

# Interview



Ralf Cabos, Founder and CEO of the Potsdam-based start-up PaxLife Innovations, explains in a one-to-one discussion how a cloud to edge open software architecture is a game-changer for the implementation of smart rail and enhanced passenger experience.

## railSTACK Cloud Edge Open Platform: An Accelerator Shot for Smart Rail and Future Passenger Experience

**Q:** Your background is in aerospace, where you have worked successfully for almost three decades. How does that shape your perspective of the railway industry?

**Ralf Cabos:** Aerospace systems have seen industry-wide standardisation of system architectures from the beginnings of 'digital'. There is also a well-defined, and internationally recognised approach to achieve certification (=homologation) for independent system upgrades ('STC'). This has supported an affordable mid-life upgrade of functionality in particular for safety-related functions.

On the other hand, the typical life expectancy of an aircraft is probably only half that of a rail vehicle.

Similarly to the aerospace industry a few years back, we can now see a tremendous dynamism in the rail and public transport industry driving digitisation. This is driven by passengers who expect to enjoy a digital journey comparable to what they could expect at home or in the context of other services. In parallel, operators, integrators and manufacturers are looking for solutions providing greater efficiency in operations as well as in maintenance.

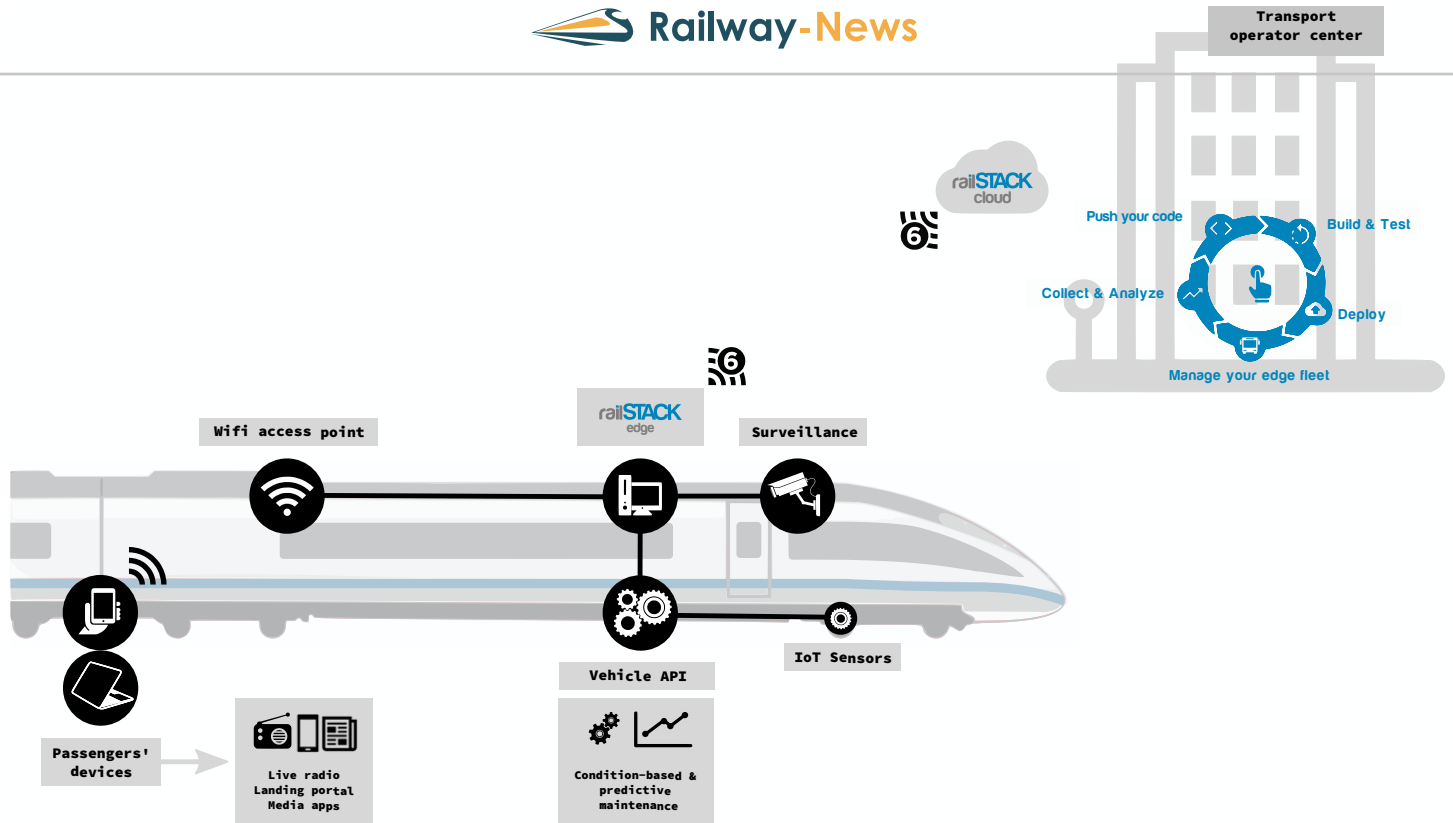
**Q:** What are the biggest challenges that need to be addressed in your view, and how should they be addressed to fulfil these expectations?

**RC:** Industry trends require

increasing levels of systems integration. But we must not forget that this needs to remain affordable. A rail vehicle will typically see several digital systems upgrades during its life. Modern digital architectures are mostly driven by software. However, as an example, a typical infotainment system will still be implemented in difficult-to-maintain firmware that is specific to the original system vendor.

In order to make a real difference, infotainment, maintenance-systems etc. need to be fleet or network-specific, and not dependent on vehicle make or mode of transport.

First of all, the process of integrating and deploying new



services onboard the vehicle has to evolve in a simpler, more unified and more efficient way. A basic, brand-new infotainment system could be developed and deployed by a single programmer within a month. Why does it take so long today? Today's systems are still mostly isolated from each other, specific to hardware equipment and quite difficult to upgrade or update. Upgrading system functionality will normally result in a significant capital investment.

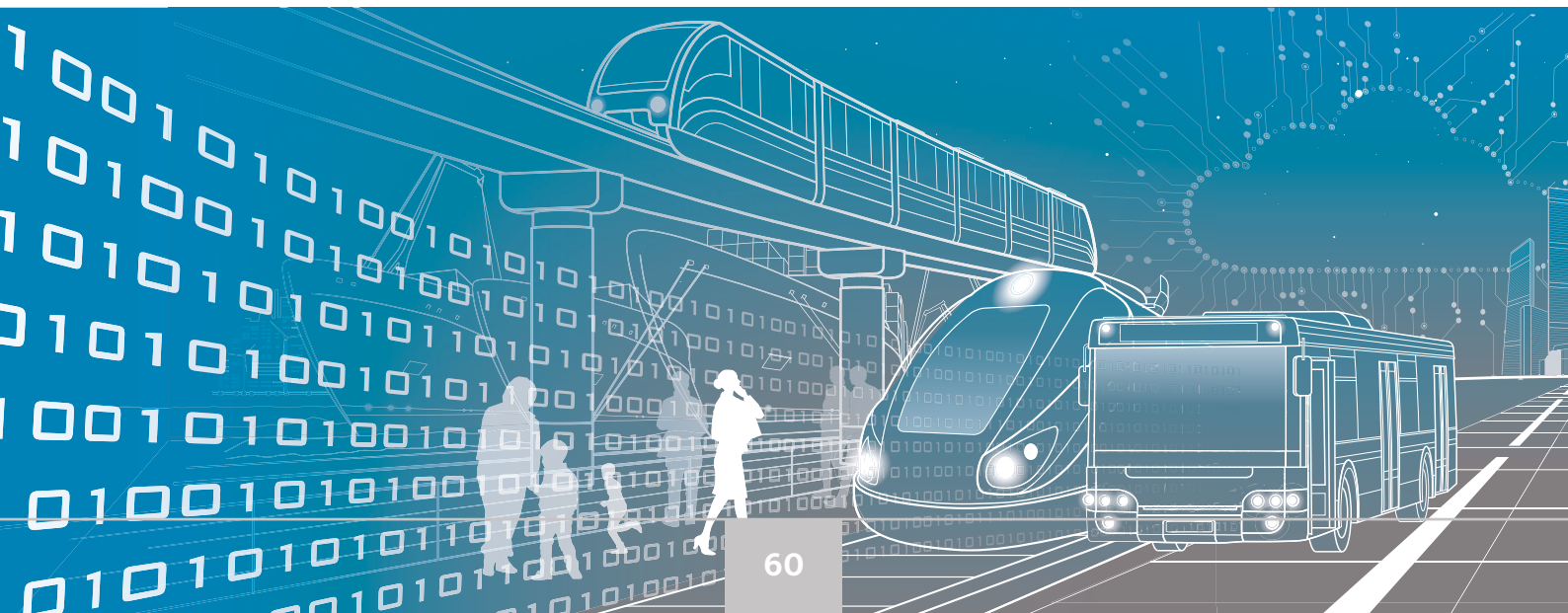
PaxLife believes that deploying and upgrading systems onboard should be as easy as installing an application on your smartphone.

If we leave aside safety-relevant functionality, we believe that an operator should have the ability to assign any vendor they prefer, or leverage their own teams, to enhance and extend functionality that is passenger-focused, or that supports the business integration into an operators' financial controlling process.

In fact, for this type of functionality there is simply no good reason why you would require a specific make or version of computer hardware. In this context, it is just a matter of computing resources- and if an upgrade is required, then this should come from the most

affordable source. It is with this idea in mind that PaxLife railSTACK architecture has been designed.

The hosting capability of our railSTACK platform enables the support and the integration, at a single point in the vehicle (the edge), of multiple applications that can come from various domains, providing a better experience to passengers or improved services to operators. You can host the entertainment apps passengers love onboard, host your TV station media library, add any dynamic internet-based service to infotainment displays, offload bulk data via WiFi or free up more



WiFi bandwidth for passenger use. Applications can be provided by any independent third party or developed in-house.

Furthermore, the regular synchronisation between the cloud and the edge part of railSTACK enables the easy update of in-vehicle services, or their upgrade with new functionalities. You could imagine enhancing infotainment displays in buses or subways with digital services. On our side, we are currently evaluating with a partner the amelioration of video surveillance systems with AI capabilities.

Probably the best part is that it doesn't require a major capital expenditure on your part. While we are happy to prove the capability as part of turnkey projects, we are also happy to make the full-blown platform available as an affordable Platform-as-a-Service (PaaS) leaving the full control over upgrades, and the benefit of rapid system implementation to our customers and partners.

Once this architecture is in place in a vehicle – a train, bus or tram – this is the perfect framework for the easy and efficient expansion of future capabilities, to roll out new functionalities when they are needed, making tremendous cost, time and effort savings compared

to how projects are currently being implemented.

**Q:** You mentioned a better experience for passengers but also improving services for transport operators. In which area do you see the most important benefits?

**RC:** railSTACK brings together a cloud edge architecture and a software development paradigm. This powerful combination enables transport operators, vehicle manufacturers and engineering experts to develop, test, validate and continuously improve the new models or applications they need very easily.

In my opinion this is a key capability of our railSTACK cloud edge platform: empowering engineering services to develop their own solutions that can iteratively mature. Often it is not the first version of a solution that brings the financial benefit – it might be more important to continue to improve, learn from initial results, innovate and expand the solution.

Following the discussion we had in the industry, I believe that condition-based/predictive maintenance is the area in which I see the most pronounced benefit our platform can produce. For this reason, PaxLife Innovations has partnered with a team of

railway and aerospace engineers to initiate the development of predictive maintenance models leveraging AI capability. The project goal is to bring savings in maintenance costs and a reduction in unplanned downtimes. The starting point is to use the data the existing systems provide, and to make best use of existing sensors, where sufficient. It is key to measure success in terms of financial controlling data. The railSTACK platform is the framework enabling the development, the iteration, the update and the deployment of the predictive AI-based maintenance algorithms in operating conditions. This collaboration is being launched as part of a joint project with a railway operator and a vehicle manufacturer.

## PaxLife in a Nutshell

PaxLife Innovations GmbH originally started to connect aircraft passengers to the digital world. Based in Potsdam, Germany, PaxLife Innovations now brings its cutting-edge technology to rail and public transport.

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