

Improving operational efficiency within legacy railway systems

Security and safety in the railway industry whitepaper



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Executive summary

One of the biggest challenges in the digital transformation of the global railway industry is merging existing legacy systems into the modern digital world.

Older legacy systems based on mechanical technology (locks, padlock, manual key control and logistics) are vastly inferior in operational efficiency, safety and security compared to the modern digital technology available.

The lack of approved global railway safety and security standards, process and regulations across rolling stock, infrastructure, control, signalling or processes compounds the problem. This is creating huge inconsistencies in how the global rail industry is securing locomotives, rolling stock and railway infrastructure against the threats of terrorism, vandalism and cyberattack.

So, there is an ever-widening gap of security, safety and access control between modern digital technology used in high speed railway networks and older mechanical technology used in legacy railway networks.

“The digital transformation in rail transport operations is having a substantial effect on the security, reliability, and costs of rail operations and efficiency.”

Pauli Jormanainen, Regional Director, Abloy

This whitepaper looks at how digital solutions provide a simple and effective way to transform legacy systems with digital technology. Highlighting how digital convenience improves operational efficiency with less costs, logistics and risk of lost keys, while improving security. It also highlights how the recent developments in web-based, wireless and wire-free solutions are proven and have gained trust as valid options for transforming the global railway industry, into a more secure and safer digital ecosystem. There is also some insight into Abloy digital solutions and the innovation and trust they bring to the global railway security context.

There are large cost savings and efficiency improvements that come with the transformation from of legacy to digital railway operation solutions. The future is looking towards the electronic key as a starting point.



Introduction

A new digital railway system but no new global standards or regulations

Even with the incredible effect of digital transformation on railway security, reliability and costs there are still no set global standards that regulate security, access control or processes around it. With no official standards to follow it creates inconsistency and leads to poor operational excellence.

This is a huge challenge for legacy systems as most of their equipment and security is mechanical and can't simply be connected to a remote or wireless network. So, there is no transparency or awareness of the security situation across the operation. Nor is there centralised control of keys or access management.



Legacy system's barriers to operational excellence and access control:

- There are many different mechanical keys for accessing rolling stock, doors, gates and mechanical locks across the entire railway operation. Controlling them all is done manually and can be very complicated and time consuming. Adding new keys or scaling up legacy systems with mechanical technology just adds to the complexity of managing security and access control.
- Mechanical keys always need to be picked up and dropped off at different locations. Creating a huge amount of extra time, travel and inefficient logistics.
- There is a security risk around every lost key, and they are easy to duplicate.
- Essential railway power and communication equipment is usually located in trackside control rooms, boxes or cabinets. These areas are usually secured by a mechanical padlock that is exposed to extreme weather conditions and vulnerable to the threat of vandalism
- Rolling stock internal and external doors are often secured by one standard, conventional mechanical key and lock. Many times doors are opened with T-keys that can be purchased on the internet by anyone. This is a weak point for terrorism and vandalism.
- All access and schedules for staff or 3rd party contractors and maintenance crews are manually logged and recorded, so there's no transparency of movement, scheduling or online visual overview or awareness of your security situation.

How digital solutions are adding operational excellence to legacy systems

Embracing digital solutions is leading the way to transform legacy systems into becoming more secure, efficient and cost effective.

The advanced digital solutions available connect all essential locks, key and access management needs into a digital ecosystem that can be managed remotely via a browser based web manager. This brings all essential security technology securing infrastructure, rolling stock and stations into one digital ecosystem. All connected to a web based browser as a digital control centre with a visual interface. This enables remote key and access management control with the convenience of one key access for everywhere.

The wireless and wire-free technology is a great benefit in saving installation time and costs while adapting legacy systems into more complete digital systems.

This is where the operational excellence and access management comes into play. It changes the slow and complicated manual way of mechanical technology into an interconnected digital ecosystem. In an instant you are able to have a visual overview of your security situation, that is updatable anytime and accessed from anywhere. There are huge cost savings in the reducing key logistics and management alone. Not to mention the tighter security and convenience of being able to track all movement across every lock and key in real time, online. Digital solutions bring high-level security and efficiency. They add a whole new level of trust, transparency and security to legacy operations.



Insights into digital access management solutions available

Digital solutions are becoming more accepted and trusted

Over the last five years we have seen positive acceptance of digital and wireless technology as the technology has improved. Installers are also reporting that they are finding it 60% easier to sell wireless solutions. So, the trend and benefits such as convenience, efficiency and lower cost of ownership are evident. But there is still a lot of education and training needed to be done on digital and wire-free solutions to clarify the benefits and convenience.

Bluetooth is becoming the dominant standard for mobile access

Despite the number of manufactures, phone models and operators, Bluetooth doesn't require permission from handset manufacturers or mobile network operators. So, it is becoming the dominant wireless standard for mobile access. The simplicity of the cheap plastic key card, fobs and key codes are still trusted and seen as a sufficiently viable solutions versus wireless locks and Bluetooth mobile access. But this is changing rapidly as Bluetooth is basically available on every smartphone. The Bluetooth Low Energy (BLE) has proved very effective and cost efficient in the innovation of electric locks. Since smartphone usage is widespread globally and most have an authenticator to 'unlock' or access data on the device, it is a potentially larger customer base compared to competing technologies.

Smart phones as an access control device

Smart phone authentication features have been improved to protect the security of the mobile phone holder if a key is lost or stolen. Plus, the cost to add or remove access rights on a mobile phone is essentially zero and can be done remotely. Giving it a big advantage over the legacy key card systems in the long run. There is also another point that an employee is far less likely to lend their mobile phone to a colleague than a smart card. One drawback on the use of mobile phones is the battery life issue, which is seen as a major obstacle as organisations do not want to have cards or fobs as a back-up.

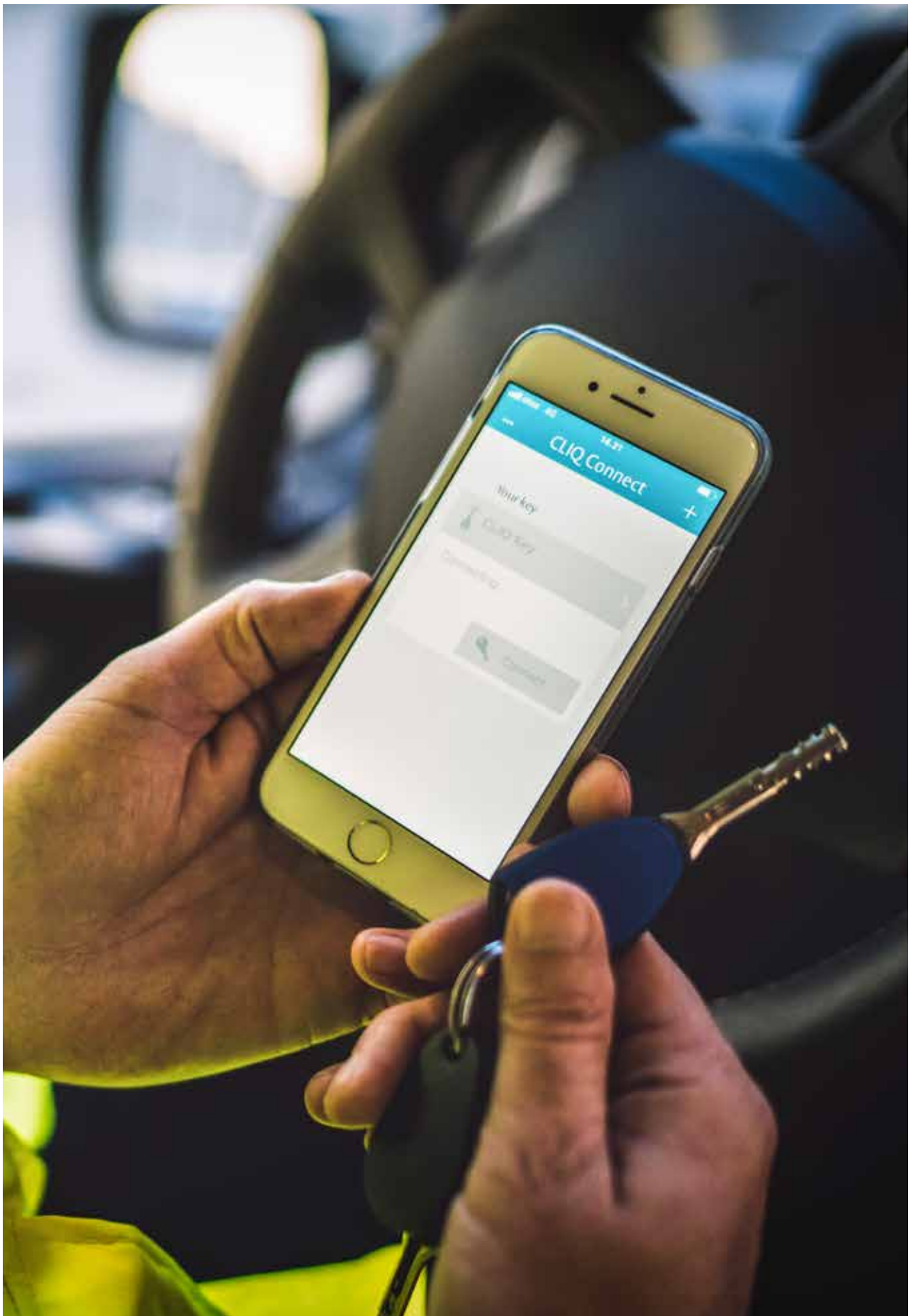
The cloud and web manager online platforms for centralised and remote access management

This brings in the cloud as a player in this ecosystem. There is a growing demand for large organisations to use cloud-based physical access control systems. Where open platform, cloud based IT infrastructure will make integrations with peripherals like the smartphone more viable.

Software as a service (SaaS) is usually the most cost effective and popular cloud set up. Compared to self-hosting SaaS needs no extra investment, is scalable with managed software updates. Maintenance and support are included with agreed service level agreements (SLA's). They are also more secure and resilient with regulatory compliance, since they are usually hosted by a global data centre specialist. A wise option for organisations and operations with multiple locations.

What access management solutions are suitable for legacy railway systems?

SaaS is relevant to the digital transformation solution for legacy railway systems as the simplest way to manage all the software that connects digital technology across the stations, rolling stock and infrastructure. Include the convenience of smartphone identification they will simplify and improve control and security of access management systems. This is where future for legacy railway transformation is heading.



Planning for digitally transforming legacy systems

Linking all the necessary components of your railway operation into one secure digital solution, is complex and needs professional planning. The usual components include rolling stock plus track infrastructure such as signal and control rooms, maintenance yards and stations. Then of course the personnel including sub-contractors and your own staff.

It is always a big decision to redefine legacy systems. With careful planning potential downtime and security breaches during implementation of the new system can be minimized. Analysing the entire system from policies, standards, procedures, and technology within it, gives a clear idea of the challenge at hand. It also enables making a well-informed decision regarding the access control management and locking system you need.

One of the most critical aspects is systems integration. How existing structure integrate with new digital solutions? Is it necessary to create a whole new system from scratch if the legacy system is outdated? Here are a few of the general consideration to look at before deciding on what digital security or access management system to choose.

Policies:

Knowing how your operation's entire railway security is governed and the way your operations manages it, is essential. This helps you set the right goals and move in the right direction.

Standards:

What are your rail industry and organisational standards that will meet your security and safety compliance policies? Each region and company have their own standards, so you need to be fully aware of this before planning ahead.

Processes:

Define your processes to create adherence to your rail security and safety compliance requirements. With clearly defined ownership, roles and responsibilities you are able to define and implement the right plan.

Technology:

Railway operations have so much technology that needs to be integrated with the digital security solutions. Having a good idea about what your existing capacity and capability to integrate is, is vital in choosing the partner with the compatible digital solution and cloud based set up that suits your railway operation.

The beauty of digitalisation is that once you have your initial digital set up it is scalable and easily updated, and legacy systems will be a thing of the past forever.



What does Abloy offer to digitally transform legacy railway operations?

Abloy is a hallmark of trust in critical infrastructure with the most advanced locking and control access systems. Here is an overview of the digital technology, benefits and solutions Abloy has to offer to create operational excellence and future access management control in legacy railway systems.

The benefits of Abloy's advanced electronic locking and key systems

Abloy's digital solutions with electronic keys and remote access control are proving to be a very convenient and secure solution in the case of legacy railway systems. Even in the harshest outdoor environments including weather and sheer force from train movement or vandalism.

1. Simplified and risk free key management

The complicated logistics and key management related to legacy system are all removed with digital solutions. With keys and access rights managed from a central online web based browser. Rights are also able to be validated on the go with smartphone apps. Simplifying everything. A huge convenience for railway operations with multiple locations across vast distances, with large numbers of key holders.

2. One key access to everywhere

The electronic key can be programmed remotely for each holder from a central location, for the exact time, date and place the access rights need to be valid for. Drastically reducing the number of keys to manage in your operation. If a key is lost, you can simply delete its access rights and eliminate the security risk. No need for the cost or downtime of rekeying either. The rights are also updated via a smartphone, mobile Programmable Device (PD) or Wall PD on location. All wireless connections are encrypted and secure.

3. Centralised and transparent access control management

The convenience of digital technology in smart keys, locks and access control systems takes logistics and confusion out of the equation. Opening up a whole new world of convenient mobile or web based access rights management, key control and transparency. There is also a full audit trail available, to track the movement of every key holder in your system. Adding up to a huge cost saving in travel, logistics and time.

4. Security under all conditions

With legacy systems the threat of terrorism and vandalism remains as the potential areas of attack such as rolling stock, signal boxes, maintenance yards and tracks are still protected with mechanical keys, padlocks and other non-integrated

systems. Abloy has the widest range of door cylinders, cabinet locks and Super Weather Proof padlocks that meet IP68 specifications. The entire range is made of the highest quality to withstand railways most extreme force and weather conditions, including cold, saltwater and dust. Abloy lock cylinders are made to the highest levels of security. Unsurpassed in durability, pick and bump proof. They can all be digitally connected.

5. Safety across every access point

Encrypted and secure access management with our digital PROTEC2 CLIQ system gives you complete transparency across every lock and key. Ensuring that only the right people have access to the right places at the right time. It is essential to secure entry into restricted or 'risky' zones, including track maintenance areas and the driver's cabin. This ensures all your rolling stock, infrastructure and stations are secured and maintained safely each day. Keeping every journey, cargo and most importantly passengers safe.

6. Wire-free for faster installations and implementation

The biggest asset of digital solutions is how quickly and cost efficiently they can be installed and implemented. Especially with Abloy's electronic key and locking systems. The solutions are wire-free, with no cable installations needed. This creates savings on installation costs and time. The energy-efficiency of wireless doors delivers significant cost savings. The standard batteries locks have long lives, and only fully 'power up' when there's a credential to read.

7. Wireless, Bluetooth technology enables access rights on the go

Abloy has Bluetooth technology in the CLIQ Connect mobile solution that allows keyholders to validate access rights via their smartphone from anywhere. Perfect for managing access rights at remote locations. A complete audit trail is also available to manage and track all movement from the CLIQ Web Manager, the central web browser-based, access management system.

Where are Abloy solutions typically in use within railways?












ROLLING STOCK SOLUTIONS

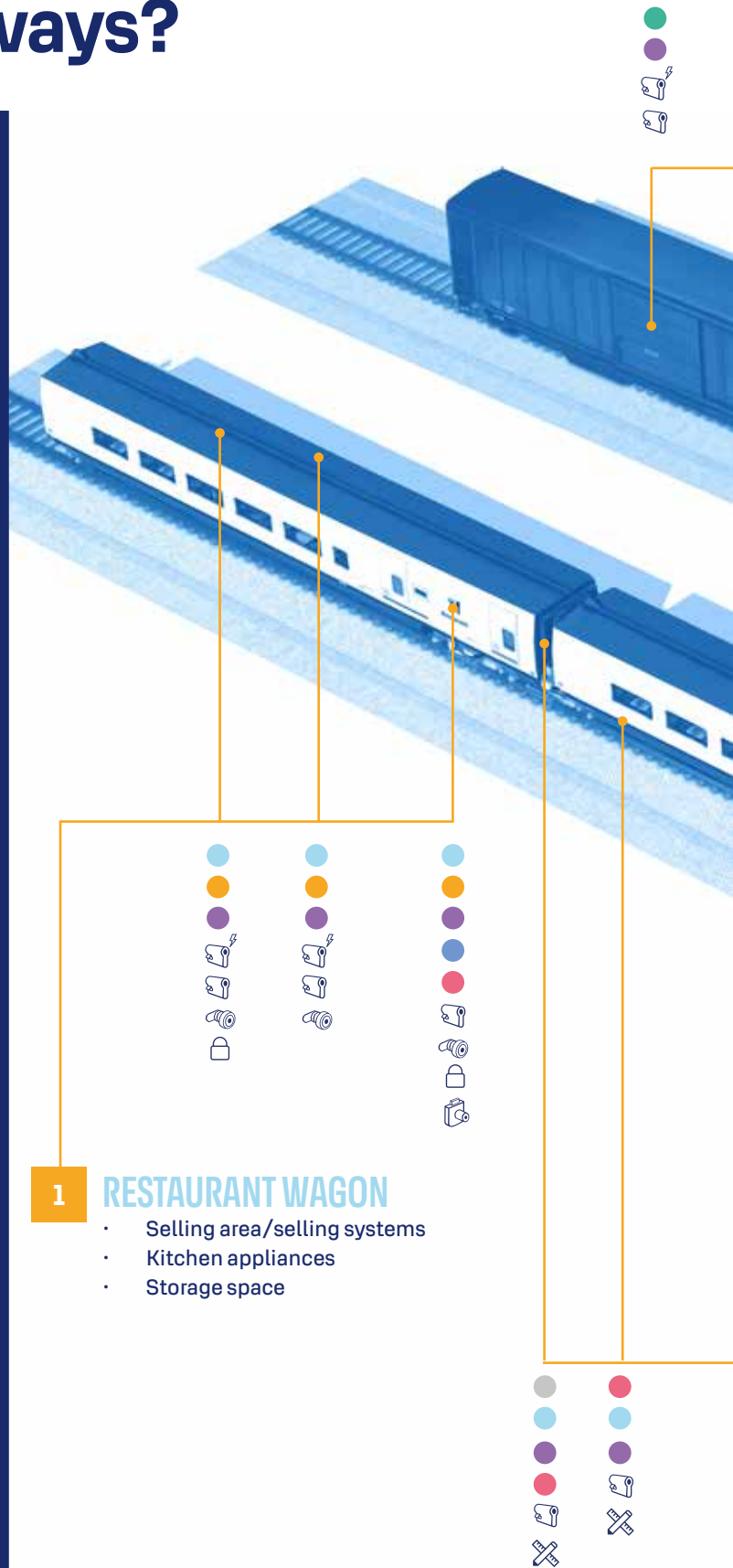
Here are all the Abloy products and where they are in use within rolling stock solutions. This diagram shows the different locks, where they are used, and the access groups usually covered within the system.

Access Groups

- Passengers
- Cleaning
- Restaurant personnel
- Shipping company
- Technical maintenance
- Food delivery
- Conductor
- Driver

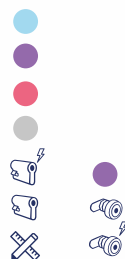
Products (mechanical / CLIQ)

-   Padlock
-   Cabinet lock
-   Cylinder
-   Cam lock
-   Key deposit lock
-  Custom made product



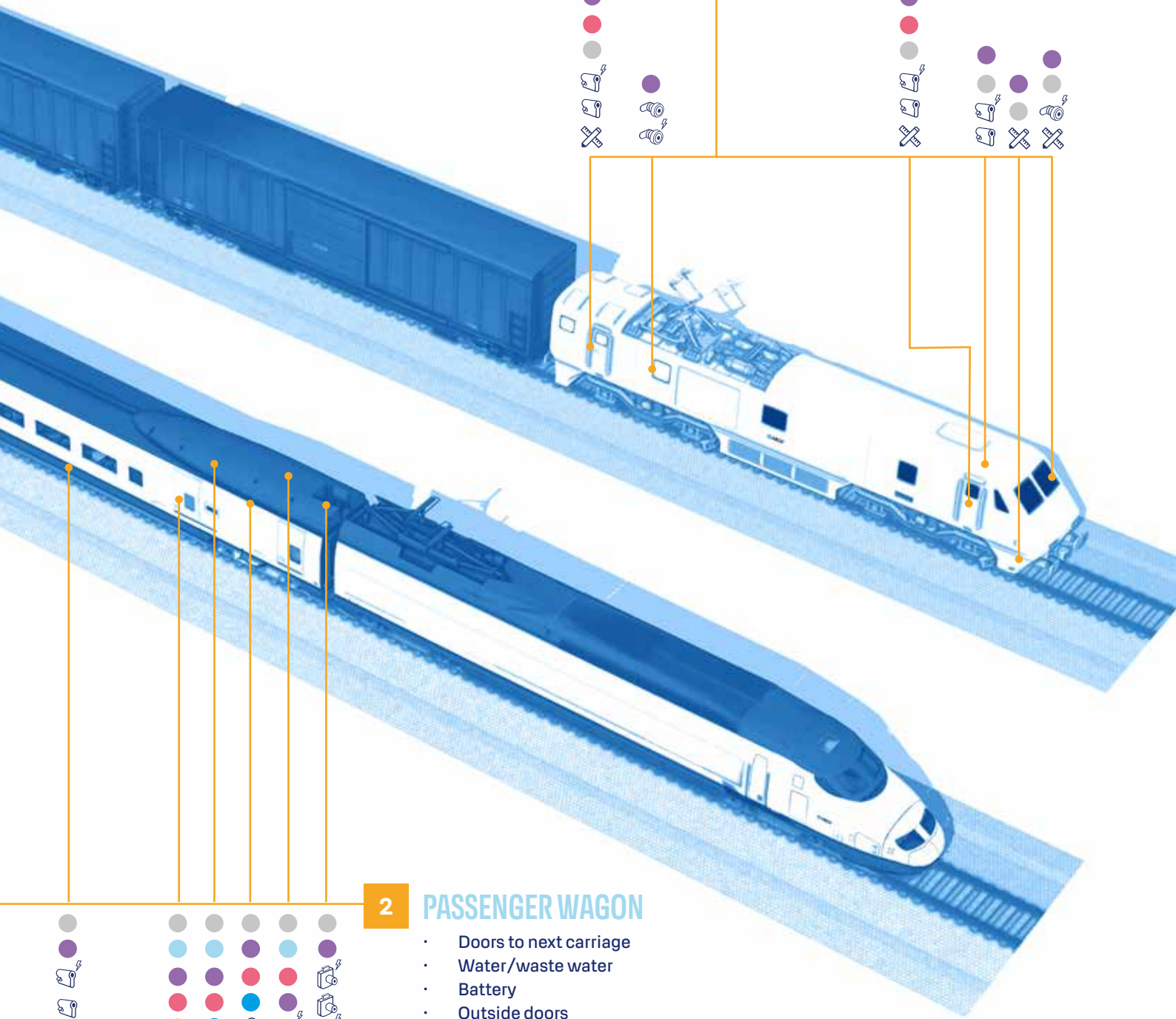
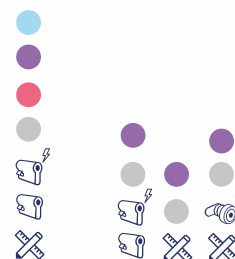
3 FREIGHT TRAIN

- External door (mech. override)



4 LOCOMOTIVE

- External door (mech. override)
- Service hatch
- Driver door
- Door to motor room
- Sand, water
- Control table



2 PASSENGER WAGON

- Doors to next carriage
- Water/waste water
- Battery
- Outside doors
- Lockers for luggage
- Locking for bicycles
- Conductor's compartment
- Technical cabinet














RAILWAY INFRASTRUCTURE SOLUTIONS

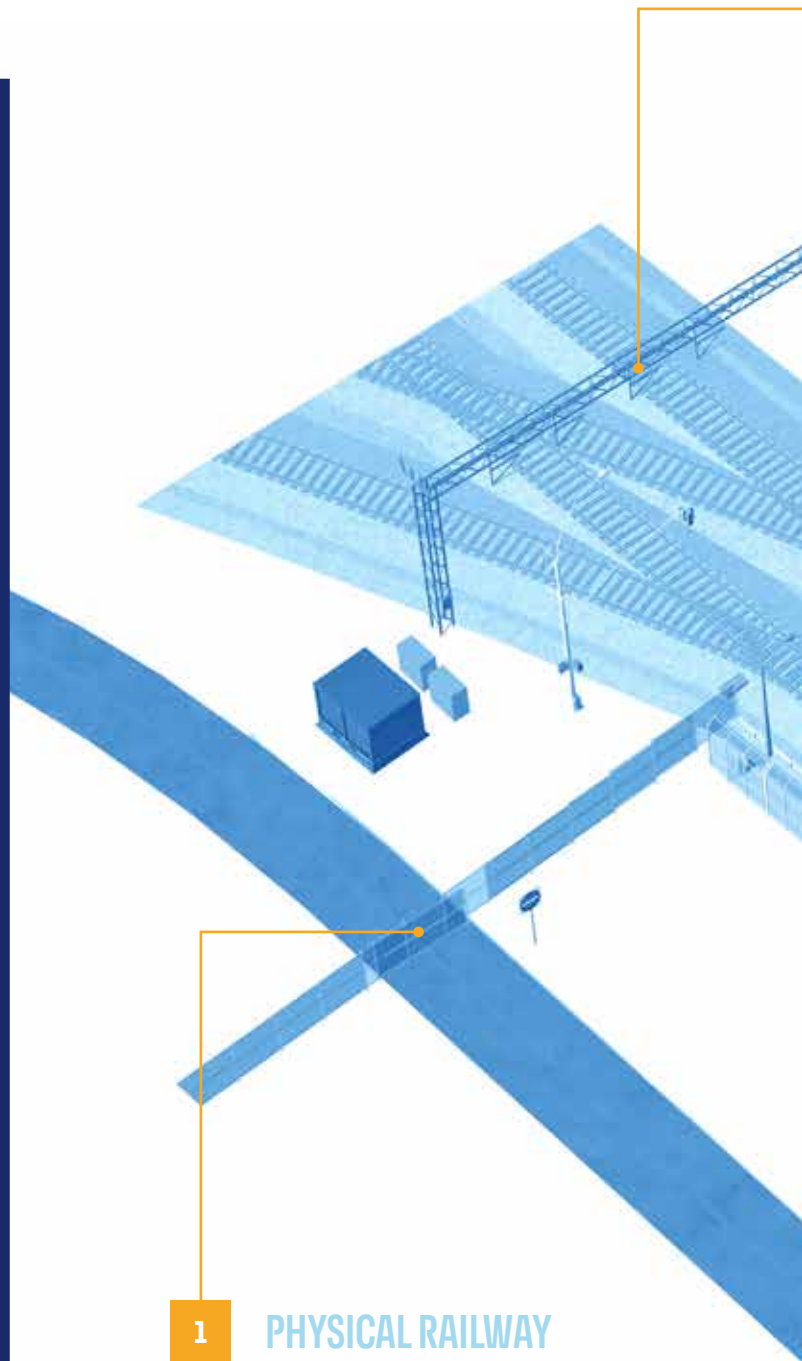
Here are all the Abloy products and where they are in use within railway infrastructure. This diagram shows the different locks, where they are used, and the access groups usually covered within the system.

Access Groups

- Maintenance
- Electricians
- Emergency traffic coordinators
- Emergency services

Products (mechanical / CLIQ)

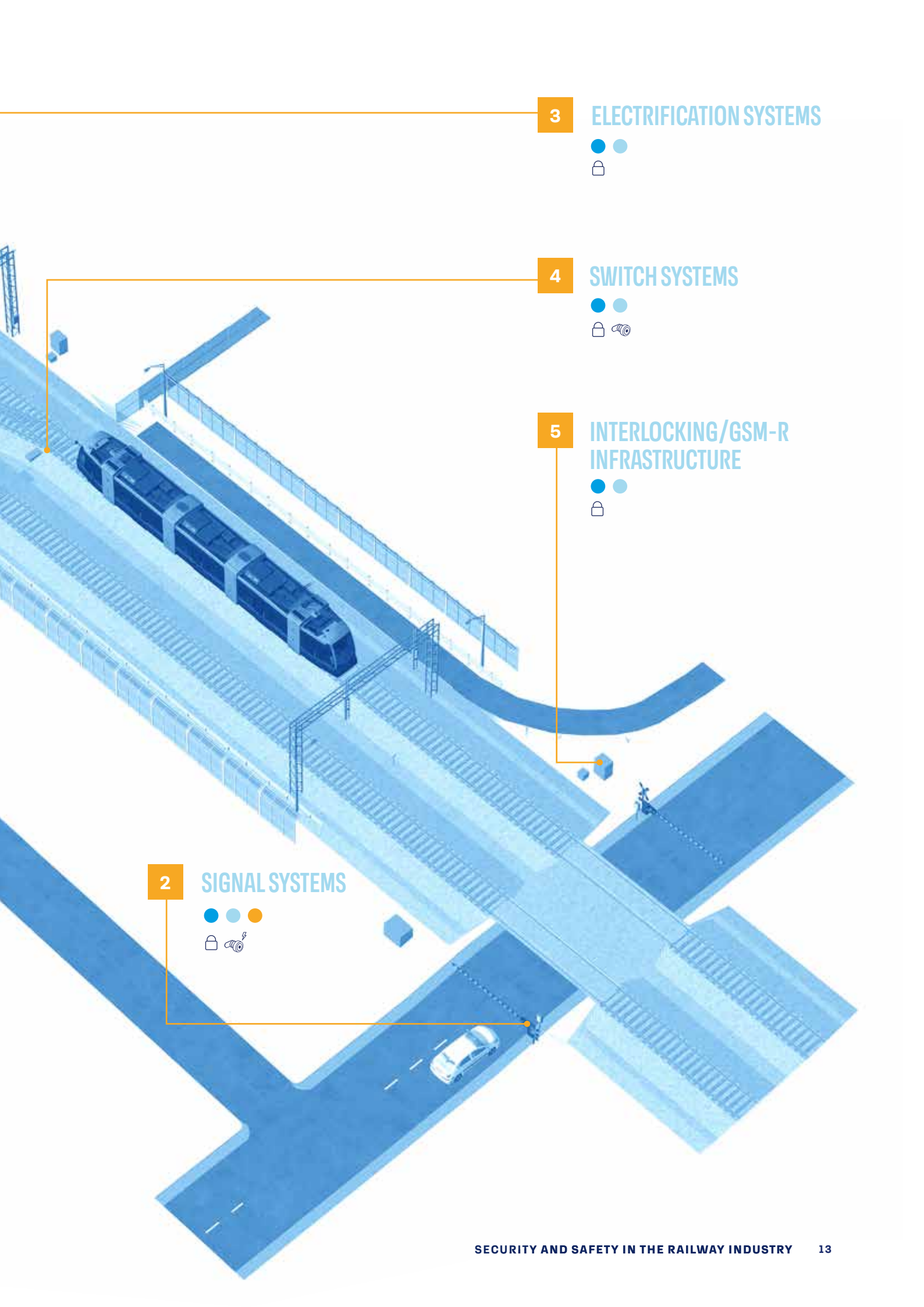
-   Padlock
-   Cabinet lock
-   Cylinder
-   Cam lock
-   Key deposit lock
-  Custom made product



1

PHYSICAL RAILWAY ACCESS SYSTEMS





3 ELECTRIFICATION SYSTEMS



4 SWITCH SYSTEMS



5 INTERLOCKING/GSM-R INFRASTRUCTURE



2 SIGNAL SYSTEMS



Abloy service and support

Abloy's global network of service and support for entire security upgrades

Abloy's advanced electric locking and digital access management systems are designed for smooth integration with a wide range of existing systems. There is an extensive worldwide service network of certified Abloy professionals to plan, install, implement and support you and handle entire security upgrade projects with care and expertise.

The future of optimised and secure rail operations is an integrated ecosystem built on smart data and digital intelligence around locomotives, carriages, tracks and throughout railway infrastructure.

New CLIQ Competence Centres in operation

Abloy will be at the forefront, aiming to be active in major railway infrastructure and rolling stock projects worldwide. To strengthen this development Abloy is establishing CLIQ Competence Centres globally, focusing on Abloy's PROTEC2 CLIQ access control technology.



Conclusion

The digital transformation process is sweeping the global railway industry.

While digital transformation offers so many benefits of logistics, installation, energy and time cost savings, it also presents major security and safety threats. As progress surges forward, safety and security standards are being left behind. Creating vulnerability to terrorism, vandalism and cyber threats. Minimising keys in circulation, having a web based, visual situational overview of your security and an audit trail of every key movement is solving these challenges.

Having the convenience of an online central control centre that can manage all your access rights remotely from anywhere – including a mobile solution – certainly seems the way ahead. This is what Abloy brings with its advanced mechanical and electronic security ecosystem.

This is a huge benefit to legacy systems as new technology can be digitally accessed and managed. Often with wire-free installation and Bluetooth technology. Making installation more cost efficient and adding additional keys or access points so much simpler. These are the main breakthroughs of digital solutions. They add more control and security while making the system simpler to manage, install and update.

This is the essence of how digital solutions are the answer to adding operational excellence and future access management to legacy systems. Bridging the safety, security and access management gap that currently exists between older legacy systems and modern developed high speed rail networks.

Sources:

ASSA ABLOY – IFSEC – The Wireless Access Control Report 2018
Ramboll Finland





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ABLOY offers security and locking innovations dedicated to creating more trust in the world. Combining digital and mechanical expertise, Abloy Oy develops industry-leading security solutions that protect people, property and business. Abloy is part of the ASSA ABLOY Group, the global leader in access solutions. Every day, we help billions of people experience a more open world.

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