

Irving Lachow
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EDUCATION

Ph.D. Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, May 1994

Dissertation title: “The Global Positioning System: Managing the Tensions Between Defense Needs and Civilian Applications.” Dissertation examined the economic benefits and security risks of providing highly accurate navigation information to civilian users of the Global Positioning System.

B.S. Physics, Stanford University, Stanford, CA, June 1989

A.B. Political Science, Stanford University, Stanford, CA, June 1989

PROFESSIONAL EXPERIENCE

Title: Senior Principal Cyber Security Engineer

Dates: May 2016-Present

Title: Principal Cyber Security Engineer

Dates: September 2010 – September 2012, and July 2013 – April 2016

Employer: The MITRE Corporation, McLean, VA

- Lead development and implementation of MITRE’s social justice platform. Oversee team of 50 staff members focused on providing resources, data, tools, and frameworks that empower decision makers to create and sustain equitable solutions that bring positive change for a more just society. Have created frameworks and models that are being used by federal agencies and city governments.
- Led development and implementation of a cyber platform to coordinate and enhance delivery of cyber work across the Corporation. Platform incorporates tools, data, labs, ranges, and training modules in a web-based collaborative environment. During my tenure as project leader, the platform had over 8,000 visits, 40,000 page views and 5,000 downloads.
- Working with MITRE’s Director, Cyber Strategy and Execution, developed corporate cyber strategy to guide efforts of approximately 1,000 staff members.
- Led MITRE’s international cybersecurity business development and outreach. Developed and implemented international cyber strategy, identified key opportunities, created new service offerings, led proposal teams, negotiated partnerships and oversaw delivery of work.
- Generated over \$4 million dollars in revenue from nine organizations, eight of which are first-time supporters of MITRE.
- Negotiated research partnerships with the Australian National University, the Australian Strategic Policy Institute, Data61, and Nanyang Technological University.
- Led project for State Department Office of the Coordinator of Cyber Issues (S/CCI). Developed an engagement plan to enable S/CCI to help partner nations develop, improve and implement national cyber strategies. Plan has been presented to over 100 foreign service officers and used to assist the development of national cyber strategies in Latin America, Africa, Europe and Asia.
- Led MITRE work in support of the Department of Defense’s Deputy Chief Information Officer for Identity and Information Assurance. Managed a team of nine full-time equivalent staff in numerous areas, including information assurance policy, supply chain risk management, and cyber innovation.

- Provided strategic advice to the Department of Defense's Deputy Chief Information Officer. Developed a cyber innovation strategy, coordinated cyber demonstrations across the Office of the Secretary of Defense, provided written and oral updates to senior leaders and Congressional staffs, and identified candidates for future cyber demonstrations.

Title: Senior Fellow and Director, Technology and National Security Program**Dates: October 2012 – June 2013****Employer: Center for a New American Security, Washington, DC**

- Responsible for research agenda, media relations, outreach, and fundraising for the Technology and National Security Program.
- Published CNAS policy brief on active cyber defense, CNAS commentary on the cyber Executive Order, two cyber security Op-Eds on Time.com, one cyber security Op-Ed in the Christian Science Monitor, and one blog about the Syrian Internet outage on ForeignPolicy.com.
- Conducted TV, print and radio interviews with PBS NewsHour, CSPAN, EuroNews, This Week in Defense News, Newsweek, Politico, LA Times, XM radio, Kyodo News Service, TV Tokyo, Nikkei Media, MIT Technology Review, Inside U.S. Trade, and The Christian Science Monitor.
- Invited to give presentations at IT Security Entrepreneur's Forum, Stanford Law School, Kellogg Innovation Network, George Washington University and National Defense University. Invited to participate in panel discussions at the American Bar Association, the Brookings Institution, the Atlantic Council, the Center for Democracy and Technology, and the Center for Strategic and International Studies.
- Obtained funding from two corporate sponsors and asked to submit formal proposal by major foundation for study on Internet Governance.

Dates: January 2010 – September 2010**Employer: Special Capabilities Office, Office of the Secretary of Defense (Acquisition, Technology & Logistics), Arlington, VA (On Half-Time Assignment from NDU)**

- Established cyber program within the Special Capabilities Office (SCO). Created and oversaw evaluations and demonstrations of cyber technologies. In collaboration with the Assistant Secretary of Defense (Networks and Information Integration), secured \$30 million from Congress to fund four pilot programs to evaluate innovative commercial cyber security solutions. The pilots focused on a range of technologies including real-time, high-speed network analysis and malware detection, TCP header authentication across global commercial networks, and multi-network malware detection and mitigation through a vendor-neutral managed security environment. One pilot also explored a new business model for improving the government's access to innovative private sector intellectual capital from small companies and entrepreneurs.

Title: Senior Associate**Dates: June 2001-October 2003****Employer: Booz Allen Hamilton, McLean, VA**

- Led Strategy, Policy, and Planning Team within Booz Allen's Defense Information Technology Group. Responsible for the identification and tracking of emerging technologies, development of new service offerings, business development, recruiting, and administrative oversight of nine people and over \$4 million in revenue.
- Provided strategic planning, E-Government, and program management support to the Department of Labor's Deputy CIO; developed the action plan, governance structure, and initial products of the Defense Information Systems Agency's Enterprise Architecture; provided staff support to the Information Infrastructure Office within the Army CIO directorate; and provided organizational, technical, and planning services to the External E-Business Center within the Department of Defense's Office of Defense Procurement and Acquisition Policy.

Title: Account Manager**Dates: May 2000-June 2001****Employer: Digital Signature Trust, Rockville, MD**

- Managed accounts that generated over \$1 million in revenue in Calendar Year 2000. These accounts provided over 40 percent of company's total annual revenue in the Federal market.
- Managed project for the Social Security Administration's (SSA's) Office of Electronic Services that developed methodology for performing risk assessments of electronic transactions. Led team that performed a technology and cost assessment of e-commerce authentication technologies, developed a spreadsheet-based survey tool for eliciting input from stakeholders, and assessed best practices in government and industry. The methodology has been used for several SSA programs and has been disseminated to other federal agencies and state governments.

Title: Policy Analyst

September 1999 – April 2000

Title: Associate Policy Analyst

Dates: July 1994 – August 1998

Employer: The RAND Corporation, Santa Monica, CA and Washington, DC

- Led project for the U.S. Army's Chief Information Officer and developed information technology strategic plan for the U.S. Army's Headquarters. Interviewed executives from Cisco, Exxon-Mobil, and Lockheed-Martin to identify best practices.
- Assessed impact of the Network Economy on private sector organizations, identified best practices, and recommended strategies for applying those practices to the U.S. military. Co-authored Issue Paper with Vice President of National Defense Research Institute.
- Assessed the risks of enemy use of the Global Positioning System (GPS). Analyses focused on use of GPS for missile guidance. Results were briefed to the White House Office of Science and Technology Policy and the National Security Council. The White House implemented our recommendations. Report was best-selling RAND publication of 1996 and is being used in several university courses.
- Developed new operational procedures that would allow Air Force logistics aircraft to operate in environments contaminated with chemical and/or biological weapons. These improvements were presented to numerous generals, including the commander in chief of the U.S. Transportation Command. The U.S. Air Force Air Mobility Command is implementing our recommendations.
- Created and ran wargame and developed spreadsheet model for assessing utility of new technologies in various non-traditional military operations such as peacekeeping and humanitarian assistance. Results were briefed to Air Force Chief of Staff.

Title: Defense Policy Fellow

Dates: September 1998-August 1999 (On Sabbatical from RAND Corporation)

Employer: Office of the Deputy Under Secretary of Defense (Advanced Systems & Concepts), Department of Defense, Washington, DC

- Provided oversight for a multimillion-dollar advanced concept technology demonstration designed to improve information security. Briefed high-level government officials and oversaw product development, schedule, budget, and measures of performance.
- Managed project that identified threats to the United States' future public telecommunications infrastructure. Organized workshop that gathered over 30 experts from industry, academia, and government to identify both vulnerabilities and possible solutions associated with communications links utilizing Asynchronous Transfer Mode and Internet Protocol standards. Results were presented to Deputy Under Secretary of Defense (Advanced Systems & Concepts) in May 1999 and distributed to other senior government executives.
- Was member of three-person team that developed strategic plan for the Deputy Under Secretary of Defense (Advanced Systems & Concepts). Planning focused on two goals: improving the process of technology identification and assessment, and increasing international participation in our programs. Implemented strategic plan to meet 6-month milestone.

ACADEMIC EXPERIENCE

Title: Professor of Systems Management

Dates: October 2003-September 2010

Employer: Information Resources Management College, National Defense University, Washington, DC.

- 2007 to 2010: Program manager for international collaboration between the Information Resources Management College and the Swedish National Defense College to provide information assurance courses in Sweden. Developed and executed program plan and budget. Program met timelines and came in under budget.
- June-July 2009: Temporary assignment from National Defense University to Office of the Deputy Assistant Secretary of Defense (Space & Cyber). Drafted cyber strategy for Quadrennial Defense Review, assisted in policy formulation on defense support to civil authorities, and led a cross-departmental team exploring legal and policy issues surrounding cyber warfare.
- 2006 – 2008: Deputy director of the Knowledge Management Working Group for the Congressionally-funded Project on National Security Reform. This project, a non-partisan initiative sponsored by the Center for the Study of the Presidency, was designed to improve the U.S. Government's ability to effectively provide for the nation's security in the 21st century. Managed research staff and contributed to both initial and final reports for Congress.
- 2004 – 2006: Director, Advanced Management Program (AMP) for the Information Resources Management College. AMP is a 14-week residential program that annually prepares approximately 60 senior managers from government and industry to lead organizations in the information age. Updated program structure and content, coordinated efforts of approximately 12 faculty members involved in the program, and provided administrative support to faculty and students.
- Developed and taught course titled *Terrorism and Crime in Cyberspace*. This course studied the nature of conflict in cyberspace by focusing on two major Internet-based threats to U.S. national security: cyber terrorism and cybercrime. The course analyzed who is undertaking these activities, what techniques they use, and what countermeasures can be adopted to mitigate their impact.
- Taught course titled *International Perspectives in Information Power*. Course was created to educate each year's cohort of international students the fundamental principles of the information component of national power. It addressed three themes—information warfare, critical infrastructure protection, and public diplomacy—from both U.S. and international perspectives.
- Taught course titled *Assuring the Information Infrastructure*. Course provided an overview of information assurance and critical infrastructure protection. It identified best practices for protecting an enterprise's information assets and described strategies for incorporating information security technologies and processes into broader management frameworks.
- Taught course titled *General Enterprise Networking and Telecommunications*. Course addressed fundamental technological and management issues associated with communications networks and technologies. It combined lectures, group exercises and a field trip to a telecommunications provider that provided real-world examples of the material we discussed in the course.
- Co-taught course titled *Strategic Infrastructure Operations*. Course examined the national security risks of society's growing reliance on connected, complex and potentially fragile infrastructures.

Adjunct Professor, The George Washington University, Washington, DC. Dates: January-May, 2004.

- Science and Arms Control, Elliott School of International Affairs, The George Washington University, March 2-April 27, 2004.

Guest Lectures

- "International Challenges in Cyber Crime," Our Digital Planet, Kogod School of Business, American University, March 28, 2016.
- "Two Case Studies in Management Consulting," Strategic Management Consulting, McIntire School of Commerce, University of Virginia, October 29, 2002.
- "PKI and E-Government," Information Warfare, Department of Engineering and Public Policy, Carnegie Mellon University, April 11, 2002.

- “Digital Signatures: Building Trust for Electronic Government,” Department of Engineering and Public Policy Brown Bag Lecture, Carnegie Mellon University, November 28, 2000.

Teaching Assistant

- “Engineering and Public Policy Project Management,” Carnegie Mellon University, Spring 1991. This semester-long course asked undergraduate and Masters-level students to address a real-world problem and use policy analysis techniques to recommend solutions.

PUBLICATIONS

Journals

1. Lachow, Irving. “The Upside and Downside of Swarming Drones,” *Bulletin of the Atomic Scientists* 73, Issue 2, (2017): 96-101.
2. Butler, Robert J. and Irving Lachow. “Multilateral Approaches for Improving Global Security in Cyberspace,” *Georgetown Journal of International Affairs*, Special Issue: International Engagement on Cyber (2012): 118-125.
3. Lachow, Irving. “The Stuxnet Enigma: Implications for the Future of Cybersecurity,” *Georgetown Journal of International Affairs*, Special Issue: International Engagement on Cyber (2011): 118-125.
4. Miller, Robert A., Daniel T. Kuehl and Irving Lachow. “Cyber War: Issues in Attack and Defense,” *Joint Forces Quarterly* 61 (2011): 18-23.
5. Crane, N. et al., “Leadership Imperatives of the Information Age,” *Electronic Journal of Knowledge Management* 7, Issue 2 (2009): 219-226.
6. Lachow, Irving and Courtney Richardson. “Terrorists and the Internet,” *The Information Leader* 12, No. 3 (2007): 1-3, 6-7.
7. Lachow, Irving and Courtney Richardson. “Terrorist Use of the Internet: The Real Story,” *Joint Forces Quarterly* 45 (2007): 100-103.
8. Lamb, Christopher and Irving Lachow. “Reforming Pentagon Decision Making,” *Joint Forces Quarterly* 43 (2006): 68-71.
9. Pace, Scott, Gerald Frost, Irving Lachow, David Frelinger, Donna Fossum, Donald K. Wassum, and Monica Pinto. “At the Crossroads: Developing a National Policy for GPS,” *GPS World* 7, No. 3 (1996): 53-58.
10. Lachow, Irving. “Crossing New Horizons: Navigating the Future of GPS,” *Business and the Contemporary World* 7, No. 2 (1995): 134-145.
11. Lachow, Irving. “GPS-Guided Cruise Missiles and Weapons of Mass Destruction,” *Lawrence Livermore Laboratory Director’s Series on Proliferation* 8 (1995): 1-22.
12. Lachow, Irving. “The GPS Dilemma: Balancing Economic Benefits and Military Risks,” *International Security* 20, No. 1 (1995): 126-148.

Books

1. Gompert, David, Irving Lachow, and Justin Perkins. *Battle-Wise: Seeking Time-Information Superiority in Networked Warfare*. Washington, DC: National Defense University Press, 2006.
2. Pace, Scott, Gerald Frost, Irving Lachow, David Frelinger, Donna Fossum, Donald K. Wassum, and Monica Pinto. *The Global Positioning System: Assessing National Policies*. Santa Monica, CA: RAND, 1995.

Book Chapters

1. Lachow, Irving and Taylor Grossman. “Cyberwar Inc. Examining the Role of Companies in Offensive Cyber Operations.” *Bytes, Bombs and Spies: The Strategic Dimensions of Offensive Cyber Operations*, Ed. Herb Lin and Amy Zegart. Washington, DC: The Brookings Institutions, 2018. 379-399.
2. Lachow, Irving. “Cyber Terrorism: Menace or Myth?” *Cyberpower and National Security*, Ed. Franklin D. Kramer, Stuart H. Starr and Larry Wentz. Dulles, VA: Potomac Books, 2009. 437-464.
3. Lachow, Irving. “The Metastable Peace: A Catastrophe Theory Model of U.S.-Russian Relations.” *The Limited Partnership: The New Russian-American Security Agenda*, Ed. James Goodby and Benoit Morel. Oxford: Oxford University Press, 1993. 185-206.

Reports and White Papers

1. Butler, Robert and Irving Lachow. *Smart Cities and the Internet of Things: Benefits, Risks, and Options*. Washington, DC: New America, October 2016.
2. Lachow, Irving. *Active Cyber Defense: A Framework for Policymakers*. Washington, DC: Center for a New American Security, February, 2013.
3. Lachow, Irving and Jacob Stokes. *Assessing the Cyber Executive Order*. Washington, DC: Center for a New American Security, February, 2013
4. Lachow, Irving, Gary Gagnon and Matt Richard. *Cyber Information-Sharing Models: An Overview*. McLean, VA: MITRE, 2011.
5. Miller, Robert and Irving Lachow. *Strategic Fragility: National Security in the Information Age*. Defense Horizons 59. Washington, DC: National Defense University Press, 2008.
6. Lamb, Christopher and Irving Lachow. *Reforming Pentagon Strategic Decision Making*. Strategic Forum 221. Washington, DC: National Defense University Press, 2006.
7. Gompert, David, Irving Lachow, and Justin Perkins. *Battle-Wise: Gaining Advantage in Networked Warfare*. Defense and Technology Paper #8. Washington, DC: National Defense University Press, 2005.
8. Gompert, David and Irving Lachow. *Transforming U.S. Forces: Lessons from the Wider Revolution*. IP-193. Santa Monica, CA: RAND, 2000.
9. Lachow, Irving. *Centralization of IT Services: Lessons from Industry and Government*. AB-409-A. Santa Monica, CA: RAND, 2000.
10. Crawford, Natalie, Richard Hillestad, Manuel Carrillo, Jeff Hagen, Irving Lachow, David Persselin, Peter Rydell, and Barry Wilson. *Shaping the Future Air Force: Methodologies for Analyzing Future Force Capabilities*. DRR-1584-AF. Santa Monica, CA: RAND, 1997.
11. Hura, Myron, Gary McLeod, Richard Mesic, Jody Jacobs, Gerald Frost, Brian Dingess, Jeff Rothenberg, Daniel Norton, Irving Lachow, Walter Perry and Arthur Bullock. *Developing Future Integrated C2 and ISR Capabilities*. DRR-1966-AF. Santa Monica, CA: RAND, 1998.
12. Lachow, Irving. *AEF Command and Control: Communications Challenges and Solutions*. PM-798-AF. Santa Monica, CA: RAND, 1998.
13. Chow, Brian, Gregory Jones, Irving Lachow, John Stillion, Dean Wilkening, and Howell Yee. *Air Force Operations in a Chemical and Biological Environment*. DB-189/1-AF. Santa Monica, CA: RAND, 1998.
14. Bonds, Tim, Eric Larson, M. G. Weiner, Irving Lachow, Howell Yee, Michael Thirtle, and John Godges. *Wargames for Revealing Future Operational Capabilities*. DRR-1498-1-AF. Santa Monica, CA: RAND, 1997.
15. Lachow, Irving. *Enhancing the Effectiveness of AEF Command and Control; Phase I Results: Identification of Challenges*. PM-678-1-AF. Santa Monica, CA: RAND, 1997.
16. Killingsworth, Paul, Eiichi Kamiya, Irving Lachow, Tim Ramey, Bob Tripp, James Wendt and Caroline Wong. *Enhancing the Effectiveness of Air Expeditionary Forces; Phase I Results: Focus on the Challenges*. PM-676-AF. Santa Monica, CA: RAND, 1997.
17. Harshberger, Edward R., Richard Mesic, Joel Kvitky, Bruce Davis, and Irving Lachow. *Theater Air Defense BMC4I Issues and Opportunities*. DRR-1308-AF. Santa Monica, CA: RAND, 1996.
18. Lachow, Irving. *The Global Positioning System and Cruise Missile Proliferation: Assessing the Threat*. CSIA Discussion Paper 94-04. Cambridge, MA: Kennedy School of Government, 1994.

Book Reviews

1. Lachow, Irving. "Crypto: How the Code Rebels Beat the Government—Saving Privacy in the Digital Age," Review of *Crypto* by Stephen Levy. *Georgetown Public Policy Review* 6, No. 2 (2001): 167-168.

Op-Eds and Blogs

1. Lachow, Irving. "Cyber Gaslighting: PsyOps in the Home." *Lawfare*. June 12, 2019, <https://www.lawfareblog.com/cyber-gaslighting-psyops-home>.
2. Lachow, Irving. "The Promise and Peril of Active Cyber Defense." *The Hill*. April 18, 2018, <https://thehill.com/opinion/cybersecurity/383704-the-promise-and-peril-of-active-cyber-defense>.
3. Lachow, Irving. "In Cybersecurity, Stronger Tech is Only Half the Solution." *Context by New America*. January 31, 2017, <https://context.newamerica.org/in-cybersecurity-stronger-tech-is-only-half-the-solution-9b09ffef5258#.r5132f82z>.
4. Butler, Robert and Irving Lachow. "Smart City Partnerships: Keeping Smart Cities Safe in the Age of the Internet of Things." *New America Weekly*. December 1, 2016,

- <https://www.newamerica.org/weekly/edition-144/smart-partnerships-keeping-cities-safe-age-internet-things/>.
5. Lachow, Irving and Evan Wolff. "When Your Computer Gets Hacked, Why Can't You Call the Police to Deal with It?" *Foreign Policy*, June 26, 2014, <http://foreignpolicy.com/2014/06/26/when-your-computer-gets-hacked-why-cant-you-call-the-police-to-deal-with-it/>.
 6. Lachow, Irving. "How Obama Should Work with Business to Combat China Cyber Spying." *The Christian Science Monitor*, May 29, 2013, <http://www.csmonitor.com/Commentary/Opinion/2013/0529/How-Obama-should-work-with-business-to-combat-China-cyberspying>.
 7. Lachow, Irving. "Cyber Insecurity: The 21st Century's Version of Air Pollution." *Time*, May 10, 2013, <http://nation.time.com/2013/05/10/cyber-insecurity-the-21st-centurys-version-of-air-pollution/>.
 8. Lachow, Irving. "Time to Change the Rules of the Cyber-Security Game." *Time*, February 7, 2013, <http://nation.time.com/2013/02/07/time-to-change-the-rules-of-the-cyber-security-game/>.
 9. Lachow, Irving. "What the Syrian Internet Outage Tell Us About the Ultimate Dual-Use Technology." *Foreign Policy*, December 12, 2012, http://ricks.foreignpolicy.com/posts/2012/12/12/what_the_syrian_internet_outage_tells_us_about_the_ultimate_dual_use_technology.

CONFERENCE PRESENTATIONS

1. Lachow, Irving, Asma Abuzaakouk, Jenine Patterson, Tammy Freeman. "Human-Centered Systems in Equitable Decision Making," Panel discussion at National Academy of Public Administration Social Equity Leadership Conference, Washington, DC, June 9-11, 2021.
2. Lachow, Irving, Rich Baich, Bob Butler, Scott DePasquale. "Deterring Adversaries and Mitigating Risks in Cyberspace, From Resilience to Active Defense," Panel discussion at Security Innovation Network Showcase, Washington, DC, November 9, 2017.
3. Lachow, Irving, David Hickton, Samir Jain, Kate Kuehn, John Mills. "The Next Generation of Cyber Laws and Regulations: Balancing Risk, Innovation and Security in the Digital Economy," Panel discussion at Security Innovation Network Showcase, Washington, DC, November 8, 2017.
4. Lachow, Irving, "The NCCoE: A Resource and Partner for Securing FinTech," Presentation at The AustCyber National FinTech Cyber Security Summit." Sydney, Australia, September 28, 2017.
5. Lachow, Irving, Catherine Buhler, Gary Hale, Daniel Potts. "Challenges of Cyber Physical Systems and the Industrial/Internet of Everything." Panel discussion at Security Innovation Network 61 Conference, Sydney, Australia, September 26, 2017.
6. Lachow, Irving, "The Promise and Peril of Active Cyber Defense." Presentation at The Australian National University, Canberra, Australia, July 13, 2017.
7. Lachow, Irving, "The Promise and Peril of Active Cyber Defense." Presentation at The Australian Security Summit, Canberra, Australia, July 19, 2017.
8. Rodriguez, Robert, Craig Davies, Sean Duca, Irving Lachow, and Michael Scotton. "Hackbacks and Honeypots: Corporate Options for Active Cyber Defense." Panel discussion at Security Innovation Network 61 Conference, Sydney, Australia, September 13, 2016.
9. Butler, Robert J. and Irving Lachow. "Effective Partnerships: Security and Privacy in Smart Cities." Presentation at RSA Conference Asia-Pacific, Singapore, July 23, 2015.
10. Lachow, Irving. "Cybersecurity 2014: Key Trends and Issues." Keynote address at Confidence Building Measures and Norms for Cybersecurity and the Future of Internet Governance, Singapore, July 3, 2014.
11. Lachow, Irving. "Active Cyber Defense: Policy and Strategy Considerations." Keynote address at CyCon Tallinn, Estonia, June 4, 2014.
12. Lachow, Irving, James Denaro and Randy Sabett. "A Legal Continuum for Analyzing Private Sector Use of Active Defense." Panel discussion at the RSA Conference, San Francisco, CA, February 27, 2014.
13. Lachow, Irving, James A. Lewis, Paul Rosenzweig, and Evan Wolff. "To Regulate or Not to Regulate Cyber Security: That is the Question." Panel discussion at the RSA Conference, San Francisco, CA, February 26, 2014.
14. Lachow, Irving. "Accelerating Innovation Through Cyber Pilots." Presentation at the Fifth Annual IT Security and Entrepreneur's Forum, Stanford, CA, March 15, 2001.

15. Lachow, Irving and Robert Miller. "Thinking Strategically About Information Operations." Paper presented at the 2nd International Conference on i-Warfare and Security, Monterey, CA, March 8, 2007.
16. Lachow, Irving. "A Snapshot of the Cyber Battlefield," Presentation at the Cyber Conflict Studies Association Fall Symposium, Arlington, VA, November 3, 2006.
17. Gompert, David, Irving Lachow, and Justin Perkins. "Battle-Wisdom: Improving Cognitive Performance in Network Centric Warfare." Paper presented at the 10th International Command and Control Research and Technology Symposium, McLean, VA, June 13, 2005.
18. Lachow, Irving. "Making E-Business/E-Commerce an Integral Part of DoD Operations." Presentation at the U.S. Army Tank-automotive and Armaments Command 2002 E-Business/E-Commerce User Conference, Las Vegas, NV, January 30, 2002.
19. Lachow, Irving. "ACES High: Lessons from the First Year." Presentation at the RSA Conference, San Francisco, CA, April 9, 2001.
20. Lachow, Irving. "The Automated Intrusion Detection Environment ACTD: Helping Protect the DoD's Information Infrastructure." Presentation at the 4th Annual Warfighter Information Assurance Symposium, Laurel, MD, March 9, 1999.
21. Lachow, Irving. "The Information Warfare Red Team: An Overview." Presentation at the 1998 Advanced Concept Technology Demonstration Managers Conference, Quantico, VA, September 9, 1998.
22. Frost, Gerald and Irving Lachow. "GPS-Aided Guidance for Ballistic Missile Applications: An Assessment." Paper presented at The Institute of Navigation's 51st Annual Meeting, Colorado Springs, CO, June 5, 1995.
23. Lachow, Irving. "GPS-Guided Cruise Missiles: Issues and Implications," Presentation at the Fifth International Summer Symposium on Science and World Affairs, Cambridge, MA, July 22, 1993.
24. Frost, Gerald and Irving Lachow. "GPS Guidance in a Jamming Environment: Assessing the Impact of Anti-Jam Technologies on Mission Performance." Paper presented at The Institute of Navigation's 49th Annual Meeting, Cambridge, MA, June 21, 1993.

MEDIA APPEARANCES

1. "How Business Can Outsmart Rulers of the Dark Web," *Afternoons with Laura Tchilinguirian*, Australian Broadcasting Corporation Radio Canberra, July 14, 2017, <http://www.abc.net.au/radio/canberra/programs/afternoons/cyber-security/8709676>.
2. "The Promise and Peril of Active Cyber Defense," *Interview with Michelle Mosey*, The Australian National University National Security College, July 13, 2017, <https://nsc.crawford.anu.edu.au/news-events/podcasts/video/10942/promise-and-peril-active-cyber-defence>.
3. "How Does the Government Manage Workers with Access to Classified Information," *PBS NewsHour*, June 11, 2013, http://www.pbs.org/newshour/bb/government_programs-jan-june13-nsa2_06-11/.
4. "Threat of Cyber Attacks," *C-SPAN*, March 17, 2013, <http://www.c-span.org/video/?311563-5/threat-cyber-attacks>.
5. "WWIII on the WWW," *EuroNews*, March 11, 2013, <http://www.euronews.com/2013/03/11/wwiii-on-the-www/>.
6. Simonite, Tom, "Data Espionage Sleuths Aim to Put Chinese Corporations in Court," *MIT Technology Review*, February 25, 2013, <https://www.technologyreview.com/s/511701/data-espionage-sleuths-aim-to-put-chinese-corporations-in-court/>.
7. Romm, Tony, "Sequester Could Hinder Cyber Security," *Politico*, February 25, 2013, <http://www.politico.com/story/2013/02/sequester-could-stall-momentum-on-cybersecurity-088005>.
8. Dilanian, Ken, "A New Brand of Cyber Security: Hacking the Hackers," *Los Angeles Times*, December 4, 2012, <http://articles.latimes.com/2012/dec/04/business/la-fi-cyber-defense-20121204>.
9. "The Pentagon's New Cybersecurity Strategy," *This Week in Defense News*, October 21, 2012, <http://michaelmabee.info/tag/irving-lachow/> (original link no longer active).

HONORS/AWARDS

- 2021: MITRE Trailblazer Award
 2019: MITRE Breakthrough Award
 2019: MITRE Catalyst Award
 2016: MITRE Department Manager Award.

- 2008: John A. Williamson, Sr. Information Resources Management College Professor of the Year.
- 2006: Certificate of Appreciation, Information Resources Management College, National Defense University
- 2004: Chairman for American Association for the Advancement of Science Homeland Security Science and Engineering Fellowship Program Ad Hoc Selection Committee
- 2002: Profiled in Fall 2002 issue of Carnegie Mellon University's *Engineering* magazine
- 2000: American Association for the Advancement of Science Defense Policy Science and Engineering Fellowship Program Ad Hoc Selection Committee
- 1999: Inaugural Member, Carnegie Mellon University School of Engineering Dean's Leadership Council
- 1998: Defense Policy Fellowship, American Association for the Advancement of Science
- 1993: Pre-Doctoral Fellowship from the Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University
- 1992: Hubert H. Humphrey Doctoral Fellowship, U.S. Arms Control and Disarmament Agency, State Department
- 1989: National Science Foundation Minority Graduate Fellowship
- 1989: Ford Foundation Minority Graduate Fellowship
- 1989: Honorable Mention, National Science Foundation Graduate Fellowship
- 1987: National Chicano Council for Higher Education Graduate Science Fellowship

PROFESSIONAL and ACADEMIC AFFILIATIONS

- 2016-Present: Affiliate, Center for International Security and Cooperation, Stanford University
- 2015-Present: Advisor, Mach37 Cyber Accelerator, Center for Innovative Technology
- 2014-Present: Senior Associate (Non-Resident), Center for Strategic and International Studies
- 2016-2018: Visiting Fellow at the Hoover Institution, Stanford University
- 2013-2015: Chair, Board of Advisors, National Cybersecurity Institute, Excelsior College
- 2012-2014: Editorial Board, *Environment, Systems, and Decisions*, Springer.

SECURITY CLEARANCE

- Top Secret