

Performance Management of Emergency Services: The Digitalisation of a UK Ambulance Service during the COVID-19 Pandemic as an Exemplar of an Extreme Context

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Abstract

This paper examines how the onset of digital transformation has impacted on the performance of the revamped emergency services dispatch system in the UK, not just from a targets achievement perspective, but also considering staff wellbeing and welfare. Specifically, an NHS ambulance service was used as the exemplar of managing in extreme contexts; this is because of the stress levels inflicted on staff performing the work and the severity of the task at hand. Based on over fifty first-hand interviews, rich insights on the difficulties of operating during the COVID-19 pandemic that were previously overlooked have been identified. The research used Westerman's framework of digital transformation to guide the empirical investigation. We find for non-commercial contexts, the incorporation of such components like 'employee' and 'customers' must be redefined to reflect the 'extreme context' nature of work. We conclude that emotions normally associated with extreme context working must be reimaged and re-introduced to assist future digital transformations, and only with this in mind can the real performance of the work at hand be improved.

Keywords: Digital transformation, emergency services, extreme contexts, COVID-19.

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Introduction

Performance management concerns not just the ultimate outcome of an organisation in terms of financial performance and organisational efficiency! Broader and a balanced set of measures have now come to recognise the importance of the welfare and wellbeing of the employees within it. While technology lies at the very heart of effective emergency services deployments, not the least because of the imperative to ensure the best possible provision to those receiving the service, a much-ignored reason is also to reduce the highly stressful conditions under which emergency service workers are placed (Baseman et al., 2018; Wetherell et al., 2024). An organisation that delivers the targets but has a stressed out workforce is hardly deemed to be performing well, regardless of the official figures. Where that service concerns life/death consequences and even opens the potential for being prosecuted for breaching duties of care, these can be regarded as conditions of ‘extreme contexts’ within the psychology of work literature (McCann, 2022; Granter, et al., 2019) . These two areas of literature have had significant growth and development in the past decades, at increasing rates, but not directly addressed in the context of emergency services that are not commercially focussed.

Thus, this article explores how the onset of digital transformation has impacted the supposedly improved emergency services deployment system which was recently updated in the UK. Specifically, an NHS ambulance service located in the UK was used as the exemplar of the phenomenon of ‘managing in extreme contexts’ – by this, staff managing the situation at hand were placed in highly stressful conditions due to the severity of the situation. These areas of extant literature developed in the present research thus comprise the effective diffusion of digital transformation for managing in extreme contexts. Thus, the research is premised around the following research questions:

1. Does the new NHS ambulance dispatch digital transformation assist the management of extreme contexts?
2. Is the implementation of the new NHS ambulance dispatch system an effective and successful digital transformation?
3. How have extreme contexts, like COVID-19, escalated beyond normal working within ambulance services?

In answering these questions, the research also offers significant insights about the nuances of the UK ambulance service through the voices of a range of employees working for the NHS ambulance service, which in turn highlights how the diffusion of technology for emergency services may be regarded as a special case. For such, we can ultimately answer, how can a framework for managing in extreme contexts be augmented specifically for emergency services. Figure 1 below presents how the three research themes relate to each other and where the ultimate contribution lies (1, 2, 3 and ?, respectively, corresponding with the three research questions above). The empirical research took place during the COVID-19 pandemic, when the efficiency of the ambulance service was stretched and therefore represented an exemplar of an extreme context.

[Insert Figure 1 about here]

Digital transformation and ‘extreme context’ services

The practical relevance of extreme contexts in general seems clear: problems like the present global wars, corporate scandals and changing political relationships have seen increasing frequency in the media with severe implications for those working in such sectors. When coupled with advances in technology, such as automation or even AI, these are likely to place greater pressure on the people involved, and further, society in general for whom their work concerns. As such, there are questions about resources, processes, and how best to manage the workforce to alleviate such problems.

Substantial contributions to management and organization studies were originally derived from extreme contexts (Bamberger & Pratt, 2010; Bartunek et al., 2006), ranging from dangerous situations like aircraft carriers (Weick & Roberts, 1993) to healthcare teams (Faraj & Xiao, 2006), where the nature of ‘extremeness’ is broader and more generally interpreted. Recently, the extreme contexts literature has been tending in the direction of high reliability organizing, particularly meso-level explanations of teamwork and practices in public sectors and emergency services, such as fire-fighting, police work and hospital response, where protocols for quick response has been the essence. Nonetheless, theoretical progress has been slow (van der Vegt et al., 2015). For example, while much has been researched about how resilience in extreme contexts – such as critical care (eg. Leuridan and Demil, 2022) – there is still a knowledge gap of the holistic relationship (Turoff et al., 2013). Ryan (2013) argued for crucial centralised systems, and Laakso and Palomaki (2013) for a common language for emergency care. More recently, Margherita et al. (2021) and Cobelli et al. (2021) find specific factors concerning technological adoption during the pandemic. Most of the extant literature is however disjointed, and there is yet a common and unified understanding, at least that specifically for the UK ambulance context.

On the other hand, there have been many theoretical developments on the role and use of digital transformation. Digital transformation, among its many definitions, can be understood as “an organisational change that is triggered and shaped by the wide-spread diffusion of digital technologies” (Lynch et al., 2024: p. 257). A significant body of research is now emerging that examines how digital transformation can improve a range of services, normally for the competitive advantage context (Nambisan et al., 2019), but this can also be considered for organisational efficiency and will be highly beneficial if this can extend to the public good. It has three principal functions: its broad applicability across industries, the scale benefits from its application, and its ability to speed up the change process of the concerning organisation (Hanelt et al., 2021). Other benefits include greater data access, internal resilience and broader societal benefits, such as reduction in externalities (Aker and Wamba, 2016). Digital transformation goes beyond digitisation/digitalisation in the form of ‘going digital’, but rather, now has broader applicability to competitive and innovation advantages (AlNuaimi et al., 2022; Verhoef et al., 2021), even for the public sector. At the organisational level, digital transformation refers to new configurations of support for people, systems and processes to support internal and external channels (Lanzolla et al., 2020). At the external level, its application links to institutional and geographical conditions that support public services (Brem & Nylund, 2021).

Of particular interest in the present research, we draw on the original framework of Westerman et al., (2014) on nine elements of digital transformation relating to the performance orientation of the change process. They argue that an organisation (a business in their sense) can be redefined in nine elements under three headings of understanding the ‘customer’, improving the internal processes, and changing the ‘business model’. While commercially focused, their reference to the customer may be extended to users/patients, and

the business model need not be a business as such in the public sector or emergency services context. More significantly, Bonnet and Westerman (2021) revisited this early work to add to it the importance of *people* – such as those internal and external involved in the digital transformation and who deliver by the outcome. This is the missing link for managing in extreme contexts, where a match is necessary between the transformation and people pressures has not been considered in tandem.

Specifically, the revised Westerman framework concerns: the *business model* (digital enhancements, information-based service extensions, and multisided platform businesses); *customer experience* (experience design, customer intelligence, and emotional engagement); *operations* (core process automation, connected and dynamic operations, and data-driven decision-making); *employee experience* (augmentation, future-readying, and flexforcing); and the *digital platform* (core, externally facing, and data). This framework was therefore used as the basis for the present research, where answers to the three research questions and novel contribution (as mentioned above) were building on. While relevant to all the other elements, the key focus was the ‘employee experience’ element, and what that meant to emergency (ambulance) services as a form of working in an extreme context.

UK ambulance services

In the UK, the ambulance service serves a critical role in public health, providing the pre-hospital care to patients needing an urgent response. These are at a critical juncture: staff need greater clinical and managerial support to carry out their work and improved digital ambulance services are required in the control centre structure (NHS England, 2019). The technology adopted is based on the Ambulance Priority Dispatch System (AMPDS), an American import now replaced by the UK version (called NHS Pathways) in many ambulance trusts, but this is risk averse and over prioritises higher category of response category. This digital transformation has resulted in much perverseness in the simplistic response times targets, which has implications on work intensity and wellbeing of staff including the pressure to achieve these targets, resulting in ambulance delays and A&E handover issues (House of Lords, 2023).

Thirteen publicly funded ambulance services provide the pre-hospital care as part of the National Health Service (NHS) in the UK, dealing with over twelve million 999 calls annually (Wankhade and Murphy, 2023). Notwithstanding the global provision of these organizations and the critical role played by them within the wider urgent and emergency networks, critical management inquiry of how these organizations are led, organized, and function is largely unexplored within the literature except a small body of work in the sociological literature (Wankhade et al., 2020; 2018; Granter et al., 2019; McCann et al., 2015; Bevan and Hood, 2006).

Ambulance services, rather unfairly, have been perceived as a ‘blue collar trade’ due to their historical emphasis on quick transfer of patients from a scene of emergency to the nearest hospital (Wankhade and Mackway-Jones, 2015; McCann et al., 2013). These organizations in the UK (and most of the western world) are performance managed against a set of nationally determined stringent response times standards, which are based upon severity of the emergency such as the 8-minute response for life threatening situations, in a ‘risk-averse’ operational environment (Wankhade, 2011). These get embedded as a critical organizational routines and practices (Feldman & Pentland, 2003). The arguments for the limitations and perverse consequences of the response time targets, including the detrimental effect on staff mental health, wellbeing and engagement, have been well-rehearsed in the

literature (National Audit Office NAO, 2011,2017; Williams et al., 2017; Reardon et al., 2020). Not surprisingly, instances of poor mental health, high sickness absence rates, stress, trauma, and post-traumatic stress disorder (PTSD) among ambulance staff are on a steady rise (Ebben et al., 2023; ; Lawn et al., 2020; Santarone et al., 2020).

The ‘risk averse’ landscape is further characterised by a ‘command and control’ organisational culture, reinforcing rank-based notions of decision making, norms and rituals (Wankhade and Brinkman, 2014; Wankhade, 2012). Consequently, this has become a persistent leadership and management challenge to draw a meaningful balance between giving clinical autonomy to staff versus exercising appropriate level of managerial control to meet nationally determined policy and performance targets (McCann, 2022; Wankhade et al., 2020). As a result, there is a minimal room to manoeuvre and embrace adaptive behaviour, creating a further wedge between different staffing groups, which often leads to a ‘blame’ culture (Leech, 2024; Kirk et al., 2018). Adoption of new technologies by the ambulance services has been at best tardy but identified as a key driver for reducing conveyance to hospitals in recent reviews (House of Lords, 2023; Carter, 2018).

Healthcare services, including the pre-hospital care delivered by the ambulance services, was an essential service under the Coronavirus Act 2020. This meant that ambulance services had to deliver its essential life-saving services within a highly volatile, fearful, and dynamic policy environment. This situation was characterised by high COVID-19 infection and mortality rates due to close proximity with sick patients (and colleagues), staff sickness absences, heightened emotional intensity and resources constraints (Wankhade et al., 2023; Heath et al., 2024; Association of Ambulance Chief Executives AACE, 2021). There is growing recognition that in the post-pandemic work environment, a new leadership approach centred on agile decision making and compassion to drive motivation, foster change and deliver better service to the patients is needed even more (Ebben et al., 2023; Rodriguez et al., 2023; Grint, 2020; Tourish, 2020). The new context requires an understanding of how critical organisational resources, such as technology, leadership style and better communication style, can lead to a mutually rewarding social exchange between the leaders, managers and frontline staff in creating a favourable climate for adaptive behaviour. This will in turn help create a better institutional fit between employer demands and staff expectations to deliver a better service for patients and the users.

Research Methodology

We carried out inductive case research (Vears and Gillam, 2022) on an ambulance trust in the UK, which formed the parameters for what constitutes the methodological ‘case’ (Yin, 2014) as the basis for understanding the technological transformation. This means, while other ambulance services adopted the technology in a similar way, making the data and context exemplary, the findings were particularly rich and representative of the case. Details of the research approach and data analysis are as follows.

Data and Methods

Our qualitative case study was conducted during the height of the pandemic between October 2020 to May 2021 in a large NHS ambulance service in England, herein after referred to as *Omega* for sake of anonymity. Omega serves more than 6 million people across an area of 5000 square miles and employs more than 6000 staff and operates over 8000 vehicles. It

receives over 1.5 million 999 calls and makes over 1.5 million patient transport journeys (non-urgent transport) every year. It also provides the non-urgent NHS 111 service handling over 1.5 million calls annually.

The study took the opportunity during the COVID-19 pandemic to see how this heightened ‘extreme context’ impacted Omega’s response to use of technology in fostering social change, taking a multi-level approach. Data was gathered between October 2020 and May 2021 from fifty-two semi-structured interviews. In accordance with the existing lock down and social distancing measures in place, interviews were conducted remotely over Zoom. Respondents included senior leaders (executive and non-executive board members), managers (operational and corporate), frontline crews (paramedics, emergency medical technicians, EMTs and students) and staff from the Emergency Operations Centre, EOC staff (call handlers and dispatchers) as per Table 1 below.

[Insert Table 1 about here]

Following a purposive sampling strategy, our inclusion criteria was guided by the role, availability, of our participants and their organisational role during the pandemic (Denzin and Lincoln 2011; Miles and Huberman 1994). Such a multi-level approach provided us with a rich, contextual understanding of the key set of actors within their social settings, allowing us to analyse their response to the crisis. Such an approach is also supported in the literature (McCann, 2022; Granter et al., 2019; Watson 2011; Van Mannen 2011; Tangherlini 2000; Morgan, 1983). Access was negotiated at the highest level through Omega’s research department. Ethical approval for the study was obtained through the University and the centralised NHS research application system (IRAS).

Interviews typically lasted between 20-70 minutes and were recorded digitally with prior consent and transcribed verbatim resulting in recordings of over 30 hours and transcripts running to over 275,000 words. In accordance with our ethical permissions, the data has been fully anonymised to avoid identification of our case organisations and the research participants. We have hence used generic titles (e.g. senior executive, #30: to indicate the post and interviewee number) to assign quotes to individual respondents. Questions included the role of senior leadership and the senior managers in fostering innovation and adaptation, as well as the impact of the pandemic on staff resilience and service delivery in times of crisis (Yin, 2014), all within the broad parameters of digital transformation.

Data analysis was an iterative process wherein the authors independently read all the transcripts to identify and triangulate emerging themes. Applying the open coding approach (Strauss and Corbin 1998), emerging themes were grouped into initial categories and were then thematically analysed into the key themes identified in the study (Atkinson and Coffey 2011; Charmaz 2003; Lincoln and Guba 1985). Additional patterns and relationships leading to the broader themes, were further explored to minimise any researcher bias. Theoretical saturation was reached after eight months in the field after fifty-two interviews were completed and no new themes were emerging.

Our approach is not free from some limitations. Data has been collected from one large albeit single case organization which limits the generalizability of our findings, notwithstanding the richness of our data, the unique setting of an ambulance service and the

wider acceptability of a robust case-study design in generating new theoretical insights (Yin, 2014; Eisenhardt and Graebner, 2007; Santos and Eisenhardt, 2005). We however provide a rich contextual understanding of how an important healthcare provider, such as the ambulance service, addresses the key question of adapting and promoting technology in its service delivery model to foster social change within a highly institutionalised and regulated landscape. The impact of pandemic is further explored in a setting that is currently under-researched within the literature.

Findings

Based on the Westerman framework and broadly within the ‘employee experience’ element of issues, the following empirical themes emerged from the interviews with the respondents.

Extreme context meaning of the obligations to the ‘customer’

Much of the extant literature has already explored the meaning of the equivalent of the ‘customer’ in the emergency services – predominantly meaning the patient and issues relating to his/her legal rights. However, our research identified the specific consequences of ‘extremeness’ for ambulance workers and their coping mechanisms in fulfilling that ‘customer’ obligation. A national emergency service goes beyond standard public sector provisions, like an energy provider or local school; both the ‘customer’ and staff form the ‘community’ in which the service operates, beyond legal obligations. As commented by one of our respondents:

“And it’s nice to know the community is supportive ... and the ambulance service actually securing those and thanking the people who’ve made them was positive ... but in terms of emotional support, it was there from our management team and higher management, and colleagues as well. We have contact shifts with our line managers regularly, which obviously, through the depths of COVID, haven’t been as easy to do as many contact shifts as normal, but we have still had them. Managers as well have really focussed on mental health in this last year ... making sure we know where counselling services are available through the ambulance service ... reminding people that you can go to your own doctors. Obviously, wellbeing things like going for walks and physical things, trying to keep as healthy and eating well. I do feel supported by my specific line manager who I get on really well with, and I feel like if I didn’t know, you know, if I had forgotten where that email was or I needed information, I could just go straight to them”. (Paramedic, #37)

As was explained by the paramedic, the ‘community’ of other services from related services supports the extreme context of working conditions.

In emergency services, staffing operates on a reserve basis, unlike for the commercial context that operates minimal levels or a ‘just-in-time’ concept, where cost savings are plausible. This is particularly the case where the demand is uncertain but likely and where it must be met, which forms the extreme context. As explained:

“I think staffing... maybe, for too long we’ve run on bare minimum staffing levels. From this, it will show that we need to have staff in reserve. It could be a case of increasing team levels and allowing certain staff to go on to train in other things in the meantime. I think we’ve really been caught short with actually covering the desks

in the room, the areas that we cover, managerial and dispatcher-wise. Hopefully that's a lesson learned, that we need to have these bigger teams so that we are prepared for this. Also, the outputs of information given... always constantly checking emails at home and after shift, before shift. The sheer weight of information and procedures and policies that we've had to learn has just been astronomical. I think we can learn from how we roll out this information and who rolls out the information and how people get the information and can apply it. If you're a dispatcher and you've just been working absolutely non-stop all week, you're 50 hours into the block that week, and someone goes, "Right, here's a 20-page document about what you need to do". (Performance Manager, #33)

Thus, the heightened nature of the work required both the procedures and paperwork to be well integrated within staff deployment.

Emotions like stress and burnout stood out as repeating concerns for the workforce and the support mechanisms that are put in place that recognises the extremeness of the mental strain and the physical work conditions. For mental health, the COVID-19 pandemic heightened the already problematic nature of work pressure, and added to it the constraints of high demand and uncertainty, thus exacerbating a grim situation. As one senior executive described, additional support systems were offered to staff:

"We've had to adapt quite a lot of what we have in place. So from a health and wellbeing perspective, obviously there's been a national offer put in place. So there has been access to online support through the Samaritans nationally. And a range of different kind of offers, including a range of apps that have been offered free of charge to the NHS. So things like Headspace, Sleepio, but also locally, we developed a suite of podcasts early on really, which were aimed at being preventative. So very kind of short and sharp support for anxiety, sleep, nutrition on the go, exercise on the go, to try and help staff. We've looked to expand our chaplaincy support, which we didn't have in place in any real strength previously. We've developed and put in place our own 24 hour employee assistance programme. We've expanded our benefits office. We've opened up a financial wellbeing offer as well, recognising how people are being impacted from a financial perspective. Links in with charities and quite a lot of work that we've been doing, both nationally and locally around suicide prevention as well, that we've accelerated as a result of what's happened over the last few months". (Senior Executive, #11)

In addition, staff were noted to have operated their own self-help individual coping mechanisms, as another frontline staff explained.

"Well, the ultimate coping strategy was to remove a chunk of stress, and walk away from it, which is something that I don't tend to do, I tend to tackle it and get through it. So, just being able to sit in the garden was brilliant really, because we couldn't go anywhere. I'm massively into my outdoor pursuits, so I like climbing, open water swimming, couldn't do that; it was just a walk round the estate, that was our exercise really". (Senior Paramedic, #40)

For physical fatigue, the public sector (unlike the commercial context, where services are less likely to be as well integrated) the 'extremeness' of work conditions is well recognised and other governmental/public services can be called upon to provide assistance, particularly at times of difficulty (Lakoma and Liu-Smith, 2023; Wilkinson and Richmond, 2023). The respondents commented on calling on the army to assist with physical call of duty work as well as other blue light services. For example:

“In terms of the other blue light responders ... we are looking at that with the fire service now, as a contingency, should we need to, could we utilise their workforce to drive the vehicles and obviously we would supply the paramedic to do the clinical bits. The fire service is very, very willing at a senior level to get involved, and they are very, very keen to work with us. Whether that’s translated down to their workforce and the fire brigade union, that will be a little bit different”. (Operations Executive, #10)

This is a unique arrangement that may not be found in the commercial context in the exact form. For example, while the ‘co-opetition’ (cooperation and competition) arrangements are sometimes found, whereby commercial firms form arrangements to provide to the market, they do so for their exclusive benefit perhaps to prevent other competitors from benefiting from the arrangement.

Processes and supporting culture

Specific technological methods for carrying out the work of emergency services represent the form of processes in place, and the culture represents the general attitudes surrounding those methods. These were specifically modified under UK government guidelines as well as alongside the standard ambulance delivery upgrades. The interviewees have spoken openly and specifically in such terms.

Governance, as the overall system of rules and procedures for the working of the ambulance service, was considered important, not just a part of the legal boundaries for how the service operates, but also as the practical backbones for how the different parts of the delivery would work in action. It was commented:

“We decided that we needed to strengthen our governance. So, although we had a lot of virtual meetings, those meetings were kept in the diary because we wanted to keep everybody on side, everybody supportive of the organisation, everybody understanding what the organisation was having to go through. I think as an organisation, from a governance point of view, I thought it stood up really well”. (Senior Executive, #12)

Thus, this provided understanding of the difficulties as well as helped the processes.

Similarly, the actual models and frameworks used seem to be well routinised into the regularity of daily operations, to the point, terms like ‘muscle memory’ have been used to describe the nature of extreme working. For example:

“I think we’ve got good muscle memory for this ... In the ambulance service we’ve got good frameworks for dealing with rising tide events and spontaneous incidents, so we’ve got good models of decision-making, command and control response, and principles that sit around developing working strategies to meet difficult occasions. We’ve got solid governance frameworks in place, our data sharing, our medical clinical pathways. Those models were instrumental to all the decision-making and setting up all those processes. We were using tried and tested models, for implementation of plans and procedures. In that sense, I became more cognisant of the benefit that those models bring. Having confidence in those models, and the national models as well, and having confidence in the clinical pathway governance arrangements that we’ve put in place over previous times with NHS partners, it’s allowed for some rapid clinical pathway development. Balancing that and capturing all the salient elements of it, to try to bring it together, was the challenge around that,

to see how they all interlinked and, importantly, supported each other”. (Tactical Commander, #23)

However, the heightened event of the COVID-19 pandemic unfortunately posed difficulties for either procedural models or technological systems to run effectively and allow for novel eventualities. The triage method without a similar benchmark within living memory was viewed as being rolled out in a rush, with a lot of pressure over the design of it. As noted by another respondent:

“Anything that’s rolled out without preparation for staff, so any new procedure we’d like to take the staff out the room and brief them on it and familiarise themselves with it on the training system. But this was done in a rush. It had to be done in a rush. When it did come out, there was a lot of confusion over it. It’s all that kind of stuff that just blows people’s minds really. In the call handling it was horrendous for a while”. (Performance Manager, #35)

Thus, the concept of the ambulance service being a learning organisation is much acknowledged as both crucial and applicable, which sits at the heart of digital transformation. For example:

“I think, in this case, we were constantly learning as an organisation, constantly having to adapt to the changing set of circumstances. One of the key things for us now is the reflection from that, what we can do differently, how we can use, for example, teleconferencing and tele-diagnostics better, to enable us to deal with demands for certain supports. I think also it’s taught us a lot about which vehicles we deploy, how we crew the vehicles and how we respond to calls. And I think the other aspect is that we work with the other services to ensure that we’re able to maximise the synergy between whether it’s primary care or the hospital trusts”. (Senior Executive, #44)

In this way, it in turn re-fosters innovation and builds resilience back into the system. Another senior executive saw a connection between how extreme conditions call for the development of more advanced digital technologies, resulting in greater resilience and agility.

“I think we are even better now than we were, and I think we’re able to demonstrate. Other parts of the NHS weren’t used to the command-and-control structure, didn’t understand how it worked, and we did. So I think we were able to actually influence some of that. I think we’ve also been able to demonstrate how much more agile we need to be as an ambulance service. So, I think we have had areas that we haven’t innovated, digital in particular, but also some of our very traditional practices that have been historical, I think some of that significant transformation has been massively accelerated. Yes. I genuinely think we’re a much more resilient and agile service now as a result of both wave one and wave two”. (Senior Executive, #6)

Along with physical change came the importance of a supportive management culture. During heightened ‘extreme contexts’, in which the early pandemic phase each day seemed like a battlefield itself, there was neither slack to feel complacency nor punitiveness for problems. Instead, culture went strongly from one of blame to empowerment to move the teams forward for another day’s survival. As commented by a frontline member of staff :

“Management culture changed. We’ve historically had quite a punitive management culture in the ambulance service; it’s like they’re very slow to congratulate you on anything good that you do, but if there’s a complaint or if something goes wrong, they’re there the next morning to take you into the office and start deconstructing,

basically blaming the frontline clinician, and that culture seemed to change; there was a lot less of a blame culture or autonomy culture. Historically they were very behind modern management methods, sort of encouraging staff to be the best they can be; it was more a fear culture. And it's transformed management culture a lot, in that they're a lot less about instilling fear in staff, and they're a lot more about empowering staff, I would say". (Emergency Medicine Technician, #46)

Despite this, a third theme emerged from the research specifically reflecting on the inability to carry out the call of duty with the desired outcome.

Emotions for undesired outcomes

Beyond the standard emotions and mental struggles, a unique feeling that stood out was that of sorrow from the service's inability to perform to achieve the outcomes desired by the team. Unlike the commercial context in which incomplete transactions are rarely the case of refusal to offer it (eg. a store wishes to sell a computer and is normally able to do so), an ambulance service may have fulfilled the legal obligation by attending the scene of call but may feel incompleteness if the patient does not survive, and then a sense of sorrow is felt.

In the case of the COVID-19 pandemic, specific and additional factors may have come into play for causing this, but which should not be ignored. For example, the additional shortness of staff may be generalised as part of further learning:.

"It was also looking at back-office functions and seeing how we could free up individuals who might have other duties and put them into the vehicles that would go out and provide support in the community. Or, alternatively, the ability to provide support within the control centres. As sickness rates went up, that became harder because there was a smaller pool of people to call on. Or you were calling on individuals such as the army who were less familiar with the operating systems. So, it may take you a little bit longer". (Non-Executive Director, #44)

When the situation within the workforce intensified, there was a feeling that the internal desperation became as bad as that the service was supposed to resolve for the patients. There was a sense of parallel extremeness of the context of both the work as well as work environment, and a vicious cycle of illness. As commented:

"I think we were massive spreaders of COVID-19, because there will have been lots of staff who were asymptomatic, going into nursing homes, spreading it. I think the government must have known we were going to be massive spreaders, and we did. And I don't think we did keep patients that safe; I don't think we did keep ourselves safe. We got through it, didn't we? We didn't have a catastrophic meltdown of the NHS, however; we spread it. We will have been the spreaders, at times, to each other. There were ambulance stations that became like hotspots; loads of the staff had all caught it, probably off each other. There have been a load of staff who all work in the control room, so we're not safe. We're not actually safe, and we spread it, but I think it's inevitable". (Emergency Medicine Technician, #46)

More broadly speaking, this notion of parallel extremeness has made many ambulance staff question their own mortality, but ultimately accept it as part of the profession.

"Despite saying about the increase in violence, it was manageable because it was our norm for want of a better expression. I think for me there were odd moments where

your own mortality was in question. You're sat in the back of a metal box with a highly contagious patient and your own mortality is in question. Then again, sometimes the most dangerous thing we will do is drive to work that morning. I think you become a little bit, I wouldn't say blasé, but you become a bit stoic about it and just think, "Well, hey ho. This is the job I signed up for. This is what I'm expected to do." I think this is a job that I'm being paid to do. I have to accept that there are risks to it and there are risks to health, the risk to mental health and all that stuff". (Paramedic, #49)

However, the feeling of compassion towards various groups persisted as an integrative mechanism to ensure the work would continue. As commented:

"I think where I feel compassion is that I genuinely believe all our teams come to work to do the best they can every day. I think through the pandemic certainly in the first wave prior to lockdown at least, we knew we weren't doing the best for patients and the staff because of the pressures they were under and the size of the stacks and the pressure they felt under that. Recognising that it's okay to feel like that is quite important because in reality I couldn't knit 400 more ambulances overnight; if we could we'd have an aggressive team of knitters all the time. So it's about trying to put yourself in their position and in their shoes. I think we've always been aware of that need for compassion with the team". (Senior Executive, #29)

The feeling of pride in delivering a lifesaving service to the public and making a difference notwithstanding in the difficult circumstances, , was also an important ingredient of re-motivating the workforce and ensuring all components of the task would not fall apart. As commented:

"[Reacting to the challenges of the dispatch] was probably my proudest feeling throughout the whole thing. As a new manager, I used to go home every night and worry about, "How am I going to get these up to do all this again? How am I going to motivate them to keep going?" The things that the staff have done during this last year is nothing short of exceptional. What would always get me is that I'd leave the staff before I went home and they just looked distraught, exhausted, and then I would come in the next morning after thinking, "How am I going to motivate all these again?" All the staff would just be ready to go again, it was a real proud moment for me". (Performance Manager, #33)

Hence, ultimately a range of emotions have conditioned the nature of extreme working within ambulance services.

Discussion

The above themes have formed the empirical findings of the present research. We now return to our original research questions to posit our theoretical contribution.

Does the new NHS ambulance dispatch digital transformation assist the management of extreme contexts? Much of the interviewee commentary has regarded the ambulance system upgrade as a required improvement to the performance requirements experienced in the UK. While still not perfect in prioritising calls, the broader governance structures within trusts and local service centres and procedures form the backbones of the various dispatch procedures, many of which were commented to have supported critical management during the pandemic. The empirical findings support the extant literature, particularly Westerman's

revised digital transformation framework about the ‘business’ model, ‘customer’ experience, operations and employee experience. In the ambulance context, the *business* model is represented by the obligation to attend casualties despite risks and difficulties (albeit not a business in the commercial sense). The ‘customer’ (patient/public taxpayer) view was not sought other than from the service’s point of view which perceives it as being mixed due to both the violence described by some of the paramedics and the positive performance targets met. However, the last theme of emotions (such as pride/proudness), alongside the tangible support community (other blue-light services), has demonstrated the importance to keep wellbeing positive and manage it to work hand-in-hand with the digital transformation. This is particularly the case during the pandemic, as a special extreme context.

Is the implementation of the new NHS ambulance dispatch system an effective and successful digital transformation? The COVID-19 pandemic provided tough conditions under which to answer this question: additional protocols were implemented and ‘rushed through’ as some of the interviewees commented, to augment the new dispatch system, along with the feelings of sorrow and the staff distress, suggesting a *no* to this question. Alternatively, without the new system as the foundation, the pandemic would have been even more difficult to manage. Acknowledging continuous change models for the NHS as a learning organisation, digital transformation has served its function in providing a foundation for the unfolding and dynamic COVID-19 situation, on which new governmental guidance would augment and develop the dispatch system furthermore. Notwithstanding the mental health issues that already exist with extreme context workers, the answer can also be a *yes*.

How have extreme contexts, like COVID-19, escalated beyond normal working within ambulance services? The pandemic represented an exemplary extreme context, and in practice was also an extension of it. This means the existing literature, such as Rodriquez et al (2023), that had identified compassion and resilience in healthcare provision, have similar emotions in the UK ambulance context. The present research identified both physical processes and support systems to deal with such emotions, as well as other self-help mechanisms to relieve the stresses brought on by the pandemic. The parallel conditions, whereby the Westerman et al., (2014) categories of ‘customers’ and ‘employees’ (patients and paramedics) represented parallel situations of mortality (such as the spreading of COVID-19) that would otherwise would unlikely be the case in peacetime, both escalated the extreme condition for the workforce and augmented it to create a vicious cycle until the pandemic’s end. Given the uncertain and unplanned nature of the pandemic, this escalation was a temporary but potentially long-lasting arrangement.

Conclusion

In this study, we have brought together three important areas of literature: UK emergency (ambulance) services, digital transformation and extreme context working. The COVID-19 pandemic was used as the exemplar for the latter as well as a specific setting for specific examination. Rich commentaries around issues of emotions, the customer relationship and processes were identified, all of which have helped to answer questions around digital transformation of the NHS as an example of extreme conditions. We now end by addressing the interrogation mark (?) in Figure 1 to posit conceptually what our novel contribution is. We argue that Westerman and colleagues are right to recognise the imperative to incorporate the employee dimension within a digital transformation framework, which has otherwise been driven by leaders who are not serving at the frontline of provisions. These have been dominated by processes for planned efficiencies. The unique non-commercial context of

emergency services that is within the public sector, and which represents working in extreme contexts, has highlighted not just the existence of emotions that can hinder efficiency but also can be used to re-motivate the workforce and improve efficiency (eg. compassion). Performance management from a hard-statistics stance would neglect this. Additionally, no digital transformation framework has yet attempted to incorporate this aspect prominently, or at least examined the finer nuances of employee emotions. We also believe this is a useful direction for future research in digital transformation.

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Tables and Figures

Table 1: Summary of the research participants

Senior leaders (executive and non-executive board members)	08
Managers (operational and corporate)	13
Frontline crews (paramedics, technicians, and students)	20
Emergency Operations Centre staff (999 and 111 call handlers and dispatchers)	11



Figure 1: Research scope and contributions