paxlife INNOVATIONS

Towards Unified Passenger Information

Defining and managing complex flows of passenger information through diverse channels and edge devices.

White Paper

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Summary

The new paradigm of rail and public transport relies on robust and enhanced passenger information service. To ensure long-term development of the network and the network usage, operators want to improve passenger experience, boost operational efficiency, and even unlock new revenue streams. This requires a strategy with two key aspects : actively pushing the relevant information to passengers while simultaneously gathering new data about their usage patterns.

However, the growing traffic together with complexity of infrastructures, multiplying equipment, rigid information systems and data sources brings new challenges for transport operators, transport authorities and systems integrators.

The problem lies partly in managing data flow and system updates across numerous channels, disparate equipment, vehicles, and legacy assets. Additionally, there is a difficulty in consistently delivering accurate information and enriched content to these various peripheral edge devices, both onboard and on land.

The traditional approach of designing passenger information solely around the type of vehicle or equipment has reached its limits.

Hence, a solution is necessary to rethink passenger information system design, to simplify data collection and delivery to various recipients, through unified interfaces and management tools.

This paper defines a novel solution for a Unified Passenger Information.

Context

More complex journeys

In our modern transport systems, the journey from A to B now offers passengers more choice. Public transport is perceived in the perspective of mobility chains, involving increasingly elaborate connections and several transport options.

At the same time, it generates more complexity and anxiety not only for the passengers ...but also for the operators. Indeed, they struggle to provide the exact information at the right time and in the right place to support their passengers' sophisticated journeys in a multi-modal environment: including connections, interline transportation, disruptions, etc.

In this framework, the ever growing liability of operators to ensure a safe and smooth journey to their passengers requires new technologies to handle complexified itineraries.

New Passenger Expectations / New needs for Operators

The Passenger Information aims to reassure, guide and satisfy the clients using the transport network.

In addition, Passenger Information is a showcase for evaluating the overall quality of service. The challenge for operators is to offer a travel experience that sets them apart from the competition and to build customer loyalty. Operators also engage with their public transport authorities to increase customer use of public transport. For this purpose, they invest in new trains and new solutions to collect information. But how to ensure the information passengers receive is to the point?

These challenges are forcing Passenger Information to evolve.

First of all it has to bridge the gap with the expectations of the modern traveler: take into account a wide variety of new data, from new transportation modes availability to the display of local news or even data on, for example, the carbon impact of a given mobility.

Also, the aging of the population and the recent pandemic have the effect of making travelers more anxious; Passenger Information is expected to provide peace of mind throughout the journey. This means receiving instantly and with consistency the correct information at the right place on the relevant channels, enabling travelers to immediately adapt to unexpected events or to be guided through disrupted situations.

Ultimately, to make the right decisions, operators need access to new dataset highlighting service usage patterns to ensure alignment with passenger expectations.

Challenges

Transport operators lack a unified solution to meet the passenger information challenges of today and tomorrow

In the perspective of Public transport integrating the mobility chains, companies are getting more accurate real time systems; the quality of available information data is also increasing.

Meanwhile, operators are dependent on closed and rigid legacy systems unable to respond to more sophisticated requirements in terms of integration, management and rapid delivery of new information, new display logic, and content.

The design of passenger information solutions considers vehicle types, fleet characteristics, and display types. These solutions operate independently with specific equipment, focusing mostly on displaying locations and connections. Systems are organized by means of transport: the solution for managing and distributing passenger information on a bus is different from the one used for passenger information on a train. Collecting passenger feedback is often non-existent.

Systems are also partitioned by function and differ depending on whether the distribution channel is visual or audio. The information provided is not always consistent if displayed in a vehicle or delivered to another channel.

Over the years, heterogeneous equipment has accumulated, preventing even more the seamless, rapid and reliable dissemination of consistent, enhanced information expected by passengers across all distribution channels.

And finally, the monopoly of the legacy players in the Passenger Information field has had the effect of keeping costs high and limiting in-depth changes to systems that would bring significant benefits to operators and authorities.

This complexity underscores the need for a modern software solution.

Such a solution would streamline information management, ultimately freeing operators to deliver the core priorities of today and tomorrow:

- Integrating and processing additional information sources seamlessly
- Providing passengers with access to more quality information
- Curating and delivering engaging content to passengers
- Efficiently distributing new data, with real-time updates and enriched content across diverse vehicles and equipment

PaxLife´s railSTACK platform

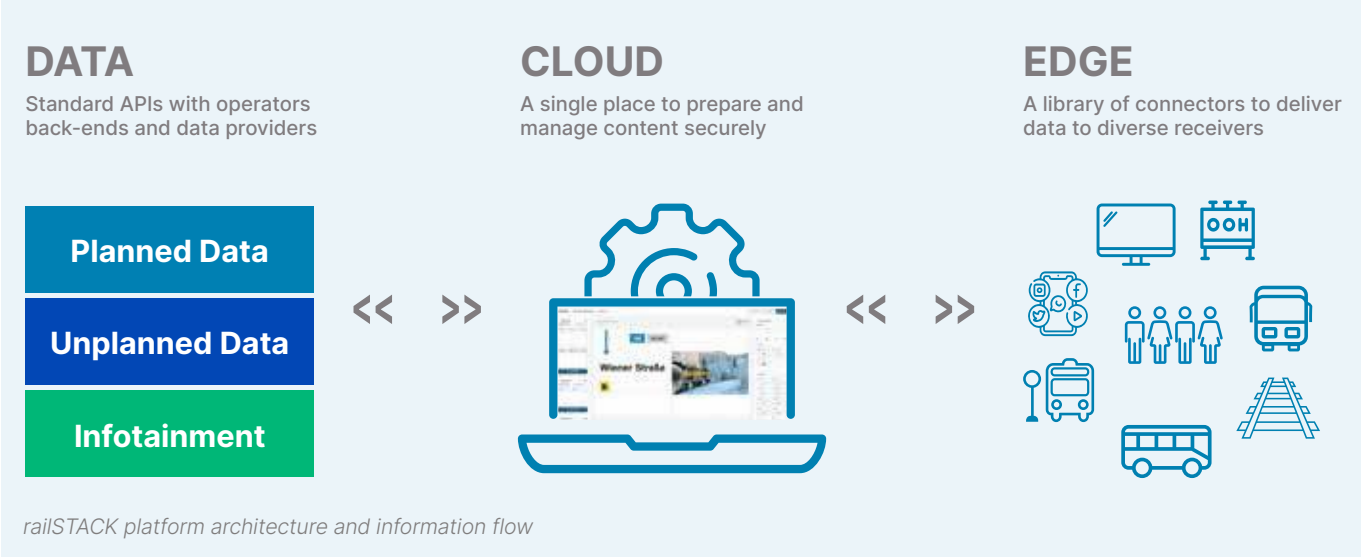
A platform for Unified Passenger Information

PaxLife Innovations has designed railSTACK, a software platform that allows transport operators or systems integrators to easily design, flexibly update, manage and reliably deliver real-time information and infotainment content to passengers quickly and everywhere, whether in vehicles, in stations, at bus stops or on smartphones.

Collect and Enrich: railSTACK seamlessly integrates real time DATA from a large number of various sources: traffic data from data hubs, external sources such as weather data, media content from advertising platforms, vehicles´data, new mobility options, etc.

Setup, manage, update: railSTACK hosts many applications, including paxCMS, a powerful editing tool for operators or other users to easily build the passenger information concept, information layouts and specific playlists without any programming knowledge. From the CLOUD, the user-friendly WYSIWYG interface of paxCMS gives standard - but authorized - users the ability to update design, business logic and content, flexibly and when needed.

Deliver to all EDGE devices: railSTACK incorporates edgeSTACK, a Hardware Abstraction Layer that enables it to work with any type of peripheral hardware. At a click of a mouse, operators are able to quickly distribute selected updates, content and information to targeted distribution channels, vehicles and output equipment, even divergent. The railSTACK platform makes it possible to significantly reduce and manage the underlying complexity of all output channels.



railSTACK platform architecture and information flow

With railSTACK, transport operators can take advantage of any innovation: for example incorporating fresh data or developing new methods of presenting information that become accessible, and make them rapidly available to passengers, regardless of vehicles and equipment specifics.

The railSTACK platform enables operators and integrators to offer an enhanced, regularly updated information service that constantly follows travelers expectations and needs.

New content available to passengers

Public transport operators and authorities are increasingly looking to improve the travel experience or create new sources of revenue.

In combination with PaxLife´s paxCMS application, railSTACK enables operators to enrich the Passenger Information and to integrate, design and display the infotainment content of their choice: from local news and weather channels to apps gathering information on local points of interests, new available transport services, etc.

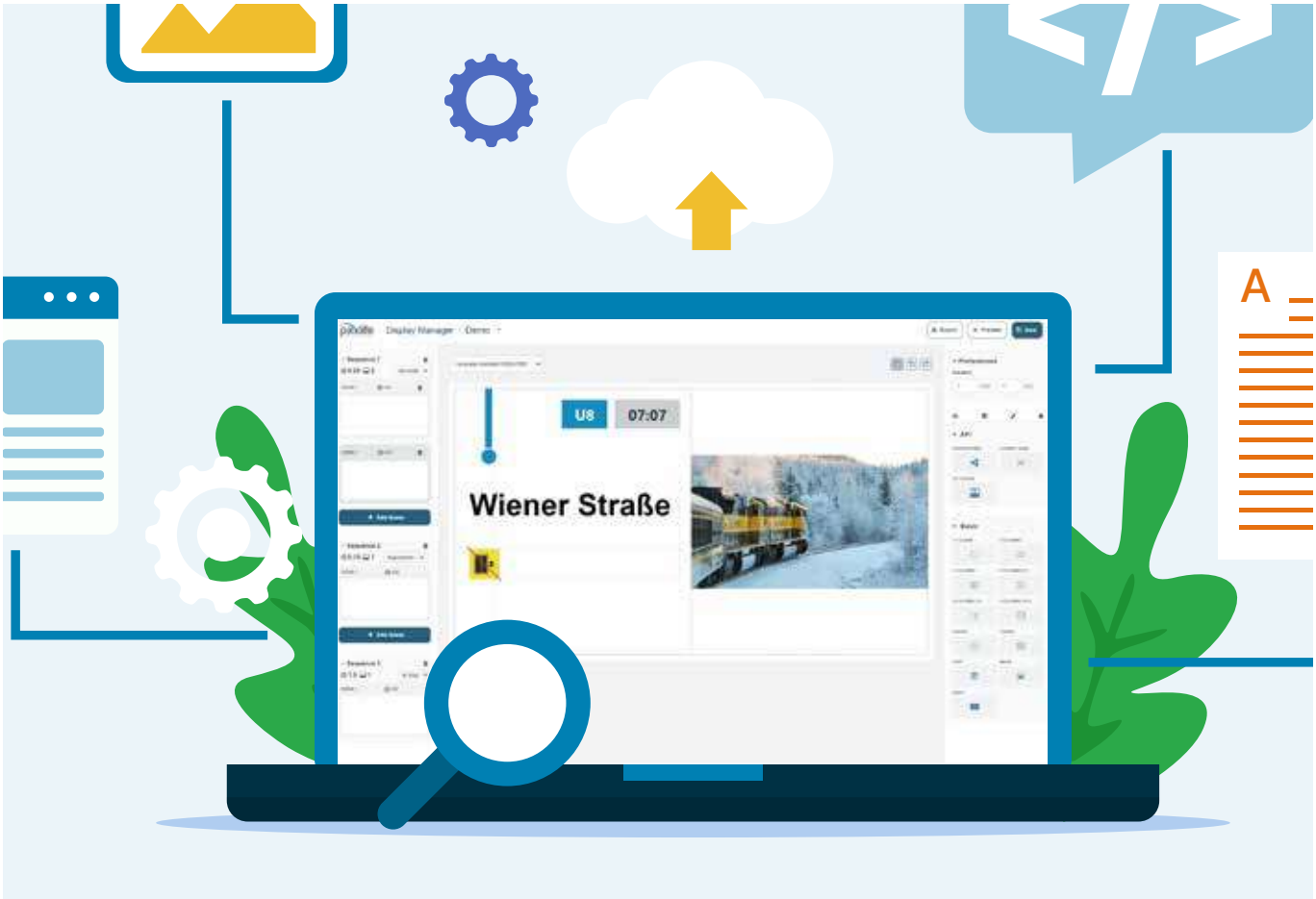
Content can be based on time and/or location or on other rules configured and managed by operators; it offers the possibility to partner with local or national suppliers looking for advertising placements and opportunities for creating additional revenue.

A display screen to engage your audience

In a similar vein, it becomes effortless to include and structure the presentation of recently-available information obtained from data hubs providers or "single source of truth" solutions. For example PaxLife's solution could seamlessly integrate and present vehicle occupancy information to passengers. This data is originally collected by operator´s back end systems, through surveys or automated detection sensors, offering valuable insights to be used by passengers when traveling.

Easy-to-use interface

The paxCMS application provides a user-friendly interface and gives any authorized users the ability to integrate design and content, branding or message, flexibly and when needed. paxCMS offers intuitive, customizable integration capabilities, and everything necessary for operators to build and grow their Passenger Information service.

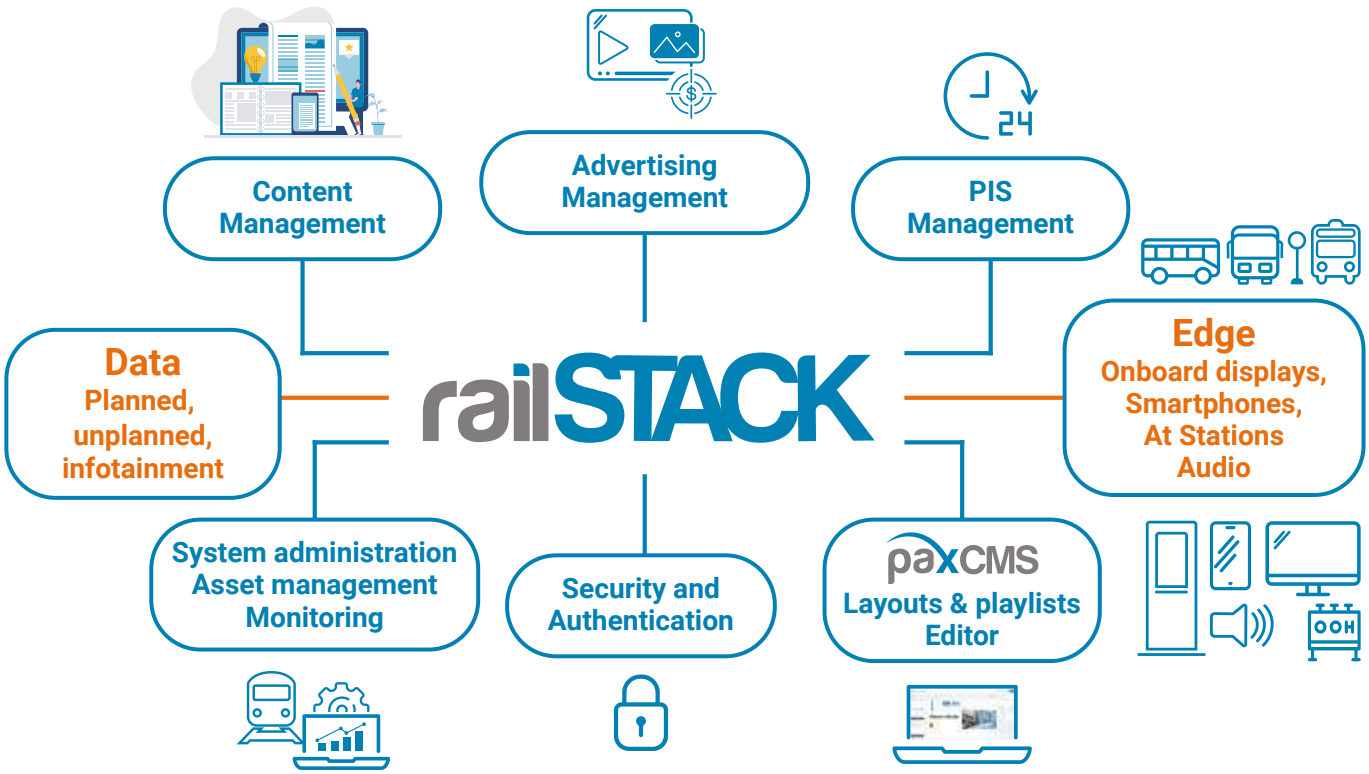


Easy to integrate

railSTACK provides the interfaces and tools needed to connect information from and to any onboard and landside systems and equipment. Thanks to the Hardware Abstraction Layer built at the edge, the railSTACK platform streamlines the management of output channels and the distribution of passenger information to new and existing equipment and mode of transport - from trains, trams or buses, on any displays or to portals, to information kiosks or static displays in stations or at vehicle stops. In many cases, it is not even necessary to have a separate vehicle server, as the slim software architecture can run on existing CPUs e.g from existing vehicles PIS-displays or routers.

Platform Applications

The railSTACK software platform connects with any available back-end data hubs to retrieve planned data, unexpected information as well as additional infotainment content; it then allows operators or integrators to decide to where and how to display which information : as a standard passenger information appearing on display screens on board a train, in the form of an audio call at a station or a bus stop etc.



railSTACK core

The main idea behind railSTACK is to offer transport companies and system integrators the possibility of producing, using a single, easy-to-use software package, comprehensive passenger information at ALL points of contact with passengers.

The Security, Authentication and System Administration modules set up the initial configuration of the system, the creation of users with their levels of responsibility, and the secure transmission of information when required.

Users can monitor operating systems, whether screens are operational, whether messages are delivered as expected and what the status of a given element is.

Standard contents (such as multimedia files, PDF files, etc.) for display on screens are organized via the Asset Manager. This function also manages the registration of the physical end points: equipment, displays, bus fleets, information kiosks, trains etc.

Messaging: the platform's initial function is the setup of a basic infrastructure to retrieve messages from point A and send them to point B. This involves connecting with the appropriate interfaces to retrieve the data and, above all, distribute it to the output channels and peripheral equipment, however divergent.

Value added services

paxCMS is a powerful playlist and layout editor, for operators or integrators to define, for themselves or for an end customer, the rules that determine what information is displayed to passengers, where and how. It applies to the management of visual and audio equipment and to the definition of rules for portals.

paxCMS allows for the straightforward definition, customization, modification, or upgrading of information, content, AND the passenger information service software logic. These changes can be seamlessly distributed to output channels and peripheral devices, ensuring a more efficient and highly flexible content management process.

Real time traffic information, to build a standard Passenger Information System: The railSTACK platform enables operators to seamlessly integrate real-time data from a large number of different sources, the main one being traffic data from datahubs (or single source or truth), but also data from the vehicles or from external sources such as new mobility options or weather data, point of interests information etc.

Advertising management: The advertising management module gives operators the opportunities for creating additional revenue streams through the display of commercials. It can be programmed to integrate seamlessly with the Passenger Information System PIS or to independently manage the display of advertising messages on an autonomous set of screens, in accordance with commercial rules defined centrally by the operator and its advertising customers.
The solution is also automating the generation of essential “Proofs-of-Play”, for accurate billing of played adverts.

Audio delivery: In the case of broadcasting information to acoustic equipment such as loudspeakers, a content processing module transforms textual information into audio files (mp3). Generally speaking, this microservice can be used by any application that needs to produce audio to suit the output channel.

Managing the output channels, the railSTACK core focus.

railSTACK frees operators and integrators to concentrate on building great app functionalities. It constantly takes care of the intricate task of integrating those applications as well as their regular updates, seamlessly into vehicles, audio speakers, platform displays or digital out-of-home equipment ...

Benefits

Thanks to the railSTACK platform and the paxCMS editor, the rail and public transport sector can take advantage of the latest information concepts or newdata available and make them rapidly accessible to passengers.

Giving passengers all the information they need

There are no longer any technical obstacles preventing operators from providing their passengers with all the information they need. With railSTACK and paxCMS, there is no limit to the information that can be acquired, organized, and pushed to your passengers.

Distribute anything, anywhere

railSTACK can deploy, with a single tool, consistent information on mixed fleets of vehicles, on screens in stations or at bus stops, on Out-of-home (OOH) networks and on audio channels: this is Unified Passenger Information.

Instantly define new graphical passenger information display services

Pioneering the industry, the paxCMS editor enables users to seamlessly define, modify, enhance, and disseminate the software logic to bring together desired output sources, values, formats, and designs. This maximizes the information value to passengers based on the best data available.

This breakthrough enables the rail and public transport sector to swiftly provide passengers with evolving information concepts and new data, revolutionizing the accessibility of crucial information.

Say goodbye to complex integrations, focus on what matters most

Operators are no longer burdened with the intricacies of interfacing with disparate data sources and heterogeneous equipment. PaxLife´s standardized connectors provide seamless integration with a wide array of hardware and APIs.

PaxLife is streamlining technology to liberate teams for core objectives.

Real time capability ...

The railSTACK platform interfaces directly with real-time data feeds and passenger information systems to transmit information to passengers instantly: updated timetables, information on disruptions, connection options, and so on.
One of the platform's key functions is to reliably deliver messages to the right place when it is needed.

... And also reliable in sparse connectivity

railSTACK's overall architecture has been designed with reliability in mind. Therefore, it always provides a stable experience to passengers in all kinds of connectivity environments, and all states of equipment (within reasonable limits !)

Do it yourself or work with partners

PaxLife´s intuitive, codeless solution enables any team to imagine, build and flexibly update Passenger Information applications.

This flexibility grants Operators or Integrators the freedom to either leverage internal resources or collaborate with external partners to tailor their solutions.

Operators retain granular control over the orchestration and deployment of the displayed information to their passengers.

Scalable and future-proof

PaxLife´s software platform scales seamlessly upwards or downwards: increasing fleet equipment and the number or type of vehicles, revising the distribution channels (audio, OOH, ...) or content, by integrating new data sources.
PaxLife ensures regular, effortless operation and updates of the software's functionalities, regardless of hardware and infrastructures.

One unified software platform

Paxlife provides a unified solution that centrally integrates and distributes traffic, infotainment information and service software updates while simplifying the management of the wide variety of distribution channels and output equipment.

Use cases

Thanks to the capabilities of the railSTACK platform, operators and systems integrators can explore multiple use cases: from a simple messaging application delivered to legacy loudspeakers, an advertising management module to Digital Out-Of-Home equipment in stations, to an end-to-end solution managing the infotainment and passenger information system in the fleet of vehicles, using a single tool.

Design of dynamic infotainment and Passenger Information System, with one tool

In this use case, the paxCMS application enables the operator to integrate the design of the information portal, to which passengers connect via their smartphones, as well as the distribution of passenger information to this same portal and to the display screens of two types of train and the operator´s bus fleet.

The main challenges have been to integrate various sources of information (real-time traffic information, local news and weather), distribute them to different types of vehicles and display equipment and to ensure that the distribution of information works even when connectivity is sparse.

Content distribution is organized according to the rules that have been easily defined and centrally programmed by the operator using the paxCMS playlist and layout editor. The solution enables peripheral devices to be monitored and controlled.

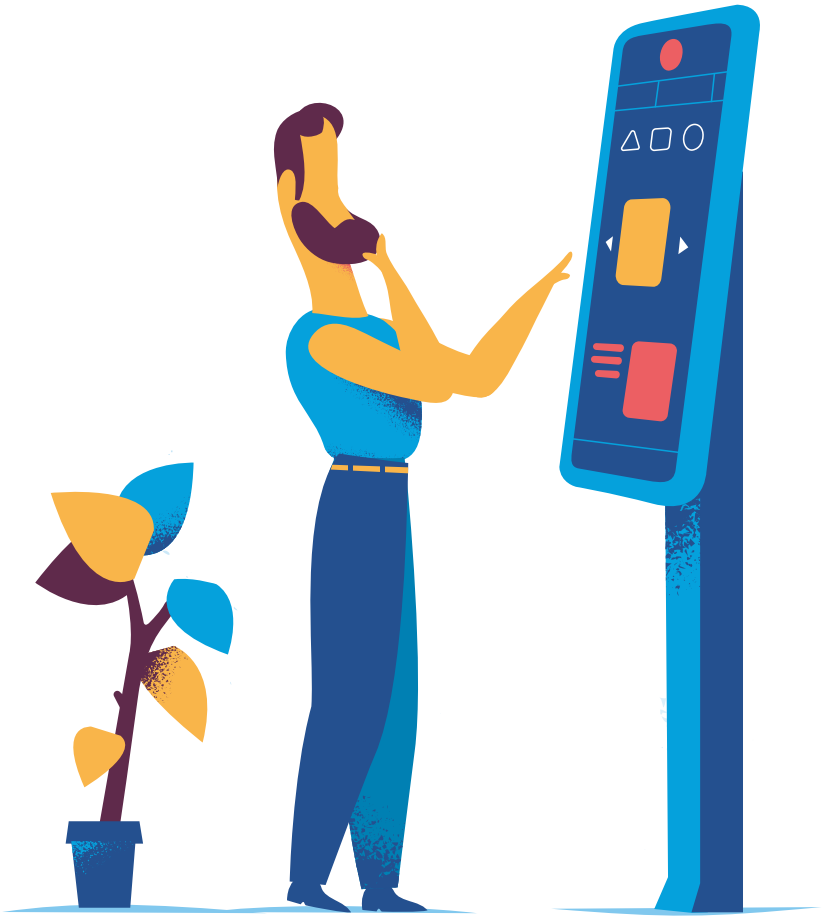
Content Management System for digital information kiosks, with advertising management

railSTACK and the **paxCMS** application can be deployed network-wide in digital information kiosks in railway stations. The solution enables content to be managed centrally by the operator's teams, with data and services hosted on premises inside the operator's infrastructure.

The main objective is to digitally display local timetables and traffic information at the request of passengers, when they interact with the information kiosks.

In parallel the solution is integrating PaxLife´s powerful advertising management module; Edge players run on board each of thousands of D OOH displays , enabling ads to be displayed automatically in accordance with the commercial rules defined centrally between the operator and their advertising customers.

The solution also automates the generation of essential "Proofs-of-Play", for accurate billing of played adverts.



Upgrade subway displays with paxCMS to deliver pertinent information during service disruptions.

railSTACK can be used to enhance the operator's ability to centrally organize and supervise the communication of information about disruptions in a very granular fashion, in hundreds of subway stations, and to an extensive range of diverse peripheral device hardware.

At the same time delivery to onboard passenger displays and audio output devices can be managed.

railSTACK interacts with the disruption information database procured by the operator and integrates cybersecurity requirements. railSTACK orchestrates the targeted transmission of messages to the relevant edge device, or group of devices, by presenting messages visually on LED screens (news sticker line) or as audio announcements via existing loudspeakers.

The paxCMS editor empowers operators to create new display formats including the change of business logic to decide which information is shown on the screen under which circumstances.

With paxCMS, when a disruption occurs at a particular location, operators are able to retrieve updated data from central hubs, and e.g. present information such as alternative travel options to commonly frequented destinations.

Traditional passenger information systems are not designed for this purpose. Even though operators are investing in centralized data collection engines, there is a lack of a solution to organize and distribute the new information in the appropriate format and to the required location.
That is, until now.

Whatever use case you start with, such as the management of advertising, or the distribution of disruption messages, whatever the distribution channel, on trains or buses, at stops or on smartphones, the railSTACK platform combined with the paxCMS application, can then very easily be extended to other use cases and, ultimately, offer a central system for designing, orchestrating and supervising the provision of information to passengers globally, whatever the distribution channel and equipment.

About PaxLife Innovations

Initially focused on connecting aircraft passengers to the digital realm, PaxLife Innovations GmbH now extends its advanced technology to rail and public transportation. As a software company, PaxLife excels in delivering innovative solutions at every passenger touchpoint.

PaxLife envisions a Unified Passenger Information, where complex data flows are processed and streamlined to provide accurate and enhanced Passenger Information globally, across various channels and heterogeneous devices or vehicles.

Through its cloudedge software platform railSTACK and application paxCMS, PaxLife empowers transport operators and systems integrators to effortlessly design, update, and deliver the real-time information and infotainment content the passengers really need.
This unique solution enables the regular updates of the passenger information logic or concepts while ensuring fast and reliable distribution of data in any vehicles, stations, bus stops, and even on smartphones.

By prioritizing a seamless and enjoyable travel experience, PaxLife supports its customers in enhancing a key service contributing to the long-term growth and utilization of rail and public transport networks.

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