

Zachary Kallenborn

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Experience:

Policy Fellow

January 2021 - Present

Center for Security Policy Studies, Schar School of Policy and Government, George Mason University

Research Affiliate

December 2020 - Present

Unconventional Weapons and Technology Division, National Consortium for the Study of Terrorism and Responses to Terrorism (START), University of Maryland

Senior Consultant

October 2019 – Present

ABS Group, Arlington, VA

- Researched, analyzed, and wrote about a wide range of critical infrastructure risks and programmatic challenges as an on-site analyst at the National Risk Management Center, Cybersecurity and Infrastructure Security Agency (CISA)
- Researched and analyzed critical infrastructure risks and policies related to COVID-19 in support of two teams that each won the CISA Director's Gold Exceptional Service Award
- Received over 70 instances of positive feedback from diverse CISA clients in 2020

Freelance Researcher

June 2018 - Present

- Researched and analyzed drone and emerging technology related risks for National Defense University, the Office of the Secretary of Defense for Policy, and the Naval Postgraduate School.

Analyst

April 2018 – January 2019

The Cadmus Group, Washington DC

- Wrote, analyzed, and developed analytical methodology to assess large numbers of emergency management doctrine documents for FEMA

Senior Associate Analyst; Talent Development Program

September 2015 – September 2017

Analytic Services (ANSER), Falls Church, VA

- Conducted futures analysis, organizational strategy assessments, and systems thinking analysis for offices within the Departments of Commerce, State, Homeland Security, and Air Force.

Graduate Research Assistant

September 2013 – May 2015

James Martin Center for Nonproliferation Studies

- Conducted extensive open source research, writing, and editing on chemical and biological weapons and CBRN terrorism, including publishing profiles on the historical U.S. chemical and biological weapons programs

Honors and Awards

- Proclaimed official U.S. Army Training and Doctrine Command "Mad Scientist"
- Awarded two CISA Division Spotlight team award for work on National Critical Function decomposition validation and White House National Security Memorandum cybersecurity performance goals development
- Received ABS Group spot-bonus for excellent, high tempo service to CISA COVID-19 response
- Awarded ANSER annual (2017) and semi-annual (2016) Alan S. Boyd award for improving company reputation
- Awarded Jonathan B. Tucker Memorial Scholarship and Merit Scholarship to Middlebury Institute of International Studies at Monterey

Education:

Middlebury Institute of International Studies at Monterey, Monterey, CA Graduation: May 2015
Master of Arts in Nonproliferation and Terrorism Studies

University of Puget Sound, Tacoma, WA Graduation: May 2013
Bachelor of Science in Mathematics and Politics and Government, focus in International Relations
Minors in History, Physics, and German

Publications (Google Scholar Citations: 137 H-index: 7):

Peer-Reviewed Publications (4):

-“A Plague of Locusts? A Preliminary Assessment of the Threat of Multi-Drone Terrorism,” *Terrorism and Political Violence*, May 20, 2022 (Lead author with Gary Ackerman and Philipp Bleek)

-“InfoSwarms: Drone Swarms and Information Warfare,” *Parameters*, 52, no. 2 (2022)

-“Swarming Destruction: the CBRN Implications of Emerging Drone Swarm Technology,” *The Nonproliferation Review*, 25, January 2019, (Lead author with Philipp Bleek)

- Included on emerging technology reading list for the National Intelligence Council
- Cited in UK Parliamentary Office of Science and Technology Research Note
- Cited in two NATO policy papers

-“Avatars of the Earth: Radical Environmentalism and CBRN Weapons,” *Studies in Conflict and Terrorism*, May 2018, (Lead author with Philipp Bleek)

Other Studies and Book Chapters (4):

-“Going Viral? Implications of COVID-19 for Bioterrorism,” *Combating Terrorism Center Sentinel* 15, no. 5, May 2022 (with Gary Ackerman and Philipp Bleek)

-“An Analysis of Drone Swarms as Weapons of Mass Destruction,” *USAF Center for Strategic Deterrence Studies*, May 13, 2020

- Written about and interviewed in “U.S. Army’s New Drone Swarm may be a Weapon of Mass Destruction,” *Forbes*, June 1, 2020. (Shared by Yahoo News)
- Written about in “Are Armed Drone Swarms a Weapon of Mass Destruction?” *Forbes*, June 29, 2020.
- Written about in “The U.S. Army’s New Weapon of Mass Destruction: Swarm Drones?” *The National Interest*, June 3, 2020. (Shared by Yahoo News)
- Written about in at least eight foreign language media outlets.

-“Chemical and Biological Weapons,” in Brent Steel, Eds., “Science and Politics; an A-Z Guide to Issues and Controversies,” *CQ Press*, May 2014, (Lead author with Kelly Erickson)

-“Disarming Syria of its Chemical Weapons: Lessons Learned from Iraq and Libya,” *Nuclear Threat Initiative*, October 31, 2013, (Lead author with Raymond Zilinskas)

Proceedings (6):

-“Opioid Attack and the Implications for Counter-terrorism Medicine,” *Prehospital and Disaster Medicine*, October 11, 2021 (with Derrick Tin, Gregory Ciottone, Alexander Hart, and Atilla Hertelendy)

-“Rise of the Unmanned Vehicle: an Imminent Public Health Threat Mandating Counter Terrorism Medicine Preparedness for Potential Mass Casualty Attacks,” *Prehospital and Disaster Medicine*,

forthcoming, (with Derrick Tin, Gregory Ciottone, Alexander Hart, Atilla Hertelendy, and Amalia Voskanyan)

-“Armed, Fully Autonomous Drone Swarms (AFADS): Weapons of Mass Destruction?” International Studies Association (ISA) International Security Studies Division Conference, October 13, 2017

“Avatars of the Earth: Assessing the Threat of Eco-Radical Chemical, Biological, Radiological, and Nuclear Terrorism,” (Lead author with Philipp Bleek), ISA Conference, March 2016

-“Complex Pore Spaces Create Record-Breaking Methane Storage System for Natural-Gas Vehicles,” (with Peter Pfeifer, et al), *Chaos: an Interdisciplinary Journal of Nonlinear Science*, 17, 2007

-“Hockey Pucks: the Energy of the Future,” (Lead author with Peter Pfeifer), 2007 Summer Undergraduate Research and Creative Achievements Forum (MU), 2007

Opinions and Commentary (46):

-“Assessing the Risk to Soft Targets from Drones,” *Homeland Security Today*, September 4, 2022

-“The Role of Electronic Warfare, Cyber, and Space Capabilities in the Air Littoral,” *Atlantic Council*, August 30, 2022

-“Information Warfare in the Air Littoral: Talking with the World,” *Atlantic Council*, August 30, 2022

-“Why COVID-19 Probably Hasn’t Helped Bioterrorists, Despite Fears,” (with Gary Ackerman and Philipp Bleek), *Bulletin of the Atomic Scientists*, August 11, 2022

-“Necro-Aeronautics: Raising Undead Aircraft for War,” *War on the Rocks*, August 10, 2022

- Covered in Popular Mechanics

-“Bring Back the Anti-Rail Landmine,” *Small Wars Journal*, July 25, 2022

- Covered in Popular Mechanics

-“Swarming Terror,” *Small Wars Journal*, June 30, 2022

-“Can a Focus on Innovation Save NATO?,” *the National Interest*, June 23, 2022

-“Is it too Late to Stop Autonomous Weapons?” *The National Interest*, June 13, 2022

-“Seven (Initial) Drone Warfare Lessons Learned from Ukraine,” *Modern War Institute at West Point*, May 12, 2022.

-“From Electronic Warfare to Cyber and Beyond: How Drones Intersect with the Information Environment on the Battlefield,” *Modern War Institute at West Point*, April 27, 2022

-“The Indian Drone Perspective: Growing Capability; Uncertain Future,” (Lead author with Sameer Patil), *Gateway House Indian Council on Foreign Relations*, March 22, 2022

-“Russia May Have Used a Killer Robot in Ukraine; Now What?” *Bulletin of the Atomic Scientists*, March 15, 2022

-“Send in the Quadcopters: Arm Ukrainian Citizens with Simple Drones,” *DefenseOne*, March 3, 2022

-“Ban Autonomous Nuclear Weapons,” *Bulletin of the Atomic Scientists*, February 1, 2022

- Covered in Popular Mechanics, the New York Post, the Daily Mail, and the Sun

- “Swarm Talk: Understanding Drone Typology,” *Modern War Institute at West Point*, December 10, 2021
- “Drone Risks to Critical Infrastructure,” *Bulletin of the Atomic Scientists*, November 26, 2021
- “Autonomous Weapons and the Offense-Defense Balance,” *Georgetown Journal of International Affairs*, November 22, 2021
- “Drone Swarm Motherships,” *Army Mad Scientist Blog*, November 22, 2021
- “Thousands of Afghan Refugees Await Rescue. Here’s What the US Needs to Do,” *DefenseOne*, November 9, 2021 (with Mike Edwards)
- “Fear and Arms Control in an Age of Killer Robots,” *The Brookings Institution*, October 5, 2021
- “A Weapon of Mass Destruction Strategy for the 21st Century,” *War on the Rocks*, September 8, 2021, (with Al Mauroni, Seth Carus, and Ron Fizer)
- “Drone Swarms are Here; We Should be Worried,” *DefenseOne*, July 7, 2021
 - Translated into Arabic for al Jazeera
- “If a Killer Robot Were Used, Would We Know?” *Bulletin of the Atomic Scientists*, June 4, 2021
- “Was a Flying Killer Robot Used in Libya? Quite Possibly,” *Bulletin of the Atomic Scientists*, May 20, 2021
 - Received global press coverage, including the New York Times, NPR, the New Scientist, Fox News, and numerous others in at least fifteen foreign languages.
- “Meet the Future Weapon of Mass Destruction, the Drone Swarm,” *Bulletin of the Atomic Scientists*, April 5, 2021
 - Named best of 2021 disruptive technology stories at the Bulletin of the Atomic Scientists
- “National Security Needs Both Futurists and Traditionalists,” *War on the Rocks*, April 1, 2021
- “Drones are Proving to Have a Destabilizing Effect, Which is Why Counter-Drone Systems Should be a Key Part of US Military Aid to Partners,” *Modern War Institute at West Point*, December 9, 2020
- “A Partial Ban on Autonomous Weapons Would Make Everyone Safer,” *Foreign Policy*, October 14, 2020
 - Cited in UN Development Programme report
- “In a Robot War, Kill the Humans,” *DefenseOne*, August 27, 2020
- “How Big of a Deal are Drone Swarms?” *U.S. Army Mad Scientist Laboratory*, August 17, 2020
 - Named #11 best post for the U.S. Army Mad Scientist Laboratory Blog in its three-year history.
- “In Defense of ‘WMD’: A War of Words and the Challenge of Swarms,” *War on the Rocks*, July 23, 2020
- “Pay Every American \$1,000 to Download a Contact Tracing Application,” *Slate*, July 21, 2020
 - Cited in “The Logic Around Contact Tracing Apps is All Wrong,” *WIRED*, August 13, 2020
- “Build a National Counter-Drone Network,” *DefenseOne*, July 6, 2020
- “Swarms of Mass Destruction: The Case for Declaring Armed and Fully Autonomous Drone Swarms as WMD,” *Modern War Institute at West Point*, May 28, 2020

- Top 20 most read article for the Modern War Institute for 2020
 - Written about in “Should Drone Swarms be Considered Weapons of Mass Destruction?” *Popular Mechanics*, May 29, 2020. (Shared by MSN)
- “AI Risks to Nuclear Deterrence are Real,” *War on the Rocks*, October 10, 2019
- Cited in National Security Commission on AI Interim Report, November 2019
- “If the Oceans Become Transparent” *Proceedings of the U.S. Naval Institute*, October 2019
- “A New Era of Terrorism: New Mass Casualty Terrorism Threats,” *Army Mad Scientist Laboratory*, September 26, 2019
- “A New Era of Terrorism: the Future of CBRN Terrorism,” *Army Mad Scientist Laboratory*, September 9, 2019
- “What if the U.S. Military Doesn’t Develop AI? AI Futures and U.S. Incapacity,” *War on the Rocks*, September 3, 2019
- Recommended read on podcast “AI with AI,” Center for Naval Analyses, October 18, 2019
- “The Race Is On: Assessing the US-China Artificial Intelligence Competition,” *Modern War Institute at West Point*, April 16, 2019
- “Lord of the Drones: Fellowship of the Drone,” *CBRNEWorld*, February 2019, (Lead author with Philipp Bleek)
- “Drones of Mass Destruction: Drone Swarms and the Future of Chemical, Biological, and Nuclear Warfare,” *War on the Rocks*, February 14, 2019, (Lead author with Philipp Bleek)
- “Academic Paywalls Harm National Security,” *DefenseOne*, December 14, 2018
- “The Era of the Drone Swarm is Coming and We Need to be Ready for it,” *Modern War Institute at West Point*, October 25, 2018
- Top 10 most read article for Modern War Institute for 2018
- “Swarming Sea Mines: Capital Capability?” *Center for International Maritime Security*, August 29, 2017
- Written about in Asia Unhedged, “Get Ready for ‘Swarming Sea Mines’ in a Naval Conflict Near You,” *Asia Times*, August 30, 2017

Works in Progress

- From Bi- to Multi-polar Nuclear Deterrence, draft to be completed Spring 2023
- Rampage Terrorism: Theory and Strategy, draft to be completed Spring 2023
- Existential Terrorism: Can Terrorists Destroy Humanity? Draft to be completed Spring 2023

Invited Presentations:

-Invited speaker, “Drone Swarms: Theory and Threat,” *Marine Corps University*, September 22, 2022

-Invited speaker, “Roundtable: Emerging Technologies and Use in Recent Conflicts,” *Konrad-Adenauer Foundation*, August 31, 2022

-Invited speaker, “Drones and Swarming – the Impact of Artificial Intelligence on Future Conflicts,” *NATO Partnership for Peace Consortium*, August 29, 2022

- Invited speaker, “Counter-UAS Forum,” *IDGA*, August 17, 2022
- Workshop Participant, “Unpacking Technological Complexity and Approaches to Nuclear Policy Formulation,” *Arms Control Association*, July 28
- Invited speaker, “AI and Robotics,” *Naval Postgraduate School*, July 26
- Workshop participant, “UAV / UGS Threats,” *WeThink*, July 11 and 15, 2022
- Workshop participant, “Ukraine Air War,” *Atlantic Council*, May 18, 2022
- Recorded podcast, “Drone Swarms and Information Warfare,” *Army War College*, May 9, 2022
- Invited speaker, “Future Autonomous Weapons Risk: Hopes and Fears,” *DataFest Online*, May 6, 2022
- Workshop Participant, “Tomorrow’s UAV Battle,” *National Intelligence Council (Organized by SAIC)*, May 3-4, 2022
- Invited speaker, “Counter-UAS Industry,” *Full Spectrum Air Defense*, April 14, 2022
- Invited speaker, “Complex Coordinated Terrorist Attack Seminar: Unmanned Aerial Systems,” *University of Houston*, April 13, 2022
- Invited speaker, “NATO Strategic Concept Seminar,” *U.S. Military Academy at West Point*, February 4-5, 2022
- Invited speaker, “Artificial Intelligence and Autonomy in National Security,” *Naval Postgraduate School*, January 20, 2022
- Recorded Podcast, “Counter-terrorism Medicine SIG Podcast #2,” *World Association for Disaster and Emergency Medicine*, January 17, 2022
- Documentary speaker, “A.I. & Nuclear Weapons,” *Carnegie Endowment for International Peace*, December 13, 2021
- Invited speaker, “Multidrone Terrorism: Theory and Threat,” *Harvard Medical School*, November 29, 2021
- Invited speaker, “A Counter-Drone Network to Protect Critical Infrastructure,” *DroneSec*, November 2, 2021
- Recorded podcast, “Countering Unmanned Systems,” *Gateway House: Indian Council on Global Relations*, September 30, 2021
- Invited speaker, “Global Power Shifts and their Impact of Global Security,” *NATO Partnership for Peace Consortium of Defense Academies and Security Institutes*, September 29, 2021
- Invited Speaker, “Multi-Drone Terrorism and Airline Threats,” *Department of State – Overseas Security Advisory Council*, September 23, 2021
- Recorded podcast, “How Air Warfare is Changing,” *DefenseOne Radio*, September 17, 2021
- Panel Moderator, “Drone Swarms and the Future of cUAS,” *cUAS Summit*, September 1, 2021

- Invited speaker, "Drones, Terrorism, and Critical Infrastructure," *ASIS International*, August 26, 2021
- Recorded podcast, "Which Countries are Already Testing Drone Swarms as Military Tools?" *The Tonya Hall Show, ZDNET*, June 24, 2021
- Workshop participant, "Proliferation in the Second Drone Age: the Threat of State and Non-state Drone Diffusion," *Center for War Studies Denmark and Center for Security Studies Zurich*, workshop sponsored by NATO, June 15, 2021
- Recorded podcast, "The Future of Weapons of Mass Destruction and Apocalyptic Terrorism," *ClearanceJobs*, June 14, 2021
- Workshop participant, "Malign Use of Weaponized Autonomy and AI," *United Nations Institute for Disarmament Research*, April 26, 2021
- Invited speaker, "Multi-Drone Terrorism: Theory and Threat," *Harvard Medical School*, April 15, 2021
- Invited speaker, "Containing the Swarm: Drone Swarms and Arms Control," *International Studies Association*, April 9, 2021
- Invited speaker, "Multi-Drone Terrorism: Theory and Threat," *International Studies Association*, April 6, 2021
- Invited speaker, "Drones and the Future of Chemical, Biological, Radiological, and Nuclear (CBRN) Threats," *George Mason University*, March 26, 2021
- Invited speaker, "Drone swarms as Weapons of Mass Destruction," *National High School Model United Nations*, March 6, 2021 (delivered the same talk to two separate groups)
- Invited speaker, "Drone swarms as Weapons of Mass Destruction," *National High School Model United Nations*, March 1, 2021 (delivered the same talk to two separate groups)
- Recorded podcast, "Stuart Russell and Zachary Kallenborn on Drone Swarms and the Riskiest Aspects of Lethal Autonomous Weapons," *Future of Life Institute*, February 25, 2021
- Invited speaker, "Drone Swarms are Weapons of Mass Destruction," *START*, February 19, 2021
- Invited speaker, "The Future of cUAS," *Counter Unmanned Aerial System (cUAS) Summit*, February 15, 2021
- Invited speaker, "Lessons Learned: UAV in the Armenia-Azerbaijan Conflict," *Department of Defense*, February 5, 2021
- Invited speaker, "International Law Enforcement Collaboration to Combat Illicit Use of Unmanned Aerial Systems," *INTERPOL*, February 3, 2021
- Workshop Participant, "Infectious Incentives," *Center for Advanced Red Teaming*, December 28, 2020
- Invited speaker, "Swarming Destruction: Drone Swarms and CBRN Weapons," *START*, December 18, 2020
- Invited speaker, "Data Drones: Drones, Cybersecurity, and Critical Infrastructure," *ABS Group*, December 17, 2020
- Workshop Participant, "Infectious Incentives," *Center for Advanced Red Teaming*, October 31, 2020

- Invited speaker, “The Future of Unmanned Aerial Systems,” *U.S. Army Mad Scientist Lab*, September 16, 2020
- Invited speaker, “sUAS Terrorism: Theory and Threat,” *cUAS Summit*, August – September 2020
- Guest lecture, “Drone Terrorism: Theory and Threat,” *University of Albany, SUNY: EHC 360: The Legal, Ethical, and Operational Impacts of Unmanned Systems*, April 15, 2020
- Invited speaker, “sUAS Terrorism: Theory and Threat,” *cUAS Summit*, April 1, 2020 (recorded presentation)
- Invited speaker, “Chemical and Biological Technology Watch Forum,” *Defense Threat Reduction Agency*, March 4, 2020
- Invited speaker, “Understanding the Threat: Non-State Actor Use of Unmanned Aerial Systems,” *CRDF Global*, October 22, 2019
- Invited speaker, “The Floating Eye: Border Security and Unmanned Aerial Vehicles,” *Customs and Border Protection – National Targeting Center*, September 18, 2019
- Special invited speaker, “Workshop on Autonomous and Remotely Operated Systems: Benefits and Challenges to Nuclear Security,” *World Institute for Nuclear Security*, April 2-4, 2019 (Presented via Skype)
- Invited speaker, “Technical Horizon Research Evolution Anticipation Tool Expert Event,” *Defense Threat Reduction Agency*, April 2, 2019
- Invited speaker, “Emergence and Convergence Workshop: The Dynamics of Technology Push and Market Pull,” *National Defense University*, October 31, 2018
- Recorded podcast, “Environmental Extremism and CBRN Weapons,” (with Philipp Bleek), *NJ Office of Homeland Security and Preparedness*, May 23, 2017
- Invited speaker, “Avatars of the Earth: Assessing the Threat of Eco-Radical Chemical, Biological, Radiological, and Nuclear Terrorism,” (with Philipp Bleek), *START*, September 2016
- Invited Presenter, “The Adoption of International Norms: Russian Landmines and the Conflict in Chechnya,” *18th Annual Conference for Students of Political Science*, April 2010
- Poster Presentation, “Hockey Pucks: The Energy of the Future,” *University of Missouri – Physics Department*, 2007

Press:

Extensive interviews in print, radio, and broadcast press, including the BBC, NPR, the New York Times, Forbes, the New Scientist, WIRED, and dozens of others in dozens of languages

Peer Reviewer:

The Nonproliferation Review
Science and Engineering Ethics
Asian Security

Professional Activities:

Master Coordination Director (Volunteer)

September 2021 – December, 2021

Project Exodus Relief (formerly National Security Forum)

- Provided program management, strategy, narrative, and direct engagement to support the evacuation of high-risk Afghan refugees
- Developing accountability project to capture and share evidence of atrocity crimes with international human rights organizations
- Represented Project Exodus Relief among evacuation coalition efforts and media outlets

Fellow/Policy Advisor

December 2016 – September 2017

IT Acquisition Advisory Council (IT-AAC)

-Researched and reported on defense industrial base and acquisition policy developments for IT-AAC leadership, in support of meetings with White House officials and senior government leaders

Participant

April 2019 – June 2019

Integrated Discovery of Novel and Emerging Technologies (IDENT) Project

-Won second place overall in Countering Weapons of Mass Destruction expert knowledge competition to assist the Defense Threat Reduction Agency in identifying important emerging technologies