The Journal of Military History and Defence Studies
Volume 6, No. 3. *Special Edition* (Summer 2025)
Maynooth Academic Publishing ISSN 2712-0171
http://ojs.maynoothuniversity.ie/ojs/index.php/jmhds

Using Low Tech Simulations to Enhance Defence Logistician Learning

Patrick Finnegan, Tony Clark, and Amy Mumby.

Wargames and simulations have a long pedigree in the training of defence personnel. This paper will discuss how educating defence logisticians at various levels of their careers demonstrates the need to alter some of our traditional practices. The experience of the authors shows the need to move away from traditional wargaming contexts and mechanics, such as zero-sum victory conditions or a focus on completion and competition. This paper provides evidence of positive outcomes for the logistics profession at different levels of career, and how different levels of study can take advantage of the same resources to achieve different effects. These effects will contribute to the current and future needs of British, and by extent Western, forces as they seek to do more with constrained resources in a world returning to peer competition. In its discussion of wargaming, this paper will highlight the importance of interpersonal skills in what we call the 'Future Defence Logistician', in doing so it will confirm the continued need for 'low-tech' or analogue training packages that buck the trend of increasing investment in digitalisation and the use of virtual reality environments. The events discussed in this paper will show the continued benefits of abstraction and interpersonal communication for both introducing new recruits to likely context or allowing more experienced members to share best practice with one another to support the wider organisation in a manner that builds professional networks and removes the need to add additional weight to constrained budgets.

At a time when technology plays an ever-increasing role in our lives and professions, especially through developments such as industry 4.0 (Moufaddal, Benghabrit, and Bouhaddou, 2019; Ivanov and Alexandre, 2020), this paper demonstrates the continued relevance of low tech, out-of-the-box, simulations (games) in educating defence logisticians. It provides evidence of positive outcomes for those engaging with in an academic-defence partnership to deliver PME by contract to logistics professionals at different levels of career. As a result, this paper highlights that while enhanced technology and advanced computer simulations are effective learning tools (Alzayed, McComb, Hunter, and Miller, 2019) at times taking advantage of table-based simulations or board games provides a better solution.

To achieve the above, this paper discusses the authors' experiences in working with different stages of British Defence Logistician training with a focus on how they use the game *Aftershock* within various contexts to support learning and professional competence. This paper will comprise a literature review, a discussion of the problems facing defence logistics, and how our research approach can provide some answers. This research focuses on what we label the 'Future Defence Logistician' (FDL). Our original data is drawn from the reflections of a cohort of students from Academic year 24/25 where we used *Aftershock* as part of their assessment. In using these reflections, we agree firmly with Barnhart (2021) when he says that one of the most important elements in this kind of exercise is 'allowing students to reflect upon their simulation experiences once the game itself concludes. Student postmortems often provide not just a summary, but often the epitome, of student learning experiences'.

Literature Review

In their work on logistics professionals, Mangan and Christopher (2005) developed the T-model for Supply Chain Management (SCM) and logistics to illustrate how the different skills and knowledge of a logistician interact. Simply put, the vertical element represents practical skills while the horizontal represents managerial aspects, focused on broader awareness and interpersonal skills. Clark (2024) has adapted this model by developing the central intersection to predict what the FDL will need to master. This can be found at Figure 1. Specifically, Clark highlights the need for increased 'People-centred skills' and an awareness of 'Management Information Systems', to provide the social and technical needs of future operations. Clark's findings highlight the need to maintain the horizontal skills of management and business to coordinate across the SC and the vertical, practical skills. However, to promote resilience, the intersection between vertical and horizontal requires greater awareness and experience with

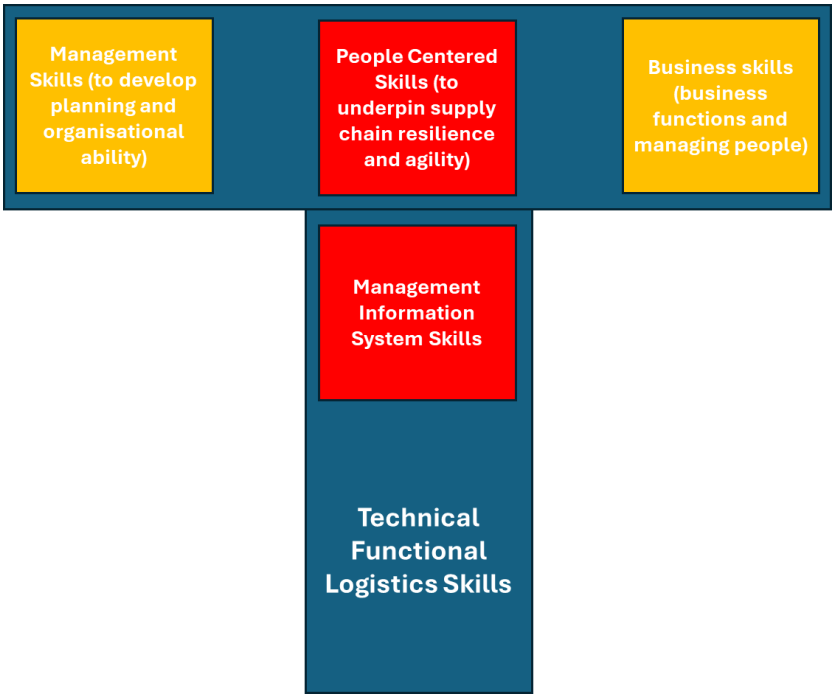

Figure 1. Clark's adapted T-Model

inter-personal attributes. This is especially the case in non-combat scenarios where inter-agency cooperation between military and civilian agencies is paramount.

These findings relate strongly with contributions already found in the literature, especially those drawing on internal perspectives of strategy and organisational behaviour, such as the Resource Based View (Barney, 2002; Lynch, 2021), and contributions attempting to open the black box of defence organisations (Kress, 2016; Strategic Command, 2022). The increasingly dominant view from researchers and practitioners is that stable, predictable, environments are a thing of the past (if they ever really existed) (Christopher, 2023; Strategic Command, 2022). The answer to an increasingly turbulent environment is partially technological but primarily a deepening of human capital reserves. In other words, a more capable body of people with assistive technologies (Prabhu, 2023, Luiz Carlos Roque, 2023 and Ramin et al, 2023). According to Clark's (2024) research, central to this is 'the ability to work within collaborative groups and build on the role of using data to manage the SC'. To answer Mangan and Christopher's (2015) call for a 'soft skills approach', teams will be required to work together with the data that is available to them in emergent scenarios.

These observations then beg the question of how we build these abilities. Thankfully within this literature, there are already some suggestions. Perhaps the simplest but most important observation comes from Kovacs et al (2012) when they argue that knowledge creation stems from a combination of classroom and contextualised experience. This is precisely where we can make the best use of simulations. Members of the defence community are no strangers to simulations, exercises, or role-playing scenarios. Although many of these experiences, and our recording of them, focus on the combat arms, with the most dramatic cases replicating full-sized towns to allow formations to practice close-quarters battle (CQB) or in various sized 'battle preparation' exercises (King, 2013; King, 2021; Bury, 2019), simulation can be found at every level of training and in every element of the force. A central tenant of all these experiences is to try to bring to life the abstract lessons being taught. In a philosophical sense, instructors go to great lengths to make these exercises, from full scale exercises to the smallest briefing in a forest block (Figure 2), meaningful in a sociological sense. For those involved, the rock on the ground representing a house, or a flag standing in for an objective is *the real thing*. Through this, instructors are drawing on Bourdieu's (2005) idea of habitus and symbolic power. This might sound extreme, but especially for those in the combat arms these exercises matter as the relate to the use of force.

While there is limited literature on field-based simulations, there is a greater body to draw upon for classroom-based options, the most significant contributions coming from the likes of Peter Perla and Philip Sabin. The simulations used in this research are not historical in nature nor do they focus on direct conflict and competition. This sets them apart from most simulations discussed in the literature which are historically based and conflict driven. Many premade games focus on the violent episodes of our history, but it is important to note that they do not need to. Barnhart (2021) does advocate the inclusion of some kind of conflict to give meaning to the exercise to 'force students to advocate, debate, and choose sides', but

Figure 2. Squad level briefing, simulating the immediate battlefield. Taken by Author.

there are other ways. Some of these are prompted by debates among historians about the inherent value and the utility of considering 'what ifs?' (Buckley, 2021; Cowley, R. ed., 1999; Ferguson, 2008). Even though the authors differ from Barnhart in this regard, we do value his central argument that a useful simulation will include careful consideration of student roles, simulation rules, participation requirements and success conditions, room layout and facilities, and the role of the instructor.

From an instructor's perspective, classroom simulations share the same desire as those conducted in the field. The intention is to get the students to feel like it is real, and they are living the role they have been assigned (Buckley, 2021; Barnhart, 2021), which will in turn influence how they think, act and engage with one another. Also key within the literature on simulation is following up the activity with a serious debrief or reflection. This is especially the case if learners have gotten wrapped up in trying to win. As is often the case, students involved in these events view the challenge as needing to do better than their historical counterparts and outdo one another (Barnhart, 2021). A key initial finding from our work, is the importance of not focusing on the completion of the scenario, in not encouraging them to win, but to participate with awareness. A final note derived from this literature, is that to remember that regardless of how serious the simulation is attempting to be, it is still a game, it is imaginary and should be enjoyable rather than punishing. Otherwise, participants will not truly engage and learn (Barnhart, 2021). These exercises are about getting them 'to think about how and why command decisions are made', not punish them for mistakes (Buckley, 2021, 3). For this research we must abide by these principles within the specific context of British defence training but also a contractual relationship between defence and our Higher Education Institutes.

Research context and approach

This research seeks to contribute to achieving the UK's current aspiration of a people-centric logistics system, enhanced but not dominated by technology (Strategic Command, 2022). As such it must contribute to the best education possible to a smaller and smaller establishment, within a more complex environment. In some instances, this has led British defence training down a path which relies extensively on high-tech simulations, including projects the authors are involved with. An example is the two-pronged approach of the Royal Navy investing heavily in virtual training systems to ensure its newest members are given the best training possible in the time available. While also ensuring in phase two training they are exposed to dedicated 'realistic working environments. These are staged replicas of warehouses, ship's kitchens, etc. Counterintuitively, this presents a situation where training transitions from highly advanced, digital training environments to accurate but often mundane spaces. Those who rise sufficiently in rank will proceed to staff training and engage in more abstract war games and tabletop simulations designed to represent the command. This forces learners to develop their mental rather than technical ability.

The authors of this paper encounter most of their students in these mid to latter stages, immediately following their exposure to the 'realistic working environments' or as they make steps towards becoming staff officers. This provides a student body with substantial amounts of experience, often with limited academic grounding. The implication of this is that these learners can at times be sceptical of academic practices, as detached from reality, but those who do engage often bring with them far greater ability to connect the theory used in the lessons/games to the reality of their professional experience. The challenge in the classroom that spills out of this is to discipline the activity and to direct the various discussions and reminiscences towards the shared learning objective. These objectives in turn need to fulfil defence requirements while maintaining academic standards.

Accepting the argument that logistics require both technical knowledge and social skills, this research has used the out of the box game called *Aftershock* to balance these demands. *Aftershock* was a deliberate choice as it is set within a humanitarian crisis, rather than a conventional conflict scenario. Different teams play different factions in a fictional east African state, Carana, that has been devastated by an earthquake. The factions are: Local Government, the UN, Military Assistance Teams from neighbouring states, and NGOs. The game lacks a traditional adversarial mechanic. Players either lose collectively, through generally poor performance, or by allowing the local government team to lose. This aspect drives cooperation amongst the diverse teams, although it is complicated by a sub-mechanic that allows only one team to claim overall victory should the game end positively with the local government team ending with a positive score.

Figure 3. Aftershock set up.

Adopting a subjectivist approach this project has conducted a series of games with different audiences to establish the utility of a pre-packaged game designed for and by logisticians. The primary researcher has used *Aftershock* for several years in different institutions and with a variety of different students, primarily civilian students interested in strategy and decision making. While in more recent year, several sessions have been conducted with those who the game is ultimately designed for, members of the armed forces and civil service who will need to deal with a humanitarian crisis. Defence-based populations allowed for a deepening of the research process as the discussion became much more focused and relatable to the work experiences of the participants. This paper is based on both direct provision of simulations and observations of others delivering the content. This allowed the researchers to gather information from both their own experiences as educators but also through observation of logistics professionals.

Central to our approach is that we are more interested in the social interactions between participants rather than the ultimate game outcome. The game's mechanics focus upon the logistics profession and the intent is to draw the students in by connecting the game to their jobs. Students tend to initially focus on playing and winning. The delivery team focuses on their decision making, interpersonal skills, and professional judgement. The team have run this exercise with various cohorts including an invitation to work with junior RAF Logistics Officers (Figure 4). With this junior cohort, the level of experience in the room was comparatively limited. But they benefited from input from training staff, who provide real world examples illustrating the importance of abstract ideas represented in the cards. Figure 4 captures the initial turn in the game. No student-officer had experienced HADR interventions and often questioned the topics represented on the cards, such as celebrity visits, social unrest, or the role of the media. The instructing staff were invaluable in bringing these to life and demonstrated to us the benefits of defence-academic partnering. This iteration of the

Figure 4. Aftershock being used in Initial Officer Training with the RAF.

game involved much more direct participation from the researchers, as the training staff had not used the game themselves previously.

The remainder of this paper will highlight reflections from the most recent cohort to play, comprising mid-career defence and civil service personnel with various degrees of real-world experience of disaster relief. These sections will highlight reflections from the cohort showing how they derived benefits from of low-tech, abstracted, games rather than high-fidelity replications of specific platforms.

Reflections from participants

Prior to the game, students received a series of lectures on HADR and engaged in relevant group activities. A primary theme was the importance of the 3Cs (Coordination, Cooperation, and Collaboration) and the benefits of using the UN's Cluster approach. Students were all pre-warned that the game would be part of their assessment and were free to look up information in advance. They were not encouraged to do so, as the advice from the game developers is to limit pre-briefing to recreate the confusion and urgency found in real life event. The following paragraphs highlight several common themes but also some individual observations. Initials have been used to quote participants while maintaining their anonymity. Students were of various ages, genders, services, rank and backgrounds, providing a representative example of the defence establishment. While they were all defence professionals, they had different opinions, priorities and ideas, resulting in various perspectives being raised throughout. For instance, the group representing the NGO collectively represented over fifty years of military experience including as part of the humanitarian effort (Student ZF).

Preparation and play

Mirroring the confusion that faces HADR responses (Ishikawa, 2015), many of the students highlighted their lack of preparation. Some put it nicely through language such as 'there was an air of bewilderment' (Student TB), others were blunter. Student GK, part of the HADR team, claimed that 'it was clear that no one had read the rules or really had any idea about where best to provide initial people and aid supplies'. Understanding the rules in any situation is clearly important (Altay and Green, 2006) and this became a salient point in reflections. Student CBM confirmed that their team's 'first failure was not reading the game's rules, which resulted in a lack of understanding of the game's requirements and the resources we had, causing panic, confusion, and desperation'. Other students reported similar reactions (Student POK), while some admitted that the 'rules of the game were readily available to all involved and all players were forewarned of the upcoming task well in advance of the day. However, much like those involved in crises where early warnings failed, we did not do enough preparation prior to the first roll of the dice' (Student RV). Uncertainty and confusion resulted in a poor initial turn, exacerbating these feelings, especially with how teams later in the turn sequence responded to the moves made by the leading local government team, describing their approach as containing 'gaps' (Student CBM), or how errors made affected the other teams: 'due to the [local government] failing to establish a communications hub, the NGO team was unable to collaborate or coordinate due to a lack of communication. Instead, the NGO made unilateral decisions on where and what resources to deploy' (Student RV). Usefully, the local government team recognised their early failures such as 'deploying aid without considering resource requirements, e.g., deploying shelter to areas that already had shelter, whilst overlooking the requirement to establish a communications hub' (Student RV) and tried to improve as the game progressed.

Thankfully students saw beyond frustration at the game mechanics and recognised the link these made to real world responses: 'I felt extremely frustrated and confused at the beginning of the activity because of the limited information we were given, which created a high level of chaos and uncertainty…I realised that feelings of anxiety and frustration were common experiences associated with the initial phases of all-natural disasters' (Student TB). Interestingly, some (Student ZF) highlighted that however stressful their initial activity might be, it 'must be acknowledged that the scenarios were played in a comfortable setting of a classroom and would not fully replicate the stresses and complications of a real time humanitarian crisis'. This is certainly true and may prompt cynical questions of how those who struggle in a calm environment would respond to the increased difficulty of real-world scenarios.

Logistics

Given that these students are logisticians, logistics weighed heavily on their minds. One account made the connection between logistics and success clear: 'Logistics uncertainty hindered decision-making and resource allocation, limiting the humanitarian supply chain' (Student POK). An essential part of defence logistics training is the achievement of Key

Performance Indicators (KPIs), while the game does not enforce any of these beyond general scoring, some students devised their own: scale of resources (food, water, shelter, or medicine), or the figures of those saved/at risk. Others focused less on material KPIs and more on organisational metrics (Kapucu, 2008; Alexander, 2015): including 'the effectiveness of communication and speed of at which emergency services were delivered' (Student TB). This was echoed by others (Student CBM) who claimed that 'our focus was primarily on the number of people, the locations, and the amount of aid, rather than the quality of aid that reaches the correct location at the appropriate time'. Some sought to fall back on their own practice which drove them in militarised directions including saturating the board with teams: 'Having personnel on the ground in the disaster zones as soon as possible' to enable 'a more accurate demand signal which in turn would improve SC effectiveness' (Student KL). Other contributors struggled to translate their KPI based training as the game lacked appropriate feedback systems, forcing them to adapt their practice (Student NS).

A minority sought to employ real world knowledge, having researched events such as the Haiti earthquake (Student GK). This preparation did not receive universal praise:

> The importance of impartiality when delivering humanitarian relief was also highlighted when a team member made a critical decision fuelled by emotions. He admitted to watching a video of the Haiti disaster before attending class (influencing his decision) which was in direct contrast to the fundamental principles of the International Committee of the Red Cross, which states that all victims of a disaster must be treated equally irrespective of Gender, Nationality, Race, Class or Religious belief (Student TB).

Regardless of whether influence from previous crises helped, many reflections showed that engaging with a game designed around their profession, rather than a generic conflict scenario, allowed them to grasp ideas more readily. Although logistics is at the heart of this game, many students focused on another element: the media.

The media

Aftershock includes a token representing the media. There is a chance that the media amplifies positive or negative actions in its current location. It may also play no role at all given the random nature of events in the game. Teams tend to build their strategy around the media, thinking it will serve them well or they ignore it all together, a minority simply see it as a source of anxiety. These responses played out in this iteration. The HADR team recognised the various roles the media could play and sought to manipulate it (Student GK) while others took longer to grasp it: 'Due to a fear of negative publicity, the team took a while to consider the importance of the media' (Student CBM). This anxiety saw some students exaggerating the power of the media, expecting temporary failure to be more harmful than it would be. This meant they prioritised areas where the media were present *because the media were present*: 'The group also considered that it would be representationally harmful and cause unrest if the organisations which are supposed to deliver aid essentially sat in a Headquarters

and not physically delivering aid; even having a small representation on the ground can signify that help is on the way' (Student KL).

These kinds of strategies became increasingly telling, with various teams differing on how to deal with the media. Many became concerned with how the NGO team prioritised it (Student RV). The UN team provided an interesting account of this:

> Whilst in the cluster, the teams discussed whether to place people and supplies within the area where the media were present to showcase the good work that stakeholders were doing, suggesting media exposure was the best means of measuring success of the relief effort. However, my moral compass led me elsewhere, believing that the media should be an afterthought as opposed to the main reason for delivering aid to that area. Whilst playing the game, I felt that the social and political aims of the aid relief were starting to take over the immediate need which was saving lives (Student MM).

In comparison to previous, civilian focused sessions, the media played an outsized role, with one student claiming that competing for the media's attention acted as a proxy for the conflict mechanic missing from the game (Student RV). Perhaps this was due to the personalities in the room, or perhaps it was due to the caution defence personnel reserve for the media.

Clusters, cooperation and people centred skills

The main learning outcome was the importance of the 3Cs and the UN's cluster approach. This connects to our wider research interests around the FDL. As highlighted in the literature review, one of the expected criteria for successful defence logistics in the future will be interpersonal skills in increasingly complex and multi-agency environments. *Aftershock* encourages but does not force teams to work together. The goal of the session as to encourage this but the teaching staff could not direct teams to do so. This resulted in a mixed but eventually positive approach taken by the learners.

Although some students did not report feelings of stress or confusion (Student JG), this was not the norm and the initial confusion in the scenario saw the players struggle to cooperate. This echoes Tatham and Christopher's (2018) findings, with one account (Student POK) reporting that 'actors solely focused on winning the game, leading to a lack of coordination, cooperation, and collaboration, causing delays, disagreements, a lack of focus, and significant duplication of efforts'. Their points were supported by others: 'This lack of communication sometimes led to misaligned efforts and duplicated actions which could have been avoided with better information sharing' (Student NS). Rather than competitiveness, other teams identified internal dynamics as a barrier, including rank, even though our environment was 'uniform free'. This resulted in the more experienced holding back in favour of higher ranks, such as in the local government team where a lower ranked member was 'more experienced…having participated in multiple HADRs as an RAF mover' (Student MM).

In deciding whether to engage with the cluster approach teams encountered one of the main tensions in HADR: delivering as much aid as quickly as possible, at the risk of waste

and errors, or taking the time to coordinate and plan, possibly at the expense of the most vulnerable. One student highlighted this at the centre of their reflection: 'the first few teams decided to establish their presence in the clusters as an initial 1st response on the basis that this would promote C3. However, this did not deliver immediate aid which is the main object of humanitarian aid mission' (Student KL). For some it took failure to highlight its importance: 'the local government was disoriented…their primary goals were to preserve human dignity, save lives, and lessen suffering…they were unable to determine how best to allocate their resources to accomplish this…The local officials' attempt to prioritise placement of individuals…was key to identifying the significance of coordination cells' (Student CBM).

The overall situation is summed up well by the following: 'The players spent a lot of time acting very self-centred, but after some guidance from the tutor, we eventually realised that the operational objectives and aspirations of our individual organisations can only be advanced and attained through collaboration' (Student CBM). It was the eventual interjection of the facilitator that helped guide the students towards effective use of clusters, reinforcing Barnhart's (2021) point that these events should not punishing, students failing needlessly does not promote learning. Sometimes facilitators are required to step in. Thankfully the teams rallied, with one pointing out that 'decision-making of stakeholders improved during the game as more information became available' (Student TB).

Perhaps the most interesting aspect of the cluster approach is how it drew thinking into the open to be challenged. Some disputes went unresolved with multiple parallel strategies: 'local government prioritised the rebuilding of hospitals, while the NGO's pushed for immediate food distribution causing delays in actions' (Student NS). More serious tensions were also brought to light, including challenges to where and why aid was being distributed. Some accounts showed how the cluster approach could be a way to resolve the issues:

> My team was conflicted on where to distribute our aid; widely or in one area. Both the slum and the middle-class areas were most in need which inevitably started a debate as players had contradicting views. The argument appeared very class based, indicating there was bias seeping into the decision-making process thus contravening the humanitarian principle of impartiality…This debate did, however, lead my team to realising that we should move someone into the cluster to enable C3, where a more diverse approach could be applied (Student MM).

While others showed how the clusters could result in targeted criticism:

> I as NGO leader decided to mobilise resources to facilitate the protection of vulnerable people before any demand was actually reported or realised. Some of the group saw this as a waste of resource, whilst others agreed to mitigate and minimise a likely consequence of the disaster before it materialised was preferable to waiting for the inevitable to occur…my actions did prevent a negative event occurring further in the game. Some of the group pointed out that my decision could be biased as I am female and mother of two young children. Whilst this might partially be true, I believe my decision was based on my knowledge of recent reports of disasters (Student KL).

Considering the cluster approach, some offered light praise: 'the UN cluster approach worked ok, chaotic at times, but it facilitated discussions and appropriate responses to be made' (Student JG). Some clearly identified the benefits of the lessons they had been taught earlier: The game 'highlighted the importance of establishing a command centre in the cluster areas to coordinate…the game underscored the need to foster a unified response effort amongst all stakeholders to work collaboratively to reduce wastage and improve the overall impact of the relief effort on the lives of the victims' (Student TB).

Usefulness for individual and group learning

The final aspect worth discussing is what the students thought about the experience as a learning tool. Usefully for us, some of the students identified areas of growth. Some included decision making, for those who 'made some panic decisions during the game due to pressure' (Student NS). For others it was a need to work on information sharing and stakeholder engagement (Student MM; Student NS), reflecting the findings of Christopher and Tatham, (2018). Some simply claimed that 'this game reiterated what I already knew about the complexity, uncertainty, and associated with humanitarian relief' (Student TB), which is understandable given their roles. Positively, this same student highlighted that 'The great lessons that I learnt have enriched my ability to support disaster response operations in a manner that provides help, which is well-coordinated, collaborative, and supportive of local authorities' (Student TB).

There were some unexpected considerations in these reflections, including the role of the military in HADR. This occurred as we were asking most of our students to adopt non-military persona while allowing a small number to remain in that mindset. As might be expected the HADR team were very confident in living their actual roles. This allowed others to perceive how they might be seen by others: 'The UN and the NGO were very good at "cooperation" of the stakeholders. The military were very keen to get involved and were very vocal in what they wanted to do not necessarily understanding the context' (Student JG). Others noted that 'Whilst the HADR-TF did not negatively impact this game, it is clear how uninvited or self-initiated participants' presence could hinder a relief effort' (Student MM). Although limited, this exposure to being the 'other' spurred some of the cohort to reconsider how they deal with civilian partners.

Conclusions

This paper argued that although investment is taking place to digitise the training space, physical materials remain important. The real benefit of these simulations was not their completion but how they catalysed discussions between, especially when instructing staff have experiences in the content. With the above cohort, the facilitator was a veteran of humanitarian interventions who has since become an academic, engaging students with targeted questions and vignettes. We followed the developer guidance of a strict time limit and limited initial information. This is designed to create chaos and to inject pressure, which clearly had an influence, but it perhaps had an additional physical impact. One member of the

HADR team, a strong student in traditional settings, physically isolated themselves from the group, standing apart and eventually on top of furniture to literally gain better visibility of the scenario and the participants. They remained in this position for a short time before returning to their team with suggestions. When asked why they were doing this, their responses suggested that the need for physical dislocation stemmed from the mental adjustments needed to engage with the pressured scenario. This is something that those planning similar sessions should consider.

Our experiences show that winning a scenario does not really matter, even finishing a scenario is relatively unnecessary. Once students are engaged with the process, and discussion is flowing with debates taking place, the simulation is serving its purpose. To develop people centred logisticians, the use of these simulations, cheap and low tech as they are, is a vital vehicle to ensure that these interpersonal skills are exercised in a constructive and directed manner. A reliance on individual simulators may develop technical skills, but to develop a people centric, resilient capability will require the continued and deepening use of traditional materials. The best option will be an appropriate balance, but practitioners and educators must exercise caution when tempted by the allure of high-tech options. At the very least, these options offer the benefit of avoiding vulnerable digital infrastructure and the need for constant connectivity.

References

Alexander, David E. "Disaster and emergency planning for preparedness, response, and recovery." Oxford University Press, 2015.

Altay, Nezih, and Walter G. Green III. "OR/MS research in disaster operations management." European journal of operational research 175, no. 1 (2006): 475-493.

Barney, J. (2002). Resource-based theories of competitive advantage: A ten-year retrospective of the resource based view. Journal of Management, 27, 643–650

Barnhart, M.A., 2021. Can You Beat Churchill?: Teaching History Through Simulations. Cornell University Press.

Buckley, J, (2021) The Armchair General Can you Defat the Nazis?, London, Century.

Bury, P. (2019), Mission Improbable The transformation of the British Army Reserve, Hampshire, Howgate.

Clark, T. 'The Future Defence Logistician', Logistics Research Network 2024 conference paper (unpublished).

Cowley, R. ed., 1999. What If? Military Historians Imagine what Might Have Been. Pan Macmillan.

Dmitry Ivanov & Alexandre Dolgui (2020): A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0, Production Planning & Control, DOI: 10.1080/09537287.2020.1768450

Ferguson, N., 2008. Virtual history: Alternatives and counterfactuals. Hachette UK.

Ishikawa, Akira. Uncertainty and catastrophe management: the 2011 Great East Japan Earthquake and beyond. World Scientific, 2015.

Kapucu, Naim. "Collaborative emergency management: better community organising, better public preparedness and response." Disasters 32, no. 2 (2008): 239-262.

King, A., 2013. The combat soldier: Infantry tactics and cohesion in the twentieth and twenty-first centuries. OUP Oxford.

King, A., 2021. Urban warfare in the twenty-first century. John Wiley & Sons.
KOVÁCS, G., TATHAM, P. and Larson, P. (2012), What Skills Are Needed to be a Humanitarian Logistician. Journal of Business Logistics,33 (3), pp. 245-258.

KRESS, M. (2016), Operational logistics: the art and science of sustaining military operations. Second Edition. Cambridge, Springer.

LUIZ CARLOS ROQUE JÚNIOR, FREDERICO, G.F. and MAYKON LUIZ, N.C., 2023. Maturity and resilience in supply chains: a systematic review of the literature. International Journal of Industrial Engineering and Operations Management, 5(1), pp. 1-25
LYNCH, R. (2021), Strategic Management, 9th edition, Middlesex, Sage.

MANGEN, J. and CHRISTOPHER, M. (2005), Management development and the supply chain manager of the future. The International Journal of Logistics Management, 16(2), PP178-191.

Moufaddal, Mariam, Asmaa Benghabrit, and Imane Bouhaddou. "Industry 4.0: A roadmap to digital Supply Chains." In 2019 1st International Conference on Smart Systems and Data Science (ICSSD), pp. 1-9. IEEE, 2019.

Peacock, Walter Gillis, Hugh Gladwin, and Betty Hearn Morrow. Hurricane Andrew: Ethnicity, gender and the sociology of disasters. Routledge, 2012.

PRABHU, M. and SRIVASTAVA, A.K. (2023), Leadership and supply chain management: a systematic literature review. Journal of Modelling in Management, 18(2), pp. 524-548.

RAMIN, S.A., MAJID, B.K., PASBAN, M. and ROSTAMZADEH, R., 2023. A systematic literature review on supply chain approaches. Journal of Modelling in Management, 18(2), pp. 372-415.

STRATEGIC COMMAND DEFENCE SUPPORT. (2022), Defence Supply Chain strategy.

TATHAM, P., WU, Y., KOVÁCS, G. and BUTCHER, T. (2017), Supply chain management skills to sense and seize opportunities. International Journal of Logistics Management, 28(2), pp. 266-289.