4-1-2011

Improvised Explosive Devices in Iraq, 2003-09: A Case of Operational Surprise and Institutional Response

Andrew Smith Brigadier

The Letort Papers

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The
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Letort Paper

IMPROVISED EXPLOSIVE DEVICES IN IRAQ, 2003-09: A CASE OF OPERATIONAL SURPRISE AND INSTITUTIONAL RESPONSE

Andrew Smith

April 2011

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Comments pertaining to this report are invited and should be forwarded to: Director, Strategic Studies Institute, U.S. Army War College, 632 Wright Ave, Carlisle, PA 17013-5046.

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ISBN 1-58487-488-0

FOREWORD

"Surprise" is a familiar term in military writings: the achievement of tactical surprise has such obvious benefits that it is enshrined in the military doctrine of most nations. Surprises that emerge in tactics, however, can also operate at the strategic and operational levels. These surprises are particularly dangerous, because they can test the relevance and adaptability of military forces and the "institutional" defense establishments that create, develop, and sustain them. A military establishment that is too slow to recognize and respond to such surprises places its nation's interests at grave risk. In the bipolar strategic environment of the Cold War, deep knowledge of a known adversary reduced the likelihood of such surprises. The same is not true now. This monograph thus comes at an important time, as Western nations contemplate major reductions in defense spending with consequent limitations on force structure. The range of enemy capabilities that a force will be able to match, qualitatively and quantitatively, will become smaller; hence the potential for operational and strategic surprise will increase.

In this monograph, Brigadier Andrew Smith uses the improvised explosive device threat as it manifested itself in Iraq between 2003 and 2009 as a case study of such a surprise and how defense establishments responded to it. He argues that, although tactical in itself, this threat posed an operational and strategic threat in a modern "war of discretion" that demanded institutional responses from both the U.S. and Australian institutional militaries, including major equipment, training, and budgetary changes within

time frames that circumvented the normal peacetime force development cycles of those countries. There are disappointments in the way both countries met this challenge. A key conclusion from this analysis is the critical role of strategic leadership in recognizing the scale of surprise and in forcing the necessary institutional response. At a time when budgets will not allow surprise to be addressed by maintaining large and technically diverse forces at high readiness, the ability to recognize and respond adroitly to operational and strategic surprise may be a critical requirement for a modern defense establishment.

DOUGLAS C. LOVELACE, JR.
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ABOUT THE AUTHOR

ANDREW SMITH is a Brigadier in the Australian Army. He is currently assigned as the Director of the Combined Planning Group within the Headquarters of United States Central Command. In that capacity, he directs a team of international officers from 30 countries in the preparation of strategic-level political-military analyses and assessments. As a regular military officer with over 30 years of experience, Brigadier Smith has commanded army units and formations up to brigade level and has served a number of operational tours, including several in which he was responsible for dealing with the threat of improvised explosive devices. In a staff capacity, he has extensive experience in the force development field. He has also served as an instructor at the U.S. Army Command and General Staff College. Brigadier Smith's research interests include institutional responses to unconventional security threats and weapons law, and he has published journal articles on those subjects. Brigadier Smith holds a B.A. with Honours in English, a Master of Defence Studies, and a Ph.D. in Politics.

SUMMARY

The threat of improvised explosive devices (IEDs) that has emerged in conflicts in Iraq and Afghanistan since 2003 is a contemporary example of conventional militaries being confronted with a tactical surprise with operational—if not strategic—implications. Those implications can necessitate "institutional" responses to avoid strategic defeat in what, for many countries, are "wars of discretion." Operational surprise, as defined in this examination, differs from strategic shocks as described by Nathan Freier, and the necessary responses are distinct from the military adaptations considered by John Nagl. The paper contends that the 6-year evolution of the IED experience from 2003 until 2009 constitutes a complete cycle of surprise and response, of which the most significant part is the institutional response. A case study of this experience illustrates how conventional military establishments recognize and respond to such surprises, with a particular focus on the experience, respectively, of the U.S. and Australian defense establishments. This case study reveals that institutional response is triggered by recognition of the surprise, which then cues organizational, equipment, training and doctrine, research and development, industrial, funding/budgetary, and policy actions.

Because the IED problem has mostly been a phenomenon of the land environment, this examination tends to emphasize the responses of armies, but the lessons have more general application. This paper contends that both the U.S. Department of Defense (DoD) and the Australian Defence Organisation (ADO) could have responded quicker than they did: contemporary defense establishments, it seems, may not cope well

with such surprises. Despite this, the DoD demonstrated impressive agility in its response, especially for such a large organization, while the ADO was curiously slow to make the necessary institutional adaptations. In both cases, the role of senior leadership was key to mobilizing an effective response. In a fiscally constrained future that lacks the certainty of bipolar, state-on-state threats, the ability to recognize and respond quickly to operational and strategic surprise may be the decisive characteristic of national defense establishments.

IMPROVISED EXPLOSIVE DEVICES IN IRAQ, 2003-09: A CASE OF OPERATIONAL SURPRISE AND INSTITUTIONAL RESPONSE

INTRODUCTION

Throughout history, nations have found themselves confronted with unexpected threats that place them at a fatal military disadvantage. These situations are an extension of the more general military notion of surprise—a familiar military term that is enshrined as a principle of war in the military doctrine of many countries.[1] Sometimes the source of these surprises is the application of a completely new technology; more often, it is a change in tactics or behavior. German submarine operations in World War I and World War II are an example. Even in World War I, submarines were not new and Germany's possession of them not a secret, but their use in the Atlantic shipping lanes threatened the Allies' strategic supply lines and their ability to sustain a war effort.[2]

To avoid defeat, agile responses are needed to negate the disadvantage imposed by a new threat or capability. Returning to the example of the World War II Atlantic submarine menace, this involved the adoption of escorted convoy tactics,[3] increases to aerial maritime patrol coverage, improvements to detection technologies such as sonar and radar, the development of the acoustic homing torpedo, and the increased capacity of the shipbuilding industry to compensate for losses.[4] Significantly, not all of these responses were purely military: industrial mobilization, for example, could be considered a national response.

Nations and their military establishments have shown differing levels of agility in responding to these surprises. Before an entity can respond, however, it must recognize that it has been surprised; that is, it must understand that familiar capabilities and accustomed reactions may not secure success. With that realization, the entity can begin to address the challenges of deciding how to respond, and of organizing and executing that response.

Nations use their military power for political reasons. In democracies, government decisions to commit and sustain military forces depend on judgments that, among other things, their employment has sufficient popular support. This is particularly important in wars of discretion—those conflicts in which governments have some choice in whether, and to what extent, they become and remain involved.[5] In such conflicts, popular support can be a volatile commodity and may decline if the population believes that the cost of military involvement is too great for the benefits in prospect, especially in terms of casualties, or that a costly commitment is dragging on without a reasonable prospect of successful resolution. If a lack of popular support, and consequently of political will, leads to the withdrawal of military forces before a conflict is satisfactorily won, the outcome could amount to strategic defeat without suffering decisive tactical defeat. High casualties and long duration could therefore constitute a defeat-threshold for a modern military, especially one wielded by a democracy, by prompting decisions to terminate its involvement in a conflict.[6] If this proposition is accepted, then it follows that military surprises can threaten strategic defeat if they cannot be overcome before they cause casualties **above** or prolong a military commitment **beyond**

the national tolerance for those things. The ability to respond to surprises in an agile and effective way is always critical to military success. In an environment in which political support for military commitment is fragile, that ability takes on a special importance for modern democracies.

This Letort Paper argues that the threat of improvised explosive devices (IEDs) that has emerged in conflicts in Iraq and Afghanistan since 2003 is a contemporary example of conventional militaries being confronted with a tactical surprise with operational—if not strategic—implications, necessitating "institutional" responses to avoid strategic defeat. The manuscript contends that this 6-year evolution, from 2003 until 2009, constitutes a complete cycle of surprise and response. A case study of this experience illustrates how conventional military establishments recognize and respond to such surprises, with a particular focus on the experience, respectively, of the U.S. and Australian defense establishments. Because the IED problem manifests itself mostly in the land environment, that examination tends to emphasize the responses of armies, but the lessons have a more general application. The paper will contend that both the U.S. Department of Defense (DoD) and the Australian Defence Organisation (ADO) could have responded quicker than they did. Despite this, the DoD demonstrated impressive agility in its response, especially for such a large organization, while the ADO was slower to begin making the institutional adaptations it eventually found necessary.

OPERATIONAL SURPRISE AND RESPONSE

Surprise is a familiar concept in the theory of warfare. Achieving it is set as a key objective in most countries' doctrines. "It [surprise] lies more or less at the foundation of all undertakings. . . ."[7] Surprise is seen most frequently at the tactical level, but operational and strategic surprises also occur. Recent writings have posited a similar concept of strategic-shock to describe an unanticipated turn of events that renders previous strategic planning obsolete or irrelevant: the Japanese attack on Pearl Harbor in 1941 and the terrorist attacks of September 11, 2001 (9/11) are examples of these events.[8] Determining the level of surprise (tactical, operational, or strategic), or the demarcation between surprise and shock, could be the subject of its own debate: for the purposes of this paper, surprise is considered to function at the level at which it compels a response. Tactical surprise has tactical consequences and necessitates a tactical response that is within the remit of the tactical commander.[9] Operational surprise threatens operational vulnerabilities and requires a response beyond the resources of the tactical commander. Operational responses can include a redistribution of forces within the theater, the release and employment of theater reserves, and other decisions within the remit of the operational commander. They may also necessitate reaching back into strategic resources and capabilities. In the latter situations, surprise begins to impinge on the strategic level, requiring a strategic response.

A surprise and its successful response constitute a cycle that begins when the surprise emerges, putting the surprised force at a disadvantage by negating some aspect of its capability. The cycle continues as

the surprised force responds: if it does so successfully, it nullifies that disadvantage and regains its previous relative capability. At the operational and strategic levels, the response itself is a complex activity that consists of:

- **Recognition,** whereby the surprised force becomes aware that it has been surprised and must devise a response.
- **Tactical response,** by which tactical commanders respond as best they can with the means available to them. The impact of surprise will tend to be obvious at the tactical level, and any competent tactical commander will attempt to respond. For this reason, tactical responses are not analyzed deeply here.
- **Institutional response,** which engages (potentially) the full resources of the national military organization to respond comprehensively. This can involve a partial transformation of the force. Elements of the institutional response include:

— **Organization.** This can include changes to force structure, such as the establishment of new units or agencies.

— **Equipment.** This includes the identification and supply of different equipment to support new capabilities.

— **Training and doctrine.** At the institutional level, this involves developing new training and doctrine to address the threat posed by the surprise and delivering this systematically through the routine "raise, train, and, sustain" process of the national defense apparatus. This is particularly important when the threat posed by the surprise is assessed to be an enduring

feature of the security environment rather than an aberration.

- **Research and development (R&D).** National R&D capacity may need to be engaged to develop technological solutions to surprises, or to conduct the operational analysis (OA) needed to devise improved tactics, techniques, and procedures.
- **Industry.** Manufacture of unanticipated quantities of special equipment or of consumable supplies may require the development of new industrial capacity or the direction of existing capacity contrary to normal market influences.
- **Funding.** The allocation of unobligated funding may be necessary to support the response elements identified above, especially for such equipment acquisitions and operating costs.
- **Policy.** All of the foregoing can constitute a policy response if their implementation involves a *de facto* departure from existing policy. This response may be stated explicitly in published policy pronouncements, or it can be implicit in the redirection of force structure, equipment, or funding priorities. In the latter situation a policy response might evolve incrementally, through a series of pragmatic management decisions by military leaders, defense officials, and industry leaders, rather than through a single conscious decision of a government.

THE CONTEMPORARY IED EXPERIENCE

IEDs are not new. The use of unattended explosive devices of one sort or another was a common feature of 20th century warfare. Terrorist bombs have been

a reality since the 17th century.[10] IEDs have been a particular feature of insurgencies since the mid-20th century.[11] Landmines were a standard feature of conventional warfare, in both practice and doctrine, from World War II until an arms limitation process began in the 1990s.[12] The British, U.S., and Australian Armies confronted these explosive hazards, in the form of nuisance landmines,[13] booby traps, and true IEDs, in their operational experiences of Vietnam and Northern Ireland from the 1960s. More recently, British and U.S. forces encountered minefields in the former Yugoslavia in the 1990s, while Australia contributed military experts to humanitarian demining efforts in various parts of the world consistently since the late-1980s.[14] Modern militaries that did not face these threats directly had full visibility of their existence and their effects on other countries' forces.

In the years leading up to the 2003 Iraq War, Western military establishments began to acknowledge a probable shift in the nature of the conflicts they would encounter in the future, and a need to adapt in anticipation of that shift. Debate in professional journals began to recognize the impact of factors such as urbanization, the rise of nonstate actors and the dominance of the United States and its wealthier Western allies in conventional military operations. Well before the emergence of the dangerous insurgencies in Iraq and Afghanistan, military thinkers expected adversaries on future battlefields to present asymmetric threats that would negate that dominance.[15] Despite this apparent intellectual readiness to accept that new problems might be lurking, as well as experience that showed that things like IEDs were within the repertoire of potential adversaries, neither the U.S., Australian, nor United Kingdom (UK) militaries commenced

operations in Iraq in 2003 with a mature counter-IED (CIED) capability; nor, apparently, did they anticipate the emergence of a significant IED threat. In the U.S. case, this has been criticized formally:

> DoD was aware of the threat posed by mines and improvised explosive devices (IEDs) in low-intensity conflicts and of the availability of mine-resistant vehicles years before insurgent actions began in Iraq in 2003. Yet DoD did not develop requirements for, fund, or acquire MRAP (mine resistant ambush-protected)-type vehicles for low-intensity conflicts that involved mines and IEDs. As a result, the Department entered into operations in Iraq without having taken available steps to acquire technology to mitigate the known mine and IED risk to soldiers and Marines.[16]

DATA SOURCES

For sound reasons of operational security, most national defense organizations limit the public release of information on current operations. This complicates open-source research into emerging operational phenomena, such as the contemporary IED experience. Key sources of data on IED casualties are U.S. DoD media releases.[17] These announce fatalities among personnel assigned to operations, including, in most cases, the cause of death. These data have been collected and processed for Iraq for the period May 1, 2003, the end of major combat operations, until June 30, 2008. This data set provides attributable information on the cause of U.S. fatalities, but has certain limitations that must be acknowledged:

- It is limited to U.S. DoD personnel and does not include contractors or personnel from other Coalition countries.

- It relates to **fatalities** only: details of nonfatal casualties are not disclosed. Conclusions about the effectiveness of IEDs and countermeasures could therefore be distorted if fatalities are not proportional to nonfatal incidents.
- The U.S. Marine Corps (USMC) stopped disclosing the cause of death of its combat fatalities in 2004.[18] USMC IED fatalities in Iraq are, therefore, underreported from that point on, introducing unreliability in the data if those fatalities are not proportional to those suffered by the other U.S. services.

The restriction of the Defenselink data to U.S. fatalities only is not a significant defect for the purposes of this paper, which examines only U.S. and Australian behavior specifically, and good data are available on fatalities from Australia.[19] Finally, the reliability of the Defenselink figures is supported by the fact that they are generally consistent with summary statistics available occasionally from official sources, such as Congressional Research Service reports,[20] and detailed statistics available from unofficial sources, such as the "Iraq Coalition Casualty Count."[21] Other data sources include statements by officials, reported in the media or in U.S. and Australian government media releases and transcripts, and governmental reports, such as Congressional or Parliamentary Committee proceedings.

U.S. EXPERIENCE IN IRAQ

President George W. Bush's "Mission Accomplished" declaration on board the USS *Abraham Lincoln* on May 1, 2003, has come to symbolize the end

of the shock-and-awe maneuver phase of the current Iraq conflict, in which the forces of the United States and its allies enjoyed a swift and predictable victory against the conventional forces of Iraq, suffering relatively few casualties.[22] The insurgency that was to develop in the succeeding months, however, would soon cause a steady climb in the U.S. casualty toll and belie the "Mission Accomplished" assertion. The United States has maintained over 100,000 personnel on the ground in Iraq (who are therefore subject to IED hazards) through early 2010. The unquestioned U.S. leadership role in the Coalition in Iraq, combined with the administration's political equities in that conflict, effectively limited its discretion in the size of its commitment, or in the degree of risk it must accept—as the Coalition leaders, U.S. forces had to do the business in Iraq, and were therefore exposed to adversaries' offensive tactics.

The first reported U.S. IED fatality in Iraq after "Mission Accomplished" occurred on June 28, 2003.[23] The monthly total of IED fatalities climbed steadily from then. In August and September 2003, IEDs were responsible for more U.S. combat fatalities than the combined totals for direct fire weapons (small arms and rocket-propelled grenades [RPGs]) and indirect fire, the methods that had, historically, caused the majority of battle casualties. Figure 1 illustrates the increase in IED fatalities and the reversal in fatality cause trends that occurred over this period (that is, IEDs went from a minor to the major cause of fatalities). By late-2003, monthly IED fatalities were double those of direct and indirect fire weapons. To adapt the language of epidemiology, this period (October 2003) can be identified as the index event of the IED surprise: that is, the point at which it is possible to prove

empirically that a new phenomenon is at work on the battlefield, and from which the development of, and response to, that phenomenon can be measured.[24]

When monthly U.S. IED fatalities are charted out over the entire sample period (until June 2008), IED fatalities are seen to continue to increase over the next year, with significant spikes associated with major insurgent offensives up until 2007 (Figure 2).[25] From late-2007, U.S. IED fatalities began a sustained decline until, by mid-2008, monthly totals had returned to mid-2003 levels. Over the course of this evolution, the IED threat exposed a number of gaps in the capabilities of Coalition forces in Iraq, ranging from intelligence processes, through detection methods and protective technologies, to the medical capacity to treat injuries.[26]

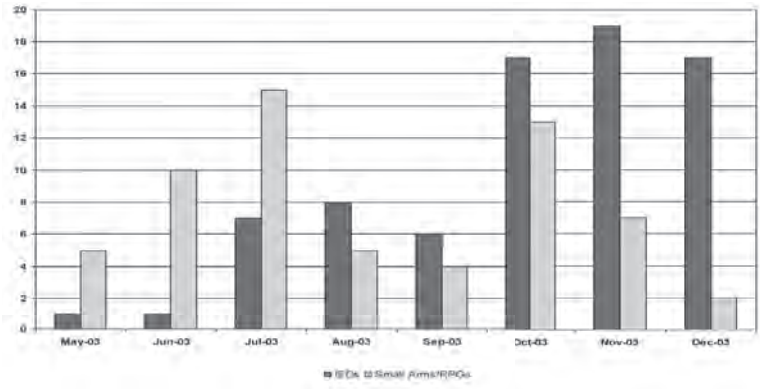

Figure 1. U.S. Battle Fatalities in Iraq by Cause, May-December 2003.[27]

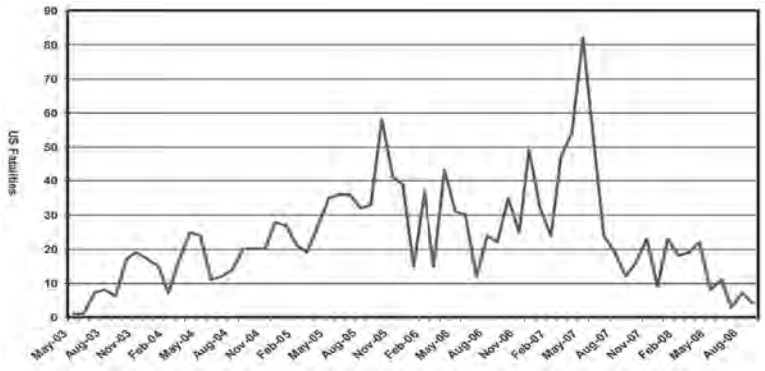

Figure 2. Monthly U.S. IED Fatalities in Iraq, May 2003-September 2008.[28]

One of the most significant aspects of the growth in U.S. IED fatalities in Iraq is that it was incurred over a sustained period by a military that was, by most quantitative and qualitative measures, among the best in the world. Despite this superiority, the U.S. Defense establishment, collectively, took years to bring the threat under control. This fact is perhaps the most stunning evidence of the level of surprise involved.[29]

The above-mentioned point notwithstanding, before drawing any conclusions about the effectiveness of U.S. CIED measures as a reason for the eventual decline in IED fatalities, it must be acknowledged that IEDs were a weapon employed in the context of an insurgency. Consequently, variations in IED incident rates, and hence fatalities, can be attributed to changes in the intensity of the insurgency overall and the effectiveness of U.S. counterinsurgency (COIN) efforts generally, as well as changes in the effectiveness of CIED measures specifically. Changes in capability and tactics, techniques, and procedures (TTPs) designed to work across all aspects of the insurgency (such as

improved intelligence, surveillance, and reconnaissance [ISR] capacity and better intelligence fusion), would be expected to yield significant results against its weapon of choice.

THE U.S. RESPONSE

Recognition.

The U.S. response to the new IED problem in Iraq began quickly. The propensity of tactical commanders to recognize and respond quickly to new threats, within their means, was demonstrated and will not be discussed further.[30] Recognition at higher levels also came early. Evidence of this is found in the emphatic language used by Commander of U.S. Central Command General John Abizaid in a memorandum sent to his strategic superiors (Secretary of Defense Donald Rumsfeld and Chairman of the Joint Chiefs of Staff General Richard Myers) in October 2003. Abizaid described a need for a "Manhattan-like project" to address the IED problem.[31] The comparison with the Manhattan Project is significant: the U.S. project to develop a useful nuclear weapon in World War II is a benchmark for scale, cost, complexity, and urgency in a military undertaking, one that needed to harness the full depth of the U.S. scientific and industrial capacity.[32] Clearly, Abizaid saw in the IED problem a surprise of strategic proportions.

Institutional Response.

The U.S. Defense establishment's response to Abizaid's request is evidence of recognition, at the strategic level, of a significant new problem needing an

institutional response. As that response evolved, it demonstrated all the elements noted above.

Organizational.

The DoD's initial response was organizational: the immediate formation by the U.S. Army of an *ad hoc* task force of 12 personnel (an **organization**—the Army IED Task Force), located in Washington, DC, to study and attempt to address the IED problem.[33] This response was repeated over the ensuing years as the IED problem grew. In July 2004, the Army Task Force was upgraded to a Joint Integrated Process team (under Army leadership), moving the IED response into the Joint arena.[34] In June 2005, the U.S. CIED apparatus was upgraded again into the Joint IED Defeat Task Force (JIEDD TF), under a specific DoD Directive, to further improve coordination of the DoD's efforts.[35] The status of the JIEDD TF was further elevated in December 2005 by the appointment of retired four-star General Montgomery "Monty" Meigs as its Director.[36] Meigs' selection was significant in its own right. Some years previously, he had published a treatise on the scientific response to the submarine threats of World War II, in which he explained the evolution of a solution that, he concluded, consisted of optimized equipment and doctrine developed by close cooperation between the R&D community and operators.[37] With this background, Meigs brought with him a sophisticated understanding of how urgent capability development efforts need to be coordinated.[38] The JIEDD TF's title was upgraded to the Joint IED Defeat **Organization** (JIEDDO) in January 2006 by Deputy Secretary of Defense Gordon England,[39] and finally the new Organization was codified by the issue of a specific Direc-

tive in February of that year.[40] This entire evolution, from the first U.S. IED fatality to the establishment of a statutory organization under four-star leadership, had taken 2.5 years (a few months less from the "index event" of October 2003).

Figure 3 maps these major milestones in the development of the U.S. CIED apparatus against fatality figures over time. This indicates a correlation between significant spikes in fatalities and progressive escalations in the resourcing and profile of CIED efforts. Figure 3 suggests that the U.S. Defense establishment was highly responsive to indications of a worsening problem and increased efforts to address it until it was brought under satisfactory control.

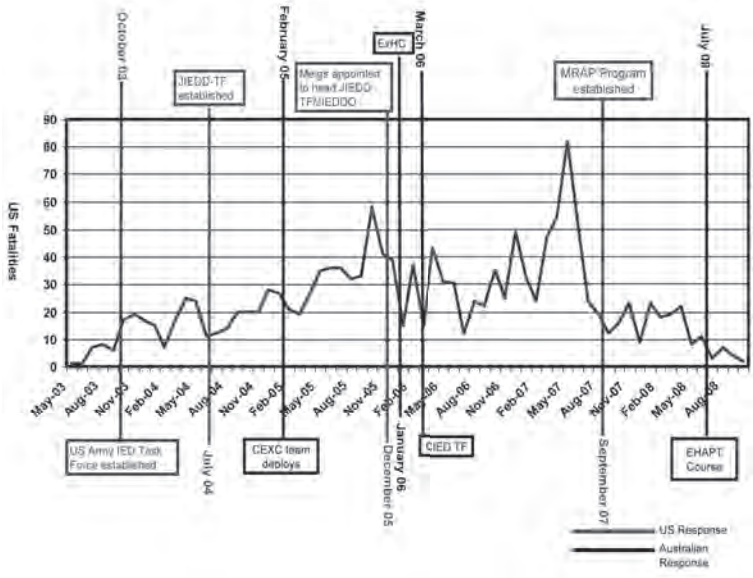

Figure 3. Selected U.S. and Australian Institutional Responses.

Another level of organizational response to the IED surprise is reflected in the U.S. Army Engineer Branch's adoption of a modular force structure approach in the period 2005-08.[41] The Modular Engineer Force had been under development for some time, but the emergence of the IED threat led to the inclusion of specific unit roles and structures, in particular the Route Clearance Company, with specialized equipment and a focus on clearing IEDs and other explosive hazards from roads and infrastructure. Activation of these units was accelerated in response to the IED threat, with several being raised by mid-2006.[42] Measured from the index event in late-2003, this represents an organizational and force structure response cycle of less than 3 years.

Equipment.

At the operational and strategic levels, the U.S. equipment response to the IED surprise in Iraq was broad, ranging from improved body armor for personnel to quantitative and qualitative improvements in intelligence, surveillance, and reconnaissance (ISR) capabilities. The greatest emphasis was in the areas of physical protection against IED effects, especially in the form of protected vehicles, and in prevention of IED detonations through the use of specialized electronic countermeasures (ECM). The need to make significant acquisitions of new equipment, much of it not previously held in DoD inventories, supports the contention that the DoD was surprised by the emergence of the IED threat.

Vehicles.

Almost from the beginning of the Iraqi IED problem, media reports characterized the devices as roadside bombs because of their use predominantly against Coalition vehicles. An early response to the problem was to employ vehicles with armored protection to increase personnel survivability against IED effects. This was particularly necessary for soft-skinned general purpose vehicles, in which the majority of movement was undertaken and which are essential for the efficient conduct of routine functions such as personnel transportation, administrative movement, and logistic resupply. Initially, U.S. forces in Iraq had few general purpose vehicles with armored protection and even fewer vehicles that were optimized for the conduct of CIED activities.

Initial efforts to increase the number of protected vehicles available were, in effect, a tactical response, whereby deployed units improvised so-called hillbilly armor onto their vehicles using whatever methods were available.[43] Official attempts to increase the number of protected vehicles resorted to existing solutions for the most common soft-skinned vehicle, the ubiquitous high-mobility multipurpose wheeled vehicle (HMMWV). The requirement for significant numbers of additional protected vehicles, as well as add-on armor kits (Armor Survivability Kits [ASKs]) to provide protection for existing HMMWVs, was passed by U.S. Central Command to the DoD in late-2003. In response, the U.S. Army initiated contracts to produce additional vehicles and ASKs, which began to flow into the theater in November 2003.[44] Demands for protected vehicles continued to emanate from the theater over the following years. By July 2005, Cen-

tral Command's requirement for 9,727 up-armored HMMWVs for Iraq had been met.[45] In all, a total of 30,000 additional protected HMMWVs (either factory-built or fitted with ASKs) are now available to the U.S. Armed Forces.[46]

Even when armored, however, the protection offered by the HMMWV was inadequate and a need for a better protected vehicle was soon identified. This was prompted, in part, by the appearance of a more lethal type of IED in Iraq, using explosively formed projectile (EFP) technology.[47] Deployed forces made an initial request for 1,169 vehicles in June 2005. The Mine Resistant Ambush Protected (MRAP) vehicle program was initiated in November 2006 to provide a solution to this requirement.[48] MRAP orders increased, progressively, to more than 25,000, of which 15,000 had been delivered into the Iraq and Afghanistan theaters by January 2010, at a cost of over U.S. $22 billion.[49] An unprecedented personal focus from Secretary of Defense Robert Gates since May 2007 has seen the program expanded and enormous priority given to funding, procuring, and delivering the vehicles to troops.[50] The MRAP fleet now encompasses 5 vehicle types, including a lighter-weight variant, the MRAP All-Terrain Vehicle (MATV), to meet mobility requirements identified through operational experience in Afghanistan.[51]

An interesting illustration of the surprise that the IED problem presented the United States from an equipment perspective is presented by the Interim Vehicle-Mounted Mine Detection (IVMMD) Project. This was a small project initiated in the late-1990s to provide an interim capability for U.S. Army combat engineers to deal with mine threats along routes.[52] The equipment solution eventually devised consisted of

a set of specialist vehicles, of South African design, capable of deploying detection technologies along a road, and dealing with any mines detected, from within vehicles that would provide the operators with excellent protection against explosive effects. As the name implies, the project was intended to provide an interim capability, involving a small fleet of only 10 systems, awaiting the development of a more permanent capability as part of the U.S. Army's Future Combat System (FCS) project.[53] Ironically, by late-2003, the FCS requirement (intended to replace, eventually, all combat vehicles in the U.S. Army) did not include a capability like the IVMMD, making the latter an orphan legacy capability that was limited to the initial tiny fleet.[54] The U.S. Army's deliberate capability development process, in other words, did not anticipate a threat of the sort that IVMMD was meant to address; at least, it did not see any urgency in the need to counter such a threat. The IVMMD fleet was deployed to Iraq in late-2003 in response to an operational requirement emanating from the theater as a result of the growing IED threat along routes (roadside bombs). Although not optimized for dealing with IEDs (it was a countermine system), this use of the IVMMD was an example of the deployment of the closest thing available to deal with a surprise.[55]

The MRAP solution demonstrates one characteristic that recurs across other aspects of the IED response: it is not new. The key element of the solution—the vehicles' v-shaped hull, designed to dissipate explosive forces before they penetrate the crew space—was well known, having been developed to a high state of maturity by the South Africans more than 20 years before.[56] A number of vehicles with this design feature were commercially available prior to 2003, and were

even represented in the IVMMD fleet. Any assessment of the adequacy of U.S. responsiveness in adopting this solution must take account of this fact.

A prominent feature of the MRAP program is the personal involvement of Secretary of Defense Robert Gates. Shortly after assuming office in December 2006, Gates interceded to accelerate the program massively, directing that, "the MRAP program should be considered the highest priority Department of Defense acquisition program" and creating special management arrangements for it.[57] He has remained engaged with the project ever since and has been a driving force behind not only the procurement of the vehicles, but their rushed delivery into the field. Gates has directed unprecedented efforts to get the new equipment to users in theater rapidly, including the employment of scarce and expensive air transport to move vehicles virtually directly from manufacturing facilities to operational areas. Gates's background is significant: as a civilian and a newcomer to the most senior executive role in DoD, he had few equities in the established response. More importantly, recently he had been a member of President Bush's Iraq Study Group, which undertook a review of the U.S. campaign in Iraq. He therefore came with an independent but well-informed perspective, which should have enabled him to recognize the strategic vulnerability exposed by the IED problem and the urgency of addressing it.[58] It is possible that, through his experience in the Iraq Study Group, he brought an agenda in relation to Iraq, which may have included the CIED problem.

Electronic Countermeasures.

Most countries tend to group ECM among the highly classified capabilities referred to, collectively, as electronic warfare (EW). In the emerging jargon for this equipment, one acronym encountered frequently is CREW (counter radio-controlled IED electronic warfare). [59] Because of its high classification level, open-source data on the acquisition and fielding of CREW equipment in response to the IED threat is sparse. There is evidence, however, that the United States has made major investments in this equipment and in organizational and doctrinal structures needed to keep its complex programming up to date with the rapidly changing electronic environment.[60] The scale and pace of the U.S. response is indicated by the rate of generational change in the equipment solutions used, the first being early Warlock systems procured under the CREW-1 specification, which were fielded in Iraq before the end of 2003.[61] This had evolved to the CREW 2.1 (second generation) specification by mid-2007, with that equipment entering service in Iraq by April 2008. This represents a complete cycle from first- to second-generation equipment fleets, with associated supporting capabilities, of 5 years. This represents rapid progress when compared with the priority that the U.S. Army had applied historically to ground EW equipment in peacetime procurement.[62] Operational effectiveness of CREW systems in Iraq reveals a similarly impressive achievement, with the proportion of U.S. casualties caused by radio-controlled IEDs declining significantly over an 18-month period from mid-2006 until late-2007.[63]

Like the MRAPs' V-shaped hulls, the concept of ECM as a counter-IED capability was not new. British forces had been employing it in Northern Ireland for

almost 20 years, and the U.S. Navy had possessed a limited capability, called Acorn, since the 1990s . In fact, a number of Acorn systems were deployed to Afghanistan in 2002 in response to the early emergence of RCIEDs there.[64]

Training and Doctrine.

U.S. forces began to modify training in response to IEDs and explosive hazards in Iraq well before the end of 2003. Units encountering the IED hazard in theater began to adapt their own TTPs, an example of the tactical response that would be expected of units in contact. This effort was reinforced at the tactical level by adapting an existing structure that was already available—the Mine and Explosive Ordnance Information Coordination Center (MEOICC) that had deployed as part of Operation IRAQI FREEDOM (OIF).[65] The MEOICC's initial deployment was a normal, doctrinal measure to address the hazards from explosive remnants of war (ERW), usually in the form of landmines and unexploded ordnance (UXOs), that are encountered after conventional military operations. The MEOICC's Explosive Hazard Awareness Team (EHAT) evolved over the course of its deployment, gradually increasing its emphasis on IEDs.

Institutional training responses were first demonstrated by modifications to training for deploying elements—in the first instance, this involved the use of training developed by the EHAT in Iraq, which by early-2004 began to make its way into predeployment training delivered in the United States for units deploying as part of the OIF-2 rotation.[66] Further training, in dedicated IED training lanes, was also delivered to units arriving in the theater as part

of reception, staging, onward movement, and integration processes. Formal changes to doctrine and to the structure of the U.S. Army's training establishments took a little longer, but had begun to emerge in 2004. For example, the U.S. Army Engineer School's Counter Mine/Counter Booby-Trap Center, itself created only in January 2002, was renamed the Counter Explosive Hazards Center in early-2004, in response to the new IED threat.[67] Reflecting the energetic debate on professional issues normal in the U.S. military, articles on the IED threat and responses to it also began to proliferate in U.S. military journals from early-2004.

The doctrinal response also began in 2003, with the establishment of the Asymmetric Warfare Group, an Army initiative, to study emerging aspects of the insurgency. Doctrine also began to be overhauled from 2004, with doctrinal structural arrangements being examined and adjusted, where necessary, to optimize the force for the CIED fight. An example is the traditional division of responsibility between U.S. Army Engineers and Ordnance Corps personnel in the field of Explosive Ordnance Disposal. This division was reviewed in response to the shortage of personnel available to deal with IED hazards, leading to the development of new skill sets within the Engineers.[68] In summary, the institutional response to the doctrinal and training challenges of the IED threat was well underway in the U.S. Army by mid-2004, approximately 8 months after the index event.

Research and Development.

The U.S. R&D response to the IED threat began almost immediately, perhaps reflecting a U.S. military predilection for technological solutions to problems.

From an early stage, however, pundits and practitioners alike warned that a technological "silver bullet" for the IED problem would be elusive at best, and that the forces in contact could not afford to wait for it. Nevertheless, technology was part of the answer and the U.S. R&D establishment began to be harnessed from an early stage, as reflected by General Abizaid's use of the Manhattan Project analogy to communicate a sense of the problem's R&D dimension. Technological responses were pursued across the spectrum of CIED measures, including detection, protection, IED defeat in the form of ECM and remote disposal, and prevention in the form of the technical exploitation of evidence to enable proactive network attack. Much R&D was also devoted to technical ISR enhancements to support all CIED measures. As understanding of the IED threat spread, individuals and organizations began the R&D of solutions independently.[69]

Institutionally, the importance of R&D was reflected in the structure of the JIEDDO and the bodies that preceded it, all of which incorporated an element with R&D responsibilities. In the JIEDDO, this is the JIEDD Lab Board, which "coordinates, synchronizes, and sponsors mid- and long-term research, development, science, and technology that contribute to countering the IED threat."[70]

The evidence suggests that the IED threat constituted a less dangerous surprise to the U.S. R&D capacity than it did in other areas. There is little indication that capacity was inadequate, qualitatively or quantitatively, and in need of expansion. Rather, available capacity needed to be redirected, but this does not appear to have come at the expense of other R&D priorities.

Industrial.

The U.S. industrial response to the IED threat is best demonstrated by the effort to field rapidly large numbers of protected vehicles. As discussed, this manifested itself initially in orders for large numbers of ASKs for HMMWVs, then matured into the MRAP effort. At first, the United States had minimal capacity to produce the necessary armor kits or vehicles and industrial capacity needed to expand significantly. One company, Force Protection Inc., had obtained licenses to produce a limited number of mine-protected Buffalo vehicles for the IVMMD project, but the design of the vehicle's V-shaped hull was based on South African research. High-performance steel for MRAP armor was a particular shortfall. Initially, U.S. capacity to produce this domestically was very limited, and supplies for MRAP production needed to be deconflicted with other Defense projects.[71] Some steel needed to be imported, involving a waiver of normal policy on the use of foreign materials.[72] In response to the demand created by the MRAP orders, the four U.S. steel mills capable eventually of producing such steel made "capital investments and process improvements that enabled a 100 percent increase (in) . . . production capacity."[73] This is evidence of the U.S. industrial base adjusting to the unexpected demand for a new military platform. The initial paucity of the industrial base is also demonstrated by the need to spread procurement over a number of manufacturers and vehicle types, including overseas suppliers. This led to a diversified fleet that significantly complicates the logistical sustainment of the capability, a situation normally avoided in deliberate procurement decisions. In this case, the urgency of the requirement left the DoD with

no option—further evidence of the degree to which the U.S. military industrial base was surprised.[74]

Funding.

The allocation of funding specifically to address the IED threat is a useful metric for the scale of the U.S. response to it, although difficult to track accurately over the entire period since 2003, due to the diverse application of funds. Prior to the emergence of the threat, virtually no funding was allocated specifically to it.[75] The first institutional response, the U.S. Army's small IED Task Force, was initially funded in late-2003, with U.S. $20 million from the Army's budget.[76] Specific appropriations began in 2004, with U.S. $100 million.[77] Since its creation, the JIEDDO has had its own funding line, with a base budget of U.S. $500 million in fiscal years 2008 and 2009, but also including significant supplemental appropriations that brought the total budget to U.S. $4.4 billion in 2009. By late-2008, JIEDDO had spent about U.S. $16 billion.[78] This must be added to the funds allocated to specific CIED programs, such as the MRAP, which totaled U.S. $22.7 billion by mid-2009.[79]

The funding allocated by the United States to CIED measures is impressive, but two aspects are particularly relevant to this analysis. First, the funding was not obligated in 2003, a clear indication that the IED threat was not anticipated. Second, there are indications that the JIEDDO's budget will be rolled into DoD's baseline funding, with responsibility for development and procurement of specific equipment, such as ECM jammers, migrating to parent Services.[80] This would indicate a maturing of the response, insofar as it becomes part of DoD's business as usual, without

requiring a custom-made organization to manage it. This is a strong indication that, for the U.S. DoD, the IED surprise response cycle is closing.

Policy.

An implicit U.S. policy response can be detected in the establishment and robust funding of the JIEDDO from 2005. This is reinforced explicitly in the *2006 Quadrennial Defense Review* (QDR), which recognizes surprise as an enduring characteristic of the contemporary security environment and cites the creation of JIEDDO as an example of DoD's agility in support of operations.[81] The 2006 QDR is overshadowed, however, by the policy response that has evolved since the appointment of Robert Gates as Secretary of Defense. Gates's public statements since early-2007 are evidence of a conscious decision to elevate the priority of CIED capability development over existing conventional capability requirements. The relative fortunes of the MRAP program and the F-22 Raptor Project under Gates's incumbency are a materiel reflection of this policy shift, which is also articulated concisely in the 2010 QDR and in the official statements accompanying the Fiscal Year 2010 Budget submissions.[82]

Summary Assessment.

The evidence suggests that the emergence of the IED threat in Iraq was a dangerous surprise for the U.S. military, necessitating a response of national proportions with military, industrial, scientific, and budgetary dimensions. That response is still evolving more than 6 years after the index event. Recognition of the surprise was reasonably prompt, but initially the DoD

attempted to cope with the problem by adapting existing resources, structures and processes, in addition to tactical responses. A coordinated national response to the threat, with its attendant management structures, took approximately 2.5 years to develop. Even then, key aspects of the DoD response, such as the MRAP requirement, were not triggered until much later and were influenced heavily by external perspectives, such as that brought by a new Secretary of Defense. Indeed, Congress was openly critical of the U.S. Army's slowness in addressing the troops' IED protection needs.[83] Once the strategic leadership was provided, the DoD began to respond more adroitly: for example, it adopted nonstandard and relatively risky procurement strategies for necessary equipment. The appearance of a deliberate policy shift in favor of CIED capabilities in public documents coincided with this change in strategic leadership.

There are indications that the U.S. response cycle is now closing. Measures to deal with IED threats are increasingly seen as business as usual, with their management moving toward more normal organizational and budgetary arrangements, such as baseline funding, while the attendant military capabilities are finding their place in everyday doctrine, training, and equipment fleets. This cycle has occurred in the context of a war of discretion, in which U.S. national survival was not threatened. U.S. military casualties in that war, although appalling and the highest since Vietnam, have also been historically low (a tiny fraction of those incurred in Vietnam). This may have prolonged the U.S. response cycle, compared with what may have been possible against a threat of national extinction or even higher casualties. Given the political importance of success in Iraq, it is hard to conceive

a lack of urgency. Accordingly, the U.S. response suggests that: recognition of surprise by senior leaders, and their effective engagement in dealing with it, is a major determinant of the speed of institutional response;[84] conventional defense establishments may not be good at responding to strategic surprises in wars of discretion, and special arrangements may be necessary to kick start an agile response; and, depending on the effectiveness of senior leadership, it may take the United States about 5-6 years to respond completely to a strategic military surprise during a war of discretion.

THE AUSTRALIAN EXPERIENCE IN IRAQ

Australia's involvement in the current Iraq conflict was small in comparison with that of the United States. It began with Special Forces and air operations during the invasion of April-May 2003 prior to the emergence of the IED threat, then shrank to a number of niche contributions except for the period April 2005–June 2008, when a mounted battle group was deployed to the British-led region in Iraq's south.[85] Australian troops on the ground in Iraq never exceeded 800, and many of these spent most of their time inside secure bases with limited exposure to IED hazards.[86] The only remaining Australian military presence is a detachment providing security to Australia's diplomatic mission, the SECDET, and two individuals seconded to the United Nations Assistance Mission for Iraq. At the time of the writing of this manuscript, Australian forces have suffered no combat fatalities in Iraq, but a number of personnel have been wounded. The most significant injuries were from IED attacks.[87]

Throughout Australia's involvement in Iraq, its military contributions have been characterized by a high degree of discretion and selectivity as to their size, capabilities, location, duties, and timing. With the exception of the Overwatch Battle Group in the south, most missions allowed Australians to avoid exposure to high IED risks.[88] The largest number of exposed personnel, members of the battle group, operated in an area that experienced very low levels of IED activity, compared with the most dangerous areas where large numbers of U.S. forces operated, such as the Sunni Triangle. The relatively small and discretionary nature of Australia's commitments allowed the maintenance of high levels of force protection for most personnel, such as the almost exclusive use of protected vehicles for ground movement after 2003.

THE AUSTRALIAN RESPONSE

Little information on Australia's initial response to the IED threat in Iraq is available from open sources. Given the limited exposure of most personnel to such risks until mid-2005, it is likely that tactical responses were adequate for much of that time and operational security concerns would preclude the publication of those responses in detail. Institutional responses became visible later, giving the false impression that Australia had been doing little about the threat until then.

Recognition.

It is difficult to identify the point at which the ADO recognized that it had been surprised by the IED threat in Iraq. Recognition may have been complicated or de-

layed by the small number of Australians in Iraq when the threat emerged, most of whom had little exposure to IED hazards.[89] Tactical responses probably occurred immediately, consistent with normal military behavior, but those responses would have little visibility in open sources. Recognition that the Baghdad environment remained dangerous into mid-2003 is indicated by the decision to equip the SECDET with armored vehicles—an unusual means of diplomatic transport—but such would have been a reasonable response to a small arms threat as well as IEDs. References to the IED threat to Australian Defence Force (ADF) personnel do not appear in official statements until 2004, although they have been frequent since 2006. While it is difficult to discern the point at which Australia recognized that the IED threat in Iraq constituted a strategic or operational surprise demanding an appropriate response, it is reasonable to conclude that such recognition was considerably slower than that of the United States and did not occur before 2005.

Institutional Response.

Just as Australian recognition of the IED surprise was slow, so was the institutional response to it. That response is described below, using the same criteria as for the United States.

Organizational.

The ADO's first publicly visible organizational change in response to the IED threat occurred in February 2005, when a team of six specialists deployed to Baghdad to participate in the U.S.-led Combined Explosives Exploitation Cell, a technical intelligence

organization established in late-2003 to do technical exploitation of evidence from IED incidents in order to cue action against insurgent IED cells.[90] A secondary purpose for the CEXC contribution was to bring advanced IED exploitation skills back to Australia.[91] The ADO appears to have maintained that commitment until Australian troops withdrew finally in 2009. Subsequent changes occurred in early-2006, with the establishment of the ADF's Counter IED Task Force (CIEDTF) under a one-star commander. This was followed almost immediately by the establishment, within the Army, of an Explosive Hazards Centre (ExHC), responsible for the delivery of IED-specific training.[92] No further organizational changes were evident publicly during the period of ADF deployments to Iraq. While it is obvious that IED threats have heavily influenced the task-organization of ADF elements deploying to Iraq and Afghanistan,[93] there has been no evidence of any long-term force structure changes to deployable ADF elements to address that threat until the establishment of an Army Explosive Ordnance Disposal (EOD) Squadron in late-2010 (well after the ADF had left Iraq).[94] Organizationally, the ADF has largely made do with existing structures in response to the IED threat.

The ADF's most significant organizational changes in response to the IED threat occurred after the appointment of Air Chief Marshall "Angus" Houston as Chief of Defence Force (CDF) in mid-2005; the CIEDTF was raised at his direction.[95] CDF sources also reveal more frequent public references to the IED threat after Houston's appointment, even prior to the ADF's first IED fatality, in Afghanistan in October 2007. Reporting of IED incidents affecting ADF elements has often included reference to the CIEDTF as evidence of the

ADF's efforts to counter the threat. This suggests a higher awareness of the IED threat coinciding with a change in CDF—a noteworthy possibility, given the new perspective that Houston brought to the situation.

Equipment.

The ADO's most significant response to the IED threat, in terms of equipment, is the inclusion of protected vehicles in all combat elements deploying to Iraq and their almost exclusive use for movement outside the wire since 2004. The most obvious example of this has been the use of the Bushmaster Protected Mobility Vehicle (PMV), which first deployed with the AMTG in April 2005 to perform the same role as the U.S. MRAP. Unlike the MRAP, the PMV was not newly acquired in response to the IED threat; its procurement had been underway since at least 1994 as part of a land force capability requirement for "defence of Australia" scenarios.[96] The materiel solution to that requirement—the Bushmaster—had been selected in 1999 but had not entered service fully when the AMTG requirement arose. PMVs were rushed into use in Iraq ahead of the deliberate introduction-into-service (IIS) schedule. This involved some risk, as logistic sustainment systems were not mature and personnel were not experienced in the vehicles' employment. Readiness to take that risk shows some agility in response to surprise. The ready availability of a materiel solution could also be evidence of sound force development processes that had anticipated the threat; equally, it could be serendipitous, like the Bushmaster, which was developed for another purpose. Although precise figures are not publicly available, the photographic

and budgetary record suggests that the number of PMVs deployed to Iraq and Afghanistan rose steadily over the next few years, and that they have undergone rapid improvements in response to new requirements identified on operations.[97] Additional PMVs are also being procured to meet other vehicle requirements, suggesting that the need for protection is now appreciated much more widely than previously, perhaps due to the IED experience.[98]

While the employment of the PMV, especially by units not normally issued with them, suggests some adaptation in response to surprise, it does not compare with the U.S. MRAP program in the level of ministerial push, procedural innovation, or new funding required. Australia simply did not need to initiate a proportionate industrial response from a cold start, as the United States did. It is uncertain whether Australia would have been capable of doing so. It is more likely that, in the absence of the Bushmaster, it would have sought to acquire an alternative vehicle overseas. Given the tight world market for such vehicles, this would probably have delayed or severely constrained ADF contributions to Iraq.

Other Australian equipment responses to the IED threat are difficult to discern, although there is evidence of significant funding for other CIED equipment requirements from 2007 onward.[99] It must be presumed that ECM and other best-practice capabilities employed by other nations have been fielded by the ADF.[100] Defence has attracted some criticism over the slow fielding of CIED equipment, although this has largely been inspired by fatal incidents in Afghanistan since 2007, rather than in Iraq.[101]

Training and Doctrine.

Australia's training and doctrine response to the IED surprise has been generally tactical, with most emphasis on the pre-deployment training of forces deploying into the theater, culminating in elaborate Mission Rehearsal Exercises. The first institutional training response visible publicly is the commencement of Explosive Hazard Awareness and Protection Trainer (EHAPT) courses within the Army's Training Command in July 2008, the first new CIED training delivered as part of the ADF's normal raise-train-and-sustain processes.[102]

The ADO's doctrine has yet to demonstrate much publicly discernible change in response to the IED challenge. Similarly, articles and debate on IEDs in the various professional journals have been limited. They were virtually nonexistent before 2005 and sparse until 2008.[103] While not publicly available for security reasons, presumably doctrine has existed to support the EHAPT since 2008. Given that the IED threat emerged in 2003, the ADO's institutional training and doctrine responses appear slow.

Research and Development.

There is little evidence of a major shift in Australia's R&D efforts in response to the IED threat, although Defence's relatively exclusive expertise in such areas as explosive technology and ECM would suggest that the Department's R&D agencies are heavily involved in such work.[104] The absence of major budgetary changes or organizational shifts within the Defence Science and Technology Organisation (DSTO) would suggest that it is absorbing additional work within existing re-

sources and, consequently, that the R&D response has not reached strategic proportions.

Industrial.

Australia's response to the IED threat has not had a significant industrial dimension. Although the emergence of the threat has led to orders for additional Bushmaster vehicles, these have not demanded any significant expansion in industrial capacity.[105]

Funding.

Defence required additional funding in response to the IED threat, some of it in the form of budget supplementation for operations in Iraq and Afghanistan under no-win, no-loss arrangements. While impossible to isolate in the published budget data, it is likely that the operating costs of IED-related requirements, especially PMVs, have added significantly to the level of operational supplementation. Further IED costs have been absorbed within Defence's normal budget, with inevitable impacts on other priorities: this includes AU$40 million approved specifically for CIED equipment in 2009-10. This equipment is for Operation SLIPPER (Afghanistan), and therefore not in response to the IED threat in Iraq, but is significant as one of the few published examples of expenditure on CIED requirements. It is also significant that this was an additional budget measure, outside the deliberate budget process, supporting the assessment of surprise.[106] The IED threat has also contributed to other unforeseen requirements, such as urgent enhancements to PMVs.[107] In the 2010 budget, specific provision for CIED funding appeared for the first time as part of a AU$1.1 Billion package of force protection enhancements.[108] Given the diversity of funding arrangements,

it is difficult to attribute accurately specific amounts to all Australian CIED efforts, but the funding impacts of the surprise are significant in Australian terms.[109]

Policy.

There is little evidence of a policy dimension in Australia's response to the IED threat before 2010. With the exception of the funding decisions of unforeseen expenditures, IEDs seem to have caused no changes to the direction of existing Defence policy. The 2009 *Defence White Paper* makes no mention of IEDs, nor of the notion of surprise as it is considered here.

COMPARATIVE ANALYSIS OF RESPONSES

The starkest difference between the U.S. and Australian handling of the IED threat in Iraq is the time taken to recognize the surprise and initiate an institutional response. As Figure 3 indicates, the first indication of an Australian institutional response—the deployment of the CEXC contingent—came a full 15 months later than that of the United States, despite having troops deployed to the same theater, at the same time, and with access to the same threat data. An equivalent response, the creation of a dedicated task force to begin dealing with the problem, took Australia 28 months longer than the United States. Continuing through to the implementation of an institutional training response, Australia took a full 5 years from the emergence of the IED threat in mid-2003 to the delivery of the first EHAPT course, and this was after substantial combat forces had been withdrawn from Iraq. Compared with the 30 to 36 months that the United States took to perform the same actions, Aus-

tralia's institutional response to the IED threat seems remarkably slow.

U.S. and Australian responses also manifested themselves differently in terms of the balance between the elements of the institutional response. The U.S. reaction featured significant material acquisitions, with major industrial and funding implications. In comparison, Australia's response emphasized organizational and training measures.

Given the relative sizes of the U.S. and Australian defense organizations, the slowness of the Australian response is counterintuitive: a small organization should be more agile than a larger one. Other factors must account for the relative speed of each country's reaction. The different balance between the elements of institutional response must also be explained. The reasons for these things lie in:

- the timing of leadership changes;
- the perceptions of the threat to respective national interests and equities, including the number of personnel at risk; and,
- judgments as to the adequacy of existing response options.

Leadership Changes.

The significance of strategic leadership changes lies in the extent to which they bring fresh perspectives to the problem and reduce affinities with existing solutions. In both the United States and Australia, the changes that most characterize the overall response were initiated by a newly appointed strategic leader, respectively, Secretary of Defense Gates with the MRAP Program, and Chief of Defence Force Houston with the CIEDTF. In both cases, institutional respons-

es were already underway when the new leader arrived, but their direction changed significantly once that person became familiar with the problem. Both individuals were also new to the organizational problem space: Gates was an intelligence specialist, and his recent experience in the Iraq Study Group gave him excellent threshold knowledge of the problems in Iraq, but he was not a Defense insider. Houston was an Air Force officer looking at a land force problem that hitherto had only been addressed by land operations experts. As such, it is possible that neither was influenced by orthodoxies—born of conventional doctrine and traditional TTPs and structures—that limited conceptualization of the problem and its appropriate response. Similarly, neither had preexisting personal equities in the way the land force contribution in Iraq had evolved. This may have allowed more freedom to consider alternatives.

In both the U.S. and Australian cases, it is significant that institutional responses had commenced prior to the appointment of the new leader, but they had not yet adopted their decisive characteristic, especially in terms of scale. This suggests that recognition of surprise is not dependent on a fresh perspective in the first instance, but a new outlook or especially acute powers of insight may assist realization of its full extent or implications, and consequently, the identification of the right response.[110] Firm conclusions to this effect are impossible without detailed knowledge of the decisionmaking process followed by each country, but the personal impact of new strategic leaders in both countries suggests that leadership has an important role in the comprehensive appreciation of surprise and is therefore a key determinant of the tempo of the institutional response cycle.

A change in leadership does not explain why Australia's initial institutional response, the deployment of the CEXC contingent, lagged the U.S. formation of the Army IED Task Force by 15 months. The justification for such a measure was the same in October 2003 as it was in February 2005.

National Interests and Equities.

The United States led the invasion of Iraq and was the undisputed leader of the Coalition fighting the insurgency until 2009. That leadership role, and the political necessity of guaranteeing success in the conflict, meant that it could neither avoid any aspect of the fight nor stint on the resources it must commit. Although not a war of national survival, for the United States the Iraqi insurgency has been much less a war of discretion than for most of its Coalition partners. Thus, the United States could not reduce its exposure to threats such as IEDs, raising the urgency of finding an effective response to them. The mounting U.S. casualty figures reinforce this point. By comparison, Australia had far less at stake in Iraq, and consequentially, enjoyed broad discretion in the size and nature of its commitment. This allowed Australia to mitigate risk substantially and largely explains the complete absence of Australian IED fatalities. Consequently, an institutional response had no urgency for Australia initially. Although unsatisfying intellectually, this explanation may partly explain Australia's slow response. A corollary conclusion, however, is that the delayed response meant that Australian troops began to benefit from improved CIED measures 15 months later than they might have—a disappointing reflection on Australia's Defence establishment.

Adequacy of Existing Capabilities.

Another factor driving the urgency of a response to a capability-based surprise might be the size of the capability gap created. Such gaps have quantitative and qualitative dimensions. A quantitative gap exists when the surprised force possesses the elements of the necessary response, but not enough of them. A qualitative one exists when the surprised force is outclassed by the adversary's new capability, without necessarily being outnumbered. In the U.S. case, the absence of a capability like the MRAP constituted a large qualitative gap, while the size of the force exposed to IED hazards automatically meant that the gap was also huge quantitatively. This capability gap manifested itself immediately in the scale of casualties suffered by the United States. The United States thus confronted a major problem, necessitating an urgent response.

By comparison, Australia had a much smaller force exposed, especially when the threat first emerged; it could minimize its exposure to that threat by being highly selective about the size of forces deployed, the roles they performed, and the timing of commitments; and in the PMV it had on hand a solution to the most pressing equipment deficiency, in sufficient quantities for the forces it needed to deploy. These factors shrank the capability gap and therefore reduced the urgency of an institutional response, but they do not explain fully why its initiation was delayed until 2005-06, when the factors that demanded it had existed since late-2003.

COUNTERVAILING ASSESSMENTS

As with any assessment based on a small sample of cases, firm conclusions on cause and effect are risky. In the interests of balance, it is important to consider alternative interpretations. Three of these are discussed below.

Conventional Thinking.

While a conventional military background could inhibit the recognition of surprise or limit response options by creating narrow orthodox perspectives, that effect is not demonstrated consistently. General John Abizaid, whose Manhattan Project memo sparked the U.S. institutional response, saw almost immediately that he had a game-changing problem: Abizaid was a career soldier from an infantry background, as was Australia's previous Defence chief. A number of key innovators had similarly conventional backgrounds. While it seems clear that leadership is a critical requirement for agile responses to surprise, it is less certain, based on the two examples considered, that a conventional background necessarily leads to leadership orthodoxies that impede agile responses, especially at the military level.

Adequate Agility.

While Australia's recognition of operational surprise and its consequent institutional response seem worryingly slow, they pass an empirical test of adequacy in that Australia suffered no fatalities and very few casualties in Iraq from IEDs. Indeed, the institutional response was well under way before the first

IED fatality in Afghanistan.[111] By these measures, the ADO could be assessed as adequately responsive. Such an assessment, however, would need to discount luck as a factor in Australia's fatality-free record. This seems unreasonable, given that Coalition partners operating similar equipment in Iraq in the same areas at the same time suffered catastrophic IED attacks. There is no doubt that the training, TTPs, and equipment of the ADF elements were major factors in their success, but most of these fall into the tactical-response category. Judgments about the adequacy of the ADO's institutional CIED response in Iraq need to be tempered with reasonable skepticism.

Flexible Force Structure.

In Iraq, both U.S. and Australian forces needed protected mobility in the form of a purpose-built armored truck that neither had fielded previously. To do so, the United States needed to embark on a massive cold-start acquisition program to equip its forces with the MRAP: Australia did not, instead accelerating slightly the fielding of the PMV, which was already in the acquisition pipeline. This could be argued, optimistically, as a demonstration of the prescience of Australia's force development process and the inherent flexibility of its force structure. Given that the PMV was acquired to meet a very different requirement, however, it could be interpreted equally as luck. Nevertheless, the Australian response passes another empirical, and comparative, test of adequacy in the fact that the Al Mutthana Task Group (AMTG) deployed to Al Mutthana, Iraq, in 2005 **with** its PMVs, while U.S. troops in Iraq waited a further 2 years for their equivalent.

OTHER CONSIDERATIONS

Failure to Anticipate and the Risk of Overreaction.

Military professional literature and defense documents show that both the United States and Australia had begun to contemplate threats like IEDs well before the invasion of Iraq. With the exception of dedicated management structures, such as JIEDDO and the CIEDTF, virtually all elements of the response that eventually manifested itself existed before 2003. It could be said that, by not pursuing a CIED capability in anticipation of the IED threat, both countries **chose** to be surprised by it. Such a course, however, would have brought its own risks.

Compared with other areas of government spending, defense budgets are large, but they are finite, especially in nominal peacetime. Judgments on investment in expensive, long-term capability projects must be made carefully because, once made, these commitments severely limit discretion to pursue other capabilities for years. Expensive capability projects, however, tend to be those that address the worst threats, those that threaten national survival. They secure the ability to win wars of necessity, rather than wars of discretion. Failure to make timely investment decisions can lead to capability gaps that cannot be made up in time to meet rising threats—leading to calamitous strategic vulnerability in the future.[112] On the other hand, failure to win today's wars, even if they do not threaten national survival, can lead to the fall of governments and the slow erosion of our agreeable way of life.

The dilemma facing modern militaries, therefore, is to balance their efforts and investment between the capabilities needed to win today's wars and those es-

sential to win tomorrow's. As the cost of high-end military capabilities rises, these judgments are becoming more critical and more difficult. Secretary of Defense Gates's decisions to channel funding into the MRAP program, while severely restricting the scope of the F-22 Raptor fighter acquisition, is a case in point. Overinvestment in an acute capability gap that proves to be an aberration, however debilitating at the time, could leave a nation fatally exposed in a cataclysmic state-on-state contest. Failing to address the gap and losing the war, however small, could bring down the government in the near term. This dilemma is a major theme in contemporary defense policy and academic literature.[113]

This suggests that, in an era when warfare may be dominated by "small," intra-state conflicts and insurgencies, national defense establishments could be best served by maintaining those capabilities needed to defend against threats to national survival and optimizing their ability to respond to dangerous surprises as they arise.[114]

The Focusing Power of Casualties.

A striking feature of the U.S. experience is the way the escalating institutional responses in the building of the JIEDDO closely followed significant spikes in IED fatalities, and their cumulative growth. In Australia's case, with no fatalities in Iraq, the proximate stimuli for institutional responses are harder to determine. Australia appears to have watched the mounting U.S. deaths for some time before deciding that the IED phenomenon was not an isolated aberration and required an institutional response. This suggests that casualties, and especially fatalities, concentrate the

minds of defense leaders and politicians and may be **the** decisive metric by which the adequacy of evolving responses is gauged. This is not counterintuitive, but it poses the risk that a nation that is able to avoid casualties by a combination of selective participation and luck could delude itself as to the enduring nature of a surprise threat and therefore miss an opportunity to develop its response, leaving itself open to further, more serious, surprise in the future.

SUBSEQUENT EXPERIENCE—AFGHANISTAN

IEDs have been endemic in Afghanistan for more than 20 years.[115] Their use against Coalition forces has been increasing since 2006, and they have been the principal cause of fatalities for some time.[116] To meet this threat, the United States is increasing the flow of MRAPs to troops in Afghanistan and has commenced deliveries of MATVs.[117] To encourage Coalition participation in the International Security Assistance Force (ISAF), the United States is providing MRAPs to its Coalition partners.[118] This indicates that both the United States and its partners have again been surprised by the IED threat.

Given the recent experience in Iraq, a second surprise is difficult to explain: intuitively, a technique that had proven so useful in one contemporary insurgency should have been expected to appear in another, especially a technique that is well known, due to its high media profile, and one that is relatively simple, technically speaking. While the shortage of MRAPs is evidence of surprise, it does not necessarily indicate slow recognition of that surprise: rather, it signifies the extent of the materiel shortfall, in that the U.S. industrial base has been unable so far to deliver the total number

of vehicles required to support operations in both Iraq and Afghanistan; Iraq has had priority. The current draw down in Iraq may alleviate this problem.[119]

Australia's experience in Afghanistan differs from that in Iraq in several ways. Compared with Iraq, in Afghanistan the ADF operates in more dangerous areas, with far less discretion to avoid IED hazards. Unlike in Iraq, in Afghanistan Australia has suffered fatalities, IEDs being the principal cause. In public announcements about casualties, the ADF emphasizes its significant CIED efforts, drawing attention to measures such as the CIEDTF.[120] To the ADF's credit, much of this was in place before the first fatality. Evidence of unanticipated requirements, however, lies in the need to seek additional funding for new CIED measures **after** fatalities began to be suffered.[121] While these requirements may not have completely blindsided the ADF, they are evidence of operational surprise in so far as the ADF was unable to meet those needs from its force-in-being, even after 3 years at war. The U.S. and Australian experience in Afghanistan suggests, therefore, that both countries still see the IED threat as an aberration, to be responded to when it arises, rather than as a likely feature of the counterinsurgency battle space, to be anticipated and prepared for. The next war will demonstrate whether this is true.[122]

CONCLUSIONS

Surprise is an essential part of military operations; defense professionals will always seek ways to inflict it on their adversaries, and to recover quickly when surprised themselves. When fighting the current insurgency in Iraq, the Coalition suffered an operational, if not strategic, surprise in the form of the IED threat

that emerged in the second half of 2003. To deal with that surprise, both the United States and Australia needed to make institutional responses in a cycle that took at least 6 years. The subsequent impact of IEDs in Afghanistan suggests, in fact, that the response is still incomplete.

To constitute an operational surprise, a threat based on a specific technique or capability need not be completely novel, but merely unanticipated and unanswerable without recourse to operational-level capacities and resources and some change to institutional behavior. IEDs are not new, nor are the principal measures used to deal with them—protected vehicles, disposal techniques, ISR, ECM, intelligence fusion, etc.—yet neither the United States nor Australia was prepared for the threat that arose in Iraq. In Australia's case, the considerable discretion it enjoyed in the size and nature of its Iraq involvement appears to have significantly reduced the urgency of an institutional response, and may have delayed the recognition of surprise in the first instance.

Given their scale and complexity, institutional responses to operational surprises can be time consuming to implement. To minimize their impact, it is critical that surprises be recognized quickly and responses initiated swiftly, especially for those in contact. Strategic leaders have a crucial role in the recognition of operational surprise and in directing institutional responses. Professional orthodoxies, limited perspectives, and equities in the status quo can delay these decisions, impacting responsiveness. It may take the appointment of new leadership to achieve the necessary impetus in the recovery. For both the United States and Australia, a comprehensive response to the IED surprise took some years to evolve and then only

after changes in senior leadership. In Australia's case, there was an inexplicable delay of 15 months before the first institutional adaptation was made. Although this delay did not appear to contribute to casualties, it is a disturbing reflection on the ADO's agility. This is not to say that the ADO was not responding to the situation at hand, but perhaps that it was not contemplating how that situation might deteriorate without a timely and bold response.

Many predict that the international security environment over the next few decades will be dominated by irregular warfare in intrastate conflicts and insurgencies. In such an environment, adversaries will seek asymmetric advantages over conventional forces by confronting them with unanticipated threats. If this proves true, further dangerous surprises can be expected unless the new threats are predicted and prepared for. The range of potential surprises is very broad, however, and it is unlikely that every candidate threat will eventuate. Attempting to address every possible surprise in advance could consume a nation's defense budget, yet amount to little more than "dancing at shadows" while important conventional capabilities deteriorate through underinvestment. In such an environment, there is a strong case for relying on institutional agility to respond to surprises, by recognizing and recovering from them quickly. This is risky, but there may be little alternative. To mitigate the risk, national defense establishments should pursue ways to optimize their responsiveness to surprises. A good first step would be to support senior leaders with the processes needed to recognize and respond to operational surprises when they arise.

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ENDNOTES

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3. These were not new, having been used in World War I.

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5. For example, conflicts in which national survival is not immediately threatened or a treaty obligation is not invoked.

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7. Carl von Clausewitz, *On War*, Rapaport, ed., London, UK: Penguin, 1968, p. 269.

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9. See John Nagl, *Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam,* Chicago, IL: University of Chicago Press, 2002, pp. 192-193.

10. See Antonia Fraser, *The Gunpowder Plot,* London, UK: Phoenix, 2002.

11. Eric Ouellet, "Ambushes, IED and COIN: The French Experience," *Canadian Army Journal,* Vol. 11, No. 1, Spring 2008, pp. 7-24.

12. Culminating in the "Ottawa Treaty," banning anti-personnel landmines and booby traps, in the late 1990s.

13. "Nuisance" use of landmines can be differentiated from their conventional use in deliberately designed and laid *minefields*, the mandatory marking and recording of which was intended to create an obvious obstacle and to prevent them from becoming a hazard to noncombatants.

14. While a member of an Australian Army contingent to a UN humanitarian demining training mission in Pakistan in late-1989, this author was involved in instructing Afghan refugees on the hazards of explosive booby traps that would nowadays be called IEDs.

15. See Ian Wing, "Australian Defence 2048 —An Alternative Future," *Australian Defence Force Journal,* No. 132, September-October 1998, pp. 3-11; Michael Evans and Alan Ryan, *From Breitenfeld to Baghdad: Perspectives on Combined Arms Warfare,* Land Warfare Studies Centre Working Paper No. 122, July 2003; Kilcullen; Charles Krulac, "The Strategic Corporal: Leadership in the Three-Block War," *Marine Corps Gazette,* January 1999, pp. 18-22.

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18. This is not explained by any specific policy statement, but was detected in the course of research on *Ibid*.

19. As of March 10, 2010, the ADF had suffered no IED fatalities in Iraq. U.S. deaths constitute the vast majority of Coalition fatalities and are therefore a significant sample. The other limitations of this data set require an assumption that U.S. IED fatalities are proportional to nonfatal IED incidents and that, by extension, IED fatalities at any time reflect the general trend in the IED problem confronting U.S. forces at that time. If unsound, this assumption could lead to an overestimation of the influence of IED fatalities on institutional behaviors', although any potential overestimation is compensated for somewhat by the known underreporting of USMC IED fatalities.

20. For example, Clay Wilson, *Congressional Research Service Report for Congress: Improvised Explosive Devices (IEDs) in Iraq and Afghanistan: Effects and Countermeasures,* Washington, DC: The Library of Congress, August 28, 2007.

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22. Bush never used the words "Mission Accomplished," but his speech has since been identified by that term, which appeared on a banner displayed behind him on the USS *Abraham Lincoln* as he was speaking.

23. This was caused by an incident in Baghdad on June 26, 2003, available from *www.defenselink.mil/releases/release.aspx?releaseid=5499*. Andrew Cockburn cites an unexploded ordnance incident in Baghdad on May 26, 2003, as a probable IED, but this cannot be confirmed from Defenselink. See Cockburn, *Rumsfeld: His Rise, Fall and Catastrophic Legacy*, New York: Simon & Schuster, 2007, p. 200.

24. In epidemiology, the index case is defined as the *First disease case in an epidemic within a population*, Washington, DC: National Institute of Allergy and Infections, Glossary, available from *science.education.nih.gov/supplements/nih1/diseases/other/glossary/act1-gloss3.htm*.

25. See also Cockburn, pp. 200-202.

26. These include the hitherto arcane area of blast lung injuries, the treatment of which runs contrary to conventional emergency medical practice. Colonel (Dr.) Stephan Rudzki, presentation to a Regional Conference of the International Association of Bomb Technicians and Investigators (Region VII), Canberra, Australia, December 2004.

27. *Defenselink.*

28. *Ibid.*

29. *Ibid,* p. 200.

30. Evidence of this lies in the rapid adaptation of U.S. deployed Mine and Explosive Ordnance Information Coordination Center [MEOICC] from an organization concerned mainly with traditional explosive hazards (landmines and unexploded ordnance [UXOs]) to one focused on the IED problem, and in the creation of a dedicated tactical grouping to deal with IEDs, "Task Force Right of Way," before the end of October 2003. See William Blaylock and Dorian D'Aria, "Mine and Explosive Ordnance Information Coordination Center Operations in Iraq," *Engineer,* Vol. 34, No. 1, January-March 2004, Fort Leonard Wood, MO, U.S. Army Engineer School, 2004, pp. 33-35, available from *www.wood.army.mil/ENGRMAG/PDFs%20for%20Jan-Mar%2004/Blaylock-D'Aria.pdf.* Further evidence lies in the conduct as early 10 September 2003 of dedicated counter-IED operations such as the 4th Infantry Division's Operation *Ivy Focus*. Major General Raymond Odierno, Media Teleconference from Tikrit, Iraq, October 27, 2003, transcript available from *www.defenselink.mil/transcripts/transcript.aspx?transcriptid=3064.*

31. John Barry, Michael Hastings, and Evan Thomas, "Iraq's Real WMD," *Newsweek,* March 27, 2006, available from *www.accessmylibrary.com/coms2/summary_0286-13987448_ITM.* The analogy with the Manhattan Project is widely attributed to an unpublished memo sent by Abizaid to then Defense Under-Secretary Paul Wolfowitz.

32. See Sadowski, p. 6.

33. *The Joint Improvised Explosive Device Defeat Organization*, Report of the U.S. House of Representatives Committee on the Armed Services, Washington, DC: 2008, p. 15, available from *armedservices.house.gov/pdfs/Reports/JIEDDOReportNov2008.pdf*; James Lovelace and Joseph Votel, "The Asymmetric Warfare Group: Closing the Capability Gaps," *Army*, Association of the United States Army, March 2005, pp. 29-34.

34. This was directed by Deputy Secretary of Defense Paul Wolfowitz. See *Ibid*.

35. DoD Directive 2000.19D, June 27, 2005.

36. DoD News Release No 1260-05, December 5, 2005, available from *www.defenselink.mil/Releases/Release.aspx?ReleaseID=9137*.

37. Montgomery C. Meigs, *Slide Rules and Submarines: American Scientists and Subsurface Warfare in World War II,* Honolulu, HI: University Press of the Pacific, 1990. See also Sadowski, pp. 6-12.

38. Meigs's 1982 doctoral thesis was on the Manhattan Project. Sadowski, p. 17.

39. Deputy Secretary of Defense Memorandum, January 18, 2006, available from *www.dtic.mil/whs/directives/corres/html/200019.htm*.

40. DoD Directive 2000.19E (superseded Directive 2000.19D), February 14, 2006.

41. "Engineer Doctrine Update," *Engineer,* Vol. 38, January-March 2008, pp. 34-41, available from *www.wood.army.mil/ENGRMAG/PDFs%20for%20Jan-Mar%2008/Doctrine%20Update.pdf*.

42. Major General Randal Castro, "Clear the Way," *Engineer,* U.S. Army Engineer School, April-June 2006, pp. 3, 4-11.

43. Martha Raddatz and Mike Cerre, "Soldiers Must Rely on "Hillbilly Armor' for Protection," ABC News, December 8, 2004, available from *abcnews.go.com/WNT/story?id=312959*. Improvised armor installations were commonplace on vehicles observed by this author in Iraq in January 2004.

44. "CENTCOM up-armored Humvee requirements being met," Army News Service, February 6, 2004, available from *www.globalsecurity.org/military/library/news/2004/02/mil-040206-usa02.htm*.

45. *Army Posture Statement 2008*, available from *www.army.mil/aps/08/information_papers/prepare/Up-Armored_High-Mobility_Multipurpose_Wheeled_Vehicle.html*.

46. DoD Press Briefing with Press Secretary Geoff Morrell from the Pentagon, December 9, 2008, transcript available from *www.defenselink.mil/Transcripts/*.

47. Nathan Hodge, "U.S. moves to counter threat from more lethal roadside bombs," *Jane's Defence Weekly,* Vol. 44, Issue 8, London, UK: Jane's Information Group, February 21, 2007, p. 5.

48. Mine Resistant Ambush Protected (MRAP) Vehicle Program, available from *www.globalsecurity.org/military/systems/ground/mrap-proc.htm*. For general background on the MRAP, see Andrew Feickert, *Mine-Resistant, Ambush-Protected (MRAP) Vehicles: Background and Issues for Congress*, Washington, DC: Library of Congress, August 3, 2009.

49. Secretary of Defense Robert Gates, *DoD News Briefing on the Release of the Financial Year 2010 Defense Budget,* Washington, DC: February 1, 2010; *Mine Resistant Ambush Protected (MRAP) Vehicle Program*.

50. Donna Miles, "'Herculean Work' Drives MRAP Production, Procurement, Officials Say," Armed Forces Press Service, July 20, 2007, available from *www.defenselink.mil/news/newsarticle.aspx?id=46790*.

51. Donna Borak, "Pentagon Launches New Competition for MRAP All-Terrain Vehicles for use in Afghanistan," *Orlando Sentinel,* December 9, 2008, available from *orlandosentinel.com/business/nationworld/sns-ap-pentagon-mrap-contract,0,1532057.story*; and Feickert, pp. 2-3.

52. *U.S. Army Field Manual (FM) 3-34.2, Combined Arms Breaching Operations,* Annex E, Washington, DC: Headquarters Department of the Army, 2000.

53. Sandra Erwin, "Bomb-Detection Technology Useful for Countermine Ops," *National Defense,* March 1, 2001, available from *www.allbusiness.com/public-administration/national-security-international/760046-1.html*.

54. *Issues Facing the Army's Future Combat Systems Program,* Report of the United States General Accounting Office, Washington, DC: U.S. General Accounting Office, August 13, 2003, available from *www.globalsecurity.org/military/library/report/gao/d031010r.pdf*.

55. Alex Urbina, "Route Clearance Vehicle Repair Parts Sustainment Transition—From CLS to Organic," *U.S. Army Acquisition Support Center AL&T* (Acquisition, Logistics & Technology) *Online Monthly*, July 2008, available from *www.usaasc.info/alt_online/printer_friendly.cfm?iid=0808*.

56. The Casspir mine-protected vehicle, featuring a v-shaped hull, entered service in South Africa in 1979. Ben Goodlad, "South Africa gears up for major MRAP production," *Jane's Defence Weekly,* July 30, 2008, p. 16. Other sources state that the Buffel vehicle, also with a V-shaped hull, entered service in 1978.

57. Feickert, p. 2.

58. Gates resigned from the Iraq Study Group Panel in November 2006 after he was nominated to be the next Secretary of Defense. The Group's Report, released in December 2006, makes only a few references to IEDs, but the context suggests that they were considered in detail. James A. Baker *et al., The Iraq Study Group Report,* Washington, DC: United States Institute of Peace, 2006.

59. Nicholas Merrett and Tamir Eshel, "Next Generation Jammers," *Asia-Pacific Defence Reporter,* January 2008, pp. 50-54.

60. *Ibid.*

61. "Counter Remote Control Improvised Explosive Device (RCIED) Electronic Warfare (CREW)," *GlobalSecurity.org*, available from *www.globalsecurity.org/military/systems/ground/crew-2.htm.* The U.S. Army admitted to having minimal capability in the theater in August 2003. By January 2005, there 1,496 systems deployed in Iraq and Afghanistan. See Francis Harvey and General Peter Schoomaker, *U.S. Army Posture Statement 2005,* Washington, DC: U.S. Department of the Army, February 2005, available from *www.army.mil/aps/05/index.html*.

62. As evidenced by the fact that the U.S. Army's Electronic Warfare Division was only raised within its Operations, Mobilization and Readiness Directorate in 2006. John Ohab, *Technology, Threats Accelerate Army Focus on Ground Electronic Warfare,* Armed Forces Press Service, available from *www.defense.gov/news/newsarticle.aspx?id=53379*.

63. Merrett and Eshel, p. 50.

64. Rick Atkinson, "Left of Boom: The Struggle to Defeat Roadside Bombs," (Part 1: "The IE Problem is Getting out of Control: We've Got to Stop the Bleeding"), *The Washington Post,* September 30, 2007, available from *www.washingtonpost.com/wp-dyn/content/article/2007/09/29/AR2007092900751.html?sid=ST2007092900754*.

65. Blaylock and D'Aria, pp. 34-5.

66. *Ibid,* p. 35.

67. Robert Baker and Dorian D'Aria, "Countering IEDs and Explosive Hazards," *Engineer,"* January-March 2005, pp. 32-35; U.S. Army Engineer School, available from *www.wood.army.mil/ENGRMAG/PDFs%20for%20Jan-Mar%2005/Baker-D'Aria.pdf*.

68. Lieutenant Colonel Craig Jolly, "EOD and Engineers "Close the Gap'," *Engineer,* January-March 2005, pp. 40-55. U.S. Army Engineer School, 2005, available from *www.wood.army.mil/ENGRMAG/PDFs%20for%20Jan-Mar%2005/Jolly.pdf*.

69. See Committee on Defeating Improvised Explosive Devices *et al*., *Countering the Threat Of Improvised Explosive Devices: Ba-*

sic Research Opportunities, Washington, DC: National Academy of Sciences, 2007, available from *www.nap.edu/openbook.php?record_id=11953&page=R1*.

70. Deputy Secretary of Defense Memorandum, Enclosure 2, p. 15.

71. In 2007, there were only two U.S. steel mills capable of producing the necessary steel. By October 2009, there were four. Jim Cooney, Vice President Business Development of Force Protection Inc., Tampa, FL: Headquarters U.S. Central Command, October 20, 2009; Michael J. Sullivan, Testimony Before the House Armed Services Committee, Defense Acquisition Reform Panel, *Defense Acquisitions: Rapid Acquisition of MRAP Vehicles*, Washington, DC, U.S. Government Accountability Office, October 8, 2009, p. 9, available from *www.gao.gov/new.items/d10155t.pdf*.

72. *Ibid.*, p. 4. Also see *Defense Federal Acquisition Regulation Supplement; Restriction on Acquisition of Specialty Metals* (DFARS Case 2008-D003), Washington, DC: Department of Defense, July 29, 2009, available from *www.acq.osd.mil/dpap/dars/dfars/changenotice/2009/20090729/E9-17967.htm*.

73. *Defense Federal Acquisition Regulation Supplement; Restriction on Acquisition of Specialty Metals* (DFARS Case 2008-D003).

74. Feickert; Sullivan, p. 8.

75. CIED capabilities, such as the IED disposal function within EOD units, were funded as part of each Services' baseline but had no special visibility and did not attract significant funds (in U.S. terms).

76. Atkinson.

77. *Ibid.*

78. Marina Malenic, "JIEDDO To Fold Funding Request in FY "10 Base Budget," *Defense Daily,* December 12, 2008, available from *findarticles.com/p/articles/mi_6712/is_49_240/ai_n31181737/*.

79. Sullivan, p. 1.

80. Lieutenant General Tom Metz (Director, JIEDDO), quoted in Malenic.

81. *Quadrennial Defence Review 2006*, Washington, DC: U.S. Department of Defense, 2006, pp. vi, 33, 63-64.

82. There are a total of 12 references to IEDs and CIED capabilities in the 2010 QDR, compared with three in the 2006 document. Both the QDR and the Budget statements refer explicitly to the policy of giving priority to the capabilities needed for current conflicts over those needed for potential conflicts in the future. *Quadrennial Defense Review 2010*, Washington, DC: U.S. Department of Defense, 2010; and Undersecretary of Defense (Policy) Michele Flournoy, *DoD News Briefing with Undersecretary Flournoy and Vice Admiral Stanley,* Washington1 February 1, 2010.

83. "I remain concerned about the Army's slow reaction to the theater's urgent request for vehicles that provide better protection against Improvised Explosive Devices . . . " Senator Carl Levin, Chairman, Senate Armed Services Committee, letter to Secretary Robert M. Gates, June 19, 2007, available from *pogoblog.typepad.com/pogo/files/sen_levin_to_sen_biden_sen_levin_to_secdef_archive.pdf.*

84. This is similar to Nagl's observations on the significance of "The Man" (the senior leader) in military innovation. The difference lies in the level at which Gates was operating, in comparison with Nagl's two examples (Templar and Westmoreland): Gates was operating at a national political (strategic) level and commanding a national response, while Templar and Westmoreland were operating at theater/operational levels and were responsible for "theater' responses. Nagl, pp. 196-198, 201-204.

85. The number of troops reported officially as committed to Operation CATALYST, which covered Australia's post-conflict involvement in Iraq (from mid-2003 until July 2009) also included personnel deployed outside Iraq on ships and as part of Air Force detachments. The largest group inside Iraq was the battle group in the south, originally known as the Al Mutthana Task Group (AMTG) and later as the Overwatch Battle Group (West) (OBG[W]). The battle group and an associated training team had

a combined strength of about 500. The next largest group was the Security Detachment (SECDET) for the Australian Embassy in Baghdad, with a maximum strength of about 120 personnel. Other elements included a national command element, an air traffic control team, medical teams, training teams, and individual officers embedded in Coalition headquarters.

86. Australians required to conduct combat operations or otherwise face significant exposure to IED hazards were members of the AMTG or OBG(W), the SECDET, and personnel assigned to the Combined Explosives Exploitation Centre (CEXC).

87. Two ADF fatalities on Operation CATALYST were caused by a training accident in Kuwait and a self-inflicted gunshot wound. A third ex-ADF member serving in the Royal Air Force was killed when his aircraft was shot down.

88. Only the battle group's mission required it to provide security over an extensive area or to respond "outside the area" at times of high risk.

89. When the threat emerged in mid-2003, Australian troops in-country consisted of only about 130 personnel, most of whom (with the exception of the SECDET) worked within secure U.S. bases and had little exposure to IEDs. This situation continued into 2004.

90. Senator Robert Hill, "Explosive Specialists Return Home from Iraq," Ministerial Media Release No. 138/2005, September 3, 2005, available from *www.minister.defence.gov.au/HillTpl.cfm?CurrentId=5076*.

91. Personal Conversation with General Peter Cosgrove, Australian Chief of Defence Force, Canberra, June 14, 2005.

92. Establishment of the ExHC was approved by the Army on July 27, 2005, but it was not officially established until February 17, 2006. Andrew Hetherington, "Centre open day a blast," *Army*, Vol. 11, No. 38, March 2006, available from *www.defence.gov.au/news/armynews/editions/1138/topstories/story10.htm*.

93. For example, the inclusion of explosive detection dogs, EOD detachments, and protected vehicles at much higher levels than normal.

94. "New unit meets demand," *Army*, Ed. 1248, November 11, 2010, p. 11.

95. "Ensuring safety across the globe," *Defence Magazine,* Australian Department of Defence, May-June 2007, available from *www.defence.gov.au/defencemagazine/editions/200705/groups/ops.htm*.

96. The 1994 Defence White Paper, *Defending Australia,* refers to the forthcoming acquisition of "a lightly armoured transport vehicle . . . to provide mobility to infantry brigades." This was to support the "defeat of incursions on Australian territory." *Defending Australia,* Canberra, Australia, Department of Defence, 1994, pp. 30, 50. This was the genesis of Project Land 116 (Project "Bushranger"), which has led to the procurement of the PMV.

97. *Portfolio Additional Estimates Statements 2009-10: Defence Portfolio*, Canberra, Australia: Commonwealth of Australia, 2009, p. 125.

98. In addition to the 444 PMVs acquired under Projects Land 116 and the Enhanced Land Force for combat units, such as infantry battalions, 293 PMVs are being procured under Project Land 121 ("Overlander") for more general land transport requirements. *Ibid.*

99. For example, AU$60 million in unforecasted funding for CIED equipment was provided in early 2009. "Chief Of Defence Force Media Round Table: Question And Answer Session," Canberra, Australia, July 21, 2009, available from *www.defence.gov.au/media/SpeechTpl.cfm?CurrentId=9297*.

100. These include improved body armor and EOD robots.

101. The most significant example is media commentary relating to the wounding of Sergeant Michael Lyddiard, who lost an eye and an arm while attempting a render-safe procedure on an IED in Afghanistan in November 2007. Media commentary drew attention to alleged Government decisions to cancel acquisition of equipment that might have enabled him to avoid injury. Ian McPhedran and Mark Todd, "Digger lost eye, arm in Afghanistan blast," *The Australian*, November 6, 2007, available from *www.*

news.com.au/national/digger-lost-eye-arm-in-afghanistan-blast/story-e6frfkvr-1111114807687. Defence formally refuted the suggestion that tardiness in fielding equipment contributed to Lyddiard's injuries and referred to its "comprehensive systems and procedure"' for protecting troops against IEDs. "Defence Response to Article by Mark Dodd 'Canberra Cancelled Robot Unit for Bombs'," *On the Record,* November 6, 2007, Canberra, Australia, Department of Defence, available from *www.defence.gov.au/on_the_record/letters07.htm*0.

102. Lieutenant Colonel Dave Rye, "School of Military Engineering: Training for the Future," *Australian Sapper 2008,* Sydney, Australia: Head of Corps, Royal Australian Engineers, 2008, p. 6.

103. A survey of articles published in *The Australian Defence Force Journal* from 2001 to 2009, and *The Australian Army Journal* from 2003 to 2009 reveals only a few incidental references to IEDs during those periods, in the context of other topics. Journals pitched more at tactical-level interests, such as military branch-specific magazines, have more IED content from around 2008—this may be attributable to the accumulation of experience from Afghanistan from 2006 onward. See *Australian Sapper 2008.* Over the entire period, there is limited coverage of IEDs in Service Newspapers, and then generally in the context of general-interest articles about deployed elements, such as the CEXC contingents. The emergence of CIED efforts as a growth industry and "flavor of the month" may also have stimulated some discussion from agencies seeking to "get involved." See "Countering Improvised Explosive Devices: The Air Power Contribution," *Pathfinder* (Air Power Development Centre Bulletin) No. 94, Air Power Development Centre, Canberra, Australia, 2008.

104. These would include the Defence Science and Technology Organization (DSTO) and Land Engineering Agency (LEA).

105. These include an additional 143 PMVs ordered in 2007 for the Australian Army's Enhanced Land Force (ELF) initiative and a further 39 vehicles ordered by the Netherlands since 2006 to support its forces in Afghanistan. While the ELF order cannot be attributed directly to the IED threat, the Netherlands' requirement can, albeit the threat in Afghanistan and not in Iraq. "Australia Orders 143 More Mine-Resistant Bushmaster Vehicles,"

Defense Industry Daily, June 5, 2007, available from *www.defenseindustrydaily.com/australia-orders-143-more-mineresistant-bushmaster-vehicles-03349/*; and "Dutch Choose Bushmaster IMVs for Afghan Mission, *Defense Industry Daily,* August 23, 2009, available from *www.defenseindustrydaily.com/dutch-spend-eur-25m-on-bushmaster-imvs-for-afghan-mission-updated-02487/.* The manufacturer, Thales Australia, has stated that these orders will be met from its existing production capacity ("Australia Orders 143 More Mine-Resistant Bushmaster Vehicles"), while stating elsewhere that it is undertaking some expansion in the capacity of its Bendigo production facility. *Thales Australia Corporate Profile,* p. 10, available from *www.thalesgroup.com/assets/0/95/389/392/ac110ae0-8ea1-4ee0-a77d-4eefdf9c878e.pdf?LangType=2057.* This would suggest that any industrial expansion is not in proportion to the U.S. response.

106. *Portfolio Additional Estimates Statements 2009-10: Defence Portfolio,* p. 21.

107. *Ibid,* p. 125.

108. Senator John Faulkner, *New Measures to Protect Our Troops,* Ministerial Release No. 043/2010, May 11, 2010, available from *www.minister.defence.gov.au/Faulknertpl.cfm?CurrentId=10275*.

109. *Ibid.* In 2010, the Government stated that funding for force protection measures totaled AU$1.4 billion to the end of fiscal year 2012-2013. Much of this contributed to CIED capabilities.

110. Akin to Clausewitz's concept of *coup d'oeil,* a special level of insight which he saw as key to effective strategic decisionmaking. Clausewitz, pp. 141, 143.

111. If SGT Andrew Russell's death from a mine incident in 2002 is discounted.

112. See Seth Cropsey, "The U.S. Navy in Distress," *Strategic Analysis,* Institute for Defense Studies and Analysis, Vol. 34, No. 1, January 2010, pp. 35-45; Barrett Tillman, "Fear and Loathing in the Post-Naval Era," *Proceedings Magazine,* United States Navy Institute, June 2009, available from *www.USNI.org/magazines/proceedings/.*

113. See, for example, Australia's *2009 Defence White Paper*; also Cropsey, 2010; and Tillman.

114. This has been characterized by the U.S. Army in particular as an "era of persistent conflict." See *U.S. Army Posture Statement 2008*, available from *www.army.mil/aps/08/strategic_context/strategic_context.html*.

115. IEDs were employed against Soviet forces in the 1980s. While deployed on a UN mission in Pakistan in 1989-90, this author participated in the debriefing of an Afghan humanitarian demining team in which an IED discovered in Afghanistan was described in detail.

116. Lieutenant General Michael L. Oates, Director, Joint Improvised Explosive Device Defeat Organization, Statement before the House Armed Services Committee Subcommittees on Air and Land Forces and Seapower and Expeditionary Forces, U.S. House Of Representatives, *Protecting The Force From The Improvised Explosive Device,* 2nd Sess., 111th Cong., March 17, 2010, available from *armedservices.house.gov/pdfs/JOINTALSP031710/Oates_Testimony031710.pdf*.

117. Robert M. Gates, Testimony to U.S. Senate Committee on Armed Services, February 2, 2010, available from *armed-services.senate.gov/Transcripts/2010/02%20February/10-04%20-%202-2-10.pdf*.

118. Robert M. Gates, Press Conference in Istanbul, February 5, 2010, available from *Defenselink*.

119. *Ibid.*

120. See Air Chief Marshal Angus Houston, *RTF Soldier Killed in Roadside Bomb Attack,* Media Conference October 9, 2007, Canberra, Australia: Coordination and Public Affairs, Department of Defence, 2007; and *ADF Prepared for Improvised Explosive Device Threat,* Canberra, Australia: Defence Media Liaison, June 29, 2006, available from *www.defence.gov.au/media/DepartmentalTpl.cfm?CurrentId=5774*.

121. *Portfolio Additional Estimates Statements 2009-10: Defence Portfolio,* p. 21. See also Ministerial Release No. 043/2010.

122. The significant outcomes of the Australia-U.S. Ministerial (AUSMIN) talks of October 2010 included an agreement to cooperate on IED countermeasures. This was couched in the context of operations in Afghanistan, suggesting that the strategic response to the IED threat in that country is still evolving. *AUSMIN 2010Joint Communiqué, Melbourne, 8 November,* Stephen Smith (Minister for Defence website), 2010, available from *www.minister.defence.gov.au/SmithStatementstpl.cfm?CurrentId=11039.*