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Cambridge Service Alliance

Barriers and Facilitators to Incident Reporting in Servitized Manufacturers

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Why this paper might be of interest to Alliance Partners:

In April 2010, an oil rig owned by Transocean and operated on behalf of BP, exploded in the Gulf of Mexico, resulting in 11 deaths and 17 injuries. According to the Deepwater Horizon final report[1], the accident, also known as the 'Deepwater Horizon oil spill', was the result of various issues and involved multiple organisations, but BP has suffered '*the bulk of public and political criticism*'[2]. Like most system accidents, this failure shares a '*conceptual sameness*'[3] to other failures in the way it occurred. When carefully studied these similarities can help organisations learn from past mistakes and prevent future failures. This can be achieved with the use of an incident reporting system that helps communicate any lessons learnt from past failures to everyone involved. The Deepwater Horizon disaster, is a good example of the complexity involved in many service contracts today. Multiple independent organisations need to work together to ensure the safe delivery of the service to their customers. If any of the partners fail to complete their tasks the entire system can fail with devastating consequences. With more than one third of large manufacturing firms worldwide turning into services, more research and collaboration between academia and the industry is required in order to promote safety within service networks. To answer this call, the Cambridge Service Alliance team has been working closely with industry to provide more insights for servitized manufacturers operating in complex service networks, where decisions may be taken by one party and actions carried out by another. While data collection is still underway, this working paper provides some initial insights on the barriers and facilitators of incident reporting within a service environment.

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[1]The Deepwater Horizon Safety Group, accessed on 10/07/17, source: http://ccrm.berkeley.edu
[2]The Guardian, accessed on 10/07/17, source: https://www.theguardian.com/environment/2010
[3]Saleh, J.H., Marais, K.B., Bakolas, E. and Cowlagi, R.V. (2010), "Highlights from the literature on accident causation and system safety: Review of major ideas, recent contributions, and challenges", Reliability Engineering & System Safety, Elsevier, Vol. 95 No. 11, pp. 1105–1116

The papers included in this series have been selected from a number of sources, in order to highlight the variety of service related research currently being undertaken within the Cambridge Service Alliance and more broadly within the University of Cambridge as a whole.

Barriers and Facilitators to Incident Reporting in Servitized Manufacturers

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Investigations of high-visibility accidents like the recent 'Deepwater Horizon Spill' in the Gulf of Mexico, highlight the fact that complex systems are susceptible to failures but prove that most accidents can be avoided. The accident causation literature suggests that organisations need to learn from past mistakes by implementing incident-reporting systems, but underreporting is still a significant issue. Moreover, there is currently no guidance for servitized-manufacturers who operate within large complex environments and therefore are exposed to great safety risks. The results from this study suggest a number of barriers and facilitators that can help manufacturers promote incident reporting and reduce the risk of accidents.

Introduction

Globalisation and increased complexity in modern economies, such as the geographic dispersion of supply chains, may increase safety risks not only for traditional high-risk industries but also for a variety of other organisations (Pidgeon and O'Leary, 2000). According to the accident causation literature, accidents are the result of a chain of small events that accumulate over long periods of time; thus, organisations that learn to identify them can stop them before turning into catastrophic failures (see, for example, Turner, 1978; Roberts, 1990). Therefore, dispersing valuable information that could help identify these small failures, across many different locations, can increase the risk of accidents even more (Pidgeon and O'Leary, 2000). Pidgeon and O'Leary (2000), also argue that these small events, also called warnings, are more likely to be misinterpreted when they originate from outside the organisation. This is particularly important for servitized manufacturers who operate within very large and complex networks in order to deliver their service to customers (Mont, 2002; Oliva & Kallenberg, 2003; Davies, 2004; Ward & Graves, 2006; Neely, 2008). Considering that more than 60% of manufacturing organisations in developed economies have diversified into services (Martinez et al., 2017), the risk in safety could be immense and the consequences of potential accidents may include, notwithstanding ethical considerations, large casualty tolls, extensive environmental damage and financial losses (Hall, 2003; Saleh et al., 2010).

Critical incident analyses of high-visibility accidents, like the loss of the Space Shuttles Challenger and Columbia, proves that most failures are organisational rather than technical and, therefore, could have been prevented through organisational learning (Roberts et al., 2001; Hall, 2003; Saleh et al., 2010; Sutcliff and Christianson, 2013). This involves the implementation of an incident reporting system that enables the whole organisation to share information regarding concerns and errors with those responsible for safety (Waring, 2005). While a number of studies have argued that the benefits from

implementing safety management systems outweigh any costs (see, for example, Barach and Small, 2000; Sutcliff and Christianson, 2013), under-reporting still remains a significant issue (Barach and Small, 2000). What is more, while there are several studies investigating ways to promote incident reporting, these have no direct focus on servitized manufacturers and commonly focus on incidents in a single organisation. Based on these considerations, this research attempts to identify the barriers and facilitators to incident reporting within a service environment.

Theoretical Background

Safety is a term both widely used and highly recognisable, and as a result few efforts are made to clearly define it (Hollnagel et al., 2013). A review of the various definitions can reveal that safety is also hard to measure. For example, according to the Oxford Living Dictionaries[1], safety is *'the condition of being protected from or unlikely to cause danger, risk or injury'*. According to a report published by EUROCONTROL in 2013, safety is also defined as *'a state where as few things as possible go wrong'* (Hollnagel et al., 2013, p. 3). In another example, the International Civil Aviation Organisation (ICAO) defines safety as *'the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management'* (Hollnagel et al., 2013 p.6). The use of words such as *'unlikely'*, *'as few things as possible'* and *'acceptable level'* reveal that identifying the acceptable level of safety for each organisation is far from straightforward. One could argue that the optimum level of safety is when no accidents happen. However, the literature suggests that all complex systems will eventually fail no matter how well they are run (e.g. Roberts et al., 2001; Hall, 2003). Thus, organisations need to take proactive measures to delay these failures for as long as possible. This is even more important for organisations that operate within safety-critical environments such as the aviation or defence industry. A potential failure in these sectors can lead to critical incidents, the consequences of which are socially noticeable (see, for example, Sullivan & Beach, 2009) and may involve large casualty tolls, extensive environmental damage and financial losses (Hall, 2003; Saleh et al., 2010). These potential consequences are powerful drives for organisations to invest in safety management systems and prevent these failures from happening (Saleh et al., 2010). A review of the literature on accident causation can potentially offer insights on how these organisations can reach and maintain this optimum level of safety. In this strand of research, four themes can be identified that have an organisational and managerial focus: Man-Made Disasters –MMD– (Turner, 1978), Normal Accidents Theory –NAT– (Perrow, 1984), High Reliability Organisations –HROs– (Roberts, 1990) and Systems-Theoretic Accident Model and Processes –STAMP– (Leveson, 2004).

With his work in MMD, Turner (1978) was one of the first modern scholars of the accident causation literature and the first one to suggest that the key contributors to accidents are not technological failures but *'management and organizational matters'* (Saleh et al., 2010). Moreover, he argued that accidents are the result of a 'chain of events' that *'accumulate unnoticed'* for long periods of time (Pidgeon and O'Leary, 2000; Saleh et al., 2010; Sutcliff and Christianson, 2013). Most importantly, Turner suggested that by studying past failures, organisations can learn to identify these events and stop them

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[1] Oxford Living Dictionaries: https://en.oxforddictionaries.com [Accessed on 28/03/2017]

before the accident takes place. Perrow's (1984) NAT on the other hand was accused as a rather pessimistic approach. He named accidents 'normal' because 'interdependences' in organisational systems are so tight that even a small mistake in one place of the system can lead to a large disaster in another. As a result, all complex systems will eventually fail and organisations can either accept it and wait for the catastrophe to happen, or take proactive actions and postpone the failure for as long as possible (Roberts et al., 2001). Following a number of tragic accidents, like the Challenger explosion, a new group of scholars proposed the HROs paradigm focusing their research on organisations that cannot afford to fail (see, for example, Weick & Sutcliffe 2007; Fielder et al. 2014). Roberts (1990) defines HROs as follows: '*Within the set of hazardous organizations, there is a subset which has enjoyed a record of high safety over long periods of time. One can identify this subset by answering the question, "how many times could this organization have failed resulting in catastrophic consequences that it did not?" If the answer is on the order of tens of thousands of times the organization is "high reliability"*' (p.160). HROs scholars recognise that systems, and especially humans are not perfect, on the contrary they are prone to mistakes (see also Waring, 2005). Consequently, HROs need to assertively look for anomalies in the system and solve them before accidents happen. The HROs literature examines and highlights the key characteristics that successful organisations should have in order to promote safety. In more detail, HROs are characterised by the following attributes that allow them to achieve high levels of reliability (e.g. Roberts et al. 1994; Tranfield et al. 2003; Hopkins 2007; Sullivan & Beach 2009; Saleh et al. 2010; Lekka & Sugden 2011; Sutcliffe 2011; Makri & Neely 2015): commitment to standard procedures, culture of continuous learning, commitment to results and safety, flexible structures, in-built system and human redundancy, outstanding technology, effective communication, reward systems for reporting failures and establishment of minimum requirements. Finally, Leveson's (2004) STAMP theory covers both a technical and an organisational approach. STAMP is using systems theory to analyse accidents and focuses on constraints rather than chain of events.

The review of the accident causation literature reveals that although voluminous, it is also fragmented (Saleh et al., 2010). Nonetheless, we identify a common theme between the different approaches (Weiner et al., 2008): the human element is a vital part of work systems but makes even the best organisations prone to error. Indeed, it is estimated that 80% of accidents in safety-critical environments are due to human error (see, for example, Hollnagel, 1993; Lawton and Parker, 2002). These errors present common patterns and organisations need to focus on identifying them and communicating them to everyone involved in order to improve system safety. For this to be achieved organisations need to introduce an incident reporting system that allows all employees to express concerns and flag errors to those accountable for safety (Waring, 2005). While incident reporting systems are nothing new, and implementation in the nuclear, petrochemical and aviation industries has shown that their benefits outweigh their costs, underreporting in other industries still remains a significant issue (Barach and Small, 2000; Probst and Estrada, 2010). According to Barach and Small (2000) for example, it is estimated that 50%-96% of adverse events are underreported in the US. Furthermore, up to 100,000 patients in the US and up to 40,000 patients in the UK lose their lives annually because of human mistakes. This is additional to the financial costs of up to $9bn in the US and £2bn in England and Wales for treating injuries. The successful implementation of incident reporting in industries like aviation (Barach and Small, 2000), but also the catastrophic

failures of NASA (Hall, 2003), highlight the importance of safety management systems and the need for organisations to learn from past mistakes. However most of the studies on accident causation and incident reporting focus on a traditional view of how organisations work.

At the same time, more than one third of large manufacturing firms worldwide have been forced to complement their products by offering services (Martinez et al., 2017), in order to remain competitive in current globalised economies. This shift, also called servitization of manufacturing, requires significant organisational changes and involves the creation of new capabilities and processes in order to reflect the relationship-based nature of services (e.g. Oliva & Kallenberg, 2003; Davies, 2004; Gebauer et al., 2005; Baines et al., 2009; Martinez et al., 2017). These capabilities are often outside the organisations' core competences, and as a result, manufacturers need to engage in partnerships with a large number of suppliers, customers and even competitors in order to deliver the service to their customers (Mont, 2002; Oliva & Kallenberg, 2003; Davies, 2004; Ward & Graves, 2006; Neely, 2008). At the same time, by taking over the customers' operations, servitized manufacturers have to deal with greater responsibilities than before, and for long periods of time and assume uncertainties that were previously the concern of the customer (Oliva & Kallenberg, 2003; Tukker, 2004;Ward et al., 2005; Ward & Graves, 2006; Neely, 2008; Nordin et al., 2011). This increased complexity of service environments can pose significant threats to safety, especially for servitized manufacturers operating in safety-critical environments, such as manufacturers within the aviation or defence industry (Makri and Neely, 2016).

While insights from the accident causation literature could offer insights for servitized manufacturers for dealing with this increased threat to safety, the complexity of servitized networks makes the challenges presented earlier even greater. Moreover, there is currently no research to support how servitized manufacturers could promote incident reporting within their networks. Based on these considerations this research attempts to answer the following research question: What are the barriers and facilitators to incident reporting within a service environment?

Research Design and Methodology
Given that there are no studies in the servitization literature examining incident reporting, this study presents an *intermediate theory research* that draws work from separate bodies of literature in order to propose new constructs and relationships (Edmondson & McManus, 2007). According to Edmondson and McManus (2007), while both qualitative and quantitative data can be used for intermediate theory research, qualitative data can help introduce new constructs. Motivated by these conclusions, we focused our analysis on incidents and collected qualitative data through semi-structured interviews. In order to guide the discussions we used both open-ended and targeted questions (Hsieh and Shannon, 2005). The latter consisted of 2 different questionnaires that presented a number of pre-identified barriers and facilitators of incident reporting, as these were identified by a review of the literature about the attitudes of medical doctors and nurses towards incident reporting.

As we aim to examine cases of servitized manufacturers that operate within very large and complex service environments and specifically investigate accidents, we expect to

find a small number of cases since this is a phenomenon that does not occur very often. Furthermore, given the theoretical immaturity of this study, our main goal is to propose a provisional explanation of the phenomenon under investigation by integrating previously separated bodies of knowledge (Edmondson and McManus, 2007). As a result, and in order to gain a deeper understanding, we focus on a single organisation (Yin, 2003). Specifically, we analyse four incidents by conducting nine interviews within a single organisation with the support of the official investigation reports. Details of the interviews and incidents are provided in Table 1.

Date	Interviewee	Interviewee	Interviewee	Incident Description
Q4-14	Senior Compliance Engineer	Supervisor	Operator	Large part of vehicle accidently moved during tests risking injuries to operators
	2 years in the organisation	3.5 years in the organisation	3.5 years in the organisation	
Q1-15	Team Leader	Junior Supervisor		During preparation of a vehicle a hydraulic pump was found not to have been fitted properly risking failure during its use
	3 years in the organisation	19 years in the organisation		
Q2-15	Maintenance Support			Undocumented maintenance works performed on a vehicle
	7 years in the organisation			
Q3-15	Data Integrity	Senior Supervisor	Operator	Towing arm fitted incorrectly and was damaged during towing of vehicle
	3 years in the organisation	6 years in the organisation	6 years in the organisation	

Table 1. List of interviews

For confidentiality reasons, we refer to the company as ServManufacturerPro. ServManufacturerPro, provides an ideal setting for examining incidents within large service networks and long term contracts, as it operates in a highly safety-critical environment. Moreover, the organisation offers maintenance, technical and operational support in addition to traditional products. Most importantly, ServManufacturerPro has an integrated incident reporting system that all employees are encouraged to use. As a result, participants are familiar with the process of incident reporting. Using the information obtained during the interviews, we performed direct content analysis with the use of the NVivo software in order to understand the specific attitudes of the individuals involved that led to reporting, or not reporting, each incident.

Data Sampling, Collection and Analysis

In order to answer our research question, the unit of analysis was set as a 'barrier' or a 'facilitator' to incident reporting. For ensuring consistency the *Oxford Living Dictionaries*[2] definitions were adopted:

- Barrier: 'A circumstance or obstacle that keeps people or things apart or prevents communication or progress'
- Facilitator: 'A person or thing that makes an action or process easy or easier'

We also defined an incident as an occurrence where multiple organisations were involved and something went wrong. With the aim of gaining an in-depth understanding of the phenomenon, the interviews began with open ended questions with a focus on incident reporting within ServManufacturerPro; for example, 'why do you think someone in your position decides to complete an incident report?'. The questionnaires referred to attitudes towards incident reporting within a service environment more generally and not necessarily within the organisation. More specifically, the interviewees were presented with a list of barriers and facilitators and were asked to rate them according to how important they considered them to be (from a scale of 1 to 5 with 1 being not important and 5 most important). The results from the questionnaires were then compared with the results from the discussions.

In order to validate or extend the findings from the literature, the most appropriate data analysis method is direct content analysis (Hsieh and Shannon, 2005). To perform the analysis properly, each of the interviews was recorded and transcribed. In order to increase the reliability of the results, we began our analysis without using the pre-identified codes, but by highlighting any relevant text to more general categories (Edmondson and McManus, 2007). After working through all the transcripts, we read the highlighted text more carefully and assigned it to one or more of the pre-identified codes from the literature. In cases that the data could not be matched with a pre-existing code, we assigned new ones. To assist the process, the NVivo software was used. This process resulted in a list of 570 references all assigned against one or more of the codes. Next, all references and categories were reviewed again. Some of the categories were merged or grouped under wider 'parent' categories depending on the similarities identified between them. The process is visually presented in Figure 1. The final categories are presented in Figure 2 and Figure 3. The size of each box presents how frequently each theme was mentioned.

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[2] Oxford Living Dictionaries: https://en.oxforddictionaries.com [Accessed on 27/03/2017]

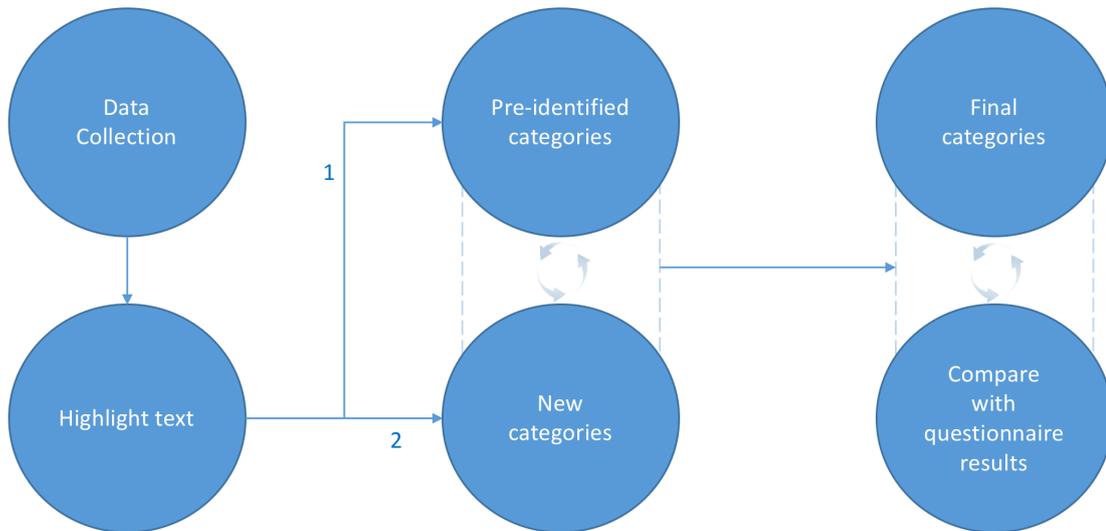## Direct content analysis (Hsieh and Shannon, 2005)

Figure 1. Data collection & analysis

Results and Discussion

Due to the long-term nature of service contracts, during the discussions, we attempted to identify whether having more experience or being with the organisation for considerable time, would affect one's decision to complete an incident report. This characteristic was not identified within the existing incident reporting literature and, therefore, was not included in the questionnaire. According to the interviewees, professional experience can make a difference when deciding whether to report an incident or not, in both ways. Normally, with more experience it is easier to understand that something is wrong and report it, regardless of the time spent in the organisation. However, and especially for members that have also been with the organisation for a long time, they could have embraced the system fully and report every incident, or feel that they know everything, can solve anything '*in-house*' and, therefore, avoid reporting. Furthermore, people often do not like change, especially if they have been within the organisation for a while, or if they come from a different sector where incident reporting was not the norm. On the other hand, according to the respondents, the less time one has spent in the organisation can affect the decision in a similar manner. First, new members go through induction training on incident reporting and as a result, should be able to recognise a case that needs reporting. Second, new members may not want to '*create a fuss*' and therefore fail to report an incident even if they believe needs reporting. While the results from this study were not conclusive, understanding the impact that experience can have on incident reporting is important as it can help organisations identify the key issues to consider when organising training. Specifically, organisations will need to focus any training for members with more experience in battling complacency, and plan induction training about the purpose of incident reporting for newer recruits.

Incident Reporting Barriers

The remaining themes from the discussions overall match those from the questionnaire and the results from this study suggest that the following characteristics within the service network can inhibit incident reporting:

Fear of consequences

The most important barrier identified was the fear of consequences. Although, respondents mentioned that there is a good culture that promotes reporting within ServManufacturerPro, the system is often used in the wrong way as it is commonly used for threatening people. Consequently, incident reporting is often considered to be a 'snitch' system and employees may avoid reporting an incident in order to avoid being implicated, face disciplinary actions, or be considered 'whistle-blowers'. Despite this, some of the respondents also mentioned that in a safety critical environment a 'blame-free' culture cannot work. Everyone involved will need to be accountable for their actions and if responsible for an incident, accept accountability. To this end, organisations will not only need to focus any efforts for promoting incident reporting into making clear that its purpose is to learn from past mistakes but also make sure that everyone understands they will receive fair treatment when reporting an incident.

Small mistakes

Another reason for not reporting incidents was for cases of small mistakes that can be solved internally. They explain that they are more likely to report a small mistake if they think that the company is going to benefit from the investigation. This was also supported by the view that reporting genuine mistakes, further puts people off from reporting their own omissions as they fear the consequences of reporting. This is a very interesting finding considering that a continuous occurrence of small incidents, even though no major accidents happen, can lead to 'normalisation of deviance' where small incidents can become the norm, with catastrophic consequences (Hall, 2003). To this end, servitized manufacturers will need to consider ways to promote incident reporting even for smaller incidents that do not seem to be very important at the time of the event. An analysis of the potential outcomes for near-misses and how these could lead to more serious accidents is a good way to promote this.

Lack of confidence in the system

Another reason that can prevent someone from completing an incident report is the lack of confidence in the system. This is usually the result of lack of feedback from the progress of the investigation, the failure to identify the real incident cause or the lack of support from management. Finally, issues that keep recurring even after having been reported several times, or investigations that take too long to resolve, put people off from reporting as it implies that incident reporting does not work.

Other categories

Finally, some other characteristics that were less frequently mentioned were hierarchy issues, lack of time or laziness, and lack of understanding of the incident reporting system.

Experience or time in organisation		Small mistake		Lack of confidence in the system		
Understanding of the incident reporting system	Complacency	No harm		Don't believe the system works	Lack of feedback about the progress of the investigation	
Don't want to 'make a fuss'	Can't see something is wrong	Can be solved 'in-house'		Recurring Issues	Failure to identify the real incident cause	
Fear of consequences				Lack of support from management		
Disciplinary action / blame	Used as a threat - seen as a 'snitch'	No time/ busy or laziness	Hierarchy Issues		Lack of understanding of the incident reporting system	

Figure 2. Incident Reporting Barriers

Incident Reporting Facilitators

During the interviews, participants were also asked to describe why someone in their position would decide to complete an incident report. The emerging themes from the discussions align with those from the identified barriers and suggest that the following characteristics within the network can promote incident reporting:

Seriousness of incident

People are more likely to report incidents with a potential of injury to people or damage to products rather than smaller incidents, especially if these can be solved '*in house*'. They are also more likely to report recurring errors rather than genuine mistakes or one-offs. It was also mentioned that they are more likely to report an incident if they think that it requires '*special attention*' or '*further investigation*'.

Training on incident reporting

Induction training is necessary in order to promote incident reporting to new recruits and continuous training on incident reporting is important in order to avoid complacency within the whole workforce.

Continuous improvement

Most of the interviewees agreed that even in cases where they would normally decide not to complete an incident report, for example, a small genuine mistake that can be solved internally, they would complete an incident report if they believed that this would lead to an improvement within the organisation (e.g. improvement of a process or of culture).

Understanding of the purpose of incident reporting

A clear understanding of the purpose of incident reporting is very important. For example, as mentioned by one of the interviewees, the current name of the incident

reporting system can sound '*threatening*', especially for someone new to the organisation. Thus, making clear that its purpose is to learn from past mistakes and improve is extremely important in order to promote incident reporting by everyone involved.

Reporting culture
People often report incidents due to the overall reporting culture within the organisation: '*if you see something wrong, you report it*'.

Accountability
Reporting an incident gives people the opportunity to take accountability of their actions and present their view of the sequence of events. On the contrary, if someone else reports the incident first, that may not be the case.

Feedback
Although not mentioned as often during the discussions, it was argued that receiving feedback about the progress of the investigation and most importantly of how it helped improve the organisation, encourages more people to report incidents.

What is interesting to note is that when respondents were presented with the questionnaires, the most important attribute identified was 'just culture'. However, the word 'culture' was rarely mentioned during the discussions. According to Linn (1965), the responses in surveys are often influenced by the '*attitudes and norms of the society*' and respondents often think of what they '*should*' or '*would like to*' do while the themes from the discussions are more reflective to what '*they could*' actually do. Thus, it is important for the organisation to investigate whether respondents did not consider this attribute as important and, therefore, did not think to mention it until asked, or whether an overall safety culture is deeply rooted within the organisation and respondents did not feel the need to mention it earlier.
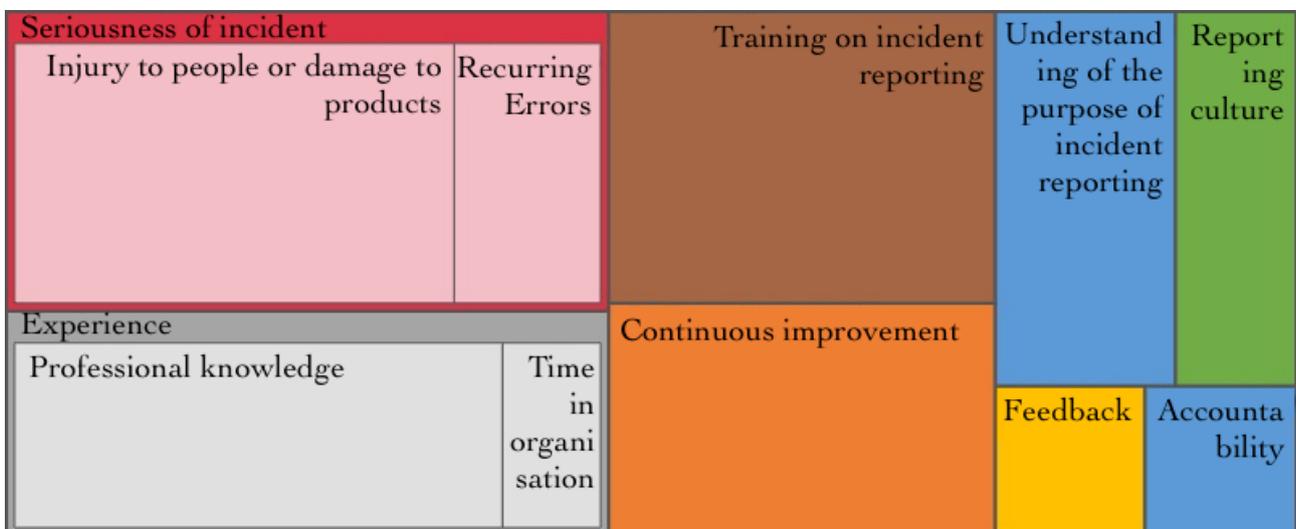

Figure 3. Incident Reporting Facilitators

Concluding remarks

Investigations of high-visibility accidents like the Deepwater Horizon Spill in the Gulf of Mexico, highlight the fact that complex systems are susceptible to failures but prove that most of these accidents can be avoided. The accident causation literature suggests that organisations need to learn from past mistakes by implementing incident-reporting systems, but underreporting is still a significant issue. Moreover, there is currently no guidance for servitized-manufacturers who operate within large complex environments and therefore are exposed to great safety risks.

Motivated by these considerations, this research attempted to identify the key attributes that can either inhibit or promote incident reporting within a service environment. As demonstrated in Figure 2 and Figure 3, from seven barriers, only 2 key categories account for 50% of the cases, while from the 8 facilitators, 4 key categories account for 75% of the responses. To be more specific, it was clear that experience and the time spent within an organisation can have a major impact on incident reporting both in a positive and a negative way. To this end, organisations need to understand the various ways experience could impact incident reporting and plan training accordingly. As expected, participants agreed that they are more likely to report a serious incident than small, genuine mistakes, unless they believed that the organisation would benefit from the report by improving a certain process, or even, the overall culture across the service network. To this end, training on incident reporting can have a positive impact by making clear, for instance, the ultimate goal of incident reporting and highlight why even small incidents should be reported. This process can also help relieve any fear of consequences since this was also one of the key issues that would stop an individual from reporting. The results from the literature on the attitudes of doctors and nurses to incident reporting suggest that fear of blame indeed plays a key role when deciding whether to report an incident or not. However, it was found that this is mainly due to a 'closed culture' and 'collegiality' that characterise the medical profession (Waring, 2005). Doctors mainly believe that incident reporting is the product of bureaucracy, therefore a process more suitable for nurses and below a doctor's professional expertise. Thus, the fear of consequences was mainly linked to the fear or external blame and the loss of professional status, that is within the society in general and not within their organisation (i.e. the hospital). In the case of the interviewees of this study, the fear of consequences was mainly linked to being unfairly implicated or facing disciplinary action within the organisation, or being tagged as 'snitches' between their colleagues. This finding proves that the same processes cannot be considered relevant across different sectors and that research focusing on certain network characteristics is important.

The principal limitation of this research, as a qualitative study, is its sample size, however, data collection is still underway and this paper only presents some preliminary findings. Furthermore, the main contribution as an *intermediate theory research* was to propose new constructs and relationships that can serve as promising avenues for future research. To this end, we believe that this study will provide both theoretical and managerial implications and as a result be of use to both the academic and practitioner community. Particularly, the proposed research addresses the research gap regarding the impact that complex service environments can have on safety and links the scattered streams of literature on accident causation with the one on service provision. Our vision is to provide

servitized manufacturers with further insights in order to face the aforementioned challenges and support them in this challenging path towards the services of the future. Naturally, potential benefits extend beyond just financial, with major implications on the safety of service offerings.

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