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### *Top-Down and Bottom-Up Innovation in Terrorism: The Case of the 9/11 Attacks*

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## **About the Author:**

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## **Abstract:**

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## **Introduction**

Ever since Al Qaeda entered the international stage with a series of spectacular attacks, and especially since the coordinated attacks of September 11, 2001, scholars have frequently employed such adjectives as nimble, agile, adaptive, and innovative to describe the group's properties and highlight the unusually high level of danger it poses to its enemies.<sup>1</sup> In 2011, when the group lost its leader Osama bin Laden and other key operatives such as Ilyas Kashmiri and Fazul Abdullah Muhammad,<sup>2</sup> a number of scholars invoked the above attributes to suggest that even if the death of its leader would weaken Al Qaeda in the longer term, the terrorist threats posed by Al Qaeda's affiliates, associates, and/or unaffiliated adherents—who together with Al Qaeda constitute the global jihad movement—would continue unabatedly.<sup>3</sup>

Al Qaeda's adaptive nature and the processes of innovation guiding this entity are rarely the subject of theoretically informed scrutiny, due to at least two challenges: Al Qaeda's highly complex and dynamic organizational structure, and the general theoretical underdevelopment of the study of terrorist innovation. Consequently, this article attempts to further our understanding of Al Qaeda while advancing the theoretical debate on terrorist innovation. To that end, it will adopt a key framework of analysis used to model the direction of military innovation processes—top-down versus bottom-up approaches—and apply it to a case study of terrorist innovation. Recent work by strategists and military innovation scholars has highlighted the importance of combining the more conventional "top-down" approaches to military innovation with "bottom-up" perspectives. While top-down approaches emphasize the role played by the military or civilian leadership in imposing or directing innovation from above, "bottom up"

approaches stress the role of innovation led by lower- and middle ranked members of an organization, often through improvisation during battlefield operations.

By applying a key framework from military innovation scholarship to terrorist innovation, this article seeks to bridge and contribute to our understanding of two fields of study that, although related, are usually examined by different scholars using different tools. Such cross-pollination, it is argued, can benefit both fields of inquiry, help refine existing assumptions, and formulate new hypotheses.

The framework is applied to a single case study, namely the attacks of September 11, 2001. Several reasons underlie the choice of this methodology and the case selection. As far as the methodology is concerned, the single case study approach allows for the deepest investigation possible given space constraints. Such depth of inquiry is especially critical given the purpose of the article. Naturally, the single case study approach limits our ability to make broader inferences on terrorist innovation in general. The approach does, however, offer an opportunity to formulate new hypotheses on processes of terrorist innovation that can be tested in future studies.

The case of the September 11 attacks has been chosen for a number of reasons. First, as the subsequent discussion will show, terrorism scholars widely agree that the attacks are a paradigmatic case of terrorist innovation. Second, the attacks had profound implications for international relations in general, and for international security in particular. Third, and most importantly, single case study investigations depend upon the availability of large amounts of information about the subject matter of analysis. Although many questions related to the 9/11

attacks remain unanswered, the material available on the origins, planning, and execution of the 9/11 attacks far exceeds our level of acquaintance with the details of most other terrorist attacks, rendering this case study particularly conducive to in-depth analysis of processes of terrorist innovation. The *9/11 Commission Report* in itself is a treasure trove of information, and quite possibly the most detailed account ever produced about a single act of terrorism.<sup>4</sup>

Inquiry on terrorist innovation not only fills a theoretical gap but, given the threat emanating from such actors, is also important from a policy perspective. According to the eminent terrorism scholar Leonard Weinberg, "Innovative terrorist groups seem to be exceptionally dangerous ... [O]rganizations engaged in counter-terrorism might well focus their strongest efforts on disrupting the operations of the most innovative groups."<sup>5</sup> The ongoing threat emanating from the global jihad movement's flagship organization makes Al Qaeda an especially relevant case for analysis, especially from a U.S. policy perspective. As the 2011 National Strategy for Counterterrorism states, "[t]he preeminent security threat to the United States continues to be from al-Qa'ida and its affiliates and adherents."<sup>6</sup> To "defeat al-Qa'ida," President Obama writes in the preface, "we must define with precision and clarity who we are fighting."<sup>7</sup>

The article is structured as follows. The next part will briefly define the concepts of innovation employed by terrorism and military innovation scholars, before it will describe the top-down vs. bottom up models of military innovation. The article will then discuss why 9/11 is a case study of terrorist innovation, albeit not necessarily one of military innovation.<sup>8</sup> Subsequently, the article will dissect the 9/11 attacks for evidence of top-down and bottom-up processes of innovations. The final part concludes with a an analysis of the findings, a discussion of their implication for theory and policy, and suggestions for further research.

## **Terrorist and military innovation**

### *Terrorist Innovation*

The concept of innovation has drawn attention from scholars reflecting a variety of disciplines, from cognitive psychology to communications, economics and business, military and strategic studies, sociology, and beyond.<sup>9</sup> Compared to its treatment in these other disciplines, innovation in terrorism has been a rather neglected field of study.<sup>10</sup> In 2008, for example, Weinberg singled out terrorist innovation along with only one additional topic as an "under-investigated" research area within terrorism studies.<sup>11</sup> Even by 2011, only two book-length studies and a handful of journal articles have tackled the question of terrorist innovation.<sup>12</sup>

Adam Dolnik, author of the sole academic book on terrorist innovation published to date, defines terrorist innovation as the “introduction of a new method or technology or the improvement of an already existing capability... [I]nnovation should... be understood as the use or preparations to use a tactic and/or technology that had not been adopted by any other terrorist organization prior to that moment.”<sup>13</sup>

Most terrorism scholars concerned with innovation argue that innovation in terrorism tends to be evolutionary, rather than revolutionary, in character.<sup>14</sup> This assessment is echoed by military innovation scholars like Theo Farrell, who argues that most military innovation is evolving over an extended period of time, during which organizations seek to "exploit core competencies in refining or modifying existing tactics, techniques, and/or technologies."<sup>15</sup> Revolutionary forms of innovation, on the other hand—those that involve the exploration of "new capacities by

developing new modes and means of operations"—are more rare.<sup>16</sup> As Gary Ackerman notes in a recent review of the innovation literature, "historians have long since discredited the notion that invention and innovation emerge fully formed from flashes of scientific or technical brilliance on the part of lone geniuses."<sup>17</sup> Instead, "[m]uch of the genesis of new technologies and other types of innovation is argued to lie in a combination or synthesis of previous ideas, technologies or practices, often using components borrowed from other domains of activity."<sup>18</sup>

Martha Crenshaw adopts a perspective on terrorist innovation broader than Dolnik's, defining innovation as the "adoption of new patterns of behavior" and distinguishing between strategic, tactical, and organizational innovation.<sup>19</sup> Strategic innovation, she argues, "involves significant points of novelty in the historical development of campaigns of armed resistance, those shifts that change the fundamental pattern of terrorist challenges to political authority."<sup>20</sup> According to Crenshaw, historical examples of such strategic innovation include the Irgun's 'glass-house' strategy against British rule in Palestine,<sup>21</sup> diplomatic kidnappings in Latin America, hijackings in the Middle East, or the adoption of suicide terrorism by Hizballah in the early 1980s. Tactical innovations entail significant shifts in technologies and techniques of terrorism without a concomitant change in objectives, such as mid-air bombings or political assassinations.<sup>22</sup> Organizational innovation involves novel ways of group organization or inventive methods to reach new recruits, e.g., a group's transition from a hierarchical to a networked group structure, or its growing reliance on the internet to recruit new members.

Research on terrorist innovation suggests several key drivers of innovation. The first, ideology, may predetermine the use of modern technologies or "the need to innovate in order to obtain the

capability to match the level of violence associated with the respective ideological and strategic preferences."<sup>23</sup> A second driver may be personal rivalries or competition between geographically co-located groups.<sup>24</sup> Third, innovation may be spurred by problem-solving, particularly in the face of government pressure and/or defensive government reactions;<sup>25</sup> and fourth, groups may benefit from a unique opportunity in the form of a human or material resource, or a target of opportunity. Three additional factors, researchers have argued, further enable innovation or its adoption:<sup>26</sup> first, the central role played by leadership in the planning and implementation phase of terrorist innovation;<sup>27</sup> second, an "expressive fascination with a sophisticated weapon or technology, or the process of innovation itself;"<sup>28</sup> and third, low financial intensity and/or high levels of organizational capital.<sup>29</sup>

Despite some recent efforts to examine additional cases in order to identify trends and patterns of terrorist innovation, innovation in terrorism continues to be an understudied and undertheorized field.<sup>30</sup> To help enlighten the theoretical discussion of terrorist innovation, the next section will review an important theoretical debate from recent studies on military innovation, a related field that has benefited from deeper and more sustained efforts at theoretically grounded analysis than terrorist innovation. Specifically, a growing number of military innovation scholars has called for combining traditional conceptions of military innovation, which are argued to work "from the top-down," with models that emphasize bottom-up directions of military innovation. Such a model, this study argues, can also help advance studies of terrorist innovation.

### *Top-down and Bottom up Approaches to Military Innovation*

In the context of security studies, innovation has largely been the purview of scholars of strategic studies whose writings have addressed questions related to the causes, requirements, nature, processes, diffusion, and outcome of military innovation.<sup>31</sup> Scholars of military innovation emphasize the importance of this topic for both theoretical and practical purposes, from balance of power considerations to defense budgets and national force structures.<sup>32</sup> How states respond to innovations, scholars have shown, can have critical consequences for the course of international politics.<sup>33</sup>

As far as the characteristics of military innovation are concerned, Adam Grissom's recent review of the state of the field has noted that there is a "distinct set of attributes" that, "in effect, constitute[s] a consensus (if tacit) definition of military innovation."<sup>34</sup> A military innovation, accordingly, must exhibit a concomitant change in operational praxis; result in an increase in military effectiveness; and, in order to distinguish it from changes of little consequence, must be "significant in scope and impact."<sup>35</sup> Perhaps to underscore the latter point, most of these scholars emphasize that technological inventions do not by themselves amount to an innovation. Technological innovation is, according to Dima Adamsky, "an important initial condition... [but] a true revolution [in military affairs] depends on confluence of weaponry, concept of operations, organization, and the vision of future war."<sup>36</sup>

One of the most important questions examined by military innovation scholars relates to the drivers of innovation. Grissom identifies four primary schools of thought within military innovation studies, which he labels the civil-military model, the interservice model; the

intraservice model; and the cultural model of military innovations. All of these four models, he states, "operate from the top-down."<sup>37</sup>

Pioneered by Barry Posen, the civil-military model of military innovation highlights the impact of civilian-military dynamics on military innovation. In *The Sources of Military Doctrine*, Posen concludes that political intervention by political leaders, sometimes influenced by 'maverick' senior military officers, is necessary in order for innovation to take place.<sup>38</sup>

The second approach to military innovation, the interservices model, hones down on the relationship between different military services within the state. At its core, Grissom argues, lie resource scarcity and turf battles. This model surmises that military services will compete to develop capabilities if new missions will emerge "in which none of the services have a dominant advantage, or an old mission may be reopened for competition between the services."<sup>39</sup>

The third school of military innovation is the intraservice model. As Stephen Peter Rosen remarked in his seminal work *Winning the Next War*, this school sees "the problem of military innovation [a]s necessarily a problem of bureaucratic innovation."<sup>40</sup> It highlights bureaucratic competition between branches of the same military services and sees innovation taking place as a result of these intrabureaucratic competitions and the intellectual struggle that ensues.<sup>41</sup>

The fourth model of military innovation stresses strategic and organizational culture. Farrell, the key scholar identified with this burgeoning approach, argues that culture fundamentally affects how organizations react to technological and strategic opportunities. Once a particular

organizational or strategic culture is defined as a result of external factors or the influence of senior service leaders, it defines which innovations are favored, and which are neglected.<sup>42</sup>

There are two connecting links between all of these four established schools of military innovation. First, they view organizations as large bureaucracies that are resistant to change, lack flexibility, and are therefore destined to stagnate. Because organizations are not meant to change, military organizations must be “goaded into innovating.”<sup>43</sup> Second, all four models argue that it is senior civilian or military leaders that are doing the goading. As Grissom notes:

“[A]ll the major models of military innovation operate from the top down. The civil-military model argues that senior civilian decision-makers interpret the geopolitical context and impose innovation upon the military services with the help of maverick proxies within the service. The interservice model of military innovation argues that senior service decision-makers, such as the chiefs of staff, determine the best course for the status and health of the service and then induce the service bureaucracy to innovate accordingly. The intraservice model contends that senior service leaders imagine a new ‘theory of victory’ then leverage the internal politics of their service to put the new theory into practice. Finally, the cultural model argues that a set of implicit beliefs exert fundamental (if largely unseen) influence on the direction of military innovation. Senior leaders are the key to setting this culture... According to the major models, therefore, the senior officers and/or civilians are the agents of innovation. They recognize the need for change, formulate a new way of warfare, position their organization to seize the opportunity

of innovation, and bludgeon, politically leverage, or culturally manipulate the organization into compliance.”<sup>44</sup>

While the competing models of top-down innovation have dominated the field of military innovation studies,<sup>45</sup> a growing number of innovation scholars argue that in many cases top-down explanations alone fail to fully capture processes of military innovation. They argue that innovation scholars should pay closer attention to cases of innovation where bottom-up forces have been important, and at times decisive. Bottom-up models of innovation emphasize improvisation at the unit-level, during both times of war and peace, but also highlight processes initiated by medium- and lower ranked strata of the military as opposed to senior military or civilian leaders.<sup>46</sup> Eliot Cohen comes perhaps closest to defining bottom-up change as "resulting from the spontaneous interactions between military people, technology, and particular tactical circumstances."<sup>47</sup>

James Russell, for example, maintains that top-down processes do not explain innovation in the counterinsurgency campaigns in Anbar and Ninewa provinces in Iraq, where innovation happened “without the presence of a scheme of operations imposed from outside organizational hierarchies.”<sup>48</sup> He suggests, instead, that a unit-level, "complex, dialectic process of organically executed innovation unfolded over an extended period in a process led from the field by units engaged with the enemy” and “preceded the formation of the U.S. military's new COIN doctrine by many months.”<sup>49</sup> This process began as “tactical, ad hoc adaptation in which individual leaders reacted to local circumstance by cycling through different ways of employing their units and equipment on the battlefield.”<sup>50</sup> Farrell identifies similar processes in how British brigades

adapted their counterinsurgency campaign (e.g., by adopting population-centric approaches) in Afghanistan's Helmand province starting in 2006.<sup>51</sup>

Bottom-up processes of military innovation are not a new phenomenon, and some noted scholars even argue that they are more widespread than top-down changes.<sup>52</sup> Interestingly, however, despite the many empirical examples of bottom-up models of innovation, the model is underrepresented as far as military innovation theory is concerned. As Farrell put it, "the main debate in the literature is over rival models of top-down (military versus civilian led) innovation."<sup>53</sup> As a result, military innovation scholars have begun to call for growing academic attention to bottom-up models.

The remainder of this article will apply this framework of analysis to a case of terrorist innovation, the attacks of September 11, 2001. It will first examine the innovative nature of the September 11 attacks, concluding that the September 11 attacks fit Dolnik's and Crenshaw's definition of terrorist innovation more neatly than they do traditional definitions of military innovation. It will then examine these attacks for evidence of top-down and bottom-up forms of innovation. The purpose of this procedure is to assess whether the growing recognition by military innovation scholars of the need to consider two-directional processes of innovation also applies to cases of terrorist innovation.

## **Were the 9/11 attacks innovative?**

### *Tactical Innovation*

It is safe to assume that to many who watched the images of the planes' impact on the North and South Towers of the World Trade Center on 9/11, the idea of hijacking an airplane and subsequently crashing it onto a target on the ground seemed novel, but Al Qaeda's seemingly ingenious plan was not entirely without precedent. Dolnik counts no less than 22 occasions between 1973 and 2001 when individuals or organizations entertained ideas to fly aircraft into buildings.<sup>54</sup> In December 1994, for example, an Algerian terror cell associated with the Armed Islamic Group (GIA) hijacked a French plane en route from Algeria to Marseille and intended to crash it into the Eiffel Tower. A year later, Abdul Hakim Murad (aka Ahmed Saeed), an associate of terrorist masterminds Khaled Sheikh Mohammed and Ramzi Youssef, planned on crashing a plane into the CIA headquarters at Langley, Virginia, apparently by hijacking a commercial aircraft.<sup>55</sup>

Of the various schemes to hijack aircraft into buildings, only two appear to have come to fruition. In 1976, a Japanese man wearing a kamikaze headband crashed his Piper Cherokee into the home of a Japanese crime leader, but failed to kill him. In the second instance, in 1994, a depressive and suicidal man, Frank Eugene Corder, attempted to crash a Cessna 150 into the South Lawn of the White House, dying in the process.<sup>56</sup> Unlike the 9/11 attacks, however, neither of these attacks were politically motivated and therefore do not constitute terrorism; instead, they were individual acts of despair.<sup>57</sup> In addition, neither of these two attacks involved multiple hijackings of aircraft. In fact, multiple hijackings had rarely been carried out in the three

decades prior to 9/11 and, according to the *9/11 Commission Report*, never in the United States.<sup>58</sup> In those instances, however, the airplanes were not crashed into buildings<sup>59</sup>—making the 9/11 attacks innovative by Dolnik's definition of terrorist innovation and Crenshaw's definition of tactical innovation because the idea to hijack multiple airliners and crash them into buildings, even if possibly entertained prior to 9/11, had never been successfully implemented prior to that date.

From a tactical and technological standpoint, then, the innovation of the September 11 attacks lies in their being the first successfully executed attacks in which multiple airliners were hijacked and subsequently crashed into buildings. Like most terrorist innovations, this tactical innovation was not revolutionary, but rather evolutionary in character, in that it built on existing technologies, and even synthesized previous innovative terrorist techniques. Specifically, they combined airline hijackings, hostage-taking, suicide attacks, and improvised explosive devices. As Dolnik rightly argues, the 9/11 attacks stand out in the annals of terrorism history because the planners “combined the most beneficial elements that the realm of terror tactics has to offer: the incident consisted of *synchronized* skyjacking achieved by the use of *primitive weaponry* involving a large number of *hostages*, in order to achieve a *stand-off* attack capability via the *suicide delivery* of planes which served as large *explosive* devices.”<sup>60</sup>

### *Strategic Innovation*

The 9/11 attacks, one can argue, were also a strategic terrorist innovation due to their significant scope and impact.<sup>61</sup> In terms of their magnitude of destruction, psychological and economic damage, as well as political impact on the course of international events, the 9/11 attacks are

unprecedented at least in modern history.<sup>62</sup> The attacks killed 2,976 people,<sup>63</sup> destroyed more than 1.07 square miles of office space in New York alone,<sup>64</sup> and ravaged critical financial and governmental infrastructure in New York and Washington, D.C. They caused an estimated financial loss of between \$35-500 billion,<sup>65</sup> shut down the U.S. airspace for three days, and generated numerous cases of post-traumatic stress disorder among the surviving victims and distant observers alike.<sup>66</sup> For a variety of reasons, the 9/11 attacks had an impact that went far beyond the United States.

Targeting the capital of the United States and the self-described "capital of the world," New York, Al Qaeda struck what Thérèse Delpech termed America's "center of gravity."<sup>67</sup> This led to a backlash with major international consequences, provoking U.S. led military campaigns in Afghanistan and Iraq that "shattered the preexisting, prevailing sense of personal, national, and international security," as Charles Kegley remarked.<sup>68</sup>

Part of the tremendous success of the 9/11 operation lay in Al Qaeda's ability to attack the world's mightiest state while garnering the attention of the world's media, thus scoring an immense propaganda victory. This propaganda victory was amplified by the fact that the attacks involved nineteen suicide hijackers. The group was now able to credibly claim to possess highly determined members who were willing, even eager, to pay with their lives to fight the 'enemy of Islam.' The use of suicide terrorism was critical in this regard, for "self-sacrifice," as Stephen Holmes aptly remarked, "has added value as propaganda, conveying important information about the cause that could not be delivered, or delivered so memorably, by a non-suicidal attack."<sup>69</sup>

These suicide hijackers displayed a degree of skill and determination that exceeded any terrorist attack of memory as well as a “level of patience and detailed planning rarely seen among terrorist movements today.”<sup>70</sup> Perhaps most remarkable was the human resolve necessary for the attack to succeed, most importantly the ability of more than a dozen and a half suicide hijackers to maintain the highest degree of commitment imaginable—a commitment to sacrifice their own life—over an extended period of time, and removed from direct observation by their supervisors.<sup>71</sup>

The immense scope of the impact of the September 11 attacks was all the more awesome because it was ingenious in its simplicity and relatively inexpensive when compared to the financial losses they inflicted upon the United States and beyond.<sup>72</sup> The selection of the particular transcontinental flights was probably deliberately designed to ensure that relatively few passengers were on board, minimizing chances of a successful mutiny on board. At the same time, the fact that the flights were transcontinental ensured that the planes carried about 10,000 gallons of aviation fuel that helped turn the aircraft into gigantic improvised explosive devices. Finally, the fact that the hijackers took control of the planes using simplistic weapons, mainly box-cutters,<sup>73</sup> rendered this terrorist attack “fundamentally a low-tech affair,” as Brian Jenkins remarked—one in which “ingenuity rather than technological sophistication enabled the terrorist to enter the domain of mass destruction”<sup>74</sup>

To sum up the above discussion, the 9/11 attacks are an example of evolutionary terrorist innovation at the tactical and possibly the strategic levels, and hence fit the conventional definition of terrorist innovation offered by Dolnik and, at least in part, that offered by

Crenshaw.<sup>75</sup> It is less clear, however, that the 9/11 attacks can be considered an innovation according to the definition used by military innovation scholars. The attacks clearly displayed an increased military effectiveness on the part of Al Qaeda and had implications that were significant in scope and impact, and thus meet two out of three elements of Grissom's composite definition of military innovation. At least to date, however, the attacks have not changed operational praxis, i.e., they have not yet set in motion a new pattern of behavior that changed the overall character of terrorism.<sup>76</sup> One might argue that the 9/11 attacks could have hypothetically established a new pattern of behavior for terrorist organizations, would it not have been for stringent counterterrorism measures put in place to prevent a repeat of this modus operandi; in this case, the 9/11 attacks might be viewed as a case of thwarted military innovation. Other military innovation scholars might object to seeing the 9/11 attacks as an act of innovation altogether, preferring to view this as a case of invention, or perhaps of adaptation of an earlier military innovation, such as suicide attacks.<sup>77</sup> This study acknowledges these potential objections, therefore choosing to label the 9/11 attacks a case of "terrorist innovation," not of military innovation.

The above discussion raises a number of interesting theoretical questions to terrorism and military innovation scholars alike, which are discussed in more detail in the conclusion.

## **Top-down and bottom-up innovation in the 9/11 attacks**

### *Evidence of "Top-Down" Innovation*

To which extent did the 9/11 attacks display characteristics of top-down innovation processes?

The following analysis of some of the drivers of the 9/11 attacks points at several factors emanating from the senior leadership of Al Qaeda that were critical for the attacks to succeed.

They include Al Qaeda's organizational goals; Bin Laden's leadership style and abilities; and the group's twin obsessions with suicide missions and attacks on aircraft.

### Organizational Goals

Al Qaeda's organizational goals, as formulated by its senior leadership, are critical for understanding not only how, but why the group innovated. A closer look at its goals suggests that Al Qaeda's desire to strike the United States on its home turf was so obsessive that it impelled the group to seek out possible ways to achieve this task. Given the immensely difficult mission of dealing a humiliating blow against a seemingly well protected superpower, it likely seemed to Al Qaeda that nothing short of an innovative act of terrorism would help the group achieve this particular objective.

Interestingly, Al Qaeda had not always been focused so intensively on the United States. In its formative years, key members of Al Qaeda had their eyes set on local Arab and Muslim regimes, such as Yemen or Egypt, the so-called "near enemy."<sup>78</sup> The strategic shift that changed the focus from attacks on the near enemy to attacks on the "far enemy," namely the United States and its Western allies, took place in the mid-1990s. To understand Al Qaeda's visceral hatred of the

United States—one that belied its search for innovative ways to punish its enemy—a brief review of Al Qaeda's organizational goals, and of the strategic shift that helped the group chart a U.S.-centric course, is in order.

As an Islamic revivalist program aiming to restore Islam's strength, one of Al Qaeda's central goals has been to defend itself from its perceived enemies, a coalition of what Al Qaeda calls Crusaders, Zionists, and Apostates.<sup>79</sup> Leading the Crusader element of Al Qaeda's declared enemy is the United States, a country seen as primarily responsible for a list of alleged Western infractions against Islam, most importantly the ongoing occupation of Muslim lands. As bin Laden stated, the September 11 attacks occurred after he had witnessed "the iniquity and tyranny of the American-Israeli coalition against our people in Palestine and Lebanon," which gave birth to his "resolve to punish the aggressors" and give America "a taste of what we have tasted and to deter it from killing our children and women."<sup>80</sup>

Al Qaeda leaders have also charged the United States with depriving the Middle East of its riches. In his book *Knights Under the Prophet's Banner*, for instance, Al Qaeda's present leader Ayman al-Zawahiri accuses the United States of invading Afghanistan because of the large quantities of petroleum lying under the Caspian Sea. Similarly, Zawahiri finds unforgivable America's "sin" of supporting Israel, which he describes as "in fact a huge US military base."<sup>81</sup>

Foreign occupation, however, is not the only way in which the West is allegedly attacking Islam. For Al Qaeda, and even for many less violence-prone Islamists, Western countries are involved in a conspiracy to incite non-Muslims against the followers of Muhammad. Underlying

Zawahiri's and bin Laden's opposition to U.S. and Western involvement in Islamic countries is a firm belief that the United States is bent on preventing Islam from playing a dominant role throughout the Middle East and beyond. Zawahiri believes that U.S. policies, its aid of Israel, and its opportunistic and devilish alliance with local Arab regimes are all designed to stem the rise of Islam. In the words of Zawahiri, "The United States, and the global Jewish government that is behind it, have realized that (government by) Islam is the popular demand of the nations of this region, which is considered the heart of the Islamic world. They have realized that it is impossible to compromise on these issues. Hence the United States has decided to dictate its wishes by force, repression, forgery, and misinformation. Finally it has added direct military intervention to all the foregoing methods."<sup>82</sup>

The United States usually tops the list of Al Qaeda's enemies.<sup>83</sup> Its leaders portray America as inhuman and evil and find 'proof' for this in countless U.S. policies, from the firebombing of Tokyo and the nuclear attack on Hiroshima and Nagasaki to its occupation of Iraq and Afghanistan, and its support of Israel and a host of authoritarian Middle Eastern regimes.<sup>84</sup> Al Qaeda is not interested merely in routing the United States out of Muslim lands but wants to defeat the United States entirely, while humiliating it in the process.<sup>85</sup>

Al Qaeda planned on achieving this aim by eroding U.S. military power, spreading its military and intelligence forces thinner and in more costly manners.<sup>86</sup> Bin Laden's contempt for the United States found an expression in his desire to hit the United States where it hurts. He hoped to punish the Americans economically and frequently boasted about his achievements. In an

October 2004 speech, for instance, he bragged that "each of Al-Qaida's dollars defeated one million American dollars, thanks to Allah's grace."<sup>87</sup>

What preceded Al Qaeda's organizational focus of attacking the United States and, to lesser extent, its allies, was a strategic shift of Al Qaeda from targeting the near enemy—nominally Muslim regimes in the greater Middle East—to targeting the far enemy. A number of ideological, strategic, and tactical factors influenced this strategic shift, which was locked in place while the group was based in Sudan during the second half of the 1990s.<sup>88</sup>

Upon Al Qaeda's return to Afghanistan in 1996, the group solidified its transition into a global terrorist organization. A dramatic step occurred on August 8 of that year, when bin Laden declared war on the United States. On February 23, 1998, he issued another declaration signed by the "World Islamic Front against the Crusaders and the Jews." Bin Laden had now openly declared war on the far enemy and announced that the United States would henceforth be hit wherever possible, including on its homeland.

### Bin Laden's Leadership Skills

Throughout the more than two years of preparations for the 9/11 attacks, bin Laden played an important role in the planning of the attacks, even though the attacks were originally devised not by him, but by an independent jihadi entrepreneur, Khaled Sheikh Muhammad (KSM). Bin Laden's input along the way included selecting the operatives for the attack, funding the operation and, perhaps most critically, insisting that the operation go forward despite dissent voiced by several senior members of the group.<sup>89</sup>

Bin Laden seemed quite comfortable making important decisions, and doing so rather speedily. KSM told interrogators that Bin Ladin “could assess new trainees very quickly, in about ten minutes, and that many of the 9/11 hijackers were selected in this manner.”<sup>90</sup> It was with a “remarkable” speed that bin Laden selected the German cell members of the 9/11 attacks, Muhammad Atta, Marwan al-Shehhi, Ziad Jarrah, and Ramzi Binalshibh, with Atta selected as the operational leader of the team. “They had not yet met with KSM when all this occurred,” the *9/11 Commission Report's* authors marveled. “It is clear, then, that Bin Ladin and Atef were very much in charge of the operation...”<sup>91</sup> The report further states that the Al Qaeda leader, with the help of Muhammad Atef, Al Qaeda's operations chief, personally selected all the future muscle hijackers, asking each one to swear bayah, the oath of loyalty, to him.<sup>92</sup>

Another important leadership skill that bin Laden exhibited was pragmatism. Thus, he reduced the original megalomaniacal plan of KSM to hijack ten planes to the more realistic plot eventually executed on 9/11.<sup>93</sup> Bin Laden, according to interrogation reports of KSM, had been worried about the initial plan’s scale and complexity. He also had to weigh these plans against other proposals for terrorist and insurgent strikes that Al Qaeda kept receiving.<sup>94</sup>

Perhaps the clearest indication that bin Laden had leadership qualities conducive to the execution of KSM's plan was his tenacious pursuit of goals despite opposition among his own ranks, and even his Taliban hosts. The 9/11 Commission, for example, cited evidence that Taliban leader Mullah Omar opposed the direct targeting of the United States by al Qaeda. Moreover, by July 2001, as word about the imminent attack had gotten around, divisions emerged among Al Qaeda's senior leadership, with a number of senior members concurring with Mullah Omar's

reservations. Those who reportedly sided with Bin Ladin included Atef and Sulayman Abu Ghayth. The dissenters reportedly included key Al Qaeda figures Abu Hafs [al-Mauritani], Sheikh Saeed al Masri, and Saif al-Adl.<sup>95</sup> According to Vahid Brown, the opposition from these senior leaders to the 9/11 attacks was so severe that they appear to have “broken with the ‘hawkish’ leaders of al-Qa’ida” after the U.S. led invasion of Afghanistan that followed the attacks.” Brown suggests that the dissenting group's move to Iran may have resulted out of this disagreement.<sup>96</sup>

### Al Qaeda's Martyrdom Complex

It is no coincidence that the 9/11 attacks were designed as suicide terrorism, a military innovation in and of itself.<sup>97</sup> Since its founding, Al Qaeda has had a symbiotic, even obsessive relationship with martyrdom and self-sacrifice, the building blocks of suicide missions. By its own admission, Al Qaeda prefers suicide attacks over any other tactic due to a combination of religious-ideological doctrine and operational pragmatism.<sup>98</sup>

According to Al Qaeda's jihadi ideology, Muslims must actively wage jihad (defined in its aggressive form) against all infidels and apostates until an Islamic state can be declared on as large a territory as possible. The Al Qaeda leadership believes that suicide attacks are the best means to pursue this goal because they most clearly manifest the true Muslim's devotion to God. It relies on selected verses from the Quran and the hadith to show that, traditionally, the Quran venerates the martyr,<sup>99</sup> and often recites these verses in key declarations. In August 1996, for example, when bin Laden formally declared war on the United States, he praised the Muslim

youth's "love of death" and offered a number of verses from the Quran and the hadith as justification for the importance of martyrdom.

Al Qaeda's emphasis on suicide missions was reflected in the training it offered to volunteers throughout the 1990s. A document found in an Al Qaeda safe house in Afghanistan titled 'Goals and Objectives of Jihad,' for example, ranked the goal of "attaining martyrdom in the cause of God" second only to "establishing the rule of God on earth." Another document listed two "illegitimate excuses for leaving Jihad as "love of the world" and "hatred of death."<sup>100</sup>

Bin Laden helped spread this veneration of martyrdom into the minds of Al Qaeda's trainees as well as the global potential recruits by releasing videotape and statements on the Internet, thus reaching a much broader audience. In 2004, for instance, bin Laden urged his followers to "become diligent in carrying out martyrdom operations; these operations, praise be to God, have become a great source of terror for the enemy ... These are the most important operations."<sup>101</sup>

Bin Laden's statements also show that the ideological veneration of martyrdom had been accompanied by pragmatic reasons to favor suicide missions, a tactic which Al Qaeda believed would create an extraordinary amount of fear, terror, and confusion among its enemies. As a result, the majority of Al Qaeda's attacks, including its most spectacular acts of terrorism, have been suicide attacks.<sup>102</sup>

Khaled Sheikh Mohammed (KSM), the operational planner of the 9/11 attacks, confirmed the group's fascination with martyrdom operations when he told his interrogators that the most

important quality for any Al Qaeda operative was a willingness to sacrifice himself. He stated that operatives used for a suicide attack were not, for the most part, placed under any pressure to volunteer for such an operation.<sup>103</sup> As was confirmed by another Al Qaeda operative, the willingness to participate in a martyrdom operation was the preeminent criterion in selecting the members of the 9/11 attacks—in addition to “demonstrable patience,” due to the long time lag that could occur between the planning and execution of the attack.<sup>104</sup>

As the above discussion suggests, Al Qaeda's adoption of suicide tactics to carry out humiliating strikes on its arch enemy was all but predetermined. Years before the 9/11 attacks, the group propagated an ideology that venerated martyrdom and suicide attacks as the best way to combine devotion to Allah with painful retribution against the despised enemy.

#### Obsession with Attacks on Airliners

Throughout its lifetime, the Al Qaeda leadership has also displayed a strange fascination with striking the international airline industry. There is no other explanation why Al Qaeda continued, even after the heightened airline security measures introduced in the aftermath of 9/11, to attempt to target aircraft. Shortly after the 9/11 attacks, for example, the group dispatched two operatives, Richard Reid and Saajid Badat, to detonate improvised explosive devices hidden in their shoes aboard airplanes.<sup>105</sup> Less than a year later, in November 2002, an Al Qaeda cell failed in its attempt to shoot down an Israeli charter airliner shortly after take-off from Mombasa using two surface-to-air missiles. In August 2006, more than twenty people, mostly British citizens of Pakistani extraction, were arrested in London on suspicions of plotting to detonate between ten and a dozen airliners over the Atlantic Ocean and American cities using liquid explosives. The

plotter's handler, Rashid Rauf, was known to have worked closely with Al Qaeda.<sup>106</sup> The attempt by Omar Farouk Abdulmutallab to detonate plastic explosives hidden in his underwear during a Northwest Airlines flight from Amsterdam to Detroit on Christmas Day 2009 suggests that Al Qaeda's obsession with the airline industry also afflicted some of its terrorist partners—Abdulmutallab had been dispatched by Al Qaeda's Yemen-based affiliate, Al Qaeda in the Arabian Peninsula.<sup>107</sup>

### *Signs of Bottom-Up Innovation*

The above discussion indicates that top-down factors are imperative for understanding the innovation process in the case of the 9/11 attacks. But the 9/11 attacks also exhibit various signs of bottom-up innovation. Thus, the attacks would have never materialized were it not for the services of Khaled Sheikh Muhammad (KSM), an independent jihadi entrepreneur and, initially, non-member of Al Qaeda who rose "up from the bottom" to present the Al Qaeda leadership with the blueprint for this spectacular terrorist attack.<sup>108</sup>

Significantly, the plan to conduct a "planes operation" was the product of several years of efforts on the part of KSM and his nephew Ramzi Youssef, the mastermind of the 1993 World Trade Center, to detonate multiple aircraft. The evolution of this plot entailed a process of trial and error on the part of KSM and Youssef that is reminiscent of bottom-up innovation processes described in recent works on military innovation.

In an additional sign of apparent bottom-up innovation, then-Al Qaeda leader Osama bin Laden and 9/11 mastermind KSM delegated many aspects of the execution of the 9/11 attacks to the

operational commander Muhammad Atta. Atta was empowered to make important operational decisions, including finding suitable flights, identifying the means by which to physically seize the aircraft, and choosing the final date of the operation.

Bin Laden's willingness to accept proposals for innovative terrorist attacks from jihadi entrepreneurs, and the decision to delegate important aspects of the 9/11 plot to subordinate commanders were manifestations of two philosophies of Al Qaeda. The solicitation of proposals was a manifestation of bin Laden's philosophy regarding Al Qaeda's organizational structure, specifically his decision to structure Al Qaeda like a venture capitalist firm. The decision to delegate authorities was a manifestation of bin Laden's philosophy regarding Al Qaeda's management of terrorist activity, namely to centralize decisionmaking related to terrorist attacks, yet decentralize their execution.

It bears repeating that both of these philosophies were originally devised by the Al Qaeda senior leadership. Thus, the very organizational attributes that promoted bottom-up innovation in the case of the 9/11 attacks resulted out of decisions made from the top-down—a point that will be discussed at greater length in the analysis section at the end of this article.

### Soliciting Proposals for Terrorism

In stark contrast to other terrorist organizations, Al Qaeda is known to have solicited proposals for terrorist attacks from a variety of jihadi entrepreneurs. In doing so, Al Qaeda has internalized modern forms of business management such as a flat organizational structure and flexible strategy, while applying them to a transnational terror organization. As Bruce Hoffman stated,

bin Laden's leadership style was similar to that of a president or CEO of a large multinational corporation. As such, bin Laden's job requirements included issuing strategic guidance by defining specific goals and overseeing their implementation. At the same time, however, bin Laden also "operated as a venture capitalist: soliciting ideas from below, encouraging creative approaches and 'out of the box' thinking, and providing funding to those proposals he thinks promising."<sup>109</sup>

Among the ideas that bin Laden adopted was a version of a plan by KSM, a seasoned terrorist mastermind whom the authors of the *9/11 Commission Report* called "a capable coordinator, having had years to hone his skills and build relationships."<sup>110</sup> During KSM and bin Laden's first meeting in which KSM shared his idea for the 'planes operation', KSM believed that bin Laden could be receptive to the idea because, as he would later state, he believed bin Laden was "in the process of consolidating his new position in Afghanistan while hearing out others' ideas, and had not yet settled on an agenda for future anti-U.S. operations."<sup>111</sup>

One indication for the "bottom-up" nature of this approach is the fact that KSM refused, initially, to become a formal member of Al Qaeda by swearing *bayah* (fealty) to bin Laden. At the time of the meeting to broach the subject of the planes operation, KSM stated, he still desired to protect his independence by retaining the option to work with other jihadist groups. In March or April 1999, Bin Laden eventually informed KSM of Al Qaeda's acceptance of KSM's proposal for the planes operation.<sup>112</sup>

The principal architect of the 9/11 attacks possessed a number of skills that came in handy for his terrorism career, including technical and managerial skills coupled with an ability to generate ideas. Yosri Fouda, an investigative reporter for Al Jazeera who interviewed KSM in 2002, later said that KSM was "very much an operational man, in short. He likes being on top of a certain operation, directing people here and there, thinking of targets and stuff... It doesn't surprise me [that KSM organized 9/11]. It's not exactly bin Laden's territory. He's not very fond of details..."<sup>113</sup>

KSM honed his terrorist skills years before 9/11 in a number of attacks such as car and aircraft bombing, assassinations, hijackings, and poisoning, among others.<sup>114</sup> Following his capture, KSM presented himself as an equal opportunity terrorist of sorts, who sought venture capital and suitable individuals to turn his ideas into practice.<sup>115</sup> Implicit in his statement was that he might have carried out the 9/11 attacks had they been supported by an organization other than Al Qaeda, provided that the organization could have supplied him with money and manpower. While it is difficult to determine if an organization other than Al Qaeda existed that possessed the intentions and capability to sponsor such an attack, what is clear is that Al Qaeda's goals and KSM's ideas were perfectly synergistic, and that the services of KSM were critical for Al Qaeda's overall plans to hurt the United States.

In retrospect, it is clear that Al Qaeda's organizational style is one that fundamentally abetted the adoption of innovative terrorist techniques, including those devised by individuals outside of Al Qaeda's organizational boundaries. Like a flat business in which the managing director encourages members of his staff and of other interested parties to "think outside the box" to

improve business operations, so did Al Qaeda, both in the years before and after 9/11, encourage its members and other interested parties to submit proposals for terrorist attacks.<sup>116</sup> As Fouda stated, "[Bin Laden is] the enigma; he's the chairman of the company, so to speak. He is the symbol of the organization. He would still need people like [KSM] to be advising him on certain operations, and [KSM] would, in turn, need people to execute things."<sup>117</sup>

By expanding the circle of individuals who could run proposals for terrorist attacks beyond formal members of Al Qaeda, bin Laden increased the chances that individuals with a good imagination would sooner or later make an enticing and innovative proposal. Al Qaeda's networked relationships with many jihadist groups and individuals—many of whom had earlier trained in AQ training camps—further increased the pool of individuals interested in shopping around unique terrorist ideas. For that matter, there is a fair amount of support for the hypothesis that networked organizations are—all else being equal—more likely to become terrorist innovators than hierarchical terrorist organizations.

### Trial and Error

KSM's idea for the "planes operation" did not emerge overnight, but was instead the result of plans devised and revised since at least 1993. Thus, KSM claimed that Youssef's 1993 bombing of the World Trade Center taught him that bombs and explosives could be problematic, and that a more novel form of attack was necessary to complete this mission. He said that it was Ramzi Yousef who contemplated using aircraft as weapons while working on the so-called Bojinka plot, an idea to detonate a dozen U.S. airliners in Asia.<sup>118</sup> The Bojinka plot was KSM and Ramzi

Youssef's attempt to execute a spectacular operation six years before 9/11, a "mini-9/11" as Foudra called it. "It failed, but the dream [of KSM] never faded."<sup>119</sup>

According to a report by the Philippine national police who led the original investigation, the Bojinka plot was "the first step in a sustained effort by Mohammed to refine the use of aircraft as weapons of terrorism."<sup>120</sup> Youssef and KSM's plan entailed preparing containers with liquid explosives, which Youssef had already begun mixing in a Manila apartment, and sneaking them onto a dozen planes headed to the United States via Seoul and Hong Kong. The bombs, according to the plan, were to be left in the airliners after the cell members would disembark the airliners at various transit stops.

As part of their preparations for the Bojinka plot, Youssef and KSM detonated a practice bomb at a Manila theater in 1994, and concealed another bomb on board Philippines Airline Flight 434 from Manila to Tokyo on December 11, 1994. The bomb detonated en route to Tokyo, killing a Japanese passenger, although the plane was able to land. The plot was eventually foiled in 1995, after a fire broke out in an apartment used by members of the Bojinka plot cell.<sup>121</sup>

The 9/11 attack was hence a plan that took into account previous successful and failed terrorist attacks, from which KSM was determined to learn the right lessons. It had been a plan developed gradually; one that involved a process of learning and improvisation that brings to mind bottom-up innovation processes described by military innovation scholars.

### Centralization of Decision, Decentralization of Execution

An additional organizational characteristic that paved the way for something akin to bottom-up innovation was the management philosophy that Al Qaeda had adopted with regard to the planning and execution of terrorist attacks. Al Qaeda labeled that philosophy “centralization of decision and decentralization of execution.”<sup>122</sup> According to this principle, bin Laden “decided on the targets, selected the leaders, and provided at least some of the funding. After that, the planning of the operation and the method of attack were left to the men who would have the responsibility of carrying it out.”<sup>123</sup>

What this management style meant for the planning and execution of terrorist attacks was that Al Qaeda’s “worldwide terrorist operations relied heavily on the ideas and work of enterprising and strong-willed field commanders who enjoyed considerable autonomy,”<sup>124</sup> as the *9/11 Commission Report* put it. Both KSM, the mastermind of the 9/11 attacks, and Muhammad Atta, the field commander and lead hijacker, enjoyed such autonomy in carrying out the mission. As the originator of the plot, KSM naturally played an important role in overseeing the execution of the 'planes operation'. Atta was chosen by bin Laden directly to become the tactical commander of the group. Bin Laden met with Atta on several occasions to provide him with instructions, including an initial list of targets.<sup>125</sup> According to KSM, Atta was “the only 9/11 hijacker who knew the entire scope of the operation from the outset,” indicating that information about the 9/11 plan was strictly compartmentalized.<sup>126</sup> His role was to finalize the operational decisions of the attack. He reported to MSK and bin Laden through an intermediate, Ramzi Binalshibh.<sup>127</sup>

The *9/11 Commission Report* reveals that several important aspects of the execution were decided by the field commander, Atta, including those related to the target selection, the exact date for the attack, and the weapons to be used during the attacks. Beginning in the spring of 1999, bin Laden, Atef, and KSM began discussing details of the ‘planes operation’, including potential targets. The original idea for KSM to land the last plane himself and make a media statement was dropped. The initial list of targets then developed by the troika included the White House, the Capitol, the Pentagon, and the World Trade Center.<sup>128</sup> That bin Laden had a particular interest in the planes hitting the White House—and that the final selection of targets was left open at least until about five weeks before the attacks—is evident from communications that took place between Binalshibh and Atta as late as August 3, 2001. In these coded messages, Binalshibh reminded Atta of bin Laden’s desire to hit the official residence of the U.S. president. Atta questioned the feasibility of this target, but told Binalshibh he would look into it. On the same day, Atta also recommended that the attacks take place not before the second week of September, when Congress would reconvene.<sup>129</sup> He passed the final attack date to Binalshibh during the third week of August 2001. Binalshibh claimed that Atta used coded symbols to inform him of the date: two branches, a slash, and a lollipop symbolizing 11/9.<sup>130</sup>

Another operational decision involved selecting the specific pilots for each plane. Atta informed Binalshibh of these plans in a meeting in Spain in the first half of July. The respective 9/11 pilots apparently volunteered for their assigned targets. Atta also informed Binalshibh that contingency plans were made in case a pilot would not be able to hit his target. In that case, the plane was to be crashed; Atta said that his own contingency plan was to crash his plane into the streets of New York.<sup>131</sup>

During their time in Spain, Binalshibh and Atta also discussed plans for how the hijackers would gain control over the planes. Atta reported that during reconnaissance flights, Shehhi, and Jarrah did not have problems carrying box cutters onto the flights. He also reported that since cockpit doors tended to open 10-15 minutes after takeoff, that would be the best time to enter the cockpit. Atta apparently had no contingency plans should the cockpit door have remained locked, other than a rough plan to claim to have a bomb or force his entry by seizing a hostage. Atta also informed Binalshibh during one of their meetings in Spain in the first half of July that he planned on selecting planes scheduled for longer flights “because they would be full of fuel, and that he wanted to hijack Boeing aircraft because he believed them easier to fly than Airbus aircraft, which he understood had an autopilot feature that did not allow them to be crashed into the ground.”<sup>132</sup>

Atta also told Binalshibh during the July meeting in Spain that the muscle hijackers would be divided into teams based on their English-speaking capabilities, so that at least one of them in each plane could provide passengers with commands in English.

The suicide hijackers all underwent a variety of trainings, including physical training, cultural and language training, counterintelligence training, and flight training. Importantly, it was not the senior Al Qaeda leadership that was solely responsible in ensuring that the hijackers were properly trained. Training, instead, was also provided both from the top-down and from the bottom-up.

The original four hijackers selected by bin Laden attended an elite training course in Al Qaeda Mes Aynak camp in Afghanistan in the fall of 1999, which included physical fitness, firearms, close quarters combat, shooting, and night operations. They also received mental training in preparation for the attacks.<sup>133</sup> Following the training at Mes Aynak, several of the initially selected team traveled to Karachi, Pakistan, where KSM took over the training. Over a period of one to two weeks, KSM instructed the team on Western culture and the intricacies of international travel. KSM reported that he trained the recruits basic English words and phrases, how to read phone books, interpret airline timetables, use the Internet, use code words in communications, make travel reservations, and rent an apartment. One of the recruits later reported that they had also received training using flight simulator computer games in order to familiarize themselves with aircraft models and functions and identify security holes. They had also viewed videos that featured hijacking scenes. Another topic of discussion was surveillance of flights. Here, KSM recommended that the team “watch the cabin doors at takeoff and landing, to observe whether the captain went to the lavatory during the flight, and to note whether the flight attendants brought food into the cockpit.”<sup>134</sup>

Among the most important skills that they were taught was to avoid drawing attention to themselves. When they returned to Germany, the German cell members went to great lengths to appear moderate. They distanced themselves from known extremists and changed their appearance and behavior. Atta and Jarrah began wearing Western clothes, shaved their beards, and stopped attending extremist mosques.<sup>135</sup> This form of deception was practiced up to the very day of the attacks. Binalshibh reported that in a July 2001 meeting in Spain, he gave Atta several

expensive looking bracelets and necklaces he had requested in order for the hijackers to appear as “wealthy Saudis.”<sup>136</sup>

As the mastermind of the 9/11 attacks, one of KSM's main tasks was to collect training and information material. Among the items KSM put together were aviation magazines, telephone directories for U.S. cities, airline timetables, and information on flight schools.<sup>137</sup> It appears, though, as if the German cell members were instructed to identify appropriate flight schools themselves. Jarrah decided to take flight lessons in the United States, convinced that the German flight schools were inadequate. Binalshibh learned in his research that flight schools in the United States were relatively inexpensive, and training periods were shorter.<sup>138</sup>

While the hijackers were enrolled in flight schools, they also took a number of cross-country casing flights. They all traveled in first class and picked those types of aircraft that they would eventually steer on September 11, 2001.<sup>139</sup>

## **Analysis**

The above discussion indicates that the 9/11 attacks, an act of terrorist innovation, bore elements of both top-down and bottom-up innovation processes. Moreover, the analysis strongly suggests that the attacks were dependent on the synergistic interplay of these two approaches.

'Top-down' drivers include the leadership qualities of the then-Al Qaeda emir, Osama bin Laden, who approved and funded the operation, selected members of the team, and maintained a

singular focus on carrying out the operation despite mounting objections from fellow Al Qaeda members and the group's Taliban hosts alike. Furthermore, he displayed a level of pragmatism that turned a megalomaniacal vision into a feasible plan.

Top-down elements also included organizational factors such as goals, strategy, and ideology, which help explain why the attack occurred in the United States; why the group selected highly symbolic targets; and why it strove to maximize the killing of civilians using particularly shocking delivery methods. Its obsession with martyrdom operations and with targeting the airline industry pushed Al Qaeda into conducting suicide operations in the course of which four airliners turned into gigantic incendiary devices.

For these reasons, it is hard to overstate the importance of top-down processes in the execution of the 9/11 attacks. This finding, alas, confirms that of other case studies of terrorist innovation that have highlighted the important role played by the leadership in driving the innovation process.<sup>140</sup>

Top-down processes alone, however, fail to tell the full story of how the innovative 9/11 attacks materialized. The above discussion shows that the 9/11 attacks would never have occurred were it not for the ingenious plan of an independent terrorist entrepreneur to devise a sophisticated and highly innovative plot. Over a period of several years KSM, along with his nephew Ramzi Youssef, worked on refining a plan to conduct a major terrorist operation designed to detonate multiple airliners. The pair conducted various trials to improve the technique, even setting off a test device on an airliner, killing a Japanese passenger in the process.

What enabled KSM to approach bin Laden with his proposal for a "planes operation" was Al Qaeda's organizational philosophy, which closely mimicked that of a modern multinational corporation. Bin Laden's decision to structure Al Qaeda like a venture capitalist firm explains why the group sought out innovative proposals by independent terrorist entrepreneurs and rewarded the most promising proposals with financial, material, and organizational support. Hence, the 9/11 attacks were not a mission conceived by the Al Qaeda leadership and subsequently handed over to subordinates to carry out. Instead, the basic idea of the operation was conceived *independently*, over time, by an actor outside of Al Qaeda's formal hierarchy, and *subsequently* adopted by the senior leadership of Al Qaeda. While the basic principle that enabled an outsider to submit a proposal to Al Qaeda —i.e., Al Qaeda's organizational philosophy—was formulated by the top leadership, the innovative attack plan had been developed from the bottom up.

Although the very philosophy that enabled independent entrepreneurs to approach Al Qaeda was devised from the "top down," the case of 9/11 shows clearly that it is also a philosophy whose success is conditional upon individuals approaching Al Qaeda with innovative and feasible proposals. In other words, while Al Qaeda's organizational principle was erected from the "top down," its successful implementation was dependent on innovation from the bottom up.

A similar conclusion can be reached regarding Al Qaeda's philosophy on the management of terrorist activity, "centralization of decision and decentralization of execution." Like Al Qaeda's organizational philosophy, its principle of managing terrorist operations was similarly established in top-down manner. In fact, this principle bears a striking resemblance to what the

German army labels *Auftragstaktik*, or mission-type tactics.<sup>141</sup> This term describes the way in which military commanders clearly specify to their subordinates a particular mission they would like the subordinates to accomplish, while providing them with a high degree of independence in carrying out the order. According to German Army regulations, the military leader "informs what his intention is, sets clear achievable objectives, and provides the required forces and resources. He will only order details regarding execution if measures which serve the same objective have to be harmonized, if political or military constraints require it. He gives latitude to subordinate leaders in the execution of their mission."<sup>142</sup> As such, *Auftragstaktik* is not a bottom-up, but rather a top-down principle, clearly designed to provide military commanders the ability to carry out missions by delegating authority. Based on "mutual trust and requir[ing] each soldier's unwavering commitment to perform his duty,"<sup>143</sup> mission-type tactics are designed to relieve military leaders from the need to micromanage as they fulfill their military duties.

Where the planning and execution of the 9/11 attacks resemble mission-type tactics is in bin Laden's delegation of the execution of the attack to KSM, and particularly in the nomination of Atta to be the field commander. The leadership placed considerable trust in his skills to manage the final stages of the attack and in his commitment to carry out the attack—the precondition of *Auftragstaktik* as described by Bundeswehr regulations. Just as *Auftragstaktik* stipulates, Atta received a general time frame for the attack and was provided the necessary manpower to carry out the attacks, but otherwise enjoyed remarkable leeway in performing the mission to the best of his abilities. The degree of Atta's independence was so considerable that it was up to him to decide on the date of execution. He also felt confident enough to adjust the final target list, even

if it meant overruling bin Laden's preference to strike the White House on the grounds that this was unfeasible.

Given its origination with the senior organizational echelons, “centralization of decision, decentralization of execution” is clearly a 'top-down' principle, but this fact should not detract from the importance of the quality of the execution 'from the bottom.' The successful execution of highly complex missions such as the 9/11 operation is dependent on the selection of highly skilled and capable individuals to carry out the mission. In selecting Muhammad Atta, bin Laden found an individual who possessed the required skills: an orientation for details, an unwavering determination, and a capability for “on the ground” improvisation.

In sum, much like in the case of Al Qaeda’s organizational principle discussed above, Al Qaeda’s philosophy of managing terrorist activity was a doctrine imposed from the “top down.” Its successful execution, however, depended on the ability of highly skilled terrorist operatives who are capable of improvising and, if need be, innovating from the bottom up.

### **Implication and challenges for future research**

What are the implications of the above discussion for the study of military and terrorist innovation and what new research challenges does it raise for these fields?

As far as the study of military innovation is concerned, the first implication is that this research lends support to recent endeavors by military innovation scholars to view processes of

innovation in bidirectional terms. It is worth reemphasizing in this regard that scholars who have called for greater emphasis to be placed on bottom-up innovation acknowledge the ongoing importance of top-down innovation. Few, if any, serious military innovation scholars would argue that top-down innovation processes are irrelevant. What a growing number of innovation scholars bemoan, instead, is the disproportionate focus on top-down approaches to innovation. As Grissom notes, "current models of military innovation, though perhaps still valuable for understanding top-down dynamics, are no longer fully adequate. There is novel evidence to be explained, and a conceptual void to be filled, regarding bottom-up innovation."<sup>144</sup>

The present research has attempted to contribute to filling this void, and in the course of doing so, suggested that some bottom-up innovation processes also drive cases of terrorist innovation. The findings of this article also suggest, however, that apart from the need to fill the void of understanding bottom-up innovation, it is equally important to gain a better understanding of how top-down and bottom-up processes of innovation interact. Are these best understood as two separate, independent processes that eventually converge to produce innovation, or are these approaches interlinked throughout the innovation process? Are bottom-up processes dependent on top-down processes, or perhaps even vice versa? Which of the two processes dominate, and what are the factors that influence the primacy of one or the other direction? Military and strategic analysts will probably wonder how the relative weight of top-down versus bottom-up innovation processes affects military effectiveness. Might there be an equilibrium point at which effectiveness is maximized?

A second set of implications for the study of military innovation relates to the definition of key concepts related to innovation. While military innovation scholars seem to agree on the general parameters of what constitutes an innovation, there seems to be less agreement in the field about how to define an event such as the 9/11 attacks. How should military innovation scholars conceive of such single events of enormous scope and impact brought forth by novel technologies or tactics, but that have not necessarily changed the nature of warfare or produced concomitant organizational changes? Do such events constitute inventions as opposed to innovations? Or should such events be understood as failed or thwarted innovations, or perhaps limited innovations? Do they constitute technological or tactical innovations, and if so, is there a need to distinguish between different types of military innovations? Or are the 9/11 attacks an example of adaptations of previous innovations? These questions suggest that even if scholars largely agree on what constitutes an innovation, they have been less successful in delineating precise analytical distinctions between such terms as military inventions, innovations, or adaptations.

The study also bears a number of implications for the study of terrorist innovation. First, the above discussion suggests that terrorism scholars have not yet produced a widely accepted consensus definition of what constitutes terrorist innovation. The only available definitions to date are uneven, defining terrorist innovation either narrowly in tactical terms, or broadly as encompassing tactics, strategy, and organizational change. A related question is the extent to which terrorist innovation scholars should borrow definitional components from neighboring fields. Should terrorist innovation be defined in accordance with how military scholars define innovation? If so, terrorism scholars would probably agree that there have been only few genuine

terrorist innovations, among them kidnapping, hijackings, or suicide bombings. Or, should terrorism scholars formulate definitions that best fit their own purpose, even if those definitions do not match, and possibly conflict with, those from related areas of study?<sup>145</sup>

Secondly, the study's procedure has obvious limitations inherent in all single case study methodologies. This limitation does not permit wider inferences of the present findings to other case studies of terrorist innovation. Whether the drivers of innovation apparent in the present case are also evident in other cases of terrorist innovation requires cross-case comparative analysis. Unfortunately, to date there is only a limited pool of in-depth case studies of terrorist innovation that interested scholars can draw from. Although terrorism scholars have recently stepped up efforts to investigate cases of terrorist innovation, much more empirical work is required before broader trends and patterns can be identified with greater degrees of confidence.<sup>146</sup> Establishing a deeper empirical basis of instances of terrorist innovation will allow subsequent scholarship to conduct more rigorous testing of hypotheses generated in these case studies.

Third, perhaps one of the most pressing policy-related questions following from this study is how terrorist innovations might spread among various terrorist actors. Terrorism scholars can benefit here from recent research on the diffusion of military power.<sup>147</sup>

This last point confirms the value of interdisciplinary research. In finding support for the co-existence of bottom-up and top-down processes in terrorist innovation, this study shows the wider applicability of a model originally designed to explain processes of military innovation, and by extension confirms the benefits that can be gained through cross-disciplinary inquiry.

Indeed, the applicability of this model may well extend beyond armies and terrorist organizations to other entities using innovation to further their repertoire of political violence, such as rebel or insurgent groups.

The top-down/bottom-up framework of analysis is far from the only analytical model that can be adopted from military innovation studies to advance the scholarship of terrorist innovation. Studies relying on cultural models of military innovations, for example, potentially offer another fruitful avenue for cross-disciplinary research. Cultural models of innovation, which incorporate explanations based on ideational factors, seem to offer a particularly useful lens with which to examine the innovation among groups that employ violence for ideological purposes.<sup>148</sup>

Most scholarship in any given field tends to be insular. Scholars tend to neglect, even ignore, advances in related fields, and terrorism scholars are no exception to this. Research conducted in related fields such as international relations, civil wars, or military strategy has great potential to advance theoretical insights into numerous aspects related to the study of terrorism. It does not substitute for those insights generated from within the field, but it is an important complement.

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<sup>1</sup> Examples abound. Bruce Hoffman, for example, refers to Al Qaeda as a "nimble, flexible, and adaptive entity." See Bruce Hoffman, "Al Qaeda, Trends in Terrorism, and Future Potentialities: An Assessment," *Studies in Conflict and Terrorism* 26.6 (November-December 2003), 435. Daniel Byman refers to Al Qaeda as "unusually innovative." See Daniel L. Byman "Al-Qaeda as an Adversary: Do We Understand Our Enemy?" *World Politics* 56.1 (October 2003), 142. Former CIA officer Bruce Riedel calls Al Qaeda "remarkably adaptive, agile and resilient." Bruce Riedel, "Al Qaeda's Tentacles," *Los Angeles Times*, 14 January 2011.

<sup>2</sup> On May 1, Al Qaeda leader Osama bin Laden was killed in Abbottabad, Pakistan, by a U.S. Navy SEAL team; Ilyas Kashmiri, a senior Al Qaeda operative, was killed by a U.S. drone strike in South Waziristan on 3 June; and Fazul Abdullah Mohammed, the most senior Al Qaeda operative in East Africa, was killed in a shootout with Somali military forces less than a week later. On the importance of the latter two operatives, see for example "Droning On: The Death of Ilyas Kashmiri," *Economist*, 5 June 2011; and Joseph Felter, J. Vahid Brown, Jacob N. Shapiro, and Clinton Watts, eds., "Al-Qa'ida's (Mis)Adventures in the Horn of Africa" (West Point, NY: Combating Terrorism Center, 2007).

<sup>3</sup> See, for example, Philipp Mudd, "The Death of Usama bin Ladin: Threat Implications for the U.S. Homeland," *CTC Sentinel* 4.6 (June 2011), 1-4; Daveed Gartenstein-Ross, "Don't Get Cocky, America: Al Qaeda is Still Deadly

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without Osama bin Laden," *Foreign Policy*, 2 May 2011; and Bill Braniff and Assaf Moghadam, "Towards Global Jihadism: Al-Qaeda's Strategic, Ideological and Structural Adaptations since 9/11," *Perspectives on Terrorism* 5.2 (May 2011), 36-49. The global jihadist movement is defined here as a transnational movement of like-minded militant Islamist actors led by Al-Qaeda. It includes affiliated and associated individuals, networks, and groups affiliated or associated with Al-Qaeda, as well as adherents. The term "affiliated" denotes groups that have formal ties to Al-Qaeda, and have often, though not always, adopted the Al-Qaeda name, e.g., Al-Qaeda in the Arabian Peninsula. The term "associated" refers to entities with more informal ties to Al-Qaeda, i.e., those that are influenced by Al-Qaeda's guiding ideology but that have not sworn fealty (*baya'a*) to the group's leader. It also includes 'adherents,' i.e., individuals who are inspired by the world view propagated by Al-Qaeda, its affiliates, and/or associates.

<sup>4</sup> There are a number of reasons why details of most terrorist attacks are sparse. Perhaps the most obvious reason is that terrorist organizations are conspiratorial in nature, and thus tend to avoid disclosing information that could potentially endanger their existence.

<sup>5</sup> Leonard Weinberg, "Two Neglected Areas of Terrorism Research: Careers after Terrorism and How Terrorists Innovate," *Perspectives on Terrorism* 2.9 (June 2008), 18.

<sup>6</sup> "National Strategy for Counterterrorism," June 2011, 3. Available at [http://www.whitehouse.gov/sites/default/files/counterterrorism\\_strategy.pdf](http://www.whitehouse.gov/sites/default/files/counterterrorism_strategy.pdf).

<sup>7</sup> *Ibid.*, preface [unnumbered].

<sup>8</sup> See the discussion at the end of the next section.

<sup>9</sup> See, for example David H. Feldman, Mihaly Csikszentmihalyi, and Howard Gardner, eds. *Changing the World: A Framework for the Study of Creativity* (Westport, CT: Praeger, 1994); Everett M. Rogers, *Diffusion of Innovations*, 5<sup>th</sup> ed. (New York: Free Press, 2003); Sidney Tarrow, *Power in Movement: Social Movement, Collective Action and Politics* (Cambridge, Mass.: Harvard University Press, 1994); and Donald MacKenzie, *Knowing Machines: Essays on Technical Change* (Cambridge, Mass.: MIT Press, 1998). The literature on innovation is vast and cannot possibly be reviewed here at greater length.

<sup>10</sup> There is, however, a substantial literature available on the relationship between technology and counterterrorism. As a useful starting point, see for example Paul Wilkinson, *Terrorism and Technology* (London: Frank Cass, 1993).

<sup>11</sup> Leonard Weinberg, "Two Neglected Areas of Terrorism Research," 11-18.

<sup>12</sup> To date, the only book devoted exclusively to the subject of terrorist innovation published by an academic press is Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics, and Global Trends* (Oxon, UK: Routledge, 2007). The other book-length treatment is a report of a conference held in 2010 at the Naval Postgraduate School on the topic of terrorist innovation. Maria J. Rasmussen and Mohammed M. Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect: Preconditions, Causes, and Predictive Indicators*, Workshop Report, Defense Threat Reduction Agency (DTRA) Advanced Systems and Concepts Office, Report Number Report Number ASCO 2010-019, 54. Available online at

[http://www.nps.edu/Academics/Centers/CCC/Research/Terrorist\\_WME\\_Spotlight\\_2010-12.html](http://www.nps.edu/Academics/Centers/CCC/Research/Terrorist_WME_Spotlight_2010-12.html). A number of articles published in academic journals discuss terrorist innovation, but not typically as the main subject of attention. See, for example, Chris Quillen, "A Historical Analysis of Mass Casualty Bombers," *Studies in Conflict and Terrorism* 25.5 (2002), 279-92; Brad McAllister, "Al Qaeda and the Innovative Firm: Demythologizing the Network," *Studies in Conflict and Terrorism* 27.4 (July-August 2004), 297-319; and Calvert Jones, "Al-Qaeda's Innovative Improvisers: Learning in a Diffuse Transnational Network," *Cambridge Review of International Affairs* 19.4 (2006), 555-69. Among the few exceptions are Brian A. Jackson, "Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption," *Studies in Conflict and Terrorism* 24.3 (May-June 2001), 183-213; and Michael C. Horowitz, "Nonstate Actors and the Diffusion of Innovations: The Case of Suicide Terrorism," *International Organization* 64.1 (Winter 2010), 33-64.

<sup>13</sup> Dolnik, *Understanding Terrorist Innovation*, 6.

<sup>14</sup> *Ibid.*, 6, 56. According to the Executive Summary of a report on the findings of a recent conference on terrorist innovation in weapons of mass effect, "the expert consensus was that terrorist innovation is often a product of a gradual, incremental synthesis of earlier innovations, rather than a dramatic leap in terrorist tactics and technologies. In Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*, 2.

<sup>15</sup> Farrell, "Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan, 2006-2009," *Journal of Strategic Studies* 33.4 (August 2010), 569.

<sup>16</sup> *Ibid.*, 570.

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- <sup>17</sup> Gary Ackerman, "Understanding Terrorist Innovation through the Broader Innovation Context," in Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*, 54.
- <sup>18</sup> *Ibid.*, 55.
- <sup>19</sup> Martha Crenshaw, "Innovation: Decision Points in the Trajectory of Terrorism," in Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*, 36.
- <sup>20</sup> *Ibid.*, 36.
- <sup>21</sup> Developed by Menachem Begin, the "glass-house" strategy involved spectacular and humiliating attacks by the Irgun against the British rule in Palestine. These attacks would compel the British to choose between protracted low-level repression (and risk make the war unpopular with the British public) and withdrawal. *Ibid.*, 37. See also Bruce Hoffman, *Inside Terrorism*, revised and expanded edition (New York: Columbia University Press, 2006), 46-53.
- <sup>22</sup> Crenshaw acknowledges that the distinction between tactical and strategic innovation is not always apparent. For example, political assassinations can be employed as part of novel strategic goals, in which case tactical and strategic innovations would coincide. Crenshaw, "Innovation," 39-40.
- <sup>23</sup> Dolnik, *Understanding Terrorist Innovation*, 173; Mark Hamm, "Timothy McVeigh and the Oklahoma City Bombing," in Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*, 145-53.
- <sup>24</sup> See Yoram Schweitzer, "Innovation in Terrorist Organizations: The Case of PFLP and its Offshoots," in Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*, 86-98; Crenshaw, "Innovation," 50; Dolnik, *Understanding Terrorist Innovation*, 174.
- <sup>25</sup> *Ibid.*, 174.
- <sup>26</sup> As with the previous four drivers, research has not established yet whether these are necessary or sufficient factors.
- <sup>27</sup> Richard English, "The IRA's Attempted Murder of Prime Minister Margaret Thatcher," in Rasmussen and Hafez, eds., *Terrorist Innovation in Weapons of Mass Effect*, 119-120; Schweitzer, "Innovation in Terrorist Organizations," 96; Crenshaw, "Innovation," 47.
- <sup>28</sup> Dolnik, *Understanding Terrorist Innovation*, 175; Adam Dolnik, "Aum Shinrikyo's Path to Innovation," in Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*, 126-44.
- <sup>29</sup> This combination, Horowitz argues, abets the *adoption* of innovation. Horowitz, "Nonstate Actors and the Diffusion of Innovations"; and Michael C. Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics* (Princeton, NJ: Princeton University Press, 2010).
- <sup>30</sup> Recent work by Michael C. Horowitz is a notable exception.
- <sup>31</sup> Some of the central works in military innovation studies include Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Ithaca and London: Cornell University Press, 1984); Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell University Press, 1991); and Theo G. Farrell and Terry Terriff, eds., *The Sources of Military Change: Culture, Politics, Technology* (Boulder, Colo.: Lynne Rienner, 2002).
- <sup>32</sup> Farrell, "Improving in War," 568.
- <sup>33</sup> See Horowitz, *The Diffusion of Military Power*, 3, 7-8.
- <sup>34</sup> Adam Grissom, "The Future of Military Innovation Studies," *Journal of Strategic Studies* 29.5 (October 2006), 907.
- <sup>35</sup> Grissom, "The Future of Military Innovation Studies," 907.
- <sup>36</sup> Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel* (Stanford, Calif.: Stanford University Press, 2010). On this point, see also Horowitz, *The Diffusion of Military Power*, 5, 34; Max Boot, *War Made New: Technology, Warfare, and the Course of History, 1500 to Today* (New York: Gotham Books, 2006), 10. See also Emily O. Goldman and Leslie C. Eliason, *The Diffusion of Military Technology and Ideas* (Stanford, Calif.: Stanford University Press, 2003); and Jeffrey A. Isaacson, Christopher Layne, and John Arquilla, *Predicting Military Innovation* (Santa Monica, Calif.: RAND, 1999).
- <sup>37</sup> Grissom, "The Future of Military Innovation Studies," 920.
- <sup>38</sup> Posen, *The Sources of Military Doctrine*. According to Grissom, this model of military innovation has found support among scholars studying a variety of military innovations, from Soviet doctrinal development to British and American counterinsurgency campaigns. Grissom, "The Future of Military Innovation Studies," 909-10. Kimberly Marten Zisk, *Engaging the Enemy: Organization Theory and Soviet Military Innovation, 1955-1991* (Princeton, NJ: Princeton University Press, 1993); and Deborah D. Avant, *Political Institutions and Military Change: Lessons from*

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*Peripheral Wars* (Ithaca, NY: Cornell University Press, 1994).

<sup>39</sup> Grissom, 910. Examples of work that falls within this model are Michael H. Armacost, *The Politics of Weapons Innovation: The Thor-Jupiter Controversy* (New York: Columbia University Press, 1969); and Andrew J. Bacevich, *The Pentomic Era: The US Army between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986).

<sup>40</sup> Rosen, *Winning the Next War*, 2.

<sup>41</sup> Ibid. Rosen's model is applied, with variations, by other scholars. See, for example, Suzanne Christine Nielsen, "Preparing for War: The Dynamics of Peacetime Military Reform," Ph.D. dissertation, Harvard University, Department of Government, 2003. For additional applications of this model, see Grissom, "The Future of Military Innovation," 913-16.

<sup>42</sup> See especially Farrell and Terriff, *The Sources of Military Change*; and Theo G. Farrell, "Figuring Out Fighting Organizations: The New Organizational Analysis in Strategic Studies," *Journal of Strategic Studies* 19.1 (Spring 1996), 122-35. For more recent work on the impact of culture on military innovation see Thomas G. Mahnken, *Uncovering Ways of War: U.S. Intelligence and Foreign Military Innovation, 1918-1941* (Ithaca, NY: Cornell University Press, 2002); and Adamsky, *The Culture of Military Innovation*.

<sup>43</sup> Grissom, "The Future of Military Innovation," 919.

<sup>44</sup> Grissom, "The Future of Military Innovation," 920.

<sup>45</sup> See, for example, Eliot A. Cohen, "Change and Transformation in Military Affairs," *Journal of Strategic Studies* 27.3 (September 2004), 400; Farrell, "Improving in War," 569; and James A. Russell, *Innovation, Transformation, and War: Counterinsurgency Operations in Anbar and Ninewa, Iraq, 2005-2007* (Stanford, Calif.: Stanford University Press, 2011), 23.

<sup>46</sup> Grissom, "The Future of Military Innovations," 920-924.

<sup>47</sup> Cohen, "Change and Transformation in Military Affairs," 400.

<sup>48</sup> Russell, *Innovation, Transformation, and War*, 207.

<sup>49</sup> Ibid., 40. See also James A. Russell, "Innovation in War: Counterinsurgency Operations in Anbar and Ninewa Provinces, Iraq, 2005-2007," *Journal of Strategic Studies* 33.4 (August 2010), 595-624.

<sup>50</sup> Ibid., 619.

<sup>51</sup> Farrell, "Improving in War."

<sup>52</sup> Eliot Cohen, for instance, says that "[t]hroughout most of military history, to include the current period, change tends to come more from below. Cohen, "Change and Transformation in Military Affairs," 400. For studies on military innovation where bottom-up processes of innovation crystallize, see for example Michael D. Doubler, *Closing with the Enemy: How GIs Fought the War in Europe, 1944-1945* (Lawrence, Kan.: University Press of Kansas, 1994); and Grissom, "The Future of Military Innovation," 920-24.

<sup>53</sup> Farrell, "Improving in War," 569.

<sup>54</sup> Dolnik, *Understanding Terrorist Innovation*, 39-40.

<sup>55</sup> National Commission on Terrorist Attacks Upon the United States, "The 9/11 Commission Report, 1st ed. (New York: Norton, 2004), 491, fn 33 [henceforth, *9/11 Commission Report*]; see also Yoram Schweitzer and Shaul Shay, *The Globalization of Terror: The Challenge of Al-Qaida and the Response of the International Community* (New Brunswick and London: Transaction Publishers, 2003), 137.

<sup>56</sup> Dolnik, *Understanding Terrorist Innovation*, 38.

<sup>57</sup> Although there is no consensus definition of terrorism, terrorism's inherently political nature is widely acknowledged. See, for example, Bruce Hoffman, *Inside Terrorism*, revised and expanded edition (New York: Columbia University Press), 1-42; and Alex P. Schmid, ed., *The Routledge Handbook of Terrorism Research* (Oxon; New York: Routledge, 2011), 39-98.

<sup>58</sup> The 9/11 Commission Report falsely states that there were no multiple hijackings of aircraft in the three decades prior to 9/11. See *9/11 Commission Report*, 10. In fact, however, Sandinistas hijacked three Venezuelan airliners on December 7, 1981.

<sup>59</sup> Between September 6-9, 1970, the Popular Front for the Liberation of Palestine (PFLP) hijacked a total of four airliners, but did not crash them into buildings. One of the planes was blown up after landing in Cairo, while the other three planes were blown up after being landed in Amman.

<sup>60</sup> Dolnik, *Understanding Terrorist Innovation*, 53. Italics adopted from the original.

<sup>61</sup> Note that change "significant in impact and scope" is also part of the consensus definition of military innovations as per Grissom. Clearly, the question of whether the 9/11 attacks are an example of strategic innovation depends,

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among other things, on how one defines "strategic," but the 9/11 attacks most likely fit Crenshaw's definition in the sense that they constituted a shift "that change[d] the fundamental pattern of terrorist challenges to political authority." See Crenshaw, "Innovation," 36. In that sense, Crenshaw's statement that strategic innovations "may also include Hezbollah's campaign of 'suicide' bombings in Lebanon" does not necessarily contradict the inclusion of a single suicide attack such as 9/11 as strategic innovation. One can of course argue over the extent to which the 9/11 attacks have fundamentally altered the "pattern of terrorist challenges to political authority," but Crenshaw herself seems to think this to be the case with the 9/11 attacks, as she includes the discussion of the 9/11 attacks under the category of "strategic innovation." She justifies this inclusion by stating that "in many ways the 9/11 attacks represented a new way of resolving an old problem for Al Qaida—how to inflict major devastation on the U.S. homeland." *Ibid.*, 38. While she acknowledges that various elements of the attacks were not new, she does admit that "the plot's complexity, length of planning time, number of participants, technical requirements (...), and ability of the conspirators to remain secret for so long in a foreign country without a popular support network were also exceptional and have not been duplicated since." *Ibid.*, 39.

<sup>62</sup> Looking at the number of fatalities, for instance, the number of fatalities in the September 11 attacks (2,976) is unmatched in the last four decades. In the Global Terrorism Database of the University of Maryland, which records terrorist attacks since 1970, the only other terrorist attack listed that claimed the loss of over a thousand lives was the Hutu assault on a church in Gikoro, Rwanda on 13 April 1994 that killed 1,380 Tutsis. Clearly, however, that attack did not match the significance of the 9/11 attacks in terms of physical devastation, financial loss, or political impact.

<sup>63</sup> This number does not include the 19 suicide hijackers. The fatalities include 2,605 people killed in New York, both in the World Trade Center towers and on the ground, 246 people who died on the four hijacked planes, and 125 people who died at the Pentagon.

<sup>64</sup> According to a 2002 report of the NYC State Comptroller's office, 30 million square feet (1.07 square miles) of office space was damaged in New York alone, including 13 million square feet of Class A office space. This figure does not include "other space, such as the Marriott Hotel at 3 World Trade Center, retail stores, or nearby areas that were covered with ash, suffered broken windows, and had to be evacuated to permit repair of the damage." William C. Thompson, Jr., "One Year Later: The Fiscal Impact of 9/11 on New York City," Report of the Comptroller of the City of New York, 2 September 2002, 3-4. Available at <http://comptroller.nyc.gov/bureaus/bud/reports/impact-9-11-year-later.pdf>, accessed 1 August 2011.

<sup>65</sup> The true financial impact of the 9/11 attacks is incalculable. The NYC Comptroller's Office has set the immediate financial impact on New York City alone, in terms of property damage and deaths of individuals in the buildings and on the ground, including those who died in the rescue effort, at \$30.5 billion. Thompson, "One Year Later," 2. The Royal Institute of International Affairs estimated the total financial damage of the 9/11 attacks at \$500 billion. A recent study by the National Center for Risk and Economic Analysis of Terrorist Events (CREATE) estimates that the impact of the September 11 attacks on the U.S. economy ranged from between \$35-109 billion. "News Release: Study Finds Economic Impacts of 9/11 Attacks Less Than Previously Estimated," University of Southern California, 9 July 2009. Available at [http://www.usc.edu/usnews/newsroom/news\\_release.php?id=593](http://www.usc.edu/usnews/newsroom/news_release.php?id=593), last accessed 27 June 2011.

<sup>66</sup> See, for example, Michael W. Otto, Aude Henina, Dina R. Hirshfeld-Beckera, Mark H. Pollacka, Joseph Biedermana and Jerrold F. Rosenbaum., "Posttraumatic Stress Disorder Symptoms Following Media Exposure to Tragic Events: Impact of 9/11 on Children at Risk for Anxiety Disorders," *Journal of Anxiety Disorders* 21.7 (2007), 888-902; George A. Bonanno, Sandro Galea, Angela Bucciarelli, and David Vlahov, "Psychological Resilience After Disaster: New York City in the Aftermath of the September 11th Terrorist Attack," *Psychological Science* 17.3 (March 2006), 181-6; and William E. Schlenger, Juesta M. Caddell, Lori Ebert, B. Kathleen Jordan, Kathryn M. Rourke, David Wilson, Lisa Thalji, J. Michael Dennis, John A. Fairbank, John A. and Richard A. Kulka, "Psychological Reactions to Terrorist Attacks: Findings from the National Study of Americans' Reactions to September 11," *Journal of the American Medical Association* 288.5 (August 2002), 581-8. Recent research, however, has shown that early estimates of the prevalence of PTSD linked to the 9/11 attacks were exaggerated. See Benedict Carey, "Sept. 11 Revealed Psychology's Limits, Review Finds," *New York Times*, 28 July 2011.

<sup>67</sup> Thérèse Delpech, "The Imbalance of Terror," in Gus Martin, ed., *The New Era of Terrorism: Selected Readings* (Thousand Oaks, CA: Sage, 2004), 48.

<sup>68</sup> Charles W. Kegley Jr., "The Characteristics, Causes, and Controls of the New Global Terrorism: An Introduction," in Charles W. Kegley Jr., ed., *The New Global Terrorism: Characteristics, Causes, Controls* (Upper Saddle River, NJ: Prentice Hall, 2003), 1.

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<sup>69</sup> Stephen Holmes, "Al Qaeda, September 11, 2001," in Diego Gambetta, ed., *Making Sense of Suicide Missions* (Oxford, UK: Oxford University Press, 2005), 159.

<sup>70</sup> Bruce Hoffman, "The Emergence of the New Terrorism," in Tan and Ramakrishna, eds., *The New Terrorism: Anatomy, Trends, and Counter-Strategies* (Singapore: Eastern Universities Press, 2002), 32.

<sup>71</sup> There has been some debate over whether all 19 hijackers were aware that the attacks were supposed to be a suicide operation. Although this question has not been answered definitely, the planner of the 9/11 attacks, Khaled Sheikh Muhammad, told investigators that all 19 hijackers knew that this was a martyrdom operation, as will be discussed later.

<sup>72</sup> The 9/11 Commission estimates that the planning and execution of the 9/11 attacks amounted to between \$400,000 and \$500,000. Estimates of the financial losses incurred by the United States were provided earlier. *9/11 Commission Report*, 169.

<sup>73</sup> The hijackers apparently also warned that bombs were present on the planes.

<sup>74</sup> Brian M. Jenkins, "The Organization Men: Anatomy of a Terrorist Attack," in James F. Hoge, Jr., and Gideon Rose, eds., *How Did This Happen? Terrorism and the New War* (New York: Public Affairs, 2001), 4.

<sup>75</sup> It might simply be too early to tell whether the 9/11 attacks were an example of strategic terrorist innovation per Crenshaw's definition. The decade that has passed since the attacks might not be a long enough period to gauge the attacks' historical significance on the one hand, and its influence on the operational praxis of terrorism on the other.

<sup>76</sup> The 9/11 attacks did serve as a model for several small-scale attempts to crash airplanes into buildings, but these attempts hardly changed the nature of warfare. On January 5, 2002, for instance, a high-school student inspired by bin Laden crashed a stolen Cessna 172 into the Bank of America Tower in Tampa, Florida. See, for example, Dana Canedy, "Teenager Who Crashed Plane Praised Terrorists," *New York Times*, 7 February 2002. On February 18, 2010, a man deliberately crashed a Piper airplane into the Internal Revenue Office building of Austin, Texas. See, for example, Michael Brick, "Man Crashes Plane into Texas I.R.S. Office," *New York Times*, 18 February 2010.

<sup>77</sup> See Horowitz, *The Diffusion of Military Power*, 166-207. Horowitz makes a convincing case for why suicide terrorism should be considered an innovation, but he uses definitions from the military innovation literature to that end.

<sup>78</sup> [Identifying reference removed].

<sup>79</sup> Space limitations do not permit a more detailed discussion of Al Qaeda's goals. On Al Qaeda's strategic shift away from a focus on the near enemy towards a focus on the far enemy, see especially Fawaz A. Gerges, *The Far Enemy: Why Jihad Went Global* (Cambridge; New York: Cambridge University Press, 2005). [Identifying reference removed].

<sup>80</sup> "The Full Version of Osama Bin Laden's Speech," MEMRI Special Dispatch Series No. 811 (5 November 2004).

<sup>81</sup> Al-Zawahiri, *Knights under the Prophet's Banner*, part 7. Published by *Al-Sharq al-Awsat* (London, 2001).

<sup>82</sup> Ibid.

<sup>83</sup> There is some degree of disagreement on this issue, for it can also be argued that the "Zionist enemy" tops that list. Brynjar Lia argues that unlike the 'Crusaders' and 'apostates', who have been offered to either accept Al Qaeda's notion of Islam or withdraw from Muslim occupied territory, Israel and the Jews have never been offered any way out of a confrontation with Al Qaeda. Brynjar Lia, "Does al-Qaida Articulate a Consistent Strategy? A Study of al-Qaida Leadership Statements, 2001-2009," Paper presented at the International Studies Association's 50th Annual Convention, New York City, NY, USA, February 15-18, 2009. On the sometimes confusing nature of Al Qaeda's definition of enemies, see also Assaf Moghadam and Brian Fishman, "Introduction: Jihadi 'Endogenous' Problems," in Moghadam and Fishman, eds., *Fault Lines in Global Jihad*, 8-9.

<sup>84</sup> Anonymous [Michael Scheuer], *Through Our Enemies' Eyes: Osama bin Laden, Radical Islam, and the Future of America* (Washington, D.C.: Brassey's, 2003), 46-47.

<sup>85</sup> One way in which Al Qaeda tries to humiliate the United States is by taunting it. In the gleeful words of bin Laden's former aide Mahfuz ibn al-Walid (aka Abu Hafs al-Muritani), "Who could have believed that the 'Capital of the World' and the giant of the New World Order could be turned in a few moments into a frightened, breathless, helpless dwarf!" Quoted in John C.K. Daly and Stephen Ulph. "How and Why: The 9-11 Attacks on America," *Spotlight on Terror* 1, no. 2 (22 December 2003).

<sup>86</sup> Fuad Husayn, *Al-Zarqawi: The Second Generation of Al-Qaida*, part 8. Published in 15 parts by *Al-Quds al-Arabi*. Translated by Foreign Broadcast Information Service, 2005.

<sup>87</sup> "The Full Version of Osama Bin Laden's Speech," MEMRI Special Dispatch Series No. 811 (5 November 2004).

<sup>88</sup> For a discussion of these reasons, see, for example, Gerges, *The Far Enemy*; and [identifying reference removed].

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<sup>89</sup> An oft-cited, but probably less important skill of bin Laden was his experience in construction and engineering, about which bin Laden gloated. In a statement following 9/11, bin Laden said, "I was the most optimistic of them all due to my experience in this field [of construction. I] I was thinking that the fire from the gas in the place would melt the iron structure of the building and collapse the area where the plane hit and all the floors above it only. This is all that we had hoped for." Quoted in Peter L. Bergen, *The Osama bin Laden I Know* (New York: Free Press, 2006), 283. These skills, however, had little to do with the selection of the targets than a desire to hit symbolic institutions within the United States. On bin Laden's desire to include the White House among the targets, see *9/11 Commission Report*, 248.

<sup>90</sup> *Ibid.*, 235.

<sup>91</sup> The reason for the quick selection of the candidates is not only due to Al Qaeda's ability to reach decisions quickly, but also a result of bin Laden and Atef's likely realization that the initial team selected lacked the proper qualifications and skills. *Ibid.*, 166.

<sup>92</sup> After swearing bayah, the future hijackers were sent to KSM to be trained and recorded for their martyrdom video. As al Qaeda's head of the media committee, KSM also oversaw the shooting of these martyrdom videos. *Ibid.*, 235.

<sup>93</sup> KSM's original plan had envisioned the hijacking of a total of ten aircraft, nine of which would crash into targets on both coasts (including those eventually hit on September 11, the CIA and FBI headquarters, nuclear power plants, and the tallest buildings in California and the state of Washington). In addition, KSM himself intended to land the tenth plane on a U.S. airport, kill all adult male passengers on board, and hold a press conference before the assembled media in which he would denounce U.S. support for Israel, Arab governments, and the Philippines.

<sup>94</sup> *9/11 Commission Report*, 154.

<sup>95</sup> *Ibid.*, 251. For a more thorough discussion of these schisms, see J. Vahid Brown, "Cracks in the Foundation: Leadership Schisms in Al-Qa'ida, 1989-2006" (West Point, NY: Combating Terrorism Center, 2006).

<sup>96</sup> Brown, "Cracks in the Foundation," 18. For a more recent discussion of the leadership schisms surrounding the 9/11 attacks, see Camillee Tawil, "The Other Face of Al-Qaeda" (London: Quilliam Foundation, November 2010).

<sup>97</sup> Horowitz, "Nonstate Actors and the Diffusion of Innovations."

<sup>98</sup> [Identifying reference removed].

<sup>99</sup> For example, they cite verse 9:111, which states "Allah hath purchased of the believers their persons and their goods; for theirs (in return) is the garden (of Paradise): they fight in His cause, and slay and are slain." They also cite verse 2:154: "And call not those who are slain in the way of Allah "dead." Nay, they are living, only ye perceive not."

<sup>100</sup> C.J. Chivers and David Rhode, "Turning out Guerrillas and Terrorists to Wage a Holy War," *New York Times*, 18 March 2002, A1.

<sup>101</sup> Quoted in Christopher M. Blanchard, "Al Qaeda: Statements and Evolving Ideology," CRS Report for Congress RL32759 (Washington, D.C.: Congressional Research Service, Library of Congress, 2005), 10.

<sup>102</sup> This is true, for instance, for the attacks against the U.S. embassies in Kenya and Tanzania in August 1998, the attack against the USS Cole in October 2000, and the attack that killed Ahmed Shah Massoud on September 9, 2001. Suicide attacks continued to be the preferred mode of operations for Al Qaeda after September 11, 2001, as was evident from the attacks in Djerba, Tunisia, in April 2002, and the attacks in Kenya of November 2002.

<sup>103</sup> *9/11 Commission Report*, 234.

<sup>104</sup> *Ibid.*, 234.

<sup>105</sup> Badat changed his mind before the attack and never boarded the plane. Reid boarded American Airlines Flight 63 from Paris to Miami on December 22, 2001, but his bombing attempt was thwarted by alert passengers.

<sup>106</sup> Bergen, *The Longest War*, 208.

<sup>107</sup> See, for example, Gregory D. Johnsen, "AQAP in Yemen and the Christmas Day Terrorist Attack," *CTC Sentinel* Special Issue (January 2010), 1-4.

<sup>108</sup> KSM swore the oath of loyalty at a later stage, either in 1999 or 2000.

<sup>109</sup> Bruce Hoffman, "Rethinking Terrorism and Counterterrorism Since 9/11," *Studies in Conflict and Terrorism* 25.5 (September-October 2002), 309.

<sup>110</sup> *9/11 Commission Report*, 150.

<sup>111</sup> *Ibid.*, 149.

<sup>112</sup> *Ibid.*, 154.

<sup>113</sup> Bergen, *The Osama bin Laden I Know*, 303.

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- <sup>114</sup> For more on KSM's background, see *9/11 Commission Report*, 145ff.
- <sup>115</sup> *Ibid.*, 154.
- <sup>116</sup> Al Qaeda's wont of soliciting proposals continued years after the 9/11 attacks. According to a 2008 report cited in *Wired* magazine's *Danger Room* blog, for example, "Senior al-Qaida leaders through a password protected Internet message board periodically ask their loyal readers to send in their best ideas for attacking their enemies." Sharon Weinberger, "Al Qaeda Issues 'Request For Proposals'," *Danger Room*, 6 June 2008. Available online at <http://www.wired.com/dangerroom/2008/06/al-qaeda-issues/>, last accessed 21 August 2011.
- <sup>117</sup> Bergen, *The Osama bin Laden I Know*, 303.
- <sup>118</sup> *9/11 Commission Report.*, 153. There may have also been a parallel effort of 'evolutionary innovation' on the part of the senior Al Qaeda leadership. According to the 9/11 Commission, some reports suggest that in the mid-1990s, Mohammed Atef and bin Laden may have conducted a study on traditional terrorist hijacking tactics and concluded that such tactics did not suit Al Qaeda's needs. While such traditional hijackings were employed in order for the terrorist organization to make specific demands, such a purpose was apparently considered not useful or too difficult to achieve. The study apparently "considered the feasibility of hijacking planes and blowing them up in flight," paralleling the Bojinka concept as well as the bombing of Pan Am Flight 103 over Lockerbie. *9/11 Commission Report*, 153-54.
- <sup>119</sup> Quoted in Bergen, *The Osama bin Laden I Know*, 303.
- <sup>120</sup> Terry McDermott, "Early Scheme to Turn Jets Into Weapons," *Los Angeles Times*, 24 June 2002.
- <sup>121</sup> Raymond Bonner and Benjamin Weiser, "Echoes of Early Design to Use Chemicals to Blow Up Airliners," *New York Times*, 11 August 2006.
- <sup>122</sup> Khalid al-Hammadi, "The Inside Story of al-Qa'ida, Part 4," *Al-Quds al-Arabi*, 22 March 2005.
- <sup>123</sup> Lawrence Wright, *The Looming Tower: Al-Qaeda and the Road to 9/11* (New York: Vintage Books, 2007), 348.
- <sup>124</sup> *9/11 Commission Report*, 145.
- <sup>125</sup> *Ibid.*, 166
- <sup>126</sup> *Ibid.*, 496, FN 92.
- <sup>127</sup> *Ibid.*, 241. Ramzi Binalshibh was a member of the German cell, and had been originally selected to pilot one of the 9/11 planes. After the U.S. government repeatedly rejected his attempts to obtain a visa to the United States, the 9/11 planners were forced to look for another fourth pilot and selected Hani Hanjour, a Saudi national with some flying experience. See *ibid.*, 168, 225-6. Binalshibh described his role in the attacks as "simply a process of interconnecting various cells, establishing a line of contact between these cells and the General Command in Afghanistan as well as following up on work priorities of these cells until all phases of preparation are complete—up to the moment of execution." Quoted in Bergen, *The Osama bin Laden I Know*, 303-4.
- <sup>128</sup> *9/11 Commission Report*, 155
- <sup>129</sup> *Ibid.*, 248.
- <sup>130</sup> *Ibid.*, 249
- <sup>131</sup> *Ibid.*, 244
- <sup>132</sup> *Ibid.*, 245
- <sup>133</sup> *Ibid.*, 157
- <sup>134</sup> *Ibid.*, 157-58.
- <sup>135</sup> *Ibid.*, 167.
- <sup>136</sup> *Ibid.*, 245.
- <sup>137</sup> *Ibid.*, 157.
- <sup>138</sup> *Ibid.*, 168.
- <sup>139</sup> See, for example, *ibid.*, 242
- <sup>140</sup> See, for example, Dolnik, *Understanding Terrorist Innovation*; and the executive summary in Rasmussen and Hafez, eds., *Terrorist Innovation in Weapons of Mass Effect*.
- <sup>141</sup> I thank Dima Adamsky for bringing my attention to this concept.
- <sup>142</sup> Quoted in Major General Werner Widder, "Auftragstaktik and Innere Führung: Trademarks of German Leadership," *Military Review*, September-October 2002, 5-6.
- <sup>143</sup> Widder, "Auftragstaktik and Innere Führung," 5.
- <sup>144</sup> Grissom, "The Future of Military Innovation Studies," 925.
- <sup>145</sup> In the introduction to his book, Dolnik discusses this issue in brief and concludes that terrorist innovation should be defined differently than military innovation. Dolnik, *Understanding Terrorist Innovation*, 6.

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<sup>146</sup> Dolnik's case studies and the recent DTRA-sponsored project on terrorist innovation are very useful starting points. See Dolnik, *Understanding Terrorist Innovation*; and Rasmussen and Hafez, eds., *Terrorist Innovations in Weapons of Mass Effect*.

<sup>147</sup> See especially Horowitz, *The Diffusion of Military Power*.

<sup>148</sup> See especially the work by Theo Farrell and Dima Adamsky.