applications. Operators want to not just provide a basic service but one that is going to lead to high satisfaction levels. Our clients are telling us that their passengers, are expecting an 'at home experience' while on-board and they have to deliver. Our networks can allow passengers to be empowered on their journey. One example would be that they can access social media or personal emails on their way to work, so they don't need to do this when they get to the office."

Train and metro operators can benefit by an increase in ridership for catering for these digital passengers. But there's also the opportunity to further this business case by integrating the passenger Wi-Fi into a single communications hub. LILEE Systems do this with transit operators, who gain a single access point to monitoring and provisioning video surveillance, infotainment, advertising and maintenance and operations.

This offers operators detailed and immediate insights on device, communications link, and network performance, connections and user sessions, user statistics and ridership reports – all creating a powerful and accurate picture of network use.

A second new technology to help further boost ridership (and the ensuing increased ticket revenues) is the on-board entertainment systems which enable passengers to watch movies, listen to music, surf the Internet, and play games from the comfort of their seats using their own personal wireless Internet enabled device, typically a tablet or smartphone.

It's a slightly more complex offering than passenger Wi-Fi, with the emphasis on passenger bringing their own device (BYOD) and the on-board communications network having to be robust enough to match the demands of streaming movies or computer games.



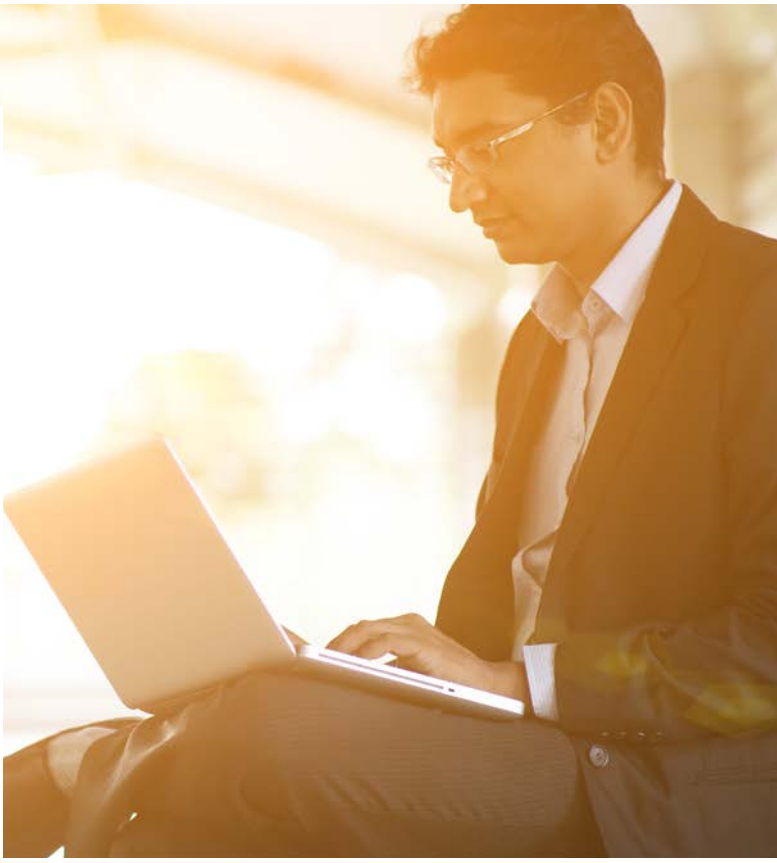
Choosing the right technologies to keep the digital passenger happy. *[cont]*

Paola is in constant conversation with their clients on passenger demands; "Without a doubt, reliable on-board internet access offers a more fun and comfortable journey and this is something rail and metro operators are seeing across the globe, each region with its unique set of motivators and challenges. I think the future of entertainment is with passengers bringing their own devices, rather than using some specifically built system, which can help keep maintenance costs low. When customers are given the option to consume free digital content provided by the operator, this can help ease pressure on bandwidth availability. To further lower some of the operational costs, like the cost of cellular communication, operators can benefit from LILEE's network management to achieve operational performance and the least cost routing option among cellular carriers or even switch to the track side radio alternative, when available. And for those operators considering rolling out passenger entertainment, we are able to offer the TransAir system as a backbone for all forms of mobile communications. It uses aggregated cellular technology to provide reliable, high-speed on-board Wi-Fi and this connectivity can also form the basis of safety and operational systems as well. So it offers a number of benefits, in a cost effective manner."

A third area helping make investments to support the on-board experience and one that we are just beginning to see the potential of is the further development of on-board advertising and mobile commerce. Passengers are a great cohort to advertise to, and by using a data platform, they can be segmented by demographics, engagement and even route to create bespoke messaging. What some are calling 'commuter commerce' is reflecting the fact that a lot of people are using their time commuting to surf the internet – and make purchases.

Twenty-seven per cent of retail sales now take place online, according to the **IMRG Capgemini eRetail Sales Index.** A study by Zapp and CEBR last year found at 20% of all online shopping in the UK is carried out on phones or tablets during consumers' journeys to and from work. And with Wi-Fi provision improving, this percentage is only going to rise. And again, this offers a huge opportunity for rail and metro operators to grow their own revenue streams and support investment in the infrastructure that makes it possible.

To give just one illustration of how these solutions can come together to deliver positive (and measurable) results we have to visit San Jose in California, where LILEE Systems, are partnering with WeDriveU **(@WeDriveU)** a leader in corporate transportation solutions to integrate their Wi-Fi solution within its Commute Alternatives offering. On the latest WeDriveU client program, LILEE found that nearly every passenger had taken advantage of the high-speed Wi-Fi to connect to the corporate VPN while on board, resulting in approximately 13% more employee productivity based on their ability to work while connected to their office during their commute. Erick VanWagenen, Executive Vice President at WeDriveU, Inc. underlined the benefits; "Superior connectivity is integral to offering the best commute experience for passengers and for us to deliver the greatest amount of value to our clients."



The benefits that WeDriveU have seen following their investment in passenger-focussed developments have been echoed by rail and metro operators around the world. The development and delivery of wireless connectivity solutions by industry leaders like LILEE are resulting in a better passenger experience and more effective operations which not only boost revenue but help further create a differentiator between rail and metro and rival forms of transport, in particular the car.

To finish I ask Paola for some advice for rail and metro operators looking to further invest in passenger focussed solutions; "Ultimately whatever solution the operators decide to implement, the end result is always to move their passengers from A to B in a safe, informed and most connected way possible. And then it's not about just implementing ten different solutions, it's about implementing ten different solutions in an architecture that is simplified and that is not going to cost them more. By doing this it is clear that the investment is a good one for both operators and passengers alike."

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For more information about LILEE Systems **(@LILEESystems)** or its hardware and software solutions, visit **lileesystems.com.**

Research: How do rail passengers really feel about their journey?

GB independent watchdog Transport Focus produce research on various topics, including the world's largest published rail satisfaction survey (NRPS) twice a year. By creating satisfaction ratings for various core elements of services, transport providers can find out where improvements are needed and deliver change where it matters to their passengers. But in today's 'always on' society, passengers, keen to make their voices heard, often use social media and other live channels for feedback to train operators 'in the moment'.

Passengers are providing a constant stream of timely feedback that could be put to good use. The team at Transport Focus @TransportFocus wanted to tap into this feedback and to devise a way of 'taking the temperature' between the waves of the main NRPS survey. To help the rail industry get 'actionable' data from the feedback, they developed a way to track sentiment over time.

The full report can be found here, but here's some of the key findings:

Passengers expressed a range of emotions for their journeys - it was not simply a case of an individual always being happy or angry throughout the four months. On average the participants reported five different emotions, with a quarter of them using all eight emotions. There were two key factors that affected passenger sentiment – being on time and the ability to get a seat. This is no great surprise; such issues have always been a core concern for commuters. However, what the research shows is how sensitive passengers are to delays and how other factors can help mitigate some of the more negative emotions experienced.

Delays

A major issue for passengers is volatile performance. When things work well they are happy or relaxed, but they are quickly annoyed by even small delays. They looked at how emotions change as the train is delayed. The study found that passengers moved from happy to less-positive emotions very quickly – within five minutes. When comparing passengers who arrived early or on time, with those who were delayed by less than five minutes, we can see that passengers' emotions very quickly change from happy or relaxed to being indifferent. As delays get longer the proportion of angry and frustrated passengers increases significantly. Also highlighted in their report (produced jointly with the Office of Rail and Road) Train punctuality: the passenger perspective.

They also asked passengers how strongly they felt emotions, on a scale of one to five. The two most negative emotions (frustrated and angry) were felt most strongly, even if they aren't the most common emotion. When there is a series of 'bad' days in terms of performance, passengers report feeling frustrated and angry and we know from previous work on passengers' trust in the industry more widely that these powerful negative emotions last much longer than does a more 'indifferent journey'.

Crowding

Crowding is the second main contributing factor to negative emotions. Negative emotions rise rapidly when passengers aren't able to get a seat, experience crowding or are not able to get things done – for example, not able to use their smartphone. The report found that over the Christmas period, when fewer commuters were travelling and trains were more punctual and less crowded, passengers were more likely to be happy and relaxed. There was a similar, although less pronounced effect, around Easter. A rise in those reporting early trains and bring able to get a seat, which coincides with an increase in 'happy' and 'relaxed' emotions. While punctuality and getting a seat were the main drivers of emotion we could also detect other, more human, influences. Women tended to show slightly stronger positive emotions than men and there was also a bit of a 'Friday feeling'. Positivity increased in the afternoon/evening journey, and built throughout the week into the weekend.

A person's mood did influence emotions. A good day at work or simply looking forward to the weekend could have an impact on people saying that they were happy with the journey. Likewise being tired or in a bad mood could make the difference between being bored with the journey rather than being indifferent or relaxed. However, mood played much less of a part in the more negative emotions – these were driven much more by punctuality and getting a seat.

Read the full report from Transport Focus here.

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Ensuring the passenger stays connected, even at high-speed.

From a technical standpoint Comlab was able to use the broad knowledge and the long history of high frequency projects as a base to fulfil all the highly sophisticated requests from the telecom provider and the German Railways.

The number of mobile phone users in the world is expected to pass the five billion mark by 2019 and most of this huge growth can be attributed to the increasing popularity of smartphones. In 2012, about a quarter of all mobile users were smartphone users, and by 2018 this number is expected to double. And if you are anything like me, your smartphone plays an important part in most aspects of your day. From business e-mails and diary planning to socialising and playing games, the description of your phone as the "remote control for your life" is an accurate one. So it is always frustrating when signal disappears or weakens, voice quality fades and data transmission becomes difficult and your phone becomes an unconnected device. This is something which is all too frequent on-board trains, and not just when going through tunnels either.

But this is not the case for passengers on approximately 400 trains and 3,800 carriages owned by Deutsche Bahn (DB) with the German rail giant having signed an agreement in October 2016 with COMLAB for a high quality and modular InTrain mobile telecommunications repeater system. Very simply, a repeater receive a weak or low-level signal and retransmits it at a higher level or higher power. Today we learn more about this technology and how the team at COMLAB are helping to ensure the digital passenger stays connected throughout their journey.

A partnership drawn from the demands of their passengers, the priority for this project is to increase the levels of on-board satisfaction. Passengers, and especially business travellers using DB trains, expect high quality mobile telecommunications when they travel. This means perfect voice quality and straightforward data transmission.

With very specific demands, a guaranteed solution is required and DB partnered with the Swiss headquartered COMLAB (@COMLAB_AG) to use their InTrain Repeaters that are designed especially for the sophisticated requirements of high-speed trains. COMLAB's repeaters compensate for the high levels of signal loss which are caused due to the high isolation levels in modern trains. They also compensate for the extreme variations in the signal levels which are caused by the high-speed trains and the forwarding of one network cell to the next. Plus an Intrain repeater improves the radio link between the passenger's mobile device and the terrestrial mobile radio station and guarantees undisturbed communication. By overcoming these obstacles, an excellent level of radio communication in the trains can be maintained.

The repeater system satisfies the strict requirements of both the mobile telecommunications network operators and DB. Around 1,200 of the carriages belong to the ICE 4 fleet, the latest generation of Intercity Express high speed trains unveiled at InnoTrans 2016, which will be travelling at speeds of up to 250 km/h (160 mph). The InTrain Repeater System supplies train passengers travelling on DB with 2G, 3G and 4G signals from the mobile telecommunications operators Deutsche Telecom, Telefonica and Vodafone.

Ensuring the passenger stays connected, even at high-speed. *[cont]*

"COMLAB has been able to leverage the broad knowledge and the long term experience in high frequency technology to fulfill all the sophisticated requests from the telecom providers and Deutsche Bahn (DB). The challenge for COMLAB was to ramp up the production capacity to cope with the ambitious roll-out plan. Reason enough for us, to totally reorganize our supply chain and to optimize our processes. Based on those improvements COMLAB is now perfectly prepared to serve high volume projects at high quality; this in order to accomplish the mission to provide best mobile connectivity to travellers globally"; said Peter Härdi, the new appointed CEO of the COMLAB Group.

The team at COMLAB have over forty years of experience on radio frequency (RF) technology. Their involvement includes design, development, production and installation of turnkey high-frequency radio systems. This expertise and many years of experience ensure they can support their customers in discovering solutions for all of their problems. COMLAB offers systems that are available for all customary frequency ranges and they have the knowledge to bundle different radio technologies into one communication system.

It's not just German rail passengers that are benefiting from COMLAB's solutions, since 2013 their technology has been providing connectivity to travellers on rail-airport link Aeroexpress in Moscow, Russia. A new fleet of 25 double-decker trains was ordered from the largest Swiss builder of railway rolling stock, Stadler Rail and these new trains demanded high levels of connectivity.

This project had some major challenges to overcome; airport rail lines generally present significant obstacles to mobile connectivity. The trains carry large numbers of passengers, about 2000 people per journey, a majority of whom will use their phones on-board, and often run through several tunnels. The line also runs at high speeds of up to 160km/h and these Russian trains that operate in cold weather are well-insulated but this can also block signal.

In order to overcome these challenges and ensure connectivity was available to each passenger, COMLAB employed high-performance and innovative repeaters. They developed an InTrain radio coverage in the form of a highly modular and expandable on-board digital repeater system. Each of the two roof antennas on each trainset receives signals from various landside base stations and forwards them via a coaxial cable to an InTrain repeater inside the train. Each trainset is equipped with two 3-band repeaters. The repeaters first use a band-blocking digital filter to eliminate unwanted signals. In order to use the full capacity of the desired GSM, UMTS and LTE signals in downlink, the repeater amplifies those signals individually for each operator, then forwards the signals via coaxial cable to the InTrain antennas and onto the passengers (read more details on the solution here).

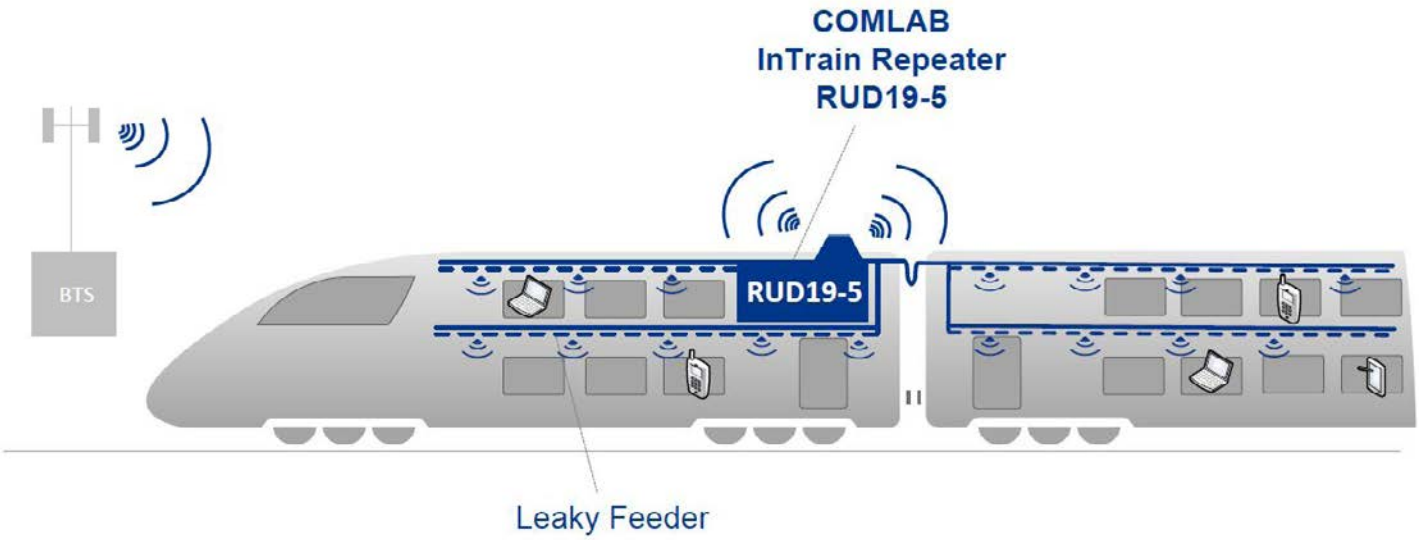
The many customers of the Russian Aeroexpress now benefit from distortion-free and qualitatively outstanding mobile reception, high availability of data services and no dropped calls.

Peter Härdi concludes by telling us about the bright future for this area of the industry; "Today's phone user is more interested in using the smartphone as a television, watching live events or as a gaming platform and no longer is just focussed on 'the classics' like phone-calls or emails on the move. So therefore the bandwidth generated with the 4 and 5G Networks needs to be sufficient not only in centres like Berlin, Frankfurt or Munich, but also on the road and train tracks in between. The challenges are open for the suppliers of Repeater systems and the providers to satisfy that market with generating the necessary network coverage in long distance and local trains, so the end-user is satisfied and can use its product at any time and any situation."

The ability to have high quality and consistent connectivity whilst on-board trains is a key demand for passengers, and an important driver in boosting ridership (and revenue) for rail and metro operators. With the growth of mobile phone users set to grow, and what they can offer continuing to expand, the ability to use them whilst on a train journey is now an essential offering, and one which COMLAB are helping to offer a growing number of passengers around the world.

COMLAB radio frequency technology

For more on the work of COMLAB click here.



How gamification of travel is aiming to boost ridership in Italy.

"For each level passed in the game, passengers receive other rewards that can be shared via social networks and all their results are publicly presented in a ranking..."

For those using public transportation in the Bolzano region of South Tirol in Northern Italy, their journey is already made appealing by the views out the window. Entirely located in the Alps, the regions landscape is dominated by stunning mountains and lush green valleys. Plus we all know the benefits of getting out of the car and onto public transport, whether it be reducing pollution and fossil fuel use, increasing exercise or even saving money. But now, SASA, regional transportation company in Bolzano have added a new factor, gamification to help increase passenger numbers further. You may think that gamification is creating a game for a business purpose. But it's not. It doesn't create anything new. Instead it takes something that already exists, in this case travelling on a bus. And integrates game playing (e.g. point scoring, competition with others etc.) in an attempt to increase participation, engagement and loyalty. So how are SASA doing this?

Gamification was introduced for the first time to public transport, with the Singapore's Travel Smart Rewards program that focusses on easing demand from peak to off-peak times in return for offering incentives to commuters for doing so. September 2016, saw SASA launch a new version of its mobile application SASABus, everyone who is registered as a user and uses the company's buses is, turns its kilometres travelled into points that can be used in online challenges and are added to an aggregate personal score which is publicly visible.

The number of kilometres is precisely calculated for each mobile user via Bluetooth. Every bus and every bus stop reached by SASA buses are covered with Onyx Beacons (@onyxbeacon), and these devices provide, via the mobile app installed on the mobile phone and via a CMS platform, an accurate measurement of the on-bus dwell time for each mobile user.

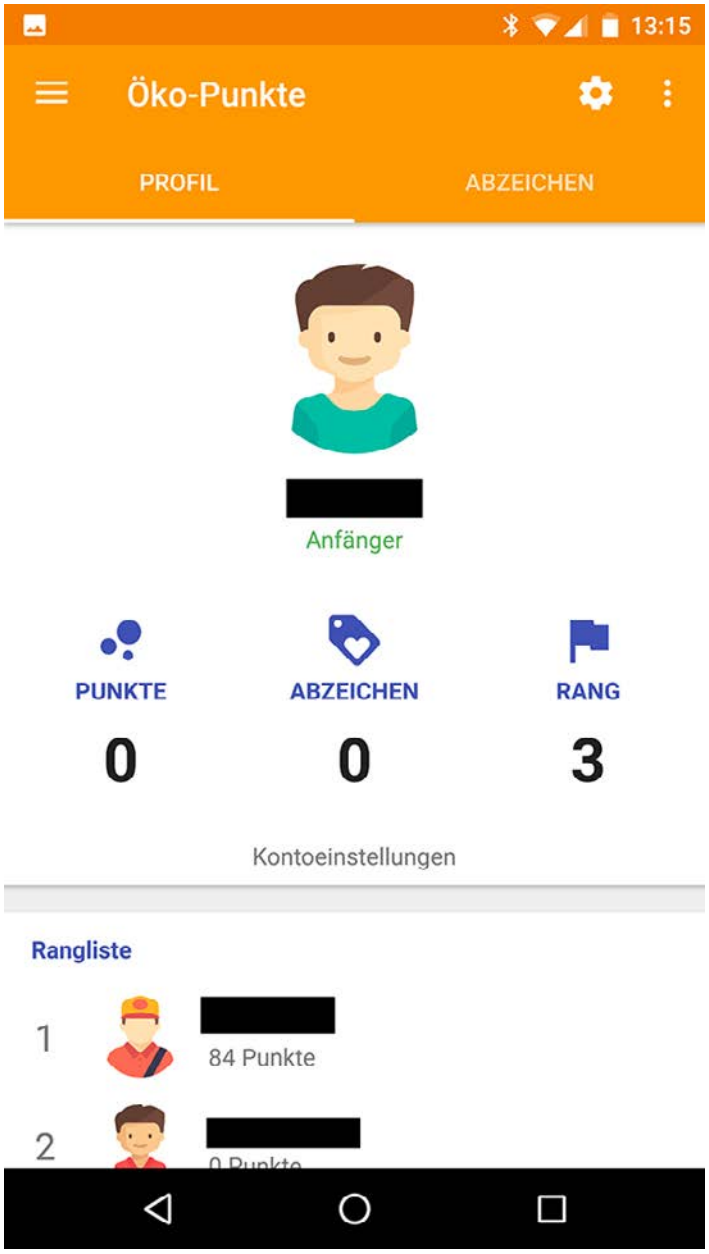
The boarding point and the drop-off point for each journey are precisely determined as well, by using the Bluetooth Beacons deployed in each point of the transportation network. So, the number of kilometres travelled, the number of journeys and all the interactions via mobile app between passengers and the transportation company can be transformed in points and accumulated in a total score.

Passengers are awarded with points for every kilometre of bus travel, but they can gain supplementary rewards when responding to various challenges launched by the transportation company, for example they are invited to follow and go on-board the ecologic fuel cell buses (powered by hydrogen engines), to accumulate a given mileage in a month or to participate at "Giornate per la mobilità" – "The Mobility Days".

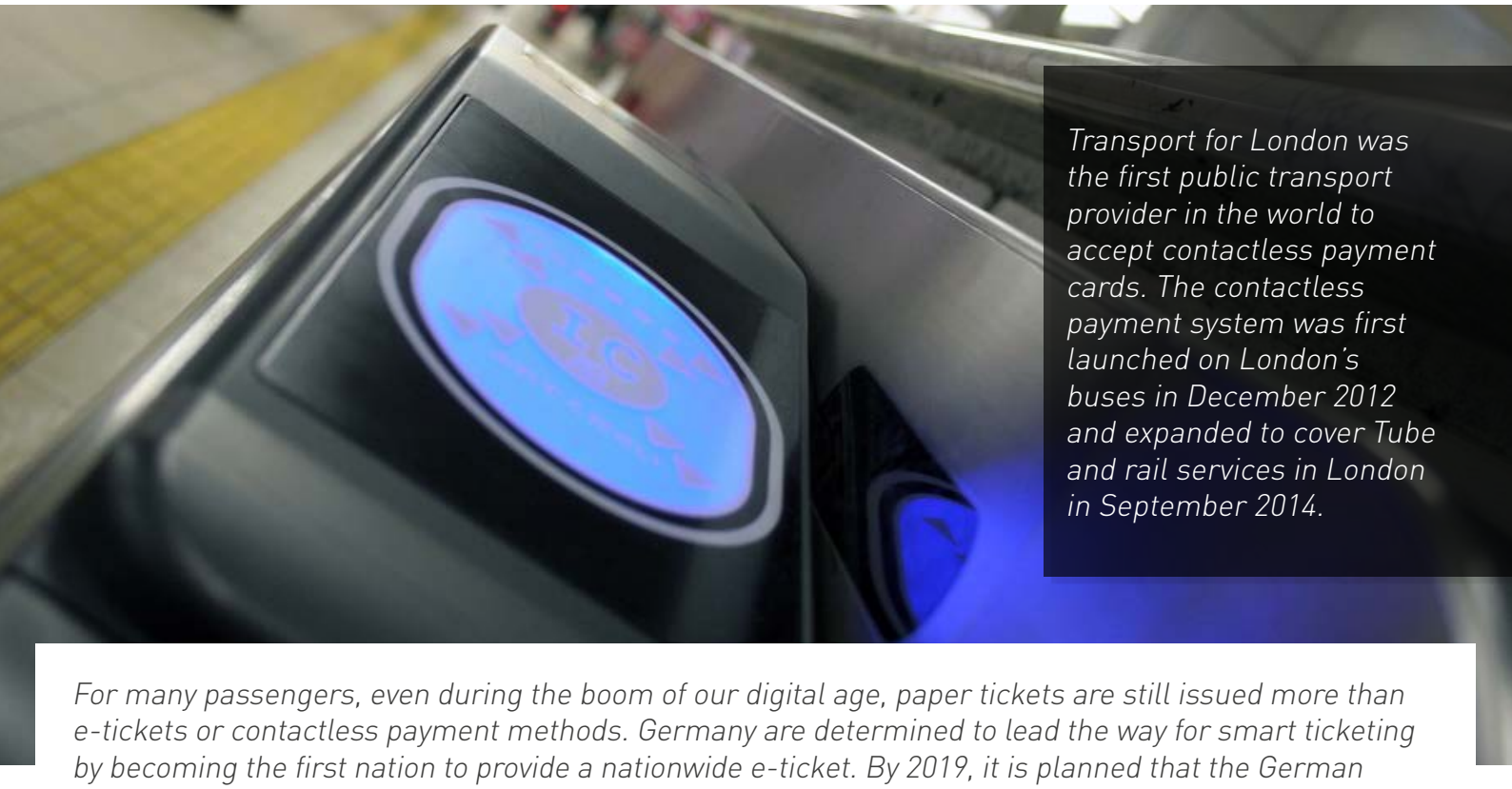
For each level passed in the game, passengers receive other rewards that can be shared via social networks and all their results are publicly presented in a ranking, so they feel like being in a continuous competition with other users.

The team behind this aim for this to make using public transportation "not anymore a boring daily routine, but one that becomes a fun, entertaining and challenging experience."

This is the second phase of implementation for the SASABus mobile application, based on Bluetooth Beacon technology. In the first phase of the project, 1000 Onyx Beacons were placed on all buses and bus stops, to provide interactive real-time information for passengers and satisfaction surveys, applied to passengers immediately after they have made a local travel. The project is implemented by Raiffeisen Online, a partner of Onyx Beacon in Italy, and a member of the famous Raiffeisen financial group.



Germany set to "advance digitalisation and interconnection" with nationwide e-tickets.



Transport for London was the first public transport provider in the world to accept contactless payment cards. The contactless payment system was first launched on London's buses in December 2012 and expanded to cover Tube and rail services in London in September 2014.

For many passengers, even during the boom of our digital age, paper tickets are still issued more than e-tickets or contactless payment methods. Germany are determined to lead the way for smart ticketing by becoming the first nation to provide a nationwide e-ticket. By 2019, it is planned that the German transport ministry will phase paper tickets out for good. By contrast, the new e-ticket will connect all public services including bus and tram across the country's cities. This means that passengers will only need one card to make a transaction on any national service. Ten million people in Germany are already using smart tickets in their individual cities, but the German Transport Minister Alexander Dobrindt believes this should be extended by 2019. Whilst 239 out of 402 transport districts accept chip cards, the new nationwide ticket is expected to unify all of Germany's public services.

According to a plan seen by publishing group Funke Mediengruppe and **reported in January on Waz,** the Transport Ministry wants to introduce a uniform e-ticket that would connect public transit systems across nearly all of the country under one card. A national e-ticket has the power to offer more convenience and flexibility for customers and create seamless connections. This is also intended to benefit the operational side of things by reducing ticket queues and crowding at ticket machines. If an e-ticket is lost or stolen, it can be easily cancelled or replaced unlike the paper alternatives. This will allow customers the opportunity to choose and purchase new tickets with more flexible travel options. From an operator's perspective, there would be lower maintenance costs compared to systems using magnetic tickets.

The e-ticket was suggested to make public transport an easy and more attractive option for 75% of the population who regularly rely on these services. "We need a Germany-wide, mobile platform that links passengers' information across regions and makes it possible to book e-tickets," Dobrindt told Funke Mediengruppe.

The upgraded ticketing service will be one project out of twelve to modernise Germany's services with an expected cost of Đ16 million both this year and continuing into 2018.

Transport for London was the first public transport provider in the world to accept contactless payment cards. The contactless payment system was first launched on London's buses in December 2012 and expanded to cover Tube and rail services in London in September 2014. Since then, more than 500 million journeys have been made by more than 12 million unique credit and debit cards from 90 different countries, as well as using contactless-enabled mobile devices. Around one in 10 contactless transactions in the UK are made on TfL's network, making it one of the largest contactless merchants worldwide.

Even though the technology to make this possible has already been available for years before this deadline, it is important for the government to have a central database to collate a range of information about prices and how to transfer a customer's revenue if they were to travel from region to region.

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Uber ties up North Carolina partnership to "eliminate transit deserts".

The first Uber journey took place in California in 2010 and since then the popular but controversial ridesharing app, estimated to be worth between $60 billion and $70 billion, has become increasingly connected to public transport. A limited partnership between Uber and the Metropolitan Atlanta Rapid Transit Authority (MARTA) was launched in **July 2015.** *But this was focussed more on offering a $20 voucher to MARTA riders to use the service for the first time and Uber advertising on the transit authority's app – nothing too revolutionary.*

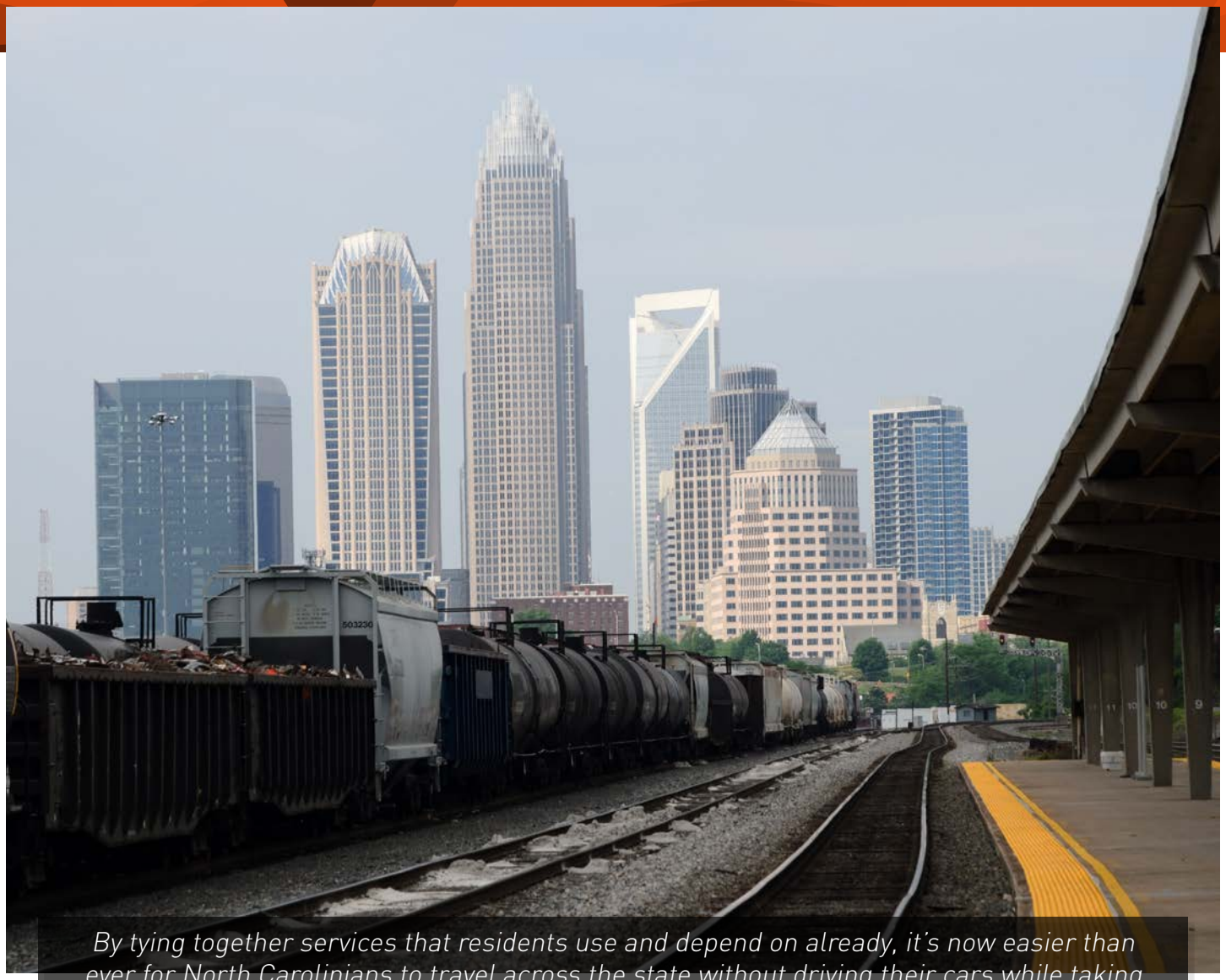
A number of partnerships between transit agencies and these kind of transport apps have been launched, with one of the most interesting being announced in November 2016, where TransLoc, a transportation technology platform that delivers seamless mobility, announced a three-month pilot partnership with the North Carolina Department of Transportation (NCDOT) to integrate Uber and public transit with the state's passenger train system to enhance state-wide mobility.

NCDOT and Amtrak partner to operate the Piedmont and Carolinian trains in North Carolina. TransLoc's Rider app will provide North Carolina passengers with seamless, door-to-door trip planning to and from nine Amtrak stations throughout the state. This project will bring multimodal transit opportunities to more than five million residents across three major metropolitan areas.

"Our partnership with TransLoc is helping us create a large network of interconnected public transit options," said Paul Worley, Rail Division Director at NCDOT. "By tying together services that residents use and depend on already, it's now easier than ever for North Carolinians to travel across the state without driving their cars while taking advantage of existing rail infrastructure."

The initiative advances NCDOT's mission to eliminate transit deserts and connect more North Carolinians with safe mobility options for travel across the state and beyond without raising costs for riders or for the state. As a result of its work with local public transit systems over the past five years, the Department has seen a **40 percent increase** in ridership. Now riders not only have more options for getting to the train, but they can plan and coordinate an entire multi-leg trip at the touch of a few buttons.

Starting on November 2nd 2016, North Carolinians can simply input their preferred train station into the Rider app. The app will display a route that integrates Uber and public transit with the train schedule, providing multimodal route options from the rider's front door to the train station platform. For example, the app might provide a synchronized route to the train that incorporates walking, taking a bus or riding in an Uber. Riders can also use the app to find transit options or an Uber at their destination. Over time, the app will learn user preferences around cost, convenience and mode of transportation to deliver a customized door-to-door plan for worry-free transit.



By tying together services that residents use and depend on already, it's now easier than ever for North Carolinians to travel across the state without driving their cars while taking advantage of existing rail infrastructure.

Uber ties up North Carolina partnership to "eliminate transit deserts". *[cont]*

"TransLoc's partnership with NCDOT builds upon some of our deep existing relationships with North Carolina transit agencies and ties that work into an important statewide effort," says Doug Kaufman, TransLoc CEO. "This is an innovative step for a transit agency as large as the NCDOT and reinforces its leadership in working to solve the chronic first-mile, last-mile problem that has historically restricted public transit ridership. We look forward to working with NCDOT to meet the needs of residents and create thriving transportation ecosystems in communities across the state."

This announcement comes on the heels of a successful implementation of private and public transit trip planning within the TransLoc Rider app in Gainesville, Florida, which helped the city seamlessly integrate Uber with existing bus services to increase mobility options for seniors and safe rides home for students at the University of Florida.

"It is exciting to see technology companies and public transit agencies work together to test new ways for making trip options convenient and complete," said Michael Melaniphy, American Public Transportation Association President and CEO. "As private sector innovation accelerates, such partnerships will enhance the attractiveness of public transportation, with the travelling public being the prime beneficiary."

The high-profile leaders in this sector like Uber, Lyft, Ola and others have in a short period of time already shaken up the taxi business. And its rapid growth is rooted in an ability to leverage spare capacity and expand quickly all without large investment. Capacity and investment are two of the biggest challenges in public transport, and these show no sign of easing. And faced with such an agile, popular and low cost form of transportation, public transport has to exercise caution. Uber will appeal to those who might have otherwise taken the train, metro or bus. And the nature of their development shows they are constantly looking for opportunities to disrupt new sectors.

MTA to deliver smart ticketing for smart New Yorkers.

"Now you can skip the line entirely to buy train tickets right on your iPhone..."

According to 2015 research, 80 per cent of New York residents own smartphones which can now be taken advantage of by ticketing services. New York has entered the 21st century by putting their smartphone technology to good use on the metro lines. It has been announced that passengers on Metro-North Railroad and Long Island Railroad can now pay for tickets with Apple Pay, Apple's digital wallet service whilst Android users will be able to download the Mastercard app, Masterpass to make quick and simple payments.

Governor of New York, Andrew Cuomo said: "We have worked tirelessly to rebuild and reimagine New York's transit system for the 21st century and a key part of those efforts is to incorporate the amenities that modern day riders demand. By adding the use of cutting edge technology like Apple Pay and Masterpass, we are not only making mass transit easier to use, but are also improving the overall experience of riders."

These plans have been brought forward from the end of the year to this month to help make New York a smarter city and to create a smarter metro.

The metro is the busiest commuter rail line in North America. Now for the first time, ApplePay and Mastercard are bringing the 8,764,983 weekly commuters a quick and easy way to ride the Metro North and LIRR journey through contactless payment options. These tickets can be purchased anywhere at any time to increase customer convenience and reduce queuing time at the stations. This application will cater for all ticket types including singles, returns, weekly or monthly tickets.

MTA Chairman and CEO Thomas F. Prendergast said, "We're pleased to welcome both Apple Pay and Masterpass to the eTix experience. We believe that the addition of these secure payment options will help us to do an even better job of meeting the needs of our customers, and we look forward to further building the user-base for the app in the weeks and months ahead."

This technology was first introduced on a public transport network by Transport for London (TfL) in 2014. This innovation was kick-started to reduce paper tickets and cash handling in order to support savings for TfL. Not only are contactless payments easier to track, but they will also provide useful information for collecting transport usage data to schedule trains, buses and trains effectively. After two years of operation, the contactless payment options have delivered results for the London rail and tube service which hope to be achieved in New York:

According to the UK Card Association, they have produced the latest figures for July 2016 in London:

- As of July 2016, there are a total of 92.1 m contactless cards in issue in the UK. These cards are split between debit (64.7m) and credit / charge cards (27.4m). This is an increase of 29.9% over the year.
- £2,105.6 was spent in the UK in the month using a contactless card. This is an increase of 11.8% on the previous month and an increase of 239.7% per the year.
- On average, each contactless transaction is for £8.76. This is split £8.75 on a debit card and £8.79 on a credit / charge card.

So why have New York taken two years to catch up? Although banks have fully promoted this technological advancement, part of the challenge has been due to the lack of vendor support. Although Apple Pay was launched in 2014 in the US, in-app support is easier to develop than in retail because it avoids having to upgrade point-of-sale terminals.

Apple Pay and Masterpass eTix will eliminate the hassle of re-typing credit card numbers, billing information and security codes to make a transaction. However, do not fret because these apps have in-built security and privacy. Each payment that is made will hide your card detail information, and once the payment has been authorised your apple device will create a single individual security code.

Apple Pay Vice President Jennifer Bailey said, "The New York commute just got that much easier thanks to Apple Pay in the MTA eTix app. Now you can skip the line entirely to buy train tickets right on your iPhone."

Similarly, Mastercard North America President Craig Vosburg added, "Mastercard is working with the world's leading cities and industry partners to remove the friction that slows down how people move around them. The integration of Masterpass into the MTA eTix app is a tremendous showcase of progress on this commitment as we look to build out a seamless user experience for commuters in New York. In today's fast-paced, always connected world, people expect to have access to payment solutions that deliver a simple and secure experience and this collaboration truly delivers on that."

The eTix will have an added feature where the user will be able to check schedules, operational statuses, refunds and receipts. As New York is the first for this type of technology in the US, it is expected that it won't be too long before other subways are making the same upgrade.

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The Last Word with David Block-Schachter, Chief Technology Office at the MBTA.

"...as the reach of technology is changing, and there are more possibilities for private sector involvement, there needs to be an equal level of competence, skill, and vision on the public sector side."

The Massachusetts Bay Transportation Authority (MBTA) provides over 1.4 million journeys a day across greater Boston through its subway and commuter trains, buses and ferries. And there's a strong case that its riders are the most educated and technologically-savvy of anywhere in the world. Over 50 colleges and universities can be found within the Boston metropolitan region, including the world renowned Massachusetts Institute of Technology (MIT) and Harvard. Plus the city now hosts a rapidly growing start-up scene as well as being a home to major international technology companies.

This heady mix of expertise aboard its trains, buses and ferries has however failed to daunt this week's interviewee, **David Block-Schachter,** who became Chief Technology Officer at the MBTA in February of this year. David took time out of his busy schedule to catch up with our Editor **Luke Upton** to discuss creating a start-up culture within a transit agency, the challenges of taking a longer-term view and why growing up in Manhattan gave him a perfect start to a career in transport...

Luke Upton (LU): Thanks for the time today, so as we always open with, how did you get into working in transit?

David Block-Schachter (DB-S): No problem Luke, I was working for a variety of digital marketing agencies in the early 2000s, and decided I wanted to do something that I cared deeply about. I'm a native New Yorker, I never learnt to drive a car, I realized the only thing I was vaguely competent at was taking the subway. On my way to growing more competent, I ended up getting a few degrees in Urban Planning and Systems Engineering from MIT. After a number of years focused on research, I ended up at a small start-up called Bridj working with smart shuttles, and then found my way to the MBTA.

LU: You joined MBTA, how's the role going so far?

DB-S: It's been fascinating, there's been a new administration here and they are really serious about running the MBTA (@MBTA) as a customer focussed business. In both senses, the customer part and the business part. Which for me is perfect. Because it's really at the heart of what I have come here to do, which is to figure out how new technology can improve the customer experience.

LU: It's early days still, but what drew you to the role and what do like most about your job?

DB-S: Prior to the MBTA I spent a few years in the start-up world with a company called Bridj (@Bridj). One of the things I realized there was that as the reach of technology is changing, and there are more possibilities for private sector involvement, there needs to be an equal level of competence, skill, and vision on the public sector side. After talking to the leadership team at the MBTA I became convinced that there was a unique opportunity to join a team dedicated to transforming an Authority. I know when I go to work every day, that there are 1.4 million daily trips I get to touch, and that even the smallest things I do with my team can improve their lives in a measurable way. That's fun!

LU: What's the biggest challenge in your role?

DB-S: When you work in a small start-up, you focus a lot on how the world is going to look in 6 months' time, and you have the tools to make change the organization quickly. When you work at a large public agency, decisions take longer to implement and bring to fruition, as they should, and you need to focus on the levers you can use to make change 3-5 years in the future. That means much more focus on technology standards and methods of procurement - on the strategic decisions - and less time spent on the tactical decisions. You have to think a lot about where the world will be in five years' time, not three months.

LU: I like the idea of you effectively being a start-up within the MBTA, how have you been recruiting the team for it?

DB-S: Principally by recruiting people who otherwise would have gone to a commercial start-up! We perhaps don't work at the pace of start-up but in what we lose a little in speed, we make up for in reach and the sense of giving something back to the public. The people we do get have been fantastic, the best of the best, civic-minded people who can also just do the work. It's a pleasure to be around them.

LU: We've already touched on timescales and planning, but what do you think will be some of the biggest differences between transit now and in 10 years' time?

DB-S: Full circle journey planning. Right now, when a customer takes a journey, they often have three different types of tools they interact with. One for search and discovery - think Google Maps or Transit App - one for payment and boarding - either a mag stripe or first generation smart card like in Boston, or a contactless credit or debit card like in London or Chicago (and soon to be Boston!) - and one for post payment navigation. The more those apps are part of an ecosystem where the customer - and the agency - have seamless experience, the better that experience can be, and the better data agencies can have to plan those journeys.

LU: And finally, as we always ask, what's your favourite rail journey?

DB-S: Growing up in Manhattan, the subway meant freedom. Taking the Lexington Avenue line to middle school, when I was eleven years old, will always have a soft place in my heart. But now, I'm a homer. I love my daily commute on the Red Line from Central Square in Cambridge to Park Street. It takes less than 10 minutes on the subway, and I get to walk through Boston Common on one end - what could be better?

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