Thoughts on RMAs and the Rise of the West

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Over the past three decades I have spent much of my time in examining the phenomena of what historians and social scientists are now calling revolutions in military affairs (RMAs). In fact, it has now become clear that RMAs began in the fifteenth century and were to exercise a powerful influence over the rise of the West to a position of dominance over the global commons in the eighteenth century – a factor that continued well into the twentieth century.

What has also become clear is that these RMAs have formed a portion of larger phenomena in the Western World, which have dominated the rise of the West and resulted in fundamental changes in the character of governance and the character of war.[1] I have termed these great alterations in the international playing field, military-social revolutions, each one of which has found itself accompanied by various RMAs over the course of its history, each RMA building and utilizing previous ones, while the military social revolutions have also built on each other.

I have calculated that there are five of these overarching changes in what one can best term the Western way of war. The first began in the fifteenth century and lasted until the end of the eighteenth century and involved the creation of the nation state. It lasted over four centuries before the modern nation state with its disciplined military organizations emerged. Its impact on global history was enormous because it projected military power beyond a single continent across the world's oceans and began the period of European military and political dominance. Within the four military-social revolutions a number of revolutions in military affairs took place, all having major impacts on the character and conduct of war.

The second and third of these great military social revolutions occurred at the end of the eighteenth century and while they had little direct impact on each other on the battlefields of the French and Napoleonic Wars, they had an immense impact on not only the conduct of war, but also on the social and economic framework of European states. The French Revolution created the modern bureaucratic state as well as the fundamental character of politics. At virtually the same time that the French revolutionaries were disturbing the peace of Europe, the British were involved in creating the Industrial Revolution, a revolution that altered the entire mechanisms of human economics. For the first time, energy was available, in increasingly large quantities, that did not depend on wind, water, or muscle power to support human endeavors. At the same time, a number of revolutions in military affairs occurred, all of which supported and buttressed the innovations and adaptations that took place in the conduct of war.

The fourth of the great military-social revolutions first began emerging with the American Civil War, which merged the French and Industrial Revolutions. The two world

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[1] For a more detailed examination of my argument, see Williamson Murray, *America and the Future of War: The Past as Prologue* (Stanford, CA, 2017).

wars of the twentieth century combined those two revolutions with even greater effect. Within the framework of these wars the appearance of the aircraft with its attendant missions appears as the most obvious revolution in military affairs, but in terms of ground warfare the development of combined arms tactics, married with mechanization and motorization, were equally important, although perhaps less obvious.

The final of these military-social revolutions, the fifth, began toward the end of the Second World War and has been picking up speed since then. It has involved a combination of science, information technologies, and communications. At present the globe, not just the West, is in the middle of this military-social revolution, and it is difficult to predict its full implications and where it will end. Nevertheless, it has had and is continuing to have a major impact not just on military organizations, but on civil society as well.

This current military-social revolution has spawned a number of RMAs. The one that this conference is focusing on is the Gulf War of 1991 that so astonished the military pundits after it had quite literally disassembled in a matter of hours what was supposed to be one of the most sophisticated air-defense systems in the world and turned a supposedly battle-hardened armored force into scrap metal in one hundred hours. Yet, however, much we discuss those military operations as an RMA we need to pull back and recognize that they form only one piece of what has been happening since: a whole series of RMAs that have occurred since 1945 – a number of them occurring in the worlds outside of the military.

What is worth noting is that few, if any, of those who participated the RMAs – not to mention the military-social revolutions under which the RMAs developed – had a sense of the larger picture. Instead, even the innovators soldiered on, focusing on the immediate present rather than the long-term implications of their work. Since we too are working under the pressures of another military-social revolution, we need to keep some sense of balance in our understanding of the possibilities that the future may offer. The warning from the past is that any immediate military or technical advantage in the present only represents a wasting asset.

The First Military-Social Revolution

The question that then confronts the historian is why did the first military-social revolution, with its attendant RMAs, occur in the West, especially since they have had such an impact not only on war but on the human condition as well? That is of particular importance because in the year 1500, the Islamic, Hindu, and Chinese civilizations were far ahead of Europe in science, technology, mathematics, medicine, industry, and virtually every category of human civilization. Europe at that point represented a divided, quarrelsome group of states that spent virtually all of their time engaged in wars, characterized more for their murderous, destructive nature rather than their strategic focus.

An extra-terrestrial visitor to earth at that point at the beginning of the sixteenth century would certainly *not* have picked the Europeans as being the most likely of the major global civilizations to dominate the earth within the following four hundred years. Yet, by their very circumstances those quarrelling, fractious states found themselves forced to innovate, adapt, and utilize new approaches to the character of war. And the resulting revolutionary changes led to the Western domination of the world. Those who failed to innovate and adapt fell by the

wayside, Portugal, Spain, and Holland the most notable examples.

There is one interesting footnote that might have made substantial changes to the global future as it existed in 1500. In addition to the fact that the Europeans were ideally situated by their divisions and warlike nature to take full advantage of the appearance of gunpowder weapons, the Japanese were the only other potential nation in a similar position. And in fact, they did create their own military revolutions in the sixteenth century. It is clear that in the ferocious civil wars of the sixteenth century, the Japanese were learning and adapting to the gunpowder RMA as fast as the Europeans. Not only were they putting together effective gunpowder weapons for use in their battles, but the fortresses that the contestants built in the last years of the civil wars possessed similar characteristics to the *trace italianne* that the Europeans were constructing throughout the sixteenth century.[2] Moreover, one might also note that the Japanese of the sixteenth century were every bit as ruthless and merciless as the Europeans of that time.

There were, however, two factors that prevented Japan from continuing on that revolutionary path until the Meiji revolution of 1868. The first was that the end of the sixteenth century saw a political stabilization of Japan that ended the intense military competition of the civil wars. Moreover, the disastrous Imjin War against Korea persuaded Japan's leaders to remove their nation from the intense competition that marked European history by withdrawing from international relations. The second point is that ironically despite the fact that Japan was an island nation, she failed to create the kind of maritime infrastructure that marked industry and trade in the British Isles. Thus, Japan in the Edo period remained isolated from the revolutions in military affairs at sea and on the ground that were occurring in Europe when the Europeans broke in upon her self-contained isolation. Had Japan remained in the competition, I believe she would have eventually dominated East Asia from Siberia to Indonesia.

The Breaking Point

The crucial turning point in altering the character of war came in the fifteenth century with the introduction of gunpowder artillery. In effect, it altered the character of war in fundamental ways that had ever before occurred in history.[3] How and under what circumstances gunpowder was invented remain hidden in the mists of the past. The most likely explanation is that Chinese alchemists uncovered it early in the thirteenth century; its first use appears to have been that it provided entertainment in the form of fireworks.[4] Gunpowder spread to India and then through the Islamic world, ending up in Europe in the early fourteenth century. It was to have the greatest impact on the Europeans for reasons which we will explain later in this paper.

But first we need to examine why the arrival of gunpowder was to prove such a major

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[2] I am indebted to Professor Geoffrey Parker for this point. Email 14 July 2021.

[3] I am using the term 'character' in the same fashion that the United States Marine Corps' basic doctrinal manual *Warfighting* uses it. The character of war represents the tactics, weaponry, and framework of warfare and is always subject to change. The nature of war, the fact that it involves friction, chance, uncertainty is immutable and never changes.

[4] For the appearance of gunpowder and then its transmission to the West, see Thomas F. Arnold, *Renaissance at War* (London, 2001), pp. 24-35; and T. Andrade, *The Gunpowder Age: China, Military Innovation, and the Rise of the West in World History* (Princeton, 2016).

turning point in human history. Until the beginning of the fourteenth century, killing on the battlefield was a matter of human-on-human actions with the result almost entirely determined by the muscle power of individual soldiers. Swords, spears, arrows were the weapons on which armies depended to destroy their opponents. What made the difference between the winners and losers was nearly always a matter of generalship, training, and the tactical framework within which the armies fought. In effect what mattered was the degree to which the opposing sides could stand the horrors and pressures of the battlefield without collapsing in what was little more than a massive abattoir.

Thus, throughout history from the third millennia BC through to 1400 AD we see the re-emergence of tactical formations that depended for their success on similar frameworks and weaponry. The Greek phalanxes that dominated the Aegean world from the seventh through the fourth centuries BC were little different from the Swiss pike formations that emerged in the thirteenth and fourteenth centuries AD.[5] Similarly the triremes that allowed the Athenians to dominate the Aegean in the fifth century BC were not all that different from the galleys that ruled the Mediterranean from the fourteenth through the sixteenth centuries.[6] Simply put, major innovations that altered the character of war were relatively few. The framework of tactics that marked armies was also quite similar from period to period.

There were, of course, improvements in weaponry but for the most part these were on the margin. The appearance of the English long bow in the fourteenth century is a particularly good example because compared to most bows, the long bow possessed extraordinary hitting power.[7] "A 150-pound bow could drive a heavy sixty-gram arrow 320 yards and a lighter arrow 350 yards. The broadhead arrow could break through mail with ease, while a narrow-pointed bodkin shaft could be lethal through plate armor."[8] The long bow was the most effective man-launched killer in history up to that time. With its extraordinary draw string pull, it possessed range, rapidity of fire, and punch.

Yet, it was a cultural weapon that developed idiosyncratically out of the peculiarities of frontier peasant life in Wales and northern England. The use of the longbow depended entirely on the future archers being trained rigorously from their earliest days through to adulthood. In other words, it took a lifetime to develop not only the skills of an English archer, but equally important his muscle and bone structure that enabled him to draw a 150-pound bow. Thus, other societies and cultures could not replicate the long bow, although, not surprisingly, the French tried. The crucial point here is that unlike hand-held gunpowder weapons that began to

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[5]   For the nature of Greek warfare and the phalanx, see particularly Victor Davis Hanson, *The Western Way of War: Infantry Battle in Classical Greece* (Berkley, CA, 1994).

[6]   For Athenian naval power, see John R. Hale, *Lords of the Sea: The Epic Story of the Athenian Navy and the Birth of Democracy* (London, 2009); for galley war in the Mediterranean in the fifteenth and sixteenth centuries, see John F. Guilmartin, *Gunpowder and Galleys: Changing Technology and Mediterranean Warfare at Sea in the 16th Century* (Princeton, 2003).

[7]   For the effectiveness of the long bow as a weapon, see Clifford J. Rogers, "The Efficacy of the English Longbow: A Reply to Kelly DeVries," *War in History*, 1998, 5:2; Clifford J. Rogers, "The Development of the Longbow in Late Medieval England and 'Technological Determinism,'" *Journal of Medieval History*, 2011, 37:3.

[8]   Clifford J. Rogers, "The Battle of Agincourt," in L. J. Andrew Villalon and Donald J. Kagy, eds., *The Hundred Years War,* vol. 2, *Different Vistas* (Liden, 2008), p. 44.

appear in the sixteenth century, the long bow could not be copied by others. Once, the cultural framework of Wales and northern England altered in the sixteenth century, the resultant society was no longer capable of developing such skilled archers.[9]

The tactical advantage that the longbow provided the English allowed their warrior kings to enjoy a series of brilliant victories for much of the Hundred Years' War. By Henry V's death in 1422, the English had managed to drive the French out of northern France and created a situation where his son and heir seemed poised to unite the two kingdoms. But it was not to be, because it was at this point that gunpowder weapons intervened to alter the strategic balance back in favor of the French. And it is here that we can point to a fundamental break in how armies, and eventually navies, waged war.

Whatever the problems of the new cannons – and there were many, including their propensity to explode – the Europeans poured great efforts into attempting to improve the explosive power and lethality of their cannons. What was crucial about gunpowder was that its weapons provided a significant path for innovation and improvements in lethality and range. Above all, gunpowder weapons encouraged technological innovation in the design of cannons and the composition of gunpowder itself.[10] Over the period from the early fourteenth century to 1425, gunpowder artillery developed rapidly, so that "gunners of each new generation worked with weapons quite different from those their fathers employed."[11] In other words what made gunpowder fired weapons the first revolution in military affairs was the fact that they could be adapted and improved, which has been the case right up to the present.

The first significant indication of how extensive gunpowder weapons were going to have on the character of war came with the campaigns of the French monarchy to take back the territory that the English had gained under Henry V. Here artillery was the key component. It allowed the French to attack the English defensive system, which rested on control of the castles scattered throughout the Norman and Gascon countryside. In the fourteenth century for the French to retake each castle in English hands would have required a siege lasting many months, but now French artillery was able to destroy medieval castle walls and force the garrison to surrender in a matter of a few days. In a matter of a little more than a decade, the French had driven the English out of their country and brought an end to the Hundred Years' War.

At almost the same time, the Ottoman Turks, largely reliant on European technology, were able to batter the walls of Constantinople and bring an end to the Byzantine Empire in

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[9]   Before the discovery and recovery of Henry VIII's flagship, the *Mary Rose,* in the the 1970s and 1980s, historians had argued a great deal about the supposed lethality of the longbow. To 1970, only one long bow had been recovered from the moat of an English castle, which appeared to possess a draw pull of over 100 pounds, but most historians dismissed that possibility. However, the *Mary Rose* yielded up 138 longbows, with the average draw pulls of well over 100 pounds and with some ranging upwards of 180 pounds. Rogers, "Military Revolutions of the Hundred Years' War," 82n38.

[10] Initially it was not necessarily the tactical effectiveness of gunpowder weapons that drew their attention to the Europeans but their explosive discharge. The attractiveness of the V-2 rocket for Hitler and his German advisers was not the weapons effectiveness (accuracy, the CEP – circular error of probability – was approximately southeast London) but the spectacular display it made as it lifted off its launching pad.

[11] Clifford J. Rogers, "Gunpowder Artillery in Europe, 1326-1500: Innovation and Impact," in Robert S. Ehlers Jr., Sarah K. Douglas, and Daniel P. M. Curzon, eds., *Technology, Violence, and War* (Boston, 2019), p. 40.

1453. The gradual collapse of the Eastern Roman Empire forced Europe to turn increasingly inwards away from the Mediterranean. The fall of Constantinople was to prove quite useful to the Europeans, because it would bring a substantial number of Roman and Greek military texts to Europe, where they would exercise considerable influence on how the Europeans thought about war.

The Response

By the end of the fifteenth century gunpowder artillery had exploded on the European approach to war. Combined with that was the influence that the Roman approach to war was having on how Europeans thought about war. The greatest of all European political thinkers, Niccoló Machiavelli turned to the Romans as a guide for how the Europeans needed to act both militarily and politically.[12] Here the Romans were of particular importance, because they demanded an entirely different approach to the organization and training of military formations. As the historian of the Roman Jewish War noted about the Roman Army: "Their battle drills are no different from the real thing; every man works as hard at his daily training as if he were on active service…. It would not be far from the truth to call their drills bloodless battles, their battles bloody drills."[13] The Roman example would eventually lead to the new formations on disciplined infantry that began appearing in the early seventeenth century.

Machiavelli was so impressed by the impact of French artillery in the fighting in Italy at the end of the fifteenth century that he commented: "No wall exists, however thick, that artillery cannot destroy [it] in a few days."[14] But the Italian political theorist was wrong. In the decades immediately following 1500, Europe's armies were able to come up with a defensive response. The answer to the increasing power of gunpowder artillery was fortifications which were lower in height and extended in depth by stone or earth works, so that they could absorb great numbers of artillery shots.

Initial efforts to counteract artillery involved great towers built of masonry, but not only did such efforts possess serious defects, but they were also prohibitively expensive. The cheaper response for fortresses under siege was to pile up masonry, dirt, and the other detritus caused by the enemy's artillery bombardment in front of or behind the older walls. Behind that sheltering wall, the defenders were less exposed to the effects of artillery fire.[15]

In 1515 the quadrilateral, angled, bastion fortress first appeared in Italy to defend the papal port of Civitavecchia. It was to provide the model for an increasing number of fortresses throughout Europe. By providing depth in its walls and flanking fire at virtually all points, it reversed the advantage that gunpowder artillery had enjoyed against Medieval fortresses. In effect that response represented the second RMA. The *trace italienne*, as such fortifications soon became known, provided the defense of fortresses and important population centers a

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[12]   See particularly Nicolló Machiavelli, *The Art of War,* trans. by Neal Wood (Cambridge, MA, 1965).

[13]   Josephus, *The Jewish War,* trans. by G. A. Williamson (London, 1954), pp. 194-195.

[14]   Quoted in Geoffrey Parker, *The Military Revolution and the Rise of the West, 1500-1800* (Cambridge, 1988), p. 10.

[15]   For a clear description of the development of the new system to counteract the impact of artillery bombardment, see Arnold, *Renaissance at War*, pp. 35-47.

significant advantage against artillery for the next two centuries. Moreover, the development of a defensive response to cannons underlined that the character of European war would not remain static but would demand new responses and innovations in the technology and tactics of war.

By the 1530s the *trace italienne* had spread across the Alps. In the Low Countries, between 1529 and 1572 "some forty-three kilometers of modern defenses had been built...: four citadels, twelve entirely new circuits of walls, and eighteen substantially new circuits." The fact the Spanish would be constructing fortifications based on the model of the *trace italienne* to defend Havana on the island of Cuba in the 1580s on the other side of the Atlantic Ocean underlines how fast the competition among the European military forced innovation and change on those in the competition.[16]

These two revolutions had a huge impact on the character of war in the West. First, they added immensely to the cost of war. The only method of seizing a major fortress now lay in the total blockade by "armies of unprecedented size."[17] Besieging armies ranged upwards of 40,000 soldiers, in addition to significant forces required to protect the besieged against the threat of relieving armies. Moreover, sieges required sustained logistical support over significant periods, which added to the cost of wars. To meet the altered tactical environment, armies had to grow dramatically in size.

The fact that war was occurring throughout Europe virtually every year added to the pressures to innovate and adapt. Over the period from 1500 to 1700 one sees the emergence of the modern state. Accompanying that state was the emergence of the modern military organization as we have come to know. There was a symbiotic relationship here. For example, the major tactical changes with the creation of disciplined, trained units, responsive to their officers both on and off the battlefield, required the creation of regiments that served the king full-time required the creation of state bureaucracies that could impose the taxes and build the infrastructure that could keep soldiers employed and under control over the course of the entire year.

Along the path of two centuries, a whole series of additional RMAs occurred to the gunpowder and fortification revolutions. Among these numbered the tactical revolution sparked by the innovations and reforms of Maurice of Orange, Gustavus Adolphus, and the French officers working for Louis XIV.[18] All of these revolutions in military affairs contributed to the changes in the character of war, while also having a considerable impact on the nation-states which continued along the path of intense competition.

The new style armies required training over the course of the entire year. Thus, the

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[16]   The fact that the Spanish were fortifying Havana in the 1580s underlines that another revolution in military affairs was occurring on the worlds' oceans. Beginning at the end of the fifteenth century the Europeans, led by the Portuguese and the Spanish, had created ships that were able to project their military power for the first time in history on a global scale.

[17]   Geoffrey Parker, *Emperor: A New Life of Charles V* (New Haven, CT, 2018), p. 509.

[18]   The brilliant lecture by Michael Roberts on the military reforms and innovations of Gustavus Adolphus in Belfast 1956 provided the spark that began the debates and discussions about revolutions in military affairs. Michael Roberts, "The Military Revolution, 1560-1660," Lecture at Queens University, Belfast 1956.

state now had to step in and finance soldiers and their officers on a far more consistent and effective basis. By 1700 armies of mercenaries had disappeared to be replaced by professional armies directly responsive to the monarch. The very size of professional armies now required fundamental changes in the state: the creation of effective systems of taxation, modern bureaucratic organizations, and systems of supply that were reliable. The initial instigator of these changes had been the gunpowder revolution that had sparked the *trace italliene* RMA in fortress construction, followed by a constant series of innovations and changes in the character of war. Those revolutions had also altered the character of the European state and its ability to support the new model armies and navies.

By the late eighteenth century, the nature of the European states and their competitiveness appeared to be settling down. But in fact, Europe did not settle down. The second and third military-social revolutions began and fundamentally altered the landscape of war and society in fundamental ways. The first of these great military social revolutions was the French Revolution, which overthrew the centuries-old Bourbon monarchy in France and then fought a series of wars over the next quarter century. In 1793, faced with what appeared to be an overwhelming military coalition, the revolutionaries in Paris announced a *levée en masse*, which in effect mobilized the entire French population and its resources to defend the newly created Republic against the foreign invaders.

Within a year, the French had put an army of three-quarters of a million troops in the field, an unheard-of number. The great Prussian theorist, Carl von Clausewitz put the results in the following terms: "in 1793 a force appeared that beggared all imagination. Suddenly war again became the business of the people – a people of thirty millions, all of whom considered themselves to be citizens…. The people became a participant in war; instead of governments and armies as heretofore, the full weight of the nation was thrown into the balance. The recourses and efforts now available for use surpassed all conventional limits; nothing now impeded the vigor with which war could be waged, and consequently the opponents of France now faced the utmost peril."[19]

At the same time that the French Revolution was occurring, an equally important military-social revolution was taking place across the English Channel, namely the Industrial Revolution. The use of coal and steam provided the power that drove vast increases in the productivity of nascent British factories to produce higher quality goods at lower cost by an order of magnitude. For the first time mankind was able to create energy that did not depend on water, wind, or muscle power. Over the period, despite the cost and impact of the unceasing wars against the French, the British economy grew impressively.

During the quarter century of the French Revolutionary and Napoleonic Wars, the two revolutions did not combine, but the enormous economic and financial power that the Industrial Revolution provided the British allowed the island kingdom to supply much of the weaponry and financial aid that allowed the European allies to keep the great armies in the field that finally broke Napoleon's hold on continental Europe in the great campaigns of 1813. Napoleon is

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[19] Carl von Clausewitz, *On War*, ed. and trans. by Michael Howard and Peter Paret (Princeton, NJ, 1975), pp. 591-592.

reputed to have said that "God is on the side of big battalions." He might have added that "God is also on the side with the greatest resources."

The fourth great military-social revolution began to emerge during the American Civil War when the two contestants were able to merge the French and Industrial revolutions. That combination allowed the Union to mobilize its greater industrial resources and overwhelm the Confederate in a sustained war of attrition. Contributing to the Northern victory were two revolutions in military affairs: the communications revolution with the telegraph and the transportation revolution, which with the steamboat and railroad allowed the Union to project military power over continental distances.

The fourth military-social revolution emerged with even greater virulence during the two world wars. It was the marriage between the Industrial and French revolutions which allowed the participants to mobilize so much of their manpower and resources that explains the length and human cost of those two terrible conflicts. At their end the fifth military-social revolution began to emerge. The explosion of the atomic bombs over Hiroshima and Nagasaki were the most obvious harbingers of the combination of science, technology, and electronics that would pick up speed over the course of the Cold War. But there were other indicators as well: the increasing sophistication of radar, the impressive improvement in aircraft, and the use of mathematics and cryptology to break the high level codes of the Axis powers by the Anglo-Americans.

The Implications of the Past

The historian is then left for what the past means for the future. In a sense, the explosion of atomic bombs over Japan's cities represented a Godsend. The warning of the terrible impact of nuclear weapons was there, and undoubtedly prevented the two, ideologically opposed superpowers from launching World War III which might well have ended human civilization. Ironically the arms race that ensued, particularly the missile race, created a race to produce ever smaller microprocessors.[20] By the early 1980s the Americans were achieving technological breakthroughs that allowed the creation of stealth aircraft, cruise missiles and other missiles of unheard-of accuracies, and communication systems of which the Soviets could only dream.

It is worth noting that the RMA of precision, stealth, and GPS of the Gulf War of 1991 came as a great surprise to most in the American military. Only the Soviets seem to have possessed some sense of the implications that the major developments of capabilities in the American military would have on present and future battlefields. In 1984, Marshal Nikolai V. Ogarkov, chief of the Soviet general staff, characterized the advances in non-nuclear technology, in which he included the development of "automated reconnaissance-and-strike complexes (the 'Assault Breaker')," in terms of long-range and precision guided munitions, and electronic control systems. Such emerging capabilities "make it possible to sharply increase (by at least an order of magnitude) the destructive potential of conventional weapons, bringing them closer,

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[20] The efforts to break into Soviet cyphers also played a role in this with America's National Security Agency funding IBM and other computer manufacturers at a very high level to create computers capable of achieving thec results that the British had achieved against the German Enigma system.

so to speak, to weapons of mass destruction in terms of their effectiveness."[21] The significant point here is that the American military with few exception – one of them an obscure lieutenant colonel named Dave Deptula – had almost entirely missed the potential of an RMA until quite literally it smacked them in the face.

But there is an even greater failure here. In retrospect the RMA that occurred during the Gulf War was only one road mark in the massive pattern and change that was occurring in the aftermath of the Second World War. The result in the post-Gulf War period was an over-emphasis on the potential of technological change and innovation and too little a focus on the fact that in human conflict the enemy gets a vote. For all the new and impressive capabilities that the American military have brought to the table since 1991, those improvements were not sufficient to prevent its opponents from achieving significant damage to U.S. forces in Iraq from 2003 to 2008 and outlasting the Americans in Afghanistan. Moreover, the Gulf War RMA was only a signal to the vast changes that were in the offing, not only in the military, but particularly in the civilian world.

In the larger sense I would argue that we have missed the implications of the fifth military-social revolution that began with full utilization of science and technology by the Anglo-American powers in the last two years of the Second World War. Beginning in 1943 one saw the emergence of computers, nuclear weapons, highly sophisticated radar technology, and cryptology as more than simply coding. That beginning has been picking up speed ever since. Thus, the RMA of 1991 was quite simply one more sign point on the road on which the world and its military have been traveling and will continue well into the future.

At present, we are living in the middle of the fifth military-social revolution. The current capabilities of America and her allies have improved by an order of magnitude over the capabilities that were available to those who fought in the Gulf War of 1991. Where it will lead, no one can predict because the future is unknowable. But one thing is certain. Change is occurring both within and outside our military organizations at an increasingly fast pace. The implications are considerable, but I will leave it to others to examine.

The first military-social revolution carries with it the warning that no one at the time recognized its appearance until the modern state and its attendant military appeared in 1700. The warning to us is whether we will ride the wave with some sense of the complexities that are involved in successful adaptation and innovation or whether we will allow ourselves to be swamped by the wave. One might note in concluding that Spain and Japan failed to innovate and adapt to the changes and demands that the first military-social brought in its train in the seventeenth century. And both would pay a significant price: Spain and its military to obscurity as a third-rate power; Japan to a desperate effort to catch up to the developed world beginning with the Meiji revolution.

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[21] Quoted by Barry Watts and Williamson Murray, "Military Innovation in Peacetime," in Williamson Murray and Allan R. Millett, eds., *Military Innovation in Peacetime* (Cambridge, 1996), pp. 376-377.