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Research and development agenda for Learning from Incidents

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ABSTRACT

This paper outlines a research and development agenda for the nascent field of Learning from Incidents (LFI). Effective, deep and lasting learning from incidents is critical for the safety of employees, the general public and environmental protection. The paper is an output of an international seminar series 'Interdisciplinary Perspectives on Learning from Incidents' funded by the UK Economic and Social Research Council (ESRC) in 2013–2016 <http://lfi-seminars.ning.com/>. The seminar series brought together academics, practitioners and policymakers from a range of disciplines and sectors to advance the theory, methodology, organisational practice and policy in LFI. Drawing on a range of disciplinary and sectoral perspectives, as well as on input from practitioners and policymakers, this paper lays out four key research and development challenges: defining LFI; measuring LFI; levels and factors of LFI; and strengthening research-practice nexus in LFI.

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1. Introduction

Learning from incidents (LFI) has been defined as a process through which “employees and the organisation as a whole seek to understand any negative safety events that have taken place in order to prevent similar future events” (Lukic, 2012, p. 12). The concept of LFI originated in highly hazardous industries such as the energy sector and has since been applied across manufacturing, construction, transport, aviation, maritime and healthcare sectors. Typically, the LFI process starts with an incident being reported, followed by a thorough investigation to identify the causes of the incident (Lindberg et al., 2010). Once an investigation has been completed and recommendations for changes are developed, high-level ‘learning points’ are abstracted and circulated throughout the organisation and are sometimes shared with others in different organisations. These ‘learning points’ – presented in different forms for different groups of employees – aim to communicate the required changes in human behaviour and/or processes that need to be put in place to prevent or ameliorate future incidents. A variety of communication channels are used to disseminate these ‘learning points’, ranging from reports and publications (such as inclusion in manuals, procedures and policies), to postings on notice boards or email circulars. However, dissemination of infor-

mation about an incident does not always result in the necessary changes in professional practice to prevent future incidents (Lukic et al., 2012). To get around this problem some organisations follow up information dissemination activities by encouraging groups of workers to think about the ways in which incident investigation findings fit with their own work contexts. Examples include ‘Toolbox Talks’, where a manager leads a team discussion around ‘learning points’, inviting colleagues to reflect on the impact on their practice (Lukic, 2012). Organisations that structure their LFI activities so as to connect incident information with professional practice recognise that reflective activities are more likely (than information dissemination alone) to stimulate employees to connect the new information they receive with what they already know and do, whilst extending their expertise and helping them identify potential incidents before they occur.

Connecting incident information with professional practice can lead to improved learning. Yet many organisations across different sectors continue to limit LFI activities to incident investigation and post-investigation information dissemination (Lukic et al., 2010). This means that in LFI ‘learning’ is conceptualised as the knowledge and information about the causes of incidents developed by a team of investigators and disseminated to people who are expected to learn from this information. This is a limited view of the way in which humans learn. Research in human learning has demonstrated that access to information does not *per se* lead to learning and that people learn not only by reading reports and circulars, but also by guided reflection; by deliberate practice; by

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observation and emulation of the behaviour of other people; by giving and receiving feedback; by participating in formal education as well as through self-study, self-monitoring and introspection (e.g. Billett et al., 2008; Ericsson et al., 2006; Malloch et al., 2011; Merriam et al., 2007; Rainbird et al., 2004; Smith and De Frates-Densch, 2008). An indication of whether or not someone has learned is not whether they have read information, but whether they have changed their practice, their behaviour and their mental models to accommodate the new insight. Although within the LFI discourse there is recognition of the importance of moving beyond information dissemination towards guided reflection and discussion (Kletz, 2001), organisational LFI processes and interventions often fail to integrate these (Gordon, 2008). LFI initiatives based on unidirectional flow of information often struggle to engage the workforce, missing the opportunity to capitalise on employees' experiential knowledge of their local contexts (Pedler, 2002). There is an urgent need to reconceptualise LFI and apply it more effectively.

As well as an area of safety practice within organisations, LFI is a nascent research field, with an increasing number of scholarly articles, books and PhD theses appearing on this topic. LFI research originated in the domain of Safety Science, specifically Human Factors and Industrial Psychology. Safety Science research on LFI has focused on a range of factors that can be grouped into four types: technical factors, human error, socio-technical factors and organisational factors (Lukic, 2012). Technical factors focus on malfunction of equipment, while human error is concerned with human actions within the broader technological, organisational, and regulatory environment (Salmon et al., 2011). Sociotechnical factors are those variables that arise from interactions between humans and machines (Walker et al., 2008; Salmon et al., 2016). Organisational factors that influence LFI include leadership, rewards or culture, among many others (Fruhen and Keith, 2014; Littlejohn et al., 2015; Mearns et al., 2003).

A previous analysis identified three key limitations in LFI research and practice (Margaryan and Littlejohn, 2013). First, LFI research has been limited to Psychology- and Engineering-based perspectives (Human Factors, Industrial Psychology, Safety Science, see Noyes and Stanton, 1997; Plant and Stanton, 2012). Relevant Social Sciences such as Sociology and Adult and Workplace Learning, tend to be disregarded (Lukic et al., 2010). Yet these Social Science disciplines, with their extensive bodies of knowledge on micro-, meso- and macro-processes of human learning, have much to contribute to advancing our understanding of LFI. For example, Adult and Workplace Learning can contribute the understanding of general principles and mechanisms of individual and collective learning in the workplace (Illeris, 2011; Knowles et al., 2012). Sociology could help expand the understanding of the ways in which social situations steer action and risk-taking leading to incidents, explaining outcomes in terms other than individual motivation, for example collective understandings (Adams, 1995; Scott and Freeman, 1995). This gap in the conceptualisation of LFI is mirrored in organisational structures, where LFI tends to be the responsibility of Health and Safety professionals, with little or no input from Learning and Development experts. LFI research and practice would benefit from a concerted, interdisciplinary, systematic analytical effort, through the integration of a broader set of disciplinary perspectives across Social Sciences, Life Sciences and Engineering and a wider range of stakeholders in incident investigation and post-investigation learning processes (Sanne, 2012).

A second limitation of LFI research is methodology. Most data in LFI is collected through questionnaire surveys, sometimes supplemented by interviews. Most work has been limited to measuring employees' and leaders' or managers' perceptions of various aspects of LFI and analysing the interrelationships between various sets of individual and organisational variables. LFI can be improved

by expanding the methodological repertoire, through the inclusion of methods that enable more holistic, *in situ*, multidimensional and longitudinal analyses of individual and organisational learning processes and work practices. Potential approaches include real-time data capture using mobile devices, Business and Learning analytics-based methods (Berendt et al., 2014); ethnographic methods (Ybema et al., 2009) or participatory research methods (Engstrom, 2005) as well as building on a mixture of qualitative and quantitative approaches, rather than relying on single-method designs (Johnson and Onwuegbuzie, 2004).

Third, there is a considerable gap in terms of intersectoral collaboration around LFI (Lukic, 2012). By 'intersectoral collaboration', we mean collaboration both between the public and private sectors exemplified by academia-industry collaboration, as well as collaboration within and between private sectors, such as companies within the energy sector or across the energy, construction, healthcare and other sectors. The non-academic stakeholders have extensive knowledge of the safety and work processes and practices, but may lack the conceptual understanding and knowledge of contemporary explanations of human learning to apply these to the problems they face. Although universities and industry have collaborated in process- and technology-based areas of safety, joint research and development in LFI has been limited. Extant limited intersectoral collaborations in LFI often do not move beyond data collection from companies, and the research findings are seldom embedded within practice or policy.

In response to these challenges, a series of seminars titled 'Interdisciplinary perspectives on Learning from Incidents' were held in 2013–2016. The seminar series aimed to stimulate intersectoral and interdisciplinary knowledge exchange, by bringing together experts from universities and companies with professional and regulatory bodies. The series comprised six seminars focused on mapping the LFI problem space as well as exploring theories, methods, practice and policy and the research-practice nexus in LFI. The seminars attracted 27 speakers from academia, industry, regulatory and professional organisations, from seven countries (UK, Italy, US, Norway, Netherlands, Finland, Germany) representing ten fields (Psychology, Sociology, Human Factors, Ethnomethodology, Learning Sciences, Engineering, Organisational Learning, Complexity Science, Cognitive Science, Law, Construction). Non-academic stakeholders made up at least 30% of the seminar participants at most seminars, and some seminars attracted over 60% of practitioners, including construction managers, financiers, and surgeons as well as energy specialists. The academic participants were based across 22 universities in six different countries: London School of Economics, University College London, King's College London, Edinburgh, Aberdeen, Southampton, Lancaster, Liverpool, Nottingham, Penn State, Darmstadt, Regensburg, Trento, Valencia, and Helsinki among others. Non-academic stakeholders included small to medium enterprises, large companies and multinationals such as Shell, BP, Centrica, SSE, E.ON, ConocoPhillips, Kier Group, Bilfinger Salamis, Baker Hughes, Glasgow Airport, Sir Robert McAlpine, among many others. Professional bodies and third sector organisations included the Energy Institute, British Safety Council, Chartered Institute of Securities and Investments (CISI), doctors.org.uk, and TNO Netherlands. Public sector organisations and policymakers included the UK National Health Service, the UK Health and Safety Executive, Italian National Research Council, Eurocontrol, and the Norwegian Petroleum Safety Authority.

This paper is a key output from the seminar series. Building on and extending the issues identified by the seminar participants, the paper proposes a set of key research and development (R&D) challenges in four areas of LFI. Before presenting the R&D agenda, we discuss a principle - integration as a core activity - that we propose should underpin future work in LFI.

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