



**Compete.**

Council on  
Competitiveness

# 2023 National Commissioners Summer Meeting Summary

Council on Competitiveness  
July 12, 2023

# 2023 Summer Meeting of the Board, Executive Committee & National Commissioners

10:30 a.m.

## Developing & Deploying Disruptive Tech – @ Speed & Scale

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**From left to right:** Mr. William Bates, Senior Advisor, Council on Competitiveness; Mr. Jim Clifton, Chairman, Gallup; Dr. Donde Plowman, Chancellor, University of Tennessee Knoxville; Dr. Darryll Pines, President, University of Maryland, College Park; Mr. Joshua Parker, CEO, Ancora; Mr. Paul P. Skoutelas, President and CEO, American Public Transport Association; Dr. Marlene Tromp, President, Boise State University; Dr. Santa Ono, President, University of Michigan; Dr. Jeff Gold, Executive Vice President and Provost, University of Nebraska System, and Chancellor, University of Nebraska Medical System Center; Mr. Dan Helfrich, Chair and CEO, Deloitte Consulting LLP, and Business Vice Chair, Council on Competitiveness; Dr. Mung Chiang, President, Purdue University; Ms. Janet Foutty, Business Vice Chair Emeritus, Council on Competitiveness; Dr. Suresh V. Garimella, President, University of Vermont; Dr. Dietra Trent, Executive Director, White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities; and Dr. Thomas Mason, Director, Los Alamos National Laboratory.



**From left to right:** The Honorable Deborah L. Wince-Smith, President and CEO, Council on Competitiveness; Dr. John Wagner, Director, Idaho National Laboratory; Mr. Brian Moynihan, Chair and CEO, Bank of America, and Chair, Council on Competitiveness; The Honorable Olin Wethington, CEO and Co-Founder, Graham Biosciences LLC; Ms. Joan Gabel, Chancellor, University of Pittsburgh, and Academic Vice Chair, Council on Competitiveness; Mr. Karl Engelbach, Associate Chancellor and Chief of Staff, UC Davis; Mr. Chad Evans, Executive Vice President, Secretary & Treasurer, Council on Competitiveness; Dr. René Lammers, Executive Vice President & Chief Scientific Officer, PepsiCo; Mr. Charles Holliday, Jr., Chair Emeritus, Council on Competitiveness, and Chair, GFCC; Dr. Jon McIntyre, Senior Fellow, Council on Competitiveness; Ms. Candace Culhane, Senior Advisor, Council on Competitiveness; Dr. James Peery, Director, Sandia National Laboratories; Dr. Victor Dzau, President, National Academy of Medicine; Dr. James Clements, President, Clemson University; Dr. Padma Raghavan, Vice Provost for Research and Innovation, Vanderbilt University; and Dr. Sylvia Thomas, Interim Vice President for Research & Innovation, University of South Florida.

# Agenda

## MORNING

### 9:00 Introduction and Welcome Remarks

The Honorable Deborah L. Wince-Smith  
President and CEO, Council on Competitiveness

Mr. Brian Moynihan  
Chair and CEO, Bank of America  
Chair, Council on Competitiveness

### 9:10 Keynote Remarks by Senator Martin Heinrich (D-NM) and Q&A

#### Introduction

Mr. Brian Moynihan  
Chair and CEO, Bank of America  
Chair, Council on Competitiveness

#### Initial Comments

Dr. Thomas Mason  
Director, Los Alamos National Laboratory  
Co-Chair, National Commission on Innovation and Competitiveness Frontiers

### 9:30 Roundtable Intros & “State of the Council”

**Introduction of New Business Vice Chair  
Mr. Dan Helfrich, Chair and CEO, Deloitte Consulting LLP**

Mr. Brian Moynihan  
Chair and CEO, Bank of America  
Chair, Council on Competitiveness

The Honorable Deborah L. Wince-Smith  
President and CEO, Council on Competitiveness

### 10:15 Coffee Break

### 10:30 Discussion of National Commission Phase 2, Pillar 1

#### The Future of Developing and Deploying Disruptive Technology at Speed and Scale

Dr. Mung Chiang  
President, Purdue University

Dr. Jeff Gold  
Executive Vice President and Provost, University of Nebraska System  
Chancellor, University of Nebraska Medical System Center

Dr. James Peery  
Director, Sandia National Laboratories

Dr. Darryll Pines  
President, University of Maryland

Dr. Sylvia Thomas  
Interim Vice President for Research & Innovation, University of South Florida

### 11:05 Discussion of National Commission Phase 2, Pillar 2

#### The Future of Place-Based Innovation

Dr. Suresh V. Garimella  
President, University of Vermont

**Dr. Santa Ono**  
President, University of Michigan

**Mr. Joshua Parker**  
CEO, Ancora

**Dr. Donde Plowman**  
Chancellor, University of Tennessee Knoxville

**Dr. Marlene Tromp**  
President, Boise State University

### 11:45 Special Remarks

**Dr. Dietra Trent**  
Executive Director, White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities

## AFTERNOON

**Noon Memorandum of Understanding Signing & Group Photo**

**12:15 Lunch**

**12:45 Discussion of National Commission Phase 2, Pillar 3**

### The Future of Work and the Workforce

**Dr. James Clements**  
President, Clemson University

**Mr. Jim Clifton**  
Chairman, Gallup

**Ms. Janet Foutty**  
Business Vice Chair Emeritus, Council on Competitiveness

**Ms. Joan T.A. Gabel**  
Chancellor, University of Pittsburgh  
Academic Vice-chair, Council on Competitiveness

**1:20 Discussion of National Commission Phase 2, Pillar 4**

### The Future of Sustainability

**Mr. Charles Holliday, Jr.**  
Chair Emeritus, Council on Competitiveness  
Chair, GFCC

**Dr. René Lammers**  
Executive Vice President & Chief Scientific Officer, PepsiCo

**Dr. Jon McIntyre**  
Senior Fellow, Council on Competitiveness

**Dr. John Wagner**  
Director, Idaho National Laboratory

**1:55 Discussion: Preparing for NCF 2023 and Engaging in the 2024 Election Cycle & Global Opportunities**

**The Honorable Deborah L. Wince-Smith**  
President and CEO, Council on Competitiveness

**Dr. Victor Dzau**  
President, National Academy of Medicine

**The Honorable Olin Wethington**  
CEO and Co-Founder, Graham Biosciences LLC

**2:25 Closing Remarks**

**Mr. Brian Moynihan**  
Chair and CEO, Bank of America  
Chair, Council on Competitiveness

**The Honorable Deborah L. Wince-Smith**  
President and CEO, Council on Competitiveness

# Participants

## **COUNCIL BOARD**

**Mr. Brian Moynihan**

Chair and CEO, Bank of America  
Chair, Council on Competitiveness

**Ms. Janet Foutty**

Business Vice Chair Emeritus, Council  
on Competitiveness

**Ms. Joan T.A. Gabel**

Chancellor, University of Pittsburgh  
Academic Vice Chair, Council on Competitiveness

**Mr. Dan Helfrich**

Chair and CEO, Deloitte Consulting LLP  
Business Vice Chair, Council on Competitiveness

**Mr. Charles Holliday, Jr.**

Chair Emeritus, Council on Competitiveness  
Chair, GFCC

**The Honorable Deborah L. Wince-Smith**

President and CEO, Council on Competitiveness

**Mr. Chad Evans**

Executive Vice President, Secretary & Treasurer,  
Council on Competitiveness

## **SPECIAL GUESTS**

**Senator Martin Heinrich (D-NM)**

**Dr. Dietra Trent**

Executive Director, White House Initiative on  
Advancing Educational Equity, Excellence, and  
Economic Opportunity through Historically Black  
Colleges and Universities

**Dr. Chalres Tahan**

Director, National Quantum Coordination  
Office, White House Office of Science  
and Technology Policy

## **COUNCIL EXECUTIVE COMMITTEE AND/OR NATIONAL COMMISSION LEADERSHIP**

**Dr. Mung Chiang**

President, Purdue University

**Dr. James Clements**

President, Clemson University

**Mr. Jim Clifton**

Chairman, Gallup

**Dr. Victor Dzau**

President, National Academy of Medicine

**Mr. Karl Engelbach**

Associate Chancellor and Chief of Staff, UC Davis

**Dr. Suresh V. Garimella**

President, University of Vermont



**Dr. Jeff Gold**

Executive Vice President and Provost, University of Nebraska System  
Chancellor, University of Nebraska Medical System Center

**Dr. René Lammers**

Executive Vice President & Chief Scientific Officer, PepsiCo

**Dr. Jon McIntyre**

Senior Fellow, Council on Competitiveness

**Dr. Thomas Mason**

Director, Los Alamos National Laboratory

**Dr. Santa Ono**

President, University of Michigan

**Mr. Joshua Parker**

CEO, Ancora

**Dr. James Peery**

Director, Sandia National Laboratories

**Dr. Darryll Pines**

President, University of Maryland, College Park

**Dr. Donde Plowman**

Chancellor, University of Tennessee Knoxville

**Dr. Padma Raghavan**

Vice Provost for Research and Innovation, Vanderbilt University

**Mr. Paul P. Skoutelas**

President and CEO, American Public Transport Association

**Dr. Sylvia Thomas**

Interim Vice President for Research & Innovation, University of South Florida

**Dr. Marlene Tromp**

President, Boise State University

**Dr. John Wagner**

Director, Idaho National Laboratory

**The Honorable Olin Wethington**

CEO and Co-Founder, Graham Biosciences LLC

**COUNCIL TEAM****Mr. William Bates**

Senior Advisor, Council on Competitiveness

**Ms. Candace Culhane**

Senior Advisor, Council on Competitiveness

**Ms. Marcy Jones**

Special Assistant to the CEO, Council on Competitiveness

**Ms. Katie Archer**

Vice President, Keybridge

**Mr. Dhruva Someshwar**

Senior Research Assistant, Keybridge

**Mr. Steve Jost**

Senior Vice President for Content Strategy, Subject Matter

**Mr. Michael Nelson**

Senior Director, Subject Matter

**Ms. Emily Premo**

Account Associate, Subject Matter

# Introduction

On July 12, 2023, members of the Council on Competitiveness Board and Executive Committee, and Commissioners and Advisors from the National Commission on Innovation and Competitiveness Frontiers came together at Gallup World Headquarters to take stock of the Council's work and explore the challenges and opportunities driving Phase 2 of the National Commission's work. The assembled leaders represented U.S. businesses, universities, the National Academies, and U.S. national laboratories.

Special guests addressed the gathering including United States Senator Martin Heinrich; Dr. Dietra Trent, Executive Director of the White House Initiative on Advanced Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities; and Dr. Charles Tahan, Director of the National Quantum Coordination Office at the White House Office of Science and Technology Policy.



*Council on Competitiveness 2023 Summer Meeting at The Gallup Building, Washington, DC. Attendees included the Council Board, Executive Committee and National Commissioners.*



**Top:** Council on Competitiveness 2023 Summer Meeting at The Gallup Building, Washington, DC. Attendees included the Council Board, Executive Committee and National Commissioners.

**At left, from left to right:** Dr. Mung Chiang, President, Purdue University; Dr. Suresh V. Garimella, President, University of Vermont; and Dr. Darryll Pines, President, University of Maryland, College Park.

# Key Takeaways

## The Future of Developing and Deploying Disruptive Technology at Speed and Scale

**The United States should strive to achieve and maintain first mover advantage in key emerging technologies with national security implications.** For emerging technologies such as quantum, AI, advanced semiconductors, and biotechnology, the United States must mount a full-fledged effort across the innovation process because the risk of falling behind is too high. This includes making investments in R&D and potential applications, developing research infrastructure, deliberating on policies and regulatory issues, and working with allies internationally. To ensure people are ready to do the work on commercialization and execution, we must think about the education and skills that will be required including scientists and engineers at all degree levels, production workers, innovation and commercialization specialists, and K-12 that feeds into the workforce pipeline.

**A range of barriers inhibit the speed of innovation.** While the U.S. innovation system has seen major investment in tools for innovation—such as high-performance computing, modeling, and simulation—barriers continue to hamper speed, while China appears to be working at greater speed and scale. U.S. barriers include bureaucratic red tape, risk aversion, and regulation and regulatory process, including in the Department of Defense acquisition process and at federal laboratories.

**Companies, government, and places face challenges in scaling technology.** Start-ups need to add capacity without scaling expenses, and they need to develop enterprise scale systems and management. Some places lack enough workers to scale tech-based production or a growing company. So, to scale, the company may need to relocate to a larger population center and the region may lose returns on

innovation investments it had made. Whether a government or company technology development effort, every time you go up a technology readiness level, costs often rise by a factor of ten.

**There is opportunity for significant economic and competitive benefits in addressing the aging population.** These include developing interventions in the aging process; using technologies such as remote monitoring, autonomous vehicles, and smart homes to make life easier for the aging; and keeping older people in the workforce. An industry with large markets for innovation and products will emerge.

**The United States should leverage its global leadership to improve the U.S. competitive position in the new global economy.** The United States does not take sufficient advantage to improve its competitive position of its ownership and participation in international institutions, arrangements, and agreements that develop rules of the game for the new technology-driven global economy. In addition, the potential for collaborative R&D with strong like-minded players where we come together on a complimentary basis has not been fully tapped. New models should be explored for stimulating bilateral conversation and exploration for working with allies on these issues.

**There needs to be a strong private sector voice in international competitiveness- and technology-related issues.** This includes a voice in international standards setting, use of the massive resources multilateral development banks have, coordination on controls of strategic technology, controls on investment where there are security implications, and rules of the game.

# The Future of Placed-Based Innovation

**Certain ingredients appear crucial for placed-based innovation and growth.** These include: a research university anchor, workforce of adequate size to bring innovating firms to scale, quality of life, quality of housing, and a good start-up culture. When government, universities, businesses, tech hubs, and K-12 come together in partnership, they can accelerate research translation—going from bench to market idea to product in a consortium that works across those alliances. When universities and companies, or multiple companies are co-located, proximity creates opportunities for collaboration in developing innovations that otherwise would not occur.

**Some universities have undertaken significant efforts to build strong ties with industry in R&D and workforce training, creating a more seamless economic and innovation ecosystem.** Examples include: inviting companies to locate facilities on or near campus, creating specialized degree programs aligned with the region's industries, establishing industry advisory boards, placing student interns in nearby companies, taking university research and expertise directly to industry through specialized innovation campuses or technology centers, creating an office devoted to engaging and fostering partnerships with industry, partnering with industry on joint development projects, establishing corporate endowed chairs, and corporate funding of masters and Ph.D. fellows and student scholars.

**The federal government and universities are taking steps to expand and strengthen innovation ecosystems in disadvantaged and rural communities.** Examples include: boosting federal research investment, research capacity, research centers, and digital infrastructure at HBCUs; holding innovation labs in underserved communities; talking with K-12

students about the innovation mind-set; establishing an incubator linked to an inner-city high-tech high school; sending university faculty into rural and farm communities to teach students who cannot leave home for a campus-based higher education; and developing a training facility that serves a rural area that otherwise would not be available.

**A small seed can grow an innovation ecosystem.** An initially limited partnership in emerging technology can serve as a foundation on which, overtime, a robust ecosystem can grow into a major technology hub involving a research institute, post-doctoral training, start-ups, user facility, additional partnerships involving academia, government laboratories, and business, and, eventually, international connections.

**Universities face a financial squeeze that will require new ways of thinking about their physical assets.** We have come to the end of a 30-year run of low interest financing for university facilities. Also, we are coming to the end of an ever-accelerating tuition growth rate, which is going to start capping the income potential for universities and limit the off-balance sheet debt they have been using for growth. If income is limited and there are few expenses to cut, universities must get more out of existing assets. This is an opportunity to rethink use of university infrastructure and how that can impact innovation, entrepreneurship, and growth in surrounding communities.

# The Future of Work and the Workforce

**The American spirit provides a competitive edge.** Compared to other nations, having a higher percentage of workers who are highly engaged—committed to building things, building a customer base, and building teams—has provided the United States with a competitive edge and enabled the country to outperform other countries.

**The current workforce must be prepared for the future of technology and work.** While, much attention has focused on preparing university students for emerging technologies, more attention needs to be paid to preparing incumbent workers for future jobs. Also, we need to develop early in students a capacity to move into jobs when they emerge but may not currently exist.

**The Nation's leaders must be prepared for the future of technology.** We need to develop the sophistication in C-suites, boards, and policymakers

needed to navigate waves of emerging technologies and the creative-destruction, competitive, and market challenges they will present. This includes educating policymakers on potential applications, and economic and social benefits of the multiple disruptive technologies that are emerging. Case studies and stories of real-world benefits from applications is one approach.

**The United States is in crisis with a shortage of nurses and doctors, impacting hospitals and their ability to provide care.** AI could address the need to reduce the administrative burden on these health care professional, and augmented and virtual reality could be used at greater scale for health care training and serving patients. This is a significant competitiveness issue since healthcare accounts for 20 percent of U.S. GDP.

# The Future of Sustainability

**Investment to achieve greater sustainability in a wider range of areas is needed.** While there has been significant investment in renewable energy and transportation electrification, greater attention to and investment in sustainability is needed in water, food waste, hard to decarbonize industries such as cement and steel, emissions and waste in health care and its supply chain, and packaging and recycling.

**Water is a pervasive issue, and the biggest challenge facing the planet and ensuring the food supply.** With increasing water stress, rapid urbanization, high-levels of water draws for agriculture, and

use in manufacturing, greater investment is needed in developing water technology including low-energy desalination and filtration technology, and water infrastructure and engineering. Given this is a global challenge, it is an opportunity for U.S. global competitive leadership.

**Rising global population means rising demand for food.** Given global population growth's rising demand for food, and the environmental effects of agriculture and food production, greater investments is needed in food science, food innovation, and developing technology solutions.

## KEYNOTE ADDRESS

# United States Senator Martin Heinrich

Senator Heinrich's keynote address kicked-off the day. He serves on several Congressional committees important to the Council's and National Commission's work—Committee on Energy and Natural Resources, Committee on Appropriations, Select Committee on Intelligence, and Joint Economic Committee. His address focused on artificial intelligence and machine learning.

**AI is a disruptor.** Humans are wired to think about change in a linear fashion. But, when change is not linear, we tend to miss basic developments and be surprised when things change much more quickly. There was not much interest in joining the AI caucus when Senators Heinrich and Portman formed it in 2019. However, AI has burst onto the scene capturing the public's attention, so now there is enormous interest in AI and machine learning on Capitol Hill. Recently they held their first briefing on AI for senators, explaining how AI worked.

**AI is going to change our economy in a deeply meaningful way.** AI holds enormous potential for increases in productivity and efficiency. Writing basic computer code, legal documents, and contracts will be impacted. AI is great at analyzing and finding patterns in complex data sets. On the horizon are applications for complex optimization problems, such as on the power grid, and for drug discovery.

While some of the concern about AI risks is hyperbole, there are very real risks that must be considered, for example, perpetuating bias. We cannot bake bias into a platform that determines whether or not somebody gets a mortgage or loan, and we have to guard against scams and deepfakes.



*Brian T. Moynihan, Chair, Council on Competitiveness, and Chief Executive Officer, Bank of America Senator; and Sen. Martin Heinrich (D-NM)*

**The United States is well ahead of its competitors right now, but there is no guarantee that will continue.** Barriers to entry are coming down quickly. Other actors with far fewer financial resources, even far less computational power, are able to enter this space and compete. So, there is a great deal of support for making thoughtful investments to maintain U.S. leadership.

**Federal departments and agencies play important roles.** The Department of Energy has long worked on high performance computing, machine learning, and AI. Other departments and agencies that have important roles include NIST, the National Science Foundation, and the Department of Defense (DOD). For example, DOD is doing amazing things with its unique data. Senator Heinrich does not

believe we need a new agency to deal with AI, but rather should invest in existing agencies that can best meet the current challenges.

**Workforce is crucial.** We need to make AI relevant to students and people early in their careers. Senator Heinrich is going to be working on legislation to create a cloud-based national AI research resource available across the country. For example, based on the quality of their applications, researchers can get time on the radio telescopes located in New Mexico. We can manage an AI cloud resource in much the same way to ensure the best minds from all geographies are engaged.

**Appropriate guardrails for AI need to be put in place.** There are holes in our legal structure that did not anticipate this technology. But we have values as a country that do not change in areas such as intellectual property, elections, civil rights, ethics, and privacy. We need to build a legal framework that reinforces the principles of trustworthy AI such as transparency, accountability, avoidance of bias, reliability, data governance, and human control.

## Q&A with the Senator

### **Broader impacts of federal R&D investment.**

Federal investments in national security-motivated R&D have had substantial and, sometimes, unexpected benefits for broader societal issues. For example, technology originally developed to enable submarines to accurately determine their position so they could target sub-launched ballistic missiles has had huge commercial impact. Another example is the work done in high performance computing, modeling, and simulation to certify our nuclear stockpile, combined with work on understanding the fate and transport of radionuclides in the atmosphere, underpins significant contributions to our knowledge of climate change and how we model it.

Some federal work primarily focused on developing tools for national security, for example, in transformational computing, will have utility in areas such as the grid and clean energy transformation. We need to

bake that into our thinking about investments. Also, we need to consider the interplay between the public and private sector, for example, with respect to the national laboratories, since there is a limited number of private sector firms with the capacity to do really high-performance computer processing.

**Developing AI policies and regulation.** There is hope that Congress will follow the bipartisan CHIPS and Science Act playbook and bring all the stakeholders to the table. We need to take a leap of faith. AI is coming, and we can either be a leader or a laggard. People are going to make a lot of money from AI. Do we want U.S. companies to make the money, or someone else? Most members of Congress agree on trying to maximize the opportunities and minimize the risks.

Since AI is global, as the United States establishes regulatory and other policies, we need to talk to the Europeans and others to ensure that U.S. companies are not disadvantaged. We need to both get our own house in order but also have conversations with all of our allies. Senator Heinrich pointed to a similar situation with awareness about the need for supply chains within the control of our country or at least with our allies. We need to map out where there is risk in supply chains for critical goods and fill those gaps together with our allies.

Concern was raised about regulatory issues on something moving so fast, and ensuring the Administration has authority broad enough to regulate the technology but narrow enough to avoid the intervention of the courts. Congress has a lot of experience ensuring regulations are risk-based. Some AI applications will not have the risk that raises the need for regulation, but other applications may need regulating, for example, those that approve or deny a mortgage.

To develop regulations, Senator Heinrich indicated that Congress should use its existing committee structure. The Judiciary Committee is going to be important on legal issues, but other committees will be important on technology questions.



# Meeting Insights

The Council's new Vice Chair for Business, Dan Helfrich, Chair and CEO of Deloitte Consulting, was introduced and welcomed. He is succeeding Janet Foutty, Deloitte's former Executive Chair of the Board, who served as Vice Chair for more than two years. Council Chair Moynihan thanked Janet for her service. She said it was a privilege to engage deeply in competitiveness issues, noting that technology and innovation, and talent and workforce have been at the epicenter of her career, and that is has been a perfect time to bring those issues front and center in the Council's work.

Dan indicated that throughout his career he liked the idea of being a private sector business leader working with the public sector on the most meaningful issues in our country. And, during his short time in his new capacity at the Council, he was struck by the strong emphasis on unleashing innovation across all of the United States through the distributed power of academia, labor, government, and business. He is excited to engage personally to drive the business community to engage in that.

## State of the Council on Competitiveness

Council President and CEO Deborah Wince-Smith welcomed members of the Council Board and Executive Committee, National Commissioners, speakers, and other participants. She recognized the Council's New Labor Vice Chair, Kenneth Cooper, International President of the International Brotherhood of Electrical Workers. She also welcomed new members of the Council and Commission including Rehan Chaudhri, Chairman, Altan Partners LLC; Mung Chiang,

President, Purdue University; David Danielson, Managing Director, Breakthrough Energy Ventures; Daniel Diermeier, Chancellor, Vanderbilt University; Mike Freeman, CEO, Innosphere Ventures; Santa Ono, President, University of Michigan; Elizabeth McGill, President, University of Pennsylvania; Harold Martin, Chancellor, North Carolina A&T; Van Ton-Quinlivan, CEO, Futuro Health; James Ryan, President, University of Virginia; and Marlene Tromp, President, Boise State University.

Wince-Smith provided a snapshot of the Council's ongoing work:

- **University Leadership Forum.** Chaired by Michael Lovell, President of Marquette University and Jere Morehead, President of the University of Georgia, the Forum released a major statement on the CHIPS and Science Act, stressing the importance of appropriations for the programs and initiatives the Act authorized. Forum members engaged Senator Mark Warner in a discussion on the research agenda, including security, balancing the U.S. relationship with China, and the potential of collaborating with allies and partners. The Forum will meet in Washington, D.C., on October, 26, 2023. It will focus on workforce development, including working with Workforce Boards, labor unions, and others not traditionally engaged with higher education. Also, the Council's former Vice Chair for Universities, Michael Crow, is leading a new Association of University Governing Boards Council on Higher Education as a Strategic Asset, and Deborah Wince-Smith will serve as a Commissioner on the new Council.

- **Technology Leadership and Strategy Initiative.**

The Council's long-standing think tank on technology and innovation met on June 29 at Lockheed Martin's Advanced Technology Center in Palo Alto. The meeting was hosted by TLSI Co-chair, Dr. Steven Walker, Chief Technology Officer of Lockheed Martin, who was joined by two new TLSI co-chairs—Patricia Falcone, Deputy Director of Science and Technology at the Lawrence Livermore National Laboratory, and Sally Morton, Executive Vice President of Arizona State University. Rob McHenry, Deputy Director of DARPA, joined the meeting and wants the Department of Defense to have a more formal relationship with the Council.

The TLSI laid out a new set of policy ideas focused on ensuring U.S. leadership across critical technologies with economic and national security implications—such as AI, quantum, and next generation semiconductors—and how to address their dual use aspects. There was discussion about not diffusing scarce innovation resources, how to think more strategically about our investment choices, and on international collaboration with strategic allies around the globe.

The TLSI will meet on September 21st, hosted by Pat Falcone at Lawrence Livermore National Laboratory. This will be an opportunity to visit the National Ignition Facility, where the massive accomplishment of reaching ignition and fusion took place last December, as well as LLNL's high performance computing facilities.

- **Alliance for Transformational Computing.**

Formerly known as the Advanced Computing Roundtable, ATC is led by Michael McQuade from Carnegie Mellon University, Richard Arthur from GE Research, Tommy Gardner from HP-Federal, Lizy Paul from Lockheed Martin, and Rob Neely from Lawrence Livermore National Laboratory. The Council's Executive Committee and Commissioners were encouraged to bring people in to support this activity.

“It’s very clear to me that unleashing the power of academia, labor, government, and business and unleashing all 50 states in a relatively consistent manner is the magic that will help us achieve our potential as a country.”

**Dan Helfrich**

Chairman and CEO, Deloitte Consulting

- **Global Federation of Competitiveness**

**Councils.** Established in 2010, the GFCC is the Council's sister organization, chaired by the Council's Chair Emeritus, Chad Holliday. Thirty-five countries are represented, including members from competitiveness councils from around the world, universities, and government agencies such as the Japan Science and Technology Agency. The GFCC's 2022 Global Innovation Summit was hosted by partners in Greece around the topic of place-based innovation. This year, the Summit will be held November 13–14 in London, England, and hosted by Gallup and centered on the themes of sustainability, climate, and carbon mitigation.

- **Commemoration of the Good Friday/Belfast**

**Agreement.** The Council was asked by Queen's University Belfast (QUB) President and Vice Chancellor Ian Greer and QUB Chancellor Secretary Hillary Clinton to participate in the 25th anniversary commemoration of the Good Friday Agreement in Belfast. Council President Deborah Wince-Smith led a Council delegation and major panel comprised by: the Council's Academic Vice-Chair and University of Pittsburgh Chancellor Joan Gabel; Josh Parker, CEO of Ancora L&G; and Steve Ashby, Director of the Pacific Northwest National Laboratory.

- **National Competitiveness Forum.** In December 2022, the Council convened its first in-person National Competitiveness Forum since the inception of the COVID-19 pandemic. Leaders from the Administration joined the Forum, including a fireside chat with Arati Prabhakar, the President's Science Advisor and Director of the White House Office of Science and Technology Policy, and an address by Secretary of Commerce Gina Raimondo who discussed competitiveness, supply chain resiliency, and CHIPS Act opportunities.
- **Congressional Testimony.** Council President and CEO Deborah L. Wince-Smith testified before the inaugural hearing of the new Congress's House Committee on Science, Space, and Technology on Building a U.S. National Science and Technology Strategy. She shared many of the findings from the Commission's report *Competing in the Next Economy, A New Age of Innovation*.

## Looking Ahead: National Commission on Innovation and Competitiveness Frontiers

- **Major Policy Statement.** The near-term goal for the Commission is to release a policy statement at the 2023 National Competitiveness Forum to set the stage for the Commission's 2024 outreach to the Presidential campaigns and delivery of a major report to the next President in December 2024.
- **Competitiveness Conversations Across the Country.** Starting in 2024 and extending over the next few years, and under the auspices of the National Commission, the Council will engage its members in their regions to discover regional activities, opportunities, and priorities, and build those into the Commission agenda. Each Competitiveness Conversation will feature leaders representing a local innovation ecosystem.

On October 31st, a pilot conversation will be held in Washington, D.C., on the future of the space workforce, led by Commissioners Steven Isakowitz, President and CEO of The Aerospace

Corporation, and Sally Morton, Executive Vice President of Arizona State University. The next scheduled Competitiveness Conversation will take place in Nashville, co-chaired by Vanderbilt University Chancellor Daniel Diermeier and University of Tennessee, Knoxville Chancellor Donde Plowman – and focusing on the future of mobility.

Other Competitiveness Conversations across the Country, planned or developing include:

- Boise, hosted by Boise State University President Marlene Tromp and Idaho National Laboratory Director John Wagner.
- South Carolina, hosted by Clemson University President James Clements and University of South Carolina President Michael Amiridis.
- New Mexico, hosted by Los Alamos National Laboratory Director Thomas Mason and Sandia National Laboratories Director James Peery.
- Oklahoma, hosted by The University of Oklahoma President Joseph Harroz.
- The Midwest, hosted by Purdue University President Mung Chiang, the University of Illinois System President Timothy Killeen, and Argonne National Laboratory Director Paul Kearns.
- And many others to come...

The Commission meeting then turned to the four pillars of future competitiveness around which the Commission will focus its work over the next 18 months:

- The Future of Developing and Deploying Disruptive Technology at Speed and Scale
- The Future of Placed-Based Innovation
- The Future of Work and the Workforce
- The Future of Sustainability

For each pillar, several Commissioners made short kick-off framing remarks followed by group discussion.

# The Future of Technology: Developing and Deploying Disruptive Technology at Speed and Scale

## Issue Areas

- Bolstering the security, resiliency, and reliability of critical supply chains.
- Leveraging cross-disciplinary partnerships to harness the convergence of disruptive technologies.
- Reinforcing U.S. innovation leadership through national domestic strategies and international technology statecraft.
- Sustaining and properly allocating investments in R&D while removing barriers to commercialization of disruptive technologies.



**Dr. Mung Chiang**  
President  
Purdue University

Semiconductors are the foundation of all computing, including AI, and important to both national and economic security. To advance these technologies, Purdue is addressing all four issue areas: critical supply chains, partnerships, investment, and leadership:

- **Critical supply chains.** We must onshore and double down on the human talent pipeline, arguably the most important supply chain. Purdue created a semiconductor degrees program, endorsed by about 20 CEOs, and more than two dozen corporate CTOs and leaders who serve on a Semiconductor Degrees Leadership Board. They ensure Purdue's semiconductor education programming is relevant to the industry and national competitiveness.
- **Partnerships and investment.** Purdue welcomed Skywater to build a \$3 billion "baby fab" on campus within walking distance from student dorms and Purdue teaching facilities. In the morning, a student can take courses from professors in a clean room in which Purdue is investing hundreds of millions of dollars to upgrade. Or, in the afternoon, the student can go to Skywater or other companies in the industry.
- **Leadership.** Purdue is reinforcing U.S. leadership nationally and internationally. Purdue joined the Semiconductor Industry Association and trade groups on the Hill to engage with Senator Todd Young, who worked with Majority Leader Schumer to start what became the CHIPS and Science Act. Three years ago, Purdue was part of the conversation on the Endless Frontier Act, which

evolved into the CHIPS and Science Act, and with Secretary Raimondo about how government, industry, and academia can work together.

Purdue is working with like-minded nations, including Japan, India, and Europe. Purdue signed three MOUs at the G-7, including the U.S.-Japan Semiconductor Agreement. During Prime Minister Modi's visit, Purdue signed an MOU with leaders of the India Semiconductor Mission to work together on semiconductor workforce development, research, and innovation. Also, Purdue is welcoming imec, Europe's premiere center for semiconductor innovation, to open their R&D center in the United States on Purdue's campus within walking distance of student dorms.



### Dr. Jeff Gold

Executive Vice President and Provost  
University of Nebraska System  
Chancellor  
University of Nebraska Medical System Center

**Developing the health care workforce.** About three years ago, the University of Nebraska opened the Davis Global Center, a 200,000 square foot augmented and virtual reality training program, supported by \$140 million in state and private sector funding. The Center's aim is to build competence and confidence in the future health care workforce, put an end to high turnover in the healthcare workforce and raise the quality and safety of health care. The Center provides education and training in all

**“Not only do we increase competency and reduce medical errors, but it results in reduced length of stay, which has a tremendous economic and capacity impact and reduces cost.”**

### Dr. Jeff Gold

Chancellor  
University of Nebraska Medical System Center

areas, from the most complex surgical procedures to just-in-time learning for the military at the front of combat locations in field hospitals around the world.

The Center serves students in the University of Nebraska system and active military reservists, and works closely with the Departments of State, Homeland Security, Health and Human Services, and others. More than 140,000 unique learners have gone through the center thus far, including 45,000 who wear the cloth of our nation.

### Using augmented and virtual reality for training.

One of the Center's major advantages is team learning using AR/VR to create permanent muscle memory for health care professionals such as surgeons and other proceduralists. People who do cardiac catheterization can operate on a virtual patient a dozen or 100 times with the goal of minimizing blood loss, complications, operative time, and hospitalization, and only then go to the operating room and do a real patient.

The Center has worked with the private sector on research and development, for example, on new types of cardiac stents that were first tested in a virtual environment, then deployed in the exact human being for which the images were rendered with no complications and a perfect technical outcome. The Center serves neurosurgeons from all over the world planning complex surgical procedures to minimize neurological consequences and, at the same time, optimize tumor removal, aneurysm treatment, etc.

**Proof-of-concept.** Through the use of this training, in the university's own medical center, surgical wound infections and hospital acquired sepsis deaths are down to essentially zero, which has catapulted the center from the mid-tier of Vizient rankings up to the top ten for the last years.

### Discussion point

- **Communicating the potential of disruptive technologies.** In its next series of products, case studies, and stories, how does the Commission better communicate about disruptive technologies and their potential? There are productivity gains from the use of disruptive technologies, and it is important to communicate to policymakers that this is real and not just one technology. There are a suite of technologies and their convergence, which could convey competitive advantage.



**Dr. James Peery**

Director

Sandia National Laboratories

**What is limiting our speed and innovation?** In the 1980s, we could turn a concept for a new nuclear weapon around from an idea to a first production unit in four years. Today, despite enormous investments in modeling, simulation, and computation, and amazing facilities at the three national nuclear labs, it takes more than ten years to modernize a nuclear weapon system. In military acquisition programs,

“China is working at the speed that we used to work at in the 50s and the 60s.”

**Dr. James Peery**

Director

Sandia National Laboratories

the Department of Defense has similar extensions in how much time it takes to do a generation-four aircraft, a generation-five aircraft, and other systems. Why is this? It is red-tape and confusing roles and responsibilities.

**Pursuit of perfection.** At Sandia, we thought there was a risk aversion. But, after digging deeper and deeper over two years, we found that people at the laboratory were striving for perfection as opposed to excellence, which involves risk taking and learning from things that don't work.

Sandia is trying to change the culture back to a culture of excellence. Unfortunately, they got there with red tape, bureaucracy, and slowness by death by a thousand cuts. There is no big area that can be picked on to get back that factor of two and a half. It is going to take systematically going through and removing some of those policies and taking risk in some areas to get back to Cold War speeds. This is a governmental issue, and why the regulatory piece is important. Imagine an EPA for AI.



### Dr. Darryll Pines

President  
University of Maryland

**Planting seeds for the quantum future.** In 2006, Nobel laureate Dr. William Phillips accepted an appointment at the University of Maryland while still working at MIT. He started the Joint Quantum Institute, a collaboration between NIST and the University of Maryland at College Park. This initial partnership was born out of NIST's mission of developing and enhancing measurement science. There was no agenda for quantum other than measurement science.

The Joint Quantum Institute led to the world's first pure play quantum computing startup, IonQ, here in the United States in College Park. The institute has trained more than 2,000 postdocs, who are at some of the leading universities in our nation working in quantum science and technology. Also, the university's faculty members and physics department in conjunction with NIST were instrumental in advancing development of the policy that established the National Quantum Initiative.

**Growing a quantum ecosystem.** Building on its unique collaboration with the University of Maryland, the Joint Quantum Institute has created a robust quantum ecosystem that involves 118 organizations around the DC-Maryland-Virginia region, including universities, government laboratories, businesses, and startups. More than \$3 billion has been invested in what we can now call the Capital of Quantum.

This fall, a new National Quantum User Facility will be announced, open to researchers around the world. Partnerships with multiple countries have already been established.

This all started with a simple MOU about measurement science, researchers having joint appointments, and scholarly collaboration, but led to translational activities and, now, a national user facility that will allow researchers to work on the next generation of computational breakthroughs that can be run on world class quantum computers.

### Discussion point

- **User facility model.** The Council was successful getting industrial users accustomed to high-performance computing, modeling, and simulation capabilities. Now we have the potential for a quantum user facility. Is there a model there? Is there a user facility concept for precision agriculture or next generation AI-enabled health care?



### Dr. Sylvia Thomas

Interim Vice President for Research & Innovation  
University of South Florida

**Creating an ecosystem for cybersecurity.** The University of South Florida is focused on cybersecurity because an underlying issue in AI, health tech, fintech, data mining, and semiconductors is being able to protect those assets. They are looking at tech hubs and innovation districts across the state

to bring industry, government, and K-12 together to accelerate research translation—going from bench to market idea to product in a consortium that works across those alliances.

**Engaging underserved and diverse communities.** There are communities that do not have an association with innovation or know what it means to be an innovation leader. We need to do more in those communities where we are missing out on the creativity and innovation that can come through those communities. The University of South Florida is working with the U.S. Patent and Trademark Office to go into internet deserts, look at innovation labs in those communities, and talk to K-12. For example, the Ignite program talks to K-12 about an innovation mindset so they can continue to dream and be creative.

The university has a great opportunity working with MacDill Air Force Base, SOUTHCOM, and CENTCOM in cybersecurity. These are partnerships where we can tap into the missing millions. In addition, due to the hurricanes that come through, the university is also concentrating on coastal resilience.

### Discussion point

- **Enterprise resilience.** When Chair of the Council, Chad Holliday launched a Council effort making the business case for enterprise resilience, which was updated in 2020 in a report called Transform. There are lessons we can still pull from that work. We are exploring this issue in our Global Federation of Competitiveness Council under Chad Holliday's leadership.

### Other points of discussion from Executive Committee Members and National Commissioners:

- **Biomedical research and innovation.** The National Academies is taking a deep dive on biomedical research in the United States, and how effectively we compete with China. It is exploring issues such as is a National Institutes of Health structure the right fit, do we have a

strategy in addition to a market-driven approach to innovation, the role of philanthropy, and how to bring funders together. The government tends to be more conservative, while philanthropy could take greater risk. The study should be done by the end of the year, and it could be helpful for the Council.

During COVID, we learned to pick up the pace. For example, researchers at Vanderbilt University were able to come up with monoclonal antibodies for COVID within three months. That is the kind of pace we can set going forward through partnerships with the private sector, philanthropy, and foundations.

- **Addressing the U.S. productivity challenge.** In 2016, the Council and Gallup published a study called *No Recovery, An Analysis of Long-Term U.S. Productivity Decline*. The study found that three sectors of our economy—health care, education, and housing—not only have structural declines in productivity, but also ever escalating costs. At the time, those three sectors accounted for 36 percent of national spending. These are areas where we need tremendous innovation, not just in the technology, but in the ways in which we can implement at speed and scale to address the U.S. productivity challenge.
- **Metrics in human talent development.** Purdue University is looking at metrics, including earnings-to-debt ratio. The average first year earnings out of college divided by the average debt of a graduating student at Purdue last year was 6.02. That means, pre-tax, two months of earnings right out of Purdue will be sufficient to pay back the student loan to get that degree. Purdue hopes that ratio can be as big as possible and, as a country, we permit that ratio to be no lower than one. Public universities should not be less than two. If the National Science Foundation, NIH labs, and other government research funders funded more scholarships and post graduate fellowships, funding students directly at a larger scale would be useful.



# The Future of Placed-Based Innovation: Broadening and Deepening the U.S. Innovation Ecosystem

## Issue Areas

- Establishing regional and national strategies to define, coordinate, and support specialized regional innovation hubs.
- Investment in expansion and retention of the local talent base.
- Promoting inclusive growth and innovation in regional hubs.
- Strengthening local innovation ecosystems by enhancing digital infrastructure, local financing.



**Dr. Suresh V. Garimella**  
President  
University of Vermont

**Scaling place-based innovation.** When we use the term place-based innovation, we believe there is something special going on in a place that needs

to be ramped up. Burlington has some energy innovation, a smattering of biotech companies, and a cluster of small tech businesses with 100-200 employees and \$200-\$300 million in gross sales. All of these companies and industries are fed by the university.

But the big challenge regionally is that, when these companies get to a certain size, they have to leave to find a workforce. It is very different to scale a company from 25 to 150 people than to go from 150 to 500. To go to the next level, you need to add capacity without scaling expenses. You have to move from internal systems to enterprise scale and use unit management that is well run rather than just relying on a few dynamic managers. And you need production workers.

**What kinds of places have the necessary ingredients for economic growth?** In the current economy, a research university is key; there has to be an anchor. An available workforce is important, not just a specialized one, but one that can bring things to scale. Quality of life and housing are huge issues for attracting talent, so they need to be part of the equation.

Vermont does pretty well on several of these factors. People like Vermont's quality of life. The University of Vermont is an innovation engine, and there is a good start-up culture with a diversity of growing industries. But Vermont struggles with cost of living, housing availability, and population size. Vermont has place-based innovation based on its strength, but only up to a certain size. Those challenges are a huge cap

on Vermont's growth and will not change overnight, if at all, and none come up as essential ingredients for innovation. So, as we continue to use place-based innovation as a term, let's start thinking about the ingredient list.



**Dr. Santa Ono**

President  
University of Michigan

There is a fortunate alignment of leadership in Michigan, including the governor, legislature, and universities in the region. Having all these different players coming together is going to be essential for the success and resurgence of that economy.

**Filling gaps in the innovation ecosystem.** However, an analysis of the innovation ecosystem identified gaps that have to be filled for the resurgence of the region. One of them is venture capital. One of the key steps to build local venture funding capacity is the Renaissance Fund. It has had three cycles, and the most recent one is going to be one of the most ambitious funds being developed.

The other gap is a relative paucity of serial entrepreneurs relative to the coasts. That is being addressed systematically with recruitment of serial entrepreneurs who can work with faculty and students who are at the heart of innovation to help and encourage them to think about commercializing their patents and technology.

“The University of Michigan is in the heart of one of the great innovation ecosystems that propelled our country into winning World War II, our industrial might. I’m from Akron, Ohio, which became the Rubber Capital of the World. We were part of that innovation ecosystem—Akron, Toledo, Cleveland, Lansing, the whole state of Michigan—where the companies that really transformed our country, both economically and in national security, emerged.”

**Deborah L. Wince-Smith**

President  
Council on Competitiveness

The third pillar is building centers of research excellence and capacity that benefit the region’s major corporations. This includes two new technology incubators, each in the \$200-\$300 million range of investment. One will be at the University of Michigan north campus, focused on artificial intelligence and biomedical sciences. Given the size of the University of Michigan health system, this is a real opportunity for both the university and the region.

The university is going to launch a \$300 million incubator in the City of Detroit to make innovation available to the citizens of Michigan, especially the inner city of Detroit. The incubator will be located next to Cass Tech, a very diverse, inner-city high-tech high school. The university wants to elevate what’s happening at Cass Tech and provide opportunities for Detroit inner city kids to be part of the resurgence of

the Michigan economy. Huntington, Ford, and other major automobile/mobility-focused companies are going to be part of that.

**Building an innovation ecosystem for new generation mobility.** Over the past 10-15 years, the university has invested in facilities critical at the nexus of the university's research and companies in the region. Through Michigan business leaders and the Detroit Economic Council, the university has invested in a major part of its campus called M City focused on mobility. And, with Ford, a new robotics center, one of the largest in the Nation, was launched. These are two critical ingredients for a focus on autonomous vehicles and new generation mobility, not only on the ground, but also in the air, and building the innovation ecosystem. The university was able to leverage \$52 million from the Economic Development Administration's Build Back Better program and put \$50 million of its own into creating a global epicenter on mobility.

#### **University-industry-government partnerships.**

For regional placed-based innovation, several things are important, including enhancing university linkages with government and industry. For example, the university is going to play a bigger role in the Michigan Economic Development Council. The university has not been at the table with Michigan's business leaders. There are many Fortune 500 companies in the state, and the university wants to interact much more with them. Also, the university has been increasing the dialogue with national labs, not just in the region, but across the United States, including Los Alamos, Fermilab, and Argonne.

Governor Whitmer included the University of Michigan in her strategy and set up a new Grow Michigan Council focused on talent. With Wayne State, the University of Michigan, and Michigan State, the region graduates some of the best and largest numbers of high-tech graduates in the United States. That can be part of the solution, not just regionally, but nationally. The university is also focused on being a feeder of talent to national laboratories and Fortune 500 companies.

**Cross-region and cross-border linkages.** About eight years ago, Prime Minister Trudeau launched and funded five research Superclusters across Canada. One of the most successful is the Digital Technology Supercluster, headquartered in British Columbia. Although it was place-based and regional, it connected with the strength, for example, in artificial intelligence and quantum in Toronto, and other strengths across Canada. Although it was headquartered in British Columbia, it recognized that, for maximum effectiveness, it had to be nationwide.

The Digital Technology Supercluster has had an international link across the border to the states of Washington and Oregon. The supercluster attracted a number of companies to the region on both sides of the border in what is called the Cascadia Innovation Corridor, a collaboration between the premier of British Columbia and the governor of Washington state. Microsoft straddles the border with major and growing R&D in Vancouver, also SAP. Amazon moved a huge amount of its R&D and activities to that region.

#### **Discussion point**

- **Michigan can also lead in sustainability and climate action.** Eighty percent of the fresh water in North America is in the Midwest region, for example, the Great Lakes around the state of Michigan. That's very attractive, for example, for high throughput computing. In addition to innovation, the Detroit Center will be developing the talent required for addressing climate change. The university, together with Jeremy Rifkin, will try to scale what it demonstrates on its campuses as a living laboratory for sharing with corporations, municipalities, states, and the hemisphere. Dr. Ono is leading a University Climate Change Coalition or UC3. To be successful in meeting the challenge of climate change, we have to come together around that theme. It can be regional initially, but climate change will only be solved if we have a global approach.



**Joshua Parker**  
Chair and CEO  
Ancora L&G

Ancora works at the intersection of capital, infrastructure, and real estate to meet needs and enhance the programmatic opportunities at universities, whether that is expanding the research enterprise, innovation, and entrepreneurship; economic community development; or better management of physical assets.

Universities, in particular, academic medical centers and national labs, sit at the center of place-based innovation. They have enormous real assets and infrastructure and are engaged in their surrounding community. They have deep relationships with local business and all levels of government and represent the most efficient model for moving federal funding into the private sector through the basic research function.

While every university has circumstances that are unique, there are pressing reasons why universities have to change:

- The university failure rate is increasing. There are roughly 4,000 colleges and universities in the United States. There has been about a 10 to 12 per year failure rate, which accelerated over the last couple of years to more than 30 per year, an alarmingly high growth rate, particularly when those failures are the colleges and universities most closely touching underserved populations.

“There are a lot of good reasons we did things the way we did for so long, but there are a lot of pressing reasons why we’re going to have to change.”

**Joshua Parker**  
Chair and CEO, Ancora L&G

- Money has been basically free to universities to build and do whatever they want. But we have come to the end of a 30-year run of low interest financing for university facilities. Also, we are coming to the end of an ever-accelerating tuition growth rate, which is going to start capping the income potential for universities and limit the off-balance sheet debt they have been using for growth. Meanwhile, we are seeing declining birth rates and lower overall enrollment.

But a lot more global capital is seeking yield with safety and durability. One of the positive outcomes of rising interest rates is that pensions are being fully funded around the globe, which is allowing that capital to transition into assets that are of longer duration and for which universities line up really well. So, higher interest rates mean you do not have low-cost capital for debt, but an opportunity for some debt and equity coming out of the pension environment and being rebalanced globally.

- The United States is way behind the curve on net zero and infrastructure, while Europe is much further ahead. Industry that works globally is going to have to adopt standards that they will need to meet in the United States, and universities are going to do the same. The net zero transition is huge, and imperative if we are going to meet any sort of reasonable climate goals. We are seeing that alluded to growing pension risk transfer.

- There is still deep engagement in lifelong learning, so communities around universities want to be engaged in the life of the university over the course of their lifetime. That affects the type of places we think about building.
- Universities accelerated the monetization of their environments. Now all those graduates coming to the workforce are looking around for those creature comforts they had for the last 4 or 5 years. They want that in the office and working environment as well.
- Universities and health systems are poor managers of space. Look at faculty and ask how many offices they have, and you get a clear answer about how much space utilization is not right. Uses are siloed, particularly in health system and clinical environments.
- Universities would generally land about \$0.70 of income for every dollar of research expenditure. That's not a sustainable model. Every vice chancellor of research is confronting that with their CFOs. There is only so much you can do internally to bend the cost curve. You can try to move your research to lower cost things such as data and analytics. But if you want to maintain a robust research enterprise, there is going to have to be new ways of thinking.
- There is hundreds of billions of deferred maintenance backlog at colleges, universities, and health systems across the country that need capital to deliver the type of educational, research, and industry partnership outcomes we need.

**Getting more out of existing assets.** If income is limited and there's not much you can do on expenses, you've got to get more out of existing assets. So Ancora is thinking about better utilization of university infrastructure and how that can impact innovation, entrepreneurship, and growth in surrounding communities.

Ancora is engaging with universities thinking about new models for managing their assets. Can we marry this wave of capital with this net zero ambition, and

with these problems and opportunities? At the same time, can we promote deepening engagement in the community and the ecosystem beyond the academy, bringing opportunities for research, entrepreneurship, and industry, as well as increasing density to allow for expanded capacity and inclusion in the broader community, with better management and utilization of the university's health systems, national labs, and existing infrastructure to get more out of what is already been put into the ground?



### **Dr. Donde Plowman**

Chancellor  
University of Tennessee, Knoxville

**Co-location drives innovation.** Place-based innovation is changing the economic landscape in Tennessee by bringing together academic institutions, industry leaders, and state and federal agencies to solve problems and bring new technologies to the marketplace.

Building on Tennessee's global reputation in materials and manufacturing, UT has been making strategic investments to expand its expertise and R&D capacity, she said. The university recently launched its Institute for Advanced Materials and Manufacturing, committed to faculty cluster hiring initiatives, and invested in cutting-edge R&D facilities. That's led to more partnerships with industry, government, and other colleges and universities.

UT and Volkswagen have long enjoyed a productive partnership, beginning in 2011 when the automaker opened its Chattanooga assembly plant. It grew into a formal Master Research Agreement in 2018 and culminated in the launch of the company's first North American Innovation Hub at the Knoxville-based UT Research Park at Cherokee Farm in 2020. Together, UT and Volkswagen are working on technologies that are transforming the automotive industry, including making vehicles that are lighter, batteries that last longer, and interior materials that are more sustainable.

UT has longstanding partnerships with other innovation industry leaders like the Eastman Chemical Company, who opened their Eastman Innovation Center on the university's campus in 2022. The co-location of industry and university R&D capabilities on the UT campus has also yielded new collaborations among UT's industry partners, including high-tech start-ups participating in the institution's incubator and accelerator programs. Eastman's big ideas for renewables and sustainable materials, for example, have sparked collaborations among a number of industry partners. Through the university's partnership support and activation model, dedicated UT teams bring numerous companies together to explore shared interests, solve challenging technical problems, and generate new jobs and economic opportunity.

These are the kind of spontaneous ideas and collaborations that take place when innovation-minded researchers from different organizations, disciplines and fields work side-by-side in one place, Plowman said.

“As we think about the future of work, telecommuting could make innovation more difficult. If the work force is isolated from one another, working from home, innovation won't happen. We need to pull together people, partnerships, and place.”

**Dr. Donde Plowman**

Chancellor, University of Tennessee, Knoxville



**Dr. Marlene Tromp**

President

Boise State University

#### **Reaching out to under-served rural populations.**

Many young people in rural areas work on or for family farms, or they are in farm families themselves. They need access to education, but many cannot leave home. Boise State has built hybrid model programs that create cohorts in rural communities and sends faculty out to them.

The university built an entity called the Cyber Dome, a live fire cybersecurity training facility, and any Boise student in any major can get a cybersecurity or semiconductor certificate and get into this train-

“I grew up in a small town in rural Wyoming, and almost nobody I went to high school with, including people who I know to this day, are as brilliant as they were when I was a kid, went to college. Just a handful of people from my small town went to college. And, interestingly, one’s an anesthesiologist, one’s a judge... but I think we have so under-tapped talent in rural communities. There are people who just don’t go to college and that undermines our competitiveness.”

**Dr. Marlene Tromp**  
President, Boise State University

ing facility. That facility serves rural communities that could never afford to have access to that cyber technology. It does something incredible for those students and communities, and protects our nation’s security in places that do not have the defensive resources other places have.

**Bring a diversity of people into the conversation.**

When we get that different population access to education, it changes the conversations happening on campus. It is the argument we have made about diversity for the last 30 years—when we bring in different voices, we’re going to think differently, we’re going to think in more exciting and better ways.

Dr. Tromp created at Boise State University a President’s Professor for Community Engagement, which takes pathbreaking research in quantum, cyber, or nanomaterials out into Idaho’s industry and communities. Boise State faculty get out and talk to people

“When you bring a diverse set of people into conversations, it changes the questions researchers ask, and that can produce some really exciting results.”

**Dr. Marlene Tromp**  
President, Boise State University

who can use information on those breakthroughs, but also take their questions that can help drive the way research is conducted at the university.

As a leader in the State of Idaho where diversity efforts have been subject to criticism, Dr. Tromp has often brought out the research showing that the more diverse voices you bring together, the more innovative and durable the sciences you produce are. We want all those voices to be a part of that conversation, whether they are a kid from an urban family with a college educated parent, or a young person growing up in a rural community who’s the child of farm workers or immigrant farm workers. We want those ideas to be a part of how we’re generating innovation.

**SPECIAL REMARKS****Dr. Dietra Trent****Executive Director, White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities**

Dr. Trent expressed excitement about entering into a Memorandum of Understanding with the Council to support a mutual goal to deepen and broaden diversity in the U.S. innovation ecosystem. She also expressed her appreciation to Council and Commission Chair Moynihan for Bank of America's initiative involving five Historically Black Colleges and Universities (HBCU) as well as its Center for Black Entrepreneurship located on the campuses of Morehouse College and Spelman College, as well as to the Council's former Vice-Chair Janet Foutty for Deloitte's Emerging Leaders Scholars Program. Dr. Trent recognized Commissioner René Lammers, Executive Vice President and Chief Scientific Officer of PepsiCo, noting the company's decades of partnership with HBCUs. She pointed to the profound contribution these leaders and companies make. More than 50 percent of HBCU students are first generation. So, when you support them, you support their family and change their communities.

**HBCUs play a distinctive role in America's higher education enterprise.** Created in the early to mid-19th century, these institutions have been the lifeblood of educational opportunity for many generations of African Americans and the broader communities of color. Despite long term systemic barriers to accessing resources and opportunities, HBCUs make an extraordinary contribution to society and the prosperity of our nation, generating over \$50 billion in economic impact annually and nearly 150,000 jobs in the local and regional economies they serve.

**HBCUs Play a Vital Role**

Although HBCUs make up only 3 percent of the Nation's colleges and universities, they enroll 10 percent or about 300,000 African American students a year. Nearly 20 percent of all African Americans earn a bachelor's degree. Approximately 70 percent of HBCU students are from low-income families, and 50 percent are first generation.

Of all black federal judges today, 80 percent graduated from an HBCU. Of all black officers in the armed forces, black Ph.D.s., and MDs, 75 percent graduated from an HBCU. Seventy percent of black dentists; more than 50 percent of black teachers, engineers, and lawyers; 40 percent of black members of Congress; and 100 percent of black and female vice presidents graduated from an HBCU.

Our nation's economic future and global competitiveness are rooted in advancing science, technology, engineering, and mathematics (STEM). Today, one quarter of black graduates earning STEM credentials are HBCU alums. Recent data shows that strong HBCUs have the potential to increase black worker incomes, strengthening the economy with billions of dollars in incremental business profit, hundreds of millions in decreased student loan debt, and approximately a billion in additional consumer spending.





*Dr. Dietra Trent, Executive Director, White House Initiative on Advanced Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities; and Deborah L. Wince-Smith, President and CEO, Council on Competitiveness, enter into a Memorandum of Understanding to support a mutual goal to deepen and broaden diversity in the U.S. innovation ecosystem, witnessed by the Council board.*

**Research and innovation at HBCUs.** Twelve HBCU universities have reached Carnegie R2 designation, having met the high standard of research within research and doctoral institutions, and have chances to reach R1 status.

The Biden Administration is deeply committed to bolstering research capacity at HBCUs. In his 2024 budget, President Biden proposed \$350 million to enhance research capacity at HBCUs, tribal colleges, and other Minority Serving Institutions (MSI). The Administration has taken a whole-of-government approach to assist HBCUs and other MSIs and tribal colleges, which has already yielded significant “firsts” for these institutions. For example:

- For the first time, a Department of Defense University-affiliated Research Center or UARC will be led by Howard University with a coalition of six other HBCUs. This is a five-year commitment of \$90 million with a domain in tactical autonomy.
- Prairie View A&M in Texas will be a national lead for a university transportation center.
- 12 HBCUs are benefiting from a \$435 million investment to support research aimed at developing and deploying interoperable data platforms and technology systems for transportation planning and infrastructure operations.
- The Department of Commerce distributed \$134 million in grants to HBCUs through the Connecting Minority Communities Program, which will help many institutions make critical digital infrastructure investments such as bolstering broadband internet access, purchasing equipment, and securing additional training for IT personnel.

- The Department of Energy launched the Funding for Accelerated, Inclusive Research or FAIR program, committing more than \$35 million to build research capacity, infrastructure, and expertise at institutions historically excluded from federal R&D opportunities.
- HBCUs are among the recipients of a \$12 million grant from NASA awarded for the creation of teaching and learning resources centered on AI and machine learning.
- The National Science Foundation invested \$15 million in the minority serving Cyber Security Consortium to accelerate cyber infrastructure research on the campuses of HBCUs and other minority serving institutions.

The historic support HBCUs have received has as much to do with advancing America's competitiveness as it does with righting a wrong that has existed for nearly two centuries. And while the federal government is working to provide HBCUs with infrastructure and support to enhance research and innovation, public-private partnerships are critically important for raising the level of innovation that will propel our nation forward and spur scientific discovery for the next generation.

“Investments in HBCUs are an investment in America. They represent more than funding education alone. These investments are critical to our national security, our health care system, public safety, and to all of our communities.”

**Dr. Dietra Trent**

Executive Director

White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities.

## LUNCHEON ADDRESS

**Dr. Charles Tahan**

## Assistant Director, Quantum Information Science, and Director, National Quantum Coordination Office, White House Office of Science and Technology Policy

**National Quantum Initiative and National Strategy.** The National Quantum Initiative Act of 2018 established the National Quantum Initiative and created the National Quantum Coordination Office, which has detailees from the five main federal funders of quantum R&D—DOD, DOE, NSF, NIST, and the intelligence community—running the office.

As called for in the Act, the White House developed a national strategy for quantum information science that serves as the overarching strategy for funding across the agencies. There are six pillars: science, infrastructure, workforce, engagement with industry, national and economic security, and international cooperation. Fifteen federal departments and agencies participate, including the big R&D funders, but also potential end users such as the National Institutes of Health and Department of Homeland Security, and enablers such as the FBI and U.S. Patent and Trademark Office.

The Act also called for a quantum industry consortium—the Quantum Economic Development Consortium—which has about 150 quantum companies, and about 50 universities and nonprofits participating.

**Executive Order and National Security Memorandum on quantum.** In May 2022, President Biden signed an Executive Order and a National Security Memorandum on Quantum. Overall, there are three goals:

- Getting the science right, which means understanding the application and timelines for how this emerging technology will benefit society.

- Enhancing U.S. competitiveness by accelerating technology development—moving the science from lab to market, but also figuring out ways to protect it creatively so we do not slow down our scientists and entrepreneurs.
- Enabling people, ensuring that this new technology benefits as many Americans as possible, but also that we have the pipeline of talent to ensure U.S. leadership.

The Executive Order reaffirmed the Administration's commitment to the National Quantum Initiative as an all-of-nation initiative, and established the National Quantum Initiative Advisory Committee (NQIAC) to advise the President, Congress, and leaders of the agencies. NQIAC includes leaders from industry, academia, and national laboratories.

The National Security Memorandum laid out a strategy for quantum computing and mitigating the risks of a future large scale quantum computer. Quantum computers are really good at breaking encryption, and humanity happened to choose the one encryption protocol that computers are really good at breaking. So, mitigating that risk by moving to quantum resistant cryptography in a timely manner is extremely important, and the Memorandum laid out a timeline for doing that. It also emphasized the need for other technology protections such as export controls.

**Federal coordination in quantum.** There are two National Science and Technology Council (NSTC) subcommittees on quantum. One is focused on the civilian side, co-chaired by the White House Office of

Science and Technology Policy (OSTP), NIST, NSF, and DOE. And the other is focused on the economic and security implications of quantum science, co-chaired by OSTP, NSA, DOD, and DOE.

Since the Act passed, R&D funding has about doubled across the funding agencies. Each of the federal agencies has their own mission and ways of implementing the R&D programs for quantum. To coordinate that, OSTP through the NSTC subcommittees makes the agencies talk together and develop strategies.

**CHIPS and Science Act.** Although the Science Act provisions are authorized, they have not yet been appropriated. These include authorizations for quantum-specific actions at NSF, NIST, DOE, and NSTC, for example, \$100 million a year for quantum networking and \$8 million for a Q-12 education initiative. If appropriated at a significant level, there is a huge opportunity with the new NSF Technology Directorate to bring ideas in labs such as quantum sensors to market. The CHIPS Act has been appropriated and has about \$12 billion for R&D funding. That investment will be relevant for the manufacturing part of making chips for future quantum systems.

**Quantum technology potential.** Quantum is like the tip of the spear. Right off the bat, we must deal with the potential risks of a quantum computer that can break encryption. So, how you protect technology—when we do not yet understand all the applications that may be 10, 20, 30 years away—has to be addressed right at the beginning in quantum because of the potential risk.

Quantum is just how the world works. Over the last 100 years, human curiosity led us to try to understand the microscopic scale. We took very initial understandings and developed new technology such as the transistor, laser, magnetic resonance imaging, magnetic storage for hard drives, and atomic clocks used in the global positioning system. Those are quantum 1.0 technologies based on the easiest part of quantum mechanics.

Quantum information science is the next 100 years. It is how we take the more exotic properties of quantum mechanics and apply them for even more amazing technologies like quantum computers that can solve certain problems exponentially faster. Quantum sensors would be either much smaller or have different modalities or be much more sensitive. So getting the science right, and getting an infrastructure of new ideas that could lead to applications that benefit society is the most important thing we can do at this stage. We are standing up 13 new National Quantum Information Science Centers around the country, five by NSF, five by DOE, and three by DOD and intelligence community.

**Developing quantum talent.** There is a shortage of quantum talent. NSF is expanding a program called QISE focused on workforce development and increasing the U.S. capacity to generate talent. The National Q-12 Education Partnership is an industry-led group that brings together big companies, start-ups, educators, and the American Association of Physics Teachers to provide quantum curriculum for schools, and access to quantum hardware to high school students who want to go into the field.

The Quantum Coordination Office launched World Quantum Day in the United States two years ago, getting videos with famous people talking about quantum, launching tours of national labs, etc. Last year, about 1,000 schools participated in Quantum to Go, created by The American Physical Society. Modules were developed that teachers could bring into their schools and teach their 30 students, and the program enabled physicists to go to schools or call in so students could see a real person who got in this field, and that they are not that different from me. Take 1,000 schools and multiply that by 30, and you are starting to affect at scale the message that there are great careers in this field. This is where it starts and, from there, we need to educate, inspire, and give experiences for students so they keep going and eventually figure out where they can contribute.

**International engagement in the national strategy.** We need to work with allies and partners to explore the space as fast as possible. The government signed ten bilateral cooperation statements with countries, and hosted numerous roundtables and dialogues. There are many international groups, including the Quad and AUKUS, where quantum, AI, and semiconductors are hot topics. It is important that leaders of the various national quantum initiative programs bring the science perspective to the public in those countries, because it is easy to insert fear, uncertainty, doubt, hype, and nonsense into the global discussion and have the field diverge into things you should not be doing or undermine the justification for investment.

The first output of the Q-13, an international group of 13 countries, was the Entanglement Exchange to facilitate the exchange of students, researchers, and professionals in the field of quantum. No country wants their smartest people stolen by other countries, so we need to address the talent issue and share best practices. The Entanglement Exchange is a clearinghouse for all the countries, each hosting their own websites, listing opportunities for sabbaticals, internships, and working in their country or working abroad. They will be following up with programs funded by different entities, including companies and nonprofits.

**Looking to the future.** The first task of the National Quantum Initiative Advisory Committee was to make recommendations to Congress for reauthorization of the National Quantum Initiative Act, an opportunity to address things that five years into it we need. For example, to follow up on commitments in international cooperation, we need a fund managed potentially by the State Department that can be used to get matching funds from other countries and drive global investment in a direction good for the field. Having the State Department in the National Quantum Initiative would be good for the field, as well as

NIH, NASA, and DHS, not originally part of the initiative, but big funders in this space. These additions would make this a truly national program.

Every time you go up a technology readiness level, it is usually a factor of ten more expensive. So if you want benefits of the technology—for example, new sensors for biomedical imaging, new types of clocks to make GPS better, or for working in denied environments for DOD—then you need to fund focused efforts to develop the technology. That is where we need to go in the next phase of the initiative.

In addition, labs in our universities, national labs, and federal labs are not in the best shape. In contrast, Europe used COVID money to boost up labs. The United States did not do that, so we have some catching up to do. Congress could make a big difference here in terms of U.S. competitiveness, because this is not something normally done by the R&D funding agencies; they support science, they don't invest in infrastructure.

### Points of discussion

- **U.S. global competitive position in quantum.** It is hard to ascertain how the United States compares to Europe and other locations around the globe in terms of investment in quantum R&D. You cannot trust any of the numbers put out press releases. In contrast, the U.S. National Quantum Coordination Office is transparent, publishing a report every year on federal quantum R&D spending. While we are not outspending anybody else, we have a first mover advantage. Even though quantum science is global, the United States leads in quantum computing and sensing. But that can go away quickly. The United States launched its National Quantum Initiative four years ago, and kickstarted everything, and then everybody else started working on their quantum initiatives. But, in both the VC community and government, investment in the United States

is tapering off, while everybody else is pushing forward. The concern is that we got over the first sale and everybody else will take some of the wins. So, this is why kicking it up a notch to bring things from science to market is really important.

- **International scientific cooperation.** Quantum is an exemplar of a lot of areas. In the EU, everybody is signing up and committing like \$100 million to buy into decision-making on what the future of science will be. We have no way in the United States to drive the global community. We are kind of arrogant. We are big, we do what we want, and assume everybody else is going to follow us. But they are taking a very different approach, which is creating a pile of money administered through their bureaucracy. But we have no dedicated funding for international scientific cooperation. It is all piecemeal through the agencies, and that puts us at a disadvantage.

“We have this first mover advantage and talent and expertise, but it could quickly go away, if we don’t keep our foot on the pedal.”

**Dr. Charles Tahan**

Director,  
National Quantum Coordination Office

# The Future of Work: Developing, Supporting, and Expanding the Modern Innovation Workforce in an Era of Creative-Destruction

## Issue Areas

- Revitalizing U.S. education and training systems to foster a high-skilled future workforce.
- Leveraging telework capabilities, digitalization, and emerging technologies to augment conventional work.
- Navigating workforce challenges and opportunities created by increased automation.
- Adapting to rapid labor force shifts and new models of work organization.
- Expanding efforts to increase diversity and inclusion in the innovation workforce.



**Dr. James Clements**

President  
Clemson University

Clemson is a land grant university created to change lives, give people a path to a better life, to give people and companies a path to economic prosperity. The only way Clemson can do that is taking its academics and research and partnering with others. So, Clemson has changed the way it works with industry.

**Clemson Innovation Campuses take university expertise to industry.** Clemson has five Innovation Campuses:

- ICAR, the International Center for Automotive Research, about 30 minutes off the main campus, with global partners doing unbelievable research.
- Energy research campus in Charleston, with partners doing great work related to defense, cyber, and energy.
- Center for Human Genetics in Greenwood, about 45 minutes off campus.
- CUBEInC for biomedical engineering.
- Advanced Materials in Anderson, South Carolina, 15 minutes off campus.

When it created the innovation campuses, the idea was to grow them to significant sizes and take research and expertise from the campus directly out to industry, instead of having industry come to the university. So, five years ago, Clemson created a new division, focused on engaging with industry, industry partnerships, and external relationships with corporations. Clemson also created an industry advisory board with 20 corporate leaders—for example, from BMW, Arthrex, Boeing, Lockheed Martin—who meet 2 or 3 times a year across the state.

**Working with industry partners.** Clemson gets a good bit of federal money, in partnership with industry. For example, ICAR just had the Department of Army come with a \$100 million research grant on the next generation of autonomous ground vehicles. And a big partnership with General Electric was just announced at the Paris Air Show.

**Workforce development.** Growing the workforce is a top issue for the industry advisory board. Clemson is working on new experiential learning models. For example, BMW is in the state and 50 percent of the interns at BMW are Clemson students. Clemson established the BMW Endowed Chairs, and the company provided some funding to hire the best faculty for the endowed chairs. BMW directly funds Clemson's masters and Ph.D. fellows. Clemson created the Nation's first Ph.D. in automotive engineering, and then a master's in automotive engineering. It just launched a bachelor's in automotive engineering because BMW, Michelin, and others asked for it.

Arthrex cannot get enough medical device experts working in hospitals. They have to train them all in their facility in Naples. So, they came to Clemson, which created the Arthrex Scholars Program and Arthrex provides funding directly to the student scholars.

Clemson also created a two-year college called Greenville Tech, a center for manufacturing innovation. In one facility, community college or two year students, undergraduates, masters, and Ph.D. students are all working together, all working on different things, but in the same environment. The key is co-locating industry directly on that facility.

### Point of discussion

- **Needs driving skills development.** Often, there is a thought process of what are the jobs, what are the skills, what is the program, and then give the money. Companies and philanthropy are used to giving money to programs. But, you flip that around and CEOs say here are the jobs we need. Then you go to the school system—K-12, two-year, four-year, post grad—and say what is the skill set? Then work in business to make

a difference, and give money to support the training. Sometimes it is a program, sometimes it is hiring. But, if you start with the jobs, the one thing business has that nobody else has is the absolute best currency—if you go work for these companies, you're going to have a career and you're going to get paid well.



**Jim Clifton**

Chair  
Gallup

**Importance of national spirit.** We put so much emphasis on innovation and assume something comes out of it. Are you open to the fact that we have great big discoveries that have no customers at all? You ask one of the hardest innovation centers in the world to get into to tell you some of the big stuff that has come out of there. But nothing has come out of there. Why? It has got innovation, but not the spirit of innovation.

You wonder why we are still about 25 percent of the world's GDP, about \$25 trillion. And there are only 330 million of us out of 8 billion people worldwide. How do we outperform everybody by so much? We have the biggest national spirit. We need to put a metric on spirit.

Gallup has bad news about our country right now. Trust in government, the Congress is down to eight. The media was one of the most trusted things in



## “How does the story of America end? It ends if we lose our big national spirit.”

**Jim Clifton**  
Chairman, Gallup

America, more than the military, it was the one that followed the politicians. Now it is down to single digits. The Justice Department and the Supreme Court tanked recently, and the military tanked after Afghanistan. Higher education is at a new low for confidence. But there is one thing that just keeps rising up, and it is the American spirit—free enterprise.

There are 125 million full time workers in America. So, the question is, out of those 125 million, how many of them have a real spirit of building something, building a customer base, building a team? How many of are quiet quitters just trying to get through the day, get the hell out of there, have a side gig? And what percent hate their company, hate their boss and, the big one, hate their customers? So, you have got one group trying to build customers and create companies, and you have got another that is trying to time down. So, the most important metric for us and

### American Customer Satisfaction Index (ACSI)

ACSI Portfolio vs. S&P 500



Companies with high American Customer Satisfaction Index scores typically do very well in the stock market.

for other countries is how committed are you at work, because we need to benchmark ourselves, and make sure our spirit is higher than China's.

In 2000, 26 percent of the workforce would come juiced, and they are the ones that build our economy. But something is happening. We just keep getting better, and the rest of the world is getting better too. But they are much lower than us. So, if you ask, how do you explain the fact that America has been kicking butt with only 330 million people? It is because we have a better spirit.

**Putting a metric on spirit.** There is a national index of customer satisfaction—a spirit rating because all the energy has got to hit something. The only thing that matters is if it hits the customer, anything that comes out of big labs. But here is the danger. Through COVID, we mixed up our workplaces so much by saying you guys go home, make good decisions, you are smart people. They go home. They never come back. And then we go, no, come back in or you're fired. And that is happening at really good companies. They say we are going to review you, and then they call the supervisors and ask how is it going? Are they coming in? You can't do that because the supervisors are not coming in either. And it is going to turn out that staying home is bad.

ACSI and Corporate Profits



There is a strong correlation between the aggregate national ACSI and aggregate corporate profit over time.

“If you were to bet, if you wanted to short a region of the world, you might short Europe on their future because they don’t have the kind of spirit that it takes to keep this thing going.”

**Jim Clifton**  
Chairman, Gallup

If you ask where is the money on losing free enterprise? It is right there. It is chain linked to customer satisfaction and customer retention. Watch customer retention if you want to worry about who is going to be able to keep their organization going.



Something is really wrong in Europe. As a whole group, only 13 percent of employees are really committed. But the United States is thriving at 31 percent of employees committed and, as long as that is pumping along really well, our country will too.

### Discussion point

- Metric on spirit. In 2007, the European and U.S. economies were the same size, about \$12-14 trillion. The U.S. economy is now about \$23 trillion and Europe about \$16 trillion. There is no greater metric than that. Europe has gone sideways on GDP for 15 years now. Yet, everyone wants to follow Europe. Even on the environment, Europe is not even close to how far the United States is progressing because of that spirit. It is going to be a challenge for Europe. The pie is not growing and they’ve got an aging population.



**Janet Fouty**  
Business Vice Chair Emeritus  
Council on Competitiveness

**Preparing current workers for the future of technology.** There is confidence that the university system will prepare their students for the technologies emerging today. But what about the existing workforce? Are existing workers engaged in the work of today thinking about the work of tomorrow?

It is important to think about the current workforce and emerging technologies, and get workers excited and interested in engaging, learning, and growing. Within our workforce, we have a large swath of people who are trained and will just continue to pick up on generative AI. Then the question is, how do

“I was with about 10 probably 25- to 35-year-olds a few weeks ago, and they were a high-performing team doing great work in their respective organizations. They asked me what I thought about generative AI, and I quizzed them about how many of them had a ChatGPT account, and how many of them had actually experimented with it. And I was shocked at the number of them that had not touched it. I would say maybe only 20 percent raised their hands and said they’d played around with it.”

**Janet Foutty**

Business Vice Chair Emeritus, Council on Competitiveness

we get everyone comfortable and confident with AI who is not today? That should have a place on the agenda. What is our collective responsibility to bring the entire workforce into the conversation, not just those who are currently in the education system.

**Preparing leaders in business for a future of disruptive technology.** How do you think about executive leadership teams and boards? For example, Senator Heinrich talked about raising the capability of the Senate. That is something important for business leadership too. It is not a one-time seminar you absorb, but rather how do we create a level of sophistication in C-suites and boardrooms around emerging technologies so we have the right leadership team to help us navigate through the competitiveness and market challenges in front of us.



**Joan T.A. Gabel**

Chancellor, University of Pittsburgh  
Academic Vice Chair, Council on Competitiveness

Previous presenters showed refreshing new partnerships and cross sector collaboration that lean into innovation and have, at the very least, focused on application, if not on full-fledged commercialization. For universities, this is utterly new. It is a reflection of spirit when our institutions that have been slow movers, and have benefited from not being first mover, start to take the lead. We need to do more of the same on university campuses.

**What and how we teach for emerging technologies.** There could be jobs for prompt engineers. AI will train itself, but we will train ourselves how to interface with it. What are the policy and ethical implications of that? How do we ensure equitable access so that good things go into AI and good things come out?

If we are not training people for things that do not exist yet, if we are not working together from the earliest days, pre-K up, to nurture appetites for uncertainty and things that do not exist yet, particularly in those who have not historically had access to the pathways to education that yield that appetite, then it won't matter how much spirit we have because the technology will surpass us. But the advantage we have is that we have been in the lead in the technology and in the spirit, and we do have an appetite for collaboration and thinking about the ways in which these things can happen.

Pittsburgh, for example, is placing a big bet on partnership with Carnegie Mellon in life sciences and biotech. Many universities are. But we may not think about the newness or unexplored components of it. How do we train at the doctoral level? How do we train at the innovation and commercialization level? To work on the production floor using live cells is a very specific technical, probably a two-year, college degree-level skill set or even a high school diploma with dual enrollment. So how are you going to work together across this spectrum?

It does not matter how innovative we are if there aren't people ready to do the actual work on commercialization or execution. So, a lot of the future of workforce development is thinking in this new way about listening to industry partners and going upstream in K-12. Then, if we were to quantify spirit, what is the metric? It includes quantifying appetite for uncertainty or a capacity to move, when the time comes, into something that does not exist yet.

### **Point of discussion**

- Healthcare workforce crisis. We have been in crisis with a shortage of nurses and doctors, with about a 40 percent burnout. Since COVID, its over 70 percent. Two out of five physicians are over 65 years of age. And it is estimated that about 500,000 nurses and about 100,000 doctors will be leaving the profession. So, as projected, we need 1.1 million new registered nurses.

Hospitals are losing a lot of money, partly because of the shortage. They can't provide the services. Duke gives forgivable loans to all nurses who stay. But that's taken care of only one single area versus a massive shortage. You want nurses interacting with patients. But a lot of reason for burnout is administrative burden. People say they spend way too much time on electronic health records than with patients. Perhaps AI can help in writing histories, doing discharge summaries, etc., to solve this problem.

# The Future of Sustainability: Accelerating Clean Energy Technology

## Issue Areas

- Boosting investment in development and deployment of promising clean energy technologies.
- Modernizing the U.S. power grid to enable the clean energy transition.
- Establishing a supportive domestic policy ecosystem to foster clean energy innovation.
- Engaging proactively on the international stage to address trade issues and reinforce global competitiveness in clean energy.



**Charles Holliday, Jr.**

Chair Emeritus, Council on Competitiveness  
Chair, Global Federation of Competitiveness Councils

**Are we working on the right things?** Global warming and climate change is a top sustainability problem we are all facing right now. Every organization represented in the Commission is likely dealing with it in some form or another. In all of our lifetimes, it is still going to be the number one thing we're dealing with. But are you working on the most important things that will make the biggest difference? Or are you working on the things that are in front of you and easier to see?

For example, passenger vehicles account for 7-8 percent of greenhouse gases in the world. They are about double percentage in the United States. But at 7-8 percent, how many times have passenger vehicles been mentioned in the last 24 hours, either because you have a battery plant in Tennessee, or we have all thought about buying an electric car? The cement industry is responsible for the same amount of greenhouse gases as passenger vehicles, and who has ever thought about cement before? Steel is right behind that. And we are not putting the technology to work to solve those problems. There are commercial technologies to decarbonize. Cement is just very expensive. Now, who is really working on a program to have a breakthrough there? Same for steel. If we do not start balancing how we spend our resources toward the really big problems, we are leaving a problem for the next generation.



### Dr. René Lammers

Executive Vice President and Chief Scientific Officer  
PepsiCo

#### Are we investing enough and in the right things?

Investing more is not always a good thing. Big things can happen when there is a constraint of resource. When you build something quickly, whether we are doing it in the right way, it feels good. But are we measuring progress even if it is basic science? Do we have KPIs, or critical milestones so that we are sure these investments are paying off at some stage? This includes funding for clean energy. If you think about electrification, if you look at the food industry and its carbon footprint, 14 percent is trucks and fleets.

**Food science.** We talk about AI and quantum computing, but are we investing enough as an industry, as a country, in more traditional areas that are also hugely important in terms of being competitive? For example, in basic science, are we investing enough in food science and feeding the world? It is not apparent here, in Europe, or anywhere in the world. This is an area where we could differentiate as a country from a technology solution perspective.

**Packaging in the food industry is a real challenge.** The recycling rate in this country is 28 percent—just not good enough. It seems to be very difficult. It goes municipality by municipality. We could, through public-private partnerships, bring that up and we are doing that as an industry. There could also be more federal oversight.

“Water is going to top the charts pretty quickly in terms of threat, but also opportunity.”

### Dr. René Lammers

Executive Vice President and Chief Scientific Officer  
PepsiCo

#### Water is the biggest challenge faced by the food industry and the planet.

Are we doing enough in this space? Are we looking at low-energy desalination technologies? Are we doing big pilots? Are we investing in membrane filtration technology? We are not investing nearly enough. Water is an area for which we could be world renowned if we put our heads together. This is an area where there is an opportunity for us as a country, industry, and academia.

#### Points of discussion

- **Water is a pervasive issue.** We are not going to be producing semiconductors without access to water and you're not going to produce solar. So, water ties back to prioritizing, rebalancing, and thinking about metrics around how we are investing. Sewage and health go right with it in certain places, including water infrastructure and engineering. With its global and local ties, how does the Council think about water?
- **Sustainability in health care.** 8.5 percent of U.S. carbon emissions comes from health care, higher than cement. So, a lot of innovation is needed because of the way we deliver care and the way you use renewable energy. Health care generates huge waste from disposables. We need to have a circular economy and look at renewables. Supply chain is a very big issue in health care, and accounts for about 70 percent of emissions. Innovation is really needed. Packaging is one, transportation drones is another one.

At the end of the day, we would all agree that if we are able to do what we want to do, in fact, health care would be better because patients can be taken care of in their community, at home virtually, and would not have to drive and consume energy. There are many other issues that can be so much better in terms of prevention, health care pathways, and also looking at the whole issue of circular economy. This is very much a competitiveness issue, because healthcare is 20 percent of GDP and it is just going to go higher unless we begin to move the needle in health care.



### Dr. Jon McIntyre

JCM Advisors, and  
Senior Fellow, Council on Competitiveness

Dr. McIntyre is an adviser to private equity, venture capital, start-ups, and big companies mostly in the food and the biotech space. He works with the Engine, founded by MIT, and Harvard Tough Tech Venture Fund, which has 2 or 3 companies each in concrete and in steel. Breakthrough Energy Ventures also has a few investments in that space. Dr. McIntyre also works with a small VC in Effingham, Illinois, called Open Prairie, that invests in agriculture and food.

**Solving the problem of food waste.** In agriculture and food, one of the biggest sustainability challenges is food waste. Food waste is a huge problem because of all the energy and water that goes into

producing food, and 35 percent of it goes to waste. If you could cut that waste in half, there would be an unbelievable amount of benefit.

There are approaches with real potential in this space, for example, a biological approach and a physics approach. Mori is a company that started as a spin out technology from Tufts. They upcycle the waste stream of a silk protein called Fibroin. They process it to create a thin film that coats foods extending the shelf life of leafy greens by 5 or 8 days. It is commercialized, and they are growing, scaling, and figuring out how to do their business.

EverCase takes a physics approach using a technology out of Xerox Parc and the University of Hawaii. It uses a pulsed electric field to take food below freezing temperature without ice crystal formation. There are many foods you cannot freeze and, therefore, have short shelf lives. But produce, fish, and meat can be put in this, extending shelf life by three weeks. There are no additives or preservatives. Think about high-end fish. Major grocers say 40 percent of salmon they buy gets thrown out.

**Agriculture.** The microbiome has potential applications to many things, and there are about two dozen startup companies working to understand the role of soil and endophytes, which are essentially the plant version of your microbiome. Bugs are everywhere. They have unbelievable power. We haven't even tapped into the power of mycelium and fungi, and all the interesting things they can do.

Some of these companies are finding exciting things, such as the ability to code a seed with a microbe and replace fungicides. You would not have to go over a field multiple times with a tractor burning energy, spraying a chemical that had to be made from petrochemicals. Instead, you fermented a microbe, you coded a seed, and you avoided that energy and a chemical, and you get every bit as good, if not better, yields. In addition to removing pesticides, companies are looking at being able to have water or salt tolerance. So a system approach, especially in food and agriculture, is critical. The microbiome needs an AI-driven platform because the complexity of the multifactorial challenge.

### Point of discussion

- **Food quality.** Food companies recognize food is also about pleasure and culture. So, we are not trading off sustainability for quality. We can try to up the quality or value proposition to the consumer—consumer-centric led innovation as well as sustainability.



#### Paul P. Skoutelas

President and CEO

American Public Transportation Association

In the United States and Canada, we are seeing more investment in mobility options, how we move people around urban areas more sustainably and making that transition.

**Transportation electrification.** Transportation accounts for about 25 percent of greenhouse gas emissions annually, so we are seeing major investment in electrification. But there are still a lot of questions around electrification in getting where we need to go. First, it is expensive. The cost of an electric vehicle today is not for the average person just yet. Also, there is a lot of infrastructure costs associated with that as well. So, the question becomes how quickly do we have the supporting infrastructure, EV charging, to make that happen? It is happening in public transport and buses. Hydrogen fuel is at the early stage of being deployed on both the passenger and freight side.

**Workforce.** Workforce is a major issue for the transport industry, not just highly educated people with engineering degrees, but also front-line workforce such as bus and rail operators. Those jobs are plentiful, but people to fill them are not. They may have more options today, and there is just more competition for basic labor.

**Legislation and policy.** The Bipartisan Infrastructure Law and the Inflation Reduction Act were both very strong positives for transportation infrastructure, the full array of roads, bridges, public transport, and ports. But a great Achilles heel on the transport side is the variability in policy at the federal level. The interstate highway system would have never gotten built if it were not for the federal government taking the leadership role and funding it. But it will be very difficult to sustain the kind of investment over time that we need. And as you travel around the world, throughout Europe or Asia, we are no longer the leaders in terms of public transport infrastructure. You need policy and funding continuity. It can't be 4 to 5 years. You can't even get through the environmental process in a five-year time frame, let alone invest and build. So that's one of the key issues for us as we deal with the issues of workforce, sustainability, environmental improvements, etc.





**Top, left to right:** Dr. Dietra Trent, Executive Director, White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities; The Honorable Deborah L. Wince-Smith, President and CEO, Council on Competitiveness; Ms. Joan Gabel, Chancellor, University of Pittsburgh, Academic Vice Chair, Council on Competitiveness; and Mr. Brian Moynihan, Chair and CEO, Bank of America, Chair, Council on Competitiveness.

**Bottom, left to right:** Dr. Suresh V. Garimella, President, University of Vermont; Dr. Padma Raghavan, Vice Provost for Research and Innovation, Vanderbilt University; and Dr. Sylvia Thomas, Interim Vice President for Research & Innovation, University of South Florida.

**Top, left to right:** Dr. René Lammers, Executive Vice President & Chief Scientific Officer, PepsiCo; Dr. Jon McIntyre, Senior Fellow, Council on Competitiveness; and Ms. Candace Culhane, Senior Advisor, Council on Competitiveness.

**Bottom, left to right:** Dr. Dietra Trent, Executive Director, White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities; and Dr. Darryll Pines, President, University of Maryland, College Park.



**Top left, left to right:** Mr. Dan Helfrich, Chair and CEO, Deloitte Consulting LLP, Business Vice Chair, Council on Competitiveness; Mr. Jim Clifton, Chairman, Gallup; and Mr. Charles Holliday, Jr., Chair Emeritus, Council on Competitiveness, and Chair, GFCC.

**Top right, left to right:** Mr. Paul P. Skoutelas, President and CEO, American Public Transport Association; and Dr. Dietra Trent, Executive Director, White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities.

**Bottom, left to right:** Dr. Marlene Tromp, President, Boise State University; and Ms. Joan Gabel, Chancellor, University of Pittsburgh, and Academic Vice Chair, Council on Competitiveness.

# Preparing for NCF 2023 and Engaging in the 2024 Election Cycle & Global Opportunities



**The Honorable Deborah L. Wince-Smith**  
President and CEO  
Council on Competitiveness

**Technology statecraft.** One of the Commission's recommendations in *Competing in the Next Economy* was establishing a new technology statecraft. Secretary Blinken picked that up, and it has been promulgated in the administration and Congress. We should be working with those nations that are democracies and share our values to address these big global challenges from climate to food. Also, how will we involve the emergence of Africa as a continent waiting for the future that we all have a moral and economic responsibility to engage with?

There are a number of international initiatives that the United States wants to participate in that are not being funded. We participate in big global projects on energy and things such as ITER and CERN, but should the Council—and how can the Council—expand its private sector voice in strategic international engagement?



**The Honorable Olin Wethington**  
CEO and Co-Founder  
Graham Biosciences LLC

**Leveraging U.S. participation in international institutions and arrangements.** We do not take sufficient advantage to improve America's competitive position of our ownership and participation in international institutions, arrangements, and agreements that provide rules of the game. We hit a low point in 2018-2020 when there was in this country a great suspicion of the utility of these arrangements that set the rules of the game.

To some extent, we have begun to revitalize partnerships internationally among allies and the like-minded, and accrue the benefits that alliance and working at common purpose provide to our competitive position. We are in comparison to the only country that really can rival us for changing the international rules of the game. That is China. We are ally

rich. If you aggregate the GDP of the United States, Europe, the G7, and South Korea, you get about 70 percent of global production. And that's about a 3.5 to 1 advantage over China's capability. That does not frame the question of will, nor the question of an inclination to utilize that resource advantage.

**There needs to be a strong private sector voice in this international exercise.** This includes a voice in international standards setting, use of the massive resources multilateral development banks have, coordination on controls of strategic technology, controls on investment where there are security implications, and rules of the game, for example, with respect to procurement. We also have the big area that the pandemic highlighted—supply chain vulnerabilities.



**Dr. Victor Dzau**  
President  
National Academy of Medicine

**Aging global population.** Globally, there are more people over the age of 65 than children under five years old. The fertility rate is going down as aging is going up. And those two curves have already intersected as we see more and more older people. So, if you look at the world in the next 20 years or so, the aging population will double in the United States. If you measure over 65 baby boomers, there are about 80 million, outnumbering Generation Z. All told, this is a large population that is growing older. This is an opportunity to do the right thing with this population. Healthy Longevity is a project to keep them healthy and productive, and that can be beneficial to society and the workforce.

**Science, technology, and aging.** Science is exploding with regard to understanding the cellular aging process, whereby you can begin to intervene and prevent aging. One example is called partial reprogramming, a way to turn an older cell back to a younger cell. And it has been proven in animal studies. In engineering and digital technology, remote monitoring, autonomous vehicles, and many other things will make life much easier. Japan and Singapore are very committed to this. Singapore is redoing its housing to have smart enabled technology in all elderly homes in certain areas.

**Where's the opportunity?** Not only could you have much healthier older people, many would continue to work and contribute to the workforce. AARP has talked about this significantly in terms of the business proposition, but also R&D. This is an industry that is going to be emerging with innovation and product. In addition to looking at root causes of aging, the fundamental cellular mechanism in which you can intervene, there are many social issues. For example, during COVID, isolation was a big issue for the elderly and that was a significant prognostic negative factor for the elderly. It is an international opportunity because it is bringing together international researchers and practitioners to address these issues.

- AI conversation, since they understand the larger social context in which AI is entering;
- Protecting U.S. intellectual property, for example, the technology and innovation that will flow from the CHIPS and Science Act;
- International collaboration, for example, in AI governance and addressing the risks in quantum computing. (The Council and its members have connectivity to universities all over the world, and could be a safe haven from the politics of globalization.) This includes maintaining open communication channels with countries we disagree with to work toward preventing future problems with emerging technologies; and
- Aggressive engagement in standards organizations and other bodies developing rules for the global economy.

# What Should Be the Role of the Council as We Approach the Election Season?

Recognizing both the polarization across the country and the Council's historic non-partisan status, Commissioners discussed the role the Council should play during the upcoming election season. It was proposed that the Council develop and promulgate a Commissioner-consensus policy agenda for the Nation, for example, a ten or twelve point action plan presented to the incoming Administration and Members of Congress at the end of 2024/early 2025.

The Council should articulate technology-related national security concerns and why we need to invest in certain domains. We did not invest adequately in hypersonics, and now we are having to play catch-up. Quantum, for example, cannot go the way of hypersonics. The Council should also articulate the changing and critical role higher education is playing in American competitiveness, and state and regional economic growth.

Issues were identified around which the Council and Commission could develop straightforward recommendations with the potential for broad support.

These include, as examples:

- Job formation, training, and skills building;
- Improving public higher education;
- Sustainability, the environment, and investing in environmental transition;
- Investing in research, including basic research;

- Bringing social scientists and humanists into the AI conversation, since they understand the larger social context in which AI is entering;
- Protecting U.S. intellectual property, for example, the technology and innovation that will flow from the CHIPS and Science Act;
- International collaboration, for example, in AI governance and addressing the risks in quantum computing. (The Council and its members have connectivity to universities all over the world, and could be a safe haven from the politics of globalization.) This includes maintaining open communication channels with countries we disagree with to work toward preventing future problems with emerging technologies; and
- Aggressive engagement in standards organizations and other bodies developing rules for the global economy.

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## About the Council on Competitiveness

For more than three decades, the Council on Competitiveness (Council) has championed a competitiveness agenda for the United States to attract investment and talent, and spur the commercialization of new ideas.

While the players may have changed since its founding in 1986, the mission remains as vital as ever—to enhance U.S. productivity and raise the standard of living for all Americans.

The members of the Council—CEOs, university presidents, labor leaders and national lab directors—represent a powerful, nonpartisan voice that sets aside politics and seeks results. By providing real-world perspective to Washington policymakers, the Council's private sector network makes an impact on decision-making across a broad spectrum of issues—from the cutting-edge of science and technology, to the democratization of innovation, to the shift from energy weakness to strength that supports the growing renaissance in U.S. manufacturing.

The Council's leadership group firmly believes that with the right policies, the strengths and potential of the U.S. economy far outweigh the current challenges the nation faces on the path to higher growth and greater opportunity for all Americans.