

# DIGITAL RAILWAY DEVELOPMENTS



INTERNATIONAL UNION  
OF RAILWAYS

# PROGRESS PAPER



*Making Rail Smarter*



This paper, the first of a series that will describe the interactive approach towards rail digitalisation being led by the UIC Digital Platform, has taken into account the contents of the joint "Roadmap for digital railways" in Europe developed by CER, CIT, EIM and UIC and published end of April 2016.

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## What is UIC, the International Union of Railways?

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**UIC IS AN INTERNATIONAL ORGANISATION BRINGING TOGETHER RAILWAYS AND MAJOR RAIL-SECTOR STAKEHOLDERS FROM ACROSS THE WORLD.**

**SPECIFICALLY, UIC IS 240 MEMBERS FROM 100 COUNTRIES, REPRESENTING 1 MILLION ROUTE KILOMETRES AND 7 MILLION MEN AND WOMEN WORKING DAILY TO SERVE CUSTOMERS IN OPTIMUM COMFORT AND SAFETY.**

**UIC IS THE TOOL CREATED BY THE WORLD'S RAILWAYS TO ENABLE JOINT WORKING, THINKING, ACTION, AND PROGRESS.**

### **A platform for technical cooperation and exchange**

UIC is first and foremost a repository of railway expertise and a forum for sharing experience and seeking solutions whose aim is to bring about greater consistency between railways worldwide.

In particular, it is at UIC that current and future operating standards are first developed. Taking the form of UIC-coordinated projects, this cooperation boosts railways' efficiency and attractiveness the world over. It also facilitates the development of international rail links, which benefit all rail users.

### **Future-proofing the railways**

UIC's second major remit is to help the railways prepare for the future.

For each region of the world, UIC has drawn up a strategic vision offering a consistent framework for railway development.

One part of preparing for the future is investing in innovation, new technologies, and digitalisation. UIC is coordinating some 200 technical projects and is involved in studies featuring involvement from all sector stakeholders.

Lastly, UIC's educational and training programmes are preparing future generations of rail managers to meet the challenges of the market and society.

### **Speaking for the railways**

The railways have appointed UIC as their global spokesperson.

This role is specifically recognised by the UN, where UIC represents the rail sector.

UIC is today the go-to contact partner for international and organisations of all types, whether, political, economic or financial, when they want to talk to the railways. UIC also has long-standing cooperation with a number of other bodies, and has concluded agreements to this effect.

### **So what is UIC?**

UIC is 240 railways and rail-sector stakeholders across 95 countries, coordinating their actions and efforts at international level in order to: ensure a joined-up approach to railways, prepare the future, and speak as one in order to better serve the economy and society as a whole.

## Foreword

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***With the UIC being the technical platform for the rail operating community around the world, there is a significant challenge in helping the world's railway companies in facing the metamorphosis to the digital era.***

*The concept of the digital railway is not restricted to one or two areas but has an influence on the entire rail system. The challenge therefore needs to be collaboratively developed within the rail community and influenced not only by the successes already achieved in other sectors such as aviation but also by what the customer expects from the rail system of tomorrow.*

*The objective is to offer rail transport services to the customer that are better, safer, cheaper and therefore attractive, following the priority triptych: Productivity security services, through the development of IOT.*

*Digital might be the “in word” at the moment but this is not a flash in the pan phenomenon. Rail must evolve in order to keep pace with its competitors.*

*This means being responsive to societal needs (benefits for society), bringing more efficiency for the operators, at lower costs but at the same time more attractive services to the customer.*

*The UIC will support this through the preparation of IRS (International Railway Standards) that deal with the impact of digitalisation on the system.*



**Jean-Pierre LOUBINOX**

Director General of the International Union of Railways (UIC)

## Introduction

*"Share, Open, Connect!"*

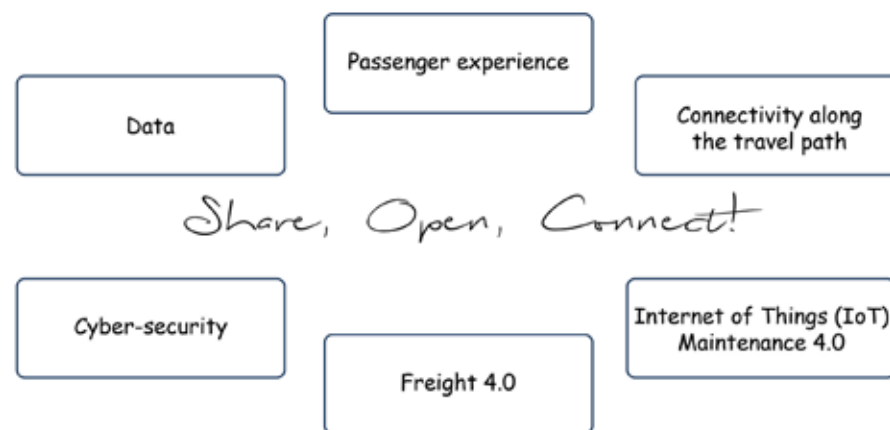
THAT WOULD BE THE MOTTO OF THE ACTION LED BY THE INTERNATIONAL UNION OF RAILWAYS, THE INTERNATIONAL PROFESSIONAL ORGANISATION GROUPING TOGETHER 240 MEMBERS WORLDWIDE, ON BEHALF OF ITS MEMBERS IN THE DIGITAL FIELD. THE INTERCONNECTION OF PERSONS AND OBJECTS THROUGH THE INTERNET WEAVES A CLOSE CONNECTION BETWEEN THE REAL WORLD AND THE DIGITAL WORLD, CAUSING STRUCTURAL CHANGES IN THE RELATIONSHIP WITH OUR ENVIRONMENT. THE DIGITAL WORLD BRINGS WITH IT NEW CHALLENGES IN THE COMPANY'S RELATIONSHIP WITH ITS CUSTOMERS, ITS STAFF AND ITS ECOSYSTEM.

Since the 19th century railways have been a cause and a consequence of the industrial revolution. And they have grown internationally at the service of society. Today in the 21st century they must be an actor and a vector of the digital revolution, with a world dimension. Railways can better share information, open services and connect people at the service of humanity.

It's important to highlight also the ongoing mobility revolution, with quantum leap evolutions in passenger experience (sharing economy, permanent connectivity, mobile first, ...) and industry 4.0 (Internet of Things allowing predictive maintenance and transforming manufacturing processes, equipment of maintenance workers with mobile devices, ...) by mentioning that railways have unevenly embraced this revolution.

Digital is a strategic issue. Objectives are to help share best practices amongst Members and help connect them with start-ups, where innovation actually happens. UIC method is openness. By setting up a dedicated worldwide platform in November 2015, the idea was to build also a community at the service of Railways, in order to "Make Rail smarter" in the coming years and decades.

This platform will foster innovation, help Members activate their projects and their contacts with the digital community. Based on their feedback, six priority topics will be cover first and foremost:



There is also a necessity to include digital in the value chain. Opportunities all along the value chain (internal and external) were mentioned – whilst allowing for the expected risks. In the "greater global digital context", UIC must prove itself able to meet its Members' needs, both now and particularly in the future, by furthering the leading-edge dimension of its research activities at global level and maintaining a vision and developing tools/actions/projects which allow UIC to continue supplying added value and global reach.

Mr Jean-Pierre Loubinoux, UIC Director General, highlights: *"We are opening a new era of creativity. Digital is at the service of everything. This platform has to be at the service of all the UIC Platforms, of all UIC Members, and ultimately at the service of society. We want to develop its activities with the motto "Share information, open data, source, innovation, services, connect people, objects" with an immediate link with security. We are becoming actors and vectors of our security. The future is outside, let's work with brains!"*

# DIGITAL TECHNOLOGY: SOME TAKE-HOME TRENDS

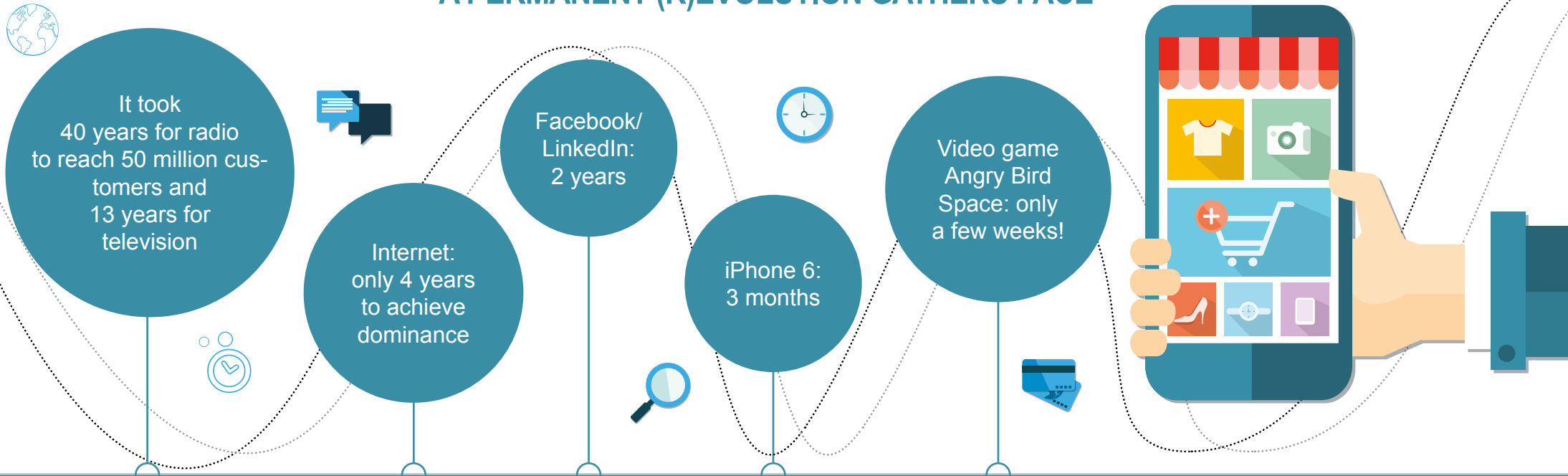
## FOCUS ON A UIC MEMBER: SNCF

- ✦ **20 MILLION SNCF APPS** downloaded
- ✦ **NUMBER-ONE** e-commerce site
- ✦ **78 MILLION** tickets sold online in 2014
- ✦ **4 BILLION EUROS** in sales volume in 2014
- ✦ **10 MILLION** unique visits to SNCF websites every month



# DIGITAL TECHNOLOGY: WHERE IS RAIL HEADED?

## A PERMANENT (R)EVOLUTION GATHERS PACE



### THE DIGITAL WORLD 2015-2025:

**“RESISTANCE IS  
FUTILE, YOU WILL BE  
ASSIMILATED!”**

### PREPARE FOR GAME-CHANGING EVENTS IN THE “REAL” WORLD

New habits and behaviours (many initiated by "digital natives") are emerging all the time, causing a major rethink in the way companies and society at large operate.

Commercially speaking, consumers are becoming "consume-actors". They want to interact with brands, obtain products in real time, via any medium, thus demanding ever-greater

responsiveness and flexibility from companies.

Welcome to the age of agility and Time-to-Market !

Alongside this, the digital revolution is seeing a new position emerge within more and more organisations - that of Chief Digital Officer (CDO). One example from a UIC Member: in 2014, Guillaume Pépy appointed Yves Tyrode as CDO (a first for any transport company in Europe).



# DIGITAL TECHNOLOGY: WHERE IS RAIL HEADED?

**No one can predict a paradigm shift!  
There is no sign of a slowdown! Change is happening,  
and will continue to accelerate.**

**Anticipation: our main weapon in facing the digital world of tomorrow**

- How can we make the right technological and organisational choices when habits are evolving constantly and faster all the time?
- How can we prepare for future digital transformations when it is technological quantum shifts - which are by their nature unpredictable - which will have the greatest impact on our habits?

For example, it is interesting to think back 10 years and remember how we imagined 2015 to be: the term “cloud computing” did not even exist!



So, after years of digital (r) evolutions, what will the “digitalised world” of 2025 look like?



What role will be played by information systems and IT in the new paradigm?



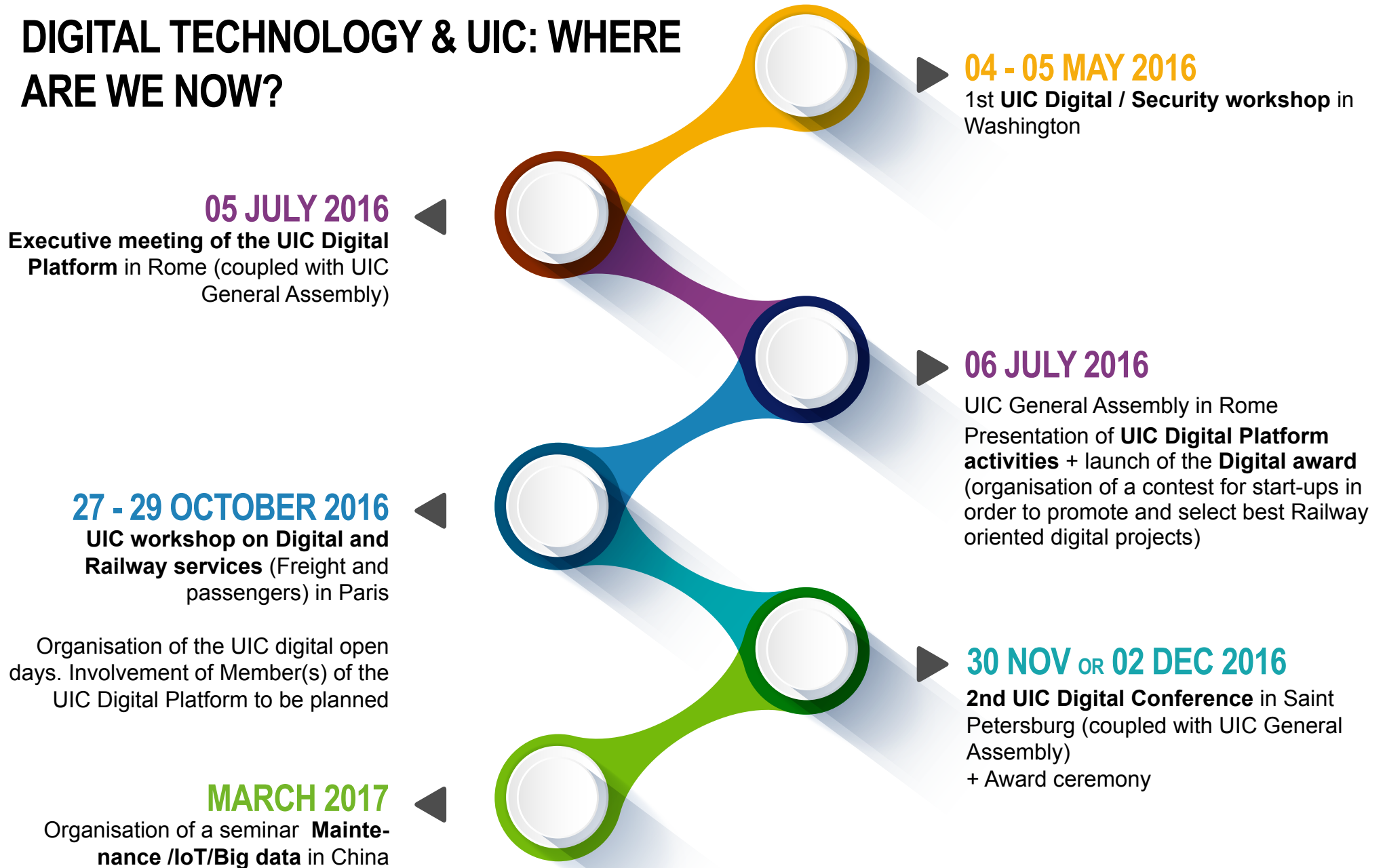
What will the architecture of a typical information system look like in 2025, and what will be the associated business model?

The question remains open, and the answers may change in line with forthcoming innovations.

One thing is certain: the big hitters in IT are doing their utmost to be ready.  
So let's not miss the boat at UIC!



## DIGITAL TECHNOLOGY & UIC: WHERE ARE WE NOW?



# WHY DIGITAL TECHNOLOGY IN RAIL: WHAT ARE THE BENEFITS?

**Opportunities** all along the value chain (internal and external) - whilst allowing for the attendant **risks**

In the "greater global digital context", rail must embrace the challenges, both now and particularly in the future, by:

- furthering the leading-edge dimension of its research activities at global level and maintaining a vision
- developing tools/actions/projects which allow UIC to support the sector to continue supplying added value and global reach

## International reach



Market-shaping factors

Market entry

Creating the value chain

Operations

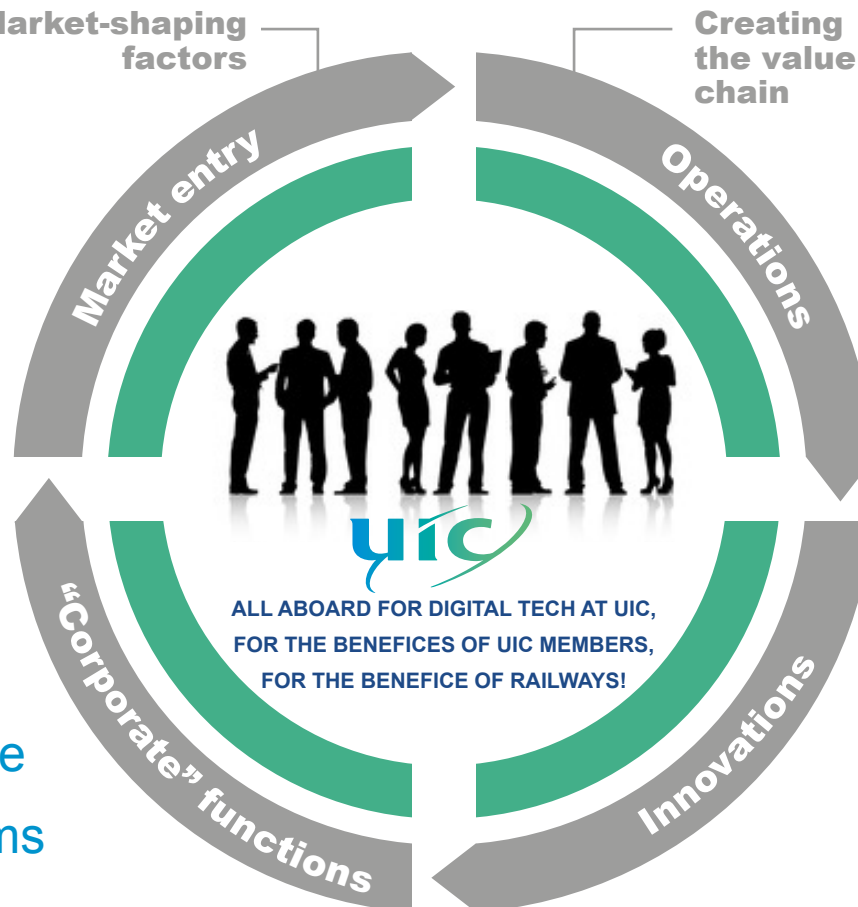
## Applicative example

- ♦ Preventive maintenance service



## "Corporate" functions

- ♦ Electronic purchasing
- ♦ Fast transfer of knowledge
- ♦ Data management systems



## Innovations

- ♦ Crowd-sourcing
- ♦ Co-development
- ♦ Innovative business models

## Feedback from UIC Members

Results from an online survey made late 2015 and completed by 185 UIC Members worldwide delivered the key outcomes below:

**Innovation  
booster**

*Digital is perceived as the way to innovate, create new habits and pattern. – internally as well as for customers by using new connected technologies*

**Mobile applications,  
e-ticketing, the internet  
of things, multimodal  
travel, digital security...**

*Among the most relevant project themes*

**Awareness  
& internal  
organisation**

*Most companies are aware of the digital impact that these technologies have created in our consumer habits*

**Digital is considered  
to be more than  
a communications  
tool developed digital  
supports**

*These technologies are identified as contributors to the new generation of R&D applied to the railway area*

**Smartphone  
Apps & social  
media**

*Are the two main developed digital supports*

## An organised approach: creation late 2015 of the uic global platform dedicated to digital

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**LISTING OF THE UNMET NEEDS AND RESOURCES: 44% OF COMPANIES HAVE NOT YET INTRODUCED DIGITAL TOOL DEVELOPMENTS SUCH AS APPS; ONE IN TWO COMPANIES STILL DO NOT USE RELIABILITY EQUIPMENT OR A MAINTENANCE OPTIMISATION SYSTEM. DIGITAL SKILLS NEED TO BE MET THROUGH EXPERT GUIDANCE. A COLLABORATIVE DIGITAL PLATFORM FOR SHARING IDEAS AND PROTOTYPING WOULD ADDRESS THIS UNMET NEED.**

It is also important to realize how dynamic, fast moving and agile the digital space is. As a consequence, we need our platform "Share, Open, Connect" to act upon the digital world principles and rules.

To meet all these challenges, UIC created in 2015 a worldwide Digital Platform to support the organisation and its Members in the digital revolution by providing tools and resources. This Platform has the mission to provide courses of action (and benchmarks) which are then translated for some projects coordinated for the benefit of UIC Members.

What the UIC Digital platform is currently doing is:

- △ Create a community platform that is simple and efficient, leveraging existing tools, so we can share our concerns, our progress and our ideas
- △ Build a "marketplace" (better name to be found) to connect with state-of-the-art start-ups, to help us drive our agenda and our priorities
- △ Launch a "start up challenge" initiative, where the winners will be awarded with the right to perform POCs with some of ourselves
- △ Select initiatives, through an ideation context, on which members will join forces"

For this, the UIC Digital Railway Platform has planned to meet three times a year.

In early 2016, the platform will launch a start-up challenge which will award winning start-ups in December 2016 in St Petersburg during the UIC General Assembly.

## Concrete fields of implementation

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Among Railway topics concerned by the impact of digitalisation, there is **SECURITY**.

### **SECURITY IN A MORE AND MORE DIGITALISED WORLD**

The growing digitalisation of our world or environment is considerably changing our information on what happened or happens, our modes of dissemination of that we know, our communication with the others on any personal or professional topic.

The notions of time and place are stepping aside when we become able to receive (and to transmit) any information at any time. Even when someone doesn't know where you are, you exchange with him permanently by electronic way.

No important event can remain unknown during a long time.

An element of security, beyond the various measures of prevention or deterrence is the information on real time 24/7 on what is happening enabling the relevant bodies to react and intervene in the best way.

Within this framework digitalisation is both a risk and an opportunity:

- △ A risk because the information is transmitted by various social networks quicker than by structured and hierarchic ways which are often used within our companies : that forces the crisis managers to react,- more than to act- faced to security events and to the media and political pressure that these events are creating.
- △ An opportunity if the digital tools are used to inform directly these crisis managers on real time.

The size of our networks makes that we cannot supervise them efficiently on 24/7. So the presence of clients and travelers has to be used as an important mode of information beyond the various technological modes: CCTV, markers ...And more and more people are equipped with Ipad, Iphones, smartphones ...

**SO THE IDEA IS TO DEVELOP SPECIFIC DIGITAL APPLICATIONS IN ORDER TO ENABLE THE PEOPLE TO SEND EASILY WITH THEIR SMARTPHONES OR IPHONES OR ...THE USEFUL INFORMATION TO A DEDICATED ANALYSIS AND CRISIS MANAGEMENT CENTRE. THAT LAYS DOWN SOME TECHNICAL QUESTIONS, BUT ALSO ETHICAL AND LEGAL QUESTIONS THAT HAVE TO BE ANSWERED.**

**THE ROLE OF UIC WILL BE TO DEFINE THE FRAMEWORK, TO MAKE A BENCHMARKING OF THE EXISTING OR IN PROGRESS INITIATIVES AND TO PROMOTE COHERENT SOLUTIONS FOR ITS MEMBERS.**

## Next steps

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This Progress Paper – version May 2016 – will be presented during the First UIC Workshop dedicated to Digital Technology and Railway Security.

This version will be reviewed and enriched with the contribution of Members of the Platform and with conclusions of the various dedicated workshops planned in 2016 by UIC in this field.







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