The role of science and technology in driving nuclear weapons modernization: a reappraisal

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The following is the text of a talk delivered at an NGO side event organized by the International Network of Engineers and Scientists for Global Responsibility on the role of science and technology factors driving nuclear weapons modernization, during the 2013 Preparatory Committee meetings for the Nuclear Nonproliferation Treaty Review Conference, Geneva, Switzerland, April 23, 2013.

Budget documents released this month show that the United States plans to deploy a new, stealthy nuclear cruise missile on B52's, B2 stealth bombers, and eventually on a strategic bomber now in the early stages of development. This will add significant new military capabilities to US aircraft, not least because the stealthy B2 will for the first time carry a nuclear cruise missile. Kristensen noted that Russia, China, France, and Pakistan all are developing new air launched nuclear cruise missiles. In his words,

> "These are only a fraction of the nuclear modernizations underway in all the nuclear weapons states. All hold speeches about ending nuclear arms competition, reducing the numbers and role of nuclear weapons, and pursuing a world free of nuclear weapons, yet all continue to do what they have always done: building and deploying new nuclear weapons."[1]

Talking about the science and technology factors driving nuclear weapons modernization and high tech militarism may be looking at things backwards. Nuclear technology establishments and the military industrial complexes are among the most powerful institutions in the societies where they are present. They now are self-sustaining, possessing ample means to prevail against largely weak and scattered efforts to rein in their power. Their power is extended by alliances with other institutions with similar organizational forms and values, which share a general interest in sustaining the current order of things. Building, maintaining, and modernizing nuclear weapons and other high-tech weapons is what they do, and what they will continue to do, until some set of social forces emerges with the power to stop them.

We are now half the duration of the Cold War past the end of the Cold War. Describing institutions as powerful and still-vital as high-tech military industrial complexes and nuclear establishments as inexplicable Cold War survivals tells us little about a present moment that poses its own dangers. Yet the portrayal of nuclear weapons as Cold War anachronisms remains a dominant theme in disarmament discourse. It might perhaps be argued that narratives of this kind make good advocacy tropes, but they generate little in the way of useful analysis.

In many ways we are in a new world, one that is hardening into a pattern of deepening inequality and of long-term economic stagnation in significant portions of the globe. These conditions are exacerbated by the challenges of extracting increasingly marginal reserves of key resources and by local and general ecological decline. All of this generates intensifying competition among the clusters of organizations that constitute the top stratum in a sharply divided global economy and society. The danger of war among nuclear-armed great powers, while perhaps not immediate, appears once again on the rise. Yet all of this remains on the margins of a single issue disarmament discourse focused narrowly on the weapons, their

effects, and the diplomatic venues where negotiations drag endlessly on with little trace of good faith to be found.

Rather than disappearing after the Cold War, nuclear establishments and military-industrial complexes sustaining permanent mobilization for war on a massive scale have shown new life in the first decade of the 21st century. Although marked by the circumstances of their emergence, they must be understood as integral features of the current order of things. Nuclear weapons establishments and high-tech military industrial complexes wield significant economic and political power in themselves, but also enjoy broad support from political and economic elites in the nation-states where they exist. Labeling nuclear weapons as "useless"—another common trope in disarmament discourse- may make a good advocacy theme, but it too does little to advance analysis of why they are still here. When such powerful institutions and technologies persist despite changed conditions that bring their purposes into question, the proper question to ask is who finds them useful, and why. Only then can we begin to think systematically about how we might eliminate them.

The roots of the nuclear dilemma run deep. Technology has been shaped by the central role war making has played throughout the development of modernity. The historian Charles Tilly wrote that from the beginning of the development of the kind of nation-states that have come to dominate the planet,

> "Power holders' pursuit of war involved them willy-nilly in the extraction of resources for war making from the populations over which they had control and in the promotion of capital accumulation by those who could help them borrow and buy. War making, extraction, and capital accumulation interacted to shape European state making."[2]

As Tilly put it, "War makes states…"[3] And war making has played a leading role in the kinds of science and technology that the victors have chosen—the kinds of science and technology that have survived and prospered up to now.

The World Wars of the 20th century constituted leaps forward in technology and social organization in the most powerful states. The world was profoundly changed by World War II and the permanent state of war engendered by the interaction of the political changes it wrought and the technologies and institutions it spawned. The Bomb is only a leading instance of the direction and magnitude of technological change, and military industrial complexes only examples of the power and social character of the kind of organizations that have come to dominate the modern world.

The urban historian and social critic Lewis Mumford likened this process to the construction of an immense machine, comprised not only of technology but of the organizations that create it.

> "Under the stress of war," Mumford wrote, "the missing component of the megamachine…. was finally unlocked and utilized: 'Bombs of cosmic violence.' The very organization that made this possible itself enlarged all the dimensions of the megamachine and increased, by an incalculable factor, its capacity to work wholesale destruction."[4]

"…[It] was the success of this project," said Mumford, "that gave scientists a central place in the new power complex and resulted eventually in the invention of many other instruments that have rounded out and universalized the system of control first established to meet only the exigencies of war."[5]

But really there is not a single megamachine—but rather many contending megamachines. What unites them are commonalities of organizational form and ways of acting in the world. We live in a world dominated by immense organizations that treat the world around them, both natural and social, instrumentally-- as a series of objects to be controlled to the maximum extent possible in order to achieve their goals. To this end, they deploy what Mumford described as a "peculiarly limited type of knowledge, deliberately sterilized of other human values and purposes."

These organizations extract a privileged wealth stream for their upper echelon inhabitants from the rest of an increasingly globalized economy, using particular combinations of technology, ideology, and organizational technique. Forming alliances across the boundary between the private sector and the state is one of the most common organizational techniques, giving rise to constellations of power of which military industrial complexes are only a leading example.

It is well established that technologies are not chosen solely because they "work" better in some way to the organization of the physical world, for example in terms of their thermodynamic efficiency, or even because they reduce costs in narrow economic terms. They are chosen because they work well in combination with other aspects of modern large organization techniques to gain and sustain wealth and power for those in the upper echelons of the immense organizations that dominate every aspect of global economic and political life today.

There is a considerable literature on the ways in which technology choice is driven by considerations of control of the workplace and the workforce, and by market considerations such as pursuit of patent monopolies. [6] But when thinking about nuclear and military-industrial complexes, it is useful to think about technology choice in relation to other elements of organizational strategy such as ideological opportunities and alliance formation.

Nuclear technology and high tech weapons are both elements in and help to sustain a dominant global circulation of trade and investment devoted to the production of goods and services that only a fraction of the world's population can afford to buy.

Large organizations provide services and buy and sell mainly to each other or to "consumers" who are the upper-echelon inhabitants of those same organizations, the scientists and engineers, technocrats and bureaucrats, lawyers, managers, and propagandists and even skilled production workers necessary for the operation of large, complex technologies and organizations. Together these upper level employees constitute perhaps a tenth or so of the world's population, and also the high-consuming end of the global "middle class." This dynamic pushes much of the world's population towards the margin, with production of export crops and resource extraction driving hundreds of millions off the land into burgeoning urban slums. Yet development efforts continue to center on centralized energy and transportation infrastructure designed to serve global supply chains for up-market consumer goods, with urban areas world-wide competing to stay or become stable nodes in

the top-tier economy. In this kind of world, weapons and military services will be a growth industry.

High tech weapons and nuclear weapons in particular provide an effective strategy for sectors of national elites and of the professional and managerial classes to carve out a secure place for themselves in an increasingly insular top tier economy. They provide privileged access to their own country's resources, capital largely without competition in capital markets, and a development context that can be shielded from foreign competition. The powerful tools of nationalism and of fears of foreign "others"—easily inflated with sophisticated propaganda techniques-- facilitate the extraction of wealth from the rest of society. National security secrecy prevents scrutiny of national nuclear enterprises that whether in first generation nuclear powers or post-colonial states have been rife with technical problems, corruption, and widespread, intractable environmental impacts. Nuclear technology, with its vision of near-magical, limitless power (an image its purveyors energetically promote), casts a positive aura over other big, centralized high-tech development programs that are profitable for elites, but have little or even negative value for much of the population in an ever more stratified world.[7]

Perhaps the most consequential fact for an individual's economic fate in this kind of world is whether one has a relatively stable, long-term place within one of the very large organizations that constitute the increasingly insular top-tier economy. And for large organizations, the minimum requisite for a secure place in that top-tier economy is a strategy that allows them to minimize competition to the degree of extracting rent-like returns from the rest of society. This now is acknowledged even in the economic mainstream. Nobel prize winning economist Joseph Stiglitz writes that

> "we have a political system that gives inordinate power to those at the top, and they have used that power not only to limit the extent of redistribution but also to shape the rules of the game in their favor, and to extract from the public what can only be called large 'gifts.' Economists have a name for these activities: they call them rent seeking…."[8]

The reigning standard for what constitutes a good investment has become the capacity to extract these kinds of returns. Organizations that have constructed specific strategies over long periods which enable them to do so are unlikely to abandon them easily. High tech armaments industries, including nuclear weapons establishments, are a case in point.

This affects various strategies often pursued by disarmament campaigners, for example advocacy of converting particular arms research and manufacturing facilities and industries to civilian uses. There are practical difficulties in converting many kinds of military research and manufacturing facilities—a topic that would require a separate discussion. But the most important factor, I think, is that the organizations of the military-industrial complex have rent-seeking strategies dependent on combinations of technology, ideology, and organizational technique that are not easily redirected to other pursuits-- particularly in regard to the relationship between ideology and technologies. They will be reluctant to leave the favorable position they have created for themselves in order to compete for capital and customers with other powerful constellations of organizations.

This is relevant not only in regard to the inclinations of investors and top managers in nuclear and military industries, but for professional and managerial workers and skilled production workers who have fairly secure positions. One recent study found that in the U.S., aerospace and military industry workers make about $80,000 per year, compared to a U.S.

average annual wage of $44,000.[9] On the same note, the research of two leading analysts of the economic impacts of U.S. military spending, Robert Pollin and Heidi Garrett Peltier, is frequently cited by peace and disarmament advocates because it shows that military spending produces fewer jobs per dollar than other possible expenditures of public funds, such as spending on education, health care, clean energy, or even tax cuts that lead to increased spending on personal consumption. Few on the peace and disarmament side of things, however, comment on the fact that their research also shows that military spending generates jobs that on average pay significantly more than these categories of civilian employment, and also generates a larger percentage of high paying jobs.[10]

The argument that military spending creates fewer jobs than other uses of public money makes good advocacy. But ignoring the larger picture short-circuits analysis of who are likely to be adversaries and allies, how committed the institutions of the military-industrial complex are likely to be to the status quo, and the amount and nature of the economic and political power they can deploy to defend to dominant order of things and their place in it. Those holding secure positions in military-industrial complexes are unlikely to see alternatives that provide them with a comparably privileged path forward. Their ideological strategies and their economic power provide them with ample means for defending their place in the status quo, particularly in a society like the United States where money translates seamlessly to political power. Finally, shifting elements of the top-tier economy from one enterprise line to another does little or nothing to democratize either the economy or political systems, leaving in place underlying dynamics of competition and repression driving the demand for military and internal security technologies and services. Efforts to convert particular facilities and industries of the military industrial complex, consequently, are unlikely to be effective in more than a marginal way. In countries where military industrial and nuclear complexes play a significant role, more sweeping conversion of the economy as a whole likely will be necessary to wind down high tech militarism.

In 1967 Martin Luther King said,

> "A nation that will keep people in slavery for 244 years will thingify them—make them things. Therefore they will exploit them, and poor people generally, economically. And a nation that will exploit economically will have foreign investments and everything else, and will have to use its military to protect them. All of these problems are tied together."[11]

And as Lewis Mumford pointed out about the same time, nuclear weapons are the ultimate example of a way of life in which everything in the natural and social worlds is "thingified," treated as objects to be manipulated and controlled for the ends of power and profit. It is this same way of thinking and organizing our social lives that drives the endless rush to mine every last resource and burn fossil fuels down to the last ounce, regardless of the consequences.

The modernity we have constructed has gone a long way down a dead end path, and has gone farther still in the half century or so since King and Mumford wrote those words. Our task, I think, is to figure out what role work for disarmament and against high tech militarism can play in the larger project of finding a new course towards a global society that is far more fair, democratic, and ecologically sustainable. I don't know how far down that new road disarmament might come, but I believe that it is the only way to get there. And I also believe that path holds the most hope for reducing the likelihood of catastrophic conflict along the way.

[1] Hans Kristensen, "B-2 Stealth Bomber To Carry New Nuclear Cruise Missile," FAS Strategic Security Blog, April 22, 2013. http://blogs.fas.org/security/2013/04/b-2bomber/

[2] Charles Tilly, "War Making and State Making as Organized Crime," in *Bringing the State Back In*, edited by Peter Evans, Dietrich Rueschemeyer, and Theda Skocpol (Cambridge: Cambridge University Press, 1985), 172.

[3] Charles Tilly, "War Making and State Making as Organized Crime," in *Bringing the State Back In*, edited by Peter Evans, Dietrich Rueschemeyer, and Theda Skocpol (Cambridge: Cambridge University Press, 1985), 169–191, 170.

[4] Lewis Mumford, *The Pentagon of Power* (New York: Harcourt Brace Javonovich, 1970) p.252

[5] Lewis Mumford, *The Pentagon of Power* (New York: Harcourt Brace Javonovich, 1970) p.255.

[6] See, e.g. Capitalism as Power, 233-235; see also, e.g., Harry Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* (New York: 1974, Monthly Review Press; David Noble, *America By Design: Science, Technology, and the Rise of Corporate Capitalism* (New York: 1979, Alfred A. Knopf); and Noble, *The Forces of Production: A Social History of Industrial Automation:* Beverly Silver, *Forces of Labor: Workers Movements and Globalization since 1870* (Cambridge: 2003, Cambridge University Press).

[7] For an extended version of this argument, including the strategies and alliances broader pursued by the nuclear industry in the context of the campaign for the recent U.S.-India nuclear deal, see Andrew Lichterman and M.V. Ramana, "The U.S. India Nuclear Deal: Violating Norms, Terminating Futures," in Ray Acheson, ed., *Beyond Arms Control: Challenges and Choices for Disarmament* (New York 2010: Reaching Critical Will Project of the Womens' International League for Peace and Freedom), pp.58-70, also available at http://www.reachingcriticalwill.org/resources/books/BAC/chapter5.pdf

[8] Joseph E. Stiglitz, *The Price of Inequality: How Today's Divided Society Endangers Our Future* (New York: W.W. Norton, 2012), pp.31-32.

[9] Deloitte Development LLC, " The Aerospace and Defense Industry in the U.S. — A financial and economic impact study," March 2012, p.15.

[10] Robert Pollin and Heidi Garrett-Peltier, "The U.S.Employment Effects Of Military and Domestic Spending Priorities," Political Economy Research Institute, University of Massachusetts, Amherst, December 2011 p.6.

[11] Reverend Martin Luther King, Jr., The Southern Christian Leadership Conference Presidential Address, August 16, 1967