

HOW CAN INTELLIGENT SECURITY SOLUTIONS ENHANCE EFFICIENCY AND SAFETY ON OUR RAILWAYS?



Introduction and executive summary

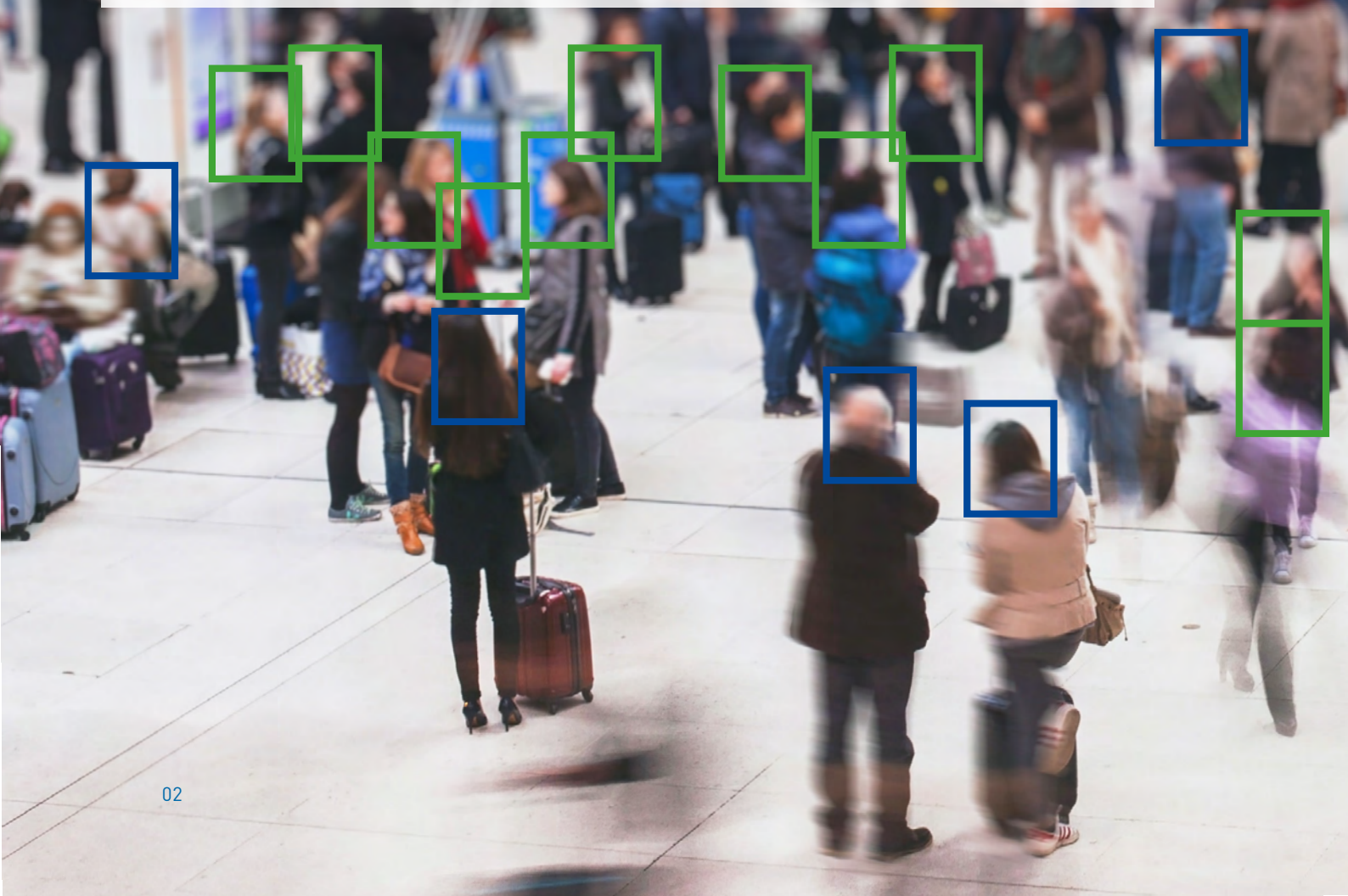
According to the UK Traveller Needs study 2015¹, two of the primary pain points for those using public transport are delays and lack of personal space. And, *Digital Railway*² has established that since 1996, passenger numbers have doubled – expectations are that they will double again over the next 25 years.

Even though safety standards in the UK are perceived to be amongst the best in the world, with growth predictions such as this it is little wonder that safety and security remain of paramount importance across the rail industry.

The inaugural Rail Industry Innovation Forum took place a few months ago, hosted and introduced by Panasonic Business. During the event, attendees identified nine key priorities for UK rail³, with the safety and security of passengers, rail workers and station staff a hot topic throughout.

Discussions were dominated by a desire to better harness technological innovation in order to further raise safety and security standards across the industry.

The following paper outlines the challenges, inhibitors and opportunities for the rail industry and discusses the types and ways in which technology can be used to create more efficient, reliable and secure railways.



Rail industry innovation forum

During the forum held in November 2016, attendees from across the UK rail industry identified a total of nine priorities for innovation.

Of these, the top three priorities were:

- How to make customer decision making better in real time?
- How to dynamically change capacity?
- How to keep our railways safe for people?

This paper focuses on the third priority and, while railway networks have already invested a huge amount in technology, these have typically been used reactively – to gather information after an incident has taken place.

Benefits and limitations of traditional technology:

Technology

Surveillance Cameras

Challenge

CCTV cameras can help provide intelligence – but are generally reliant on resource to manage and monitor them all. Resource intensive and inefficient.

Alarms

Audible warnings and alerts can trigger positive reaction from the individual potentially engaging in risky behaviour. But, relies on staff on-hand, on the ground. No good if no resource is able to get to the location in which the incident is/has taken place. Very reactive.

Observation

Reliant on individual security staff making a judgement call as to the intent of suspicious people and behaviours. Notably, it is limited in its ability to identify an individual's emotions – for example if feeling suicidal. Good for identifying graffiti and other vandalism, or drunken behaviour, but unlikely to proactively help vulnerable and at-risk individuals. Requires analytics to identify patterns and be truly effective. Vigilance is required 24 hours a day, 7 days a week which poses further challenges in both human and technological resource.

The question now, is *where* and *how* can technological innovation be used to help keep railways safe and secure, with particular consideration to concerns around predictive surveillance and trespass prevention?



Challenges for the rail industry

The issues of delays and lack of personal space are directly related to safety and security, often causing disruption and discomfort to all those affected. According to Network Rail, vandalism, trespassing and suicide are causes of a third of all passenger delays. Delays often impact crowding on already busy trains, resulting in loss of personal space and ever-greater discomfort.

Operators strive to achieve good customer communications and desire for their customers to have a positive passenger experience, however this effort is often hampered by situations

beyond their control, demonstrated by the high proportion of delays caused by trespass and other unpredictable human behaviours.

It is estimated that over 60% of fatalities on the railway were alcohol-related in the past decade⁵

Trespassing and vandalism

Trespassing is often intentional, for the purpose of deliberate vandalism or self harm. However, it can also occur unintentionally. Unfortunately, both situations create a great deal of risk for railway employees, customers and perpetrators alike, and can be costly, impacting service and efficiency.

With a growing number of unmanned stations, UK rail is challenged to enforce restrictions and processes, having to rely heavily on the information that can be garnered through technology such as surveillance cameras.

In order to achieve better service reliability and to prevent such incidents, rail companies require greater control, through better insight.

Worryingly, as can be seen from the chart below, BTP is tracking increasing instances of trespassing. The primary motivation for trespass is apparently for the purpose of taking a shortcut. And, according to their records, in 2016 BTP caught over 550 children walking or messing around on the tracks.

Railway trespass statistics⁴

	2012	2013	2014	2015	2016
Scotland	492	580	536	612	710
North West	814	911	950	935	1,142
North East	191	239	216	256	313
Yorkshire & Humberside	759	785	736	990	931
West Midlands	502	515	581	577	588
East Midlands	313	321	315	380	444
Wales	519	509	431	513	524
East Anglia	430	383	372	382	487
London	1,261	1,262	1,219	1,370	1,455
South East	895	772	885	952	1,118
South West	479	412	404	485	553
Year total:	6,655	6,689	6,645	7,452	8,265

In 2016 BTP caught over 550 children walking or messing around on the tracks.



Suicide prevention

Unfortunately, suicide prevention must remain a major focal point across the rail industry. According to Mark Smith of British Transport Police (BTP), circa 1,200 people were physically restrained from taking their life on the railway in 2015/16. This number includes being stopped by frontline railway staff or members of the public.

Suicide prevention and mental health is currently the second biggest risk that BTP faces and current records indicate that **around 100 people try to kill themselves on the railway every month**. Although a small force, BTP works with NHS nurses to case manage, support and provide care for each of these individuals.

There are multiple reasons an individual may try to end their own life, including depression, anxiety, acute stress, personality disorders, alcohol abuse and chronic disease. Worryingly however, the most common age group for attempted suicide on the railway is *generation Y*, 17 to 36 year olds. This is in part possibly owing to the demographics of those most likely to use the railway networks. Another contributing factor may be perceived social isolation. Research indicates that young people have been shown to fear loneliness more than older people do, and tend to be heavier users of mobile phones – which often actually isolates people more than they connect them.

Achieving effective suicide prevention requires tools that provide railway employees proactive intelligence based on an individual's unusual and unpredictable behaviour patterns. Another positive step would be for key organisations to move away from working in silos, and begin sharing intelligence.

A major challenge for railways and the BTP is in changing the mindset of those who believe that the railway provides them is their best option for a successful suicide. Unfortunately, not only is this incorrect, but the knock-on effect that attempted suicide has on all those who witness or who are in some way touched by the incident, can be cataclysmic.

17 – 36 year olds:
The most common age group for attempted suicide on the railways

Source: British Transport Police



Station security

Unmanned stations and overly crowded, centrally-located stations each present their individual challenges. Trespassing and vandalism are often primary concerns for unmanned stations in quiet or isolated areas. Additionally, the safety and confidence of individuals working, travelling and waiting for trains in isolated locations is a focal point for the railway industry.

Similarly, overcrowding in key locations creates both management and security risks, as an individual's unpredictable behaviour may become more difficult to track, identify and manage. Excess alcohol consumption also plays a major part in security hazards for the inebriated individual and other rail users. It is estimated that over 60% of fatalities on the railway were alcohol-related in the past decade⁵.

According to the Rail Safety and Standards Board (RSSB), of those assaulted, 40% thought their assailant was intoxicated, while staff reported that alcohol played a part in approximately 60% of assaults that they had personally experienced.

A further concern for rail staff and travellers is the issue of behaviour that leads to security incidents. Terrorism, a major concern for BTP, is thankfully of low incidence but prevention remains a top priority.

Frequently, alerts are triggered as a result of lost or abandoned luggage, but each event is treated with the utmost seriousness and the subsequent effects can be costly and disruptive.

Safety of vulnerable or at-risk persons such as young children, those with disabilities, elderly and pregnant people must also be addressed. And the way in which their individual needs are met and supported will directly affect their and other passenger's experience of rail travel.

Additionally, an RSSB report on managing risks related to alcohol consumption⁶ provides some general guidance to help improve the general passenger experience, such as improvements to station lighting, the removal of graffiti and increased staffing levels. This can then help with visibility, ambience and feelings of safety, respectively.

Frequently, alerts are triggered as a result of lost or abandoned luggage



Vigilance without fear

It is common knowledge that a person can maintain full concentration for relatively short amounts of time. As concentration wanes, it is likely that unusual behaviour or questionable events may be overlooked.

Modern surveillance technology increases efficiencies and removes the pressure and reliance on individuals to study multiple cameras. The combination of people masking, video analytics and the Trespass Warning System places control back in the hands of security and station managers. By simplifying the challenge of identifying potential risk, early warning systems such as these, enable staff to focus where needed and the proactive alerts help minimise the possible impact of unpredictable events – thereby ensuring safety, security and service reliability.

Unprecedented events, such as terrorist attacks, typically result in an increased and highly visible police presence on city streets across the UK. This presence provides confidence and peace of mind to the general public, while helping act as a deterrent for any would-be attacker.

And, across the UK rail industry, security is tightened in determination to ensure the rail networks are secure, and both passengers and staff are safe.

In such circumstances, combining surveillance cameras with proactive video analytics and prioritised alerts, plus the added benefit of early warning systems can enable railways to help implement vigilance without fear – and safety without doubt.

Capacity management throws up multiple issues that can benefit from the same such system. Being alerted when nearing and/or reaching capacity enables station staff to take pre-emptive action that helps avoid threats to safety. Simultaneously tracking capacity, identifying possible platform safety risks and possible unusual or undesirable behaviour are all achievable, and the prioritised alerts provide clear guidance on the order in which the issues should be dealt.

Beyond the clear benefits to safety and security, for management this offers opportunity to increase business efficiency, better manage costs, minimise network disruption, ensure service reliability and benefit passenger satisfaction.



Flexible, secure and reliable technology

Going forward, organisations need to ensure that they choose a reliable and trustworthy technology and business partner. The technology itself should be both flexible and secure. People masking technology, such as that from Panasonic, can be used to help ensure that the identity of railway staff, passengers and other individuals is protected.

Panasonic's people masking solution allows people and objects to be masked, whilst their silhouettes reveal movement and behaviour. When used in combination with Panasonic's Trespass Warning System, video analytics can provide proactive data analysis, enabling the prioritisation of security alerts, based on human behaviour – helping rail staff to identify and prevent risky situations.

On the occasion that authorised individuals need to review footage following an incident, privacy protection can also be deactivated – providing a flexible, ethical and effective solution for privacy.

The use of video analytics is transforming the way in which businesses gather, harness and act upon information. For the transportation industry it opens up new opportunities for more proactive behaviour management.

Video analytics help security teams by analysing behaviour, such as whether an individual is loitering or behaving in another manner that can be distinguished from the regular behaviours, and combines this with known risk areas such as platform edges and bridges. Based on multiple factors it is able then to flag priority-based alerts that can be acted upon appropriately. The technology can similarly be used to identify and flag if luggage or some other object is left unattended.

This new method of identifying and preventing possible threats is far more proactive than the processes that have previously been used, such as operators monitors banks of screens.



Harnessing technology for a safer future

Accessibility and connectivity have changed exponentially in the past three decades. We are now at a time when people generally expect high levels of access, almost no matter where they are. Being able to connect, anywhere, anytime, offers great opportunity to positively affect passenger experience.

No business owner wants to deal with negative customer feedback and advance knowledge of possible incidents is one of the best ways to manage customer expectations on the railway. If communications regarding disruption, delays and closures can be proactively shared with passengers it can enable them to make timely and informed decisions regarding journeys.

And, at a time when the world around us seems to become ever-more volatile; when data breaches and malicious digital attacks are considered commonplace, and when world events take us by surprise – often with unexpected results, we can look forward to the opportunity of enabling safer rail networks.


Although technology continues to speed and enable our communications, for some people it is a route to isolation.

Over half of calls passed to frontline police officers relate to complaints originating from social media (source: British Transport Police⁷) and 40% of mental health trusts in the UK are in budget deficit.

This is undoubtedly a huge concern, but by inciting change in organisational policies and processes – such as sharing information with other key groups, rather than working in silos – combined with investing in technology that can be used to aid and enable proactive monitoring and management of unusual or suspicious behaviour, much can be done to reduce and even remove risks.

With predicted growth in passenger numbers and rail freight, the need to better manage behaviour, unpredictable events and capacity is of increasing importance. Rail services need to meet demand, increase efficiency and performance, and increase capacity.

Panasonic views industry collaboration as an essential element of the solution development process. Working directly with its customers, Panasonic helps define individual business challenges and needs, providing support from definition right through to installation and integration.



Since 1996,
rail passenger numbers have
doubled – and are set to double
again over the next 25 years

Source: Digital Railway

What if there is a different way?

What if there is a different way to use technology to counter the challenges faced by the rail industry today? A way to implement intelligent connected solutions that:

- Provide the ability to create automated audible warnings to those meeting behaviour patterns associated with loitering and trespassing
- Allow you to drastically reduce the number of false trespassing alerts, minimise service disruption and customer delays
- Help prevent future incidents of vandalism with visible camera deterrents
- Provide prioritised alerts so that station staff can take appropriate action
- Allow the capture and appropriate management of less important incidents
- Utilise robust and reliable CCTV installations that are vandal resistant and weatherproof
- Facilitate day and night monitoring with use of Panasonic thermal cameras

Panasonic is focused on creating unique solutions for specific market problems. It strives to help customers achieve better customer experience, cost reduction, greater efficiencies and managed business risk through innovative, unique solutions across areas of connectivity, hardware, software and services.

Together with Panasonic,
UK rail can:

- Reduce expenditure
- Cut delays
- Manage compliance
- Improve passenger journeys



Panasonic, a world leader in business solutions, provides connected, intelligent technology solutions, and works with multiple rail operators to constantly drive innovation forward.

To learn more visit:
business.panasonic.com/solutions

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¹ <https://ts.catapult.org.uk/wp-content/uploads/2016/04/Traveller-Needs-Study-1.pdf>

² <http://digitalrailway.co.uk/>

³ <http://www.railway-technology.com/features/featuresetting-the-target-uk-rails-nine-innovation-priorities-5789839/>

⁴ http://www.btp.police.uk/advice_and_information/tackling_crime/trespass.aspx

⁵ <http://www.railway-technology.com/features/featuretackling-alcohol-consumption-on-britains-railways-5693290/>

⁶ <https://www.rssb.co.uk/Library/improving-industry-performance/2016-09-guidance-managing-alcohol-risks.pdf>

⁷ <http://www.bbc.co.uk/news/uk-27949674>