

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 on-site risk analyst at the National Risk Management Center, Cybersecurity and Infrastructure Security Agency (CISA)
- Researched and analyzed critical infrastructure risks related to COVID-19 in support of two teams that each won the Cybersecurity and Infrastructure Agency (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 the U.S. National Defense University, and the U.S. Office of Secretary of Defense for Policy.

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.

Honors and Awards

- Proclaimed official U.S. Army Training and Doctrine Command "Mad Scientist"
- Received ABS Group spot-bonus for excellent, high tempo service to CISA in support of 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:

Peer-Reviewed Publications (2):

-“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 (3):

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

- Written about and interviewed in David Hambling, “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 Kelsey Atherton, “Are Armed Drone Swarms a Weapon of Mass Destruction?” *Forbes*, June 29, 2020.
- Written about in Peter Suci, “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 (4):

-“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 (21):

-“Meet the Future Weapon of Mass Destruction, the Drone Swarm,” *Bulletin of the Atomic Scientists*, April 5, 2021

-“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
- “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 Kimon Drakopoulos, “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 Kyle Mizokami, “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

- InfoSwarms: Drone Swarms and Information Warfare, manuscript completed
- Drone Swarm Terrorism (Lead author with Gary Ackerman and Philipp Bleek), manuscript completed

Presentations:

- 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*, June 15, 2021 (anticipated)
- Invited speaker, “Drones, Terrorism, and Critical Infrastructure,” ASIS International, TBD 2021 (anticipated)
- Workshop participant, “Malign Use of Weaponized Autonomy and AI,” *United Nations Institute for Disarmament Research*, April 26, 2021
- Recorded podcast, “TBD,” *ClearanceJobs*, April 19, 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 twice 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 twice 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, University of California – Berkeley*, 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*, 2007

Press:

- Cited in “Inside the Global Race to Build Killer Robots,” *The Federalist*, March 26, 2021
- Interviewed and quoted in “What are Drone Swarms and Why Does Everyone Want One?” *Forbes*, March 1, 2021
- Interviewed and quoted in “Robot Motherships to Launch Drone Swarms from Sea,” *Forbes*, February 5, 2021
- Interviewed and quoted in “Indian Army Shows Off Drone Swarm of Mass Destruction,” *Forbes*, January 19, 2021
- Interviewed and quoted in “The U.S. Navy Plans to Foil Massive ‘Super Swarm’ Drone Attacks by Using the Swarm’s Intelligence Against Itself,” *Forbes*, August 26, 2020
- Interviewed and quoted in “Boats of the Future,” *Shephard Media*, *Naval Warfare*, No. 2, 2020

-Interviewed and quoted in “SF Bomb-making Case: What Someone Can Do with Illegal Toxins,”
San Francisco Examiner, 12 June 2014.

Peer Reviewer:

The Nonproliferation Review
Science and Engineering Ethics

Professional Activities:

Advisor September 2020 – March 31, 2021
cUAS Summit

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