U.S. Frontiers in Biotech: Interview with Abigail Kukura about Strategy, Science, and the Road Ahead

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Biotechnology is more than just an emerging scientific frontier, it also impacts global economy, competition, and societal transformation. To learn about a more expanded context of biotech innovations in the US economy, geopolitics, and society, I asked several questions to Abigail Kukura, the Director of Future Technology Platforms at the Special Competitive Studies Project (SCSP).

Founded Dr. Eric Schmidt, former CEO of Google, SCSP is a non-partisan, non-profit initiative with a clear mission: to make recommendations to strengthen America’s long-term competitiveness as artificial intelligence (AI) and other emerging technologies are reshaping our national security, economy, and society.

Abigail’s unique position—combining international security strategy with biotech—enables her to see the broader picture beyond just technological progress; As you read on, you’ll gain insights into not just where biotechnology might take us, but how it’s reshaping the global stage.

Andrii: Abigail, can you share a bit about your personal journey into the biotech sector and what inspired you to take on the role of Director, Future Technology Platforms at the SCSP?
Abigail: My education and experience has been aimed at international security strategy and policymaking. I have always particularly enjoyed working at the intersection of various disciplines and bringing the right actors together to build bridges and translate ideas into action. With that in mind, I joined SCSP because it seemed like a fantastic opportunity to help shape policy at the intersection of technology and national security. Two years into my work here, it has been amazing to dive into biotechnology and learn from those driving the cutting edge of the field. I see my role as helping to translate those insights to policymakers and get them excited about the promise of biotechnology and how it will reshape our world in ways that we can only begin to see today.

Andrii: The Special Competitive Studies Project was initiated by Dr. Eric Schmidt. From your perspective, what is the core mission of the SCSP, and how does it align with America's broader goals in emerging technologies?

Abigail: The core mission of SCSP is to make recommendations to bolster U.S. competitiveness for an age in which emerging technologies like AI, biotechnology, and more are transforming our economy, society, and national security.
Our work takes its inspiration from two historical projects: one near and one far. Its near history is the National Security Commission on Artificial Intelligence, a congressionally-mandated commission that was co-chaired by Dr. Eric Schmidt and directed by Ylli Bajraktari from 2019-2021 with a focus on the national security implications of AI. Towards the end of that timeframe, Dr. Schmidt was working on a book with Dr. Henry Kissinger called The Age of AI. Dr. Kissinger told Dr. Schmidt about a project that he led in the 1950s called the Special Studies Project (SSP), whose mission was to help prepare the nation for a new era in great power competition where nuclear technology was poised to transform our national security, economy, and society. Dr. Kissinger pointed out that we are at a similar pivot point today, in which many transformational technologies are on the horizon. In contrast to the 1950s, however, it is the private sector rather than government driving the cutting edge of those fields.

SCSP is carrying forward the work of NSCAI with an expanded focus on a wider set of technologies and drawing inspiration from the SSP to model what a public-private process for national technology strategy would look like. This is the logic that has led to us developing National Action Plans for key technology areas. The basic idea of the plans is to build on work the government is already doing, look further out on the horizon, and gather insights from across the innovation ecosystem and especially from the private sector that the government may not otherwise have access to.

Andrii: The recent report mentions the vast scope of biotechnology, touching on everything from health to manufacturing. As someone deeply involved in these areas, where do you see the most transformative applications of biotech in the next decade?

Abigail: I think over the long-term, biotechnology will truly be transformational in all of the application areas that it touches. As a general purpose technology, it will be a new building block that we can use for a much wider range of purposes than we can possibly imagine today.

Looking specifically towards the next decade, I think some of the most transformative biotech applications will likely be at the intersection of AI and biotechnology, particularly in areas like healthcare and therapeutics. As we discuss in SCSP’s latest report, Generative AI: The Future of Innovation Power, generative AI is driving a flywheel of value creation in which innovation will beget more, faster, and broader innovation. This starts with how AI is converging with other sectors like biotechnology, and will ultimately bring us closer to the prospect of a more general form of AI. Breakthroughs like AlphaFold have already demonstrated how Generative AI is accelerating biotech. But we will need to gather and develop
more datasets like the protein database that enabled AlphaFold.

Looking more specifically at biotech opportunities, advances in gene editing, cell therapy, and synthetic biology could lead to more personalized medicine and to curative treatments for diseases that lack effective therapies today. Biomanufacturing innovations can also enable more distributed, resilient production of essential medicines. Beyond healthcare, biotech will continue transforming manufacturing, agriculture, and other sectors so I’m really excited to see what possibilities and opportunities are coming over the horizon. However, some of those gains may take slightly longer to commercialize.

**Andrii:** The US has historically been a leader in the biotech space. Yet, as noted in the report, other regions, like Europe, Israel, and Singapore, are making significant strides. What are the key strategies or actions you believe the US needs to adopt to maintain its leadership in the long run?

**Abigail:** There is room for many winners in biotechnology and we should be encouraging and working alongside our allies and partners who are making tremendous strides in this space. At the same time, general purpose technologies are ultimately defined by their diffusion and adoption. We need to make sure that the United States is organized to translate its current technological edge in biotechnology into long-term leadership that is — at least in part — grown at home.

To that end, the U.S. should continue investing in basic and applied R&D while also aligning incentives for commercialization and scaling of biotech innovations. Strategic public-private partnerships, workforce development, and collaboration with allies on R&D or joint commercial ventures can all help match bold technology ideas with the resources and talent needed to achieve them. Finally, the United States needs to proactively work with like-minded countries to set rules-of-the-road for biotechnology that advance our democratic values and interests.

**Andrii:** Considering the People Republic of China (PRC)’s significant investments and advancements in biotechnology, what is the SCSP’s viewpoint on collaborations between the U.S. and PRC ecosystems? And, on the flip side, where should the U.S. be most delicate?
Abigail: China is home to a lot of amazing innovation. The United States and the broader global community should be open to the positive contributions China can make -- and is making -- in biotech areas like medicine and increased food supply. But it is important to be clear-eyed about the realities of this technology and the competition we are in. Biotechnology is inherently dual-use and even if 99 out of 100 applications are for the betterment of society, the very same tools can also be used for asymmetrically dangerous applications. Additionally, we are not competing with the PRC on a level playing field, as PRC biotechnology institutions and firms use multiple channels to absorb U.S. intellectual property (IP), including universities and labs, two-way investment, corporate and academic partnerships, talent programs, and licit and illicit access to U.S. data.

U.S. and democratic leadership in biotechnology, and the ecosystem that enables it, can only be sustained if common sense guardrails are in place to mitigate against these threats. In particular, we should avoid enabling PRC “platform advantage” in biotechnology areas, such that the United States and/or our allies and partners are reliant on PRC platforms to store sensitive biological data or to produce and distribute essential products such as medicines. History teaches us that innovation thrives in freedom, and the democratic values that the U.S. and its allies promote -- like transparency and the free exchange of ideas -- are critical to sustaining a healthy ecosystem for scientific discovery. Those values are worth defending.

Andrii: Drawing from the findings and recommendations of the 'National Action Plan,' what is your vision for the U.S. bioeconomy in 2030? And on a personal note, where do you see your own contributions within this evolving landscape?

Abigail: In 2030, I hope to see the United States leading the world alongside allies and partners in catalyzing biotechnology research, development, and commercialization. If we make the right investments and policy choices today, we can catalyze a future bioeconomy that delivers solutions to pressing global challenges while advancing democratic values.

By combining the power of biotechnology and AI, we can significantly improve global food and water security through advances in drought-resistant crops and algae-based biofuels. We can also incorporate bioprocesses into the manufacturing of products ranging from medicines to clothing to construction materials, and move closer to a paradigm of reliable and routine bioengineering that enables us to design and build solutions for local needs. Finally, we need a strong security baseline for a world where people have the code base and the tools to build with biology. A global Bionet could enable global awareness of
and local rapid response to virtually any biothreat.

Realizing this vision will require concerted action across academia, industry, and government to fund cutting-edge R&D, align incentives, empower the entire innovation ecosystem, and promote collaboration with allies. If we lay the right groundwork today, biotechnology in 2030 and beyond promises to create a more secure, sustainable world that unlocks human potential.