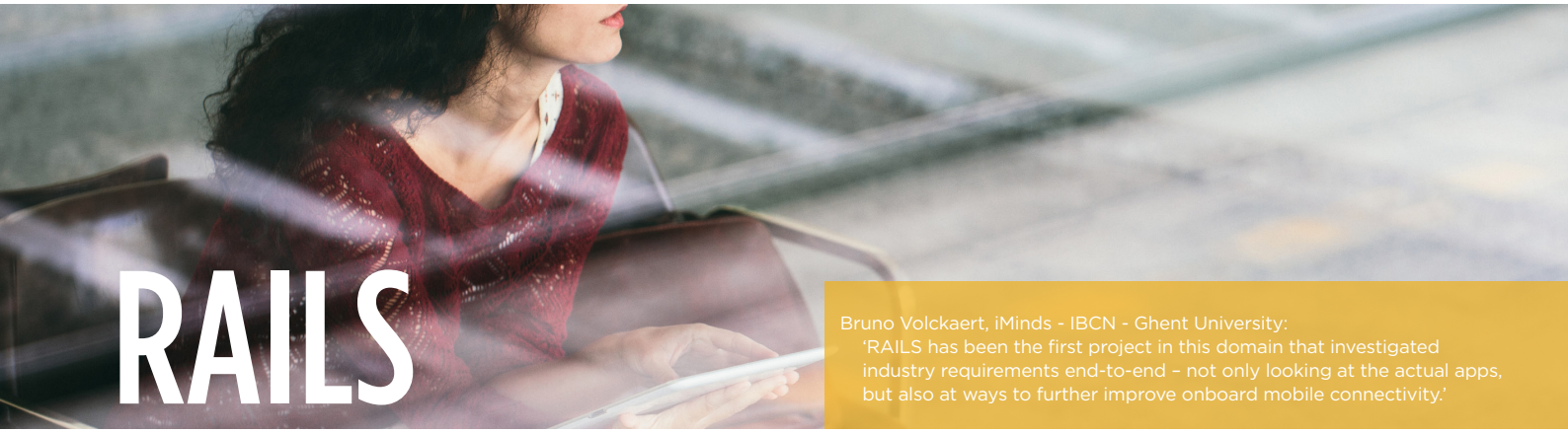
iMinds

AN iMINDS ICON RESEARCH PROJECT | PROJECT RESULTS

ICT



RAILS

Bruno Volckaert, iMinds - IBCN - Ghent University:
'RAILS has been the first project in this domain that investigated industry requirements end-to-end – not only looking at the actual apps, but also at ways to further improve onboard mobile connectivity.'

The RAILS project investigated the next big step in conveying info to train crew and passengers, focusing on two main challenges: how to make mobile connectivity between trains and the wayside more scalable and reliable, and how to overcome the challenges (such as increased latency or bandwidth limitations) that are linked to deploying crew and passenger apps in a railway environment.

An increasing number of applications are being installed on trains and other means of public transportation, interacting with off-board counterparts by means of wireless telecommunication equipment. Possible apps include passenger information systems, providing travellers with up-to-date journey info.

Passenger information systems have already been subject to some major transformations – evolving from simple announcements by train conductors to pre-recorded audio messages and real-time info that is shown on (digital) displays.

The RAILS project built on the outcomes of a previous ICON project, TRACK, which investigated how larger files can reliably be transferred between trains and the wayside; in real-time, over a wireless access network, and making maximum use of the available bandwidth.
In order to pave the way for the next step, i.e. the deployment of crew and passenger apps to disseminate information, the RAILS project investigated –

- How the TRACK framework could be made more scalable and reliable through the use of multiple, distributed servers
- The value of femtocells (small, low-power mobile base stations) to improve passengers' onboard mobile connectivity
- The development of an algorithm that allows the cellular network to determine whether users are on a train and predict group handovers for all users on that train
- The use of text-to-speech technology to support/expand passenger information systems
- The development of innovative crew and passenger apps
  - Leveraging for instance the train's onboard CCTV-alarm system, allowing the train conductors to know exactly where an alarm originated and to see what is happening in real-time on their smartphones
  - The deployment of an onboard video entertainment system, enabling passengers to stream video content to their smartphones and tablets, while taking into account major constraints such as limited availability of mobile bandwidth
- The related techno-economic evaluation framework for introducing innovative new services onboard trains such as femtocells, onboard video and mobile apps

THE OUTCOMES

1. A decentralized framework for optimal scalability and reliability

The successful decentralization of the TRACK framework was an important realization in order to guarantee the system's scalability and reliability. The RAILS team succeeded in making sure, for instance,

that any node failure is automatically compensated for – ensuring full reliability even when things go wrong.

2. Femtocells improve onboard connectivity, and reduce passengers' exposure to electromagnetic radiation

The RAILS project has shown that femtocell technology holds the promise of significantly improving onboard mobile connectivity – which is a must for crew and passenger apps to work properly. Moreover, with increased attention being paid to public radiation levels, the RAILS project found that the use of femtocells can decrease passengers' exposure to electromagnetic radiation by up to 60%.

3. App-based crew and passenger information systems come with their share of challenges

While apps are clearly the next step for onboard crew and passenger information systems, they come with their share of challenges: latency, for instance, is an important barrier to the use of security apps; limited availability of wireless bandwidth is a hurdle for the adoption of onboard video streaming services. That is why the RAILS team looked quite extensively into dynamic bandwidth allocation and low-latency dynamics.

WHY ICON?

Dirk Van Den Wouwer (Televic Rail):

'Thanks to RAILS, the industry partners in this consortium will be able to bring to the market – in a relatively short timeframe – state-of-the-art products with unique selling propositions.'

NEXT STEPS

Now that the project has ended, the various industry partners are looking to integrate the key learnings and outcomes in their respective product lines. A follow-up ICON project (TraPIST) has been kicked off as well – investigating the development of personalized passenger apps in multimodal transport scenarios.

The RAILS project was co-funded by iMinds, with project support from IWT.

FACTS

NAME	Railway Applications Integration and Long-Term Networks (RAILS)
OBJECTIVE	The RAILS project investigated the next big step in conveying info to train crew and passengers, through the use of apps. Research focused on making mobile connectivity between trains and the wayside more scalable and reliable, and on overcoming the challenges that are linked to deploying crew and passenger apps in a railway environment
TECHNOLOGIES USED	Femtocell, 2G/3G, Wi-Fi, IP, OSGi, Java, JSON over HTTP, REST, WebSocket
TYPE	ICON project
DURATION	01/01/2012 – 31/12/2013
PROJECT LEAD	Dirk Van Den Wouwer Televic Rail
RESEARCH LEAD	Bruno Volckaert iMinds - IBCN - Ghent University
BUDGET	2,557,000 euro
PROJECT PARTNERS	Belgacom, NMBS, Option, Televic Rail, UIFY
IMINDS RESEARCH GROUPS	ETRO - VUB IBCN - Ghent University MMLab - Ghent University PATS - University of Antwerp WiCa - Ghent University

WHAT IS AN
ICON PROJECT?

iMinds is the digital research center and business incubator for Flanders, Belgium. Its ICON research projects are agile and demand-driven, combining academia and industry partners. ICON projects typically have a duration of two years, yet quickly adapt to the rapidly-evolving digital landscape. ICON partners intend to use the project results in their products or services.

RAILS project partners:

iMinds vzw
Gaston Crommenlaan 8/102
9050 Ghent Belgium

www.iminds.be
info@iminds.be
T +32 9 331 48 00