Technological Innovation in the UK Police Forces: A Smooth Process?
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ABSTRACT
The aim of this study is to explore the process of innovation in a British emergency service. The interconnection of new technologies and organisation design, process, strategy and external relationships is an important issue, but current research explains relatively little about whether and how services in general (and public service in particular) innovate. This gap in the literature has arisen because our understanding of innovation and innovation process is derived from studies of manufacturing and services are often considered to be non-innovative or supplier-dominated recipients of technologies. We argue that the combination of Social Construction of Technology (SCOT) with the “meta-theory” of Activity Theory (AT) has much to offer for an understanding of the innovation process in a critical-safety organisation. We report on two in-depth case studies of Police Forces, which were conducted in a manner that reflects the principles of the interpretative paradigm and employs a variety of qualitative techniques. Drawing on SCOT and AT, we consider the “negotiations” of meanings and the tensions developed among the stakeholders, depict the dynamics of the process of innovation and recognise the contextual nature of innovation. The paper concludes that gaining a holistic and in-depth understanding of the interdependence of the innovation stages can actually support the work of non-engineering academics, practitioners in the emergency services, technology developers and government agencies that oversee the implementation of technologies in other public organisations.

KEYWORDS: technological innovation process, emergency services, activity theory, social construction of technology, location technologies.

INTRODUCTION
Twenty years ago Pennings and Buitendam (1987) suggested that the interconnection of new technologies with organisation design, process, strategy and external relationships is one of the most important issues for all types of organisations. Building on this, researchers such as Swanson (1994) argued that, ultimately, technological innovation is increasingly crucial to the organisation's success.

Yet, current research explains relatively little about whether and how services (in general) innovate (Tether, 2005) and even less is known about innovation in a public organisation context (Albury, 2005). Researchers agree that our understanding of innovation and the process of innovation has been largely derived from studies of manufacturing (Herbig and Kramer, 1993) and services are considered to be non-innovative or supplier-dominated recipients of technologies (Tether, 2005).

In addition, much of the literature on innovation examines the adoption patterns of stationary technology (such as the Internet and electronic data interchange systems), despite the fact that an increasingly active area of innovation is in wireless systems and location technologies. Systems and technologies such as WiMax, 3G and the Global Positioning System are providing higher rates of exchanging digital information (bit rate) and they can support the transmission of speech, data, audio and video (Walke et al., 2003). In contrast, such systems have attracted the attention of practitioners as well as of a limited number of academics, mainly from an engineering and very technical perspective. As a result, a better understanding of the processes by which an innovation occurs is useful (Foxon et al., 2005) in support of cutting-edge technological innovation (location technologies) in a public safety organisation.

Read (2000) points out the need for a more holistic approach in innovation research in organisations and argues that this can be achieved by examining the multi-dimensional nature of innovation as well as recognising its contextual nature. Other scholars, have called for the use of different and multiple means to study innovation involving complex technologies (e.g. Attewell, 1992, Ravichandran, 2005, Swanson, 1994). This study will be a step in fulfilling these needs,
where we go beyond the dominant Diffusion theory and draw from the Social Construction of Technology perspective in combination with the “meta-theory” of Activity Theory to portray and explain the dynamics of the innovation process in a public safety organisation. By doing so, the study informs the literature related to innovation in organisations and more specifically the literature on innovation in the safety services; this area is under-researched, possibly because of access restrictions to such organisations and their information resources. Taking into account the relatively recent emergence of location technologies, this study will also contribute to the non-engineering literature associated with advanced technology and location-based services.

THE SOCIAL CONSTRUCTION OF TECHNOLOGY

The Social Construction of Technology perspective was developed by Wiebe Bijker and Trevor Pinch (Bijker, 1995, Bijker and Pinch, 1987) and was one of the theoretical approaches bearing upon the social shaping of technology (Kline and Pinch, 1999).

The Social Construction perspective focuses on the “interpretative flexibility” of technology; referring to the way ‘relevant social groups’ – or different groups of people involved in the development of a technological artefact (Kline and Pinch, 1999) – have different understandings of the technology (including of its use, modification and associated changes) by assigning different meanings to it (Bijker and Pinch, 1987, Sproull and Goodman, 1990, Wilkins et al., 2002, Wong, 2004). The Social Construction of Technology perspective stresses the fact that the same technological artefact can mean different things to different social groups (Kline and Pinch, 1999) and examines how these groups negotiate the meanings attributed to a particular artefact; these negotiations, according to this perspective, are the determinants of the relative success of an innovation rather than the design features and characteristics of the technological artefact itself, as other more traditional perspectives on innovation argue (Wilkins et al., 2002).

Interpretative flexibility, the theory suggests, does not remain forever but decreases when ‘closure’ occurs; one artefact becomes the dominant form of the technology, others ceasing to exist and the dominant artefact develops an increasing degree of stabilisation within one (or possibly more) relevant social group (Bijker, 1995). Also, this process of closure and stabilisation should not be considered as final because interpretative flexibility may reappear (Kline and Pinch, 1999).

A few researchers, such as Prasad (1993), DeSanctis and Poole (1994) and (Orlikowski and Gash (1994) suggest that “shared assumptions about technologies play a key role in how technologies are designed and used over time, from the earliest conceptualisation of a new technology through to its creative use” (Allen, 2000). To capture the importance of these assumptions and how they structure interaction within the relevant social groups (Allen, 2000, Wilkins et al., 2002), the researchers developed the concepts of “symbols” (DeSanctis and Poole, 1994), “spirit” (Prasad, 1993) and “technological frames” (Bijker, 1992, Bijker and Law, 1992, Orlikowski and Gash, 1994); out of these notions, technological frames are most cited in the innovation literature.

Technological frames are the understanding that members of a social group come to have of artefacts and they include not only knowledge about the particular technology, but also local understanding of specific uses in a given setting (Bijker, 1987, Bijker, 1992, Bijker and Law, 1992, Orlikowski and Gash, 1994). In other words, the notion of technological frame has been introduced to understand how individuals may deviate from the shared group meaning (Kline and Pinch, 1999) and how different groups perceive the nature and the role of the technology itself as well as the specific conditions, applications and consequences of that technology in particular contexts (Orlikowski and Gash, 1994). (Bijker (1995) proposes a tentative list of elements that influence the interactions within relevant social groups and lead to the attribution of meanings to technological artefacts and relates a technological frame to three features; universal applicability, interactional nature and inclusion.

Although the Social Construction of Technology perspective has been refined and developed over the last decade (Kline and Pinch, 1999), there are researchers who argue that it has weaknesses that need to be addressed; for instance, Kline and Pinch (1999) argue that this perspective deals mainly with the design stage of innovations and says little about the social structure within which technological development takes place and that it does not demonstrate how the identities of social groups are reconstituted in the process of innovation. However, we
argue that these notes of caution should not be regarded as important issues for our study and that this framework is suitable for this study because: it provides a platform that follows a holistic and in-depth approach to the innovation process in the organisations studied; the technological innovation we examine (location technologies) is at the design phase; and that it fills the gaps with respect to the social structure of the innovation process and the identity of the social groups involved.

**ACTIVITY THEORY**

Activity Theory has its foundation in the Soviet cultural historical school of psychology founded by L. Vygotsky during the first decades of the 20th century (Bourguin and Derycke, 2000, Miettinen, 1999). The focal point of Activity Theory is an activity system and ‘mediated action’, which draws on the idea that cultural means or artefacts – that is, mental constructs or physical entities – operate in a mediating role between the human agent and the object. These cultural means or artefacts can be either signs or tools and they are internalised by the individuals by participating in common activities with others (Miettinen, 1999, Vygotsky, 1978). Recent developments of Activity Theory have extended the initial concept by emphasising the importance of analysing the interactions between three additional elements of the activity system; that of rules (the explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system), community (which comprises multiple individuals and groups who share the same general object) and the division of labour (all the horizontal division of tasks between the members of the community and the vertical division of power and status). By doing so, they examined the activity systems at the macro level of the collective and the community rather than the micro level of the individual actor functioning with tools (Daniels, 2001).

An activity system is usually illustrated in the form of a pyramid (in Figure 1) with key features being the active role of the subject, the mediating role of an artefact on the relationship of the subject with the object and the interaction of all the activity system elements with each other (Hasu and Engeström, 2000). This model looks at the activity from the point of a goal-directed subject and its actions, but it also brings into focus the interrelations between the individual subject, the activity in which the subject is engaged and the social structure within which the activity takes place (Blackler et al., 1999, Daniels, 2001); this is essential as it directly addresses one of the Social Construction of Technology perspective’s weaknesses.

Engestrom (2001) advocates that the principles of historicity and of the central role of contradictions as sources of change and development may help to summarise Activity Theory. ‘Historicity’ means that activity systems take shape over extended periods of time and their problems and potentials can only be understood against their own history, which needs in turn “to be studied as local history of the activity and its objects and as history of the theoretical ideas and tools that have shaped the activity” (Engestrom, 2001). Contradictions are historically accumulating structural tensions within activity systems and they often take place when an activity system introduces a new element from the outside (for instance, a new technology or a new object). This introduction of the new element often leads to an aggravated contradiction where the existing elements (for example, the rules or the division of labour) collide with the new one. According to Engestrom (2001), such contradictions generate disturbances and conflicts, but also innovative attempts to change the activity.

**FIGURE 1**
The mediational structure of an activity system


Finally, Activity Theory considers human activity as a three level hierarchy: activities realised through series of actions, which are carried out through operations. Human activity is always
directed toward a tangible or ideal object to satisfy a need and the subject’s expectation to this object determines the motive of the activity.

RESEARCH SITES AND METHODS
Activity Theory has been applied in a wide range of studies (e.g. Hasu and Engeström, 2000, Jarzabkowski, 2003, Nardi, 1996) and it can be said that it the general pattern is investigation over time through a variety of methods. As a result, data collection was conducted through interviews, document analysis and observation in the field.

A total of 15 interviews were conducted with individuals from all hierarchical levels of the organisations, each lasting from 55 to 85 minutes; during the interviews detailed notes of gestures also were taken and the conversations were digitally-recorded and transcribed verbatim. Interviews were semi-structured following a coherent interview protocol, which was based on the components of the Activity Theory model (add appendix), with some expanded to topics important for understanding the participant’s perception of the innovation process (e.g. working experience in other emergency or military services). Since the aim of this study was to describe the innovation process in the Police Forces as experienced by the relevant stakeholders, interviews were conducted with management and non-management individuals from each organisation. One individual at each organisation served as the liaison and contact person – a project manager and an IT Director – who provided further interview subjects who were involved in the introduction and implementation of the technologies. In addition to these initial interviews, potential interviewees were identified through the “snowballing” technique (Aaker and Day, 1986), which is commonly used in ethnographic field studies of organisations (Gallivan, 2001). Each interviewee was asked to point out all individuals, who were involved in the same innovation process and who could be potential interview subject with a similar or different perspective. At the end of each interview, participants were asked to provide demographic data as well as to comment on any other aspect they thought it would be relevant to the study but had not already been raised through the discussion. Although the total number of participants seems to be small in comparison with the size of the studied organisations (number of staff), a “saturation” point was reached where responders were recommending individuals who had already been interviewed or, in a couple of cases, individuals that had left the organisation and the persons replacing them had no involvement in the innovation process examined.

Document analysis was used to enhance the data collected through the interviews. Documents examined included a) internal organisation documents such as IT Strategy Development Plans and Business cases and project information such as project stakeholders and schedules and b) external documents such as press releases available through the Internet (e.g. Home Office papers) and proprietary sources (e.g. British Association of Public Safety Communications Officers Journal). Observations of individuals at work were also carried out to obtain data that would confirm or elaborate the interview data. In general, multiple data collection methods were applied throughout the study to provide rich data for the study as well as for the purpose of data triangulation.

Yin’s (2003) guidelines about case study research and previous Activity Theory research (e.g. Hasu and Engeström, 2000) informed the procedures that data were collected. Initial data were analysed based on inductive analytical methods suggested by Miles and Huberman (1994) to identify themes and repeated patterns regarding the process of innovation in each organisation and its progression. As a result, the transcripts of each interview, the documents gathered and the field notes from the observations were imported into NVivo version 7 software and coded. The codes were organised into groups following the Activity Theory framework. Once a coding scheme was identified, it was explained to two researchers who were somehow unfamiliar with the data and a random data sample was selected and given to those researchers (in the same format used for the initial analysis), who then evaluated and confirmed the reliability and robustness of the analysis. This approach to content analysis produced a description of two activity systems, which were then further investigated for actions and operations of the relevant stakeholders. While the innovation process appeared to be similar and have the same outcome in both organisations, tensions and contradictions were evident between
the systems’ components. These two activity systems and their tensions and contradictions are discussed below.

RESEARCH FINDINGS
Two years before our investigation, the British Police Forces implemented a Terrestrial Trunked Radio (TETRA) system, which is designed to carry voice and data communications and offers guaranteed levels of coverage and instant communication even in remote areas, within confined spaces of buildings and tunnels and/or during major incidents, when conventional mobile and fixed telephony networks have often failed in the past (Anon, 2006). The implementation of the Tetra system is the initial point of our study for both organisations in question, which we refer to as Police A and Police B for ethical reasons.

POLICE A
Police A is a Police Force that operates in the South of England, has around 4,000 employees and is considered as a strategic Force in terms of size and operational activities. In the past, the Force has been one of the innovators in the emergency services arena by testing and introducing new technologies in support of its policing practices. As a result, the Force’s employees regard their organisation as an establishment interested in innovation as well as promoting it through a staff suggestion and recognition scheme.

The main aim of the police service is the reduction of crime in general. However, the Home Office recently issued directives for reduction/retention of the forces’ budgets and at the same time for improvement of the service provided to the citizens (i.e. reduction of the recorded crime); Police A had recently to follow and meet these directives. As a result, Police A looked at the better use of existing resources, which in Activity Theory terms is the motive of the activity system. To achieve more efficient use of its resources, Police A explored the possible ways that the Tetra system could be further utilised and this is when the team project managing the Tetra system came across a GPS-enabled tracking technology, which provides geographic positional and status information about vehicles in real-time and uses the Tetra system to transfer data from the vehicle to the Command and Control rooms (we refer to this technology as “In-Car”).

The management in Police A recognised the important role that such a technology could play in the efficient use of resources and so they commissioned the initiation of a Project Board to be in charge of the introduction of In-Car to the organisation. The Project Board’s (or else the subject) objective was to introduce the In-Car technology based on an ‘ideal’ user requirement that would materialise the organisation’s motive.

At the time that we began the data collection, the Project Board had already identified and clarified their objective, the object of their activity. In particular, a project manager (the most active person of the Project Board) had visited other Forces that were using the same technology and had also talked to people within Police A, which helped him to produce a user requirement in the form of a written document. A stage of procurement followed that with the user requirements submitted to the Command and Control suppliers and the suppliers demonstrating to the Project Board the new technology. Although the Project Board did not have any specific anticipated benefits in their mindset, the system was approved and bought by the senior management of the Force because it was viewed as something that was meeting their ‘ideal perception’; that of a ‘perfect’ tool helping the Force in making better use of their resources.

While Police A’s actions were been driven by this ‘ideal’ perception, they demonstrated the new technology to several departments of the Force as well as visited other Forces to learn more about how the system was set up and what kind of efficiency it was delivering. Once this information was collected and collated, it was up to the IT department and the suppliers of the system to implement the technology on a small scale. The system was installed in a few vehicles and in one of the Force’s Command and Control rooms. The aim of the pilot was to see how the system was actually working rather than to see whether it would be installed throughout the Force; this occurred because it was already agreed within the Project Board that the technology would be fully implemented.
The Project Board did not involve any other individuals in the process until they proceeded to the full implementation of the technology, when they communicated their actions to the whole Force through an e-mail. A participant noted:

“I’ve seen nothing on it whatsoever other than the screen on the desk and an e-mail saying “this is what’s happening”… a couple of inspectors came over and… it was appearing.”

This raised some concerns within the Force’s employees when the technology was installed in all vehicles and appeared in all the Command and Control rooms (tensions). The main reason was that no guidance was given to the staff about the aim of the implementation and nor about the possible uses of the technology, which resulted in the staff not being sure how they could operate or benefit from the system (tensions).

However, once the system was installed, individuals in the Command and Control rooms started operating it, often because it was requested by some of the Project Board members or by other senior persons in the Force. The Project Board though was not ‘satisfied’ with the efficiency achieved by the use of the technology and that led them to explore further uses. At the same period of time, some of the departments, that had already seen the product being delivered by the suppliers, detected potential functions of the technology and communicated that to the Project Board. In effect, the Project Board asked the suppliers to add more screens so that the system could also be accessible to other departments. In addition, individuals from these departments exchanged information with similar departments in Forces visited earlier and established cooperation to see how the system could fully be utilised and how it can be used for common purposes.

The above mentioned actions (initiation, procurement and implementation and refinement of the system) in Police A produce the following activity system:

FIGURE 2
Innovation relating to an “In-Car” system – Police A

POLICE B
Police B is a Police Force that operates in the North of England, has around 5,000 employees and is considered, like Police A, as a strategic Force in terms of size and operational activities. The Force’s focus is mainly on performance and thus on meeting the performance targets set by the senior management and the Home Office. As a result, innovation is promoted only in a small degree. However, the employees regard the organisation as one where “good innovation is picked up”.

The data collected from Police B produced a similar narrative to Police A’s. Police B [obviously] could not be excluded from the Home Office’s directives for reduction or retentions of budgets and improvement of service to the citizens. In contrast, Police B felt stronger than the rest of the Forces about abiding by these directives (as well as were unofficially pressured to do so) because it showed a slide in its performance indicators. If there is a continuous slide in the performance indicators in a Police Force, then the Force’s management is acquired by the Home Office, which is commonly regarded as a very negative occurrence. For this reason, employees in the senior management at Police B examined the prospects of utilising their existing resources in a more efficient way (motive). In particular, there was a general awareness in the project team managing the Tetra system that they wanted to be able to track vehicles and people eventually, although they were not aware of the possible ways to do so. When the department of finance informed the team that the Tetra system was still within the budget limits even after its full implementation, the project manager asked the IT director (subject) whether he would use the remaining money for a location technology.
The IT director, an individual with non-police background and experience in the private sector, encountered the idea of an Automatic Vehicle (and Person) Location System (or else AVLS/APLS) – a positioning technology embedded in radio devices, which provides geographical information about vehicles and people and uses the Tetra system to transmit data from the radios to the base stations – but he was still unsure of how he could proceed (internal tension); primarily, because he didn’t know how the new technology could benefit the Force; eventually this is what he aimed for (objective). Accordingly, he visited other Forces as well as private organisations (such as a road assistance company) that were using similar technologies for their daily operations. While trying to communicate this idea within Police B, he met a Divisional Commander who described how resources (e.g. officers’ time, petrol, etc) were wasted in certain areas, which provided the IT director with ideas and useful arguments to support the purchase of an AVLS/APLS system. To make sure that the Force complied with existing regulations about privacy rights and employees liberties, he also spoke to the Police Federation and the Professional Standard Department. All this communication helped the IT director to form an ‘ideal’ user requirement in his mind, which in time he conveyed to the Command Team (senior management). Some tensions were observed there as some member of the Command Team requested their ideas of how AVLS/APLS should operate to be taken into account. However, the IT director managed to persuade the Command Team for the AVLS/APLS acquisition.

Although this was not an easy process and took sufficient time and effort from the IT director to “make his case”, the Command Team agreed on the purchase of the new system and the GPS chips were installed in all the Force’s radios. However, the system could not be switched on because it needed to be configured prior to its use. Police B usually develops the IT systems in-house and so the IT department became in charge of the new technology’s set up. The IT director conducted research on the Internet to provide his personnel with further information and support; he was trying to make sure that the system would be configured and work in such a way that it would meet his ‘ideal’ concept of a location technology. At the same time, he wanted to maintain the support already gained by the Command Team and so he had to also include many of their requirements to what a location technology ought to be.

A document located on a mapping company’s website played essential role in the concluding configurations of the system as it contained all the mathematical and geographical calculations required for the system to work as desired. After the IT personnel managed to set the AVLS/APLS up, the Force tested it by launching it in several large scale operations such as big concerts and street carnivals. Some of the ‘silver’ commanders’ (middle-high management) comments regarding this particular technology were taken into account and some other comments “had to” be taken into account to reconfigure the system before testing it in an other operation.

The users were encouraged to provide feedback on whether the system provided any help to the Force’s operations and also to submit comments about any potential use that could provide additional benefit to the users and their working practices. However, the feeling that the IT director has is that the system is not complete yet:

“We’re still in the process of “we’ll make a change, they look at it, they feedback”. It is continuing improving. People keep knocking on the door and saying “I wish it did this”, “wouldn’t it be great if I could see…?” and then we work out whether we can do it”.

At the time of our last observation, the system was not fully operational and the IT director had asked to be further developed before fully implemented in the Force. It is anticipated though that the system will be operational in the very near future. All these actions yield the following activity system (Figure 3).

**DISCUSSION**

As it can be seen, the activity systems referring to Police A and Police B have got several similarities. The motives behind the innovations and the object of the whole activity in both organisations are the same; they are the better use of the existing resources and a user
requirement that would meet their ‘ideal’ perception of what a location technology should do, respectively. The subjects differ in the sense of the number of individuals but in both cases the subjects are senior members in their organisations. Finally, the outcome of these activity systems is that the innovation process is (or is just about to be) concluded with the introduction of a location technology in the organisations.

FIGURE 3
Innovation relating to an AVLS/APLS system – Police B

Although the central line of the activity systems (motive – subject – object – outcome) is very much alike, the rest of the elements in the activity systems acted in a different way; a fact that had an impact on the relationships between the systems’ elements. Three key interactions were identified as crucial for understanding the process of innovation in these organisations:

- The relationship between the Project Board and the IT director (Subject) and the [formal] power and [informal] influence that they had within their organisations (Division of labour) and with the users of the newly introduced technology: In Police B, for instance, tensions were observed between the IT director and the Command Team as he had to put a lot of effort in communicating his ideas and justifying his actions to them. In Police B, in contrast, there was general consensus that the location technology would be introduced in the Force and the Project Manager’s actions were mainly focused on the implementation of the technology.

- The relationship between the Project Board and the IT director (Subject) and the other Police Forces and private companies that were using the same technologies, the suppliers and the staff that would use the new technology (Community): the analysis showed that the more exchange of information and experience the Subjects had with external individuals from other similar organisations and from suppliers, the easier it was to communicate their ideas with people within their organisations and that played a key role in deciding to purchase the systems suggested. Also, if the Project Board in Police A, for example, had involved the staff at the stage of introduction of the ‘In-Car’ system, there would be fewer concerns about the objectives of this implementation.

- The interactions among the members of the Project Board and the internal dilemmas of the IT director (Subject): the relationships within the Subjects determined the Objects of the activity systems and thus the course of the innovation process. For example, if the IT director in Police B knew what benefits the new system could deliver to his organisation, he would probably spend less time in configuring the system in multiple occasions. Yet again, if the Project Board’s member did not share the same idea of an ‘ideal’ tool that would improve efficiency in their organisation, the introduction of the “In-Car” system could have been denied at the first instance.
When the tensions between these elements were controlled, the activity systems reached a balance or else, in the Social Construction of Technology’s terms, a closure. The balance achieved resulted in the process of innovation concluding to the introduction of a location technology in the organisations investigated.

CONCLUSION
This study described briefly the Social Construction of Technology perspective and of Activity Theory’s main notions and assumptions. By drawing on the Social Construction of Technology perspective and the “meta-theory” of Activity Theory, the findings of this research described the tensions emerged among the stakeholders, and pointed out three key inter-relationships within the activity systems examined (Subject-Division of labour, Subject-Community, and Subject-Subject). The combination of these two frameworks provided a different lens to investigate the introduction of a location technology in two organisations, in line with other scholars’ suggestions. More importantly, this study produced an insight into the process of innovation in the UK critical safety services, an under-researched area, and portrayed the dynamics developed around it. Gaining such a holistic and in-depth understanding of the innovation process can provide valuable information to government agencies that oversee the implementation of cutting-edge technologies in other public organisations, and draw the attention of practitioners in the emergency services and technology developers to specific areas which they need to address when they introduce and implement new technologies and systems. In addition, non-engineering academics are able to appreciate the reasons behind the introduction of technological innovations in organisations which tend not to attract most of the scholarly interest because they lag innovation behind the private sector.

LIMITATIONS OF THE STUDY AND FUTURE RESEARCH
More in-depth future research is needed to explore the underlying reasons for the tensions depicted in this area. Readers are cautioned with several study limitations. First, we have investigated only two organisations with similar characteristics (police forces, which were strategic in terms of size, operational activities and budgets). There are more and different emergency services which have unlike operational and hierarchical structures. Future research should explore the process of innovation within other types of emergency services and assess whether the dynamics of the innovation process is similar to the ones described by this study. Secondly, this study suffers from the limitations inherent in the separation of the UK emergency services as well as of the UK police forces. The study observed occurrences in organisations operating in relatively restricted geographical region. A future research extension would be to observe the introduction of a new technology in a country with a single national police force, where the stakeholders are possibly dispersed in large geographical area.

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