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The Future of War¹

by

Mark David Mandeles

[Virgilio Ilari, ed., *Future Wars: Storia della dystopia militaire* (Milano: Società Italiana di Storia Militaire, 2016)]

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All writing about «the future of war» is speculative, as is theorizing about causes of war.² Yet, there are striking examples of powerful diagnoses, analyses, and predictions about circumstances, causes, conduct, and outcomes of war. This essay will examine little noticed organizational factors affecting diagnoses and analyses of the future of war.

During the late nineteenth-century, many military officers assessed and wrote about impacts of new weapons on tactics. In 1890, for example, U.S. Army captain, E. L. Zalinski, argued that «the increased destructiveness of war appliances»—flat-trajectory shoulder-fired rifles, smokeless powder, and artillery enabled by railroad transport, telegraphic communication, photographic reconnaissance and balloon observation—would shorten the duration of war and provide decisive battlefield outcomes. Zalinski argued that such new technologies and weapons would not, as he put it, render

¹ I dedicate this essay to the memory of the brilliant and kind Dr. John F. «Joe» Guilmartin, Jr. (Col., USAF), whose life work is an enduring example of the idea: «Historically, the force which thinks best fights best. The required exchange of ideas is invariably painful and difficult, but the internal intellectual battle which it entails must be won if we are to survive.» «Changing the Guard,» *Air University Review*, Vol. 34 (1983).

² Pitirim A. Sorokin, «A Neglected Factor of War,» *American Sociological Review*, Vol. 3, No. 4 (August 1938), pp. 475–486.

«war impossible.» Rather, success would depend on the «most careful study and preparation to meet the complex character of all combinations of contingencies in future warfare.»³

Less than ten years later, Jean de Bloch derived entirely different implications and predictions in his 3,000-page, six-volume, comprehensive, multi-level systems analysis of warfare.⁴ In an interview with pacifist W. T. Stead, Bloch summarized the thesis of *The Future of War* about warfare in nineteenth-century industrialized Europe: the future of warfare will be «not fighting, but famine, not the slaying of men, but the bankruptcy of nations and the break-up of the whole social organization.» Bloch urged diplomats and national leaders to recognize the catastrophic social, economic, and political consequences of war and to seek negotiation and arbitration of disputes.⁵ The conclusion of The Great War (later renamed World War I) saw the terrible manifestation of Bloch's predictions realized about the war's conduct, costs, and social, economic, and political outcomes.

Contemporary discussions about the future of war also focus on potential weapons and emerging technologies in «conventional» wars, and in other forms of conflict such as information warfare, cyber warfare, insurgencies, and state-sponsored covert and proxy wars.⁶ The term, «Fourth Generation

³ E. L. Zalinski, «The Future of Warfare.» *North American Review*, Vol. 151, No. 409 (December 1890), pp. 688–700.

⁴ Mark D. Mandeles, «Military Technology, Tactics and Operations, and Social Change: The Continued Relevance of Bloch's Approach,» paper presented to the Hague Appeal for Peace 1999 Conference, The Hague, Netherlands, 11–15 May 1999.

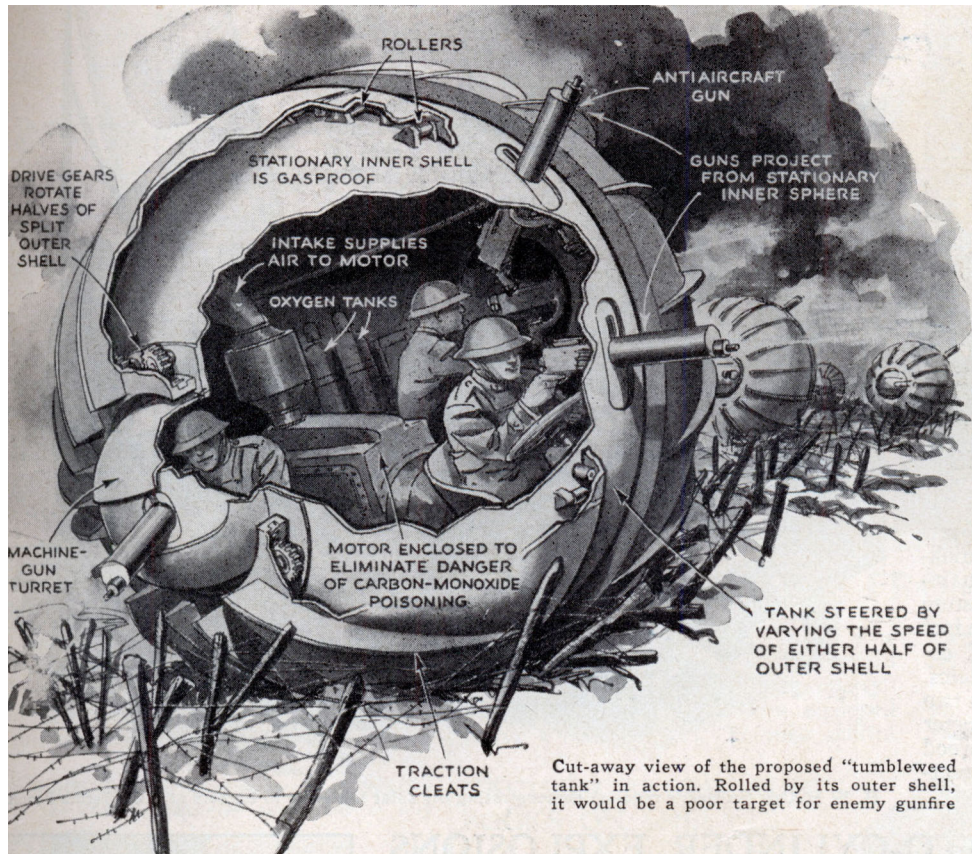
⁵ I. S. Bloch, *The Future of War in its Technical, Economic and Political Relations*, Ginn & Company, Boston, 1902, pp. xvi–xvii; Jean de Bloch, «The Transvaal War: Its Lessons in Regard to Militarism and Army Reorganization. I» *Journal of the Royal United Service Institute* Vol. 45 (November 1901), p. 1316; Jean de Bloch, *The Work of the Peace Societies: How to Widen Their Programme*, The «Observer» Works, Chatham, 1901.

⁶ David E. Johnson, *Military Capabilities for Hybrid War: Insights from the Israel Defense Forces in Lebanon and Gaza*, OP-285-A, RAND Corporation, Santa Monica, CA, 2010, <http://www.rand.org/pubs/occasionalpapers/OP285.html>, accessed 6 January 2016; Timothy M. Bonds, Michael Johnson, and Paul S. Steinberg, *Limiting Regret: Building the Army We Will Need*, RR-1320-RC, RAND Corporation, Santa Monica, CA, 2015,

War,» refers to opponents with worldviews different from the West's and to advanced forms of insurgency in which members of terror cells stage spectacular attacks and access globally-linked social, economic, political, and technological systems to inform and influence enemy populations and governments that opposing the insurgency is infeasible or too costly. Insurgent theoreticians of war and forces waging Fourth Generation War do not distinguish between conditions of war and peace, or follow international laws of armed conflict; all personnel are "combatants," including children.⁷

http://www.rand.org/pubs/research_reports/RR1320.html, accessed 7 January 2016.

⁷ Albert A. Nofi, *Recent Trends in Thinking About Warfare*, Center for Naval Analyses, Alexandria, VA, 2006.



The application of advances in the natural sciences and engineering to development of war-fighting technology is ongoing in many technologically developed nations, although information is most readily available about U.S. activities than, for example, about developments in the People's Republic of China (PRC) or Russia. A quick internet search for such information reveals that the U.S. Navy is developing solid-state lasers, hypervelocity projectiles, and the electromagnetic railgun to improve the ability of surface ships to counter enemy missiles. Successful development and deployment of any one of these weapons would significantly alter the defensive-offensive correlation of maritime forces; successful development

of more than one of these potential weapons would have an even greater impact.⁸ Nanotechnology, artificial intelligence, robotics, and genetic engineering are influencing new weapons designs, and are the basis for the U.S. Department of Defense initiative, «the third offset strategy,» to counter rapid progress in weapons development and military modernization of Russia and the PRC, and to deter their aggression.⁹

The third-offset strategy includes autonomous «deep learning» machines and systems to improve early warning of events, human-machine collaboration for decision-making, assisted-human technologies that can make people operate more effectively, semi-autonomous weapons, and human-teaming with unmanned systems.¹⁰ Technologies developed and weapons built under the third-offset strategy would enhance the operation of «precision-strike regimes» composed of precision-guided weapons, advanced sensors, computers, and communications, and organizational structures, processes, and procedures to enable targeting, coordination of forces, and damage assessment.¹¹

⁸ Ronald O'Rourke, «Navy Lasers, Railgun, and Hypervelocity Projectile: Background and Issues for Congress,» R44175, Congressional Research Service, Washington, D.C. (18 March 2016), p. 2.

⁹ Bob Work, «The Third U.S. Offset Strategy and its Implications for Partners and Allies,» 28 January 2015, as delivered by Deputy Secretary of Defense Bob Work, Willard Hotel, Washington, D.C., <http://www.defense.gov/News/Speeches/Speech-View/Article/606641/the-third-us-offset-strategy-and-its-implications-for-partners-and-allies>, accessed 24 February 2016; Ashton Carter, «Remarks Previewing the FY 2017 Defense Budget,» 2 February 2016, as delivered by Secretary of Defense Ash Carter, Washington D.C., <http://www.defense.gov/News/Speeches/Speech-View/Article/648466/remarks-previewing-the-fy-2017-defense-budget>, accessed 24 February 2016.

¹⁰ Colin Clark and Sydney J. Freedberg Jr., «Robot Boats, Smart Guns & Super B-52s: Carter's Strategic Capabilities Office,» *Breaking Defense* (5 February 2016), <http://breakingdefense.com/2016/02/carters-strategic-capabilities-office-arsenal-plane-missile-defense-gun/>, accessed 24 February 2016; Aaron Mehta, «Work Outlines Key Steps in Third Offset Tech Development,» *Defense News* (14 December 2015), <http://www.defensenews.com/story/defense/innovation/2015/12/14/work-third-offset-tech-development-pentagon-russia/77283732/>, accessed 24 February 2016.

¹¹ Barry D. Watts, *The Evolution of Precision Strike*, CSBA, Washington, D.C., 2013.

These advanced technologies promise qualitative improvements in military operational capabilities. However, the future of warfare is not simply about sophisticated application of scientific and engineering research. Attention limited to emerging technologies and development of new weapons obscures factors that have played a decisive role in adoption, deployment, and employment of qualitative advances in war—the organizational, social, political, cultural, historic, and economic context within which weapons are developed and ways of fighting occur.¹² The remaining portion of this essay will address (1) normative organizational requisites of «fusion warfare» or of a future «precision-strike complex,» and (2) generic sources of organizational error that mitigate hoped for organizational performance.

The activities of future military (and civilian) organizational structures, processes, and procedures that can deliver expected rapid and effective performance under hazardous conditions of uncertainty, risk, ambiguity, and imperfect information must be based on a foundation of criticism. Martin Landau and Donald Chisholm argued that when organizations are created, «the potential for error is inescapable. Fault-proof organizations are beyond our design capability.»¹³ Consequently, the most crucial requirement of public policy is that it be subject to criticism. All policies lie in the future tense. Policies seek to control the future—«to direct events that are yet to come.»¹⁴ The indispensability of criticism is evident in its prominent role in assuring a low frequency of errors in high-reliability or-

¹² Mark D. Mandeles, *The Future of War: Organizations as Weapons*, Potomac Books, McLean, VA, 2005; Mark D. Mandeles, *Military Transformation Past and Present: Historical Lessons for the 21st Century*, Praeger Publishers, Westport, CT, 2007); Thomas C. Hone, Norman Friedman, and Mark D. Mandeles, *American and British Aircraft Carrier Development, 1919–1941*, Naval Institute Press, Annapolis, 1999; see also Nofi, *Recent Trends in Thinking About Warfare*, p. 27.

¹³ Martin Landau and Donald Chisholm, «The Arrogance of Optimism: Notes on Failure-Avoidance Management,» *Journal of Contingencies and Crisis Management*, Vol. 3, No. 2 (1995), p. 69.

¹⁴ Martin Landau, «Foreword,» in Edward Bryan Portis and Michael B. Levy, Eds., *Handbook of Political Theory and Political Science*, Greenwood Press, New York, 1988, p. viii.

ganizations operating complex technologies to accomplish hazardous tasks.¹⁵

U.S. Department of Defense leaders occasionally discuss the necessary role of criticism in error-correction. During a conference in January 2015, Under Secretary of Defense Bob Work declared, «we [leaders of the Department of Defense] have to embrace, not shy away from criticism.»¹⁶ Mr. Work’s call to accept criticism recognizes an organizational property that all adaptive, flexible, effective organizations must satisfy.¹⁷ His call was limited in that he did not describe how criticism would align with departmental structure, processes, procedures, or incentives, or specify the organizational and bureaucratic characteristics of criticism—such as organizational locations, staffing, processes, and relationship of processes to responsibilities of organizational leaders.¹⁸

In “some definite though for now indeterminate future,» Martin Landau described normative properties of future organizations based on a foundation of criticism. In his words,

¹⁵ Gene I. Rochlin, Todd R. La Porte, and Karlene H. Roberts, 1987 «The Self-Designing High Reliability Organization: Aircraft Carrier Flight Operations At Sea,» *Naval War College Review*, Vol. 40 (Autumn 1987), pp. 76–90; Todd R. LaPorte, Karlene Roberts, Gene I. Rochlin, «High Reliability Organizations: The Research Challenge,» Institute of Governmental Studies, University of California, Berkeley (December 1987); Gene I. Rochlin, «Informal Organizational Networks as a Crisis-Avoidance Strategy: US Naval Flight Operations as a Case Study,» *Industrial Crisis Quarterly*, Vol. 3 (1989); Karl E. Weick and Karlene H. Roberts, «Collective Mind in Organizations: Heedful Interrelating on Flight Decks,» in Michael D. Cohen and Lee S. Sproull, Eds., *Organizational Learning*, Sage Publications, Thousand Oaks, CA (1996).

¹⁶ Bob Work, «The Third U.S. Offset Strategy and its Implications for Partners and Allies,» 28 January 2015.

¹⁷ Jonathan Bendor and Sunil Kumar, «The Perfect is the Enemy of the Best: Adaptive Versus Optimal Organizational Reliability,» *Journal of Theoretical Politics*, Vol. 17, No. 1 (2005), pp. 5–39.

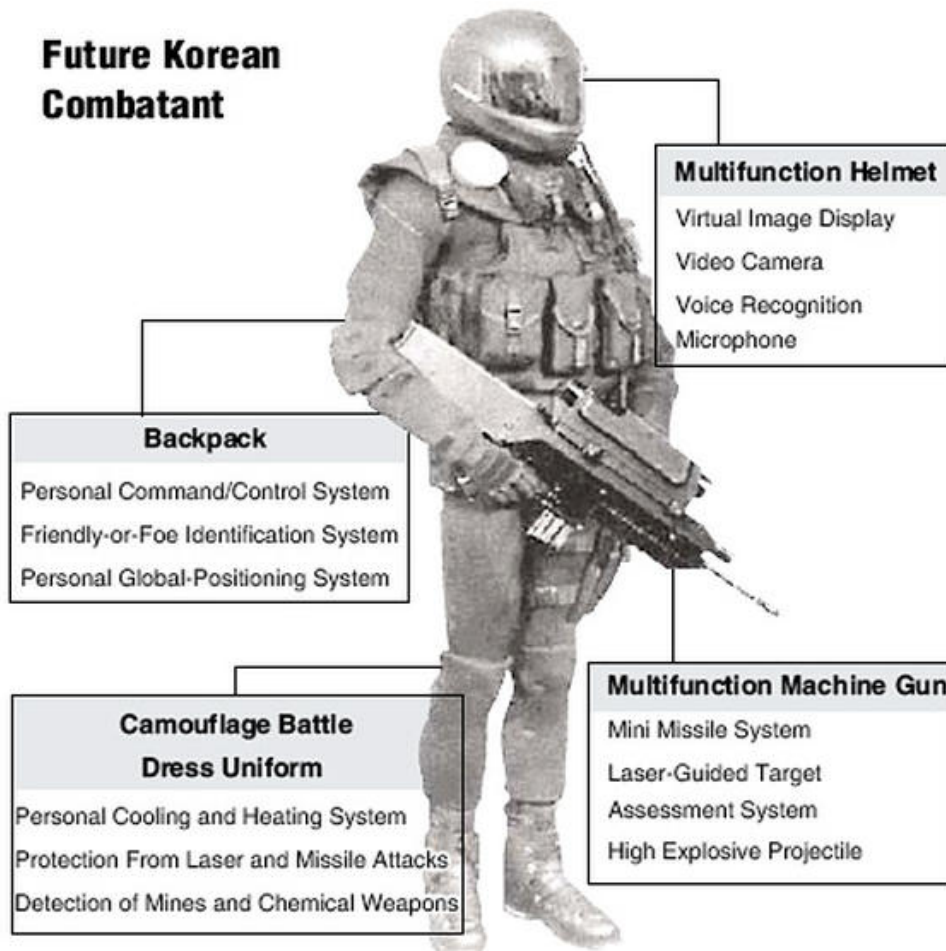
¹⁸ Similarly, what is entailed by «flexible,» «adaptive,» and other words expressing management fads is underspecified, too. See Paul R. Schulman, «Problems in the Organization of Organization Theory: An Essay in Honour of Todd LaPorte,» *Journal of Contingencies and Crisis Management*, Vol. 19, No. 1 (2011), pp. 43–50.

Bureaucracies will be less hierarchical, more pragmatic, less rule-bound, more redundant, more competitive internally, more experimental, and more appreciative of the therapeutic significance of error. Measures of effectiveness will replace those of efficiency; experimental decisions will precede terminal decisions; and premature programming, the cause of so many errors will diminish as our public organizations become less synoptic in mode and more inventive in their operations. Where control is now a responsibility of sheer incumbency, it will come to be seen as a causal factor that can only be employed effectively on the foundations of knowledge. This means that our notions of accountability will change. As fact continues to displace value in the making of decisions, and at an accelerating pace, decision makers will be held responsible for their empirical claims, not simply for their good will or political disposition. Even now we are beginning to see the emergence of the concept of 'empirical accountability,' a concept that will only grow stronger. That is because *all policies* [emphasis in the original] contain high empirical content and their success depends on the corpus of knowledge upon which they are based.¹⁹

With these normative principles guiding the organization and operation of militaries in peace and war, it would be possible to state and answer clearly questions concerning alignment of means to ends. For instance, a future military organization would devote conscious and deliberate research and analysis efforts to demonstrate to civilian authorities the causal relationship between military victory and political ends. Political leaders and publics would be able to determine which conflicts might be mitigated by force, and how that force should be organized and directed. Military organizations would deliberately gather outcome data to test hypotheses about the context of conflict, which capabilities and factors sustain and enable the conflict, and the timing and effectiveness of mixtures of diplomacy and force to resolve or diminish conflict.

¹⁹ Martin Landau, «Catastrophic Errors and the Changing Shape of Bureaucracy,» in Larry B. Hill, Ed., *The State of Public Bureaucracy*, M. E. Sharpe, Inc., Armonk, NY, 1992, pp. 217–218.

Future Korean Combatant



Such normative principles also provide insight into whether particular approaches to organizing, equipping, and training military forces align to current and foreseeable national security challenges and justify the expense of implementation. For example, a proposal to organize to conduct “fusion warfare” would require the design of an organization to fuse in a dynamic environment many types information (e.g., urgent and non-urgent, threatening and non-threatening, relevant and irrelevant to current tasks) and

large quantities of data under short deadlines.²⁰ An initial fusion warfare proposal was mute about crucial issues, such as (1) whether human information-processing capabilities can provide information at the tempo and accuracy required by decision-makers at higher command and control organizational nodes; (2) whether knowledge about the enemy can be organized into a feasible (given available resources) means-end chain of targets and kinetic and non-kinetic actions, the desired and expected outcomes; and (3) whether the organization anticipates, acknowledges, and searches for errors that would require campaign updates and reassessments.

A practical assessment of fusion warfare and of other visionary approaches to future warfare would emphasize the context of its implementation—the social, technological, and organizational complexity of hypothesized future military organizations. Modern computer, sensor, information processing, and communications technologies place a high cognitive and training burden on people operating the equipment, and affect military organizational structures. Growth of scientific, engineering, and technical knowledge is reflected in the growth of military occupational specializations—and a corresponding increase in the organizational requirement to coordinate activities between individuals and offices.²¹

Much more is known about the physics and engineering underlying how weapons systems and enabling technologies (such as intelligence, surveillance, and reconnaissance systems) operate than is known about interactions within human-machine-organization systems. Effective incorporation of sophisticated military technology into the force will require the accumulation of knowledge and data on topics relevant to dynamics of human-machine-organizational systems. Topics range from impacts of sleep deprivation and sleep debt on deficits in observation, action, command, and

²⁰ Maj. Gen. Vera Linn Jamieson (USAF) and Lt. Col. Maurizio Calabrese (USAF), «An ISR Perspective on Fusion Warfare,» *The Mitchell Forum*, No. 1, October 2015.

²¹ This and related issues were considered in the author's *The Future of War: Organizations as Weapons*, 2005, originally prepared for the Director/Net Assessment, U.S. Department of Defense.

moral judgment;²² to attention deficits when multi-tasking on computers and communications devices;²³ to individual-level incentives that quietly conflict with (and influence or modify) higher organizational goals and commander's intent.

To achieve effective functioning of future military organizations in war, one must add realistic appraisal of the extraordinary abilities of bureaucracies to hide error, and to search for scapegoats when error has been exposed.²⁴ Generic sources of organizational error accrue when minimal causal knowledge exists aligning means to ends, and organizations practice institutional self-deception,²⁵ premature programming,²⁶ uncertainty absorption,²⁷ negotiating away uncertainty,²⁸ groupthink,²⁹ and goal dis-

²² William D.S. Killgore, Desiree B. Killgore, Lisa M. Day, Christopher Li, Gary H. Kamimori, Thomas J. Balkin, «The Effects of 53 Hours of Sleep Deprivation on Moral Judgment.» *Sleep*, Vol. 30, No. 3 (2007), pp. 345–352; W. Todd Maddox, Brian D. Glass, Sasha M. Wolosin, Zachary R. Savarie, Christopher Bowen, Michael D. Matthews, David M. Schnyer, «The Effects of Sleep Deprivation on Information-Integration Categorization Performance.» *Sleep*, Vol. 32, no. 11 (2009), pp. 1439–1448; Olav Kjellevold Olsen, Ståle Pallesen, Jarle Eid, «The Impact of Partial Sleep Deprivation on Moral Reasoning in Military Officers.» *Sleep*, Vol. 33, No. 8 (2010), pp. 1086–1090; Paul Whitney, John M. Hinson, Melinda L. Jackson, Hans P. A. Van Dongen, «Feedback Blunting: Total Sleep Deprivation Impairs Decision Making that Requires Updating Based on Feedback.» *Sleep*, Vol. 38, No. 5 (2015), pp. 745–754B.

²³ Eyal Ophir, Clifford Nass, Anthony D. Wagner, and Michael I. Posner, «Cognitive Control in Media Multitaskers.» *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 106, No. 37 (15 Sep. 2009), pp. 15583–15587; Ira Flatow [host], «Clifford Nass: The Myth of Multi-Tasking.» *National Public Radio: Talk of the Nation*, 10 May 2013, <http://www.npr.org/2013/05/10/182861382/the-myth-of-multitasking>, accessed 7 November 2013.

²⁴ Landau, «Catastrophic Errors and the Changing Shape of Bureaucracy.» pp. 219, 221.

²⁵ Leonard Wong and Stephen J. Gerras, *Lying to Ourselves: Dishonesty in the Army Profession*, Carlisle Barracks, MD, U.S. Army War College, 2015.

²⁶ W. Ross Ashby, «The Effect of Experience on a determinate Dynamic System.» *Behavioral Science*, Vol. 1 (January 1956); Martin Landau, «Decision Theory and Comparative Public Administration.» *Comparative Political Studies*, Vol. 1 (1968).

²⁷ James G. March and Herbert A. Simon, *Organizations*, Second edition, Blackwell Publishers, Cambridge, MA, 1993, p. 176.

placement.³⁰

Whether acknowledged or not, these multiple sources of error challenge visions of future war as self-correcting, adaptive, and flexible organizations aided by artificial intelligence and other form of human-machine collaboration, operating advanced communications, intelligence, surveillance, and reconnaissance technologies to conduct «fusion warfare» or to operate a precision-strike network.

Absent the development of knowledge to handle generic sources of organizational error in military organizations employing ever more technologically advanced weapons and sensors, the near-term future of warfare for Western democracies will be a continuation of current conditions—small-scale operations against terror groups' leaders and forces. The final words of this essay go to Joseph Conrad, whose appraisal of the fantasies of political visionaries applies equally to future of war visions of technological solutions ungrounded in real analysis of the human-technology-organization interface: «Visionaries work everlasting evil on earth. Their Utopias inspire in the mass of mediocre minds a disgust of reality and a contempt for the secular logic of human development.»³¹

²⁸ Richard M. Cyert and James G. March, *A Behavioral Theory of the Firm*, Prentice-Hall, Inc., Englewood Cliffs, NJ, 1963, p. 119.

²⁹ Irving L. Janis, *Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes*, Houghton Mifflin Company, Boston, MA, 1972.

³⁰ Robert K. Merton, «Bureaucratic Structure and Personality,» *Social Forces*, Vol. 18, No. 4 (May 1940), p. 563.

³¹ Joseph Conrad, *Under Western Eyes: A Novel*, Knopf, New York, NY, 1991, p. 71 (originally published in 1911).

