

Institution: Leeds Beckett University		
Unit of Assessment: Unit 4 (REF Panel A) – Psychology, Psychiatry & Neuroscience		
Title of case study: Enhancing the behavioural safety capacity of two major rail maintenance companies		
Period when the underpinning research was undertaken: 2015 onwards		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr Jim Morgan Dr Matteo Curcuruto	Principal Lecturer Senior Research Fellow	Since September 2014 Since January 2016
Period when the claimed impact occurred: 2016 onwards		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact (indicative maximum 100 words)		
<p>Research by the Psychology Applied to Safety and Health (PASH) research group has informed and improved the safety culture at Amey and VolkerRail, two major UK rail infrastructure companies. Both companies have now embedded evidence-based behavioural safety protocols to monitor safety-critical workflows and to analyse incidents to improve safety. From 2015 Amey implemented the SafetySmart initiative, leading to a 33% reduction in lost time injuries and estimated financial savings of £1,350,000. From 2016 VolkerRail implemented the YourAIM project resulting in a zero accident frequency rate and estimated financial savings of up to £1,000,000.</p>		
2. Underpinning research (indicative maximum 500 words)		
<p>The railway maintenance industry involves complex human machine interactions and safety critical operations with considerable risks for health and safety of its employees. The UK Network Rail workforce safety statistics for the five years preceding, and including 2013/2014, show that major injuries have risen over this period, from 96 to 122, and lost time injuries have risen from 146 in 2009/10 to 310 in 2013/14 (Network Rail, 2014). In addition to the pain and suffering caused, the financial cost of workplace injuries and illness is high for both individuals and for companies, estimated at £14.3 billion in 2013/14, of which workplace injuries (including deaths) cost £4.9 billion (HSE, 2015).</p> <p>The PASH research team at LBU, led by Dr Jim Morgan and Dr Matteo Curcuruto, are engaged in a research programme focused on helping safety-critical organisations to translate Organisational Psychology, Human Factors, and Health Psychology research knowledge into enhanced behavioural safety management practices. This research has been supported by various funding sources, including two Knowledge Transfer Partnerships (KTPs), resulting in collaborations with industry partners. This impact case study describes the work conducted by PASH with two major rail infrastructure companies over two overlapping three-year periods (Amey 2015-2018; VolkerRail 2016-2019). Prior to the KTPs, the financial impact of worker injuries for both companies was significant (in the preceding year: Amey = £1,200,000; VolkerRail = £1,087,300).</p>		

The research adopted a bottom-up approach of directly involving frontline workers from the outset and at each subsequent stage. The aim of this participatory approach was to foster better safety-related communication, to enhance trust in safety management, and improve safety culture more generally. Some of this research was conducted with workers at the two rail companies, while other research utilised worker populations from other safety-critical industries. Discrete studies within the programme are outlined below, linked to specific journal articles.

An in-depth interview study examining accident risk factors for VolkerRail On-Track Machine operatives (OTM's, N = 10) (see [3.1]) identified a number of specific risks for these workers, notably: 'Pressure and fatigue', and 'Decision making and errors'.

A wide-ranging narrative literature review provided a much-needed appraisal of various aspects of safety climate research (3.2), for example highlighting ways in which the local safety climate influences individual processes of sense making, motivation, and work behaviour.

Research conducted with Amey recruited 528 workers and focused on the development and testing of psychological safety metrics, in this case the first validation of a rail safety climate questionnaire tool (3.3).

Two further questionnaire studies highlighted the importance of safety communication and, in particular, "safety voice". The first of these (3.4) involved 461 laboratory and chemical plant workers and provides evidence for a distinct but predictive phase of "safety envisioning" (a goal generation phase characterised by mental simulation and anticipation of risks) which occurs prior to the enactment of "safety voice" (employees' change-oriented discretionary communications about safety). The second safety voice study (3.5) sampled 103 blue collar workers to assess whether different safety leadership styles predicted different types of safety voice. The findings showed that, after controlling for the respondents' proactive personality, transformative safety leadership predicted promotive safety voice, transactional safety leadership predicted preventive safety voice, and passive safety leadership predicted hostile safety voice.

A sixth study worked with 620 VolkerRail employees to develop and validate a workplace safety tool (the Safety Behaviour Change Questionnaire) to identify the determinants of specific safety behaviours in order to develop targeted and tailored behaviour change interventions (3.6).

3. References to the research (indicative maximum of six references)

[3.1] Morgan, J., Abbott, R., Furness, P. and Ramsay, J. (2016) UK rail workers' perceptions of accident risk factors: An exploratory study. *International Journal of Industrial Ergonomics*, 15 September, pp. 103-113.

[3.2] Griffin, M.A. and Curcuruto, M.M. (2016) Safety Climate in Organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, 3 April, pp. 191-212.

[3.3] Curcuruto, M., Griffin, M., Kandola, R. and Morgan, J.I. (2018) Multilevel Safety Climate in The UK Rail Industry: A Cross Validation of the Zohar and Luria MSC Scale. *Safety Science*, Vol 110 (part B), pp. 183-194.

[3.4] Curcuruto, M., Strauss, K., Axtell, C., & Griffin, M. A. (2020). Voicing for safety in the workplace: A proactive goal-regulation perspective. *Safety Science*, 131, 104902.

[3.5] Bazzoli, A., Curcuruto, M., Morgan, J. I., Brondino, M., & Pasini, M. (2020). Speaking Up about Workplace Safety: An Experimental Study on Safety Leadership. *Sustainability*, 12(18), 7458.

[3.6] Morgan, J.I., Curcuruto, M.M., Steer, M., & Bazzoli, A. (2021) Implementing the theoretical domains framework in occupational safety: Development of the Safety Behaviour Change Questionnaire. *Safety Science*, 136, 105135.

4. Details of the impact (indicative maximum 750 words)

Impact for Amey

Amey (Consulting and Rail division) are responsible for both design and planning, and rail infrastructure operations, with an annual turnover of more than £96 million and more than 3,000 employees. Research by the PASH team has informed an evidence-based safety culture which, in turn, has reduced accidents and saved money.

PASH supported Amey's development, testing and embedding of the SafetySmart ThinkSafe Toolkit, involving more than 2500 workers. The toolkit gives safety managers access to academic safety research knowledge and allows them to collect psychological/behavioural metrics proactively at regular set intervals (to monitor risk) and also at safety trigger points (e.g. when an accident occurs).

As a result of the SafetySmart project, accident frequency rates in Amey's rail operations have reduced (33% reduction in lost time injuries, 25% reduction in non-lost time injuries) - Amey's consulting team has now been injury-free for over 2 years. Amey has also seen an increase in close call report frequencies in rail from 7333 in 2016 to 25,800 in 2018, a significant indicator of increased employee confidence in the safety management and reporting system [see 5.1].

There have also been clear commercial impacts for Amey. The company estimates that as a result of SafetySmart annual turnover will increase by £1,350,000 in the three years following project completion [5.1].

SafetySmart was a major component of Amey's submission under the behaviour safety requirements for ROSPA (Royal Society for the Prevention of Accidents), leading to the achievement of Gold status. Amey have committed to grow the SafetySmart initiative, and to facilitate this have established a new employee role of 'Human Factors Business Partner' – awarded to our KTP research associate.

In March 2019 the Amey KTP was awarded the highest rating of "Outstanding" by independent Innovate UK assessors based on impact for company, research associate, and knowledge base (LBU) [5.2].

In September 2020 the SafetySmart ThinkSafe Toolkit was awarded the Royal Society for the Prevention of Accidents (RoSPA) Initiative of the Year Award [5.3]. The subsequent press release [5.4] stated that its continued usage in Amey Rail has seen an 11% improvement in the rolling 12-month injury stats in 2019. In addition, the SafetySmart ThinkSafe Toolkit has since been rolled out to over 1,000 employees across the business and is currently being trialled in other areas, including Amey's Secure Infrastructure business.

In February 2021 the ThinkSafe Toolkit won a prestigious Zuritanken award from Amey's parent company Ferrovial (96,000 employees in over 15 countries). Zuritanken is an idea generation programme open to all Ferrovial employees worldwide and aims to promote a culture of innovation to solve challenges faced by the business.

ThinkSafe came out on top against a shortlist of six from a total of 364 global entries. The subsequent press release [5.5] stated that ThinkSafe has now been utilised to collect data from over 5,000 employees and to develop specific action plans to address areas of weakness identified by the results. Most recently this has included helping to tackle the business needs and challenges associated with the COVID-19 pandemic. The press release includes a statement from Amey Consulting's managing director praising the SafetySmart ThinkSafe Toolkit. It also states that as a consequence of winning the award, Amey Consulting will now work with Ferrovial to expand ThinkSafe globally.

Impact for VolkerRail

VolkerRail is a multi-disciplinary railway infrastructure contractor has an annual turnover of more than £218 million and 900 employees. As with Amey, research by PASH has enhanced safety culture through implementation of evidence-based interventions, leading to accident reduction and financial savings.

PASH research informed the development of the 'YourAIM' risk management programme, which has prioritized behavior change (through the development and validation of the Safety Behaviour Change Questionnaire, SBCQ, see 3.6) , a new safety conversation framework (informed by PASH studies on safety voice and safety leadership, see 3.4 and 3.5) and intelligent use of psychological metrics (informed by previous PASH research, see 3.1, 3.2 and 3.3).

As documented in research paper 3.6, three specific safety behaviours identified as high risk at VolkerRail ("removing or managing slip/trip hazards at work", "correctly using all PPE provided for the task", and "safely storing tools, equipment and materials") were subject to a safety behaviour change evaluation using the SBQC. Using worker feedback [N= 620] gathered using the validated questionnaire it was possible to identify distinct enablers and barriers for each specific high risk behaviour and therefore provide worker-driven data to aid the development of tailored behavioural interventions.

VolkerRail's behavioural safety efforts have been recognised in the form of a team award nomination (for behavioural safety coaches) at the RailStaff awards 2020 [5.6].

Using the Rail Safety & Standards Board's 'cost of accidents' model, it is generally accepted as a rough guide that a RIDDOR (Reporting of Injuries, Diseases, and Dangerous Occurrences Regulations) reportable accident will cost VolkerRail approximately £170,000, taking into account all direct and indirect costs. It is anticipated that once fully embedded, YourAIM will eliminate these types of accidents [5.6].

In March 2019 the VolkerRail KTP was awarded the second highest rating of "Very Good" by independent Innovate UK assessors based on impact for company, research associate, and knowledge base [5.7], prompting recognition of impact from senior management [5.8]. The company estimates that as a result of YourAIM, annual turnover has increased by £250,000, and a further £1,000,000 in the three years following project completion [5.6].

Recognition from the wider rail industry and safety bodies

The Amey KTP was commended by the Rail Safety & Standards Board [5.1] and shortlisted for a 'world class collaboration' award by the UK Rail Industry Awards 2018 panel [5.1]. CIRAS (the confidential incident reporting and analysis service) commended the Amey KTP and featured it twice in national publications [5.9; 5.10]. The influential Rail Technology Magazine discussed Amey's progress in its feature

'What's next for safety?' [5.11]. The Institution of Occupational Safety and Health (IOSH) magazine featured our work with VolkerRail on safety behavior [5.12].

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1 Knowledge Transfer Partnership (KTP009813) Final Report. Results for the Company Partner (pages 5-18), completed by Robert Doyle, HSQE Director at Amey, 13th December 2018.

5.2 Knowledge Transfer Partnerships Certificate of Excellence. Certificate Number KTP009813. 20th March 2019.

5.3 Amey has been awarded the 2020 Royal Society for the Prevention of Accidents (RoSPA) "Initiative of the Year Award" for its 'ThinkSafe' Toolkit project.

<https://www.rospa.com/awards/winners/2020/inspiration-awards/#initiative>

5.4 Amey press release about the award of "Initiative of the Year" for the ThinkSafe Toolkit from the Royal Society for the Prevention of Accidents (RoSPA), 3rd September 2020. <https://www.amey.co.uk/media/press-releases/2020/september/amey-s-thinksafe-project-wins-rospa-initiative-of-the-year-award/>

5.5 Amey press release about ThinkSafe winning the Ferroviaal Zuritanken Award, 4th March 2021. <https://www.amey.co.uk/media/press-releases/2021/march/amey-consulting-s-thinksafe-wins-ferrovial-zuritanken-award/>

5.6 Knowledge Transfer Partnership (KTP010089) Final Report. Results for the Company Partner (pages 5-18), completed by Stuart Webster-Spriggs, HSQES Director at VolkerRail, 25th November 2019.

5.7 Knowledge Transfer Partnerships Certificate of Excellence. Certificate Number KTP010089. 2nd March 2020.

5.8 Email from Stuart Webster-Spriggs, HSQES Director at VolkerRail for PASH website. 24th April 2017. <https://www.leedsbeckett.ac.uk/leeds-school-of-social-sciences/psychology/psychology-applied-to-safety-and-health/>

5.9 "Putting Behavioural Safety into Practice" CIRAS article about the Amey KTP. 18th July 2017. <http://www.ciras.org.uk/articles/2017/putting-behavioural-safety-into-practice/>

5.10 "Amey becomes 'SafetySmart'" CIRAS article updates readers on Amey project. 16th October 2018. <http://www.ciras.org.uk/articles/2018/amey-becomes-safetysmart/>

5.11 "What next for Safety?". Rail Technology Magazine. Lee Jones from Amey talks about the KTP project. 9th November 2017. <http://www.railtechnologymagazine.com/Rail-Industry-Focus-what-next-for-safety->

5.12 "Learning from: Health Psychologists. How can evidence-based techniques to change unhealthy public behaviour be translated to the workplace?" IOSH (Institution of Occupational Safety and Health) Magazine. 1st October 2018. <https://www.ioshmagazine.com/issue/october-2018>