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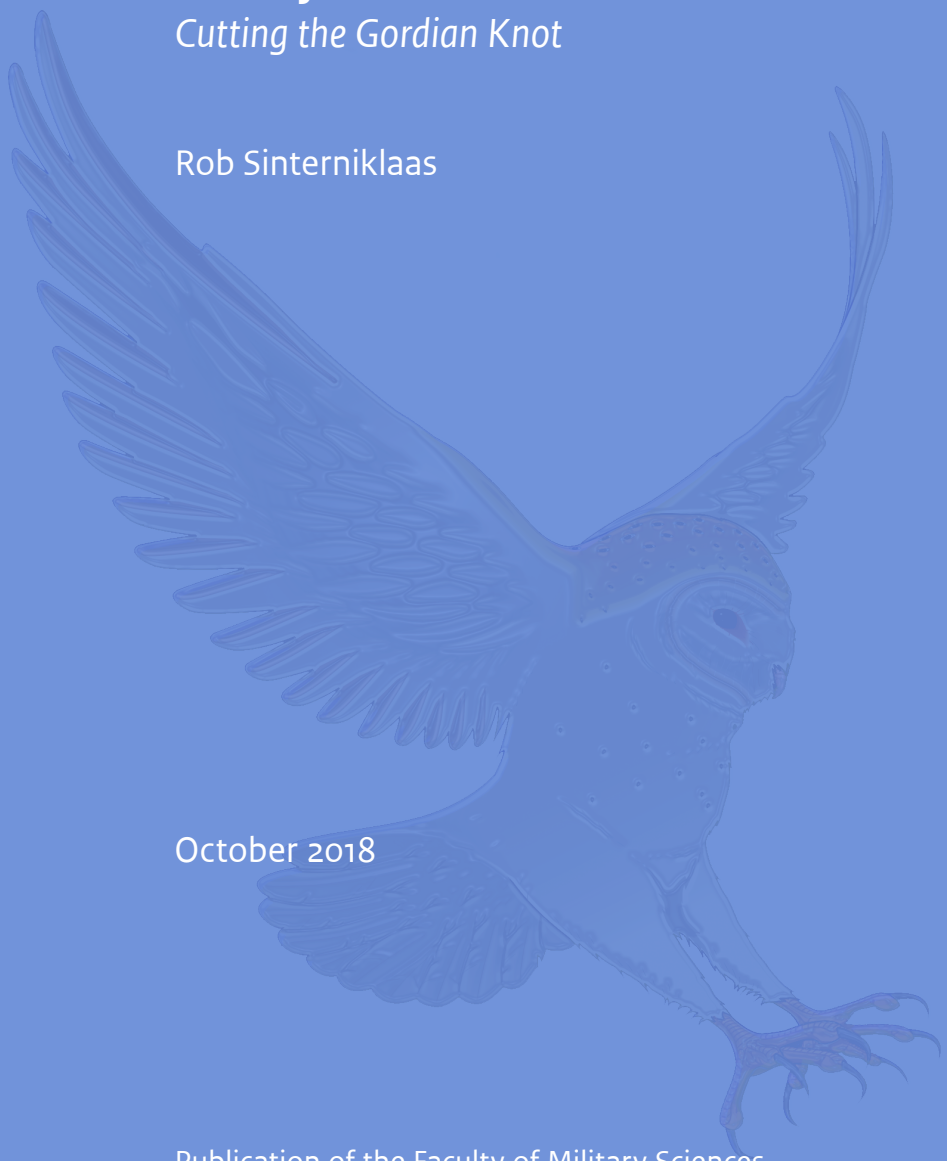
Military Innovation

Cutting the Gordian Knot

Rob Sinterniklaas



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Introduction

Which frame of reference can scholars best use for the study of military innovation? This seeming straightforward question is difficult to answer. The last four decades show an impressive accumulation of publications that address the topic of military innovation. Many scholars investigated manifestations of military innovation, explaining its progress and outcome, thereby validating hypotheses about the potential factors driving military innovation. A discourse unfolded, which showed development of several models of military innovation.[1] However, close examination of the discourse reveals that it addresses fundamental questions about a frame of reference only implicitly. These include the questions of the function of the field of research, the definition of the subject matter, and of identification of independent variables, intervening variables and the dependent variables. Formulated differently, the accumulated body of knowledge in the field of military innovation is not clear on the following four basic questions: Why study military innovation? What is meant by "military innovation"? How does military innovation manifest itself? And what are driving factors of military innovation? As the accumulated body of knowledge is not clear on answers to the basic questions, the foundation of frames of reference became unstable. It offered scholars the opportunity to answer the questions differently. As will be shown below, they do. The result is a sub-surfaced yet convoluted lack of consensus on key issues relating to military innovation. Consequently, knowledge and understanding of how military organizations innovate is unclear and incomplete. More importantly, military innovation studies lack a conceptual framework that is agreed upon, which hampers scholars to study military innovation thoroughly and consistently.

The discourse on military innovation shows consensus on multiple topics as well. In addition, some of the problematic issues can be addressed functionally just by making choices explicit. Disagreements might be solved relatively straightforward. Agreement on development of a frame of reference is possible. However, it requires detailed analysis of the discourse, and making informed choices that are clearly communicated. In other words, it is required that the Gordian knot of implicit research choices and convoluted arguments is cut. This research paper attempts to satisfy this requirement by answering the following question: which frame of reference is suitable for studying military innovation? It does so by a layered analysis of the discourse on military innovation using the following subquestions: How did scholars formulate a frame of reference for the study of military innovation? On which topics did they agree? Is that agreement deserved? What was the nature of the disagreements? What could be a solution?

This research paper is divided into six paragraphs. The first paragraph introduces the discourse on military innovation and shows the various schools of thought that exist in the field. It shows how scholars formulated various frames of reference. The second paragraph identifies the problematic issues that follow from the existence of these various frames, and argues that key issues were not addressed directly but rather remain implicit in the discourse and therefore proved detrimental to the formulation of a frame of reference. The third paragraph addresses those scholars who did

1 Adam Grissom. "The Future of Military Innovation Studies", *The Journal of Strategic Studies* 29, no. 5 (2006): 905-934.

partially recognize and acknowledge the problematic issues, and describes which solutions they proposed. The fourth paragraph argues that neither of these solutions completely suffice as the lack of consensus on key issues is still unresolved. The fifth paragraph makes clear and explicit choices about the problematic issues and other issues identified throughout, opening the way for formulation of an augmented frame of reference. The final section, the conclusion, offers an appreciation of the four basic questions, reiterates and explains the existence of the basic problems and argues its solutions, leading to a proposition of a workable frame of reference to study military innovation.

Discourse on Military Innovation

Outside-In versus Inside-Out Approaches

Although changes in the way militaries fight had figured in historical narratives before, it is generally acknowledged that scholarly discourse on military innovation started in the 1980s. Early explanatory models roughly focused on variations of the role of internal and external sources of military innovation. These were later called "outside-in" and "inside-out" approaches by Adam Stulberg and Michael Salomone.[2] Within these two approaches, there were several variations, which will be discussed below.

The publication of Barry Posen's *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars*, written in 1984, is generally considered the start of the scholarly discourse on military innovation.[3] In this seminal work, Posen defined innovation rather loosely by indicating that it involved *"large change"*[4], and that it explained *"how military doctrine takes shape, and how it figures in grand strategy"*[5]. He did so by comparing the relative explanatory power of two major competing theories in the field of international security studies. The first was organizational theory, which describes behavior of bureaucratic organizations in order to achieve efficiency and effectiveness. The second theory was balance of power theory, which explains how states react in the face of a changing threat. Posen used France, Britain and Germany as case studies.[6] He considered military doctrine to be an important indicator for innovation. He regarded it to be a reflection of the outcome of discussions within and between the professional military and civilian leaderships about which type of military could best serve the interests of the state. Technology, the geostrategic situation of a country, capabilities of the anticipated adversary and the nation's own capabilities all played a part in the considerations. According to Posen, the result was a military doctrine that was both feasible and desirable, and that in essence described how a military organization preferred to fight wars. Besides written doctrine itself, Posen considered force posture, inventory of weapons and organizational control mechanisms important manifestations of implementation of that military doctrine.[7]

Posen found both organization theory and balance of power theory relevant for explaining innovation of military doctrines, or lack thereof. Organizational theory to a large extent explained operational preferences of militaries. Due to their highly institutionalized nature, militaries in general favored predictability, stability and certainty, and produced offensive but stagnant military doctrines that ran the risk of being poorly aligned with strategic goals.

2 Adam N. Stulberg and Michael D. Salomone. *Managing Defense Transformation: Agency, Culture and Service Change* (Aldershot and Burlington, VT: Ashgate, 2007), 17.

3 Grissom, "Future of Military Innovation Studies", 906, and Barry R. Posen. *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars*, Cornell Studies in Security Affairs, ed. Robert J. Art, Robert Jervis and Stephen M. Walt (Ithaca and London: Cornell University Press, 1984).

4 Posen, *Sources of Military Doctrine*, 47.

5 Posen, *Sources of Military Doctrine*, 7.

6 Posen, *Sources of Military Doctrine*, 38.

7 Posen, *Sources of Military Doctrine*, 14.

Innovation within this framework mainly took place when military organizations faced defeat or failure. Another reason was the desire for organizational expansion, either to increase influence on an uncertain environment or to obtain additional resources.[8] However, Posen was of the opinion that this inadequately explained why military organizations innovate despite their natural tendencies not to. On this crucial point, Posen stated that balance of power theory had more explanatory power. In order to innovate, intervention of civilian leadership was needed to keep military doctrine integrated with grand strategy as part of an overall pattern of balancing behavior in the international arena.[9] Sometimes "military mavericks" were needed to provide the military leaders with the necessary expertise.[10] Organizational theory also mentioned civilian intervention as one of the innovative forces for military doctrine, but according to Posen, balance of power theory better explained the causes of this intervention.[11] Technology and geographical location of the nation did not influence innovation consistently or decisively.[12]

Posen did not claim to offer an all-encompassing theory on military innovation, just the relative explanatory power of two conceptual models in relation to development and innovation of military doctrine.[13] Nevertheless, Posen was regarded to be the primary author of what Adam Grissom called the "civil-military model of innovation" due to the role civil-military dynamics had in innovation, and because Posen's ideas were buttressed by other scholars.[14] Others however pointed at the lack of attention Posen paid to innovative dynamics within militaries. In reaction, a second school of thought arose, dubbed the "interservice model" of military innovation by Grissom. Within the "interservice model", scholars indicated that military innovation was generated by rivalry between the armed services, evolving around division of scarce resources. When changes in types of missions arose, requiring new or altered capabilities, the services would compete by innovating on capabilities that would suit the new or changed mission best.[15] Grissom identified several scholars as part of this theory of military innovation, even though some of the associated publications did not specifically address innovation.[16] Further, it stands

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8 Posen, *Sources of Military Doctrine*, 46-47 and 222-224. Posen calls a doctrine which is poorly aligned with the higher purpose "disintegrated" doctrine, as opposed to "integrated" doctrine, which is in line with grand strategy (p. 25).

9 Posen, *Sources of Military Doctrine*, 227-239.

10 Posen makes this statement with regard to with relation to General Dowding's role in the evolvement of British air defense on the eve of World War II. He rather directly states that *"Civilians do not necessarily have the expertise to directly change military doctrine in order to bring it into conformity with an overall grand strategic design. They must rely upon mavericks within military organizations for the details of doctrinal and operational innovation"* (Posen, *Sources of Military Doctrine*, 174-175). In the conclusions, Posen more generally states: *"Civilians somehow found ways to overcome the limits of their own military knowledge and get around the bureaucratic shenanigans of their military organizations"* (223). The "military maverick" however does not figure in either the introductory chapters or the conclusion, leaving Posen's standpoint on it a somewhat open question. See also: Grissom, "Future of Military Innovation Studies", 909, and Stephen Peter Rosen. *Winning the Next War: Innovation and the Modern Military*, Cornell Studies in Security Affairs, ed. Robert J. Art and Robert Jervis (Ithaca and London: Cornell University Press, 1991), 10.

11 Posen, *Sources of Military Doctrine*, 227-239.

12 Posen, *Sources of Military Doctrine*, 236-239.

13 Posen, *Sources of Military Doctrine*.

14 Grissom, "Future of Military Innovation Studies", 908-910. See for example: Deborah D. Avant. *Political Institutions and Military Change: Lessons From Peripheral Wars*, Cornell Studies in Security Affairs, ed. Stephen M. Walt, Robert Jervis and Robert J. Art (Ithaca, NY, and London: Cornell University Press, 1994), and Deborah D. Avant. "The Institutional Sources of Military Doctrine: Hegemons in Peripheral Wars", *International Studies Quarterly* 37, no. 4 (1993): 409-430. Avant disagrees with Posen on several accounts, but in general agrees with the notion that civil-military relations are primary drivers, or inhibitors, of innovation.

15 Grissom, "Future of Military Innovation Studies", 910-911.

16 Grissom, "Future of Military Innovation Studies", 911-913.

out that these publications mainly dealt with acquiring military hardware, which implies that military innovation within this school was closely related to technological innovation initiated by new requirements following from new missions.

A more pronounced and well-known reaction to Posen's view was formulated in 1991 by Stephen Rosen in his monograph *Winning the Next War: Innovation and the Modern Military.*[17] According to Grissom, Rosen was the founder of what he called the "intraservice model of military innovation".[18] Rosen agreed with Posen by stating that military innovation was in essence bureaucratic innovation, as military organizations resembled large bureaucracies. As bureaucracies were designed not to change, the question became relevant when and, if they do, under which circumstances, military organizations changed.[19] Rosen also identified military innovation with large, or very important, change. He defined major innovation as *"a change in one of the primary combat arms of a service in the way it fights or alternatively, as the creation of a new combat arm."*[20]. Within this definition, all change that altered the "essential workings" of a combat arm, including doctrine and Standard Operating Procedures (SOPs), constituted major innovation, as opposed to tactical innovation, which did not alter the "essential workings".[21]

Rosen disagreed with Posen on causal factors for innovation. In peacetime, neither defeat or civilian intervention adequately explained why or how military organizations innovated. In the theoretical outline of military innovation during peacetime, Rosen hypothesized that the manner in which military leaderships imagined what the next war would look like, and what would constitute victory, could be more important than civilian intervention. When new "ideology" was required, that is, when the environment of the anticipated next war differed from that for which the then current military was optimized, new critical tasks would be developed and the behavior of the organization would be altered. As a result, promotion pathways of innovation-minded officers became important. Therefore, the established leadership, those with the political power within an organization, would be the group responsible for innovation, not the "military mavericks" Posen referred to.[22]

A second situation where military innovation might be in order was during wartime, as it offered the opportunity for innovations to be tested in combat. Within the context of wartime, Rosen proposed to study "strategic measures of effectiveness" as variables for the need to innovate, by which he meant a link between strategic goals policymakers formulated and actual military performance on the battlefield. Well defined strategic measures of effectiveness allowed to measure to what extent strategic goals, relationship of military operations with these goals, and

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17 Rosen, *Winning the Next War*. This is the most cited publication or Rosen on this topic. However, he had expressed his insights three years earlier: Stephen Peter Rosen. "New Ways of War: Understanding Military Innovation", *International Security* 13, no. 1 (1988): 134-168.

18 Grissom, "Future of Military Innovation Studies", 913-916.

19 Rosen, *Winning the Next War*, 1-3.

20 Rosen, *Winning the Next War*, 7.

21 Rosen, *Winning the Next War*, 7-8.

22 Rosen, *Winning the Next War*, 10 and 18-21. Similar views are held by Zisk, who also identified developments within military organizations as important drivers for innovation: Kimberly Marten Zisk. *Engaging the Enemy: Organization Theory and Soviet Military Innovation, 1955-1991* (Princeton, NJ: Princeton University Press, 1993).

indicators on how well operations are proceeding, were in line with each other. Incongruence between these indicators provided the incentive for innovation. However, Rosen considered the role of military innovation during wartime to be limited, due to time constraints and the problematic availability and reliability of intelligence. Also, the organizational structure might be important, as it had to be loose enough for innovative ideas to flourish, but also hierarchical enough to get things done.[23]

Rosen identified technological developments as a separate cause for military innovation. Rosen indicated that military innovation was not easily explained by "demand pull" or "technology push" mechanisms then current in theories on technological innovation. In the military context, both predictions of future war and predictions of future technologies blurred the separation between these mechanisms. Also, the usefulness and costs of yet to be invented technologies were hard to measure and predict. Therefore, strategies to cope with uncertainties were primary variables when it came to technological innovations. According to Rosen, these strategies were possibly more useful than studying the technological innovations themselves.[24]

Rosen concluded that *"talented military personnel, time, and information have been the key resources for innovation"*[25]. During peacetime, promotion pathways set out by influential senior leadership would put talented personnel on positions where they could induce innovation. During wartime, innovation seemed to be less important due to time constraints. Innovation was too slow to determine the outcome of the war. Exceptions might be in those cases were the organization was very centralized.[26] As for civilian control, Rosen concluded that there was a relatively minor role for civilians and scientists in initiating and managing innovation. Rather, military officers provided the initiative, or vigorous support of innovative officers. According to Rosen, the influence of civilians was a bit higher in wartime than in peacetime.[27]

A fourth school of thought identified by Grissom was the "cultural model of military innovation".[28] Primary contributor was Theo Farrell, who in 1998 emphasized the explanatory power of culture when studying strategic behavior of states and how military power was generated.[29] A similar conclusion was reached by Elizabeth Kier, who showed that the interests political and military actors formulated were often a function of the interaction of their respective cultures and therefore had a direct impact on how military doctrine was formulated.[30] Farrell concluded:

23 Rosen, *Winning the Next War*, 35-36.
24 Rosen, *Winning the Next War*, 44-52.
25 Rosen, *Winning the Next War*, 252.
26 Rosen, *Winning the Next War*, 252-253.
27 Rosen, *Winning the Next War*, 255.
28 Grissom, "Future of Military Innovation Studies", 916-919.
29 Theo Farrell. "Culture and Military Power", *Review of International Studies* 24, no. 03 (1998): 407-416.
30 Elizabeth Kier. *Imagining War: French and British Military Doctrine Between the Wars*, Princeton Studies in International History and Politics, ed. Jack L Snyder and Richard H Ullman (Princeton, NJ: Princeton University Press Princeton, 1997), 27 and 38.

"Culture, as both professional norms and national traditions, shapes preference formation by military organizations by telling organizational members who they are and what is possible, and thereby suggesting what they should do. In this way, culture explains why military organizations choose the structures and strategies they do, and thus how states generate military power".[31]

Four years later, Farrell and Terry Terriff expanded on this statement when they edited their seminal work *The Sources of Military Change: Culture, Politics, Technology.*[32] In the introductory chapter, they stated that the then dominant neorealist approach as formulated by Posen was too narrow and focused too much on external influences. In order to explain military change, analysts also needed to focus on processes within military organizations.[33] They defined military change as *"change in the goals, actual strategies, and/or structure of a military organization".*[34]

They identified three basic sources of military change: cultural norms, politics and strategy, and new technology. In addition, they regarded military innovation as the outcome of a process that led to major military change. Military innovation was one of three pathways of military change, leading to changes in military technologies, tactics, strategies, and structures. Innovation distinguished itself from adaptation, the second pathway, which involved adjusting military means and methods, smaller changes that cumulatively over time could lead to innovation. Third, military organizations could import new tools and ways of war by imitating other militaries, which they called emulation.[35]

Farrell and Terriff directly challenged Posen by stating that the neorealist perspective ignored the role of ideas in shaping military change. Military change was the work of humans, who not always acted and reacted in a logical and linear fashion. They were subject to a wide variation of forces and environmental changes, whether this was the strategic environment or technology, which could both facilitate and impede military change. In short, they concluded that concepts such as legitimacy of the organization and identity of its members could be as powerful reasons for military change as increased military effectiveness.[36] They found the relationship between military organizations and their environments to be complex and interactive, in which visionary leadership, legitimacy of civilian reformers in military eyes, and the internal military mechanisms for building support for reformist ideas, all influenced the depth and width of military change. They therefore proposed to synthesize the realist perspective with their culturalist approach, at the same time adding domestic politics as a relevant research topic for the study of military change.[37]

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31 Farrell, "Culture", 416.

32 Theo Farrell and Terry Terriff eds. *The Sources of Military Change: Culture, Politics, Technology* (Boulder, CO: Lynne Rienner Publishers, 2002).

33 Theo Farrell and Terry Terriff. "The Sources of Military Change", In: *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner Publishers, 2002), 3-20, 16.

34 Farrell and Terriff, "Sources", 5.

35 Farrell and Terriff, "Sources", 5.

36 Theo Farrell and Terry Terriff. "Military Change in the New Millennium", In: *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner Publishers, 2002), 265-277, passim.

37 Farrell and Terriff, "Military Change", 269-270 and 275.

Top Down versus Bottom Up Approaches

Besides identifying schools of thought, Adam Grissom also took part in the discussion. He formulated a definition of military innovation, which in his opinion until then was only implicit in the four schools of thought.[38] In analyzing the four schools, he concluded that military innovation tacitly consisted of three components: changes in the manner in which military formations function in the field, innovation had significant scope and impact, and innovation was tacitly equated with increased military effectiveness.[39] He therefore proposed a new definition for innovation: *"approximately, 'a change in operational praxis that produces a significant increase in military effectiveness' as measured by battlefield results"*[40]. Implicitly expanding on these battlefield results, Grissom concluded that none of the four schools, despite their progress in empirical depth and sophistication, correctly valued operational experimentation at the lower end of the military chains of command. According to Grissom, scholars focused too extensively on "top down" innovation, initiated within the higher echelons of the militaries or their political masters.[41] He suggested that the research field of military innovation should be augmented with empirical and conceptual research on "bottom up" innovation performed by operational commanders and their subordinates.[42]

The attention for bottom up military innovation coincided with two developments that were in progress at the time. The first development was a change of the nature of the conflicts in which western militaries were deployed. The 1990s saw an increase of what were called peace operations. During the first decade of the twenty first century western militaries were primarily involved in irregular warfare missions and state-building missions in Iraq and Afghanistan. These missions imposed different demands on the military apparatus, especially when it came to the influence lower level tactical units could exercise on operational and even strategic processes. Ever since US Marine Corps (USMC) General Charles Krulak launched his statements on the "strategic corporal" in 1999, it is acknowledged that in modern conflict individuals operating on an organizational level that hitherto was considered to be tactical could have strategic impact.[43] Hew Strachan noted in addition that various levels of war in modern conflicts are less clear than in the traditional, regular, conflicts.[44]

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38 Grissom, "Future of Military Innovation Studies", 906.

39 Grissom, "Future of Military Innovation Studies", 906-907.

40 Grissom, "Future of Military Innovation Studies", 907.

41 Grissom, "Future of Military Innovation Studies", 920.

42 Grissom, "Future of Military Innovation Studies", 930. Schmidt specifically stated that there is a gap in professional literature on innovation in irregular warfare: Matthew J. Schmidt. "The Influence of Professional Culture on American Military Innovation in Counterinsurgency" (Dissertation submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Government, Georgetown University, February 8, 2011), 36.

43 The USMC called it the "Three Block War", meaning "*contingencies in which Marines may be confronted by the entire spectrum of tactical challenges in the span of a few hours and within the space of three contiguous city blocks*" (Charles C. Krulak "The Strategic Corporal: Leadership in the Three Block War", *Marines Magazine* (1999), 4).

44 Hew Strachan. "Strategy or Alibi?: Obama, McChrystal and the Operational Level of War", *Survival: Global Politics and Strategy* 52, no. 5 (2010): 157-182, 167.

The second development was a process known as the Revolution in Military Affairs (RMA). The RMA induced significant changes in the way western militaries fought wars. It is beyond the scope of this research paper to elaborate in the achievements of the RMA. It is however important to note the resulting preferred way of conducting warfare, among many other things, stimulated decentralized operation of dispersed forces that were able to communicate with each other via digital information networks. Consequently, the relationship between strategy, operations, and tactics, changed. Traditionally rather a "top down" endeavor, formulation of strategy, drafting of operational plans, and tactical execution became more of a reciprocal process.[45]

Both developments challenged the traditional "top down" hierarchical style of command, in favor of a decentralized "bottom up" style. Following this change of military decision making, it could follow that military innovation changed as well. In other words, Grissom might implicitly have challenged the, equally implicit, dominant notion that military innovation is a fixed process. "Bottom up" military innovation might be an expression of changes in the process of military innovation itself.[46]

Farrell himself provided some corroboration to this statement when he investigated the adaptation processes of six subsequent British brigades when fighting the Taliban in Helmand between 2006 and 2009. In this publication, he defined military innovation as major change that was institutionalized in doctrine, organizational structure and technology. Adaptation involved changes in tactics, techniques and technologies in order to improve operational performance. Farrell reaffirmed the relationship between adaptation and innovation he described with Terriff in *The Sources of Military Change*.[47] He acknowledged that adaptation involved "bottom up" change, which over time could lead to innovation. Prospective defeat was an important trigger, as the British in Helmand experienced. This led them to explore new ways of becoming operationally more effective.[48] He concluded that the context of the campaign had a grave influence on the British transfer from an operational concept focused on hard military power to one that focused on creating a safe and secure environment for the Afghan population. New tactics of the Taliban, additional available forces, and the characters of the Brigade commanders, were all contributors.[49] Changing enemy tactics provided a new element in the discussion. This acknowledgement touched on the latest insights in modern conflict, where mass media, urbanization, globalized

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45 Antoine Bousquet. "Chaoplexic Warfare or the Future of Military Organization", *International Affairs* 84, no. 5 (2008): 915-929, Frans Osinga. "The Rise of Military Transformation", In: *A Transformation Gap?: American Innovations and European Military Change*, ed. Terry Terriff, Frans Osinga and Theo Farrell (Stanford, CA: Stanford University Press, 2010), 14-34, 24-25, and Keith L. Shimko. *The Iraq Wars and America's Military Revolution* (Cambridge, UK: Cambridge University Press, 2010), 114-115.

46 See for instance, Benjamin M. Jensen. "Military Innovation in the US Army: Anarchy, Bureaucracy, and the Forging of Doctrine, 1975-1995" (Dissertation Submitted to the Faculty of the School of International Service of American University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in International Relations, American University, Washington, DC, 2010), 230-232, and Matthew Alan Tattar. "Innovation and Adaptation in War" (A Dissertation Presented to the Faculty of the Graduate School of Arts and Sciences in Partial Fulfillment of the Requirements for the degree of Doctor of Philosophy, Brandeis University, February, 2011), 39.

47 Theo Farrell. "Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan, 2006-2009", *The Journal of Strategic Studies* 33, no. 4 (2010): 567-594, 569. A version of this article can be found in: Dima Adamsky and Kjell Inge Bjerga. *Contemporary Military Innovation: Between Anticipation and Adaptation*, Cass Military Studies (London and New York, NY: Routledge, 2012).

48 Farrell, "Improving in War", 571 and 583-585.

49 Farrell, "Improving in War", 573 and 585.

connectivity, religious extremism, and suicide terrorism are relevant factors, and in which adversaries are involved in a race to stay ahead of each others' adaptations.[50]

An even more complex picture was provided by James Russell in the same issue of *The Journal of Strategic Studies*.[51] In his article about the adaptation process of several US units deployed in Iraq during the period 2005 to 2007, he defined innovation as *"the development of new organizational capacities not initially present when the units deployed into theater"*[52]. He found that these innovation processes showed an iterative process of both "top down" and "bottom up" adaptation activities, which became innovations once they were codified in SOPs, distributed to and adopted by other units, and subsequently fundamentally altered the way the US military fought in Iraq.[53] These adaptations could not be classified strictly as "bottom up" or "top down". Rather, they revealed an innovation process that was

> *"dialectical in nature and drew upon a complex series of forces both from within and outside the units that fused together in ways to produce organically generated change - change that eventually 'pulled' tactical practice, institutional innovation and (finally) authoritative doctrinal pronouncements along behind it".*[54]

This publication was a prelude to a monograph on the same topic, in which Russell elaborated further on his findings.[55] In order to complement current theories on the causes of military innovation, Russell drew on insights from organizational theory, organizational learning theory, and prior empirically based literature on wartime innovation.[56] He found that the then current literature on military innovation focused too much on "top down" processes. Additional literatures offered the opportunity to focus more on the human dimension of military change.[57] For instance, organizational change could be a reaction of technologically or environmentally induced increase of complexity to which specialized organizational functionalities adapted in attempts to cope with that complexity. Also, the roles of informal networks and an organizational culture that promoted free flow of ideas proved to be *"clearly vital"* [58] to the process of wartime military innovation, because it allowed the organization to receive constant "feedback loops" on the organization's performance. Modern communications systems could enhance such a process

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50 Lazar Berman. "Capturing Contemporary Innovation: Studying IDF Innovation Against Hamas and Hizballah", *Journal of Strategic Studies* 35, no. 1 (2012): 121-147, David Kilcullen. *Counterinsurgency* (Oxford, NY: Oxford University Press, 2010), 204-205, and David H. Ucko. *The New Counterinsurgency Era: Transforming the U.S. Military for Modern Wars* (Washington, DC: Georgetown University Press, 2009), 12.

51 James A. Russell. "Innovation in War: Counterinsurgency Operations in Anbar and Ninewa Provinces, Iraq, 2005-2007", *The Journal of Strategic Studies* 33, no. 4 (2010): 595-624. A version of this article can be found in: Adamsky and Bjerga, *Contemporary Military Innovation*.

52 Russell, "Innovation in War", 596.

53 Russell, "Innovation in War", 619-620.

54 Russell, "Innovation in War", 621.

55 James Avery Russell. *Innovation, Transformation, and War: Counterinsurgency Operations in Anbar and Ninewa, Iraq, 2005-2007* (Stanford, CA: Stanford Security Studies, 2011).

56 See for an extensive description of the discussion within organizational sciences: Tommy Tikka. "The Process of Organisational Adaptation Through Innovations, and Organisational Adaptability" (Dissertation for the degree of Doctor of Science in Technolo gy to be Presented with Due Permission of the Faculty of Information and Natural Sciences, Aalto University, Aalto, May 21, 2010). Within this body of knowledge, the notion of iterative, or "circular" adaptations from the top down to the level of the individual has been identified by several scholars within this field. Tikka, "Process", 29.

57 Russell, *Innovation, Transformation, and War*, 49 and 204-205.

58 Russell, *Innovation, Transformation, and War*, 52.

even further.[59] All these processes involved incremental, iterative "bottom up" changes that could finally produce new organizational structures and organizational capacities that fundamentally changed the nature of the organization's output, eventually leading to innovation that could live up to Rosen's standard.[60] By using the perspectives of other disciplines, Russell provided the theoretical foundations for "bottom up" innovation.

Other Approaches

Since acceptance of the "bottom up" approach as a complement to the "top down" approach, several other attempts have been made to augment the existing explanatory models.[61] For instance, Robert Foley argued that it was also possible that military units of the same level innovated by spreading knowledge between them, albeit with some limitations. He called this "horizontal innovation", in contrast to other models which all involved "vertical innovation".[62] Adam Jungdahl and Julia Macdonald argued in 2015 that the discourse still focused too much on bureaucratic inhibitors of military innovation, and in individual drivers, the latter being a reference to the military mavericks. They pointed at the role of empowered individuals who could inhibit innovation, called "gatekeepers". These individuals could have a strong delaying effect on innovation processes.[63] Olivier Schmitt used the mechanism of "mimetic isomorphism", which described and explained when and how military organizations when confronted with uncertainty copy solutions of other militaries.[64] A variant on Russell's perspective was delivered by Nina Kollars. She argued that the system of urgent operational needs, allowing the military organization to acquire weaponry or equipment fast in times of war, could induce a dialectic interaction between several sub-organizations within the military. The innovation could be the synthesis of the interaction of these sub-organizations, rather than victory of one idea or solution over another. She herself acknowledged that this insight partially confirmed but also complicated existing literature on military innovation, and suggested that temporary change could be a necessary component of innovation in times of war.[65] Finally, Michael Raska argued that complexity of security dilemmas of individual states could induce different innovation trajectories.[66] Formulated differently, the discourse on military innovation and adaptation reflects a movement toward acceptance of context-dependent military change.

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59 Russell, *Innovation, Transformation, and War*, 46-53.

60 Russell, *Innovation, Transformation, and War*, 8 and 44.

61 Collins classified the literature on military innovation differently than Grissom. He identified six primary schools of military innovation: civil-miltary, interservice, intraservice, cultural, principal-agent, and bottom up (Liam S. Collins. "Military Innovation in War: The Criticality of the Senior Military Leader" (A Dissertation Presented to the Faculty of Princeton University in Candidacy for the Degree of Doctor of Philosophy, Princeton University, June, 2014),71.)

62 Robert T. Foley. "A Case Study in Horizontal Military Innovation: The German Army, 1916-1918", *Journal of Strategic Studies* 35, no. 6 (2012): 799-827. Schmitt concurred by stating that emulation is the horizontal version of adaptation (Olivier Schmitt. "French Military Adaptation in the Afghan War: Looking Inward or Outward?", *Journal of Strategic Studies* 40, no. 4 (2017): 577-599, 579).

63 Adam M. Jungdahl and Julia M. Macdonald. "Innovation Inhibitors in War: Overcoming Obstacles in the Pursuit of Military Effectiveness", *Journal of Strategic Studies* 38, no. 4 (2015): 467-499.

64 Schmitt, "Inward or Outward?", 580-581.

65 Nina Kollars. "Military Innovation's Dialectic: Gun Trucks and Rapid Acquisition", *Security Studies* 23, no. 4 (2014): 787-813.

66 Michael Raska. *Military Innovation in Small States: Creating a Reverse Asymmetry*, Cass Military Studies (London and New York, NY: Routledge, 2016), 7.

Conclusion

In short, the discourse on military innovation shows a marked increase of identified research topics and explanatory models with regard to military innovation. In the process, the discourse subject matter expanded. It no longer concerned just military innovation, but also adaptation and other forms of change. The discourse on military innovation effectively became a discourse on military change. Although some authors reacted directly to publications of their fellow scholars, what stands out is that suggested alternatives show additions to the identified dynamics, rather than disagreement on them. Also, the discourse reflects recognition of the consequences of modern warfare and current operations, albeit without the specific acknowledgement that the process of military innovation might have changed as well.

Discourse Analysis

Problematic Issues and Their Consequences

Above-mentioned authors show differences in the ways innovation and adaptation are defined, which variables are relevant for innovation and adaptation, and how these variables are valued. Formulated in another way, scholars disagree on which elements constitute the independent variables, intervening variables and the dependent variables. Many other scholars researched these processes. What stands out is that, the many perspectives and definitions blur the discourse, leaving some highly interlinked issues unsolved.

First of these problems is definition itself. Besides the definitions already mentioned, several others can be found. In his dissertation on innovation and adaptation in war, Matthew Tattar defined innovation as *"a new mode of operation of a military service's combat arm that yields significant or decisive advantages, at least initially, to the innovator"*, and adaptation as *"responding to the significant change in the innovator's mode of operation"*.[67] Rebecca Patterson defined innovation in her dissertation on US innovation in nation-building as *"replacing old organizational routines with new procedures, tactics, strategies or structures"*[68]. Harvey Sapolsky, Benjamin Friedman, and Brendan Rittenhouse Green regarded innovation to be *"significant changes in organizational tasks and rewards in the service of a major change in organizational output"*[69], with a special relationship with the concept of "transformation", which they regarded as *"the specifically organizational half of innovation. We define it as the organizational implementation of significant change. Transformation requires changes in military tasks, priorities, and rewards"*[70]. Christopher Savos added the element of perception to the definition: it becomes innovation when a subgroup within the military regards it as novel, albeit with significant side effects for the group adopting it.[71] Focusing on organization literature, rather than literature on military innovation and adaptation, Liam Collins did so too in his dissertation. He defined innovation as: *"adoption of a major change that is perceived as new to the organization, with a change related to the goals; tactics, strategies or doctrine; and/or structure of the organization"*[72].

Some authors did not define the concepts, but what they meant by it was shown by the way they relate the concepts to one another. The definitions of Tattar and Sapolsky c.s. could be viewed in such manner. Williamson Murray linked adaptation and innovation to whether the military

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67 Tattar, "Innovation and Adaptation", 13.

68 Rebecca Damm Patterson. "The US Army and Nation-Building: Explaining Divergence in Effective Military Innovation" (Dissertation submitted to the Faculty of the Columbian College of Arts and Sciences of The George Washington University in partial satisfaction of the requirements for the degree of Doctor of Philosophy, George Washington University, August 31, 2009), 3.

69 Harvey M. Sapolsky, Brendan Rittenhouse Green and Benjamin H. Friedman. "The Missing Transformation", In: *US Military Innovation Since the Cold War: Creation Without Destruction*, ed. Harvey M. Sapolsky, Benjamin H. Friedman and Brendan Rittenhouse Green, Strategy and History, ed. Colin S. Gray and Williamson Murray (London and New York, NY: Routledge, 2009), 1-13, 6.

70 Sapolsky, Rittenhouse Green, and Friedman, "Missing Transformation", 6.

71 Christopher Jay Savos. "The Irresistable Force Vs. The Immovable Object: Civilian Attempts to Force Innovation on a Reluctant Military" (Dissertation Submitted to the Department of Political Science in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy, Massachusetts Institute of Technology, June, 1993), 13.

72 Collins, "Military Innovation in War", 34-35.

was actually conducting operations. He reserved the term innovation for peacetime military change and adaptation for wartime military change.[73] Stulberg and Salomone described change in terms of a continuum of adaptation, referred to as introduction of change, and innovation, the outcome of change. Further, they viewed transformation to be tantamount to a sustained process of innovation.[74] Ucko divided innovation into a theoretical "bottom up" adaptation process and a "top-down" learning process.[75] Another variation is provided by Nina Kollars, stating in her dissertation that adaptation was one of three components of innovation, the other two being grand design and improvisation.[76] Specifically for US Air Force innovation, Adam Grissom, Caitlin Lee, and Karl Mueller identified a phase between immediate adaptation and long-cycle innovation. They called it short-cycle innovation.[77] Of note, a review of literature on organizational innovation revealed the same lack of consensus.[78]

Admittedly, some of the definitions were tailored for specific studies, as for instance references to measurable variables within the definitions indicate. This, non-exhaustive, enumeration of definitions does show however that several tenets are used to define it, namely the scope of change, and newness of it.[79] As Robert Tomes noticed for business literature in the 1990s, it shows that several terms, especially "innovation", suffer from over-usage and under-definition, blurring the discourse.[80] The result is a stalemate with regard to definition, on which Kollars stated that the debate on *"newness and size of change is contestable, confusing, and infinitely debatable"*[81]. Although Kollars may be right, it is more than mere hairsplitting, because it partly proscribes how concepts of innovation and adaptation relate to each other. For instance, Kollars stated that adaptation is a part of innovation, while Tikka in his dissertation views innovation as a part of the adaptation process.[82] The consequence however was an unworkable situation, as the following quote form Kollars illustrates:

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73 Williamson Murray. *Military Adaptation in War: With Fear of Change* (New York, NY: Cambridge University Press, 2011), 2.

74 Stulberg and Salomone, *Managing Defense Transformation*, 16 and 28.

75 David Ucko. "Innovation or Inertia: The US Military and the Learning of Counterinsurgency", *Orbis* 52, no. 2 (2008): 290-310, 292, and Ucko, *New Counterinsurgency Era*, 16.

76 Nina A. Kollars. "By the Seat of Their Pants: Military Technological Adaptation in War" (Dissertation Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University, Ohio State University, 2012), p. 46-59. It should be stated that Kollars does provide a definition of innovation, namely "*a novel revision/change in how we do things that is brought into practice on purpose*": Kollars, "Seat of Their Pants", 43-44.

77 Adam R. Grissom, Caitlin Lee and Karl P. Mueller. *Innovation and the United States Air Force: Evidence From Six Cases* (Santa Monica, CA: RAND Corporation, 2016), 102.

78 Mary M. Crossan and Marina Apaydin. "A Multi-dimensional Framework of Organizational Innovation: A Systematic Review of the Literature", *Journal of Management Studies* 47, no. 6 (2010): 1154-1191. Of note, Crossan and Apaydin did not make a distinction between adaptation and innovation. Rather, they referred to incremental or disruptive innovation.

79 These two elements continue to be part of the definition innovation. See for variants for instance: Foley, "Horizontal Military Innovation", 802, Jungdahl and Macdonald, "Innovation Inhibitors", 469, and Raphael D. Marcus. "Military Innovation and Tactical Adaptation in the Israel-Hizballah Conflict: The Institutionalization of Lesson-Learning in the IDF", *Journal of Strategic Studies* 38, no. 4 (2015): 500-528, 503

80 Robert R. Tomes. *US Defense Strategy From Vietnam to Operation Iraqi Freedom: Military Innovation and the New American War of War, 1973-2003*, Strategy and History, ed. Colin Gray and Williamson Murray (London and New York, NY: Routledge, 2007), 25.

81 Kollars, "Seat of Their Pants", 43.

82 Kollars, "Seat of Their Pants", 46-59 and Tikka, "Process", 26-27.

"Due to the imprecise use of the phrase, innovation has, sadly, become little more than a beltway buzzword. It is a term that makes policy makers swoon and weapons developers salivate. In nearly every academic discipline, there exists an innovation alter before which all good power-seekers genuflect. Business and management schools, engineering, applied science, medicine, and political science all have significant literatures on the study of innovation. In the colloquial use, innovation gets cast as inventions and new ideas, new forms, and new methods. Innovation, by these measures, is essentially everything new under the sun. These overly-broad definitional parameters simply cannot hold weight for an academic discipline".[83]

This combination of over-usage and under-definition could well be both a reflection and a cause of the second problematic issue, that of causality. As several authors noted, there seems to be no consensus on defining the sources of change, or how to classify these sources.[84] A reason for this situation may be that the earlier scholars did not attempt to provide an all-encompassing explanation on the entire spectrum of military change. Posen compared two theories, balance of power and organizational theories, to explain one element of the military metier, formulation of doctrine. Kier explicitly stated that she chose to limit the research to one dependent variable, doctrine, to make the explanatory variable, culture, more specific and identifiable.[85] Rosen identified several gaps in his own research.[86] Subsequent scholars identified gaps and executed comparative studies to fill those gaps in search of theories that have the most explanatory power. Besides the theories of scholars already described in some depth, several others provided alternative or augmenting frameworks to produce a theory with sufficient generalizability and predictive value. Some used theories of organizational learning to explain military change.[87] Kimberley Zisk added the ecological perspective, a separate school of organizational theory, to the equation.[88] Others added the insights from the neoclassical realist school within international securities studies, the school that focuses on variations of policies of individual states rather than polarity within the international system, like the classical realists do, to do the same.[89] Stulberg and Salomone combined theories to produce a new one, called the "microfoundational approach". They regarded military change primarily a management problem, which can be explained by a combination of a normative approach and the principal-agent theory, the theory within the political sciences that explains execution of tasks in a leadership setting.[90] This led them to conclude that:

83 Kollars, "Seat of Their Pants", 16.

84 Jensen, "Military Innovation", 31, Ucko, *New Counterinsurgency Era*, 15, and Stulberg and Salomone, *Managing Defense Transformation*, 27. Stulberg and Salomone classify the discourse as being in an impasse.

85 Kier, *Imagining War*, 33-35.

86 Rosen, "New Ways of War", 166-167.

87 Janine Davidson. *Lifting the Fog of Peace: How Americans Learned to Fight Modern War* (Ann Arbor, MI: University of Michigan Press, 2010), Richard D. Downie. *Learning From Conflict: The US Military in Vietnam, El Salvador, and the Drug War* (Praeger Westport, CT, 1998), 5, Chad C. Serena. *A Revolution in Military Adaptation: The US Army in the Iraq War* (Washington, DC: Georgetown University Press, 2011), 8-9, and Stulberg and Salomone, *Managing Defense Transformation*, 21-27.

88 Zisk, *Engaging the Enemy*, 15-17.

89 Jensen, "Military Innovation", 13-14.

90 Stulberg and Salomone, *Managing Defense Transformation*, 37-51.

"military transformation can be understood as growing out of a set of choices, among a diversity of possible responses to a shifting task environment presented by a continuous interaction between and among commanders (principals) and sub-units (agents)".[91]

Scholars identify different influential factors with regard to military innovation and adaptation. None of the causal factors is however dismissed outright. The discussion implicitly evolves around the importance of those causal factors relative to each other, and by extension generalizability and predictive value of theories.[92] The problematic element of this impasse within the discourse is that scholars and the accompanying theories classify several variables differently. The question of the role of doctrine will serve as a case in point. Posen saw doctrine as a starting point for "large change" within the organization, which was visible in "top down" imposed changes in force posture, hardware inventories and organization control mechanisms.[93] Russell on the other hand saw new doctrine as a possible outcome of "bottom up" innovation, and not even a necessary one, with a pivotal role for openness of military leadership towards innovative ideas.[94] To add to the confusion, Ucko pointed out the relative relevance of doctrine as an indicator of innovation, because the mere existence of new doctrine not necessarily means that the organization adheres to it completely.[95] Catignani showed that this was actually the case with the British Army in Helmand, where the lower level officers and non-commissioned officers had not been given the opportunity to embrace doctrinal changes, and that the "bottom up" approach, in fact, did not start at the bottom, but at the task force levels.[96] The same problems apply to other indicators, to the point where relationship between military change and increased operational effectiveness of the outcomes is loosened.[97]

In sum, definition of innovation and adaptation resulted in a stalemate. Questions regarding scope and newness of the change largely remained unresolved. Strongly related to the question of definition was that of causality. How scholars defined innovation and adaptation influenced

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91 Stulberg and Salomone, *Managing Defense Transformation*, 37-38.

92 Stulberg and Salomone, *Managing Defense Transformation*, 21-27.

93 Posen, *Sources of Military Doctrine*, 14.

94 Russell, *Innovation, Transformation, and War*, 8 and 200-204.

95 Ucko, *New Counterinsurgency Era*, 17-18.

96 Sergio Catignani. "'Getting COIN' at the Tactical Level in Afghanistan: Reassessing Counter-Insurgency Adaptation in the British Army", *Journal of Strategic Studies* 35, no. 4 (2012): 513-539.

97 Patterson stated that the dependent variable in his research was designed to measure the presence of effective innovation, not success of the outcome: Patterson, "US Army and Nation Building", 7. Stulberg and Salomone suggest that change cannot be measured in terms of control of the external environment, that is, mission success, due to its complexity and dynamism: Stulberg and Salomone, *Managing Defense Transformation*, 15. These authors focus on the processes of change, implicitly or explicitly suggesting that successful processes of change could still lead to operational mission failure. It could be argued that these authors have a point: influences of complex environments are hard to measure, and actors' misconceptions about the direction of change arguably still could lead to a successful process of change. Also, the relationship between military change and operational effectiveness is not discarded altogether, as the actor's intentions are increased effectiveness. However, these statements stand in sharp contrast to, for instance, Williamson Murray, who states that (technological) complexity of war has made adaptation *"an increasingly important facet of military effectiveness"* (Murray, *Fear of Change*, 4). Tomes states that "*military innovation studies are fundamentally and epistemologically about understanding and describing qualitative improvements in military effectiveness that yield a comparative advantage over other militaries, creating opportunities for increasing a nation's overall strategic effectiveness*" (Tomes, *US Defense Strategy*, 10). For business literature, Crossan and Apaydin, indicated that most researchers regarded the outcome of innovation as the end point of their research, but that actual performance could not be discarded (Crossan and Apaydin, "Multi-Dimensional Framework", 1176). These examples illustrate that there is no consensus on the fundamentals of military change.

their identified causal relationships and vice versa. In a parallel process, the causal relationships that were identified and the manifestations they potentially influenced increased, and so did their theoretical mutual relationships. As a result of a latent lack of consensus on these two fundamental issues, an abundance of perspectives arose in which relationships between driving factors and manifestations of military innovation showed little coherence in the collective set of publications that all addressed military innovation or military adaptation. In this situation it became onerous to define the subject matter, and nearly impossible to formulate a common frame of reference.

Solutions Offered in the Discourse

These problematic issues and especially their problematic consequences were acknowledged by various authors, either implicitly or explicitly. Studying these authors reveal three options to solve this problem. The first option entailed inclusion of all relevant factors. Alternative to discussing one or a few agents with regard to their relative influence on military innovation, this option aimed to incorporate all possible agents in one overarching concept. It was acknowledged beforehand that variations of their importance could occur when studying different organizations, in different times, and in different geographical areas. In 2007, Robert Tomes devoted an entire monograph on thirty years of US transformation activities, to derive a military innovation framework that could be used by other scholars.[98] He believed that context was key to understanding innovation behavior and outcomes, and listed nearly two dozen organizational and contextual factors to investigate such a context. When investigated in a particular case, this context formed what he called an "innovation milieu", allowing for several types of change to take place, from incremental modernization to revolutionary change.[99]

The downside of this approach is the capacious nature of the research involved. Tomes acknowledges this: *"As the study and practice of military change management necessarily involves understanding multifaceted contextual elements, a cross-disciplinary approach is needed"*.[100] A similar view is held by Lazar Berman, who proposed a "comprehensive, multi-dimensional framework" in order to deal with all complexities with relation to innovation, without being very specific on what such a framework should look like.[101] He did not classify or categorize the forces relevant to military adaptation and innovation.

A second option is reasoned isolation of variables, leaving the most important variables as subject of study. The dissertation of Liam Collins can serve as an example of this approach.

98 Tomes, *US Defense Strategy*, 6. This monograph had its roots in Tomes' dissertation, which had the same subject and goals: Robert R. Tomes. "Military Innovation and the American Revolution in Military Affairs" (Dissertation Submitted to the Faculty of the Graduate School of the University of Maryland, College Park in Partial Fulfillment of the Requirements for the Degree of Doctor of Government and Politics, 2004).

99 Tomes, *US Defense Strategy*, 156-157.

100 Tomes, *US Defense Strategy*, 175.

101 Berman, "Capturing Contemporary Innovation", 145. Crossan and Apaydin were more specific in developing a multi-dimensional framework. However, this framework does not have a relation with the discourse of military innovation and adaptation, but rather with business literature (Crossan and Apaydin, "Multi-Dimensional Framework", 1167).

Collins rigorously studied literature on military innovation, and agreed that a universal theory did not exist, due to complexity of the matter and the differences of classification of factors by scholars. Isolating one variable to explain one other would not do justice to the complex reality. Incorporating all variables would be a correct approach, but it would also be complex to the extent it became useless. According to Collins, the challenge was to construct a model that included the variables that mattered most and for a multiple number of cases, while acknowledging when the model did not work.[102] He did so by phased isolation of relevant themes and variables found in the discourse of military innovation, augmented by organizational literature. He identified the gap of approaching the theme of building a military that is capable of rapid innovation, effectively focusing on innovation as a process rather than on innovation as outcome. In addition, he considered wartime innovation, and the role of leadership in it, to be understudied topics.[103] He then argued that the process of innovation could best be studied from one of the three dominant perspectives in literature on innovation in organizations, namely the interactive perspective. The other two, the individualistic perspective and the structuralist perspective, he found to be prone to attribution error, and did not provide enough insight to the innovation process. Given the time consuming nature of the resulting research, Collins adopted a case study approach. He acknowledged the detrimental effect of the case study approach on external validity.[104]

Farrell offered a third and final option. This in essence entails adopting loosely defined definitions and generally described classifications, while simultaneously acknowledging variations in the adaptation and innovation processes. Also, the use of, or the search for, theory should not be too rigid. In a study on military adaptation in Afghanistan, Farrell provided such a frame, as it implicitly integrates all variables hitherto discussed.[105] Farrell defined adaptation as *"change to strategy, force generation, and/or military plans and operations, that is undertaken in response to operational challenges and campaign pressures"*[106]. He no longer thought it feasible to draw too fine a distinction between adaptation and innovation, using the distinction of degree of novelty and disruptive nature of the change. Only when doctrinal or structural change takes place, or when a brand new technology is implemented, the classification "innovation" will be appropriate. Adaptation could, but not necessarily would, lead to innovation.[107]

Farrell proposed to make a distinction between drivers, shaping factors and manifestations. First of the drivers would be operational challenges, encompassing all variables of the operational environment such as strategic distance, geography, and tactics of the opponent. Technological developments provided the second driver, provided their implementation should be accompanied by organizational and doctrinal changes to constitute innovation.[108]

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102 Collins, "Military Innovation in War", 36 and 83.
103 Collins, "Military Innovation in War", 2-10, 25, and 70.
104 Collins, "Military Innovation in War", 90-94 and 484-485.
105 Theo Farrell. "Introduction: Military Adaptation in War", In: *Military Adaptation in Afghanistan*, ed. Theo Farrell, Frans Osinga and James A. Russell (Stanford, CA: Stanford University Press, 2013), 1-23.
106 Farrell, "Military Adaptation in War", 2.
107 Farrell, "Military Adaptation in War", 7.
108 Farrell, "Military Adaptation in War", 9-10.

As for the shaping factors, Farrell proposed four: domestic politics, alliance politics, strategic culture, and civil-military relations. Domestic politics influence military deployment to a large extent, because many modern conflicts are fought by choice, not by necessity. Internal politics of contributing nations could have a shaping effect on how their militaries were deployed. Also, western militaries currently fight wars expeditionary, meaning far away from decision makers and their electorate. Consequently, there is a large margin in where and how states become involved in wars.[109] This has an impact on another feature of modern conflict, namely that western militaries fight wars within coalitions. Therefore, dynamics within the coalition will influence the way militaries fight.[110] Farrell kept loyal to his earlier work on culture by identifying strategic culture as one of the shaping factors. Strategic culture, he defined as *"the sum of beliefs about the use of force that are shared by the military and policy communities of the state"*[111], which needed considerable pressure to change. With civil-military relations, Farrell referred to the role of political and senior military leadership, paying homage to the civil-military school of military innovation identified by Grissom. Farrell acknowledged that adaptation can originate both "inside-out" and "outside-in", and "bottom up" or "top down".[112]

As for the manifestations of innovation and adaptation in Afghanistan, Farrell proposed that these involved basically the entire operational spectrum, involving strategic juxtapositions, such as military strategy, force levels and resources, and operational and tactical ones, consisting of doctrine, plans and operations, and training and pre-deployment activities.[113]

Frame of Reference Still not Workable

When analyzing the challenges the discourse encountered several elements stand out. First, Farrell's description of drivers, shapers and adaptations can be seen as a workable integration of various schools within the discourse on military change. Schmitt called it a *"major milestone"*[114]in the research on military innovation and adaptation. This research paper concurs. It has origins in all schools of thought and consists of a number factors that influence military change and a number of possible elements that are subjected to change. The discourse shows that no identified causal relationship found by one scholar is rejected outright by others. Farrell acknowledges this situation by abstaining from classifying the elements beyond the general distinction of drivers, shapers, an manifestations. The result is a frame of reference, not so much a theoretical framework. Farrell's frame of reference offers the agility to allow influence of several causal relationships on several variables. Yet, the frame is confined enough to allow for directed research. When used for future studies, this frame of reference could possibly identify the most influential drivers or changes in the processes of military innovation and adaptation. This then

109 Farrell, "Military Adaptation in War", 10-12.
110 Farrell, "Military Adaptation in War", 12-14.
111 Farrell, "Military Adaptation in War", 14.
112 Farrell, "Military Adaptation in War", 17-18.
113 Farrell, "Military Adaptation in War", 3 and 8.
114 Schmitt, "Inward or Outward?", 580.

could become the basis for subsequent research on individual organizations facing particular circumstances, which cumulatively could possibly reveal trends or even lead to theory.

However, the frame requires additional conceptual effort consisting of four elements. First, Farrell does not offer a complete solution to the problem of causality. For instance, the difference between drivers and shaping factors is not clear. In addition, Farrell's lists excludes elements that are frequently mentioned in relation to military innovation, the most eye-catching being leadership and organizational structures. Furthermore, it has to be used consistently. In the same year Farrell launched his frame of reference, he wrote a monograph with Sten Rynning and Terry Terriff using a different frame with only four key factors: a fit with organizational interests, new ideas and military culture, the role of civilian an military leaders, and feedback from operational experience.[115] Both publications are explicit in their loose relationship with with theory, and are mostly interested in "telling the story".[116] The monograph with Rynning and Terriff is the most outspoken of the two publications in the relationship between selecting the factors and theory building:

> *"Unlike most books on military innovation, we do not propose or test "a theory" of military innovation. Instead, we focus on telling the story of army transformation in each case, capturing all of the contingencies and complexities, and personalities involved. Theory by its very nature seeks to reduce such complexities in order to focus on those factors that are essential to explaining what happened. However, theory can obscure more than it illuminates. Often, essential elements of the story get excluded, especially when they are inconsistent with a preferred theory. Thus, whilst we draw on the theoretical insights from military innovation studies to highlight key themes for our case study analysis, our study is not theory-driven".*[117]

In the conclusion, they present this approach as an example of a contribution to "*to demonstrate the virtue of "theory blending" to produce richer accounts of why and how militaries innovate*"[118]. This stance is problematic because, as this quote shows, the study is still claiming to provide a general applicability to the knowledge of how militaries innovate. This cannot be reconciled with the wish to "capture all the contingencies, complexities, and personalities" when one chooses to adopt various frameworks for various studies. It runs the risk of incorporating ever more elements into the studies, resulting a way back to Berman's all-encompassing "multidimensional framework". Reversely, focusing on just a limited set of key factors, even with the option to incorporate other factors, has the risk of unrealistic simplification. In short, when not applied rigorously, Farrell's frame runs the risk of suffering from disadvantages of both other options, without having a real advantage. Basic consensus on all relevant key factors is required in order to be able to fruitfully compare studies. Farrell's frame of reference is a valuable starting point, but this research paper argues for its completion and consistent use.

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115 Theo Farrell, Sten Rynning and Terry Terriff. *Transforming Military Power Since the Cold War: Britain, France, and the United States, 1991–2012* (Cambridge: Cambridge University Press, 2013), 9.

116 Farrell, "Military Adaptation in War", 3, and Farrell, Rynning, and Terriff, *Transforming Military Power*, 8.

117 Farrell, Rynning, and Terriff, *Transforming Military Power*, 8.

118 Farrell, Rynning, and Terriff, *Transforming Military Power*, 284.

Second, what stands out from the list of manifestations is that there is strong overlap with aspects of managing military organizations. Western militaries use basically the same measurables when they make organizational or conceptual changes when trying to optimize effectiveness. They are used for identifying capability gaps or performance gaps, which in turn provide the basis for procurement processes[119] and lessons learned processes.[120] There is a link between these processes and military adaptation and innovation, as they are important facets of institutionalization of military change. Institutionalization in turn is regarded by many scholars as a prerequisite for successful innovation and adaptation.[121] The same is true for performance gaps or capability gaps. These elements can be found literature on military innovation and adaptation.[122] So, besides rearranging drivers and manifestations found in literature on innovation, it should be recognized that western militaries have intentional processes in place that are designed to incorporate changes into their organizations, and should be taken into account when studying military innovation.

Third, military change implicitly is regarded by virtually all scholars as a positive development, inducing much needed change. What is significantly understudied are the negative sides of innovation. After all, innovations could be subject to debate until their usefulness is irrefutably

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119 The measurables are Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities, also known by the acronym DOTMLPF: James F. Dickens. "Putting the "O" in Joint DOTMLPF: Organizational Capabilities for Joint Task Force Command and Control," (Report, U.S. Army War College, 2005) http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA434988 (accessed November 30, 2012)., 27, David A. Dryer, Maureen Short and Timothy D. Beach. "Capability Test Methodology's Role in System of Systems Life Cycle Acquisition,."American Institute of Aeronautics and Astronautics https://www.jte.osd.mil/jtemctm/files/published_papers/Capability%20Test%20Methodology's%20Role-Feb%202008.pdf (accessed November 30, 2011)., 3, Sang-Gun Park, Tag-Gong Lee and Hyun-Sik Son. "Integrated Framework and Methodology for Capability Priority Decisions", *Information and Security. An International Journal* 25 (2010): 78-98, 78-79 and 89, US Chairman of the Joint Chiefs of Staff *Instruction on joint capabilities integration and development system* (January 10, 2012), https://acc.dau.mil/adl/en-US/267681/file/62221/CJCSI%203170%2001H%20-%2010%20January%202012.pdf (accessed November 20, 2012), 2 and 10, and Jeffrey P. Sundberg. "Analyzing the United States Air Force Organizational Structure - A Case for Reorganization," (SAMS Monograph, United States Army Command and General Staff College, School of Advanced Military Studies, Fort Leavenworth, KS, May 16, 2011) http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA545246 (accessed November 30, 2012).,6. For a comprehensive study on managing military organizations, see: Joseph Soeters, Paul C. Fenema and Robert Beeres. *Managing Military Organizations: Theory and Practice*, Cass Military Studies (London and New York, NY: Routledge, 2010).

120 The lessons learned community also uses the DOTMLPF-concept, mostly in the analysis phase of the lessons learned process. This phase identifies gaps, root causes for those gaps, and identifies the appropriate action body: Bruce Beville. "JCOA Update", *Joint Center for Operational Analysis Journal* 12, no. 2 (2010): iv, Center for Army Lessons Learned (CALL). *Handbook 11-33: Establishing a Lessons Learned Program. Observations, Insights, and Lessons* (Center for Army Lessons Learned (CALL), June, 2011), http://usacac.army.mil/cac2/call/docs/11-33/11-33.pdf (accessed November 30, 2012), 36, R.S. Miguel "Lessons Learned Process Ensures Future Operations Build on Successes", *Army Communicator* Winter (2011): 42-47, NATO. *Joint Analysis Handbook* (Lisbon: Joint Analysis and Lessons Learned Centre, October, 2007), http://www.jallc.nato.int/newsmedia/docs/Joint_Analysis_Handbook_3rd_edition.pdf (accessed November 18, 2012), 21 and 42, and Joint Analysis and Lessons Learned Centre. *The NATO Lessons Learned Handbook* (Lisbon: Joint Analysis and Lessons Learned Centre, September, 2011), http://www.jallc.nato.int/newsmedia/docs/Lessons_Learned_Handbook_2nd_edition.pdf (accessed November 18, 2012), 17, 21 and 42.

121 Farrell, "Military Adaptation in War", 5, Farrell, "Improving in War", 569, Stulberg and Salomone, *Managing Defense Transformation*, 1, Serena, *Revolution in Military Adaptation*, 99-100 and 118-119, Tomes, *US Defense Strategy*, 13, and Ucko, *New Counterinsurgency Era*,169-173.

122 Max Boot. *War Made New: Technology, Warfare, and the Course of History, 1500 to Today* (New York, NY: Penguin Group, 2006), 15-16, Grissom, "Future of Military Innovation Studies", 913-916, Murray, *Fear of Change*, 4, Rosen, *Winning the Next War*, 36-36, Russell, *Innovation, Transformation, and War*, 29, Serena, *Revolution in Military Adaptation*, 15-17, Shimko, *Iraq Wars*, 220, Stulberg and Salomone, *Managing Defense Transformation*, 15, Tattar, "Innovation and Adaptation", 12, Terry Terriff, Frans Osinga and Theo Farrell eds. *A Transformation Gap?: American Innovations and European Military Change* (Stanford, CA: Stanford University Press, 2010), Tikka, "Process", 30, Tomes, *US Defense Strategy* 10-11, and Ucko, *New Counterinsurgency Era*, 4-5 and 18-19.

proven. Until then, developments that impede implementation of an innovation, such as for instance bureaucratic resistance, could also function as a useful check against innovators that push the envelope, becoming a barrier against chaos and disastrous experimentation. This would imply that inhibiting and enabling factors for military change relate to each other in a relationship of mutual dependency, rather than being diametrically opposed to each other.[123] It is beyond the scope of this research paper to address this topic in significant depth. Suffice here to say that the discourse on military innovation needs additional research on possible mutual dependency of inhibiting and enabling influences of military innovation.

The fourth element is the most fundamental one. Almost as a side note, Collins touched upon an element of the discourse that is hardly addressed directly and also understudied, namely the feasibility of mixing innovation as a process and innovation as outcome in the discourse. Beneath the surface, there is lack of consensus on the question whether innovation and adaptation incorporate the process, the outcome, or both.[124] In the monograph mentioned earlier, Farrell, Rynning and Terriff, equally laterally state that they are interested in both the process and the outcome of army transformation.[125] Problematic element is that is not explicated why this is relevant and what the consequences are for the research questions. In addition, virtually all scholars ask the question of how military organizations change, and use historical cases to support their hypotheses. So, the link between the reason for research, the research topics, and the role of historical case studies is blurred. What is implicit in the discourse is that it *de facto* tries to answer three questions at the same time.

The first question has already been hinted on when describing the analytical models: according to what generalizable theory does military innovation adhere? This question is relevant, because it offers generalizability and predictive value. The second question is most directly provided by Collins, by posing the question of how to build a military organization that is optimized to execute military change. It can be argued that scholars who, like Collins, focus on innovation as a process and incorporate organizational literature in the discourse on military innovation in effect execute research to that end. This could explain the loosening relationship of innovation theories and military effectiveness mentioned earlier. When studying innovation as a process, the outcome of the process is less relevant, but historical case studies can provide for useful empirical data and insights. Conversely, and highlighting the third question, scholars that focus on the outcome of military innovation and adaptation to a large extent focus on explanations for historical developments and events. Theories, including those which focus on military change as a process, can be helpful in these explanations. Problematic element in this observation is that both process and outcome cannot be separated completely, while the scope and outlook of the research may be very different. Outcomes are the result of preceding processes, but the

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123 John F. Price. "US Military Innovation: Fostering Creativity in a Culture of Compliance", *Air & Space Power Journal* 28, no. 5 (2014): 128-134, 132, and Thomas M. Williams. "Understanding Innovation", *Military Review* July-August (2009): 59-67.

124 Some authors use a distinction of process and outcome within the definitions. Farrell regards the processes of innovation and adaptation pathways to the process of change (Farrell and Terriff, "Sources", 6). Stulberg and Salomone saw adaptation as the introduction of change and innovation as the outcome (Stulberg and Salomone, *Managing Defense Transformation*, 28). According to Tikka, organizational literature suggest that innovation and adaptation can be regarded as both process and outcome (Tikka, "Process", 20-21).

125 Farrell, Rynning, and Terriff, *Transforming Military Power*, 3.

innovation process itself almost by definition leaves out elements that are not related to the implicit subquestion of how the military can improve its innovative capability. For instance, while very valuable for analyzing innovation as a process, Collins' framework does not offer workable options to study changes in operational stance of the military, which entails mostly the outcome. It also downplays the role of external influences, such as the operational environment. In addition, Collins bypasses the literature on military adaptation. As stated, several authors identified the difference between innovation as a process and as outcome. However, the notion that approaching military change as a process or as an outcome could have as a consequence that the research could serve three different goals is largely left unmentioned. The obvious solution this research paper proposes is making the implicit goal of research with regard to military innovation and adaptation explicit, because it more rigorously demarcates the research topic and research question. It also increased opportunities to falsify eventual theories.

In conclusion of this paragraph, the discourse shows that there is a noticeable incorporation of ever more variables into the discourse, up to the point where it basically covers the entire spectrum of the military metier. While this can be assessed to be an achievement of the discourse, it also highlights the problem of capaciousness of the research involved. Second, it revealed that viewing military change as a process or as an outcome can have serious impact on the explanatory value, as it implicitly tries to answer three questions at the same time. Farrell delivered a partial solution to these problems devising a frame of reference that largely bypasses the discussion on definition, grouping the variables, and allows for multiple causal factors influencing multiple manifestations. However, indications are that it is not complete. The issue of causality is still unresolved. The lack of consensus could be a reflection of a reality in which, as Ucko indicated, organizational military change might strongly depend on the particular organization, and the particular circumstances it faces.[126] Paraphrased, the adaptation and innovation processes could be very context-dependent. These observations have far reaching consequences for the research on military innovation and adaptation. It could imply that it is impossible to formulate a theory that is sufficiently generalizable and has sufficient predictive value to be able to analyze multiple organizations and multiple contexts. This idea is ventilated by scholars both within business literature and within the discourse on military innovation and adaptation.[127] This is unsatisfactory, because it leaves the question of how military organizations innovate and adapt open ended.

126 Ucko, *New Counterinsurgency Era*, 15.

127 Collins, "Military Innovation in War", 36, Crossan and Apaydin, "Multi-Dimensional Framework", 1164-1165 and 1177, Williamson Murray and Alan R. Millet. "Introduction", In: *Military Innovation in the Interwar Period*, ed. Williamson Murray and Alan R. Millet (Cambridge, NY: Cambridge University Press, 1996), 1-5, 4-5, and Savos, "Irresistable", 17.

Cutting the Knot

Fortunately, the direction of the discourse on military innovation offers solutions as well, and refer back to the basic questions stated in the introduction. First, it is imperative that scholars address specifically which goal the research serves: developing theory, designing a military organization with optimal innovative capacity, or describing and explaining historical events and developments. From this follows that scholars also need to clarify which consequences this has for regarding military innovation as a process or as an outcome, and how this effects their research question.

Second, the issue of definition needs to be addressed. It is highly remarkable that the discourse on military innovation was able to develop itself without consensus on the definition of the subject matter. Several scholars tailor their definitions to fit the purpose of their research, limiting its general applicability. Even more remarkable is that hardly anybody tries to solve the lack of consensus by using semantic descriptions used in dictionaries. Authoritative dictionaries agree that newness, or authenticity, of change is an important factor for innovation.[128] Similarly, when adaptation is defined, leading dictionaries agree that this involves some kind of gradual accommodation to a (changing) environment.[129] Innovation and adaptation semantically differ in emphasis only, on the environment and newness respectively, and overlap when applied to organizations such as militaries. They both a) involve change and b) have a relationship with the environment. Contrary to innovation, both elements are embedded within the definition of adaptation. Innovations however do not occur in a vacuum, as the organization is part of an environment. This implies a relationship of mutual influence. An organization can adapt by changing itself, or by changing the environment, which in turn will be forced to change as well.[130] This can be done either by adopting new elements, or by changing its existing repertoire.[131] This implies that an organization can adapt through innovation, but not necessarily. Also, it can be argued that an organization can innovate through adaptation. Background of this argument is that it is indeterminable exactly when something is really new, or when something ceases to be "existing repertoire", and starts to be something new as a result of changes made to it.

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128 *Longman Dictionary of Contemporary English* defines innovation as "*the introduction of new ideas or methods*" and the verb "innovate" as "*to start new ideas, methods, or inventions*": *Longman Dictionary of Contemporary English* (Harlow: Pearson Education Limited, 2011), 908. *Cambridge Advanced Learner's Dictionary* defines innovation as "*(the use of) a new idea or method*", and the verb "innovate" as to "*to introduce changes and new ideas*": *Cambridge Advanced Learner's Dictionary* (Cambridge [etc.]: Cambridge university press, 2008), 744.

129 Adaptation is defined by *Longman* as "*the process of changing something to make it suitable for a new situation*" and the verb "adapt" as "*to gradually change your behaviour* (sic!) *and attitudes in order to be successful in new situations*" and, when hardware is concerned, "*to change something to make it suitable for a new purpose*": *Longman*, 19. *Cambridge Advanced Learner's Dictionary* defines adaptation as "*the process of changing to suit different conditions*" and the verb "adapt" as "*to change something to suit different conditions or uses*". *Cambridge* emphasizes the process by stating in its examples that it involves a change from, to or for some external factor: *Cambridge Advanced Learner's Dictionary*, 16.

130 Farrell and Terriff, "Military Change", 271-275, Chad C. Serena. "From Spectrum to Beam in Iraq Organizational Adaptation: Combat, Stability, and Beyond" (Dissertation, University of Pittsburg, Pittsburg, PA, April 2, 2010), 20, and Tikka, "Process", 20 and 30. Within the context of counterinsurgency, there currently is a discourse on the idea that modern counterinsurgencies could be characterized as a race in adaptability. See: Kilcullen, *Counterinsurgency*, 1-5.

131 Tikka, "Process", 16 and 26.

When analyzing these definitions it becomes apparent that part of the discussion can be ended because it is based on false presumptions. None of the definitions involve references to the scope of the change. This seems to be reserved for the term "transformation".[132] This means that the definitions referring to the dimension, significance, or level of institutionalization as tenets of both innovation and adaptation should be discarded. They do not comply with definitions currently commonly agreed upon. In addition, reference to these elements is conceptually irrelevant. As it is accepted that all increased performance in a specific environment constitutes adaptation, and all changes that involve hitherto unknown elements, or combination of elements, constitute innovation, size does not matter. For instance, it can be argued that if an entire military organization increased its effectiveness by creating one new type of element, the entire organization has both adapted and innovated.

So, this research paper agrees with scholars who, like Farrell, refrain from rigid and tailor made definitions. However, unlike many of the scholars, this paper provides this statement with semantic arguments to do so. The description above shows that innovation and adaptation are not easily separable. They both refer to military change. Adaptation emphasizes change to increase its fit to the environment. Innovation emphasizes the new elements of change.[133] This research paper proposes to define adaptation as any change in the way the military operates, sudden or gradual, in reaction to the perceived or anticipated environment. Innovation is defined as any change in the way the military operates, sudden or gradual, using new concepts and/or tools. These definitions allow for the actor's active involvement in that environment. When new elements are introduced, such as for instance new concepts, methods or weapons systems, and other technologies, innovation will be applicable. It is recognized that the concepts of adaptation and innovation overlap, and that distinction by definition will be disputable, as "newness" has no clearly defined threshold.

Third, the issue of causality needs to be clarified, in effect answering the question how military innovation and adaptation manifest themselves, and which driving factors can be discerned. As stated, the basic idea of Farrell's frame of reference is helpful, but this research paper argues that three adaptations to the frame be made. Farrell's set of research topics and possible manifestations is helpful as a starting point, as it shows firm links with the discourse on military innovation and adaptation. Unfortunately, Farrell identifies and describes the drivers and shaping factors without explaining their origin. The division between drivers and shaping factors conceptually is less helpful because their boundaries are not clear. Both concepts could involve an impulse for change. Both concepts also refer to the influence on the direction of change, if only by defining the limits of what is possible. Therefore, this research paper proposes to group the drivers and shaping factors into a set of driving factors.

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132 *Longman* defines the verb "transform" as "*to completely change the appearance, form, or character of something or someone, especially in a way that improves it*" and transformation as "*a complete change in something or someone*" (*Longman*, 1877). *Cambridge Advances Learner's Dictionary* defines the verb as "*to change completely the appearance or character of something or someone, especially so that they are improved*" and the noun as "*a complete change in the appearance or character of something or something or someone, especially so that they are improved*" (*Cambridge Advanced Learner's Dictionary*, 1548.)

133 Farrell arrived at the same conclusion, not by using commonly agreed definitions, but by criticizing earlier works on innovation that state that adaptation is a tactical endeavor and innovation strategic (Farrell, "Military Adaptation in War", 6-7).

Fourth, Farrell's list of manifestations needs augmentation. Strategy, force levels and resources, doctrine, plans and operations, and training show a link with both the discourse on military innovation and military operations. However, it does not take into account several other manifestations, which scholars within the field and military professionals deem to be important. It concerns most notably organizational structures[134], and lessons learned processes.[135] Therefore, the latter two elements are added to the list of manifestations.

Fifth, the list of driving factors needs small augmentation. Farrell's combined list of driving and shaping factors incorporates all causal factors identified within the discourse of military innovation and adaptation, with the exception of leadership. Farrell incorporated leadership within one of the shaping factors, but other scholars regard leadership as a driving factor in its own right.[136] This research paper adopts the latter stance.

Together, a frame of reference can be developed, showing the following manifestations of military innovation and adaptation:

- Military strategy;
- Doctrine;
- Force levels and resources;
- Organizational structures;
- Plans and operations;
- Education, training and lessons learned.

These manifestations potentially are influenced by the following driving factors:

- Technology;
- The operational environment;
- Civil-military relations;
- Alliance politics and domestic politics;
- Cultural norms;
- Leadership.

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134 Rather surprisingly, Farrell's common analytical framework does not mention changing organizational structures as one of the manifestations, although many scholars, including Farrell himself in other publications, identified this element as relevant (Boot, *War Made New*, 9-10, 15-16, and 464, Farrell and Terriff, "Sources", 5 and Farrell, "Military Adaptation in War", passim, Osinga, "Rise of Military Transformation", 33-34, Patterson, "US Army and Nation Building", 35, Rosen, *Winning the Next War*, 21, Russell, "Innovation in War", 596 and 609, Russell, *Innovation, Transformation, and War*, 8, and Shimko, *Iraq Wars*, 7-8 and 11).

135 Downie, *Learning From Conflict*, Farrell, "Military Adaptation in War", 5, Farrell, "Improving in War", Kilcullen, *Counterinsurgency*, 1-5, Williamson Murray. "Military Adaptation in War," (Institute for Defense Analyses, September 18, 2009) http://www.au.af.mil/au/awc/awcgate/dod/ona_murray_adapt_in_war.pdf (accessed January 8, 2013)., 1-16, John A. Nagl. *Learning to Eat Soup with a Knife: Counterinsurgency Lessons From Malaya and Vietnam* (Chicago and London: The University of Chicago Press, 2005), Rosen, *Winning the Next War*, Russell, *Innovation, Transformation, and War*, Serena, *Revolution in Military Adaptation*, Tomes, *US Defense Strategy*, 13, and Ucko, *New Counterinsurgency Era*, 4-5.

136 Farrell covered the dimension in of leadership within the shaping factor of civil-military relations. (Farrell, "Military Adaptation in War", 18). As other authors have noted, leadership aspects are important on other levels as well. Change of leadership, or changing vision of the existing leadership, can be an important driver of innovation and adaptation. Especially Russell pointed at the importance of tactical and operational leadership for "bottom up" innovation, and Farrell did so as well in other publications (Farrell and Terriff, "Sources", 7-8, Farrell and Terriff, "Military Change", 269-270, Farrell, "Military Adaptation in War", 17-18, Russell, "Innovation in War", 619-620, and Russell, *Innovation, Transformation, and War*, 200-209). In literature on military revolutions, leadership is also noted as an important element to implement military change. See for instance: Boot, *War Made New*, 9-10 and 15-16.

What is left is that these driving factors and manifestations need operationalization before they can provide a frame of reference for a specific environment. For instance, the driving factor "operational environment" means something different for an air commander than for a ground commander or a naval commander. Extensive expansion on the different contexts falls beyond the scope of this research paper. However, as with the goal of the research question, this research paper proposes to accompany studies on military innovation and adaptation with operationalization of the research topic.

In sum, the challenge of the convoluted discourse on military innovation and adaptation can be met by making clear choices, and being explicit about it. Farrell offers a helpful frame of reference that potentially can be used for all three identified goals of research on military innovation and adaptation. Farrell also offered a practicable solution for the problem of definition. However, one could not adopt his frame of reference outright. The solution to the question of definition was in need of legitimation. Also, the discourse on military innovation was needed to augment Farrell's frame of reference, as it was not complete. The potential result of that exercise is, however, a frame of reference that might be useful for the thorough and consistent study of military innovation and military adaptation.

Conclusion

The topic of this research paper is military innovation, and the central question is: which frame of reference is suitable for studying military innovation? The first conclusion that is drawn is that the discourse encompassed more forms of change, most notably adaptation. So much so that the discourse arguably deals with military change, rather than only military innovation. The research method was a layered analysis of the discourse on military innovation in which the following subquestions were addressed: how did scholars formulate answers to the four questions relating of formulating frame of reference the study of military innovation? On which topics did they agree? Is that agreement deserved? What was the nature of the disagreements? What could be a solution? The analysis showed that, although the field of research showed noticeable progress, formulating a frame of reference suffers from convolution. Most notably, many challenges were implicit, which needed to be made explicit.

First of the implicit challenges is answer to the question why study of military change is relevant in the first place. With regard to the question as to why study military innovation, the discourse identifies three. The first reason is relating to the heart of scientific research, namely to find generalizable theories to understand and explain phenomena. The second reason is closely related to the first one. Insights on the dynamics on military innovation can be used to increase the military's innovative capacity. Third, insights from the discourse can be used as a frame of reference in order to describe and explain historical events and processes. The problematic element is not that this threefold division exists, but rather that this goal rarely is made explicit. A choice between these options significantly influences the research. For instance, when searching for a generalizable theory the process of innovation might be regarded to be more important than the outcome, while the roles could be reversed when searching for the perfectly innovative military organization. Because the choices are implicit, the goal of the research is submerged, confusing the debate on military innovation.

With regard to the question what is meant by military innovation, the answer is both clear and disturbing: there is no consensus on definition of military innovation and adaptation, and some of the proposed definitions use tenets that semantically are not related to the term innovation. The discourse started on the wrong foot by incorporation of the element of size of change into the proposed definition. This led to unfruitful discussions about the threshold, the point upon which a change was large enough to become innovation. It should have been discarded as an element that simply does not have a relationship with the term innovation. The discourse showed a comparable discussion on a more valid tenet, namely the newness of change. However, discussions on the threshold, the point upon which a change is new enough to become an innovation, were also unfruitful because this threshold can be debated indefinitely. The result is that all scholars were forced to formulate their own definitions, which clarified their stance on these thresholds.

Initially the consensus among scholars on the question how military change manifests itself was more prominent than the lack of it, because scholars frequently proposed additions,

which in itself were not disputed. However, the discourse tended to incorporate ever more observable manifestations that actually change, which created a problem of practical feasibility of the research. The list of manifestations lingered between unworkable comprehensiveness and unrealistic simplification. Due to this situation, many scholars were forced to devote significant attention to developing a frame of reference for their specific research. While scientifically sound, it blurred the discourse on military innovation because many publications attributed different importance to the manifestations.

A somewhat similar situation existed with regard to the fourth question relating to the formulation of a frame of reference, that of which factors drive military innovation. Like with the manifestations, scholars initially added new proposals to the old ones. However, as the discourse unfolded, differences of opinion arose about the relative importance of the driving factors. On the surface, this was not problematic, as scientific differences of opinion could prove a sound foundation for a mature debate. However, it was at this point where the influence of the other problems were felt. Deciding which driving factors are most influential is highly dependent on the goal of the research, the definition of innovation, and identification of manifestations. In addition, scholars increasingly realized that the process and outcome of military innovation might be very context dependent, showing different dynamics in different environments. The net result was an expanding body of literature that seems to address "military innovation", but in fact described and explained only parts of it, and in many different configurations and contexts. This significantly convoluted the debate.

As the problems are identified, it becomes possible to formulate solutions. This research paper argues to make choices with general applicability, and making these choices explicit. It means that the goal of the research should be stated unequivocally. The three identified goals influence the research questions differently, although additional research is required to investigate to which extent. In extremis this could lead to separation of the discourse into three separate branches, one that searches for generalizable theory, one that formulates advise in order to make military organizations more innovative, and finally one that uses military innovation as a frame of reference for description and explanation of historical developments. Of course, these literatures could extensively draw from one another, but as this research paper has shown, it is imperative that the goals are clear. The second choice is to adopt definitions that are in accordance with leading dictionaries. It should be accepted that these definitions contain conceptual thresholds that could be debated indefinitely, so they should not be too strict.

Theo Farrell offered a workable proposal for addressing the third and fourth questions, identification of manifestations and driving factors. In essence, Farrell proposes to adopt a general set of driving factors influencing a general set of manifestations, and leaving conceptual leeway for different processes in different military (operational) contexts. This offers promising prospects, because when these manifestations and drivers influencing them are investigated systematically, general trends, and possibly even generalizable theories, can be induced. This research paper proposes an adapted version of Farrell's framework, in order to complete it. Generally, a distinction can be made between factors that influence the course of military adaptation and innovation (technology, the operational environment, civil-military relations,

alliance politics and domestic politics, cultural norms, and leadership), and aspects of the military metier that are subject to change as a result of adaptive or innovative processes (military strategy, doctrine, force levels and resources, organizational structures, plans and operations, and education, training and lessons learned). By doing so future research is firmly embedded in the literature of military innovation as these elements figure prominently in the discourse. It also has a close relationship with the reality of managing military organizations and military operations, and could serve to focus the attention on both the process and the outcome of military innovation, provided that these goals are made explicit and the driving factors and manifestations are operationalized to their context.

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