Original Article

WAR IN HISTORY

War in History
1–20

DOI: 10.1177/09683445241231654
journals.sagepub.com/home/wih


Know Thy Enemy and Know Yourself – The Role of Operational Data in Managing the Mines and Booby Trap Threat in Vietnam, 1965–73

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Abstract

Victim operated explosive devices (VOEDs) such as mines and booby traps, have been an enduring problem since their large-scale use started in the 1940s. While the overall problem is often known about in general terms, the real complexion of the problem was not necessarily fully appreciated. Eventually the need to understand the problem and the response to it was partially identified and acted upon in Vietnam through the collection and analysis of operational data. This did not solve the problem of mines and booby traps, but it did offer a means to better manage the threat.

Keywords

IEDs, landmines, booby-traps, anti-personnel mines, anti-vehicle mines.

> *'Know thy enemy and know yourself…. When you are ignorant of the enemy but know yourself, your chances of winning or losing are equal. If ignorant both of your enemy and of yourself, you are sure to be defeated in every battle'.*[1]

1 Sun Tzu, *The Art of War* (Hertfordshire: Wordsworth, 1999), p. 91.

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Introduction

The Vietnam War remains an example of one of the most successful applications of mine warfare in history. In a conflict that veered between a counter insurgency and full-scale war, the Viet Cong, and to a some extent the North Vietnamese Army (NVA), used mines in a highly effective manner. One 1969 U.S. analysis stated that the Viet Cong did 'have a specific mine doctrine, which, in U.S. terms, is nuisance mining in its extreme application'.[2] In 1973, in the immediate aftermath of the war, Lieutenant General John H Hay, a former corps commander in Vietnam, wrote that 'considering the magnitude of the enemy's efforts in mines and booby traps, U.S. experts failed to find the answer to the problem of how to counter them'.[3] It was recognised in the same year, after almost a decade of attempted counter-mine innovation during a counter-insurgency, that 'a need exists to develop an easily applied, reliable, and effective means to detect mines and booby traps hidden or camouflaged in field environments'.[4]

While mines and booby traps had been used extensively in guerrilla conflicts before the U.S. war in Vietnam, notably during the attempted French counter insurgency two decades earlier, the scale of nuisance mine warfare in Vietnam was arguably unprecedented. As the Deputy Commanding General of Military Assistance Command Vietnam (MACV) wrote in a letter to the Chief of Research and Development of the U.S. Army in July 1969, 'Vietnam has seen the emergence of mines as a major weapons system, used on a scale, relatively speaking, never before encountered'.[5] The Viet Cong employed 'mines and boobytraps as a key weapons system in offensive and defensive roles and to interdict movement of U.S. and Allied Forces throughout the Republic of Vietnam (RVN)'.[6] By 1973 mines and boobytraps were specifically characterised as 'casualty producing devices',[7,8,9] indicating their role as a means of attrition

2 Viet Cong Boobytraps, Mines, and Mine Warfare Techniques. December 1969. Department of the Army Training Circular. TC 5-31. Headquarters. Department of the Army, p. 5-1. US Military Manual Collection. (USMMC).

3 J.H. Hay, *Vietnam Studies. Tactical and Material Innovations* (Washington, DC: Center of Military History Publication, Department of the Army. 1974), p. 181.

4 J.L. Maxey, Identification of Potential Characteristics, Aptitudes, and Acquired Skills Involved in Human Detection of Mines, August 1973, p. 5. Office of Chief of Research and Development, Defence Technical Information Center (DTIC).

5 Deputy Commanding General, Vietnam to Chief of Research and Development, Department of the Army. 29 July 1969. Quoted in P.W. Carroll, 'Mine and Boobytrap Warfare: Lessons Forgotten', 29 February 1988. pp. 18–19, U.S. Army War College, DTIC.

6 Viet Cong Boobytraps, Mines and Mine Warfare Techniques. December 1969, p. 1–1, Department of the Army Training Circular, Library of the Marines Corps (LMC).

7 J.L. Maxey, A Study of Factors Affecting Mine and Boobytrap detection: Subject Variables and Operational Considerations', June 1973, p. 3. Office of Chief of Research and Development, DTIC.

8 Mine and Tunnel Dog Training and Employment, March 1973, p. 61. Headquarters, Department of the Army, LMC.

9 The Story of a Booby Trap Casualty, Inclosure 7, Monthly Mine and Booby Trap Report, 09 May 1969. 9th Infantry Division, National Archives and Records Administration (NARA).

against any outside force that tried to manoeuvre or even dominate ground. Some have even characterised landmine use in South Vietnam as 'the dominant form of warfare'[10] during the conflict. By 1977 one officer lamented in the U.S. Army Journal, Armor; 'the pages of the Vietnam War are indelibly etched with the grim and painful lessons of the impact of mine warfare on our mobile and most often numerically superior forces'.[11] 'A new mine warfare doctrine, one which is simple, efficient and viable, is vitally needed'.[12]

Within this context elements of the U.S. military would slowly understand the value of operational data in relation to the mine and booby trap threat. The growing urgency of casualties combined with an inability to defeat the insurgency led to a reconsideration of whether the Army or Marines really understood this form of warfare in the way they had assumed. Anecdotal accounts, often included in official reports, certainly provided a view of the problem. But such evidence, while valuable, was always susceptible to personal bias, or potentially censorship by the chain of command. An opinion or a percentage estimate was never a substitute for the conscientious collection of operational data concerning the mine and booby trap threat. That is, data not only describing every relevant aspect of the devices themselves, including where they were found, but also data on how the items were found and removed, and if the devices did function, data on the casualties they caused. For in the absence of a technological solution, the only positive action left is to maximise the effectiveness of operational procedures, and this can only ever be achieved through a keen sense of the problem and the response. Operational data required effort from units but was eminently achievable. It was not a silver bullet, but it held the prospect of a greater positive effect than a technological solution that never really materialised and still hasn't to this day.

Literature Review

While the collection and use of data by the military during the Vietnam conflict has been subject to extensive study, little attention has to date been paid to the collection of pertinent data in relation to mines, booby traps and victim operated IEDs. This is not only true of the Vietnam conflict, but also of the use of VOEDs throughout history. While there are a range of primary sources detailing the operational data response to VOEDs, they have not yet been analysed in secondary literature.

The first mention in secondary literature was by the erstwhile commander of the 9th Infantry Division, Major General Ewell, and his Chief of Staff, Major General Ira Hunt. Published in 1974, Sharpening the Combat Edge, claimed that the 9th Division had from 1968 collected and used data successfully in order to counter the insurgency in the delta region, a vital agricultural area for South Vietnam. Ira Hunt would repeat

10 C. Barron, 'The Strategic Impact of Improvised Explosive Devices in the US Military' in S. Von Hlatky and H. Christian Breede (eds.) *Going to War? Trends in Military Interventions* (Montreal: McGill-Queen's University Press, 2016), p. 58.

11 Major D.H. Starr, 'This Land is Mine Land – Or Should Be!', *Armor* 86 (1977), p. 44.

12 Starr, 'Or Should Be!' p. 44.

his claims of success against VOEDs in his 2010, 'The 9th Infantry Division in Vietnam: Unparalleled and Unequalled'.[13] Ian Jones' Malice Aforethought – A History of Booby Traps,[14] quotes Sharpening the Combat Edge, briefly referring to its collection and use of data. Greg Lockhart's The Minefield: An Australian Tragedy in Vietnam touches on a form of operational data collection detailing how M-16 mines that were retrieved by the Australians from the Viet Cong had their serial number checked and cross referenced with those originally emplaced in an Australian minefield. Estimates of casualties due to the Australians mines could then be deduced.[15]

Thomas Thayer 1984 War Without Fronts was the first real critical analysis of the overall use of data during the conflict.[16] While undoubtedly an important study, it did not cover the use of data to try to combat VOEDs. Gregory Daddis's 2011 No Sure Victory,[17] is perhaps the foremost study of the overall use of data during the Vietnam War. Daddis shows that while the intent was for data to measure 'progress and effectiveness', the overabundance of data collected of varying quality could lead to less clarity, not more.[18] He shows that while data collection by the military in Vietnam should not be simply dismissed as focusing on body counts, its effectiveness was not what could be expected given the resources expended in its collection and analysis. While Daddis' study is comprehensive, it does not cover the efforts to capture data on the mines and booby trap problem.

U.S. Understanding of the Mines and Booby Trap Threat Prior to the Conflict

It would be incorrect to say state that the U.S. military were blind to the threat of mines and booby traps immediately prior to the Vietnam War. However, it would also be incorrect to state that they were in any way adequately prepared for a way of warfare that would generate an inexorable flow of casualties and would limit their ability to manoeuvre on and control ground while providing minimal 'conventional' targets against which the U.S. military could retaliate. There was an underlying realisation of the potential significance of this threat before the conflict, but not in a way comparable with the urgency the threat engendered once it became a key 'casualty producing' method of the insurgents.

From May 1964 until July 1965, the United States Office for Naval Research sponsored a Mine Advisory Committee of the National Research Council to conduct a study of the use of mines in all forms including naval mines, and methods of countermine,

13 I. Hunt, *The 9th Infantry Division in Vietnam: Unparalleled and Unequalled* (Lexington: The University of Kentucky Press, 2010), p. 69.
14 I Jones, *Malice Aforethought. A History of Booby Traps from World War One to Vietnam* (London, 2004), pp. 252–55.
15 G Lockhart, *The Minefield. An Australian Tragedy in Vietnam* (Crows Nest NSW, 2007), p. 238.
16 T Thayer, *War Without Fronts: The American experience in Vietnam*, (Annapolis, 1985).
17 G Daddis, *No Sure Victory*, (Oxford: Oxford University Press, 2011).
18 Daddis, *No Sure Victory*, pp. 8–9.

in the context of 'Guerrilla Warfare', now more commonly referred to as counterinsurgency.[19] Guerrilla warfare was identified as 'the predominant form of armed conflict throughout the world since 1946'.[20] The various problems of mine warfare during a guerrilla campaign were identified as 'critical'.[21] Crucially, with perhaps an impressive level of foresight, the authors asserted that 'in the hands of the guerrilla the mine assumes more of the attributes of a strategic than a tactical weapon'.[22] Possibly reflecting the greater tolerance of military casualties that existed before Vietnam, the analysis identified the strategic impact of mines as deriving not so much through steady attrition, but through the inhibition of manoeuvre. 'The control of movement, in which the government forces are increasingly discouraged from frequent contact with large sections of the populace is, in the opinion of Project PEBBLE, the single most important objective of the mine as used by the guerrilla forces. Clearly the Viet Cong have all too frequently achieved this objective. Therefore, Project PEBBLE takes the position that mines…do pose a major threat'.[23]

Casualties – Ground Troops

Mines and booby traps started inflicting casualties on U.S. ground forces almost immediately. One Marine Corps study states that 'the number of marine casualties, perhaps better than any other example, illustrates how effective the enemy is with these devices. Marines landed in force in South Vietnam during March 1965 and during the first months of fighting approximately 65–75 percent of all Marine casualties were caused by mines and boobytraps'.[24] By March 1967 the New York Times reported that 'marines at Danang, were plagued by complicated devices'. 'Few United States Marines in South Vietnam question the thesis that booby traps and mines are the guerrilla's most valuable weapons'.[25] One analysis claimed that 'in 1967 enemy mines and boobytraps caused 4,300 casualties and approximately 70% of the combat losses in tanks and armored personnel carriers'.[26] Mine and booby trap courses were established in units across the country. As the 4th Infantry Division school asserted in August 1967, 'units

19 A Study of Mine and Mine Countermeasures. Operations in Guerrilla Warfare, Volume III, Bibliography, Project Pebble, November 1965, p. ii. Mine Advisory Committee. National Academy of Sciences. National Research Council, DTIC.

20 A Study of Mine and Mine Countermeasures. Operations in Guerrilla Warfare, Volume I, Assumptions, Conclusions and Recommendations, Project Pebble, November 1965, p. I. Mine Advisory Committee. National Academy of Sciences. National Research Council, DTIC.

21 Project Pebble, Volume I, November 1965, p. iii, DTIC.

22 Ibid, p. 5, DTIC.

23 Ibid, p. 5, DTIC.

24 Professional Knowledge Gained from Operational Experience in Vietnam, 1969. Special Issue. Mines and Boobytraps, p. 1. Fleet Marine Force Reference Publication (FMFRP 12-43), LMC.

25 Booby Traps Take High Vietnam Toll. 30 March 1967, New York Times, p. 1.

26 Carroll, 'Lessons Forgotten', p. 8, DTIC.

will conduct training in order to reduce casualties caused by enemy mines and booby traps'.[27] In April 1970, following Operation Randolph Glen, the 101st Airborne Division After Action Report identified 'an emphasis on the enemy's part of using booby traps as an effective means of inflicting friendly casualties'.[28]

Speaking in front of the House Armed Services Committee in April 1971 General Gribble, the Army's Chief of Research and Development, stated that a 'detailed review of statistics from Vietnam during the calendar year 1968 would reveal that approximately 25 percent of the casualties during that period – maybe a little less than that – would have been from mines and booby traps'.[29] Casualties from mines and booby traps were widely referred to as a direct causal factor in the My Lai massacre by soldiers of the 23rd (Americal) Infantry Division in March 1968. During a congressional hearing in February 1972 a New Yorker article by Seymour Hersh was quoted claiming that 'more than ninety per cent of the Americal Division's combat injuries and deaths in early 1968 resulted from Vietcong booby traps and land mines'.[30] In March 1968 the command team of the 26th Engineer battalion estimated that 'mines and boobytraps represent about 46% of the total casualties with about a 50–50 split between the two'.[31] A 1969 Marine Corps study stated that 37.7% of all Marine casualties 'were caused by the accidental detonation of a mine or boobytrap'.[32] MACV assessed the impact in stark terms. 'Mine and boobytraps continued to account for a major portion of US and FWMAF casualties in 1969. In addition to creating intolerable constraints for tactical and logistical operations, clearing operations for mines and boobytraps were extremely hazardous and required excessive time and resources'.[33]

There is some evidence to suggest that the casualty rate from mines and booby traps climbed as the U.S. involvement in Vietnam wound down. The 1st Marine Division conducted a tour of duty in Quang Nam Province to the south of the city of Da Nang from late 1969 until early 1971. By this time this was the only marine division in Vietnam, as responsibility was increasingly turned over to the Army of the Republic of Vietnam

27 Establishment of Mine and Booby Trap Confidence Courses, 25 August 1967, p. 1. Headquarters, 4th Infantry Division, NARA.

28 Combat After Action Report – Operation Randolph Glen. 04 April 1970. Headquarters 101st Airborne Division. pp. 1–3.

29 Hearings, Reports and Prints of the House Committee on Armed Services, 02 April 1971, p. 4060.

30 Seymour M. Hersh, 'A Reporter at Large – Coverup I.' *New Yorker*. 22 January 1972. Submitted to the Congressional Record by Congressman Samuel S. Stratton, Representative of the 29th District of New York. Congressional Record. Tuesday 08 February 1972, p. 3233.

31 Detection and Avoidance of Mines and Boobytraps in South Vietnam, March 1968, p. 3. Human Resources Research Office (HUMRRO), DTIC.

32 Professional Knowledge Gained from Operational Experience in Vietnam, 1969. Special Issue. Mines and Boobytraps, p. 1. Fleet Marine Force Reference Publication (FMFRP 12-43), LMC.

33 Command History 1969. Volume III. 30 April 1970, p. XII-18. Headquarters. United States Military Assistance Command, DTIC.

(ARVN). In the calendar year 1970 alone, the division lost 1868 marines either killed or severely wounded to boobytraps,[34] a staggering casualty rate that underlined the continuing cost of victim operated explosive devices (VOEDs) on U.S. Forces right up to their withdrawal. 'As the North Vietnamese and Viet Cong increasingly avoided combat during 1970–1971, they relied on boobytraps, officially grouped under the comprehensive title Surprise Firing Devices (SFDs), to inflict American casualties'.[35]

The Effect of Casualties on U.S. Strategy

Project PEBBLE was partially vindicated in their prediction that mines and boobytraps would have a strategic effect, although the exact nature of that effect was debatable. While VOEDs did restrict the manoeuvre of U.S. forces, and distance them from the population they were trying to assist, their role as casualty producing devices was possibly even more influential on strategy. Unfortunately, there is no categorical data on the exact proportion of U.S. casualties caused by mines and booby traps, although extensive primary sources indicate their significance. U.S strategy evolved throughout the conflict.[36] Ultimately the political pressure casualties exerted became a key driver in development of the strategy of Vietnamization.[37] President Nixon's address to the nation on Vietnamization on 03 November 1969 emphasised that U.S. casualties were decreasing as a result of the new strategy.[38] In 2016 one study of the impact of IEDs in Iraq and Afghanistan stated that 'the real damage from IEDs occurred at the strategic level. The steady stream of casualties and destroyed vehicles – courtesy of the IED…was a key contributor to the decline in domestic support for the wars'.[39] This echoes the Vietnam experience four decades before.

Electronic Detection

Mines and booby-traps were difficult to counter because they were difficult to detect. While the experience in Korea, and indeed during the Second World War, had showed the difficulty in not only detecting minimum metal mines but also discriminating positive from negative signals,[40] in the early 1960s some in the U.S. Army believed its metal detectors would serve them well in finding mines. In 1962, one Lessons Learned Report from officers mentoring the ARVN, claimed that the 'issue mine detector (AN/

34 G. Cosmas and T. Murray (USMC), *U.S. Marines In Vietnam. Vietnamization and Redeployment. 1970-1971* (Washington, DC: U.S. Marine Corps, 1986), p. 268.

35 Cosmos and Murray, *U.S. Marines In Vietnam*, p. 262.

36 G Daddis, *The Vietnam War and American Military Strategy, 1965-1973* (Oxford Research Encyclopaedias, March 2015).

37 S Gartner, 'Differing Evaluations of Vietnamization', *The Journal of Interdisciplinary History*29 (Autumn 1998).

38 Vietnamization. Speech by US President Richard Nixon. 03 November 1969.

39 C. Barron, 'The Strategic Impact of Improvised Explosive Devices in the US Military' in S. Von Hlatky and H. Christian Breede (eds.) *Going to War? Trends in Military Interventions* (Montreal: McGill-Queen's University Press, 2016), p. 56.

40 The Employment of Armor in Korea. Volume I. 8 April 1951, p. 56. Operations Research Office, Far East Command, Ike Skelton Combined Arms Research Library (ISCARL).

PRS-3 or SCR-625) can be used to detect all kinds of VC metallic booby traps. This includes spike traps and grenades and mines which are being used in increasing numbers'.[41] As late as 1967 one 101st Airborne Division report claimed that 'it has been found that sweeping the roads using the AN/PRC-3 mine detector can effectively locate almost all mines, even those that have a low metal content'.[42] Such claims, possibly reported up through the chain of command to please, did not reflect most recorded experience or indeed the U.S. appreciation of their ability to detect their own landmines. This perspective was more of an assumption rather than the result of a real analysis of the difficulty of practically detecting mines during operations, be it a conventional or guerrilla war.

Scepticism concerning the effectiveness of detectors was far more common. Where real analysis had taken place, the conclusions were bleak. In 1965 Project PEBBLE concluded that 'the threat posed by the land mine to counter-guerrilla operations is further magnified by the fact that no even reasonably effective countermeasure exists at present'.[43] In 1964 the Army Technical manual on land mines stated clearly that the M-14 anti-personnel mine, and the M-19 anti-tank mine, were 'nondetectable by magnetic mine detectors'.[44] The manual contained nothing on enemy minimum metal mines, and how they may too be impractical to detect, and how this could affect operations significantly.

The AN/PRS-4 Mine Detector was the standard device in use for many years of the war. Difficulty in retaining its working settings led to reports of unpopularity amongst troops on the ground.[45] The newer P-153 was preferred over the AN/PRS-4.[46] The relative ineffectiveness of detectors was underlined by such data that was collected concerning detection of mines and booby traps. For example, for the calendar month of April 1969 in the 9th Division area of operations, only 1.6% of mines and booby traps were detected by metal detectors.[47] The figure for May 1969 was even lower at 0.3%.[48] In any case there were rarely enough detectors. One captain in 1968 remarked that there were only four detectors in his whole infantry battalion.[49]

Ultimately, the continuing casualty rate spoke for itself. Regardless of the range of opinion concerning the relative effectiveness of a given model, it was broadly recognised, even officially, that 'mine detectors are not infallible'.[50] Serviceability of detectors was

41 Lessons Learned, No.25, 17 December 1962, p. 7. Headquarters. Assistance Advisory Group Vietnam, ISCARL.

42 A Summary of Lessons Learned, 01 May 1966–20 April 1967, p. 5. Headquarters. U.S. Army Vietnam. NARA.

43 Project Pebble, November 1965, p. 35, DTIC

44 Headquarters. Department of the Army. *Technical Manual 9-1345-200. Landmines* (Washington, DC: U.S. Army, 1964), p. 45 and p. 71.

45 Detection and Avoidance, March 1968, p. 3, HUMMRO, DTIC.

46 Ibid., p. 49, HUMMRO, DTIC.

47 Monthly Mine and Booby Trap Report, 09 May 1969. Headquarters 9th Infantry Division, NARA.

48 Monthly Mine and Booby Trap Report, 13 June 1969. Headquarters 9th Infantry Division, NARA.

49 Detection and Avoidance, March 1968, p. 71, HUMMRO, DTIC.

50 Operations Report. Lessons Learned. Summary of Lessons Learned. 1-68. 01 February 1968, p. 88. Department of Army, NARA.

also a constant problem. At the beginning of 1968 it was noted that 'mine detectors are receiving heavy use under adverse conditions resulting in a high deadline rate'. 'In many cases, operators are not fully aware of the fragility of the mine detector'.[51] In late 1968 the 9th Infantry Division observed that 'the major problem in minesweep is the electronic detector, both in its reliability and operator's lack of familiarity with the equipment. The head/stem coupling frequently fails and the knowledge of replacement personnel is severely lacking'. The report went on to add that 'present mine detectors should be replaced with lighter-weight, more reliable units'.[52] Even relatively late in the conflict in 1970 the commanding officer of the 11th Cavalry Regiment reported that 'the use of standard detecting equipment was of limited value in detecting VC homemade mines. The VC used non-metallic materials, usually cement, to encase their explosives thereby avoiding detection through the mine detector. The trained eye and experienced well-trained soldier were the greatest tools in detecting VC anti-tank mines'.[53] In late 1970 Colonel John Gerrity, also of the 11th Armored Cavalry Regiment, recommended that the army 'place priority attention on the development and deployment of an effective mine detector for use against non-metallic as well as metallic mines'.[54] This sentiment was echoed by the then commander of the 25th Infantry, Major General Bautz, who stated in his Senior Officer Debriefing Report that 'a practical lightweight detector for squad use or other means to detect mines and booby traps should have the highest development priority'.[55] One USMC who studied the problem wrote in 1970 that 'in the day of man-on-the-moon technology, we are twenty-five years behind the times when it comes to mine detectors'.[56] Mine detection dogs were reintroduced by 1970, although results were mixed and did not amount to an adequate solution.[57]

Visual Detection

Given the shortcomings of electronic methods, the detection of mines and booby traps in Vietnam would come to be seen as a largely visual and cognitive process. As early as November 1966, Headquarters, U.S. Army in Vietnam (USARV), emphasised in a Combat Lessons Bulletin, that 'personnel familiar with the road surface will be more effective in detecting signs of fresh digging on the road and shoulders'.[58] In 1967 the 4th Infantry Division's new mine and booby trap course, started with trainees learning

51 Ibid., p. 59. Department of Army, NARA.
52 Operational Report. Lessons Learned. Period Ending 31 October 1968, p. 47. Headquarters. 9th Infantry Division, DTIC.
53 Senior Officer Debriefing Report, 11th Armored Cavalry Regiment. Period 22 June to 21 December. 18 February 1971, p. III–27. Department of the Army, DTIC.
54 Ibid., p. I–4. Department of the Army, DTIC.
55 Senior Officer Debriefing Report. MG Edward Bautz, Jr. 25 Infantry Division. Period March 1969 to December 1970, p. 15. Department of the Army, DTIC.
56 Major W. Greene III. USMC. Countermeasures Against Mines and Boobytraps. *Army Journal.* No.253. June 1970, p. 22. Australian Army Research Center (AARC).
57 R. Evans, 'A Brief History of Mine Detection Dogs', *The Journal of Conventional Weapons Destruction* 26 (2022), pp. 08–15.
58 Combat Lessons Bulletin. Number 10. VC Mining. 30 November 1966, p. 1. Headquarters. U.S. Army Vietnam, NARA.

'visual awareness of mined areas'.[59] In August 1969 the 1st Infantry Division reported that 'the effectiveness of a mine sweep team is greatly reduced during the hours of darkness. The vast majority of mines found are detected visually and would not be found by means of flashlights or artillery illumination. In addition, trip wires and other booby traps are difficult to detect in periods of reduced viability'.[60] The 1st Engineer Battalion, reporting on the daily 'clearance' of a 20 km stretch of road in Lai Khe on route QL 13 in 1969, stated that 'nearly 90 per cent of the mines found were detected visually'.[61] For this reason 'keeping the same people on the same stretch of road was preferred. This insured familiarity with a given stretch of road; subtle indications of a mine became more noticeable. This again resulted in a better detection ratio'.[62] As a study in mines and booby traps emphasised that year, 'detection of mines and boobytraps in Vietnam requires constant alertness and careful observation'.[63]

The importance of visual detection was emphasised repeatedly in contemporary reporting and subsequent memoires. A 1969 Marine Corps analysis stated that 'although a great many detection means, ranging from intricate electronic devices to specially trained dogs, have been developed, experience has shown that an alert marine, aware of what to look for and where to look, is the most effective detection device'.[64] This was reiterated the next year by a Marine Major, 'at present the finest mine and booby trap detector in the Marine Corps is an alert and observant point man'.[65] The command team of the 26th Engineer Regiment stated in March 1968 that 'the primary way of detecting mines is a combination of visual and mine detector'.[66]

Training to meet the mine and booby trap threat now emphasised the primacy of visual detection, combined with the cognitive process of learning every tiny sign that could indicate a mine or booby trap.[67] The experience was echoed by the 9th Infantry Division who in stated categorically in their 1969 study of both mines and booby traps; 'almost all of the booby traps are detected visually. Very few, less than one percent, have been detected as a result of informants or scout dogs. Therefore, men should be constantly on the alert, eyes focused and searching ahead of the line of march. In this respect training is of vital importance to new men in-country prior to gaining the experience that comes only with

59 Establishment of Mine and Booby Trap Confidence Courses. 25 August 1967, p. 5. Headquarters. 4th Infantry Division, NARA.

60 Operational Report. Lessons Learned. Period Ending 31 July 1969. 03 December 1969, pp. 22–23. Headquarters. 1st Infantry Division, DTIC.

61 A.F. Thorp, 'This'll Blow Your Mine', *The Engineer* 1 (1971), p. 12.

62 Thorp, 'Mine', p. 12.

63 Training Circular 5-31. Viet Cong Boobytraps, Mines, and Mine Warfare Techniques. December 1969, p. 6-3. Headquarters. Department of Army. USMMC

64 Professional Knowledge Gained from Operational Experience in Vietnam, 1969. Special Issue. Mines and Boobytraps. 1989, p. 2. Fleet Marine Force Reference Publication (FMFRP 12-43), LMC.

65 Major W. Greene III, 'USMC. Countermeasures Against Mines and Boobytraps', *Army Journal* No.253 (June 1970), p. 21. Australian Army Research Center (AARC).

66 Detection and Avoidance, March 1968, p. 3, HUMMRO, DTIC.

67 199th Infantry Brigade. Mobile Training Team. Training Schedule on Mines and Booby Traps. September 1968. 199th Infantry Brigade. Mobile Training Team, NARA.

being in the rice paddies'.[68] Even for troops in armored vehicles visual detection was the primary method of detection. 'On the whole, more road mines were spotted by alert armor crewmen than were found by mine detectors'.[69]

The primacy of visual detection was underlined by the use of 'Kit Carson Scouts', also known as 'Tiger Scouts' in the 9th Division area of operations. These individuals were former Viet Cong who had defected or had been captured and turned. Their 'ability to search the terrain for information concerning mines and booby traps and their ability to gain information from the local population have assisted greatly in daily operations'.[70] The 9th Infantry Division would list 'Tiger Scout' in its list of data options when reporting how a mine or booby trap was detected.[71] In the 25th Division it was also recognised by commanders that 'the Kit Carson Scouts were especially adept at recognizing mines and booby trap and other indications of the enemy'.[72] 'The native ability of the Scouts and their Regional and Popular Force brethren, coupled with their intimate knowledge of the area, its people, and activities of the local VC, can prove highly useful in locating devices'.[73]

After the war efforts were made by the U.S. Army Mobility Equipment Research and Development Center to better understand those with the aptitude for 'perceptual detection of mines'.[74] [75] Such efforts would be repeated four decades later.[76] Regardless of the means of detection, the mine and booby trap problems plagued US forces throughout. After finishing a 1969–1971 tour of duty in the area around Danang, the Assistant Division Commander of the 1st Marine Division concluded that 'the 1st Marine Division's strenuous efforts – including troop indoctrination, land mine warfare school, contact teams and mine and boobytrap dogs – did not solve the problem. The best we can conclude is that these efforts greatly reduced what might have been the casualty figures if they had not been vigorously pursued'.[77]

68 Monthly Mine and Booby Trap Report. April 1969. 09 May 1969, p. 1. Headquarters. 9th Infantry Division. NARA

69 D. Starry, *Vietnam Studies. Mounted Combat in Vietnam* (Washington, DC: Department of the Army, 2002), p. 82.

70 Operational Report. Lessons Learned. Period Ending 31 July 1969. 18 December 1969, p. 88. Headquarters, 25th Infantry Division, DTIC.

71 Major J. Sewell. Booby Trap Trends and Countermeasures. Annex B, 16 February 1969. Headquarters, 9th Infantry Division, NARA.

72 Senior Officer Debriefing Report: MG Harris W. Hollis. CG. 25th Infantry Division. Period 15 September 1969 to 02 April 1970. 19 June 1970, p. 42. Department of the Army, DTIC.

73 Major W. Greene III, 'USMC. Countermeasures Against Mines and Boobytraps', *Army Journal* No.253 (June 1970), p. 23. Australian Army Research Center (AARC).

74 R Kanda, *MAN: Key to Countermine Warfare (*The Engineer, Spring 1974), pp. 16–18.

75 J Maxey, *Identification of Potential Characteristics, Aptitudes, and Acquired Skill Involved in Human Detection of Mines,* Human Resources Research Organization, August 1973. (DTIC).

76 J Leipold, *Study aims to identify IED detection experts,* U.S. Army, 03 April 2009.

77 G. Cosmas and T. Murray, *U.S. Marines In Vietnam. Vietnamization and Redeployment. 1970-1971* (Washington, DC: U.S. Marine Corps, 1986), p. 262.

Operational Data

By the fourth year of the conflict the urgency of the mine and booby trap problem for U.S. forces was irrefutable. A June 1969 Combat Lessons Bulletin openly admitted that 'U.S. Forces throughout Vietnam continue to suffer significant personnel and material losses to mines and booby traps'.[78] General David Parker, Commanding General, Engineer Troops, Vietnam, commented pointedly in his post tour debrief in October 1969 that 'the enemy employment of mines and booby traps has been a continuing problem of major proportions and has revealed the lack of true progress in countermine since World War II'.[79] In the face of an inability to fundamentally counter the threat, and acknowledging its significance, parts of the U.S. Army sought ways to mitigate it better. In order to mitigate the threat, it was necessary to first understand it.

While testimony gathered from various field reports was useful, there was a clear need for reliable data to move understanding beyond the anecdotal. Anecdotal reports, even when offered in good faith, could not necessarily be understood fully in the context within which they were generated and were difficult to process at scale. Even as early as 1964–65 Project Pebble had identified a lack of data concerning incidents involving landmines in South Vietnam as inhibiting analysis of the 'actual threat' posed.[80] In 1968 one interview acknowledged that, at least for the Americal Division, 'there is no dissemination of intelligence on areas that are heavily mined and, normally, until military forces move into an area, it is deemed not mined'.[81] Collection of data was one thing, analysis and distribution of lessons another. Neither was happening as well as it could do.[82] Eventually in the same year the U.S. tasked the Army Concept Team in Vietnam (ACTIV) to conduct an analysis of the problem over the four Corps Tactical Zones. The resulting report was titled 'Study and Evaluation of Countermine Activities (SECMA)'. It produced an initial data analysis for the period 01 March – 10 June 1968.[83,84] The analysis comprised of six fields or questions in a basic form to be filled out by troops in the field.

The first question, understandably given this was the fundamental problem facing US forces, was how devices were detected. Worryingly, 51.3% of booby traps were detected by means of detonation, meaning they were not detected in a useful sense at all. Visual detection accounted for 40.9%. The two main metal detector designs used by the U.S. military at the time accounted for a lowly 3.9% of booby traps detected.[85,86] The

78 Combat Lessons Bulletin. Number 7. 11 June 1969, p.1. Headquarters, U.S. Army Vietnam, NARA.

79 Senior Officer Debriefing Report. Major General David S. Parker. Commanding General Engineer Troops Vietnam. 21 July 1968–14 October 1969. 14 October 1969, p. 3. Department of the Army, DTIC.

80 Project Pebble, November 1965, p. 2, DTIC.

81 Detection and Avoidance, March 1968, p. 4, HUMMRO, DTIC.

82 Ibid., p. 60, HUMMRO, DTIC.

83 *Department of Army Historical Summary: Fiscal Year 1969* (Washington, DC: Center of Military History, 1973), p. 92.

84 Sewell, 16 February 1969, p. 3, NARA.

85 Department of the Army Training Circular. TC 5-31. "Viet Cong Boobytraps, Mines, and Mine Warfare Techniques." Headquarters. Department of the Army. December 1969, p. 5-2.

86 Sewell, 16 February 1969, p. 3, NARA.

figures are even more notable when compared against the recorded make up of booby traps, with 71.3% incorporating a grenade. Metal detectors were not picking up devices with a significant metal fragmentation casing. Many were presumably not even buried but elevated in order to maximise the fragmentation effect. Many boobytraps incorporated harvested U.S. munitions, including items of Unexploded Ordnance or items discarded by U.S troops.[87,88] The SECMA study provided a lead for individual divisional level units who wished to gather and analyse evidence more deliberately. The foremost units for this were the 9th Infantry Division operating in the Mekong Delta and the 25th Infantry Division operating north of Saigon.

The 9th Infantry Division can probably lay claim to having conducted the first deliberate individual unit study of the mines and booby trap problem based on data collection. This started in the second half of 1968. The Division Chief of Staff acknowledged that 'a review of the operational logs indicated that mines and booby traps were a major cause of combat casualties'.[89] The 'total lack of a central collecting agency charged with collecting and evaluating booby trap data' was immediately recognised.[90] Initially data was collected from a range of sources. Casualty data from Adjutants Generals Casualty Branch indicated the 'wounding agent' for a given casualty. While it could indicate mine or booby trap, wounding agents would often have a less specific description, such as fragmentation. Important data such as the type of ordnance used in the booby trap or the firing device used were not collected by medical staff.[91] Other data sources included intelligence summaries (INTSUMS), and some combat records maintained by the Assistant Divisional Engineer. This data, while useful, was inadequate. These efforts were made within a wider context of unprecedented data collection on the counter insurgency that often was of mixed value.[92,93,94] 'The normal channels of military reporting in Vietnam were often flooded with inaccurate, irrelevant information that could not be transmitted and processed on time'.[95]

The need for standardised data collection on the operational problem of mines and booby traps was clear. In January 1969, as part of what would become known as the 'Counter Mine and Booby Trap Program', the 9th Division introduced data collection forms. These were sometimes referred to as 'After Action Questionnaires'.[96] This was an important step with significant lessons that remain relevant today. It was noted that 'in order to remain abreast of the latest VC/NVA techniques for the employment of mines and booby traps, and to quickly identify areas requiring additional training

87 Counterinsurgency Lessons Learned No53: Viet Cong Improvised Explosive Mines and Booby Traps. 29 September 1966. pp. 1–7, DTIC.
88 Viet Cong Boobytraps, Mines and Mine Warfare Techniques. December 1969, Department of the Army Training Circular, Library of the Marines Corps (LMC).
89 Hunt. The 9th Infantry Division in Vietnam, p. 69.
90 Sewell, 16 February 1969, p. 2, NARA.
91 Ibid., p. 2, NARA.
92 Thayer, War Without Fronts.
93 G Daddis, *The Problem of Metrics: Assessing Progress and Effectiveness in the Vietnam War,* War In History, Vol. 19, January 2012, pp. 73–98.
94 Daddis, *No Sure Victory*.
95 M. Van Creveld, *Command in War* (Harvard: Harvard University Press, 1985), p. 256.
96 Sewell, 16 February 1969, p. 3, NARA.

emphasis, implementation of a reporting system would be of great value'.[97] This 'reporting' involved a form that spanned one side of A4, requiring input into twenty data fields. Very importantly each field was given a set list of standardised responses that corresponded to simple numbering. The twenty fields were; unit, type of system (e.g., mine or booby trap), day, time, month, location (grid reference), how first detected (e.g., detonation), type explosive (by explosive the list available really suggested type of explosive ordnance employed, for example grenade), origin of manufacture, type of firing device (e.g., trip wire), incident location (e.g., rice paddy), charge weight (e.g., less than 10 lbs), location of device (e.g., underground), device covered by enemy fire (yes or no), personnel exposed to the blast (number value), Killed by Hostile Action (number value), Wounded by Hostile Action (number value), and distance between personnel affected (meters). In addition, a sketch along with free text could be added which could provide more qualitative detail to the quantitative data collected. Each form would be signed, typically by the officer making the report, who would normally be the patrol leader.[98] The forms remained uniform to quite a high degree, with standardised question-and-answer option numbering. Some forms referred to location of damage to vehicles[99] and others the location of damage when the casualties were infantry;[100] however these were only minor differences in forms that largely remained consistent, therefore enabling valid comparisons and analysis.

The data collected was quite possibly the best data deliberately collected on the mine and boobytrap threat to combat troops up to that point in history. Data had also been collected on tank casualties in North-West Europe in 1944–45, but this looked at general trends and did not analyse each incident.[101] Significant data had been collected by the Royal Canadian Engineers on mine clearance in Holland in 1945, but this was for military deminers during peace time, with lessons extrapolated for soldiers in combat.[102] It was very probably the first time data had been collected on the mine and counter mine problem in a way that could be routinely analysed by the nascent information technology of the time. The data showed significant trends that had not necessarily been apparent from the operational reporting up to that point.

It is important to note that the 9th Infantry Division have been associated by historians with the misuse of data leading to accusations of killing civilians in order to inflate the so called 'body count' totals.[103] Does the potential misuse of data in that respect cast doubt

97 Combat Lessons Bulletin. Number 7. Counter Mine and Booby Trap Program. 14 June 1969, p.1. Headquarters. U.S. Army Vietnam, NARA.

98 Ibid., pp. 1–3 and Inclosure 1. Headquarters. U.S. Army Vietnam, NARA.

99 Sewell, 16 February 1969. Annex B, NARA.

100 Combat Lessons Bulletin. Number 7. 11 June 1969. Inclosure 1. Headquarters. U.S. Army Vietnam, NARA.

101 A. Coox and L. Van Loan Naisawald, Technical Memorandum ORO-T-117. Survey of Allied Tank Casualties in World War II. 31 March 1951, U.S. Army Heritage and Education Center (USAHEC).

102 R. Evans, 'Minefield Clearance and Casualties – Holland 1945 – Military Operations Research Unit Report No.7', *The Journal of Conventional Weapons Destruction* 23 (2019), pp. 40–46.

103 N. Turse, *Kill anything that Moves: The Real American War in Vietnam,* (New York: Macmillan, 2013), p. 256.

on the data collected in regard to mine and boobytraps? If members of the Division were willing to misrepresent data in one way, would they be willing to misrepresent data in another? It is hard to answer this categorically, although it is worth pointing out that there was no benefit to skew the mine and boobytrap results. Indeed, in trying to minimise casualties within the division, there was every incentive to collect as accurate data as possible. Patrol leaders could possibly be disciplined if troops were not dispersed sufficiently, as this resulted in multiple casualties if a device was initiated. This could conceivably lead to some form of misreporting concerning how dispersed soldiers subject to a mine or booby trap incident were, in order to try to avoid sanctioning. However, such misreporting was unlikely since there were other members of the patrol who could corroborate or not, and the number of casualties, when analysed in conjunction with the device, would always indicate whether the patrol was spread out as it should have been. There is no evidence that the data was subject to the same alleged misreporting as other aspects of the 9th Infantry Division's operations in the Mekong Delta.

It would be wrong to try to present the collection and analysis of operational data concerning mines and booby traps as a panacea. At best it underpinned sensible forms of mitigation, that could have results, albeit the enemy were always adapting to the counter measures employed by the AVRN and U.S. ground forces. Even as late as 1970, as the 9th Infantry Division redeployed, the 3rd Brigade Commander, Colonel Williams admitted that 'the single most successful enemy action against the Brigade has been the employment of booby traps. A variety of techniques are used by Brigade units to breach booby-trapped areas, although all are extremely time consuming, and none are fully effective. Extensive artillery preparations, tactical air strikes, and paths blasted by Bangalore torpedoes have proved the most effective means of reducing small, well-defined minefields and booby-trapped areas. Such techniques have sharply reduced Brigade casualties and have denuded enemy base areas and cache sites of their protective screen. This has been an area of continuing concern. Methods of clearing booby-trapped areas must be developed which are practical and can be used by the infantry in Vietnam'.[104]

Major General Ewell, the divisional commander (February 1968 - April 1969) would claim that 'our analytical approach allowed us to come up with many changes that helped reduce casualties'[105] due to mines and booby traps. 'For us, the analytical approach paid off. In a short period of time our booby trap neutralization rate increased from less than 50 percent to over 70 percent. Not only did we increase the percentage of mines and booby traps detected without detonation, but by emphasizing proper ground formations we were able to reduce the number of casualties per detonation, thereby protecting our most important asset, the soldier'.[106] Notably, Ewell did not mention mines and booby traps, during his Senior Officer Debriefing at the end of his tenure leading the 9th

104 Senior Officer Debriefing Report: Colonel W.F. Williams. 3rd Brigade. 9th Infantry Division. Period 27 March 1970 to 2 October 1970. 16 February 1971, p. I–10. Department of the Army, DTIC.

105 J. Ewell and I. Hunt, *Sharpening the Combat Edge: The Use of Analysis to Reinforce Military Judgement* (Washington, DC: Department of the Army, 1995), p. 136.

106 Ewell and Hunt, *Sharpening the Combat Edge,* p. 144.

Division in April 1969,[107] but only in his book about the use of operational data in 1974.[108]

Data analysis of the mines and boobytrap problem also took place in the 25th Division. It elaborated on the analysis conducted by the 9th Division, 'by placing the data on their computer, thus giving them the capability to present and study the problem with minimum clerical effort'.[109] In early April 1969 the 25th 'initiated a program to computerize the large volume of data which results from operations in the Division area. The ultimate objective of this program is to achieve the highest operational efficiency'.[110] As the division's own lessons learned reports stated 'the nature of the Vietnam conflict poses unique problems for those who must interpret what is happening and for those who must plan to do something about it. The fluctuating contact with a variety of enemy forces over differing terrain produces a great volume of unassimilated information. Friendly operations also generate a great deal of valuable information, but due to the pressures of combat, it is often not recognized. Present methods of analyzing and interpreting this mass of information consume much time and effort, and often fail to exploit its full value'.[111]

Major General Williamson, commander of the 25th Infantry Division, August 1968–September 1969, later stated in testimony to Senator Barry Goldwater in November 1970. 'We had a hunch that there was a pattern to the enemy's use of mines and booby-traps. In the division we had a UNIVAC 1005 computer (actually it is more of a high-speed card processor). This is used primarily for mechanizing personnel records and computing our pay. Somebody had a bright idea of punching a card for every mine and booby trap we had encountered since January 1 of 1969. After running various sorting procedures on the computer, we found that there were definite patterns in the manner in which the enemy used mines and booby traps. We found that NVA regular units seldom used antipersonnel mine or booby traps'.[112]

Major General Harris Hollis, who commanded the 9th Infantry Division, April – September 1969, after General Ewell, and then went on to command the 25th Infantry Division until April 1970, commented that 'in no other war have we been so deluged by so many tidbits of information for we have been accustomed to an orderliness associated with established battle lines. Here, though, we have had to make our decisions based not upon enemy regimental courses of action, but rather upon the numerous isolated communist squad-sized elements. So with the scale down of the level of operations, we have had to increase our reliance on objective analysis of logical courses of action. The computer reduced the time required to analyze and interpret information. The commanders obtained a better picture of the enemy and were able to exploit valuable

107 Senior Officer Debriefing Report. Major General Julian J. Ewell. 9th Infantry Division. Period 25 February 1968–05 April 1969. 17 November 1969. Department of the Army, DTIC.

108 Ewell and Hunt, *Sharpening the Combat Edge,* pp. 136–47.

109 Ibid., p. 144.

110 Operational Report. Lessons Learned. Period Ending 31 July 1969. 18 December 1969, p. 171. Headquarters. 25th Infantry Division, DTIC.

111 Ibid., p. 171. Headquarters. 25th Infantry Division, DTIC.

112 Major General E. Williamson. Hearings Before the Electronic Battlefield Subcommittee of the Committee on Armed Services. United States Senate. Ninety-First Congress. 18 November 1970.

information quickly. At Cu Chi, all the input for computer analysis was taken from existing reports, and with the computer working on a 24-h schedule, no significant interference with other activities occurred. A typical application was the use of the UNIVAC 1005 to analyze the threat from deadly mines and booby traps in the division area'.[113]

In order to do this the G3 Doctrine and Training staff extracted data by means of 'careful screening' from intelligence summaries, operational situation reports, G2 (intelligence) and G3 (operations) journals. Notably no extra reporting requirements on soldiers in the field were imposed, something that would be required in the 9th Infantry Division data collection on mines and booby traps.[114] The staff recorded the extracted data on standardised work cards which were then converted to punch cards to be processed through the UNIVAC (Universal Automatic Computer) 1005 computer. Whether staff filling in forms thereby reducing the burden on those on the ground was the best course of action is unclear. Would it have been better to accept the extra burden as a price worth paying for the prospect of more accurate data from those who were there? In any case the UNIVAC 1005 is deemed by some accounts to be the first use of an electronic computer to analyse ground combat data.

A new computer program, named Program 543A, was designed to analyse mines and booby trap data, since 'one of the most serious problems faced by this Division has been the extremely heavy incidence of mines and booby traps'.[115] The data collected for analysis included the unit involved in a given mine or booby trap 'encounter', the location (grid reference) where it happened, the time of day it happened, the type of mine or booby trap, how it was located including whether it detonated, any casualties produced and or equipment damaged including vehicles. The location description inevitably involved staff pinpointing a position on a physical map so had potential for slight inaccuracy. This data was tabulated, and analysis was used to find the answer to simple, even obvious questions that up to that point could only be answered anecdotally. 'Critical' information needs included type of areas for incidents, (padi dyke, padi, jungle, etc.), greatest casualty producing devices, possible indication of probable emplacement times when compared with previous patrol activity. The G2 (intelligence) staff of the 25th Division used this information to better emplace sensor equipment in unpopulated areas with a high prevalence of mines and booby traps. In populated areas ambushes were utilized to dissuade emplacement. It was claimed that the targeted tactics the data enabled resulted in a reduction from 15 mines to 01 mine on Highway 249 and 20 mines to 8 on Highway 7A during May 1969.[116]

One point that commanders did note was that for the 25th Division, mines and booby traps entailed 'a number of separate and distinct problems'.[117] 'These problems varied

113 J.H. Hay, *Vietnam Studies. Tactical and Material Innovations* (Washington, D.C: Center of Military History Publication, Department of the Army, 1974), p. 157.

114 Combat Lessons Bulletin. Number 7. Counter Mine and Booby Trap Program. 14 June 1969. pp. 1–3 and Inclosure 1. Headquarters. U.S. Army Vietnam, NARA.

115 Operational Report. Lessons Learned. Period Ending 31 July 1969. 18 December 1969, p. 172. Headquarters. 25th Infantry Division, DTIC.

116 Ibid., p. 172. Headquarters. 25th Infantry Division, DTIC.

117 Senior Officer Debriefing Report: MG Harris W. Hollis. CG. 25th Infantry Division. Period 15 September 1969 to 02 April 1970. 19 June 1970, p. 44. Department of the Army, DTIC.

from province to province depending upon the degree of emphasis that communist forces operating within each more localized area placed on this tactic'.[118] Analysis of a whole dataset for the 25th Division, rather than the anecdotal 'snippets', allowed differences to be more easily defined. The experience of an individual commander, captured in an after-action report, could very well faithfully reflect the experience of mines and booby traps at a given place, at given time, for a given unit. However, it did not necessarily convey the mines and boobytraps situation in all its complexity, and if misused as representing the wider situation, even in good faith, it could even be misleading. The analysis of data at scale overcame the risk of one experience would not be misrepresented as common.

While acknowledging that the data collected and analysed did not solve the problem of mines and booby traps General Williamson did identify the benefits of this 'new' approach. 'The computer…took a great deal of information that had been collected over a long period of time, that we had on hand, and allowed us to collate this data and put it in a manageable format for effective study and decision making. Some of our bright young men continued the study of the mine-booby trap problem and recommended that we emplace sensors in the vicinity of the heavily mined areas'.[119]

While the collection and electronic analysis of data did help mitigate the mines and booby trap problem, it did not amount to a comprehensive solution. Major General Hollis claimed that during the period September 1969 to April 1970, 'we were finally able to neutralize about eighty five percent of those we encountered'.[120] However in February 1970 the 25th Infantry Division reported that 'division soldiers destroyed 230 mines and boobytraps (71%) while detonating 96, resulting in 11 U.S. soldiers killed and 101 wounded'.[121] During the month of March 1970 'division soldiers destroyed 240 mines and boobytraps (77%), while detonating 72, resulting in eight U.S. soldiers killed and 106 wounded'.[122] Not quite the 'eighty five percent' claimed. Nevertheless, it is still with some justification that Hollis said, 'I am convinced that operational analysis techniques have tremendous potential for application in future combat and particularly in the complex environment of this type of war'.[123]

There is some evidence to suggest attempts to standardise the collection of operational data in relation to the mines and booby trap across the U.S. Army Vietnam (USARV). A summary of the 9th Division approach was distributed as a Combat Lesson Bulletin in June 1969.[124] This included the 'Story of a Boobytrap Casualty', based on the operational data collected, and intended to communicate to all troops in the field behaviours to

118 Ibid., p. 44. Department of the Army, DTIC.

119 Major General E. Williamson. Hearings Before the Electronic Battlefield Subcommittee of the Committee on Armed Services. United States Senate. Ninety-First Congress. 18 November 1970.

120 Senior Officer Debriefing Report: MG Harris W. Hollis. CG. 25th Infantry Division. Period 15 September 1969 to 02 April 1970. 19 June 1970, p. 45. Department of the Army, DTIC.

121 Operational Report. Lessons Learned. Period Ending 30 April 1970. 26 October 1970, p. 16. Headquarters. 25th Infantry Division, DTIC.

122 Ibid., p. 28. Headquarters. 25th Infantry Division, DTIC.

123 Senior Officer Debriefing Report: MG Harris W. Hollis. CG. 25th Infantry Division. Period 15 September 1969 to 02 April 1970. 19 June 1970, p. 43. Department of the Army, DTIC.

124 Combat Lessons Bulletin. Number 7. Counter Mine and Booby Trap Program. 14 June 1969, pp. 1–3 and Incl 1. Headquarters. U.S. Army Vietnam, NARA.

mitigate the threat. A revised data form was included in an army wide Training Circular in December 1969.[125] However, divisions retained a high degree of autonomy in how to approach the problem and no comparable data to match that of the 9th Division is evident in subsequent senior officer debriefing documents, unit lessons learned, combat bulletins, MACV command histories or later official histories. The official U.S. Army Engineers history of the Vietnam War makes no mention of the collection of data on mines and boobytraps.[126] Consistent with the decentralized nature of the campaign,[127] differences in approach remained between the various Army units that served in MACV, and between the U.S Army and Marine Corps. During questioning in front of congressional committees, the issue was largely seen as a detection problem, with improved data only mentioned by Major General Williamson. Major General Ewell only mentioned the 9th Division approach in his subsequent memoir. More modern studies of the wider use of data during the conflict[128] mention and boobytraps only in passing and identify no Vietnam wider data gathering on the subject. It also seems that the legacy of collecting and analysing operational data was short lived, even at unit level. Major General Edward Bautz, Hollis's successor in the 25th Infantry Division, makes no mention of data in relation to the mines and boobytrap in his Senior Officer Debriefing Report.[129] Unfortunately, there is no evidence to suggest that the data approach to mines and boobytraps was retained after Vietnam, or that it influenced subsequent countermine or counterinsurgency doctrine.

Conclusion

On 07 June 1971, Robert Frosch, Assistant Secretary of the Navy (Research and Development) and Brigadier General Brooks of the United States Marine Corps, appeared before the House Appropriations Subcommittee. Congressman Sikes, referring to the mines and booby trap problem, stated 'this is your number one source of casualties now. I question that we have made much progress in the development of really effective detection devices. I know the problem when the enemy is using nonmetallic devices, they are awfully hard to detect. Is there anything that looks like a breakthrough in the offing? Are you giving it enough emphasis?'[130] General Brooks replied that 'we consider it our No.1 problem. There is nothing in sight that is a cure for this problem that we can see. There is a lot of effort going into it'. Dr Frosch added; 'we have no good way to

125 Viet Cong Boobytraps, Mines and Mine Warfare Techniques. Department of the Army Training Circular, December 1969, pp. 6-10–6-12. LMC.

126 A Traas, *Engineers At War* (Washington, DC: Center of Military History Publication, Department of the Army, 2010).

127 G Daddis, *No Sure Victory* (Chapel Hill, 2009), p. 221.

128 Daddis, *No Sure Victory*.

129 Senior Officer Debriefing Report. MG Edward Bautz, Jr. 25 Infantry Division. Period March 1969 to December 1970, p. 15. Department of the Army, DTIC.

130 Hearings Before a Subcommittee of the Committee on Appropriations of the House of Representatives. Subcommittee on Department of Defense. Department of Defense Appropriations for Fiscal Year 1972, Monday 07 June 1971, pp. 713–14.

detect the mines themselves'.[131] Five years later in 1976, it was still acknowledged that detection methods were limited. 'Although certain electronic instruments and systems have proven reasonably effective in the detection of metallic land mines, currently available detectors of this type are not always effective against non-metallic mines and related surprise firing devices. And despite the expenditure of millions of dollars and a substantial number of man years of research effort, the U.S. must now face their operational mission without a fully satisfactory instrument for detecting concealed mine and booby traps'.[132]

In the absence of a detection solution, what was left to do? The 9th and 25th Divisions showed, albeit belatedly and perhaps partially, that operating in a way governed by conscientious operational data collection offered the best means to reduce casualties and increase effectiveness on the ground. What was true in 1969 remains true today. Whether it is a military unit on patrol in Helmand Province, or demining team in Jaffna Sri Lanka, there is still no satisfactory way of reliably detecting VOEDs in field conditions, especially minimum metal VOEDs. What can be done, and what at least some elements of US Army did, is increase the understanding of VOEDs, in terms of how they have been employed, the incidents where they had impact, and the instances when they managed to successfully counter the threat. This happened through the routine collection of operational data. For VOEDs, such data collection is the only way 'to know the enemy and know ourselves'.[133]

As with much of the hard-won experience of Vietnam, the value of operational data, whether in a military or humanitarian demining context, was unfortunately forgotten.[134] Nevertheless the lesson remains. It is possible the detection silver bullet will arrive and make the collection of operational data redundant, or at least less important. However, in eight decades since the Second World War, this has not happened. Therefore, the experience of VOEDs in Vietnam should be looked at again, in order to appreciate that the collection of operational data is entirely practicable and can make a difference.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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131 Hearings Before a Subcommittee of the Committee on Appropriations of the House of Representatives. Subcommittee on Department of Defense. Department of Defense Appropriations for Fiscal Year 1972. Monday 07 June 1971, p. 714.

132 D. Mitchell, *Training and Employment of Land Mine and Booby Trap Detection Dogs. Final Technical Report. Volume II, (Fort Belvoir, Virginia:* United States Army Mobility Equipment Research and Development Command, 1976), p. 2.

133 Sun Tzu, *The Art of War*, p. 91.

134 Carroll, 'Lessons Forgotten', p. 14, DTIC.