The Quantum Alliance Initiative

Arthur Herman

2018 Prospectus
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The Quantum Alliance Initiative
**The Mission**

Hudson’s interest in quantum technology stems from its potential impact on economic and national security—potential that can be used to strengthen the U.S. and its allies, or to undermine the systems underpinning our safety, security, privacy, and wealth.

The mission of the Quantum Alliance Initiative is to develop and champion policies that allow the U.S. to win the race to a universal quantum computer, while simultaneously ensuring that the U.S. is resistant to a quantum computer cyberattack—allowing Americans to thereby enjoy the maximum benefits of quantum technology with minimum disruption.

The focus of QAI includes leveraging existing alliances to: 1) secure present and future vital infrastructures from quantum attack; 2) create a Quantum Alliance network among our allies such as Canada, Australia, and Great Britain, to which other nations can be added over time; and 3) develop and secure present and future “supply chains” for quantum technology in the broadest sense.

**Background**

Following Hudson’s inaugural international conference in October 2017 on the coming quantum revolution, the QAI serves as the flagship for our various efforts in shaping U.S. policy regarding quantum technology, including quantum computers, sensors, networks, and more.

Through reports, conferences, and strategic partnerships, our team will bring its forward-thinking policy analysis to lawmakers, policy-makers, technologists, industry leaders, and the public.

QAI continues to highlight the boon quantum technology will provide to medicine, manufacturing, energy, trade, cybersecurity and more, as well as the risks, namely the overthrow of most existing encryption systems in the private and public sectors.

How do quantum computers work? All current digital computers process data in a linear sequence of ones and zeros. Every bit, the smallest unit of data, has to be either a zero or a one. But a quantum bit, or “qubit,” can be in two states at once, essentially functioning as a zero and a one at the same time. This allows a single bit to carry out two computations at once. Add more qubits, and the computing power grows exponentially. This will allow quantum computers of the future to solve problems thousands of times faster than today’s fastest supercomputer.

For example, quantum computers will help create more effective pharmaceutical drugs, analyze complex physical and chemical processes, and create new manufacturing materials. Additionally, quantum computers use a small amount of energy compared to
their supercomputing counterparts and could decouple the relationship between high energy costs and high-powered computing for the first time in history.

But at the same time, quantum computers will be able instantly to undo the complex mathematical problems that underlie today’s public encryption systems and that protect our current data and networks. Nearly all electronic data, including bank and credit card information, email communication, military networks and weapons systems, self-driving cars, the power grid, and more will be completely vulnerable to a crippling quantum computer attack—and in ways that, unlike today’s classical computer hacks, will be virtually impossible to detect.

But if a quantum computer poses a threat to national security as it exists now, quantum cybersecurity promises a solution.

Quantum cybersecurity could usher in an era of a nearly unhackable cyberspace through a layered approach of implementing quantum random numbers, quantum resistant algorithms, and quantum communication networks. Through a concerted effort to develop and implement quantum cybersecurity solutions, we can secure today’s most sensitive data from both current hackers and future quantum-enabled hackers, as well as protect vital infrastructure from the same threats.

America is currently the global leader in quantum computing, while many of our leading allies such as Canada, the UK, and Australia are taking a strong lead in the area of quantum cybersecurity.

China, however, is investing heavily in both and outspends the United States thirty to one in quantum technology. China is able to focus its resources and energies on both sides of the quantum equation because it has developed a robust quantum strategy as part of the country’s effort to dominate the world’s high-tech future. What’s more, China is stealing encrypted U.S. data and storing it because it knows that in roughly a decade, quantum computers will be able to break through the encryption. For China, winning the quantum race and protecting its own networks from quantum attack and penetration are both essential parts of a high-tech supremacy strategy.

Hudson believes the U.S. needs to do the same, with the proper and timely investment of resources in quantum technology. Allowing competitors to overtake the U.S. in quantum technology will not only pose a huge national security risk, but it will undermine our role as the world’s number one economy and limit America’s ability to shape its financial and technological destiny.

Therefore, quantum computing and quantum cybersecurity must be viewed holistically and through a strategic security lens. As such, QAI will champion policies that serve to effectively secure the critical information of both the U.S. and her allies before the advent of a powerful quantum computer.
**Quantum Alliance Initiative Key Principles**

**Industry first.** QAI knows that the reason the U.S. is leading the race to the world’s first quantum computer is due to the power of free markets and American industry. The Initiative seeks to continue promoting a landscape in which private industry leads the world in developing a universal quantum computer, ensuring that undue regulations do not inhibit innovation while encouraging mutually beneficial private-public partnerships.

**National security first.** Because a future quantum computer will be able to hack into and disrupt nearly all information technology, the development of quantum technology is not merely a scientific and economic consideration, but also a strategic national security concern.

Whereas much of the economic incentive to develop a quantum computer lies in the private sector, market forces have not and will not catalyze industry to develop quantum cybersecurity in the necessary timeframe. Because of the security threat to the power grid, food and water supply, and defense networks, the United States government must take a central role in actively developing, commercializing, and implementing effective quantum cybersecurity measures, before the advent of a quantum computer powerful enough to hack into asymmetric encryption.

**Alliances first.** A crucial element of the U.S. government’s strategy to developing quantum cybersecurity must be working with our closest allies, many of whom are global leaders in quantum cybersecurity such as Canada, Australia, and the UK.

Such cooperation will allow the U.S. and her allies to fulfill the goal of realizing the world’s first universal quantum computer in a free, democratic society. This will effectively secure critical information in advance of the grave security threats posed by a quantum computer.

For example, one of the QAI’s initial efforts has included founding the U.S.-Canada Quantum Alliance with the cooperation of the University of Waterloo, Ontario and its “Quantum Valley.” The goal of the alliance is to generate—through reports, conferences, and strategic partnerships—a close cooperation between lawmakers, policy-makers, technologists, and industry leaders in both countries, for developing joint policies and pooling present and future resources in order to win the quantum race.

The eventual goal of the U.S.-Canada Quantum Alliance is to provide a model for an ever-expanding Quantum Alliance with other quantum-savvy allies such as Australia, Great Britain, and the countries of NATO, as well as Japan, Israel, and South Korea.
With such overarching goals in mind, QAI continues to explore the following critical issues related to quantum technology and strategic policy:

- The role of the federal government and makeup of public-private partnerships
- Necessary allotment and allocation of federal funds
- Requirements for STEM education and workforce training in quantum technology
- Ways to speed up the commercialization of quantum research
- Developing compliance and compatibility standards for quantum cybersecurity
- The relationship between quantum cybersecurity and intellectual property
- The balance between classified and unclassified research
- The intersection of quantum with emerging technologies such as artificial intelligence, 5G, blockchain, autonomous systems, and more
**Why Hudson Institute**

Founded in 1961 by strategist Herman Kahn, Hudson Institute challenges conventional thinking and helps manage strategic transitions to the future through interdisciplinary studies in defense, international relations, economics, health care, technology, culture, and law.

Situated six blocks from Capitol Hill, Hudson seeks to guide public policy makers and global leaders in government and business through a vigorous program of publications, conferences, policy briefings, and recommendations.

In addition to its policy experts, the Initiative has an Advisory Board that includes scientific leaders in quantum technology, as well as former members of Congress and other senior government officials—all of whom understand the important relationship between quantum technology and national security.

Hudson Institute is the only Washington think tank with a center dedicated to quantum technology. Our team of experts and advisors work closely with other national quantum efforts such as the National Quantum Initiative and the Quantum Industry Coalition, allowing Hudson to help shape the national conversation and strategy surrounding quantum technology.

In these ways, Hudson is uniquely situated to raise awareness and promote solutions to the key challenges quantum technology poses to the economic, national security, and technological realms.
**Personnel**

**Arthur Herman**, Ph.D. is a Senior Fellow at the Hudson Institute and co-founder of the Quantum Alliance Initiative Policy Center. He is the Pulitzer Prize Finalist author of ten books, including most recently *1917: Lenin, Wilson, and The Birth of the New World Disorder* (HarperCollins, 2017), and the Hudson Institute report *Pacific Partners: Forging the U.S.-Japan Special Relationship* (2017).

His *New York Times* bestseller *How the Scots Invented the Modern World* has sold more than half a million copies worldwide, and his *Freedom’s Forge: How American Business Produced Victory in World War Two*, was named by the *Economist* as one of the most notable books of 2012.


**Sorin Ducaru**, Ph.D. is a Senior Fellow at the Hudson Institute. Ambassador Sorin Ducaru took over the post of Assistant Secretary General for Emerging Security Challenges in September 2013. He is responsible for providing support to the North-Atlantic Council and for advising the Secretary General on the evolution of emerging security challenges, their potential impact on NATO’s security, the development of relevant policies and action plans; directing the Emerging Security Challenges Division of the NATO International Staff and coordinating NATO’s Science for Peace and Security Programme.

Prior to his appointment as ASG, Ambassador Ducaru served as Romania’s Permanent Representative to the North Atlantic Council, from September 2006 to September 2013. From November 2011, Ambassador Ducaru was the Dean of the North Atlantic Council. He joined the Romanian Ministry of Foreign Affairs in 1993, assuming various posts such as member of the Policy Planning team, counsellor to the Minister, spokesman of the MFA and Director for NATO and Strategic Issues. From 2001 to 2006, he served as Romania’s Ambassador to the United States of America. In 2000–2001, Ambassador Ducaru served as Permanent Representative of Romania to the United Nations, in New York.

In the year 2000 Ambassador Ducaru was awarded by the President of Romania the National Order of “Faithful Service” in rank of Commander, followed by, in 2006 the Order for “Diplomatic Merit” and in 2008 the rank of Knight of the National Order “The
Star of Romania”. He received the title of “Ambassador of the Year” in 2003 and 2012, from the Minister of Foreign Affairs of Romania.

He holds a MPhil Degree in International Relations from the University of Amsterdam (1993) and a PhD degree in International Economics from the Academy of Economic Studies in Bucharest (2005). Ambassador Ducaru speaks German, English and French.

**Thomas Keelan** is a Research Associate and Project Manager at Hudson Institute where his work focuses on emerging threats and technologies, including quantum computing, artificial intelligence, and biodefense. His published work includes, “How the Five Eyes Can Win the Race for Quantum Computing Supremacy,” which appeared in *C4ISRNET* and “Machine Strategists & the Future of Military Operations,” which was published in *Real Clear Defense*. He holds a dual B.A. in English Literature and Classics, *magna cum laude* from Brown University.
**Publications**


Idalia Friedson, “Behind Enemy Transmission Lines,” *National Review*, October 18, 2018


**Events**


Idalia Friedson, Participant, “Opinion Leader Perspectives Roundtable with the Undersecretary of the Air Force Matthew Donovan,” April 17, 2018*

Idalia Friedson, Presenter, “The Intersection of Policy and Quantum Computing,” DC Quantum Computing Meetup, Washington DC, March 29, 2018

Arthur Herman, Moderator, “Quantum Computing,” Armed Forces Communications and Electronics Association (AFCEA), Washington DC, February 27, 2018

Arthur Herman, Participant, “Panel IV: Does the U.S. Need a National Quantum Initiative?” Hudson Institute, Washington DC, October 17, 2017

Idalia Friedson, Moderator, “Panel II: Quantum Cybersecurity: Ushering in an Unhackable Era?” Hudson Institute, Washington DC, October 17, 2017

*denotes private event
Strategic Advisory Board

Geoffrey Davis was elected to the U.S. House in 2004 and served until 2012. During his tenure in Congress, he held a leadership role within the Republican Conference as a Deputy Whip. Davis served on the House Financial Services and Armed Services Committees until 2008, and then was appointed to the Committee on Ways & Means. In the 112th Congress, Davis was named Chairman of the Ways and Means’ Subcommittee on Human Resources, which has jurisdiction over a wide range of Federal Programs including Unemployment Insurance, Temporary Assistance to Needy Families, Child Welfare, Adoption and Foster Care, as well as select nutrition and Social Security related programs. Davis was also the second highest ranking Member of the Trade Subcommittee for four years, and was involved in the completion and passage of three critical agreements, the Columbia, Panama, and South Korea Free Trade Agreements. Since leaving the Congress, he has participated in conferences and meetings in the Middle East and South Asia related to advancing economic security, religious freedom and reconciliation. In addition, for the last several years, he has served as a panelist on political-military affairs at an annual Track 1.5 SINO-U.S. Counter Terrorism Dialogue in Beijing China with former senior U.S. Military and Diplomatic leaders.

Christopher DeMuth is a Distinguished Fellow at Hudson Institute in Washington, DC. He was President of the American Enterprise Institute for Public Policy Research (AEI) from 1986-2008 and D.C. Searle Senior Fellow at AEI from 2008-2011. DeMuth attended Harvard College (A.B. 1968), and the University of Chicago Law School (J.D. 1973). He served as Staff Assistant to President Richard M. Nixon in 1969-1970, working first for Daniel P. Moynihan (then Assistant to the President for Urban Affairs) on urban policy matters and then as Chairman of the White House Task Force on Environmental Policy. Following law school, he practiced regulatory, antitrust, and general corporate law with Sidley & Austin in Chicago (1973-1976) and was Associate General Counsel of the Consolidated Rail Corporation (Conrail) in Philadelphia (1976-1977). From 1977-1981, DeMuth was Lecturer in Public Policy at the Kennedy School of Government, Harvard University, Cambridge, Massachusetts, and Director of the Harvard Faculty Project on Regulation. There he taught courses on law, economics, and regulatory policy and conducted and sponsored research on health, safety, environmental, and economic regulation. Returning to Washington in 1981, DeMuth served as Administrator for Information and Regulatory Affairs in the U.S. Office of Management and Budget, and as Executive Director of the Presidential Task Force on Regulatory Relief, during President Ronald Reagan’s first term of office. From 1984-1986, he was Managing Director of Lexecon Inc., a law-and-economics consulting firm; in 1986, he was also Publisher and Editor-in-Chief of Regulation magazine. He was elected President of the American Enterprise Institute in December 1986.

Van Hipp is Chairman of American Defense International, Inc. (ADI), a Washington, DC based consulting firm specializing in government affairs, business development and public relations. From 1986 to 1989, he served as the Chairman of the South Carolina Republican Party. In 1990, Mr. Hipp was sworn in as Deputy Assistant Secretary of the Army (Reserve Forces and Mobilization). In this capacity, he served as the Army
Secretariat’s "point man" for the successful mobilization, and then demobilization, of the Army’s reserve forces for Operation Desert Shield/Storm. He was named by Secretary of Defense Dick Cheney to be the Principal Deputy General Counsel of the Navy. Mr. Hipp is a veteran of the U.S. Army and served on active duty in both Operation Desert Storm and Operation Restore Democracy. He continues to speak on defense issues at public forums across the country, and his articles on defense and international policy have been widely read in the national print media. His book, The New Terrorism: How to Fight It and Defeat It, was published in February 2015. He currently serves on the Board of Directors of the American Conservative Union and The National Capitol Board of The Salvation Army. He is also on the board of the Palmetto Promise Institute and is a member of the Committee on the Present Danger.

**Mike Rogers** is a former member of Congress representing Michigan's Eighth Congressional District, and previously served as an officer in the U.S. Army and FBI special agent. He is a highly sought-after expert on national security issues, intelligence affairs, and cybersecurity policy. He advises multiple boards and academic institutions, working to enhance America's strength and security. Mr. Rogers built a reputation as a leader on cybersecurity, intelligence, and national security policy from his years of service in the U.S. House of Representatives, where he chaired the powerful House Permanent Select Committee on Intelligence (HPSCI). As chairman, he authorized and oversaw a budget of $70 billion that funded the nation's 17 intelligence agencies. In Congress Mr. Rogers was—and remains—a prominent leader on cybersecurity, shepherding multiple cybersecurity bills through the legislative process, and greatly enhancing America’s cybersecurity posture. In Congress, Mr. Rogers worked across the aisle with two presidents, Congressional leadership, countless diplomats, military service members, and intelligence professionals to ensure the brave men and women who fight for our nation are equipped with the resources necessary to get the job done.

Today, Mr. Rogers advises C-suite executives from Fortune 100 companies, providing analysis and expertise on the challenges facing companies operating in the digital era, and on cybersecurity and executive leadership. Additionally, Mr. Rogers is a Senior Fellow at Harvard University, a member of the Board of Trustees and the David Abshire Chair at the Center for the Study of the Presidency and Congress, a Distinguished Fellow at the Hudson Institute, and a member of the Advisory Board for George Mason University's National Security and Law Policy Institute.

**R. Paul Stimers** is a partner at K&L Gates LLP and the founder of the Quantum Industry Coalition. He focuses his policy advocacy efforts on matters related to emerging technologies, such as commercial spaceflight, IT, nanotechnology, and water technology, and advises a wide range of companies and industry associations in pursuing legislation and representing their interests before Congress and federal agencies. As policy counsel to several major commercial spaceflight companies and the leading industry association for commercial spaceflight, Mr. Stimers has been active in helping the industry grow quickly and safely, while continuing to support a strong role for NASA in space exploration. He works with software companies and industry associations to ensure data and network security without restricting technological
development. He has helped manage industry-wide efforts to prevent technology mandates while improving security. He has also assisted companies in developing privacy policies that protect consumers’ personal information while enabling new products and services. In the field of information technology policy, Mr. Stimers is actively involved in matters relating to Internet governance. Mr. Stimers was listed among the “40 Under 40: K Street’s New Generation of Lobbyists” by The Washingtonian. Most recently, he was nationally ranked by Chambers USA 2015 under “Government: Government Relations (Up and Coming).”

**Technical Advisory Board**

**Michael Brett** is Chief Executive Officer and co-Founder of QxBranch and is leading the company’s mission to solve complex analytical problems using the most advanced techniques available. An expert in complex systems, he has extensive experience developing and accelerating adoption of early-stage technologies and delivering projects in aerospace, defense, and data analytics. Prior to QxBranch, Mr. Brett was Chief Operating Officer of Shoal Group (formerly Aerospace Concepts), a systems engineering firm based in Canberra, Australia where he was responsible for daily operations and project delivery across the company. His work in leading technology organizations has been recognized many times including selection as one of five global Young Space Leaders by the International Astronautical Federation in 2014, an Australian Leadership Award in 2013, and one of the Most Inspiring Young Engineers by Engineers Australia. He has authored several technical publications in the field of probabilistic risk analysis and has been interviewed by news outlets such as Washington Post, Australian Financial Review, South China Morning Post, and ABC Science Online.

**Idalia Friedson** is a business consultant at Publicis.Sapient where she focuses on developing and implementing information technology solutions for the public sector. Previously, she was a Research Associate and Project Manager at Hudson Institute where she helped co-found the Quantum Alliance Initiative. She co-authored the report, “Quantum Computing: How to Address the National Security Risk” (Hudson Institute, August 2018). Her work also includes “How Quantum Computing Threatens Blockchain” (National Review) and “Behind Enemy Transmission Lines” (National Review), which emphasizes the role that quantum cybersecurity can play in securing the electric grid. Ms. Friedson assisted in convening Hudson’s international conference on quantum technology, where she chaired the panel on quantum cybersecurity. She graduated from Amherst College with a B.A. in law, jurisprudence, and social thought.

**Charles Harvey Jr.** is a Senior Advisor to American Defense International. He has extensive experience in the information technology sector and worked with classified U.S. Federal Government customers and classified programs to provide advanced technologies to defense related organizations. He founded TurboImmigration to deliver cloud based applications to consumers and G2 Consulting, G2 Asia. He also served as VP of Business Development for Tahoe Networks and before that as Director of Global
Business Development for Ericsson. He holds a Bachelor of Science in Business Administration from The Citadel.

**Martin Laforest** is the head of scientific outreach at the Institute for Quantum Computing, University of Waterloo. Dr. Laforest specializes in translating the technicalities and the impacts of quantum information science and technology to broad audiences including stakeholders in government, industry, media and the general public. He also oversees all aspects of IQC’s educational outreach. Dr. Laforest holds a PhD in Physics, specializing in experimental quantum information.

**Chris Monroe** is Chief Scientist at IonQ and Professor of Physics at the University of Maryland and a member of the National Quantum Initiative. He is a leading atomic physicist and quantum information scientist and demonstrated the first quantum gate in any system at NIST in the 1990s. At the University of Michigan and the University of Maryland, he discovered new ways to scale trapped ion qubits and simplify their control with semiconductor chip traps, simplified lasers, and photonic interfaces for long-distance entanglement.

**Ray Newell** Ph.D. leads the Quantum Communications Team at the Los Alamos National Laboratory. In this role, he leads research on satellite-to-ground quantum communication systems, terrestrial systems operating over installed fiber optic networks, and applications of quantum technologies for critical infrastructure protection. In addition, Dr. Newell is the lead optical engineer for SuperCam, a remote-sensing spectrometer suite on the Mars2020 rover. He received his doctorate and Master’s in atomic physics from the University of Wisconsin-Madison and Bachelor’s degree from Pomona College.

**Aaron VanDevender** Ph.D. is the Chief Scientist and a Principal at Founders Fund. He monitors the scientific impact of the portfolio, works with portfolio companies, assesses new technologies, and conducts his own research. Prior to Founders Fund, Dr. VanDevender was CTO of enterprise war games firm The Prosperity Institute. He has designed single-photon and single-atom quantum computers in academia and government (NIST), advanced the quantum-mechanical theory for microscopic black holes, patented the fastest transparent optical switch, and is a co-inventor of yoctotechnology (named after the smallest unit prefix on the SI scale). He then developed next-generation DNA sequencing technology at Halcyon Molecular. His broad scientific interests encompass energy, biotech, nanotech, and computing. Dr. VanDevender received a SB from MIT and a PhD in physics from the University of Illinois at Urbana-Champaign. In addition to entrepreneurial science, he is a professional skydiver.
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