## Plenary Session 1
The Role of Railway Operators in Enhancing the Customer Experience

# From Today's Research to Tomorrow's Enhanced Customer Experience

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It was my great honour to moderate the first Plenary Session of the 12th World Congress. What better way to start proceedings than to have the leaders of some of the most important railway companies in the world share with us the varied benefits that have been delivered for their customers through research, and to set the challenges for future researchers to address.

We had the President of the North American Transport Technology Centre Inc (TTCI), Lisa Stabler, the Vice Chairman of the East Japan Railway Company, Masaki Ogata, the Deputy Chief Executive and Chief Technical Officer of SNCF from France, Pierre Izard, the Executive Vice President and Representative Director of the Central Japan Railway Company, Shunichi Kosuge, the Chief Technical Officers from Germany, Rolf Härdi, of DB, and Italy, Marco Caposciutti of Trenitalia.

The panel session was organised in two parts. Each panellist was asked to introduce their company and the achievements they are proudest of which have been delivered through research. This was followed by each of the distinguished speakers describing the biggest challenges they face, where they are looking to the research community to deliver solutions in the future.

Pierre Izard kicked things off by describing the size and scope of SNCF' s activity, pointing out that SNCF led the introduction of High Speed Rail in Europe, with extensive research support for all of the technologies needed to make HSR the success it has been. He drew attention to SNCF's diversification, with one third of its total revenue coming from overseas activities. Three more recent developments he highlighted are the personal mobility assistant, the digital freight train and digital brake tests.

Masaki Ogata followed by describing the immense scope of the East Japan Railway Company Activity – moving 17.9 million passengers per day, principally in and around Tokyo, but also the many Shinkansen routes to the North, and the development of retail and other property assets. The vision of JRE is to provide the smoothest of journeys for passengers and he characterised this in three dimensions; horizontal - through seamless operations and good connections, Vertical – through efficient escalators, lifts and platform screen doors and Psychologically – through Smart Cards and Mobile Phone applications. The theme that holds this all together is that of MaaS – Mobility as a Service, and Ogata san shared some of the initiatives that had been promoted for MaaS when he was the president of UITP.

**Masaki Ogata**
JR East, Japan

**Shunichi Kosuge**
JR Central, Japan

**Pierre Izard**
SNCF, France

**Rolf Härdi**
DB, Germany

**Marco Caposciutti**
Trenitalia, Italy

**Lisa Stabler**
TTCI, USA

Rolf Härdi explained that DB and its subsidiaries carry 4.5 million people per day and 200 million tonnes a freight a year, making it the largest railway operator in Europe. Like JRE, DB are moving rapidly into Mobility as a service, and he described the various steps, arising from research and development activity, that have helped to deliver enhanced levels of passenger comfort and convenience. These include a travel app that provides all the information a traveller could want; the novel development of highly accurate and clear sound for station announcements, based on much smaller and targeted speaker systems. Other innovations that have been derived from research include the use of lighting within concrete on platforms to assist passengers in wayfinding, the increased use of vegetation within station designs, to enhance carbon capture and improve the environment; the development of smart lockers for bikes; and a facility to accept and segregate all types of waste through one portal.

Shunichi Kosuge explained how the Tokaido Shinkansen is the backbone of the Central Japan Railway Company and also the key travel corridor for two thirds of the population and economy of Japan. Being the first Shinkansen in the world, it was and is the product of research into all the various systems that enable efficient movement at ever higher speeds. He showed how the research effort on HSR has enabled todays trains to be 25% lighter while travelling 65 kph faster, while consuming less electricity than the earlier versions of Shinkansen, making the service more and more sustainable. All of this having been achieved while having Zero fatalities over the 55 years of operation, emphasising how safety is the number one priority.

Marco Caposciutti told delegates that Trenitalia moves around 250 million train kms a year, of which 60 million are High Speed. He also pointed out that Italy is the only country in the world where there is on rail competition among high speed operators, which is a driver for innovation and value for money. While emphasising how the top priority is for ever improved safety, he highlighted innovations through the new dynamic maintenance management system which will help to improve performance and reduce cost; about the improvement in delivering internet on board trains and the development of the new train for Trenitalia's regional services.

Lisa Stabler runs the USA's world leading research facility at Pueblo Colorado, and emphasised the difference between the North American Railways, which are dominated by freight, and the passenger-oriented activities of the other panellist's railways. She emphasised that freight customers want three things from their railroads – On time delivery, goods in top condition and delivered for the lowest possible cost. She went on to explain how the research and development of wayside detection equipment has led to a 40% reduction of notifiable derailments, albeit, in the last few years the rate of improvement had slowed – leading to the challenge she was to set later in the panel.

In following up the introductory remarks, Pierre Izard highlighted a number of further research based developments – the challenge to assure safety when using artificial intelligence, sharing intelligence between the train and the track, whether there is a role for quantum computing in railways, the development of intelligent level crossings and the critical challenge of cyber security for the railways. Building on these challenges Marco Caposciutti highlighted that while many operators, including Trenitalia, are seeking to raise speeds above 300 kph to further reduce journey times, there are issues like flying ballast that need to be solved to do so safety. Shunichi Kosuge reflected on the


**PI** SNCF — ***We are really convinced at SNCF that the railway system must be the backbone of mobility for the 21st Century.***

**MO** JR East — ***The public transport will lead MaaS and JR East will build up MaaS, Mobility as a Service, as a platformer for the life of people.***

**SK** JR Central — ***The Linear Chuo Shinkansen will dramatically expand the range of people's activities, create a completely different business and lifestyle, and have new economic benefits.***

**RH** DB — ***It's not good enough anymore to move from one station to another. DB have to cater for the entire service.***

**MC** Trenitalia — ***Trenitalia wants to reduce journey time and increase the customer experience of our customers.***

**LS** TTCI — ***Customer satisfaction for freight has three areas. It is on time, without any damage, and lowest cost possible.***

development of the Chuo Shinkansen, using superconducting maglev technology, which will provide an alternative and faster route from Tokyo to Nagoya and ultimately to Osaka, providing Japan with a more assured route (against geophysical risks) as well as further technological leadership of world railways. He also commented on the alternative high speed development from America, the Hyperloop, and suggested that there are two significant issues which may hamper its widespread introduction – first the safety issues around assuring a continuous vacuum, the loss of which would be catastrophic for passengers, and secondly, the fact that it could never match the capacity of conventional or maglev trains, thus limiting its commercial potential.

## Future Challenges

The challenges that our panellists offered for future researchers were many and varied, and, with one exception, I will describe them without mentioning the author as these are all universal challenges which researchers are invited to address over the coming years.

The wheel rail interface is the fundamental technology that gives railways their competitive advantage, and there remain challenges to address over the forces and materials arising at the tiny contact point – future research into the profiles and material used could lead to reductions in rail and wheel fatigue which would improve safety, cost and passenger/freight comfort.

Global warming, and the role that railways can play in meeting carbon targets was a common theme. The development of optimised wheel rail interface, the development of hybrid, battery and hydrogen powered trains and further work on weight reduction will all help railways to maintain and improve its lead in environmentally sustainable transport. This theme leads to the one attributable quote I am going to mention. Guillaume Pepy, the retiring President of SNCF was due to participate in the panel but had to return to Paris at short notice for family reasons. Before leaving Tokyo he insisted that the panel discussion should include his commitment that railways should develop as the backbone of sustainable mobility in the 21st century and Pierre Izard was eloquent in passing this message on.

The challenges of digitalisation, which offers both huge potential in the exploitation of artificial intelligence and machine learning while creating risks in the form of cyber security and the increasing complexity of the 'production line' were mentioned by all of the panel.

On service and comfort, the sector must improve its product offering to compete with new models of car design, ownership and operation to ensure that rail does become the backbone of MaaS. Many of the panellists developed the MaaS theme, with co-operation with other linked modes, shortening total travel time (STT), data integration exploitation, and excellence in customer information, all areas where researchers can develop solutions.

The panel had focussed quite a lot on technology and environment, but all supported the overarching importance of researching futures that address people issues – such as the demographic time bomb of declining populations and the skills and cultural challenges that staff will face as the industry transforms itself into a digitally driven sector. Where populations are likely to reduce this enhances the need for ever more efficient use of labour and even the development of autonomous trains, which have potential for freight, metro and mainline passenger services.

After a stimulating and thought provoking 75 minutes, the Plenary Session was brought to an end with thanks from the audience for the panel's many insights, which really had helped us all to see a prospectus for future research and to anticipate some of the exciting opportunities that can form the basis of papers for the 13th WCRR in 2022 in the UK!