Institution:
Glasgow Caledonian University

Unit of Assessment:
23 – Education

Title of case study:
Improving organisational safety through learning from incidents

Period when the underpinning research was undertaken:
2009 – 2015

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 Dane Lukic	Senior Lecturer	2012 - present
Professor Anoush Margaryan	Professor	2006 - 2016
Professor Allison Littlejohn	Professor	2006 - 2014

Period when the claimed impact occurred:
2014 – 2021

Is this case study continued from a case study submitted in 2014?
No

1. Summary of the impact

The GCU team's research on learning from incidents (LFI) helped to reduce negative effects of incidents in high risk organisations by developing and testing learning science informed frameworks and tools. Our research had direct impacts on practitioners and the delivery of professional services through improving the services and products around LFI offered by the Energy Institute (EI). We developed a LFI Toolkit and introduced reflective learning into the novel Toolbox site that is being used by a number of the major energy companies, including Shell, BP, Exxon, TOTAL, Chevron, ConocoPhillips, and Phillips66 to improve their LFI practices.

2. Underpinning research

GCU research explored the phenomenon of learning from incidents (LFI) through an innovative interdisciplinary approach via several industry and research council funded projects (LFI PhD 2009-2012, £80k funded by the EI and Shell; LFI-Engage 2012-2013, £107k funded by the EI and Shell and LFI Seminar series 2013-2014, £30k funded by ESRC). Our studies used applied research where we worked with energy sector organisations directly (EI, Shell, ConocoPhillips and Centrica) to identify issues around LFI and develop solutions. An important feature of our research was co-creative approaches to developing evidence-based practice-oriented tools where practitioners are considered as co-creators, ensuring impact throughout our research. This was particularly facilitated through the use of Change Laboratory methods rooted in expansive learning theories for co-creation and exploring validity, utility and impact of our research outcomes directly with the stakeholders and target groups [R1]. One specific issue identified was that approaches to learning from incidents in high risk organisations focus on safety and engineering sciences and do not draw on the wealth of knowledge of adult learning, organisational learning and educational research related to such individual and group development change [R2, R3, R4, R5]. Our research was one of the first studies to use workplace and organisational learning sciences in applied research around LFI with the energy sector in order to affect long term change in practice [R2, R3, R5]. Our research demonstrated

that organisational learning approaches in the energy sector mostly rely on pure information dissemination as a sole means of LFI which fails to acknowledge the need for developing customised learning opportunities, contextualising information, reflection and double-loop learning needed for long lasting behavioural change [R1; R2]. We developed a novel framework for holistic LFI aimed at better understanding of learning elements of safety practices through workplace learning lenses [R3].

We developed and tested the learning from incidents process model that visually and conceptually clarifies stages of LFI at individual and group level, and allows for assessment of the quality of LFI practices in organisations [R1]. The LFI Process model highlights that considering only the risk level (which is the general practice and the only criteria for prioritisation of incident learning until our research) is not sufficient and that the learning potential when deciding on the LFI approaches is vital. Moreover, it outlines needs for developing in-depth and customised 'lessons learned' that need to be coupled with shop-floor level contextualisation and reflection activities, in order to really make an impact on companies' safety and incident related knowledge sharing. We developed a new instrument for measuring the quality of learning from incidents - Learning from Incidents Questionnaire (LFIQ) - that helps organisations diagnose the depth and quality of their LFI policies and practices aimed at improvement [R6].

Furthermore, based on our empirical research findings we developed a series of practical guidelines for implementing and improving LFI throughout the incident life-cycle in a reflective manner. These research results enabled informing practices of LFI for long term safety effects, quality of learning and knowledge sharing in the energy sector.

3. References to the research

- R1 - Margaryan, A., Littlejohn, A., & Lukic, D. (2018). The development and evaluation of a Learning from Incidents toolkit. Policy and Practice in Health and Safety, 16(1), p. 57-70. A blind peer-reviewed paper on the development and testing of the Learning from Incidents Toolkit in England and Canada. (JCR impact factor 1.00).

- R2 - Lukic, D., Littlejohn, A., & Margaryan, A. (2012). A framework for learning from incidents in the workplace. Safety Science, 50(4), p. 950-957. A blind peer-reviewed article in the leading journal for safety research for both academic and industry on our empirically tested LFI Framework. (JCR impact factor 4.105) (69 citations, Google Scholar).

- R3 - Lukic, D., Margaryan, A., & Littlejohn, A. (2010). How organisations learn from safety incidents: a multifaceted problem. Journal of Workplace Learning, 22(7), p. 428-450. A widely cited (78 citations) and utilised blind peer-reviewed article on the framework LFI informed by learning sciences. (SJR impact factor 0.57).

- R4 - Lukic, D., Margaryan, A., & Littlejohn, A. (2013). Individual agency in learning from incidents. Human Resource Development International, 3/4, p. 409-425. A blind peer-reviewed article reporting on a qualitative study in two case studies in Scotland and England exploring an important aspect of interaction of individual and organisational factors in LFI. (SJR impact factor 0.46).

- R5 - Littlejohn, A., Lukic, D., & Margaryan, A. (2015). Comparing safety culture and learning culture. Risk Management. 16(4), p. 272-293. A blind peer-reviewed article on a conceptual comparison between safety culture and learning culture that have not been systematically compared before. Relevant journal for risk management learning in organisations. (SJR impact factor 0.28).

- R6 - Littlejohn, A., Margaryan, A., Vojt, G., & Lukic, D. (2017). Learning from Incidents Questionnaire (LFIQ): The validation of an instrument designed to measure the quality of learning from incidents in organisations. Safety Science. 99(A) pp. 80–93. A blind peer-

reviewed article in the leading journal for safety research for both academic and industry on developing the first LFI measuring instrument focussed on learning processes. (JCR impact factor 4.105).

4. Details of the impact

The learning from incidents case study is a clear example where educational research can have a substantial impact on industry. Our research has had multiple types of impact in high risk organisations. Since the research on LFI had been conducted with direct collaboration with the end users and stakeholders (Shell Canada and Shell Scotland; ConocoPhillips England and Centrica England), the approach enabled first level impact with case study organisations. Changes in their case study organisations included introducing the LFI Process Model as a tool to evaluate LFI practices throughout their sites, changing staff training to include holistic LFI and implementing recommendations from our research in staff team initiatives. Building on the co-created studies our impact of widest scope and level was achieved through impacting professional bodies related to safety.

The Energy Institute (EI) is a UK-based professional body with membership of all major energy sector companies. The EI provides a golden standard policy guidelines and training for safety issues. Our research produced a Learning from Incidents Toolkit [C1] which enabled the EI to improve their products and professional standards around LFI for their stakeholders based on our empirical evidence [C2]. The LFI Toolkit provides an easy to use framework and set of exercises that can be used at different levels in the organisation to analyse and improve LFI processes and learning opportunities to prevent repeat injuries and losses. The LFI Toolkit was purchased by more than 300 industry partners [C2]. The EI members and stakeholders utilising the Toolkit are in senior positons in charge of safety, staff training, and organisational learning thereby having the leverage to impact organisational policy and practice. Through the use of the Toolkit's training and diagnostic instruments developed through our research we estimate that at least 2,000 employees' practice have been impacted.

Moreover, our research on LFI directly led to the development of further specific tools on reflective learning by Shell through the EI Hearts and Minds set of tools. Shell produced 9 key videos informed by our reflective learning findings and structured around the GCU developed LFI Process Model [C3]. This page had been viewed 2,200 times in the 2019-2020 year and the videos are regularly used to inform staff training and safety learning practices informed by learning research rather than only engineering and safety perspectives [C2].

Furthermore, our research and outputs on LFI had multiplying effects on developing novel holistic sets of tools used in the industry to improve safety parameters and foster reflection that could ultimately reduce the number of incidents. Our research has been instrumental in the creation of a new resource called Toolbox, a site that shares learning from incidents with frontline personnel. The EI integrated our framework, models and reflective learning questions into all content on the site (some 300+ incidents) [C2, C4]. The site is being used by a number of major international energy companies, including Shell, BP, Exxon, TOTAL, Chevron, ConocoPhillips, and Phillips66. Since the public launch of the site in September 2019 it has been visited 50,000 times by 30,000 people, all over the world. The reflective learning videos on the site have been watched several thousand times in the last 12 months [C2]. The higher interest in the material based on our research was a result of the lack of empirically developed learning tools to support safety learning that leads to improved learning practices and safety outcomes. This makes the Toolbox one of the most visited and utilised products and services for the EI, expanding the scope and depth of impact this professional body has on the industry. Our work on LFI was the first time the EI utilised educational research to inform their tools development and its success made the EI prioritise this area leading to several other research, development and testing projects.

Our research and collaboration with the EI had multiplying effects on another professional body - the International Association of Oil and Gas Producers' (IOGP) Health, Safety and Environment

Guidelines. IOGP is a key international professional body association for oil and gas producers. Its policy and guidelines are predominantly informed by engineering and business research. However our research on LFI had an impact on their guidelines, acknowledging the importance of learning sciences research to underpin LFI [C2, C5].

LFI is a crucial area of safety management and our educational research focused on developing pragmatic yet empirically based tools and the impact on key professional bodies allowed us to influence a change in focus and contribute towards more sustainable energy organisations as a part of UNSDGs (Goals 3, 4, 7, 9 and 12).

5. Sources to corroborate the impact

- C1- The Learning from Incidents Toolkit https://heartsandminds.energyinst.org/toolkit/learning-from-incidents
- C2 - Evidence support statement from the Energy Institute
- C3 - Shell's reflective learning videos https://heartsandminds.energyinst.org/toolkit/reflective-lfi
- C4 - The Energy Institute Toolbox website https://toolbox.energyinst.org/
- C5 - Implementing IOGP 423 – HSE management guideline for working together in a contract environment