

## Why do organisations implement automated external defibrillators?

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Automated external defibrillators are becoming ubiquitous in public space, with a wide variety of organisations adopting this technology as a way of dealing with the risk of cardiac arrest to staff or users of the organisation. In this article, we examine why organisations had purchased defibrillators. We explore how organisations perceive their responsibilities to staff and visitors in an emergency, and why organisations believe a defibrillator is an appropriate technology. This article draws on data from a qualitative, interview-based study of five large public-sector organisations (universities) in the United Kingdom, in 2011–2012. We found that the organisations perceived the risk of cardiac arrest to be substantial, though the available epidemiological evidence did not support this. They perceived the defibrillator to be an effective technology for managing this risk, as part of a wider first aid system. Instances where a cardiac arrest had occurred in the organisation were likely to persuade them to adopt the defibrillator. Our study indicated that the organisations were unaware of (or chose to ignore) the available ‘scientific’ evidence, which cast doubt on both of the scale of the risk of cardiac arrest and the effectiveness of the defibrillator in dealing with it. In this case, the symbolic power of the defibrillator to address a risk perceived to be serious enough to warrant substantial expenditure was sufficient to persuade organisations to adopt it.

**Keywords:** automated external defibrillators; risk; actor–network theory

### Introduction

The management of risk is a central activity for modern organisations, and technology can play a key role in the management of these risks. The automated external defibrillator is an example of a technology which has been adopted by a large number of organisations to manage the risk of cardiac arrest to staff or users of the organisation. In this article, we examine why organisations purchased defibrillators. We explore how organisations perceive their responsibilities to staff and visitors in an emergency and why organisations believed a defibrillator was an appropriate technology for the management of the risk of cardiac arrest.

### Defibrillators, risk and organisational adoption

#### *Defibrillators and heart attacks*

A large and varied group of organisations in the United Kingdom have purchased defibrillators so that staff or users of those organisations can be resuscitated in the event of a cardiac arrest. Automated external defibrillator technology makes possible

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defibrillation by rescuers who have no clinical training. The automated external defibrillator is a small, portable device that delivers instructions to the user via voice prompts. When attached to a casualty who has collapsed, it monitors the electrical activity of the heart via the on-board electrocardiogram, ‘interprets’ the findings from the electrocardiogram using artificial intelligence software and delivers the appropriate electric shock (to ‘restart’ the heart) if necessary. The defibrillator is effective in treating ventricular tachycardia and ventricular fibrillation. Both tachycardia and fibrillation are disturbances in the heart’s normal rhythm: tachycardia is a very rapid, but regular rhythm and fibrillation a completely irregular pattern. Tachycardia can often lead on to fibrillation and thus cause cardiac arrest. Cardiac arrest is distinct from myocardial infarction (MI), which is usually caused by the blockage of a coronary artery. The defibrillator is not effective in treating other kinds of cardiac arrest or MI. Defibrillators are safe and have been shown to be effective in out-of-hospital settings (Colquhoun *et al.* 2008). The organisations that have implemented this technology include shopping centres, leisure centres, railway stations, airports, golf clubs, universities, factories and refuse collection services. The defibrillator is usually intended for use for designated first-aiders who have received training in its operation, though this is not a necessity (Caffrey *et al.* 2002).

The scientific research on defibrillators shows that it is most effective when it is part of a wider system of care. Sweeney *et al.* (1998) studied whether equipping emergency medical technicians with defibrillators influenced survival rates and found that this made no improvement. Vukov *et al.* (1988) also demonstrated that merely introducing defibrillators into an ambulance service in a rural community did not improve survival rates. Marengo *et al.* (2001) came to the conclusion that, by itself, early defibrillation by defibrillators could not overcome any deficiencies that existed in the other elements of the chain of survival. It is possible that organisations view the defibrillator as a ‘stand-alone’ intervention that requires no further action on their part, and this body of research suggests that this may not be a very effective way (in terms of survival) of using this technology. Though it is well established in the medical literature that rapid defibrillation leads to better outcomes (Colquhoun *et al.* 2008), overall, the results of resuscitation more generally remain disappointing to medicine (Stiell *et al.* 2004). Nonetheless, Descatha and Baer (2008) argue strongly for the use of defibrillators in the workplace, though on the basis of questionable empirical evidence. A systemic review of the cost-effectiveness of defibrillators in the workplace (and other locations) for the government of Ontario, Canada (Medical Advisory Secretariat 2005), concluded that placing in defibrillators in workplaces is not cost-effective, because of the relatively small number of cardiac arrest that occur in these settings.

For all that heart attacks are a common cause of death in the developed world, the statistical likelihood of one occurring in a given location is relatively small. For instance, at the world’s busiest airport (O’Hare, Chicago), processing 100 million passengers a year, defibrillators are used on average 10 times a year (Caffrey *et al.* 2002). What is of more significance in informing understandings of heart attack risk, and of defibrillators, is media coverage. Defibrillators have received a great deal of media coverage and publicity in the United Kingdom. People who have been successfully resuscitated by a defibrillator in a public place are usually featured in local (and sometimes national) media (Caffrey *et al.* 2002). This has led to local newspapers, communities and charities all fundraising for their purchase and implementation.

UK organisations are governed by the Health and Safety at Work Act (1974), which makes them responsible for the safety of employees and any visitors or customers on their premises. The Health and Safety (First-Aid) Regulations (1981) requires employers to

make appropriate provision for first aid (principally equipment and employees trained in first aid). The regulations make no mention of defibrillators, and there is no regulatory requirement for organisations to provide them nor is their use in any way regulated. While guidance on placement of defibrillators in the workplace has been published in the United States (American Heart Association 2000), no such guidance is available in the United Kingdom.

### ***Organisations and risk***

For the purposes of this article, our theoretical orientation is one which considers risk to be a social phenomenon. This is not to say that the risks are not real, or not amenable to scientific measurement, but rather that how individuals and organisations understand risks, and respond to them, is as principally social. What is considered to be a risk and an organisation's response to it are part of a socio-cultural context, where risks and organisations both have symbolic connotations (Douglas and Wildavsky 1982, Douglas 1992).

Rothstein (2006) argues that contemporary organisations are increasingly driven by a fear of threats to the organisation, which he terms institutional risks. He distinguishes institutional risks from the wider threats to society, which he terms societal risks. The inability of organisations to manage societal risks creates the institutional risks, especially in a climate of increased regulation, transparency and accountability (Hood *et al.* 1999). Rothstein (2003) shows that organisations, as much as lay people, can have variable and irrational attitudes to risk, which may be at variance with regulations. In a late modern 'risk society' (Beck 1992), institutions are unable to prevent risks or manage them effectively (Lupton 1999). Organisations' understandings of who they are responsible for, and where those responsibilities begin and end, may be at odds with the understandings of the people involved. For instance, Rickard *et al.* (2011) found that visitors to US National Parks perceived safety to be largely their own responsibility, rather than that of the National Parks Service. Organisations also have to respond to external forces when managing risk. In the context of this study, Power *et al.* (2009) show how risk management has become increasingly important for UK universities, driven principally by the state. This process of organisations becoming increasingly concerned with the management of risk is held by Beck and Holzer (2007) to be typical of risk societies.

### ***Using technology to manage risk***

In this study, we conceptualise defibrillator technology from a broadly Science and Technology Studies standpoint. The defibrillator is not a fixed, objective or purely physical object. It needs to be understood in its social context, as part of a broader network of people, organisations and other devices. The defibrillator is capable of embodying multiple meanings and can be interpreted flexibly (Pinch and Bijker 1987). For instance, Pinch and Bijker (1987) show in their analysis of the bicycle that the 'penny-farthing' bicycle was interpreted both as an exciting and fast machine for one group of users and, simultaneously, as dangerous for another group. Another key concept from Science and Technology Studies that we will seek to employ analytically is the notion of delegation to technology (Akrich and Latour 1992). While this might seem prosaic (Latour analyses delegation to objects as apparently trivial as an automatic door closer and a hotel key fob), the question of what activities are selected for delegation from humans to machines and other objects, why and how, are more complex and substantial

than they might at first appear. For Akrich and Latour (1992), who can be broadly situated in the Actor–Network Theory tradition (Latour 2004) of Science and Technology Studies, humans and machines are both analytically and practically interchangeable.

Further to the role of technology in Actor–Network Theory thinking, beyond its technological affordances (Hutchby 2001) (the designed ability of the machine to defibrillate), the introduction of new technology into universities or any other organisation throws into relief the organisational networks that coalesce around the technology, from finance departments, estate security to sports departments. In Actor–Network Theory terms, the technology can be seen to operate as a heterogeneous engineer (Law 1992), bringing organisational elements together. Although we have suggested that organisations have different risk cultures, even within institutions, different departments will have their own internal organisational logic, which throws up local perspectives on apparent risk (Adams 1995). That is to say, the risk management of university finance departments will be different to those constructed in estates departments. All these actors, with their various interests, must be brought together in order for the technology to be established as part of the university-wide response to the risk of heart attack. However, as we show in the findings, different risk construction can bring with it contestation over the nature of collective risk. It is for those actors who take on the task of drawing together diverse claims around health risk and technology to mediate or ‘translate’, as Law states, divergent interests towards ‘...transformation and the possibility of equivalence’ (Law 1992, p. 386). Manufacturing equivalence involves making other actors’ notions of risk chime with one’s own. It is about shaping their interests in line with the immediate network interests, while lessening the same interests within other networks vying for ascendancy. The art is to translate interests without losing the involved interests of the various network elements. This is the task of achieving network stability and the ordering of socio-technical relations in Actor–Network Theory. Any set of elements that make up a network, in this case defibrillators in university, has to be constantly worked upon to keep stable. Conversely, without network maintenance (the work of ensuring risk reduction benefits among those who fund the technology; first aiders who carry out the procedure; and those who sanction policy on defibrillators use), the technology may not succeed as a response to heart attack risk. It is in some ways beside the point whether the technology ‘works’, if network arrangements collapse. One way of ensuring network stability is to establish objects that stand in for face-to-face interaction. For example, policy and procedure document formalise and, to an extent, stabilise interactions, much in the same way as Latour’s automatic door closer stands in for the concierge. In the case of big universities, we might expect to see greater levels of bureaucratic organisation: more policy and procedures; more objects standing in. Smaller institutions are likely to bring informal arrangements with proportionally more ad-hoc negotiation around risk and the implementation of defibrillators.

Given this context of how contemporary organisations understand risk and the role that technology plays in the management of those risks, the defibrillator, and its implementation, present an interesting and significant opportunity to analyse how these issues play out and what the relationship between the organisation, risk and technology is.

## Methods

In this article, we draw on data from a study, which examined why organisations had purchased defibrillators. We explored how organisations perceived their responsibilities to staff and visitors in an emergency and why organisations believed a defibrillator was an

appropriate technology. Since there is currently little published evidence on organisational reasons for the implementation of defibrillators, our study was designed to provide data on these issues. We used a qualitative approach as such an approach is effective when little is known (Pope and Mays 2006), as their exploratory and flexible design enable the researcher to map out a new area of knowledge. Furthermore, as ideas about risk, and response to it, are socially constructed and contextually bound, qualitative interviewing provides a method for gaining a better understanding of these issues.

Though defibrillators are in widespread use in the United Kingdom, no central data is collated on their numbers or locations. We decided to use universities in the United Kingdom as the sites for this research, partly for pragmatic reasons, but mainly because they are typically large, centrally managed organisations occupying defined spaces, campuses, in which the people and processes responsible for safety will be clearly defined, and thus identifiable. We approached universities through the professional association for safety staff who have an Internet mailing list. One hundred and fifty-five UK universities (of all types) are currently members of this association, so there are potentially several hundred users of the mailing list. A general invitation was posted to this list and potential participants responded to the researchers. The universities that participated were a diverse, though not statistically representative group, including Russell Group (premier research institutions), other universities established before and during the 1960s and new universities created in and after 1992. The sampling procedure was influenced by the ways in which the university had adopted defibrillators. One university, 'Big University'<sup>1</sup> had adopted a fairly formal approach involving key stakeholders in the organisation so we conducted eight interviews before the snowball sampling approach was exhausted. These interviewees included safety staff, trade union representatives, senior university managers and a doctor (GP), who had provided clinical advice to the project at that university. The other four universities sampled had adopted more informal approaches to implementation, such that only one or two interviews were necessary in each institution, all with safety staff. Again, while the index interviewee was asked for suggestions, no more than one was forthcoming in those institutions. As a result, we undertook 15 interviews (Table 1), and this was sufficient as we reached data saturation with no new themes being identified in the later interviews.

We used a semi-structured approach to the interviews using a list of questions (see Table 2) and encouraging participants to discuss how and why defibrillators were adopted in the university. They were conducted either by one of the authors (Stephen Timmons) or a research assistant.

Table 1. Characteristics of the universities and interviewees.

University	Type	Sites	City/campus/ both	Number of students	Interviewees
Big University	Russell Group	3	Campus	30,000	Safety Managers (3), Senior Managers (2), Trades Unions (2), GP (1)
Seaside University	Post-1992	5	Both	21,000	Safety Managers (2)
West University	Post-1992	7	Both	7000	Safety Managers (2)
Centre University	Post-1992	2	City	30,000	Safety Manager
Port University	1960s	2	City	30,000	Safety Manager, Occupational Health

Table 2. Interview questions.

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Tell me a little bit about yourself and your role within this organisation
What responsibility do you have for health and safety?
How did you come to hear about the defibrillator?/Have you heard of the defibrillator?
What's your understanding of how it works?
Tell us about how the decision (or not) was made to implement defibrillators
Who was involved?
Why do you think that decision was taken?
What do you think is the size/nature of the risk?
Who did you take advice from?
How did the implementation process work? (if relevant)
What sort of training has been organised? (if relevant)
How effective do you think the defibrillator is?
Anything else you'd like to tell us about defibrillators?

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We digitally recorded all interviews, and the recordings were transcribed verbatim. We coded each transcript, starting with descriptive coding and then developing more analytical coding as the analysis progressed. Some parts of the transcripts were allocated to more than one coding category and no part of any transcript was left uncoded. Once we had coded all of the transcripts, we refined the codes and grouped categories into themes. We obtained ethical approval from the University of Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee in 2011. We obtained written consent from all participants at the time of their interview and all participants received written information about the study before their interview. We stored all data securely and confidentially and have anonymised the data, and in this article, pseudonyms are used for the universities studied.

## Findings

### *Impetus for adopting defibrillators*

We found that the initial impetus for introducing the defibrillators came from a number of sources, including safety staff themselves, and academic departments concerned about the risk of heart attacks among students and visitors. In one institution, trades unions were influential in advocating for the introduction of defibrillators. For example, in his interview, a health and safety manager from 'Big University' mentioned that trades union representation on the organisation's safety committee played an important role in advocating for defibrillators:

*Interviewer:* Where did you hear about the defibrillator or have you heard about the defibrillators?

*Health and Safety Manager, Big University:* Uh, the first time it particularly came to my official attention, was as a result of a request by the trade union representatives for the statutory safety committee. That's to say some of their members had expressed an interest in having some of these units.

In this university, the impetus came from negotiations over industrial relations with trade unions representatives seeing defibrillators as a way of making the work place safer. Managers were receptive to these trade union representations as it fitted with their



approach to risk and their responsibility for managing the risks to staff, students and campus visitors as the senior manager noted:

*Senior Manager, Big University:* To the extent that all organisations are increasingly focused on mismanagement, so the University has, an increasingly robust risk-management regime and the body that would typically consider risk-management would be the audit committee. So it was in that context that, recognising the risks to our employees and to students and to visitors, to take on board particular issues around health and safety;...and around protection and safeguards that we put in place, which would cover defibrillators.

Despite fairly extensive media coverage of defibrillators in the United Kingdom, none of the interviewees in our study mentioned the media as a source of information about or a stimulus for the adoption of defibrillators. Similarly, interviewees did not mention either the ambulance services which employ community defibrillation officers to promote the use of defibrillators or any of the charities which promote the use of defibrillators, even funding their purchase. The interviewees saw the adoption of defibrillators as a specific response to risks within the organisation, and we will discuss the various risks they cited.

### ***Defibrillators as a way of dealing with risk***

#### *The risk of cardiac arrest*

All the interviewees saw defibrillators as a way of managing the risk of cardiac arrest. They tended to see the risk of cardiac arrest as a major concern, sufficient for institutions with many budgetary pressures to spend tens of thousands of pounds. As there are approximately 124,000 cardiac arrests in England and Wales each year (British Heart Foundation 2011), this might seem like a reasonable assumption. However, the populations of universities consist almost exclusively of adults of working age, with a substantial number of students aged under 25. Given that heart disease is relatively uncommon<sup>2</sup> in these groups, an epidemiological justification for the use of defibrillators in universities may not be compelling. However, none of interviewees in our study indicated that decision to adopt defibrillators was based on a quantitative assessment of the risk of a cardiac arrest. None of the interviewees referred either to the use of epidemiological data or to data which they had collected themselves. The interviewees tended to take it for granted that defibrillators were an effective way of treating cardiac arrest, without citing any evidence to support this view, even though such information should have been easily accessible in a university.

In one university, the efficacy of defibrillators was questioned. The safety manager did consult an occupational nurse who questioned the benefits of defibrillators. He reported their conversation in the following way:

*Safety Manager, Seaside University:* one of the nurses [I consulted] was a senior clinical advisor before she joined here, who said... 'They're not as effective as they could be – they're not for everybody. They work on certain instances but they're not sort of like a be-all case, and there are a few others as well, the ambulance service are close by, so why do we need them?'

The nurse appears to be have been raising serious concerns about the benefits of defibrillators and they are indeed only effective in one (albeit quite common) type of cardiac arrest, where ventricular fibrillation is present. She also drew attention to ways in which the local ambulance services could deal with cardiac arrests on campus. As the safety manager noted, these concerns were not enough to destabilise confidence in

defibrillators as a way of managing cardiac risk as he was able to characterise the alternative, the ambulance service, as unreliable and persuade the safety committee that it needed its own solution:

*Safety Manager, Seaside University:* I managed to reply to that by saying, ‘Okay, there’s a – I think it’s seventy to eighty per cent response rate by the local ambulance service, but they cannot guarantee [this] because of the flow of traffic, it’s not always possible to get here in the eight minutes’. And they [safety committee] said ‘okay...so it’s a positive step, but we’re not – we’re not fully there’.

As the safety manager reported this discussion, it was highly one-sided. Having asked for expert advice when it conflicted with ‘taken-for-granted’ assumptions, he found ways of dismissing the advice. The ambulance service was not reliable because it could not guarantee it would be with the cardiac case in 8 minutes. However, it was not clear how long it would take to access an on-site defibrillator.

This reliance on taken-for-granted assumptions was evident in all interviews. We did not find any evidence that those involved in the decision-making adopted the rational approach of starting by assessing the size of the problem, the incidence and prevalence of cardiac arrest:

*Interviewer:* You didn’t have any hard evidence heart attack numbers?

*Senior Manager, Big University:* No.

*Interviewer:* This is purely based on –

*Senior Manager, Big University:* literally, you know, one or two over you know, a decade, that people could recall and, you know, an ambulance being called and it turned out you know somebody had had a heart attack.

The interviewees in our study indicated that anecdotes about individuals who had experienced cardiac arrest in the last few years were far more compelling in persuading the university to adopt defibrillators than other sorts of evidence. For example, the safety officer at Big University noted the importance of anecdotes in the following way:

*Safety Manager, Big University:* But there are, sort of anecdotal, I picked up on anecdotal discussions around, previous examples of heart attacks, someone had a heart attack upstairs here, four or five years ago, for instance.

While the safety manager at West University commented:

*Safety Manager, West University:* So we did – so we lost somebody last year. And who could’ve possibly been saved if we’d had a defibrillator at hand. Unfortunately.

Both of these interviewees went on to recount, at some length, a narrative of the incident, how it was dealt with and what the outcome was. In the institutions where cardiac arrests had occurred, and were widely known about, these incidents appeared to have played a decisive role in the decisions to adopt defibrillators. These direct representations of cardiac arrests far outweighed any scientific information or media representations. As the safety manager at Seaside University noted, their decision was influenced by the move from risk as an abstract category to its embodiment in specific individuals:



*Safety Manager, Seaside University:* ... [W]e were very divided, we couldn't decide whether to or not to [adopt defibrillators]. But because of the expense and practice as well, we decided against it. But then we became very aware of staff and some students with heart problems. So we did a complete turnaround, and decided that at least it would give them the best chance possible, if there were defibrillators were available.

### *Sport as a source of risk*

While many of the individuals on campus were fit healthy young people, the activities that they engaged in could be a source of risk. One activity in particular featured in discussions about defibrillators, sport. The safety manager at Big University noted that sport presented particular issues as it increased the likelihood of health incidents but reduced the probability that they would occur in a central location:

*Safety Manager, Big University:* And we felt people doing sports can be, you know – make it more likely that someone might suffer an incident there, than they might sort of elsewhere just wandering about the Estates, that's why we picked those ones, particularly.

This association between physical exertion with heart attack risk was evident in several interviews. This is an interesting finding, which exemplifies a perception that cardiovascular exercise carries a level of risk. Of course, exercise also has a protective effect. It is possible that this view of risk is caused by the very small number, but very high-profile incidents where sports people have had heart attacks in training or competition.<sup>3</sup> In one institution, the safety manager identified a more compelling reason for viewing sport as a source of risk:

*Safety Manager, Seaside University:* The Sport and Recreation department who have a gym over in [location] and they link in with the hospital and run a cardiac rehab programme for patients, so they felt they needed one, that one's been used.

### *The influence of time and space on risk*

The interviewees accounts of risk were shaped by location and time. For example, in his discussion of risk, the safety manager of multi-campus Big University noted the ways in which the remoteness of satellite campuses and the effect on first aider response time shaped their decisions on the location of defibrillators:

*Safety Manager, Big University:* ...we did have them at our [satellite] campus, which is eleven miles from the main campus. And the reason for having two, on that campus, was its distance from a major hospital.

The decisions around defibrillator were influenced by perceptions of the impact of student and visitor population on risk. Several of the interviewees argued that heart attacks were more likely to occur at heavily populated sites as an incident of heart arrest was more likely to occur there as there were more people. This influenced where defibrillators were located as the safety manager in Big University noted:

*Safety Manager, Big University:* So for instance, [Name] Building, has one in there, just because it's a very populated area of the campus.

While the high use of central campus facility could be used to justify the placing of defibrillators in these locations, the remoteness of relatively low-used parts of the university could also be used to justify the location of defibrillators in these locations as in the following discussion by the safety manager at Centre University:

*Safety Manager, Centre University:* We've got a remote bit of campus; you do require to [place defibrillators]... But then you could argue that if the remote bit of campus is very low risks, or there aren't that many people on it, then... you might argue not.

These two apparently contradictory strategies for locating defibrillators could be maintained in the same university as risk assessment were based on lay logic and were not informed by epidemiological data or cost benefit analysis. If such analyses had been carried out, it is unlikely they would justify investment in defibrillators; as we note above, the data from O'Hare Airport show (Caffrey *et al.* 2002) that heart attacks in these sorts of setting are very rare events. Whether the 'scientific' information that might have informed the decision about the purchase and placement were available (or accurate) or not, they did not play a part in that decision. Instead, the organisations relied on what might be termed a 'folk epidemiology' (Lowy and Ross 1994) of heart disease. This understanding sees heart attack as a comparatively frequent occurrence, where time to treatment plays a crucial part in outcome, and the available intervention (defibrillator) is effective. As we have noted, none of these beliefs is entirely accurate, though none of them are simply untrue.

#### *Risk to the organisation*

The interviewee discussed the adoption in terms of minimising risks to staff, students and visitors but also in protecting the reputation of the organisation and ensuring it was seen to carry out its responsibilities. While, as we have noted, there is no legal requirement in the United Kingdom that organisations should have defibrillators, interviewees felt that having defibrillators showed that the organisation took its safety responsibility seriously. As the senior manager noted, the university wanted to show that it was aware of its responsibilities:

*Senior Manager, Big University:* [The] University council, have significant responsibilities in that they are responsible for health and safety issues...so there's recognition – in increasing recognition – by council of their responsibilities; particularly through the Corporate Manslaughter Act of 2006.

As a large prestigious University, Big University appeared particularly concerned about its reputation, and this appears to underpin its emphasis on defibrillators as part of its health and safety responsibilities. In the interviews at other universities, this concern about reputation and its link to health and safety was not as evident. In these interviews, it appeared that the initiative for adopting had come from health and safety experts who had some insight and background of defibrillator technology and believed that introducing them, as one safety manager expressed it, 'would be a good idea'. However, the initiative of these individuals was generally sympathetically received by the university health and safety committees and used as an indicator of corporate responsibility.

While the University has a clear legal duty to protect the health and safety of their employees, their legal responsibility to other campus users was less clearly defined.

However, in the interviews, we found that those we interviewed as representatives of their university felt that they had a duty to protect all individuals who used the campus, regardless of how and why they used the university campus. The senior manager in Big University saw this broad approach as progressive and related to enhancing the reputation of the university:

*Senior Manager, Big University:* I think it [adopting defibrillators] is seen as showing a forward-thinking approach by the organisation in terms of well-being of its staff and students, and visitors. I think it aligns very much with the University's reputational aims. And generally being seen as a corporate – well a socially responsibly organisation.

However, interviewees noted that the risks associated with the public using the campus varied according to the location of each campus. For example, as Centre University was located in the town centre, a large number of 'visitors' used the campus as a shortcut and, as the safety manager noted, these were often older, high risk people, but the University would offer equal treatment to all campus users:

*Safety Manager, Centre University:* We are part of the city centre, there's a large population of people walking through campus, who might be old, might need it, so in the same way that any shopping centre has the same risk, we probably do too... with first aid we've always treated anyone who needed it.

The safety manager justified this approach on pragmatic grounds; it was difficult to differentiate visitors from students, but also in terms of maintaining the University's good relationship with the local community:

*Safety Manager, Centre University:* [We are] the kind of a community, [where] you couldn't just go, 'No.' And anyway, how do you know? The students aren't always marked, 'Student'.

### **Locating the defibrillators**

Interviewees indicated that once the decision had been taken to purchase defibrillators, the university had to decide where to locate them. Decisions about location and ongoing training and maintenance issues constituted a problem for the organisations as no definitive advice was forthcoming from the various experts consulted, and the universities were (often unwillingly) forced to rely on advice from the suppliers of defibrillators, of which they were quite suspicious. The interviewees indicated that placement decisions were framed around the issue of timing: how long would it take for a first-aider with a defibrillator to arrive? The interviewees identified different optimum times, which informed the placement of defibrillators. One solution to this placement problem was to place the devices on the security vans, which undertook regular surveillance journeys around the campus. As the safety officer noted, it was an additional option (to permanent placement) in the multi-campus, Big University.

*Safety Manager, Big University:* And option three was to just have them on the mobile vans that security drive around as part of the security detail.

Similarly, the safety manager at West University noted the advantages in locating a defibrillator in the security lodge where the security staff could rapidly deploy it to any part of the campus:

*Safety Manager, West University:* One was located with our security staff at the security lodge, who are able to maintain it and get to anywhere on site within two minutes. So they're a mobile unit. So if a first-aider needs a defibrillator they just contact security lodge and they'll come to them, they'll bring it to them.

In each case, the potential for defibrillator implementation was embedded within pre-existing organisational networks. In most universities, the existing security service provided a ready-made location, and in their interviews, safety managers were aware of the benefits of using this network.

## Discussion

We would contend that organisations adopted this technology (defibrillators) because there is perceived to be a serious risk (that of death) that the organisation can manage using relatively cheap and straightforward technology, defibrillators, and by adopting such technology enhance its reputation as caring, trustworthy organisation. Faced with the myriad of unmanageable risks that organisations are now responsible for, these institutions decided to manage a risk that they perceived, at least, to be manageable. Symptomatic of late modernity, the organisation's responsibilities are extended to such a degree that risk is no longer rationally calculable in the manner undertaken by a 'classic' bureaucratic organisation (Beck and Holzer 2007). Thus, the reported absence of rational calculation in the decision-making process in the organisations studied is hardly surprising. In fact, despite the (limited) available epidemiological science, precisely how local risks will play out in a specific organisational context is unknowable (Heyman 2013). This might also explain why the organisations found it so difficult to get definitive advice on the number of defibrillators that they should purchase and how they should distribute them.

Crucially, in this case, management of the risk was made possible by a sophisticated 'intelligent' technology. The defibrillator is perceived to be effective in managing the risk of cardiac arrest, though even the scientific evidence would suggest that this faith is exaggerated, if not misplaced.

While the defibrillator does not substitute for human intervention, in so far as the organisations retained their first-aiders and systems, the perceived power of this technology makes it possible for organisations to delegate some management of this risk to the defibrillator (Akrich and Latour 1992). Given that the risks that organisations face in late modernity are myriad, and many of them intrinsically ungovernable, the defibrillator holds out the promise (Borup *et al.* 2006) that at least one serious risk can be better managed. The organisations studied have, in Akrich and Latour (1992) terms, partially delegated the management of this risk to the defibrillator. The issue of whether this is a 'successful' delegation to technology is hard to establish, given the nature of the data collected. None of the institutions we studied reported to us that the defibrillators had been used up to the time of the study.

The interviewees in our study indicate that their university chose to respond to the risk of heart attacks and to do so by purchasing a technological fix. There are always other choices that could be made – for instance, the universities could seek to manage the risk of cardiac arrest by encouraging its staff to become more physically active, by the provision of improved facilities for cyclists. However, there are other issues that arise with the introduction of the defibrillators, such as where to place them, who is responsible for them and who is responsible for ongoing training and maintenance.

The interviews also showed that the adoption of defibrillators was not just about the management of risk. It was also an opportunity for the organisation to make a statement about how it positioned itself in relationship to its staff, students and other users of its campuses. The adoption of defibrillators was an opportunity to symbolically demonstrate to a wider world that this was an organisation that is concerned for the health and safety of its employees and campus users. The defibrillator was a visible manifestation of this concern, not least because the defibrillators were often physically located in public areas, with distinctive signage. In the case of Centre University, this concern is extended beyond the users of the campus to the wider community in the neighbourhood where the university is located.

### Conclusion

Universities, in common with all organisations in late modernity, are faced with a wide range of risks, many of which are not easily calculable or amenable to rational management. Nonetheless, they are held to be responsible for the management of those risks to their staff and users of their facilities. Faced with this seemingly impossible task, they have, in the case of the universities which we discuss in this article, opted to manage one risk, cardiac arrest, by delegating partial responsibility for its management to a device, the automatic external defibrillator, within a wider first-aid system. The defibrillator offers the promise of a sophisticated technological solution to this problem. The interviewees suggested that the organisations were unaware of (or chose to ignore) the available 'scientific' evidence, which presents a different view, both of the scale of the risk of cardiac arrest and the effectiveness of the defibrillator in dealing with it. In this case, the symbolic power of the defibrillator to address a risk perceived to be serious enough to warrant substantial expenditure was sufficient to persuade organisations to adopt it. Contemporary organisations already look to a variety of sophisticated technologies to manage the risks that they are thought to be responsible for. This looks likely to expand in range and scope for the foreseeable future and presents an opportunity for new and fruitful directions in the social study of risks and how they are managed.

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### Notes

1. Pseudonyms have been adopted for the universities for reasons of confidentiality.
2. 2.75 deaths from cardiac disease per 100,000 people in the United Kingdom (Nichols *et al.* 2013)
3. Fabrice Muamba who had a heart attack on the pitch in a premiership football match is a good example of this phenomenon.

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