

National Commission on Innovation & Competitiveness Frontiers



Compete.

Council on
Competitiveness

Commission Community Launch Conference

Arizona State University
January 16, 2020



Located in the center of student life at ASU's Tempe campus, the Student Pavilion is a multi-use event space designed as a net-zero energy building—having the goal to produce as much energy as it uses on an annual basis to complement the larger university goal of climate net neutrality and sustainable business systems.



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WiFi Instructions

1. Connect to **asu guest** from the list of available wireless connections.
2. Open a web browser and try to connect to the internet.
3. You will be directed to the guest sign in portal. Click **"Don't have an account?"**
 - Fill in the registration information and click **Register**. (You can enter in a valid email address OR mobile phone number.)
 - Click **Email Me** or **Text Me** to receive your password.
 - Then click **Sign On** and enter your username and password.

Welcome to Arizona State University and the Launch Conference of the National Commission Community

Dear Colleagues,

In today's global economy, low costs, high quality, rapid product and service design and deployment, and organizational dexterity all come together and form a baseline to compete—but, increasingly, these traits characterize many markets and nations.

Long-term, inclusive prosperity requires strengthening this baseline—but it requires more. It requires placing ever more attention on innovation to confer competitive advantage.

Why?

Innovation is a proven driver of productivity and economic growth, job creation, and rising living standards.

And while the United States has stood apart from the rest of the world during the past half century in its record of sustained innovation, across industries old and new, and through the ups and downs of economic cycles, the nation today faces new realities and new imperatives transforming the context for continued innovation leadership:

- Other nations are replicating the structural advantages that historically have made the United States the center of global innovation;
- Many nations are developing their own, distinctive innovation ecosystems;
- The nature of innovation is changing—becoming dramatically more interconnected, turbulent and fast-paced;

- New research and business models are emerging, allowing someone to imagine, develop and scale a disruptive innovation independent of traditional institutions.

What will the United States do in the face of these challenges at home and coming from abroad?

Will we plan for the long term?

Will we put in place the talent, innovation capital and infrastructure necessary for continuing success?

Will we recognize the multifaceted nature of these challenges and come together across all sectors to forge a new, national innovation compact?

This is the opportunity for the National Commission on Innovation & Competitiveness Frontiers over the coming months and years—to develop together a “modernization model” and spur an inclusive innovation movement across the United States.

We are grateful for your participation in this movement—nominated by ourselves and our fellow National Commissioners, and forming a powerful, insightful and unique community of stakeholders. You will help us—starting at Arizona State University—to surface, shape, refine and share a new innovation agenda for the country. Thank you for joining this Community Launch conference, and we look forward to our conversations and explorations on campus—and going forward over the coming months.

Sincerely,



A handwritten signature in black ink that reads "Michael Crow".

Michael M. Crow
President
Arizona State University, and
University Vice-chair
Council on Competitiveness



A handwritten signature in black ink that reads "Mehmood Khan".

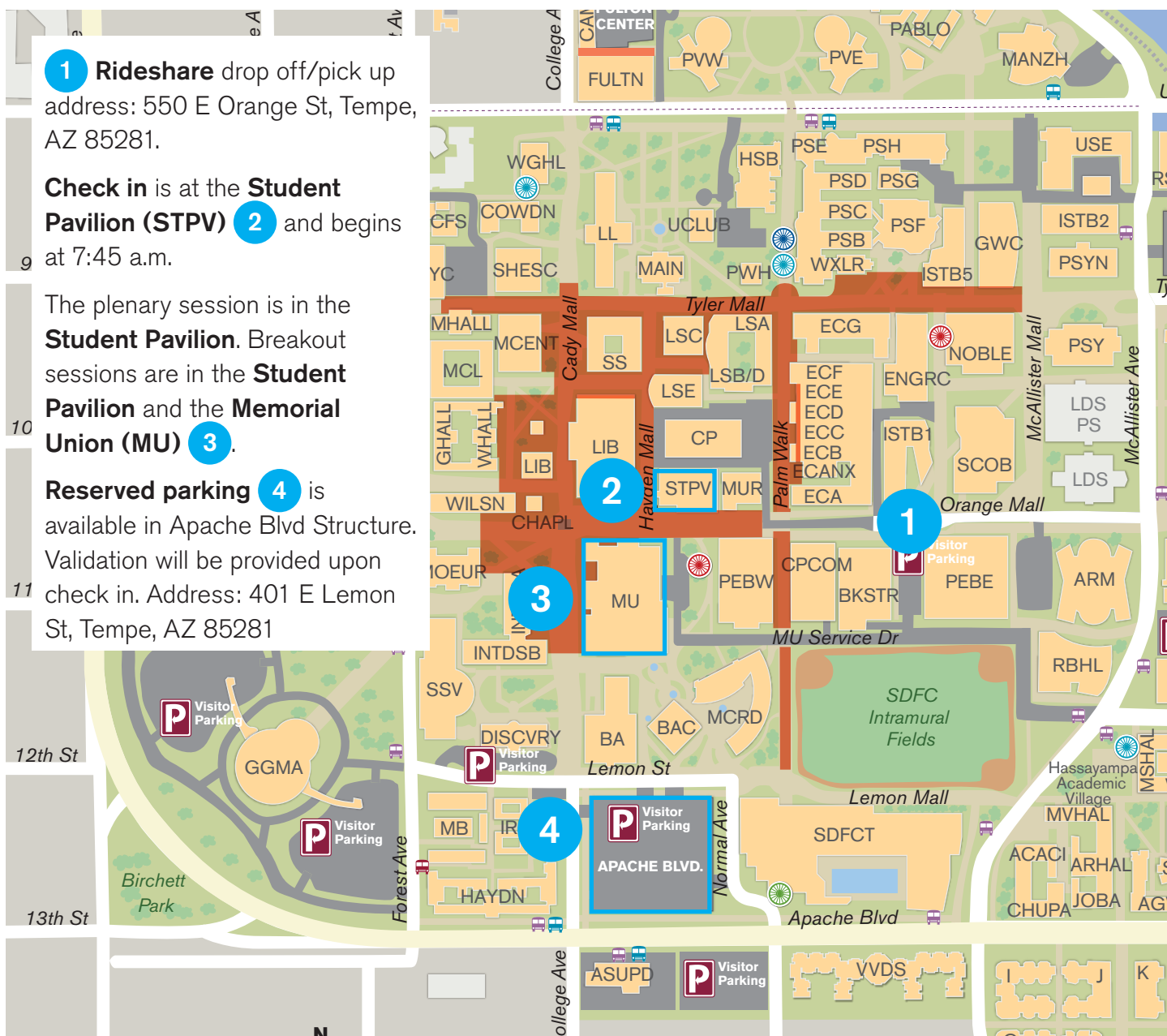
Mehmood Khan
Chief Executive Officer
Life Biosciences, Inc., and
Chairman
Council on Competitiveness



A handwritten signature in black ink that reads "Deborah L. Wince-Smith".

Deborah L. Wince-Smith
President & CEO
Council on Competitiveness

Event Map



National Commission Community's Online Collaboration Platform

Login in, Activate Your Account and Create

To help all of us connect, communicate and co-create during the coming weeks, months and years, we are launching the first iteration of our secure online collaboration platform at innovation.compete.org.

Our goals for the platform are simple:

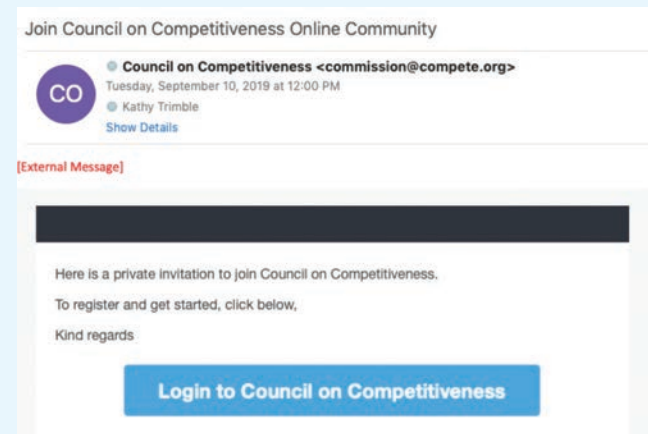
- We want to empower you—as a member of the Commission Community—to engage with each other, when and where you like.
- We want to provide a curated, personalized experience, including access to the extensive Commission Community library of interesting and useful reports, studies and data that will help you in your policy-making conversations online.
- We also want to leverage innovative software and tools to facilitate and accelerate the innovation policy-making process for the Commission Community.

AN IMPORTANT NOTE: In addition to this quick start guide, you will receive an email from us with a more comprehensive guide and answers to frequently asked questions, hints to get you started on the platform, and details about how to access the tremendous community library.

For any questions or concerns with your login, please contact commission@compete.org.

Quick Start: Joining the Commission Community Platform

1. Check your inbox! On January 16, 2020, you should receive an invitation email like the below image from “Council on Competitiveness <commission@compete.org>” to register and get started. If you don't see an email from commission@compete.org, please check your junk folder.



2. Create a password! After clicking on “**Login to Council on Competitiveness,**” you will be directed to a personalization step and will be prompted to create a password for access.

3. Access the platform! Once you create your password, you will have access to the online collaboration platform. To expedite your access, the Council staff has pre-loaded your photo and biographical information, and you will be able to change/edit that information as you see fit.

Master Agenda

MORNING

7:45 Registration Open

Location: Student Pavilion, Senita Ballroom

8:30 Welcome & Launching the National Commission Community

Location: Student Pavilion, Senita Ballroom

Dr. Michael M. Crow, National Commission Co-Chair
President, Arizona State University
University Vice Chair, Council on Competitiveness

Dr. Mehmood Khan, National Commission Co-Chair
Chief Executive Officer, Life Biosciences, Inc.
Chairman, Council on Competitiveness

The Honorable Deborah L. Wince-Smith, National Commissioner
President & CEO, Council on Competitiveness

8:45 Chats with the National Commissioners— Re-inventing America's Innovation Systems

A series of brief kick-off conversations with National Commissioners—an opportunity for them to share their vision and goals for the Commission, and to charge the Commission Community to develop an bold, actionable and inclusive innovation agenda for the United States. Q&A with the Community.

Moderator

Mr. Chad Evans
Executive Vice President, Council on Competitiveness

Chat 1: Developing and Deploying at Scale Disruptive Technology

Dr. Michael M. Crow, National Commission Co-Chair
President, Arizona State University
University Vice Chair, Council on Competitiveness

Mr. Edward Jung
Founder and CEO, Xnova, LLC

Mr. Chris Musselman, National Commissioner
Head of U.S. Commercial Business, Palantir Technologies

Chat 2: Exploring the Future of Sustainable Production and Consumption, and Work

Dr. Mehmood Khan, National Commission Co-Chair
Chief Executive Officer, Life Biosciences, Inc.
Chairman, Council on Competitiveness

Dr. Elisa Stephens, National Commissioner
President, Academy of Art University

Dr. Mark P. Becker, National Commissioner
President, Georgia State University

Chat 3: Optimizing the Environment for the National Innovation System

Mr. Thomas R. Baruch, National Commissioner
Managing Director, Baruch Future Ventures

Dr. M. David Rudd, National Commissioner
President, University of Memphis

The Honorable Deborah L. Wince-Smith, National Commissioner
President & CEO, Council on Competitiveness

9:45 National Commission Year 1: Mapping the Journey

A summary of the Community Launch Conference agenda—as well as a preview of the Commission's Year 1 goals, activities, tools and deliverables.

Mr. Chad Evans
Executive Vice President, Council on Competitiveness

Ms. Kathy Trimble
Vice President, Council on Competitiveness

10:00 Transition to Breakout Groups

Commission Community members break out of plenary and head to individual sessions for: the Advisory Committee and the Outreach and Engagement Committee, and the three Working Groups.

10:30 Commission Community Breakout Sessions

Each Commission Community group will convene. The purpose of these initial work sessions is for member self-introduction, and a review of the key “charters” and goals set out for each group by the National Commissioners.

After the first hour and a half, there will be working lunches, kicking off a set of afternoon deliberations and innovation tours across campus.

Specific breakout group primers and discussion guides follow in this book.

Locations

Advisors and Outreach/Engagement Leaders
Student Pavilion, Senita B Room

Working Group 1: Developing & Deploying at Scale Disruptive Technologies
Student Pavilion, Senita C Room

Working Group 2: Exploring Future of Sustainable Production & Consumption, and Work
Memorial Union, Cochise Room

Working Group 3: Optimizing the Environment for National Innovation Systems
Memorial Union, Turquoise Room

AFTERNOON

12:00–3:00

Each Commission Community group continues their conversations over working lunches—shifting more toward: mapping out parameters/boundaries of the issues the Community groups will explore; brainstorming and developing potential policy recommendations—or frameworks off of which to build policy recommendations in the coming months.

And each group will have a curated innovation tour on campus—more details to come on the day of the conference.

Groups should also end their session with: nominating a representative(s) to summarize their conversation in the upcoming plenary at 3:30pm; a conversation on workflow and how best to move forward as a Group—engagement on the online platform; potential physical meetings plus online platform; etc.

	Advisors/Outreach	Working Group 1	Working Group 2	Working Group 3
	<i>Location:</i> Student Pavilion, Senita B Room	<i>Location:</i> Student Pavilion, Senita C Room	<i>Location:</i> Memorial Union, Cochise Room	<i>Location:</i> Memorial Union, Turquoise Room
12:00	Working Lunch with Commissioners	Working Lunch	Working Lunch	Working Lunch
12:15				
12:30				
12:45	Breakout Conversation	Innovation Immersion Tour	Breakout Conversation	Innovation Immersion Tour
1:00				
1:15	Innovation Immersion Tour	Breakout Conversation	Innovation Immersion Tour	Breakout Conversation
1:30				
1:45				
2:00				
2:15	Breakout Conversation	Breakout Conversation	Breakout Conversation	
2:30				
2:45	Breakout Conversation	Breakout Conversation	Breakout Conversation	Breakout Conversation
3:00				

3:00 Commission Community Groups Return to Plenary

Location: Student Pavilion, Senita Ballroom

3:30 Reports from the Community

Commission Community groups share in plenary their respective conversations—initial scoping of their charge; preliminary ideas around policy areas of interest; plans for workflow over the coming months.

Moderator

Mr. Chad Evans

Executive Vice President, Council on Competitiveness

4:15 Next Steps for the National Commission

The Honorable Deborah L. Wince-Smith, National Commissioner

President & CEO, Council on Competitiveness

Dr. Mehmood Khan, National Commission Co-Chair

Chief Executive Officer, Life Biosciences, Inc.
Chairman, Council on Competitiveness

Dr. Michael M. Crow, National Commission Co-Chair

President, Arizona State University
University Vice Chair, Council on Competitiveness

4:30 Commission Community Launch Conference Closes

Advisors and Outreach and Engagement Committee

Community Breakout
Session Mini-Agenda
and Discussion Guide

Student Pavilion
Senita B Room

Moderator

Mr. Chad Evans
Executive Vice President
Council on Competitiveness

MORNING

10:30 Introductions and Roles of the Advisors and Communications Leaders

Role of Advisors

The Advisors represent—and in some cases, proxy for—the National Commissioners. Advisors are the day-to-day points of contact and advice for the Council on Competitiveness team driving the Commission's research and supported by a set of three Working Groups (Developing and Deploying at Scale Disruptive Technologies; Exploring the Future of Sustainable Production and Consumption, and Work; Optimizing the Environment for the National Innovation System).

The Advisors will serve as a strategic screen for the National Commissioners—helping to coordinate and review the efforts of the Working Groups, as well as setting goals and tracking progress for the Working Groups. And in conjunction with the Council staff, the Advisory Committee will develop the final set of recommendations and reports for review, debate and approval by the National Commissioners and the Board of the Council on Competitiveness.

Role of the Outreach & Engagement Committee

This Committee will develop and manage for the Commission a creative and actionable media, outreach and government relations strategy. As such, this group will liaise tightly with the Council on Competitiveness staff and the Advisors—as well as the National Commissioners themselves. This Committee will comprise experts appointed by the National Commissioners.

National Commissioners—who first met on August 7, 2019—have provided general guidance to the three policy Working Groups for their study of issues, challenges, and opportunities, and the development of recommendations to address them (see *Launch* for more details).

And given the roles of the Advisors and Outreach & Engagement Committee—in overseeing, integrating and communicating the output of the Working Groups—this key summary should be helpful in your efforts:

- Examine challenges and opportunities from an ecosystem perspective inclusive of the broader economy, (e.g., if considering opportunities related to disruptive technology in the agriculture space, also consider linking the cost-benefit outcomes of agribusiness technology-enabled solutions to improvements in efficiency and productivity, and to their impacts on consumers, healthcare systems, and the environment).
- Recommended actions should create opportunities that uplift as many stakeholders—business, labor, education, research, and consumers—as possible, and improve outcomes for broader segments of the population, especially for those at the lower end of the socioeconomic scale. Be specific about the economic impacts to families and individuals of investments in R&D, physical infrastructure, intellectual property, and industry and academic sectors. Convey the socioeconomic benefits to people and communities whose livelihoods the recommendations will directly affect.
- Recommendations need to center on competitiveness, while also recognizing that any recommendations may have unintended consequences in potentially lowering competitive advantage or negatively impacting some elements of the workforce.
- Recommendations should lead to action-oriented measurable outcomes—policy recommendations, as well as those the Council's membership and affiliated constituencies could put into practice and track results.

- Public attitudes toward science and engineering should be incorporated into the Commission's assessment.
- Identify which decision-makers can act on recommendations, and consider how to shape a compelling narrative that will encourage them to listen and act.
- Other considerations in prioritizing challenges, solutions and recommendations to address could include: Is the issue or challenge urgent? Is the issue, challenge, or potential solution pivotal in terms of its impact or the number of other issues or factors affected? Is the recommendation actionable, and what is the vehicle for advancing the recommendation?

11:15 Focus of the Advisors and Outreach & Engagement Committee—and Conversation Kick-off

National Commissioners' guidance specific to Advisors and members of the Outreach & Engagement Committee includes:

- At the moment, our nation has a tremendous inability to understand innovation and complexity.
- How do we develop an actionable and realistic policy agenda that enhances human capabilities—and, at the same time, communicate that emerging agenda clearly, creatively and compellingly?
- How do we shape the message environment?
- How do we reach an audience of hundreds, thousands or millions?
- How do we move public opinion on this complex issue set?
- How do we spur action in Washington, DC as well as on Main Street, USA?
- How do we integrate and unify communications and government relations efforts?

This discussion guide will focus on two fundamental threads:

- Substance—a deep dive on Commission issues, concerns, opportunities and challenges. The Commission's "work" / output should succinctly and emotionally capture the urgent need for turning around the United States' decline in productivity growth (or perhaps an alternative message that's tested to more deeply resonate with core audiences).
 - Does it do so today?
 - How do we make the case to America for the urgency implied in standing up a National Commission?
- Strategy—does the Commission need a formal, strategic publicity plan? If so, what would that look like? How could we co-develop? What would be the elements of such a case/plan?
 - Digital Executions?
 - Media advisories and press releases?
 - Administration, federal affairs and Legislative materials? How do we navigate the DC environment and coordinate the writing and positioning of white papers, development and design of collateral, and Hill/administration briefing messaging? How do we establish and sustain a recognizable "brand?"
 - Events? How do we take advantage of existing "stages" (like our annual National Competitiveness Forum)—and create others—to share our work?
 - Stakeholder toolkits? Can we support National Commissioners, Working Group members, general Council members, media, and other stakeholders with easy-to-access, clearly branded, supportive materials to advance our messaging? What would be in such a toolkit? How do we start to build this?

11:45 Community Collaboration Portal—A Deep Dive

A representative from HiveBrite, the company helping to develop our Commission Community's online collaboration platform, will join us to provide further details, answer questions you might have, and explore opportunities to leverage this tool for internal and external outreach.

AFTERNOON

12:00 Working Lunch with National Commissioners

National Commissioners will join the Advisors and Outreach & Engagement Leaders to hear initial ideas on how best to develop a strategic communications plan for the Commission.

12:45 Breakout Conversation

1:30 Depart for Innovation Immersion Tour

ASU leaders will guide Commission Community members on a tour of a relevant innovation hotspot on campus to inspire and engender further conversation.

2:45 Return from Tours, Wrap-up Conversation and Prep Plenary Report Out

3:00 Return to Plenary

Working Group 1:
Developing and
Deploying at Scale
Disruptive Technologies
Community Breakout
Session Mini-Agenda
and Discussion Guide

Student Pavilion
Senita C Room

Moderator

Ms. Kathy Trimble
Vice President
Council on Competitiveness

MORNING

10:30 Working Group Introductions and Role of the Working Group

Role of the Working Group

Working Groups are the Commission's "ideas and policy recommendation generation engines," charged with framing and developing actionable recommendations to achieve specific goals. The recommendations will likely have many audiences; many will be geared toward policy makers to spur new legislation, executive orders, or public-private initiatives to achieve specific goals. Many other recommendations will be designed to encourage businesses and organizations to take their own steps to promote competitiveness and innovation in their company, region, or industry.

National Commissioners—who first met on August 7, 2019—have provided general guidance to the Commission's Working Groups for their study of issues, challenges, and opportunities, and the development of recommendations to address them (see Launch for more details):

- Examine challenges and opportunities from an ecosystem perspective inclusive of the broader economy, (e.g., if considering opportunities related to disruptive technology in the agriculture space, also consider linking the cost-benefit outcomes of agribusiness technology-enabled solutions to improvements in efficiency and productivity, and to their impacts on consumers, healthcare systems, and the environment).
- Recommended actions should create opportunities that uplift as many stakeholders—business, labor, education, research, and consumers—as possible, and improve outcomes for broader segments of the population, especially for those at the lower end of the socioeconomic scale. Be specific about the economic impacts to families and individuals of investments in R&D, physical infrastructure, intellectual property, and industry and academic sectors. Convey the socioeconomic benefits to people and communities whose livelihoods the recommendations will directly affect.
- Recommendations need to center on competitiveness, while also recognizing that any recommendations may have unintended consequences (e.g., potentially lowering competitive advantage or negatively impacting some elements of the workforce).
- Recommendations should lead to action-oriented measurable outcomes—policy recommendations, as well as those the Council's membership and affiliated constituencies could put into practice and track results.
- Public attitudes toward science and engineering should be incorporated into the Commission's assessment.
- Identify which decision-makers can act on recommendations, and consider how to shape a compelling narrative that will encourage them to listen and act.
- Other considerations in prioritizing challenges, solutions and recommendations to address could include: Is the issue or challenge urgent? Is the issue, challenge, or potential solution pivotal in terms of its impact or the number of other issues or factors affected? Is the recommendation actionable, and what is the vehicle for advancing the recommendation?

11:30 Focus of the Working Group— and Conversation Kick-off

Working Group 1, Developing and Deploying at Scale Disruptive Technologies, focuses on the issues, challenges, opportunities, and factors that affect innovation, technology development and its commercialization at scale. National Commissioners' guidance specific to Working Group 1 includes:

- Consider scalability and technology, and industrial and market disruption from multiple perspectives: U.S. government investments, U.S. and international regulatory environment, industry leadership, academic communities, societal impacts and, when appropriate, in the context of certain industries or public-private partnerships.
- Consider social and ethical implications of technology applications.
- Assess disruptive technologies in terms of the supply chain, global trade implications, scaling to production, and barriers to growth and opportunities for success.
- Determine regional models as well as national level recommendations to inform a national strategy for innovation.

This discussion guide will focus on four fundamental threads, and a series of interconnected questions to consider in shaping actionable policy recommendations:

- Understanding the U.S. competitive position and innovation capacity relative to competitors in a multi-polar science and technology-driven world;
- Assessing the current U.S. investment position in research and development (R&D);
- Mapping the general structure and components of, and challenges facing the U.S. innovation ecosystem; and,
- Exploring government leadership and national strategies for innovation and competitiveness.

ISSUE 1: Understanding the U.S. Competitive Position and Innovation Capacity Relative to Competitors in a Multi-polar Science and Technology World

The United States is competing in a rapidly globalizing science, technology, and innovation environment. Science and technology development capabilities are rising rapidly around the world, and all countries potentially have access to new knowledge and emerging technologies. In 1960, the United States dominated global R&D, accounting for a 69 percent share of the world's R&D investment. The United States could drive developments and lead in technology globally by virtue of the size of its investment. However, the U.S. share of global R&D expenditures has dropped to 29 percent in 2017, diminishing the U.S. dominance and leverage over the direction of technology advancement, and China has risen to account for 26 percent of global R&D spending. China's spending on experimental development has grown rapidly in recent years to more than \$370B, now exceeding U.S. spending by nearly \$70B.

In addition, China has set its sights on world leadership in technology, presenting a growing strategic economic and national security challenge to the United States. It is spending hundreds of billions of dollars, and employing strategic and aggressive, licit and illicit practices around the world to achieve that outcome. In addition, many smaller, often overlooked regions and nations have distinctive strategies to build global innovation competency and competitiveness. These alone may not pose a significant threat to the United States but, collectively, can present a challenge to the U.S. economy and national security. The federal government does not systematically collect, analyze, or publish data and information on the investments, policies, and programs of other nations designed to strengthen their competitive position and build their innovation capacity.

Key Questions to Address

- What is the outlook for U.S. global competitiveness in the application and deployment of disruptive technologies? In which of these technologies is the United States comfortably ahead globally, behind, or risk falling behind? And what can be done about this?
- What factors account most for the U.S. global competitive position in disruptive technologies?
- For both economic and national security, does the United States need to ensure that China does not achieve an over-match position against the United States in technology? If so, what should that entail?
- In which critical technologies is the U.S. competitive position at risk of ceding to China? Are there areas of technology for which we need to shore-up U.S. efforts? If so, how?
- Should the U.S. government systematically monitor what other nations are doing to advance and scale new technologies and innovations?
- Do we need a better understanding of the extent of China's technology collecting in the United States? Does the United States need to crack down on these efforts and how?

ISSUE 2: Investment in Research and Innovation

The United States invests around \$540B annually in R&D, about 2.8 percent of its GDP (Figure 1).

Businesses dominate U.S. R&D investment, mostly funding nearer-term applied research and development aligned with company business strategies. The federal government invests mostly in basic research and mission-related R&D (Figure 2).

Universities and non-federal governments also invest in R&D—universities around \$20B and non-federal governments about \$5B (2017 est.; Figure 2). In addition to their own spending, universities receive about \$36B in federal R&D funding, and about \$4B from private enterprises, about 1 percent of business R&D funding (2017).

Defense and health related research dominate the federal R&D investment portfolio, accounting for three-quarters of federally-supported R&D (Figure 3).

In the United States, venture capital plays a key role in funding start-ups, and emerging technology and innovation development and commercialization. U.S. companies received \$131B in venture capital in 2018. Venture investments of \$100M or greater accounted for 47 percent of the capital invested. In addition, every federal department and agency with an R&D budget of \$100M or more is statutorily required to operate a Small Business Innovation Research program, which sets aside 3.2 percent of its extramural research funding for competitive grants for small businesses that can total a few million dollars to support research and technology development with commercial potential. The Research and Experimentation Tax Credit encourages private sector investment in R&D.

Key Questions to Address

- Overall, is the United States investing enough in research and technology development? If not, what would you recommend?
- What areas of investment require more funding to maintain U.S. global technology leadership?
- Does the United States need to rethink how it spends its public R&D investment? Are we spending it at the right pivot points? And how can we spend it in ways that ensure the opportunities created by this investment are captured by the United States?

- As they become more globalized and remain open in their research, do U.S. research universities have a responsibility to help ensure U.S. taxpayers capture the benefits from the university R&D they fund? What more could universities do? Should they protect the technology?
- Should we embed more public R&D in private organizations as a measure of protection and ability to drive development toward commercialization?

Figure 1. National R&D Investment as Percentage of GDP

Source: OECD Main Science and Technology Indicators

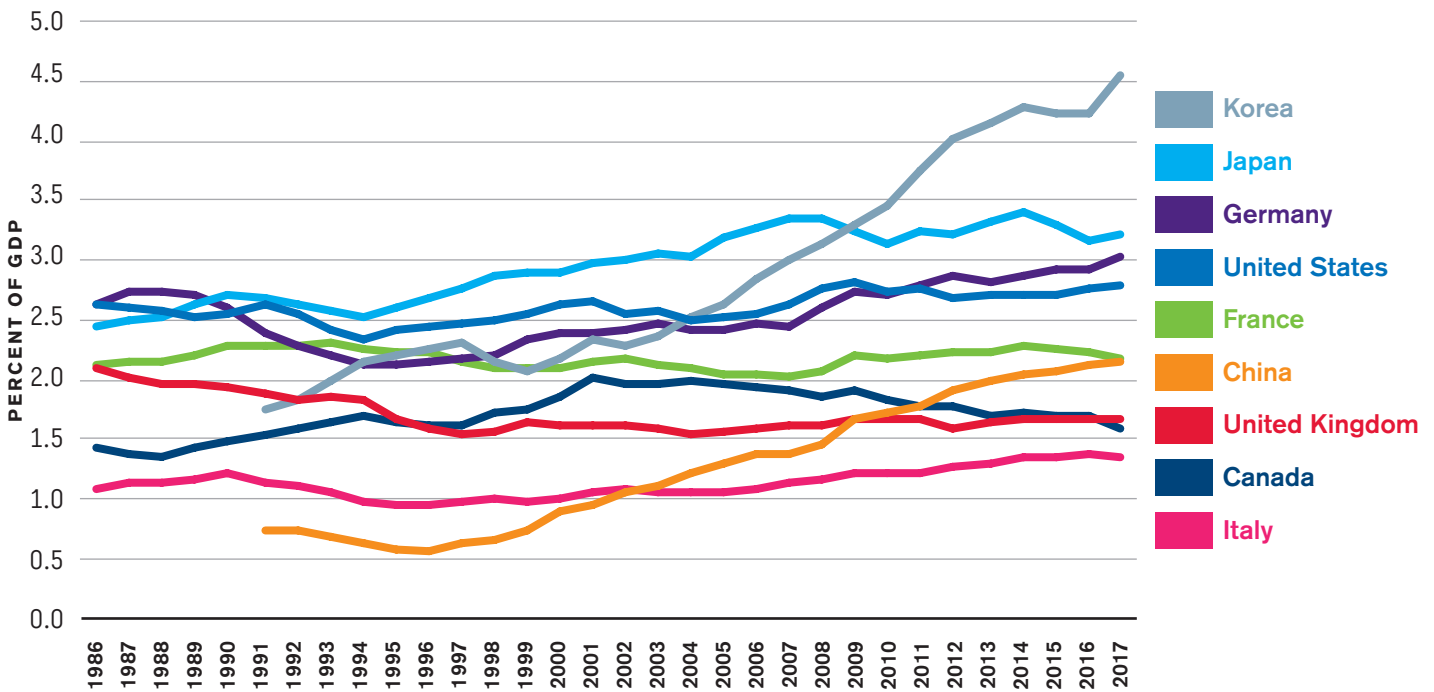


Figure 2. U.S. Funding By Sector and Type of R&D Work (2017 est., billions)

Source: National Science Foundation

Sector	Basic Research		Applied Research		Development		Total	
	\$	%	\$	%	\$	%	\$	%
Federal government	38.6	41.9	36.5	33.1	42.9	12.6	118.0	21.8
Non-federal government	2.5	2.7	1.6	1.4	0.6	0.2	4.7	0.9
Business	27.4	29.7	61.1	55.3	289.6	85.3	378.0	69.7
Higher Education	12.0	13.0	5.4	4.9	2.2	0.6	19.5	3.6
Other Non-profit	11.8	12.8	5.8	5.3	4.4	1.3	22.0	4.1
Totals	92.2	100.0	110.4	100.0	339.6	100.0	542.2	100.0

Figure 3. Distribution of Federal R&D Budget 2018 (preliminary)

Source: National Science Foundation

Budget Function	Millions of \$	%
R&D	128,107	100.0
National defense	60,775	47.4
Health	34,379	28.8
General science and basic research	10,050	7.8
Space flight, research, and supporting activities	9,713	7.6
Energy	3,483	2.7
Natural resources and environment	2,389	1.9
Agriculture	1,994	1.6
Transportation	1,439	1.1
Veterans benefits and services	1,338	1.0
Commerce and housing credit	953	0.7
Administration of justice	656	0.5
Education, training, employment, and social services	463	0.4
International affairs	322	0.3
Income security	63	*
Community and regional development	70	0.1
Medicare	19	*

AFTERNOON**12:00 Working Lunch****12:45 Depart for Innovation Immersion Tour**

ASU leaders will guide Commission Community members on a tour of a relevant innovation hotspot on campus to inspire and engender further conversation.

2:00 Return from Tour and Focus of the Working Group—Continuing the Conversation**ISSUE 3: Structure and Components of and Challenges Facing the U.S. Innovation Ecosystem**

Businesses perform nearly three-quarters of all R&D in the United States, more than half of the Nation's applied research, and more than one-quarter of basic research (Figure 4). Companies are moving away from exploratory research toward nearer-term applied R&D that supports business units, and now frequently look outside of the firm for breakthrough innovations. In a recent survey of U.S. manufacturing firms, of those firms that had innovated, 49 percent reported that the invention underlying their most important new product had originated from an outside source.¹

At universities, basic research is the dominate type performed, along with a significant amount of applied research; universities do little development work.

The federal government performs about 10 percent of the Nation's R&D, around the EU average (11 percent), and lower than in China (15 percent). In addition to universities, private companies also compete for grants to perform federally-funded R&D. With

Figure 4. U.S. R&D Performance By Sector and Type of R&D Work (2017 est., billions)

Source: National Science Foundation

Sector	Basic Research		Applied Research		Development		Totals	
	\$	%	\$	%	\$	%	\$	%
Federal government	\$10.4	11.3	\$17.8	16.1	\$23.2	6.8	118.0	21.8
Non-federal government	0.2	0.2	0.5	0.5	0.0	0.0	4.7	0.9
Business	26.2	28.4	64.8	58.7	306.1	90.1	378.0	69.7
Higher Education	43.8	47.5	20.2	18.3	6.9	2.0	19.5	3.6
Other Non-profit	11.8	12.8	7.1	6.4	3.4	1.0	22.0	4.1
Totals	92.2	100.0	110.4	100.0	339.6	100.0	542.2	100.0

1 Arora A, Cohen W, and Walsh J. *The Acquisition and Commercialization of Invention in American Manufacturing: Incident and Impact*. NBER Working Paper, National Bureau of Economic Research, 2016.

federal funds, universities perform research on a vast array of subjects, while federal research carried out by businesses often involves defense-related work.

Universities and small businesses can retain patent rights and license the inventions they develop with federal funding. National laboratories can enter into cooperative R&D agreements with private enterprises.

Technology breakthroughs increasingly come from universities, national labs, and small start-up companies. For example, universities are driving rapid developments in gene editing, while small software start-ups are driving many of the developments in artificial intelligence. The United States has a long history of start-up companies spinning out of university research programs. Many universities are undertaking efforts to encourage spin-off companies based on the R&D they perform, and train students in entrepreneurship.

Key Question to Address

- How can we increase flows of innovation, enabling companies to tap innovations from outside the private sector, and outside of their own industries?

Concentrations of Innovation Assets and High-Tech Industry

National Commissioners have emphasized the need for inclusivity in the U.S. innovation ecosystem. Yet, U.S. R&D and venture capital funding are highly concentrated in certain geographic locations in the United States, and in certain industries. Also, the United States has numerous high technology clusters, geographic regions with higher levels of research, technology, and high technology firm intensity. Many are closely linked to top research universities. These include the renowned Silicon Valley, Boston Route 128, and the Research Triangle, but there are others across the country.

In 2015, the 10 states with the largest R&D expenditure levels accounted for about 65 percent of U.S. R&D spending that can be allocated to the states. California alone accounted for 25 percent of the U.S. total, about four times as much as Massachusetts, the next highest state (Figure 5). Venture capital investment is also highly concentrated in certain geographic regions of the United States—particularly California, New York and Massachusetts—which, together, accounted for 79 percent of venture dollars invested in the United States in 2018.

The R&D performed domestically by U.S. businesses occurs mainly in five business sectors: chemicals manufacturing (particularly the pharmaceuticals industry); computer and electronic products manufacturing; transportation equipment manufacturing (particularly the automobile and aerospace industries); information (particularly the software publishing industry); and professional, scientific, and technical services. In 2015, these five business sectors accounted for 83 percent of total domestic business R&D performance that year. More than half of venture capital in the United States goes to software (36 percent) and life sciences (18 percent) companies. Large companies (25,000 or more domestic employees) accounted for 36 percent of all U.S. business R&D performance in 2015. Micro companies (5-9 domestic employees) and small companies (10-49 domestic employees) together accounted for 5 percent.

Key Questions to Address

- How can we spread innovative activities and support for innovation outside of those industries, geographic regions, and companies in which they are concentrated?
- How do we link geographic clusters of innovation to rural areas that need economic revitalization? Can we afford the costs (rural schools, health care, infrastructure)?

Figure 5. Top 10 States in the U.S. R&D Performance, by Sector and Intensity, 2015

Source: National Science Foundation

Rank	State	All R&D		Sector Ranking	
		Amount (current \$M)	Business	Higher Education	Federal Intramural and FFRDCs
1	California	125,056	California	California	Maryland
2	Massachusetts	28,665	Massachusetts	New York	California
3	Texas	23,668	Michigan	Texas	New Mexico
4	New York	22,401	Texas	Maryland	Virginia
5	Maryland	20,385	Washington	Massachusetts	District of Columbia
6	Michigan	19,891	New York	Pennsylvania	Massachusetts
7	Washington	20,038	New Jersey	North Carolina	Alabama
8	Illinois	16,502	Illinois	Illinois	Tennessee
9	New Jersey	15,865	Pennsylvania	Florida	Illinois
10	Pennsylvania	14,839	Connecticut	Michigan	Washington

Research and Technology Development Institutes, Centers and Programs

There are numerous research and technology development institutes and centers across the United States, operated by federal government agencies and universities, as well as companies' internal R&D organizations. They include the 17 laboratories in the crown jewel Department of Energy National Laboratory System, which house 30 unique scientific instrumentation and research facilities available to the public and private sector. These institutes also include 14 diverse national manufacturing innovation institutes,

public-private partnerships jointly funded by government and private industry. At some of these premier and globally unique laboratories and facilities, core scientific and technological capabilities are potentially at risk due to deficient and degrading infrastructure. Space in many facilities within the system is old, outdated, even obsolete, with maintenance and repair hamstrung by chronic underfunding.

The United States has established national research initiatives, such as the BRAIN Initiative, National Quantum Initiative, and the Materials Genome, which include public-private partnerships. There are other

programs and challenges focused on technology development such as the Small Business Innovation Research Program, defense programs to strengthen defense technology and the defense industrial base (e.g. Electronics Resurgence Initiative and MAN-TECH); and other mission-related grant research and technology development programs in areas such as renewable energy and energy efficiency efforts, space technology, homeland security, and agriculture.

Key Questions to Address

- Do we need new types of R&D programs, such as national technology initiatives, technology focused centers and hubs, critical technology targeting, etc.? Should these efforts target the dynamism and innovation capabilities concentrated in U.S. metropolitan areas?
- How do we convince national leaders and the American public that this infrastructure is just as important to the economy as roads, bridges, waterways, etc. and worthy of substantial investment?
- Looking forward—facing accelerating technological advancement, and other disruptive developments such as the industrialization of space—what should be the plan for new science and technology infrastructure?

State and Regional Efforts

In addition to funding R&D, and in connection with their economic development efforts, States and regions have a wide range of initiatives, programs, and facilities designed attract high tech companies, stimulate innovation, grow industry clusters, and nurture start-ups and entrepreneurs. These efforts are often near or connected to research universities. They include: research and technology parks, start-up incubators, accelerators, seed funds, and programs to train and mentor entrepreneurs. The federal government provides funding support for some of these initiatives.

Key Question to Address

- How can the efforts of national government be better integrated with those at the state and local level?

Venture Capital

Venture capital plays an indispensable role in funding U.S. innovation, supporting the development of some of the most innovative and successful U.S. companies. Venture capital has been a key and historically distinctive tool in the U.S. innovation ecosystem—tweaked to solve hard problems via a culture of matching multidisciplinary technologies and applying diverse, data-driven financial tools. The size of the U.S. venture industry has steadily increased over the past decade. At the end of 2018, there were 1,047 venture firms, managing 1,884 venture funds, \$403B in U.S. venture capital assets under management.

Key Questions to Address

- How can the United States even better leverage this asset—in the face of growing global competition in the venture space?
- How do we encourage venture capitalists/funds to invest in longer-term, hard-to-solve and scale societal innovation challenges?

Talent and Democratization of Innovation

While there are many occupations involved in innovation, scientists and engineers play a critical role. In the United States, there are roughly 7.8M professionals working in computer, mathematical, engineering, life science, physical science and social science occupations. About 70 percent of these professionals work in business enterprises. There is significant untapped U.S. innovative and entrepreneurial potential: about half of those whose highest degree is in science or engineering do not work in science or engineering occupations, and 54 percent of the U.S. population aged 18-65 believe they have the required skills and knowledge to start a business.

Some companies have programs to provide support and training to nurture innovative start-ups. Also, some companies, private foundations and federal agencies sponsor open-to-all innovation challenges and platforms.

Key Questions to Address

- How can the United States encourage more of the population to engage in innovation and entrepreneurial activities?
- Should the United States launch a global dragnet for top researchers and innovators, and encourage them to come and work in the United States?
- How can we scale current models that seek to achieve democratization of innovation, and to engage a wider segment of the population of current and potential innovators?
- Are there other models or ways in which we can further democratize innovation?

Technology Transfer Model

Several challenges hamper the transfer of research results and technology from universities to U.S. businesses. Industry is market driven, while university researchers focus on advancing knowledge (and federal labs on their government missions). Some may be unresponsive to the constraints under which the private sector operates, for example, time horizons at universities are incompatible with the fast pace of commercial innovation, and academic researchers want to publish results, while industry wants to keep results proprietary for competitive advantage. Private sector innovation is increasingly multidisciplinary, yet university research remains dominated by single

discipline, investigator-driven research projects, and reward systems, publication practices, and career paths reinforce that approach. In working with universities, there may be significant intellectual property barriers. Technology emerging from universities and federal laboratories may need significant investment to advance the technology toward an application in the private sector.

Key Questions to Address

- What do research universities need to do to make partnering more attractive and productive for industry?
- Should universities seek routine industry input to shape and guide the research they perform?
- Do we need to reexamine IP/licensing models? To what end?

Valley of Death

Obtaining capital at critical points in the innovation development life cycle can be challenging for innovating entrepreneurs, and small and medium-sized enterprises. There are two key investment gaps. In the first, entrepreneurs and small firms—including those developing technologies transferred from universities and federal labs—often lack funding to develop prototypes, and to test and validate their innovations. Lacking adequate resources at this critical juncture in the innovative life cycle, these technologies may fall into the “valley of death,” stalling or

terminating their development toward commercialization, and increasing their vulnerability to foreign acquisition. A second area of challenge is securing adequate financing to scale-up to full production in the United States.

Key Question to Address

- Are greater funding and more programmatic efforts needed to scale promising technologies being developed by U.S. start-ups? What would these efforts be, and who would deploy them?

Given the emerging technological and competitive environment, National Commissioners have suggested that the United States must achieve a 10x increase in the U.S. rate of innovation.

Key Questions to Address

- To what degree does the United States need to accelerate technology development, commercialization, and deployment? How much faster do we need to go to keep pace with the technological and economic disruption that is happening?
- Can the current system be optimized to operate at that pace?
- Can the “tech transfer” model of innovation scale to the size of the emerging opportunities, and operate at the speed

at which technology is accelerating and disruption occurring?

- How can we protect U.S. technology?
- What in the fundamental structure of the U.S. innovation system is dragging down the speed at which the United States develops and scales new technologies?
- What factors play the most pivotal role in the speed with which the United States develops, scales, and deploys technology? What factors in government, universities, and the private sector? What are the highest priorities for change?

ISSUE 4: Government Leadership and National Strategies for Innovation and Competitiveness

There are many factors that affect a country's ability to innovate and compete. These include investment in R&D, the availability of capital for innovation at critical stages, talent, the environment for entrepreneurship, and the general business environment including taxes, certain trade policies, and business regulation. The United States does not have in the federal government a single focal point on U.S. innovation competitiveness, capacity, and capabilities. Instead, responsibility for addressing the factors that affect innovation and competitiveness cuts across

many stove-piped missions of federal agencies and Congressional committees. In contrast, some U.S. competitors have established high-level ministries, government departments or other organizations devoted to stimulating technology and innovation, and to guide national strategic plans. For example, Japan's public science and technology administration operates under the policies of the Council for Science, Technology and Innovation chaired by the Prime Minister, and works to promote coordination with related ministries.

Some nations' science, technology and innovation efforts are guided by national strategic plans. For example, Germany's New High-Tech Strategy 2025 aims to ensure coherence within Germany's innovation policy, and focuses on speeding up transfer of scientific findings into marketable products, processes and services, as well as on improving the overall environment for innovation. Japan's 5th Science and Technology Basic Plan (2016–2020) provides directions designed to translate down to changes such as methods of managing science and technology budgets, and the fields seen as strategic in R&D for the next five years, where government policy and resources should be concentrated. China's national plans focus on both the innovation ecosystem, and strategic technologies. The 13th Five-Year Plan on National Scientific and Technological Innovation, and the Made in China 2025 Plan are concerted efforts to cultivate indigenous technological innovation, while the New Generation of Artificial Intelli-

gence Development Plan is a blueprint for constructing an AI innovation ecosystem that they believe will make China the world's AI leader by 2030.

The United States relies significantly on market mechanisms to stimulate technology commercialization and innovation. Typically, it does not issue National Innovation or Technology Strategic Plans; however, it has developed an R&D strategic plan on artificial intelligence and technology for advanced manufacturing. Two initiatives—one on nanotechnology and the other on advanced IT and computing—seek to coordinate and integrated federal R&D investments in these fields. In addition, some U.S. state and regional governments have strategic science and technology plans to guide their technology initiatives in connection with their economic development efforts.

Key Questions to Address

- Should the United States move its global technology and innovation leadership to the top of the national agenda?
- What kind of leadership structure in government—in both the Executive Branch and Congress—is needed to address the multiple factors affecting technology development, commercialization, deployment, and innovation in a strategic and integrated way?

- Does the United States need to engage in national technology and innovation strategic planning?
- Should the United States align its R&D investment with national strategic plans?
- Should the United States have a national strategy for strengthening its innovation capacity, and strategies focused on specific game-changing technologies?
- In this era of disruptive technology and rising strategic competition, what is the proper balance between the speed and dynamics of the marketplace, and greater national investment and strategic planning? Can these co-exist in a productive way?

2:45 **Wrap-up Conversation and Prep Plenary Report Out**

3:00 **Return to Plenary**

**Working Group 2:
Exploring the Future
of Sustainable
Production and
Consumption, and Work
Community Breakout
Session Mini-Agenda
and Discussion Guide**

Memorial Union
Cochise Room

Moderator

Dr. Roberto Alvarez
Executive Director
Global Federation of
Competitiveness Councils

MORNING

10:30 Working Group Introduction and Role of the Working Group

Role of the Working Group

Working Groups are the Commission's "ideas and policy recommendation generation engines," charged with framing and developing actionable recommendations to achieve specific goals. The recommendations will likely have many audiences; many will be geared towards policy makers to spur new legislation, executive orders, or public-private initiatives to achieve specific goals. Many other recommendations will be designed to encourage businesses and organizations to take their own steps to promote competitiveness and innovation in their company, region or industry.

National Commissioners—who first met on August 7, 2019—have provided general guidance to the Working Groups for their study of issues, challenges, and opportunities, and the development of recommendations to address them (see *Launch* for more details):

- Examine challenges and opportunities from an ecosystem perspective inclusive of the broader economy, (e.g., if considering opportunities related to disruptive technology in the agriculture space, also consider linking the cost-benefit outcomes of agribusiness technology-enabled solutions to improvements in efficiency and productivity, and to their impacts on consumers, healthcare systems, and the environment).

- Recommended actions should create opportunities that uplift as many stakeholders—business, labor, education, research, and consumers—as possible, and improve outcomes for broader segments of the population, especially for those at the lower end of the socioeconomic scale. Be specific about the economic impacts to families and individuals of investments in R&D, physical infrastructure, intellectual property, and industry and academic sectors. Convey the socioeconomic benefits to people and communities whose livelihoods the recommendations will directly affect.
- Recommendations need to center on competitiveness, while also recognizing that any recommendations may have unintended consequences in potentially lowering competitive advantage or negatively impacting some elements of the workforce.
- Recommendations should lead to action-oriented measurable outcomes—policy recommendations, as well as those the Council's membership and affiliated constituencies could put into practice and track results.
- Public attitudes toward science and engineering should be incorporated into the Commission's assessment.
- Identify which decision-makers can act on recommendations, and consider how to shape a compelling narrative that will encourage them to listen and act.
- Other considerations in prioritizing challenges, solutions and recommendations to address could include: Is the issue or challenge urgent? Is the issue, challenge, or potential solution pivotal in terms of its impact or the number of other issues or factors affected? Is the recommendation actionable, and what is the vehicle for advancing the recommendation?

11:30 Focus of the Working Group— and Conversation Kick-off

Working Group 2, Exploring the Future of Sustainable Production and Consumption, and Work, focuses on the ever-evolving disruption underway in the production and consumption of goods, and new ways innovators are finding to produce sustainably. The Working Group will also explore the rapid evolutions unfolding in the American workforce—up and down the career ladder, and across the workforce landscape—and mega trends affecting U.S. labor markets, the occupational mix in the country, what people do on the job and the skills they need to compete and succeed. National Commissioners' guidance specific to Working Group 2 includes:

- Consider the pace of change across workforce skills, technology adoption, and policy changes.
- Examine the role of culture and the future of work in U.S. economic competitiveness, including consideration of workforce skills, retirement timelines in key sectors, alternative work arrangements, and public attitudes toward science and engineering.
- Since many people perceive innovation as negative and detrimental to their lives—for example, equating innovation with job-destroying automation—be mindful in how innovation is discussed, present solutions as enhancements that improve equity and access to opportunities, and communicate the benefits and changes that innovation will have on consumers and workers, so they can see the positive impacts innovation can have on their lives.
- Put forth solutions that reduce or eliminate barriers for individuals on the low end of the socioeconomic scale to take advantage of opportunities.
- As part of a commitment to promulgating inclusive and equitable solutions, recommended actions should seek to close minority gaps that exist in the workforce, for example, gaps in educational outcomes and employment for specific populations.

This discussion guide will focus on four fundamental threads, and a series of interconnected questions to consider in shaping actionable policy recommendations:

- Enhancing the sustainability of production and consumption.
- The changing shape of work and new models of work organization.
- Strengthening entrepreneurship and increasing entrepreneurial opportunity.
- Development and allocation of human capital in a U.S. economy disrupted by rapid technological, market, and competitive changes.

ISSUE 1: Enhancing the Sustainability of Production and Consumption

Around the world, pressure to make production and consumption more sustainable is growing. Companies are responding with initiatives and corporate reporting on the sustainability of their business. A wide range of efforts and some regulations—by companies, governments, non-profit organizations, and others—seeks to make consumption more sustainable, for example, by banning plastic take-out food containers, and to raise consumers' awareness about the role of their choices in the sustainability of consumption.

Production

The industrial sector accounts for 32 percent of total U.S. energy consumption. In producing goods, many companies are striving to reduce their energy consumption and to use cleaner sources of energy to power their operations. In addition, many are implementing efforts to use more sustainable materials and greener chemicals; reduce water usage, waste, and scrap in manufacturing; deploy more energy efficient, alternative power vehicles in their fleets; and to increase the energy efficiency of buildings, facilities, and the equipment they use. Eighty-five percent of the S&P 500 companies published a sustainability report in 2017.²

² The State of the Sustainability Profession, 2018. *GreenBiz*, September 24, 2018.

The **REMADE Institute**—one of the newer Manufacturing USA institutes for shared innovation infrastructure—enables early stage applied research and development aimed at driving down the energy and cost required to recover, reuse, remanufacture, and recycle four classes of materials: metals, fibers, polymers, and electronic waste. The Institute is leveraging \$70M in federal funding and \$70M from private partners.

Others are designing greater sustainability into their products, for example, more energy efficient appliances, and reduced, recyclable, compostable, or bioplastic packaging. Proctor and Gamble was the first company to introduce a cold-water laundry detergent, reducing the energy needed in washing by up to 90 percent. All Nike Air soles contain at least 50 percent recycled manufacturing waste, and some of the company's apparel—including team jerseys—have at least 50 percent of its polyester derived from recycled plastic bottles.

Improving sustainability across the entire product life cycle—materials sourcing, production, packaging, distribution and warehousing, delivery to customer, customer use, and final disposition—is another focus of attention. For example, overall, 65 percent of companies' ultimate water use comes from supply chains (for the S&P 500/S&P Global 1200, Trucost, 2018), yet only a quarter of these companies have set a water reduction target. About half of global companies have set a greenhouse gas (GHG) reduction target. And companies, like PepsiCo, are setting ambitious sustainability goals on packaging, water, climate, and agriculture to be met in the coming five to 10 years.

In a recent survey of companies,³ 52 percent said climate change was a very significant issue, and 40 percent said it was a key investor interest. Only half of the companies said they were integrating sus-

PepsiCo has key metrics to measure progress toward meeting 2020/2025 sustainability goals, for example:

Agriculture

- Strive to sustainably source direct agricultural raw materials by 2020.
- Sustainably source 100 percent of palm oil and cane sugar by 2020

Water

- Improve water-use efficiency of the direct agricultural supply chain by 15 percent in high-water risk sourcing areas
- Building on progress achieved, improve water-use efficiency an additional 25 percent by 2025, focusing on manufacturing operations in high-water risk areas

Packaging

- Strive to design 100 percent of packaging to be recyclable, compostable, or biodegradable
- Strive to use 25 percent recycled content in plastic packaging

Climate Change

- Reduce absolute GHG emissions by at least 20 percent by 2030

tainability into their core business extremely or fairly well. Similarly, in an eight-year study on how corporations address sustainability, 90 percent of executives see sustainability as important, but only 60 percent of companies have a sustainability strategy.⁴

Some universities are integrating sustainability into their educational programming, helping prepare the workforce for jobs in companies to address this challenge. For example, Arizona State University

3 *The State of Sustainable Business in 2019*. BSR and Global Scan. November 12, 2019. Available online: <https://www.bsr.org/en/our-insights/report-view/the-state-of-sustainable-business-in-2019>.

4 *Corporate Sustainability at a Crossroads*. MIT Sloan Management Review, May 23, 2017.

established the Nation's first school of sustainability, offering both undergraduate and graduate programs and degrees in sustainability, including specialized programs in sustainable food systems, global sustainability science, sustainability leadership, and sustainable energy. Most of its graduates are working in sustainability careers.

Radically different forms of more sustainable production are emerging. For example, additive manufacturing and 3D printing build objects layer-by-layer from 3D model data, rather than through subtraction processes such as milling and grinding, eliminating scrap. Vertical indoor farms increase harvest productivity, cut water use by 70-95 percent, and do not use pesticides. A European consortium (Siderwin) is working to develop a new steel production process without CO₂ emissions based on electrolysis technology.

Circular models turn post-consumer plastics into new value streams. Zume uses a proprietary process to repurpose agricultural waste and biomass to produce cost-effective compostable food packaging that performs and feels like plastic. The packaging breaks down into organic material and can be used again to regenerate soil or other organic matter, creating a fully closed-loop cycle where the food grown creates the input materials for the packaging that carries food to the consumer and then, once used, is used to help grow more food.

Biomanufacturing is on the rise. Ecovative Design uses mycelium, the root structure of mushrooms, as a biofabrication platform to grow biodegradable materials, structures, textiles, apparel, footwear, and leather alternatives. The material can be infused with flavors and other components to create a whole cut of meat. The biofabrication process can be tuned based on desired characteristics by controlling porosity, texture, strength, resilience, and more.

The cement industry is energy-intensive and the third-largest industrial emitter of CO₂ (EPA). In producing an alternative construction material, BioMason pours sand into a mold, and then adds microorganisms and nutrient rich water. The bacteria create calcium carbonate crystals that cause the sand grains to stick together, growing bricks in 3-5 days.

The strength of Biocement materials is comparable to traditional masonry, but has no CO₂ emissions or waste in its production.

Redesigning organisms so they produce a substance, such as a medicine or fuel, are common goals of synthetic biology. For example, vanilla and vanillin are among the most important flavoring agents. With the demand for all "natural" food and beverage products growing, demand for natural vanilla flavoring is outstripping supply, costs have risen, and food companies are looking for additional supplies. Most synthetic vanilla is produced with a petrochemical precursor. Synthetic vanilla can be grown from modified yeast; it is less expensive than pure vanilla from vanilla beans, and tastes better than artificial vanilla. In other examples, oils grown from modified algae can take the place of palm oil, for example in laundry detergent, avoiding harvesting oil from palm trees which can damage rainforests. Scientists at Cornell University and the University of Illinois have carried out field trials suggesting that genetically engineered tobacco plants could be grown as crops to produce pharmaceuticals and industrial enzymes. Using an enzyme from fireflies, scientists created a modified plant that glows in the dark that could create sustainable natural lighting.

Key Questions to Address

- Has the business case for greater sustainability been made?
- How can we encourage companies to think about sustainability in systematic ways across the product life cycle?
- How can companies influence the decisions suppliers and other actors across the product value chain make with respect to the sustainability of their practices and purchases? How can major corporations encourage and help their suppliers become more sustainable?
- What is the degree to which these efforts are global, deploying in countries that are growing contributors to environmental degradation?

- What is a good balance between market-generated solutions vs. regulation?
- Does the total quality movement and the circular economy concepts offer a model for change?
- What are the challenges in harnessing American innovation to meet the need for low carbon energy across the board, at every scale, and around the world? Where is more investment needed? Will market-based approaches meet the challenge?
- Are greater investments needed to advance biomanufacturing and other novel production approaches?

Trash Talk

Source: UNenvironment

- One million plastic drinking bottles are purchased every minute.
- 5 trillion single-use plastic bags are used worldwide each year.
- Half of all plastic produced is designed to be used only once.
- 300M tons of plastic waste is generated each year; 80 percent of it ends up in landfills, dumps, or the natural environment.

Consumption

For the first time since agriculture-based civilization began 10 millennia ago, the majority of the world's population—just over half—could be considered middle class or richer. By 2030, the global middle class could reach 5.3B–1.7B more than today. Reaching middle class is transformative as a life experience. These new middle class consumers will want a wide range of products and services.

With increasing development and rising income around the world, consumption is on an upward trajectory. For example, according to the UN, the per capita “material footprint” of developing countries increased from 5 metric tons in 2000 to 9 metric tons in 2017. In high income countries, the per capita material footprint is 27 metric tons.

U.S. per capita municipal solid waste (MSW) generation is 4.5 pounds per person per day (EPA). Total MSW generated in 2017 (latest data) was 267M tons, of which 67M tons were recycled and 27M composted—equivalent to a 35 percent recycling and composting rate. Fifty-two percent ended up in a landfill. Paper and paperboard products made up the largest percentage of all materials in MSW (one-quarter), followed by food (15 percent), plastics (13 percent), and yard trimmings (13 percent). Seventy-five percent of food that could be composted ends up in a landfill.

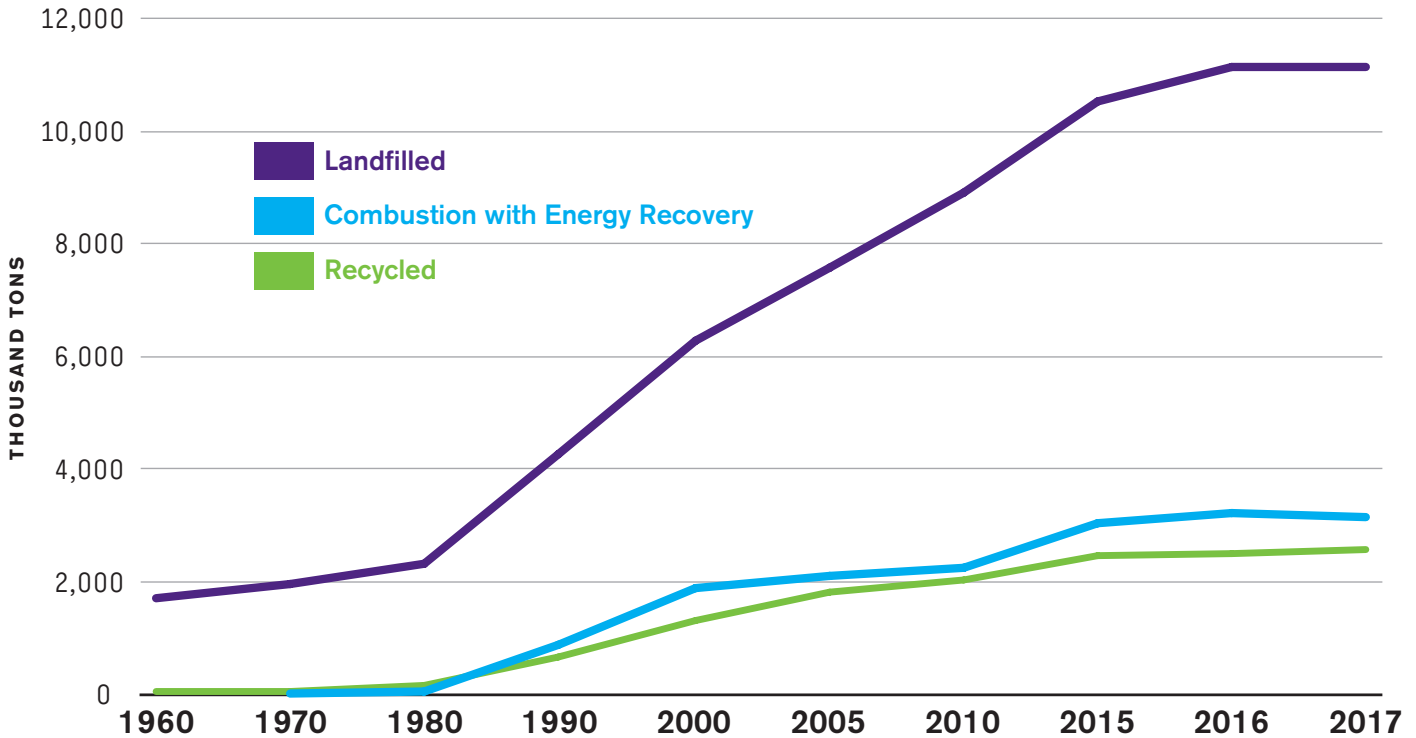
Garments are a common consumer product. Their life cycle involves materials production, manufacturing, shipping, use, and disposal. Garments made from natural fibers, such as cotton, use gallons of water, fertilizers and pesticides, and fuels in their materials production. Synthetic fibers often use petroleum and other chemicals that release hazardous emissions. According to Levi Strauss & Company, the life cycle of one pair of its iconic 501 jeans equates to the emissions generated by driving an average car 69 miles and three days' worth of one U.S. household water needs. The EPA estimates that discarded clothing and footwear amounted to 12.8M tons or nearly 5 percent of MSW in 2017, mostly textiles, rubber, and leather. Only 13.6 percent was recycled and nearly 9M tons ended up in landfills.

There are diverse strategies for enhancing the sustainability of consumption. For example, while taxis waste fuel hunting or waiting for fares, ride-matching optimizes personal transportation. Ride-matching drivers often drive an energy efficient vehicle to minimize their fuel use. Turo capitalizes on idle private vehicles, allowing owners to rent out their cars to others when not in use. These matching and sharing services may reduce the need to own a vehicle.

“Rent the Runway” rents high quality and designer fashion apparel, including formal wear, giving consumers thousands of options. Consumers can rent

Figure 6. Clothing and Footwear Waste Management: 1960–2017

Source: US EPA. (2020). Textiles: Material-Specific Data. U.S. EPA. (online) Available at: <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data> (Accessed 2 Jan. 2020).



a single time, for example, for a swanky formal event, or sign up for a monthly service that sends several new apparel pieces a month for a consumer to try. It aims to help keep out-of-fashion and no longer loved apparel out of the landfill.

Small changes in consumer behavior can have a significant impact on the sustainability of consumption. For example, the tenant of “reuse” is being put into action at the neighborhood level. More than 200,000 U.S. neighborhoods use private social networks for, among other things, selling or giving away used consumer items. Neighbors moving in pass on moving boxes to neighbors moving out, new homes are found for furniture being discarded that would otherwise end up in the landfill, curb alerts tell neighbors when toys, bicycles, kitchenware, or other items are sitting at the curb and up for grabs for free.

Levi Strauss & Company is encouraging consumers to think about the life cycle of a pair of jeans. The company created a “Care Tag for Our Planet,” which offers tips on how to extend the life span of their clothing—“wash less, wash in cold, line dry, and donate when no longer needed.” The company also collects clean and dry denim from any brand at any U.S. Levi store for recycling.

From food to fuel, consumption is concentrated in cities and metros. Cities have taken steps to enhance sustainability, ranging from banning plastic food containers to adopting building energy efficiency standards. Other technologies and designs could make a significant difference in city sustainability including energy efficient building designs and technologies; intelligent highways and vehicles that optimize traffic flows, reducing congestion and

“So, what if we said that you could mulch your jeans, put them in your garden, and see how the decomposition of your Levi’s could feed the food that you were growing. That’s conceivably how we might dispose of garments in the future. That would prompt the consumer to think about little details like how the color was applied to the garment in the first place. Would the chemicals in the dye affect the garment, my food, and my body? This is the kind of holistic thinking we want to spur in our customers. Fundamentally, asking them to take into account the impact they’re responsible for in the whole system, from the supply chain to the eventual disposal of the garment.

Paul Dillinger,

Head of Global Design Innovation
Levi Strauss

Source: Segrán E. “Levi’s Is Radically Redefining Sustainability.”
Fast Company, February 9, 2017.

Trash Trends

Source: Environmental Protection Agency

Generation, recycling, and disposal of MSW has changed substantially.

- Generation of MSW increased from 88.1M tons in 1960 to 267.8M tons in 2017.
- The generation rate in 1960 was just 2.68 pounds per person per day, but has increased to 4.51 pounds per person per day in 2017.
- Over time, recycling rates have increased from just over 6 percent of MSW generated in 1960 to 16 percent in 1990, to more than 35 percent in 2017.
- The amount of MSW combusted with energy recovery increased from zero in 1960 to more than 12 percent in 2017.
- The disposal of waste to landfills has decreased from 94 percent of the amount generated in 1960 to 52 percent of the amount generated in 2017.

idling; high levels of Internet and computing penetration to support telecommuting; autonomous vehicles for transit and deliveries, “lights-out” robotic and autonomous systems, etc. Widespread adoption of existing energy-efficient building technologies—and the introduction and use of new technologies—could eventually reduce energy use in homes and commercial buildings by 50 percent.⁵

5 *Quadrennial Technology Review: An Assessment of Energy Technologies and Research Opportunities*. U.S. Department of Energy. September 2015.

What Consumers Can Do

- Shop for products made with recycled materials
- Buy items with less packaging
- Buy and use refillable/reusable containers
- Reuse bags
- Refrain from discarding items that can be reused or repaired
- Compost food and yard waste
- Wash laundry in cold water; line dry
- Remove names from paper mailing lists

Key Questions to Address

- Who is responsible for making consumer consumption more sustainable?
- How can we convert public concern into more sustainable daily decision-making (that would also have the benefit of driving market change)? Do we need a movement?
- How much responsibility can we expect consumers to take in changing their consumption behavior and practices to make them more sustainable? How can we make sustainable consumption easier for consumers?
- How can producers help customers use and dispose of their products in more sustainable ways?
- Does the circular economy concept offer a model for change?
- How can we encourage cities and metros to leverage a larger toolbox in more strategic approaches to sustainability?

ISSUE 2: The Changing Shape of Work and New Models of Work Organization

Globalization, new scientific discoveries, accelerating technology development, and new models of organization promise to change dramatically the landscape of work. New technologies make entirely new forms of work possible—work without humans, work in which humans and technologies form teams, work performed in remote locations and, potentially, entirely novel forms of work organized using today's powerful computing, Internet, and communications technologies. Advances in cognitive science will provide new insight on creativity, and how to better analyze, solve problems, adapt to new situations, and make decisions. This new knowledge will be applied to improve how we work together, manage teams, design organizations, and interact with customers and machines.

Work with Machines

Robots are likely to become commonplace, working in homes and offices, assisting in hospitals and classrooms, helping run farms and caring for the elderly. Autonomous systems will operate across factories, smart cities and infrastructure. It is estimated that about 2.4M industrial robots are in operation worldwide. Global sales of industrial robots reached a high of 422,000 units in 2018, with double digit growth expected in the next couple of years.⁶ The use of service robots is increasing in areas ranging from logistics and medical applications to lawn mowing, window cleaning, and room service delivery in hotels.

Artificial intelligence is likely to affect portions of almost all jobs, changing the tasks performed, the way work is organized, how decisions are made and problems solved. Artificial intelligence could also change the size and mix of human capital and skills needed in an organization.

Many Americans may not understand how automation and AI could affect professions and the work they do. For example, 80 percent think it is not at

6 <https://ifr.org/ifr-press-releases/news/robot-investment-reaches-record-16.5-billion-usd>.

Americans' Views of Automation

Source: Pew Research Center, 2019

- Most Americans (82 percent) anticipate widespread job automation in the coming decade and that, by 2050, robots and computers are likely to do much of the work currently done by humans.
- About one-third believe robots or computers will do the type of work they do by 2050.
- 76 percent of Americans say inequality between the rich and the poor would increase if robots and computers perform most of the jobs currently being done by humans.
- Americans think automation will likely disrupt a number of professions but they are less likely to think their own job will be impacted.

all or not very likely that automation could replace a nurse,⁷ while patient monitoring, routine caregiving, physical therapy, medication dispensing, and patient transport are all opportunities for future automation. Two-thirds believe teachers could not be replaced,⁸ despite the likelihood that AI-infused on-line learning, learning in virtual or augmented reality environments, and smart learning assistants and chat bots could disrupt many of the tasks teachers perform. For example, in connection with a new television series, National Geographic created a Facebook messenger chat bot where one can have a conversation with Albert Einstein about his life and physics.

In the coming world of collaboration between humans, robots and intelligent systems—and as enterprises integrate extended (virtual, augmented and mixed) reality into operations—we could fundamentally reimagine how work gets done.

Key Questions to Address

- As AI, autonomous systems, and robots increasingly perform routine tasks, will the skill/wage gap grow—and if so, by how much? Will rungs on lower/middle levels of career ladders disappear, closing-off traditional pathways to upward mobility? Does this present new kinds of challenges in reducing economic inequality?
- Do we need a new multidisciplinary field in work engineering—the convergence of automation, cognitive and behavioral science, organizational development, job design, systems integration, etc.?
- As machines increasingly perform routine work, does the public have a grasp on the potentially sharp upward trajectory of the economy's knowledge and skill requirements? What role must policymakers play in educating and supporting this shift?
- How will new machine-enabled work change daily lives and the patterns of work and society?
- What kinds of new corporate and government policy issues will arise with increased use of artificial intelligence and robot/human teaming in the workplace, in areas such as risk, safety, liability, performance evaluation, cybersecurity, etc.

New Forms of Work Organization

The prominent model for accomplishing work has been employer-based and carried out in a full-time job that is task-, time- (9-5 day), and place-based, in a career or working life that begins at the conclusion of formal education, typically in the late teens or early twenties, with job holding continuing until retirement, typically 30-40 years later. Job holding

7 <https://www.pewresearch.org/internet/2017/10/04/americans-attitudes-toward-a-future-in-which-robots-and-computers-can-do-many-human-jobs/>.

8 *ibid.*

The Gig Economy: Electronically-mediated Work

Source: U.S. Department of Labor

Workers obtained short jobs or tasks through websites or mobile apps that connected them with customers and facilitated payment for the tasks.

- In May 2017, there were 1.6M electronically-mediated workers, accounting for 1.0 percent of total employment.
- Of all workers, 0.6 percent did electronically-mediated work in-person and 0.5 percent did it entirely online. Some people worked both in-person and online, for example, in two different electronically-mediated jobs.
- Compared with workers overall, electronically-mediated workers were more likely to be in the prime-working-age category (25 to 54) and less likely to be in the oldest age category (55 and over).
- Electronically-mediated workers were more likely than workers overall to work part time.
- Compared with workers overall, people age 25 and over who did electronically-mediated work were more likely to have a bachelor's degree or higher (67 percent of online electronically-mediated workers age 25 and over had bachelor's degree or higher).
- Self-employed workers were more likely than wage or salary workers to do electronically-mediated work (4 percent vs. 1 percent).
- By industry, workers in transportation and utilities, professional and business services, information, and other services on their main job were the most likely to have done electronically-mediated work.

may be interrupted, for example, by adult education, training, child rearing and, less frequently sabbatical or extended vacation. Work, many of its rules, compensation and promotion policies, worker decisions on where to live, financial and retirement planning and saving, family planning, and childcare are typically based around this model of work and working life. Today's technologies enable other models for accomplishing work and designing working life—such as telecommuting, working from remote locations and freelancing, as well as enabling more flexible work schedules and staffing.

For workers, these models can help people integrate work more seamlessly into their personal lives—if juggling responsibilities for children, health issues, or other activities—as well as access jobs outside of their geographic regions, a particularly important feature for those living in declining rural and industrial areas of the country, or those who cannot afford to live in job-rich, high cost-of-living locations. Time spent commuting can be significantly reduced, saving perhaps hours per week that can be devoted to other productive and personal activities.

For employers, more flexible patterns of work allow them to tap a wider range of workers with knowledge and skills that can contribute value to the organization or business, but may reside in distant locations, or who cannot or prefer not to work in a 9-5, full-time job on employer premises. This broader landscape for recruiting can be especially valuable when unemployment is low and labor markets are tight, or recruiting for occupations in high demand. With a more flexible workforce and flexible staffing, employers can scale workforce size and mix as needed.

Uber, Lyft, Takl, TaskRabbit, and the Gig economy have established new models of worker independence, although accounting for a small percentage of total U.S. employment. Digital technologies have made it easier to connect customers that need work performed with those able to perform it on a free-

lance basis. While workers may face greater financial risk in the Gig economy, they may also engage in work of greater interest to them, make better use of their knowledge and skills in a place that may be more convenient, performed on a schedule of their choosing, or more aligned with the demands of their lives.

New technologies could enable entirely new forms of people-centered, rather than employer-centered, and self-organized forms of work that optimize human capital and human capacity. For example, today's digital technologies could be applied to identify markets of one or many around the globe, and search algorithms can match workers, goods, and services with buyers, or workers around the world with each other, to form independent work teams that meet customer needs. Working on a global scale with five billion potential customers, a relatively small number of buyers can make a market. Service providers and innovators could facilitate marketing and matching for independent workers and forming of teams, helping them maximize their earnings, a model similar to those in today's electronically-mediated gig economy.

Key Questions to Address

- Will the redesign of work just organically emerge?
- Are employers comfortable with workers working remotely and out of sight?
- How can we encourage employers to expand the geographic scope of recruiting, for example, to rural areas, distant areas, and globally?
- What kind of ecosystem and infrastructure would be needed to support a people-based (vs. employer based) economy?
- What kinds of new knowledge, skills, and support systems are needed for those working outside of traditional employer organizations?

- What kinds of new regulations or policies are needed to address the challenges of worker protection, benefits, and income security in a workforce of freelancers?
- What is needed in the area of taxation and labor laws to reduce barriers to cross-state remote work in the United States?
- What is needed in the area of pay, labor regulation and standards, and taxation for cross-border remote work?
- What kinds of new laws might be needed to protect those buying work or services from independent workers or temporary freelancing work teams, especially those that cross international borders?
- Who is liable for the work performed, and what happens when a team disbands?
- What is needed to scale new forms of work organization that are not employer centered?

Gender Equality

While U.S. women exceed men in attaining bachelor's degrees, they have not achieved parity in workforce participation, pay, or career progression. The ratio of women's to men's median weekly earnings for full-time wage and salary workers in all occupations was 81 percent in 2018. The gap has narrowed, in part, because women are increasing their presence in higher paying occupations. Nevertheless, the earnings ratio is lower in some occupations, such as personal financial advisors, physicians and surgeons, real estate brokers, sales agents and chief executives. In addition, women's rate of workforce participation has leveled off at 57 percent, compared to men at 69 percent, in 2018.

Majorities of Americans see men and women as equally capable in terms of qualities for leadership. Yet, only 4.8 percent of CEOs in the Fortune 500 are women, and only 22 percent of Fortune 500 board members. Women leaders are more prominent—though still a significant minority—in academia, with 30 percent of universities having women presidents in 2016.

Some of the reasons for the gaps include: inflexible career paths (while women have greater involvement in providing childcare), occupational selection, hours worked, and industry of employment. For example, some higher paying jobs favor long hours and reward willingness to put work over other life activities. Also, working women are nearly twice as likely as men to say they have faced gender discrimination on the job, one in four working women say they have earned less than a man who was doing the same job, and more than one in five say they have been treated as if they were not competent because of their gender.

Key Questions to Address

- Employers have taken steps to support women in their workforces, including onsite daycare, family friendly leave policies, more flexible work schedules, etc. What more can employers do within the structure of company benefits? What can policymakers do?
- Can telecommuting and remote work be expanded to increase women's participation in the workforce and the organization? Does working off-site reduce women's ability to build company-specific skills and social capital within the organization that helps underpin their advancement?
- Is national legislation needed, for example, to mandate paid family leave or equal representation on boards of directors? Other?
- What greater efforts can be made to attract women to prepare to enter higher paid careers such as those in engineering, computer, or financial occupations?

AFTERNOON

12:00 Working Lunch

12:30 Focus of the Working Group— Continuing the conversation

ISSUE 3: Strengthening Entrepreneurship and Increasing Entrepreneurial Opportunity

The United States is known worldwide for its entrepreneurship and start-up culture, and many nations seek to emulate the U.S. model. Entrepreneurs and start-ups play a vital role in leveraging new knowledge and technology to create and grow new businesses and, those that grow into large and successful firms, can transform entire industries. The process of finding creative ways to combine new technologies and processes, and make novel products and services, leads to the start-up of businesses and the decline of less productive businesses or those whose business lines are made obsolete. This churning of firms—business dynamics—has broad impacts on technical progress, economic growth, and productivity in modern market economies, as resources are reallocated away from less profitable businesses to more profitable and competitive ones.

While the U.S. start-up and entrepreneurial punch weakened in the years surrounding the Great Recession, it is recovering. In 2018, openings of establishments with employees surpassed one million for the first time.⁹ The number of closings also rose, indicating a higher level of churn in the economy, characteristic of greater business dynamics. Annual openings have exceeded closings for eight consecutive years (Figure 7).

Business applications have also recovered from the Great Recession, increasing from 596,111 coming out of the recession (Q4 2009) to 860,125 in the third quarter of 2019, far above the pre-recession levels (Figure 8). However, while business applica-

9 <https://www.bls.gov/news.release/cewbd.htm>.

Figure 7. Annual Establishment Openings and Closings

Source: Business Employment Dynamics, Bureau of Labor Statistics.

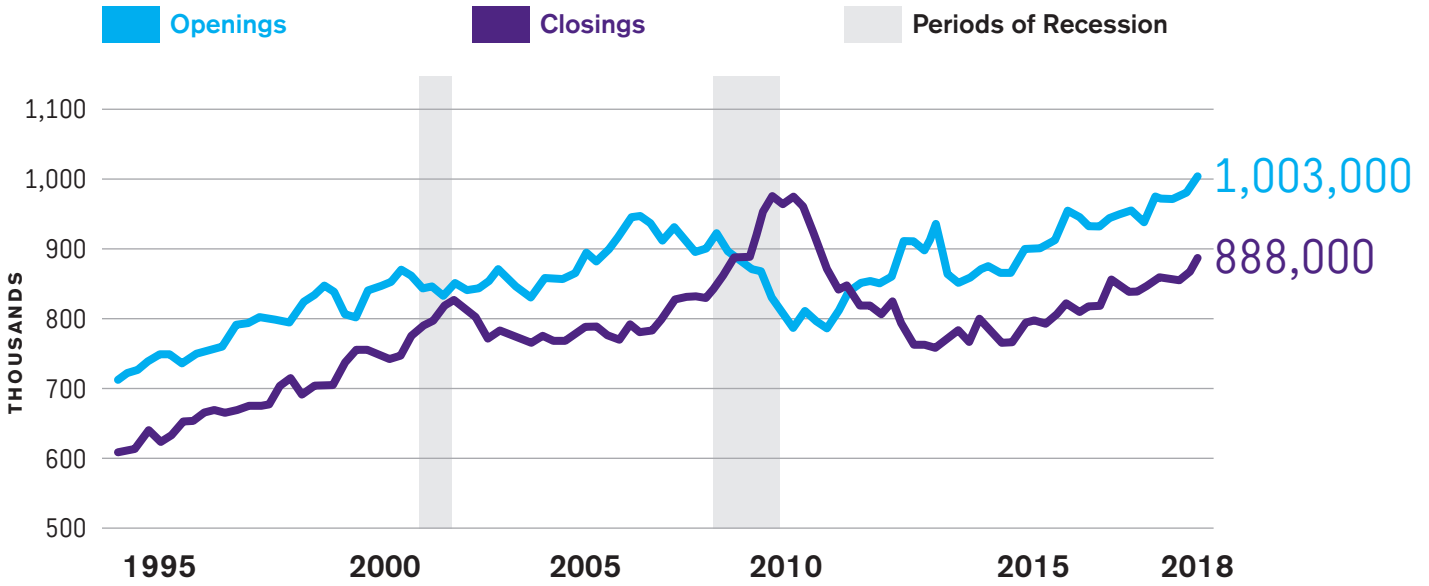
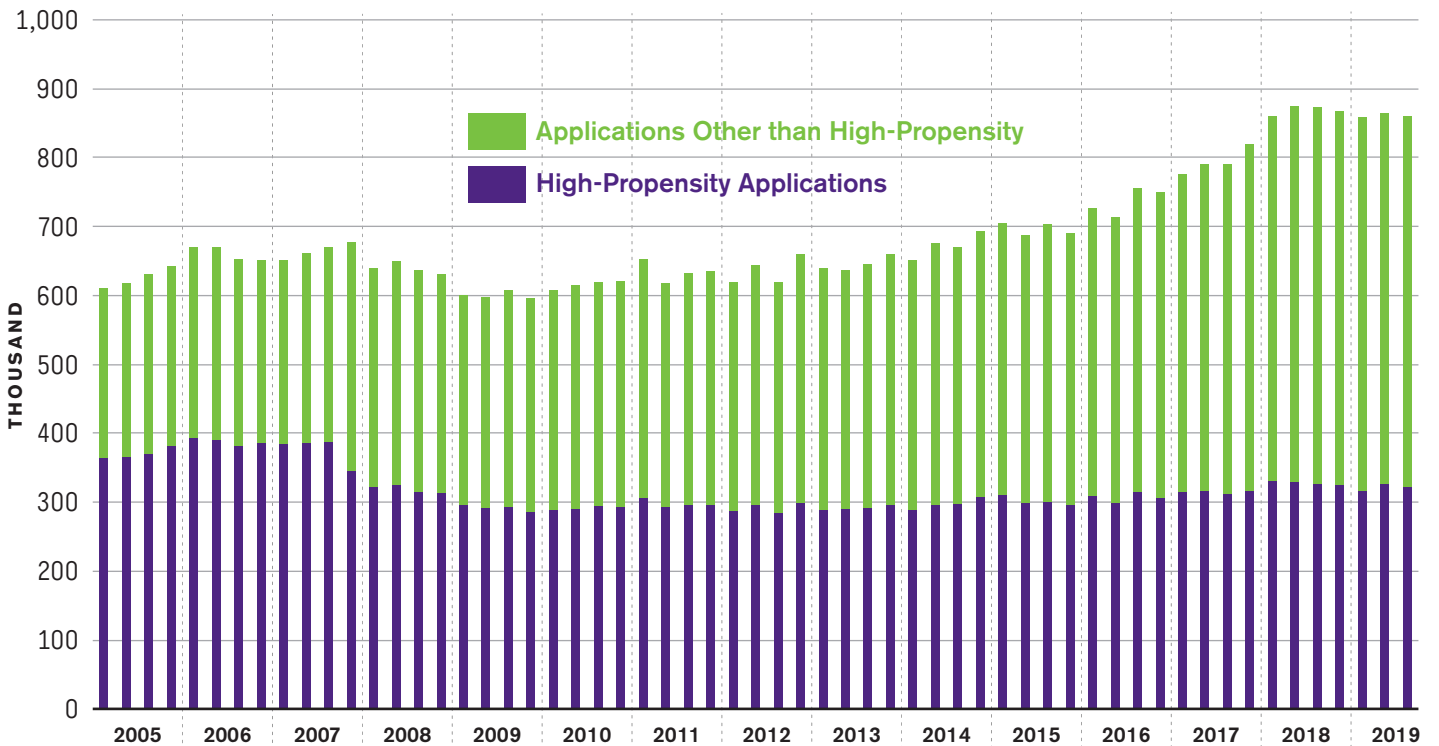


Figure 8. Quarterly Business Applications, Seasonally Adjusted

Source: "Business Formation Statistics," Third Quarter 2019 Release, U.S. Census Bureau.



tions have recovered, high-quality applications (high propensity applications)—those that have a relatively high likelihood of turning into job creators—have not fully recovered, and their volume is still below pre-recession levels.

The United States has latent entrepreneurial potential. Among the U.S. adult population, 70 percent see good opportunities to start a firm in the area where they live (compared to a 46 percent global average), and 56 percent believe they have the required knowledge and skill to start a business. About 12 percent of the U.S. population aged 18-24 (excluding those involved in any stage of entrepreneurial activity) are latent entrepreneurs and intend to start a business within three years.¹⁰

U.S. entrepreneurs and start-ups face challenges in moving their innovations to the marketplace. For example, U.S. universities and federal laboratories are increasingly key sources of breakthrough technologies that entrepreneurs and start-ups spin out to develop and scale. However, entrepreneurs and small firms often lack funding to develop prototypes, and to validate and scale their innovations. Lacking adequate resources at this critical juncture in the innovative life-cycle, these technologies may fall into the “valley of death,” stalling or terminating their development and commercialization, and increasing their vulnerability to foreign acquisition.

Ecosystems in support of small innovators are growing around research universities and in U.S. metro areas—workspaces, networks, training, and events. Because these dynamic young firms play a key role in driving regional economic development, many state and regional governments have programs in place to nurture entrepreneurs and start-ups, including seed and venturing funds, incubators, and accelerators. Some companies are nurturing new start-ups, and reaching out to access their technologies.

Key Questions to Address

- Excluding the return to economic growth after the Great Recession, what other factors have propelled the upward trajectory of U.S. business formation? How can we reinforce and extend this momentum?
- What are the most important policies in the United States for starting and growing a business, and especially a technology-based start-up? Which ones play the most positive role, and which are serving as barriers to success?
- There are numerous efforts across the country to nurture entrepreneurs and start-ups—connected to state and regional economic development, at universities, and operated by private companies. Is this ecosystem adequate? Can it be better integrated to provide more seamless support through the innovation life cycle?
- What are the critical elements of university programs that successfully spur entrepreneurs and spin-out start-ups?
- What more needs to be done to address the “valley of death”?
- How can we tap more of America's entrepreneurial potential, encouraging more Americans to take the leap of starting a business?

¹⁰ https://www.babson.edu/media/babson/assets/blank-center/GEM_USA_2018-2019.pdf.

ISSUE 4: Development and Allocation of Human Capital in a U.S. Economy Disrupted by Rapid Technological, Market, and Competitive Changes

In our advanced, market-based economy, businesses and organizations that develop and/or adopt new and improved products, services, and processes grow and displace those that don't, shifting capital, labor, and markets away from less productive to more productive and competitive businesses.

Moreover, the reorganization of the economy and society around powerful technologies is inherently disruptive, creating and destroying businesses, markets, and jobs, as well demonstrated by the massive changes that have occurred during the digital revolution. These disruptions can have a variety of impacts on labor markets, and what people do on the job. For example, new technologies may replace workers, make occupations or skills obsolete, or create new types of jobs and demands for new skills. Countries and communities can face disruption as industries fade or new industries rise, and as new technologies alter the ways in which humans carry out activities across society.

It may not be a good time for those whose skills limit them to routine work, as smart systems, sensors, and software are increasingly capable of doing that work. Higher-skilled workers are better able to use new technologies when they are introduced, and better prepared to move to new industries, new jobs, new occupations, or new skills when displaced by technological, labor market, or market disruptions. Workers with less knowledge and fewer skills, many in rural and rust belt areas of the country, are at greater risk of being left behind in an era of frequent technological disruption, shrinking numbers of jobs with routine tasks performed by humans, and fewer jobs outside of metro areas. For example, a recent study found that five metro innovation hubs—Boston, San Francisco, San Jose, Seattle, and San Diego—accounted for more than 90 percent of U.S. innovation-sector

How Technology Can Affect Jobs and Workers

- Changes skills needed on the job
- Changes the way work is organized
- Changes tasks performed
- Makes workers more productive so fewer are needed or jobs eliminated
- Changes mix of human capital/ skills needed
- Drives expansion of existing industry's employment
- Creates new industries with growing employment; drive declines in other industries
- Creates new or eliminates existing occupations
- Changes what skills or occupations are in demand
- Changes supply of skills/occupation in the labor market
- Changes labor market value of skills

employment growth (high tech, high R&D industries) over 2005-2017, increasing their share of innovation employment from 17.6 percent to 22.8 percent.¹¹

Some of these at-risk workers think they are too old to go back to school and may not have the basic computer or math skills to enter training programs for jobs that require more advanced skills. Also, many of these workers have built social capital in a community that makes them reluctant to leave for greener pastures.

11 <https://www.brookings.edu/research/growth-centers-how-to-spread-tech-innovation-across-america/>.

There is little consensus on how many jobs could be automated in the years ahead. One review showed dramatically different predictions about jobs that automation could create and destroy, for example, with estimates for job losses in the United States ranging from 3.4M by 2025 to 80M by 2035.¹² But the studies also indicated that millions of new jobs would be created. An OECD study across 32 countries indicated that, in the United States, about a quarter of jobs are at risk of being significantly affected by automation based on the tasks they involve, and about 10 percent are at high risk for automation.¹³

Many Americans are worried. In recent surveys, around three-quarters of American adults anticipate more negative than positive effects from widespread job automation, including more economic inequality, and about half say automation has already hurt U.S. workers.¹⁴

The impacts of disruptive technologies on the economy and their rising frequency may increase the need for greater labor market flexibility, job-switching, and moving around the country, raising the importance of the U.S. ability to retool, relocate, and reallocate its human capital. Every year, a large number of workers moves between employers. The gross flow of workers (worker churn) is much larger relative to the net change in employment. These job flows are important indicators of reallocating human capital. However, evidence suggests that labor mobility—job reallocation, worker churn, and geographic labor mobility—has been on the decline for the past 20 years or more.¹⁵

Increasing labor market dynamism raises the importance of labor market signaling—employers conveying to education and training institutions, and workers the knowledge and skills they will need. It

also increases the importance of employers and job matching mechanisms making it easy to identify organizations that are recruiting job candidates and jobs for which they are hiring.

As greater knowledge and higher-level education become necessary for employment for many, the cost of higher education in the United States is soaring, often leaving students with a heavy debt burden. New technology has transformed almost every other knowledge and service industry in the United States. Yet, the basic model of education provision has changed very little, remaining largely a face-to-face delivery of service with limitations on scaling and limited modes for consumption. In addition, with rapid technological change, many young students are being prepared for jobs and technologies that do not exist today.

Key Questions to Address

- Is industry adequately engaged in giving direction to education and training institutions in terms of the knowledge and skills employers need? What are the best mechanisms for achieving that exchange of information? Are universities listening?
- Is the U.S. education system preparing U.S. students and workers for the advanced economy ahead, (when AI and other automation perform routine tasks), and with the ability to respond to frequent disruptions in the labor market?
- Do we need to reevaluate the baseline of what people need to know and be able to do? And how do we balance the new baseline—including the rise of multidisciplinary in business and innovation—with the need for specialization? Is higher education structured to address these new needs?

12 MIT Technology Review, 2018.

13 Nedelkoska L, Quintini G. *OECD Social, Employment and Migration Working Papers: Automation, Skills Use and Training*. OECD iLibrary. March 8, 2018. No. 202. Available online: <https://doi.org/10.1787/2e-2f4eea-en>.

14 <https://www.pewresearch.org/fact-tank/2019/04/08/how-americans-see-automation-and-the-workplace-in-7-charts/>.

15 <https://fas.org/sgp/crs/misc/IN10506.pdf>.

- What levers do we have to reduce the cost and improve the productivity of higher education? How do we change the cost structure? What is standing in the way of transformation in education?
- How do we incentivize universities to link their teaching with the needs of the economy and labor markets to provide career- and life-relevant curricular experiences and credentials?
- Universities often stake their reputations on exclusivity, behaving as customers evaluating what prospective students are “selling.” How do we democratize higher education, creating an education and training system that is inclusive regardless of current education and skills, age, income, work status, time for learning, etc.? How do we get universities to treat students as customers looking to buy knowledge and skills, and to compete to provide those?
- Generally, higher education institutions deploy the same education system model and bestow a credential recognized by employers and society. The power to bestow the credential serves as a barrier to non-traditional forms of education and training, reducing competition in the sector and pressure to reduce costs and improve productivity. Could alternative forms of credentialing create new entrants to and competitors in the education sector?
- The U.S. science and engineering workforce is aging, which could have important implications for the supply of science, engineering, and technological expertise in the economy. The number of science and engineering degree holders in the United States far exceeds those working in science and engineering jobs. What could draw these professionals back into innovation and to replace those aging out of the workforce?

- Metropolitan areas are the most dynamic and innovative in the American economy. Can we afford to continue subsidizing the infrastructure, public services, etc., to support the continued existence of declining industrial areas in the country, or should investment instead be focused on more dynamic and growing areas, and getting people to move to them? Should investment be made to revitalize industrial metros in decline? What is an honest outlook for the revitalization of dying industrial communities?

1:30 Working Group Innovation Immersion Tour

ASU leaders will guide Commission Community members on a tour of a relevant innovation hotspot on campus to inspire and engender further conversation.

2:45 Return from Tour, Wrap-up Conversation and Prep Plenary Report Out

3:00 Return to Plenary

Working Group 3: Optimizing the Environment for the National Innovation System

Community Breakout
Session Mini-Agenda
and Discussion Guide

Memorial Union
Turquoise Room

Working Group 3: Optimizing the Environment for the National Innovation System

Community Breakout Session Mini-Agenda and Discussion Guide

Moderator



Mr. William Bates
Executive Vice President
Council on Competitiveness

MORNING

10:30 Working Group Introduction and Role of the Working Group

Role of the Working Group

Working Groups are the Commission's "ideas and policy recommendation generation engines," charged with framing and developing actionable recommendations to achieve specific goals. The recommendations will likely have many audiences; many will be geared towards policy makers to spur new legislation, executive orders, or public-private initiatives to achieve specific goals. Many other recommendations will be designed to encourage businesses and organizations to take their own steps to promote competitiveness and innovation in their company, region or industry.

National Commissioners—who first met on August 7, 2019—have provided general guidance to the Working Groups for their study of issues, challenges, and opportunities, and the development of recommendations to address them (see *Launch* for more details):

- Examine challenges and opportunities from an ecosystem perspective inclusive of the broader economy, (e.g., if considering opportunities related to disruptive technology in the agriculture space, also consider linking the cost-benefit outcomes of agribusiness technology-enabled solutions to improvements in efficiency and productivity, and to their impacts on consumers, healthcare systems, and the environment).
- Recommended actions should create opportunities that uplift as many stakeholders—business, labor, education, research, and consumers—as possible, and improve outcomes for broader segments of the population, especially for those at the lower end of the socioeconomic scale. Be specific about the economic impacts to families and individuals of investments in R&D, physical infrastructure, intellectual property, and industry and academic sectors. Convey the socioeconomic benefits to people and communities whose livelihoods the recommendations will directly affect.

- Recommendations need to center on competitiveness, while also recognizing that any recommendations may have unintended consequences in potentially lowering competitive advantage or negatively impacting some elements of the workforce.
- Recommendations should lead to action-oriented measurable outcomes—policy recommendations, as well as those the Council’s membership and affiliated constituencies could put into practice and track results.
- Public attitudes toward science and engineering should be incorporated into the Commission’s assessment.
- Identify which decision-makers can act on recommendations, and consider how to shape a compelling narrative that will encourage them to listen and act.
- Other considerations in prioritizing challenges, solutions and recommendations to address could include: Is the issue or challenge urgent? Is the issue, challenge, or potential solution pivotal in terms of its impact or the number of other issues or factors affected? Is the recommendation actionable, and what is the vehicle for advancing the recommendation?

11:30 Focus of the Working Group— and Conversation Kick-off

Working Group 3, Optimizing the Environment for the National Innovation System, focuses on the physical and policy structures that support innovators—including intellectual property protection, business regulation, capital availability, standards, and emerging trading systems—and how to optimize the entire system in which the Nation’s innovators and enterprises operate. This includes the roles business, and local, state, and federal governments must play.

National Commissioners’ guidance specific to Working Group 3 includes:

- Need to identify a specific roadmap with attributes of an optimized environment for innovation that provides competitive advantage. Because the innovation landscape is so broad, yet interconnected, what does competitive advantage look like across industries and geographies, as resources and investments needed to sustain an advantage will vary greatly.
- Consider different actions to achieve desired outcomes based on particular inputs and environmental factors that affect the ability to innovate. For example, some actions may spur large change over time, while others may be important “quick wins;” some may operate in the current system, while others are more appropriate for a new innovation system model.
- Consider how changes to a venture capital or federal funding model could impact the value or protection of intellectual property.
- A sole focus on a singular national innovation system could lose sight of the complexity of the innovation ecosystem, or how different factors affect different stakeholders and industries. For example, some industries are highly sensitive to regulation, while start-ups in some industries are less sensitive to the availability of capital, for example software compared to the energy industry. The working group could consider multiple innovation systems.
- Consider the impact of different government funding streams, rules, and policies, as well as norms in the United States and in other countries on the ability to advance a portfolio of key emerging technologies, their applications, and in bridging the “valley of death” toward the marketplace. This includes funding for federal labs and universities, and the rules, policies, and practices under which they operate.
- Explore how the United States can better protect publicly-funded and industry-developed intellectual property from theft and foreign acquisition.

This discussion guide will focus on four fundamental threads, and a series of interconnected questions to consider in shaping actionable policy recommendations:

- Capital Availability for Investment in Innovation from Start-up to Scale-up
- Shaping Standards and Regulation Around Technologies Critical to Innovation
- Protecting U.S. Intellectual Property
- Trade Systems, Policies, and Trade Barriers

ISSUE 1: Capital Availability for Investment in Innovation from Start-up to Scale-up

While the U.S. financial system for innovation, business investment, and expansion is considered among the very most, if not the most competitive in the world, obtaining capital at critical junctures in the innovation development life cycle can be challenging, and not just for innovating entrepreneurs and smaller enterprises. Even in large corporations, investments in innovation of even a few hundred thousand or a few million dollars often must be sold to corporate finance based on ROI thresholds and return timelines, rather than on technical promise.

There are two key innovation investment gaps. In the first, entrepreneurs and small firms—including those developing technologies transferred from universities and federal labs—often lack funding to develop prototypes, and to test and validate their innovations. This step is crucial for generating the performance data needed to attract commercial financing. Lacking adequate resources at this critical juncture in the innovative life cycle, these technologies may fall into the “valley of death,” stalling or terminating their development and passage to commercialization, and increasing their vulnerability to foreign acquisition. A second investment gap is securing adequate financing to scale-up to full production in the United States, when risk has been significantly lowered, but investment needs are significantly higher. To capture the full fruits of the U.S. innovation ecosystem, the United States must bridge both gaps.

Venture Capital

Venture capital plays an indispensable role in funding U.S. innovation and supporting the development of some of the most innovative and successful U.S. companies. However, the U.S. lead in venture capital is shrinking. While the absolute level of venture capital coming to the United States has increased, the U.S. share of the growing global pool of venture capital has eroded sharply from more than 90 percent in the 1990s, to about half in 2018. Moreover, venture capital investment is highly concentrated in a handful of geographic regions of the United States—particularly California, New York, and Massachusetts—which, together, accounted for 79 percent of venture dollars invested in the United States in 2018. Also concentrated, more than half of venture capital in the United States goes to software (36 percent) and life science (18 percent) companies.

U.S. venture capital appears to be shifting, with capital increasingly concentrated in bigger funds and bigger investments, with fewer companies receiving investments. For example, the number of companies receiving venture capital has been on a downward trend since 2015, reaching a six-year low in 2018. Large investments are taking a significant share, with investments of \$100M or more in venture-backed companies accounting for 47 percent of venture capital invested in the United States in 2018; unicorns—venture-backed companies valued at \$1B or more—accounted for 35 percent of the total venture dollars invested, but only 2 percent of the deals.

Key Questions to Address

- Does the geographic concentration of venture capital prevent the United States from harnessing its full capacity for innovation? Do we need a more geographically inclusive venture financing system? If so, how do we attract venture capital to other U.S. regions?

- Does the industry concentration of venture capital prevent the United States from fully exploiting a broader range of emerging technologies that could result in additional jobs and industrial expansion? Do we need a more industry inclusive venture financing system?
- Does the shift in venture capital to larger investments in fewer firms have the potential to undercut U.S. innovation by reducing the venture capital available to a broader, more technologically diverse set of start-ups? Or, does the U.S. benefit from larger infusions of capital into new firms that are perceived as more attractive to drive their scaling more quickly?

Federal Funding for Innovation

The federal government provides financial support for innovation through a number of channels:

- Grants to principal investigators and companies for research and technology development projects;
- Grants, often cost-shared, for research consortia, and research and technology development centers, and large-scale demonstration projects;
- Loans and loan guarantees;
- Challenge competitions;
- Developmental competitions among defense contractors, for example, for next generation vehicles or weapons systems;
- Government procurement; and
- Direct appropriations and grant competitions for work at federal laboratories.

Efforts to advance innovations by start-ups and small firms are supported by some government funding, but that funding can decrease abruptly after a technology is created, right when funds are needed to test and begin commercializing the technology. For example, the Small Business Innovation Research Program (SBIR) is a three-phase, merit-based R&D grant program. In Phase I, small businesses can receive up to \$150,000 to establish the technical merit and commercial feasibility of their innovations. In Phase II, those who have participated in Phase I may compete for up to \$1M to further their R&D or to develop a prototype. In Phase III, SBIR awardees pursue commercialization, but there is no SBIR funding. Federal departments and agencies have authority to offer financial support beyond the first Phase II award, however, matching funds may be required. Through the SBIR program in 2018, federal departments and agencies awarded or obligated \$3B in more than 5,600 awards to about 3,000 small firms.

In another example, the Department of Energy awards merit-based grants for research and development to advance clean energy and energy efficiency technologies. Grants can range from several hundred thousand dollars to \$10M or more. However, cost-sharing is often required and grant applications are complex, a challenge to cash- and time-strapped small businesses and start-ups.

Most federal support for research and technology development has typically been provided for basic research or in the context of government missions. However, over the past few decades, more federal investment has supported projects with broader economic, job creation, and competitiveness objectives, or to address the “valley of death” funding gap. Federal support is said to be justified because the R&D is important to the Nation, but too risky for the private sector to invest. Some non-mission-related federal funding has also migrated further downstream in the innovation lifecycle. The degree to which funding has migrated downstream has varied; over the past few administrations, federal investment has expanded downstream or retrenched based on the philosophy of the political party in power. This tension is less prevalent in some U.S. competitor nations.

Differing Philosophies on the Federal Role in Innovation and Cautionary Tales

The Perils of “Picking Winners and Losers”

Developing and scaling emerging technologies involves risk. Some projects will be wildly successful, but at the leading edge of technology, many will fail. The question of who decides which technologies are worthy of investment and who bears this risk has produced differing philosophies among the Nation’s policymakers and economists on federal support for innovation beyond basic research and government mission-related work. Periodically, this divergence in views has produced political debate over the government role vs. the free market—in shorthand, in “picking winners and losers.” Two recent cases provided fodder for this debate:

- Solyndra, Inc. secured a \$535M Department of Energy (DOE) loan guarantee for construction of a photovoltaic manufacturing facility. The new plant was expected to initially create 3,000 construction jobs, as many as 1,000 jobs at the plant, and hundreds more as the company’s solar panels were installed on U.S. rooftops. But, two years later, undercut by a flood of cheap, Chinese government-subsidized solar panels and European cuts to incentives for installing solar power projects, the company laid off 1,100 employees, ceased operations and manufacturing, and filed for bankruptcy protection—at a loss to U.S. taxpayers in excess of \$500M. In addition, DOE’s Inspector General
- A123 Systems—an MIT advanced lithium ion battery technology spinout—received several million in federally-supported technology development grants and a \$250M DOE grant to build production facilities in Michigan. A123 was expected to create 3,000 new jobs, and help establish the United States as a leader in the manufacturing of electric vehicles. A123 had problems scaling its technology and relied heavily on a single company—Fisker, which had secured a \$529M DOE loan—that failed to bring its electric vehicle to market on time and cut its orders for batteries. A123 stock value fell dramatically, the company took financial losses, filed for bankruptcy, and its assets were acquired in 2013 by the Chinese Wanxiang Group. In 2012, dogged by recalls, other problems, and the A123 bankruptcy, Fisker—after receiving nearly \$200M in U.S. taxpayer funds—suspended production and its assets were acquired in 2014 also by the Wanxiang Group.

Key Questions to Address

- Given U.S. interests in both national security and global competitiveness, how do we balance the risk of losing critical technologies to foreign competitors with the need for funds for U.S. fast-growing industries, start-ups, and other companies advancing new technologies?
- How far should the federal government go in support of commercially-relevant technology?
- How should the federal government balance the need for investment in advancing key or strategic technologies—including those not related to its missions, or those that may require large investments for demonstrations or multidisciplinary initiatives—with risk to the taxpayer? (For example, federally-supported biorefinery demonstrations included DOE single project awards in the \$30-\$45M range, and as high as \$97M, with a separate industry cost-share).
- How does the Nation balance cycles of expansion and retrenchment that come with changes in political power with the need for both long-term stability in federal R&D investment, and the need to open new or reduce funding streams based on technology developments?
- Should the federal government play a larger role in providing capital at critical stages of the innovation life cycle, for example, to help bridge “the valley of death?”
- Are current federal programs—such as SBIR, Department of Energy R&D grants, and the Manufacturing USA Institutes—the right kinds of tools to accelerate U.S. innovation by providing critically-timed financial support?

Intel Capital

Intel Capital was established in 1991 to back start-ups in a range of digital technologies. Since then, Intel Capital has invested \$12.4B in 1,544 companies in 57 countries. In that timeframe, 670 portfolio companies have gone public or been acquired. In 2018, Intel Capital invested \$391M in 88 companies, including 38 new companies. This includes small investments in emerging technologies that are expected to be more mature and potentially useful to the company in three to five years.

Other Sources of Funds for Innovation

U.S. research, technology development, and innovative start-ups have been supported by several other types of funding models. For example, philanthropic foundations have provided support for biomedical research, space technology development, and non-profit research institutes. Platforms such as Kickstarter, EquityNet, and Crowdfunder crowdsource funding for new technology, inventions, innovation projects, and start-ups. For example, Kickstarter has raised \$888M in its technology category, and successfully funded 8,350 technology projects. Oculus VR—acquired by Facebook for \$2B—used Kickstarter to raise \$2.4M to fund development of its virtual reality headset for gaming. In connection with their economic development programs, some state governments have supported seed funds and start-up funding.

Some corporations provide funding for innovations and innovators outside of the company. For example, General Mills' 301 INC. identifies and nurtures emerging food brands, and includes a venture capital fund. Kellogg established the 1894 capital fund for early stage venture investments in food related technology, packaging, etc. These investments allow companies to selectively identify and mature technologies and innovations outside of the company that may be useful for their business lines without having to establish an internal research or innovation effort.

Key Questions to Address

- Do crowdsourcing models have greater potential? Should we find ways to expand the scope of U.S. investors in innovation, or does that present too much risk?
- How can more private companies take a greater role in investing in innovations developed outside of the company that could potentially be of future interest and utility?
- Many state and local economic development agencies seek foreign investment to create new jobs. How should those needs be considered?
- What other kinds of investment tools—both public and private—are needed?

Key Questions to Address

- Is this basic tax structure adequate and/or optimal for getting the most innovation out of the U.S. system as possible?
- Do we need to do more to inform U.S. small businesses about the benefits available to them through the R&E tax credit, given the wide range of research, development, testing, manufacturing process advancements, and other activities that qualify for the credit?
- Are there other opportunities for using tax or other financial incentives to encourage innovation?

Tax Incentives and Tax Treatments that Foster Innovation

While other nations have steadily lowered their corporate tax rates since 2001, the United States had a tax rate highest among all OECD countries. The Tax Cuts and Jobs Act of 2017 reduced the corporate income tax rate from 35 percent to 21 percent—making doing business in the United States significantly more attractive and potentially freeing more private sector funds for investment. However, there are questions as to whether investments are increasing due to the rate reduction, and there is some political pressure to increase the rate.

The U.S. Research and Experimentation Tax Credit is a significant incentive for investment in R&D. The tax credit was permanently extended in 2015, and its provisions were expanded to further reach U.S. innovators. For example, prior to the changes, the R&E tax credit did not benefit start-up firms with no federal corporate income tax liability. Now start-up businesses with no federal income tax liability and gross receipts of less than \$5M can take the R&E tax credit against the employer portion of payroll taxes, creating a refundable credit capped at \$250,000 for up to five years. In addition, some states and localities have additional tax benefits and inducements for investing in R&D, and to attract R&D facilities and high-tech companies.

ISSUE 2: Shaping Standards and Regulation Around Technologies Critical to Innovation

The disruptive technologies that will shape the economy for decades to come will require the development of a wide range of standards and some regulations. Examples of emerging technologies and their regulatory and standards challenges and issues include:

Autonomous Systems and Vehicles

Autonomous systems will require technical standards for safety, interoperability, human factors, privacy, transparency, and to protect these systems from malicious attacks and cyber intrusions that could have profound consequences for security. Since they will be used in transportation, health care, and the military, failures could be catastrophic. For example, standards must support the safe and effective operation of automated vehicles that may not have steering wheels, pedals, mirrors, or human controls; may have drastically different passenger seating; may rely on networks for their operations; must adhere to rules; and must react to unpredictable roadway conditions, interaction with other vehicles and pedestrians who may not always adhere to traffic laws or behave in unexpected ways. These may require new approaches to motor vehicle safety standards and regulations, and for when humans are and are not

present in the vehicle. Also, as intelligent highways deploy and smart cities develop, standards will be needed to integrate into these platforms.

Robots

Robots have been used for years in controlled industrial settings. As robots become more commonplace in a wide variety of venues—such as homes, hospitals and retail establishments—their exposure to humans will increase substantially in more intimate interactions, with implications for standards in areas such as safety, trust, and human interfaces.

Nanotechnology

As nanotechnology advances and is used more widely, there are implications for standards and regulations throughout the product life cycle—in raw material production, consumer product manufacturing, worker exposure, industrial emissions, consumer use and exposure, ecological exposure, and at product end-of-life in landfills and incinerators. Workers within nanotechnology-related industries have the potential to be exposed to uniquely engineered materials with novel sizes, shapes, and physical and chemical properties.

Gene-Editing

Concerns have increased about ethical guidelines and safety standards for gene-editing, and the scientific and international communities are getting discussions underway. Areas include the use of gene-editing in health care and disease mitigation, food production, and environmental applications. Focus is particularly strong on germ-line editing and genetic enhancement. International guidelines and standards could be used for countries to set their own national regulations. However, ethical principles that could underpin domestic guidelines and standards vary across countries and regions, and the roles of public institutions and private companies in different countries.

Personalized Medicine

Standards of care have been developed based on the effects of treatments and medicines as observed in clinical trials involving large cohorts of individuals. But, in personalized medicine, addressing a patient's

“The pace of innovation in automated vehicle technologies is incompatible with lengthy rule-making proceedings and highly prescriptive and feature-specific or design-specific safety standards. Future motor vehicle safety standards will need to be more flexible and responsive, technology-neutral, and performance-oriented to accommodate rapid technological innovation.”

Source: *Preparing for the Future of Transportation, Automated Vehicles 3.0*, U.S. Department of Transportation

health is based on a range of an individual's specific characteristics and will increasingly include a person's unique genetics. This is expected to lead to an era of individualized diagnostics, therapy, and medication, with dramatic implications for the development of standards of care.

Implicit with these dramatic technological transformations is the fact that as the pace of development accelerates, government may struggle to keep pace. For example, the U.S. Department of Transportation has acknowledged that the pace of federal rule-making is incompatible with the speed of advancement in automated vehicles.

In another example, with two cultures colliding, the Federal Aviation Administration has struggled for more than a decade developing policies and regulations for using drones (or unmanned aircraft systems (UAS)). For the most part, development of small drones is not being driven by the traditional aviation industry, but by new participants in the field—innova-

tors from the electronics and IT industries—who are entrepreneurial, more comfortable with risk, value speed to market, and subject to minimal regulation, where traditional aviation is conservative, concerned about safety, tightly regulated, and avoids risk. The National Academies concluded that the FAA risk culture is too often overly conservative with regard to UAS technologies. In the Academies' view, this has prevented safety-beneficial UAS operations from entering the airspace, and that these two cultures need to merge to establish an appropriate balance in the regulatory approach. Currently, for commercial operators, waivers must be secured, for example, to operate a drone from a moving vehicle or at night, to operate a drone out of visual sight, or to operate multiple drones.

Standards are often embodied in national regulations. While conforming to standards is voluntary, compliance with regulations is mandatory. Nations can craft unnecessary or discriminatory technical standards and embody them in regulations to disadvantage competitors, impeding market access or sometimes requiring excessive testing or redesign of products.

U.S. innovation and its global competitive position will benefit from an international environment of standards and regulations that reduces barriers and underpins open markets for the use and commercialization of emerging technologies. This involves both regulatory and non-regulatory approaches. Since the U.S. system of standards development is distributed and private sector-led, the development of U.S. standards and U.S. participation in international standards development will involve numerous actors, including government, industry, academia, and society. Standards-related bodies are beginning to address these new needs, and the administration is exerting greater pressure on countries to reduce non-tariff standards-related barriers to trade.

Key Questions to Address

- Are standards and regulations for new, disruptive technologies being developed in a timely fashion to match the rapid pace of technological advancement, and to fully capture the economic opportunities and societal benefits these technologies present? Where are we lagging, where are we leading?
- Is greater government leadership and coordination needed to drive, accelerate, and optimize standards development and deployment in the United States—to match the pace of new technology development and the challenges from strong competitors?
- How do we manage and/or prioritize both cross-cutting standards development for new technologies and for sector specific applications?
- How do we balance risk in promoting safety and rapid innovation?
- What is the degree to which we can draw from current standards to accelerate standards development for these new disruptive technologies?
- Will new R&D be required? If so, in what areas?
- What is the role of U.S. values and societal issues in developing standards, for example, in biotechnology and gene-editing?
- Will the willingness to push the envelope beyond internationally accepted guidelines and standards be a determinant in a country's global competitiveness?

AFTERNOON**12:00 Working Lunch****12:45 Working Group Innovation Immersion Tour**

ASU leaders will guide Commission Community members on a tour of a relevant innovation hotspot on campus to inspire and engender further conversation.

2:00 Return from Tour and Focus of the Working Group—Continuing the Conversation**ISSUE 3: The Protection of Intellectual Property in a Hyper-diverse Innovation Economy**

The U.S. patent system was established and evolved for a simpler economy that was very different from today's hyper-competitive, hyper-paced, knowledge-driven global economy. This is reflected in the 1790 U.S. Patent Act's very definition of the subject matter of a U.S. patent: "any useful art, manufacture, engine, machine, or device, or any improvement thereon not before known or used." Rather than built simply on mechanical devices, today's economy, its growth industries—such as microelectronics, software, and biotechnology—company value, and competitive advantage are based on the generation, control, and use of knowledge.

These knowledge-based technologies and industries also enable a wide range of other industries in the economy, contributing to their growth and competitiveness. For example, retail industries gain advantage from big data and software that manage logistics, while the oil and gas industry depends on computing and seismic imaging. Moreover, emerging technologies—such as gene editing and synthetic biology—have the potential to create new types of intellectual property, for example, a new gene

sequence or chimeras. Recently, the world's first pig-monkey chimeras were born in a Chinese lab (but died several days after their birth).

The U.S. patent system is "one-size-fits-all." But the needs of intellectual property (IP) holders and the ways in which they use IP protections are increasingly diverse. For example:

- The microelectronics industry, where product life cycles have collapsed, requires speed and shorter-term protection before products are commoditized and it turns to the next generation technology, while the pharmaceutical industry needs long-term protection to recover the billions spent on R&D, clinical trials, long-term studies, regulatory approvals, and project failures.
- Securing patent protection is a complex and costly process that large firms are financially equipped to handle, while many small firms and start-ups without such resources tend to seek protection for trade secrets because it is cheaper and simpler.
- Some entrepreneurs, small firms, and start-ups secure IP protections to attract financing or for a stronger position when seeking out a joint venture. Others do not intend to commercialize their innovations, but seek IP protection for a stronger negotiating position in attracting potential suitors for an acquisition or licensing agreement.
- Large firms may use patents to keep competitors at bay.
- Different forms of IP protection may be important at different stages of the innovation life cycle, for example, trade secrets during R&D, before it is known if a new technology is worth patenting.

In addition to the challenge of a "one size fits all" U.S. patent system, different countries have different ideas about IP rights, for example, what can be protected, as well as the balance between what should be free to society and what can be sold by the private sector.

Key Questions to Address

- Is the U.S. intellectual property regime out of date—configured as a “one size fits all” model in a world riddled with diversity?
- Is it time to remake the U.S. system of IP protection more aligned with today’s knowledge economy and diverse needs? What would be some of a new system’s key features?
- Should greater consideration in IP protection be given to the benefits of faster, more widespread distribution of new knowledge and technology? Where is the balance between faster, more widespread distribution and incentives for the private sector to advance technology?
- Would faster dissemination drive greater ancillary and associated innovations, new firm entry, and speed up the transformation of the economy around new technologies?

business partners with universities on only a small percentage of its research, about 1 percent of business research funding.

While a few U.S. universities are state-of-the-art in negotiating with start-up companies and established firms, there are often mismatches between the goals of a firm and a university, and over how each party values the IP in question. The entrepreneur or firm often has to acquire, license, or create several patents in order for the whole IP package to generate value, and it is often difficult to determine the royalty stream appropriate for each IP component. This is pointed to as a significant barrier to industry-university collaboration. Many universities employ master agreements that are “one-size-fits-all,” despite vast differences in the market realities of different industries. Company-university collaboration may also suffer from current laws that incentivize universities to pursue more rigid profit-making IP strategies than would be best for commercialization. Most research universities overseas have a greater bias for commercialization, far fewer IP barriers to collaboration, and many of them offer greater IP flexibility.

Challenges Businesses Face in Engaging Universities in Technology Transfer and IP

Universities spend about \$79B for R&D (2018) and perform 13 percent of U.S. R&D, including 47 percent of the Nation’s basic research, and 18 percent of U.S. applied research. The federal government provides about \$42B dollars to support this research, \$20B comes from universities themselves, and about \$5B comes from private enterprises.

Universities and small businesses can retain patent rights, and license the inventions and IP they create with federal funding. National laboratories can enter into cooperative R&D agreements with private enterprises. These U.S. technology transfer laws are considered a U.S. competitive advantage. However, the challenges of negotiating IP agreements with universities—while being ameliorated across many campuses—remains a continuing trouble spot for U.S. industry. In the Council’s Technology Leadership and Strategy Initiative, many participants confirmed that industry-university collaboration falters most often over IP differences. Due to IP or other issues, U.S.

Key Questions to Address

- How can we reduce costs and delays in negotiating and transferring IP from universities and federal laboratories to businesses?
- What can we do to encourage even more flexible and attractive IP terms in corporate-university partnerships?
- Should the federal government use its leverage in funding university R&D to encourage more R&D engagement with industry and more favorable IP terms?
- Can we create model master agreements that offer greater flexibility for different industries and different types of projects?
- Should we show preference to potential licensees in the best position to commercialize federal research and technology, even if that means a waiver to the small business preference?

A recent Department of Justice indictment reveals China's efforts to steal technology from Micron Technology, Inc., a global leader in semiconductors and the only U.S.-based company that manufactures DRAMs. According to the indictment, a Chinese individual illegally obtained Micron's trade secrets, valued at up to \$8.75B.

USTR 301 Report

Examples of Measures to Require or Pressure Technology Transfer from U.S. Companies

- Requiring technology transfer as a condition for obtaining investment and regulatory approvals, securing access to a market, or for allowing a company to continue to do business in the market
- Directing state-owned enterprises in innovative sectors to seek non-commercial terms from foreign business partners, including with respect to the acquisition, use, or licensing of IP
- Providing national firms with an unfair competitive advantage by failing to effectively enforce or discouraging enforcement of U.S. IP rights
- Failing to take meaningful measures to prevent or deter cyber intrusions
- Requiring use of, or providing preferences to, products or services that contain locally developed or owned IP
- Manipulating the standards development process to create unfair advantages for national firms
- Requiring submission of unnecessary or excessive confidential business information for regulatory approval purposes and failing to protect such information appropriately

Protecting U.S. Intellectual Property

Intellectual property is foundational to economies and companies built on knowledge and technology, and its theft can be a serious blow. The Commission on the Theft of American Intellectual Property estimated that the annual cost of IP theft to the U.S. economy could be as high as \$600B.

Pressure to Transfer Technologies

The U.S. Trade Representative reports that IP rights holders operating in other countries report an increasing variety of government measures, policies, and practices that require or pressure technology transfer from U.S. companies. While these measures are sometimes styled as means to incentivize domestic "indigenous innovation," in practice, they disadvantage U.S. companies, requiring them to give up their IP as the price of market entry.

For example, the 2018 China Business Report of the American Chamber of Commerce in Shanghai reported that 21 percent of member companies had felt pressure to transfer technology in exchange for market access. This pressure was particularly notable in high-tech industries, with 44 percent of aerospace and 41 percent of chemical companies reporting pressure to transfer technology.

These actions deny U.S. companies reciprocal opportunities to access foreign markets relative to foreign companies operating in the United States.

Cyber-Enabled IP Threat

Cyber-enabled economic collection and industrial espionage is a significant and growing threat to U.S. companies. Collectors are especially interested in technologies vital to competitiveness and national security including information and communications technologies, military systems, marine systems, aerospace and aeronautic technologies, clean energy

China's Strategy of Introducing, Digesting, Absorbing, and Re-innovating

Foreign Intellectual Property and Technology

Source: Office of the U.S. Trade Representative

China's National Medium- and Long-Term Science and Technology Development Plan Outline (2006–2020) (MLP) is the seminal document articulating China's long-term technology development strategy. It identifies 11 key sectors, and 68 priority areas within these sectors, for technology development, and designates eight fields of "frontier technology," within which 27 "breakthrough technologies" will be pursued. Section 8(2) of the MLP calls for "enhancing the absorption, digestion, and re-innovation of introduced technology." Subsequent policies articulate the concept of Introducing, Digesting, Absorbing, and Re-innovating foreign intellectual property and technology (IDAR):

- **Introduce:** Chinese companies should target and acquire foreign technology. Methods of "introducing" foreign technology that are referenced include: technology transfer agreements, inbound investment, technology imports, establishing foreign R&D centers, outbound investment, and the collection of market intelligence by state entities.
- **Digest:** Following the acquisition of foreign technology, the Chinese government should collaborate with China's domestic industry to collect, analyze, and disseminate the information and technology that has been acquired.

- **Absorb:** The Chinese government and China's domestic industry should collaborate to develop products using the technology that has been acquired. The Chinese government should provide financial assistance to develop products using technology obtained through IDAR. To absorb foreign technologies, authorities have established engineering research centers, enterprise-based technology centers, state laboratories, national technology transfer centers, and high-technology service centers.
- **Re-innovate:** Chinese companies should "re-innovate" and improve upon the foreign technology.

Since first articulated in 2006, China has continued to emphasize the IDAR approach in broad-ranging five-year plans and technology plans issued by China's State Council, central government ministries, provincial and municipal governments, and China's Communist Party. The IDAR approach also has been incorporated into numerous economic development plans for specific sectors, such as integrated circuits.

technologies, health care technologies and pharmaceuticals, agricultural technology, advanced materials, and manufacturing techniques.

For example, the cybersecurity firm FireEye observed 262 cyber intrusions from late 2015 through mid-2016, conducted by 72 different China-based groups whose identities range from "government and military actors, contractors, patriotic hackers, and even criminal elements." Of the 262 intrusions, 182 involved the networks of private and public U.S. entities. FireEye recorded that, in April and May 2016, "three groups compromised the networks of four firms

headquartered in the United States, Europe, and Asia that are involved in the manufacturing of semiconductors and chemical components used in the production of semiconductors."

China, A Strategic Competitor to the United States Seeks Foreign Technology

China is employing a range of strategic and aggressive, licit and illicit practices around the world to acquire foreign technology.

The United States does not have a comprehensive policy to address this massive technology transfer to China...The U.S. government does not have a holistic view of how fast this technology transfer is occurring, the level of Chinese investment in U.S. technology, or what technologies we should be protecting.

China's Technology Transfer Strategy, Defense Innovation Unit Experimental

The U.S. Trade Representative reports that China has engaged in a range of unfair and harmful conduct, including investment and other regulatory requirements that require or pressure technology transfer, and direction or facilitation of the acquisition of foreign companies and assets by domestic firms to obtain cutting-edge technologies. China's National Intelligence Law requires private companies to cooperate with its national intelligence agencies, raising concerns that this law could require companies to turn over sensitive data, trade secrets, or IP to the Chinese government or military.

China remains the world's principal IP infringer, and most active and persistent perpetrator of economic espionage. The U.S. Trade Representative (USTR) reports that China has engaged in supporting unauthorized intrusions and theft from computer networks of U.S. companies to obtain unauthorized access to IP. According to USTR, the U.S. government has evidence that the Chinese government provides competitive intelligence through cyber intrusions to Chinese state-owned enterprises through a process that includes a formal request and feedback loop, as well as a mechanism for information exchange via a classified communication system.

Indictments for Theft of Autonomous Vehicle Trade Secrets

In July 2018, the U.S. Department of Justice announced an indictment against a former Apple, Inc. employee for theft of trade secrets. The former employee is alleged to have taken a confidential 25-page document containing schematic drawings of a circuit board designed to be used in the critical infrastructure of a portion of an autonomous vehicle. Apple learned the former employee was hired by X-MOTORS—a company focused on electric automobiles and autonomous vehicle technology headquartered in China. The former employee was arrested at the airport prior to boarding a flight to China.

As China is committed to industrial policies that include maximizing the acquisition of foreign technologies, particularly in high-tech sectors, these policies could drive even greater IP theft, and pressure to transfer technology.

China has sent an increasing number of students to the United States for academic study. In 2017, there were 266,000 Chinese foreign nationals studying at U.S. colleges and universities, one-third of all foreign students. Most do not have visas to stay in the United States and will return to China. Chinese companies seek research partnerships with U.S. universities, and are setting up research centers in the United States to access U.S. talent and technology. State-backed Chinese enterprises increasingly finance joint research programs and the construction of new research facilities on U.S. campuses.

In addition, Chinese State actors are building research centers in innovation hubs such as Silicon Valley and Boston. At the U.S. national laboratory level where leading-edge defense research takes place, open source reporting indicates Chinese nationals working at some top laboratories have

Indictments for Theft of U.S. Biotech Trade Secrets

In October 2018, the U.S. Department of Justice announced indictments against former employees of Genentech for stealing biopharmaceutical trade secrets, alleging they stole confidential information to help a company in Taiwan create and sell drugs similar to those that were created by Genentech.

returned to China with expertise and knowledge transferrable to the development of systems with military applications.

China's "Thousand Talents Plan," a recruitment program launched in 2008 by the central government, targets scholars who are leaders in their respective fields with top-level research capabilities, and who may hold intellectual property rights, key technologies or patents in technological fields desired by China.

Despite proposed revisions to IP laws and regulations, China has failed to make fundamental structural changes to strengthen IP protection and enforcement.

China is not the only country where IP protection and enforcement are inadequate. For example, long standing IP challenges facing U.S. businesses in India include those which make it difficult for innovators to receive and maintain patents in India, particularly for pharmaceuticals. Numerous other countries present a variety of IP protection and enforcement problems such as patentability criteria, inadequate protection for trade secrets, and lack of IP enforcement.

Recent Government Actions to Protect U.S. Intellectual Property

The Trump Administration has focused on the protection of U.S. IP as a top-tier priority and made it a top goal of U.S.-China economic negotiations. The administration has used tariffs and the threat

of more tariffs to compel China to respect IP rights and curtail IP theft. After the G20 Summit in Buenos Aires in December 2018, where President Xi and President Trump said they would begin negotiations on IP protection, China announced a crackdown, releasing a list of 36 punishments for companies that engage in IP theft.

The new U.S.-China trade agreement announced in December includes stronger Chinese protection and enforcement of IP rights, and China's agreement to stop forcing or pressuring foreign companies to transfer their technology to Chinese companies as a condition for obtaining market access or administrative approvals. China committed to refrain from directing or supporting outbound investments aimed at acquiring foreign technology in support of its national industrial plans and technology strategies.¹⁶

The National Institutes of Health (NIH) has identified failure by some researchers at NIH-funded institutions to disclose substantial contributions of resources from other organizations, including foreign governments; diversion of IP in grant applications or produced by NIH-supported biomedical research to other countries; and, in some instances, sharing of confidential information by peer reviewers with others including, in some instances, with foreign entities, or otherwise attempting to influence funding decisions. In 2018, NIH sent a letter to more than 10,000 universities outlining these findings, and urging them to be vigilant in addressing these problems. Last year, NIH director Francis Collins testified that investigations of NIH-funded foreign scientists are underway at more than 55 institutions. To help address this issue, NIH has developed a list of recommendations for the agency and grant recipient organizations in areas such as communication and awareness, risk mitigation, monitoring, and consequences.

In other examples, under National Science Foundation (NSF) policy, NSF personnel and those serving in Intergovernmental Personnel Act (IPA) assignments at NSF are not permitted to participate in foreign government talent recruitment programs. For some grants, the Department of Defense has

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included restrictions on foreign participation, access, and transfers, as well as direct or indirect participation, collaboration, communication, or acceptance of funding with non-U.S. programs such as the Thousand Talents Program. NASA cannot use appropriated funds to enter into or fund any grant or cooperative agreement to participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company at the prime recipient level and at all subrecipient levels, whether the bilateral involvement is funded or performed under a no exchange of funds arrangement.

The Foreign Investment Risk Review Modernization Act of 2018 (FIRRMA) and the Export Control Reform Act of 2018 are measures expected to increase protection of U.S. IP. The Committee on Foreign Investment in the United States (CFIUS) oversees the national security implications of foreign direct investment. Among other things, FIRRMA expands CFIUS's jurisdiction to review investment transactions—whether or not they convey a controlling equity interest—where a foreign person has access to information, certain rights, or involvement in the decision-making of certain U.S. businesses involved in critical technologies. In reviewing investment transactions, FIRRMA also allows CFIUS to discriminate among foreign investors by country of origin by labeling some as “a country of special concern”—a country that has a demonstrated or declared strategic goal of acquiring a type of critical technology that would affect U.S. leadership in areas related to national security. FIRRMA states that emerging and foundational technologies are among those controlled, as pursuant to the Export Control Reform Act of 2018.

To begin specifying emerging technologies, the U.S. Department of Commerce issued an Advance Notice of Proposed Rulemaking (in connection with implementing the Export Control Reform Act), which included a list of more than three dozen examples of emerging technologies in categories such as biotechnology, artificial intelligence, microprocessor technology, advanced computing, data analytics, quantum information and sensing technology, additive manufacturing, robotics, brain-computer interfaces, and advanced materials.

Key Questions to Address

- Is the level of theft of U.S. IP and emerging technologies a threat to U.S. global technology leadership and national security?
- Is the federal government giving the issue appropriate priority?
- Given the landscape of global commerce and scope of U.S. business transactions with foreign entities known to pose IP risks, how can we help U.S. businesses better understand the level of risk they face when doing business with a foreign entity?
- How can we use market mechanisms to encourage foreign companies to comply with laws and values that protect IP?
- Are there other sources of leverage the United States has to seek to compel foreign entities to provide adequate and effective protection and enforcement of U.S. IP rights?
- Should the government take greater punitive measures against foreign entities that are directly benefitting from U.S. IP theft, such as denying access to the U.S. market or banking system, or public reporting of the use of stolen IP when foreign entities seek to be listed on U.S. exchanges?
- What other kinds of sanctions could be levied against foreign entities that steal U.S. IP?
- Are other countries concerned about IP theft adequately engaged in showing a unified front in confronting IP thieves and enforcing IP laws?
- Should there be harmonized national and international legal and regulatory approaches?
- How can we improve coordination, intelligence gathering, and information sharing on IP threats and incidents among nations, and the public and private sectors?

Non-tariff Barriers Faced by the U.S. Pharmaceutical Industry

The United States is a world leader in pharmaceuticals and medical device innovation. The pharmaceutical industry invests about \$75B annually in R&D. In addition, the federal government invests about \$33B annually in life science R&D, which has supported the U.S. competitive edge. U.S. pharmaceutical firms have raised concerns about policies and practices in several trading partners, for example, pressure for compulsory licenses, which can undermine incentives to invest in R&D, be used to advantage domestic companies, or to gain leverage in pricing negotiations. Other challenges faced include unreasonable regulatory approval delays, and outright bans on some imported pharmaceutical products and medical devices in favor of local products.

ISSUE 4: Trade Systems, Policies, and Trade Barriers

The United States has long championed free and fair global trade, including fair and equitable market access, and the reduction of non-tariff trade barriers. When small countries deploy trade barriers, the impact is relative to the size of their market. It is a different story entirely when a large, strategic competitor to the United States deploys barriers to trade.

Non-tariff Barriers

Non-tariff barriers can pose significant competitive and business challenges to U.S. firms and globally-leading U.S. industries, putting them at a competitive disadvantage. Examples of these barriers that can affect U.S. firms' access to foreign markets for emerging technologies include:

- **Telecommunications:** Brazil requires testing of telecommunications products and equipment by a designated testing facility in Brazil. This redundant testing increases costs for U.S. exporters and can delay the time to market for their products. Brazil provides tax reductions and exemptions on many

domestically produced digital goods. The rule is product-specific and stipulates which stages of the manufacturing process must be carried out in Brazil in order to be considered produced in Brazil. China's onerous requirements on the use of encryption include, in many cases, mandatory use of indigenous encryption algorithms (e.g., for WiFi and 4G cellular products).

- **Internet-based Service Activity:** China's restrictive Internet regulatory regime affects a broad range of commercial services conducted via the Internet. China continues to engage in extensive blocking of legitimate websites. According to the latest data, China currently blocks 10 of the top 30 global sites, and U.S. industry research has calculated that more than 10,000 domains are blocked, affecting billions of dollars in business, including communications, networking, app stores, news, and other sites. China prohibits foreign companies from directly supplying cloud computing services, including computer data and storage services, and software application services over the Internet.
- **Agricultural Biotechnology:** The EU's lack of predictability, excessive data requirements, and delays in the approval process for genetically engineered (GE) crops have prevented GE crops from being placed on the EU market even though the agricultural biotechnology products have been approved (and grown) in the United States. USDA estimates that the lengthy EU approval process (average 7.5 years) and resulting asynchronous approvals has resulted in an annual loss of approximately \$2B per year to U.S. agriculture. In 2015, the EU adopted a directive that allows Member States to ban the cultivation of GE plants in their territories for non-scientific reasons. Nineteen Member States "opted-out" of GE crop cultivation for all or part of their territories, and 17 have opted out of cultivation using biotechnology seeds.
- **Digital Data:** The free flow of data has been critical to the continued growth of digital trade. The EU's new and sweeping General Data Protection Regulation restricts the transfer of

the personal data of EU citizens outside of the EU, except to specific countries that the EU has determined provide adequate data protection under EU law or when other specific requirements are met, such as the use of standard contract clauses or binding corporate rules. Restrictions on the flow of data have a significant effect on the conditions for the cross-border supply of numerous services and for support to the functionality embedded in intelligent goods (i.e., smart devices). The EU has so far found only a handful of countries to provide adequate data protection under EU law; the United States has received an EU determination of partial adequacy.

Under the GDPR, which took effect on May 25, 2018, fines of up to 4 percent of annual global revenue can be imposed on firms that breach the new data protection rules. For multinational corporations, such fines could amount to billions of dollars. The GDPR creates joint liability for controllers (the entity that determines the purpose and means for processing personal data) and processors (generally contractors hired to process personal data on behalf of the controller). The regulation requires companies to have a data protection officer or representative present in the EU. It adds new requirements for accountability, data governance, and notification of a data breach. In addition, the GDPR provides expanded rights to EU data subjects, including data portability, more stringent consent requirements, and the right for EU citizens to demand that search engines remove information that is inaccurate, inadequate, irrelevant, or excessive for the purposes of data processing.

The day the GDPR went into effect, complaints were filed against Google and Facebook—companies with data at the core of their business—as well as WhatsApp and Instagram which are owned by Facebook. Google and Facebook are the subject of numerous investigations; Amazon, Apple, Netflix and Twitter are also under scrutiny in the context of this regulation. Numerous U.S. news web sites withdrew from European countries finding it too cumbersome and too costly to comply.

Challenges to U.S. Leadership in Shaping the Environment for Global Commerce

China seeks to shape large swaths of the 21st century global economic and trading system. China's Belt and Road Initiative is staggering in scope, a new Silk Road of railways, energy pipelines, highways, shipping lanes, and special economic zones, fueled by \$1 trillion in Chinese investment. The initiative would touch more than 4 billion people, 65 countries, and \$23 trillion in GDP.

Dovetailing Belt and Road, China has establishing a major new foreign policy framework—the 17+1—a cooperative platform of Central and Eastern European countries—potentially creating a new regional context that could undermine the EU's unity, given that 12 of the 17 are members of the EU.

Among the three priority areas for increasing cooperation in the 17+1 are advanced technologies and green technologies, areas that would contribute to China's goal of global technology leadership. China has already contributed around \$15.4B toward infrastructure and other investments in these countries since 2012.

On the one hand, the initiative has the potential to develop the infrastructure needed to drive trade, investment, and economic development in regions where it is desperately needed. But, the initiative also serves China's economic and geopolitical goals, and could align a large part of the world economy toward China, and position China to shape the rules and norms of economic activity in the region.

For example, there are suggestions that its strengthening economic ties to China were a key factor in Greece blocking joint EU statements unfavorable to China—one on respecting the International Law of the Sea, and the other calling on China to respect freedom of speech and human rights. Also, there are growing concerns about debt trap diplomacy. Secretary Pompeo has warned of the potential that China will use “economic means to coerce countries into lopsided deals that benefit Beijing and leave its clients mired in debt.”

Key Questions to Address

- Is the U.S. approach to dealing with trade, non-tariff trade barriers, and pressures to transfer U.S. intellectual property the right approach; is the level of pressure appropriate? What are the alternatives?
- Are we confronting new trading (mercantilist) systems in our global competitors?
- Can we compete with those systems? If not, what do we need to do as a nation to ensure U.S. made goods and services can compete in the global marketplace?
- How concerned should the United States be about China's Belt and Road Initiative? Does the United States need more aggressive investments and policies in that part of the world to counter-balance China's actions?

**2:45 Wrap-up Conversation and Prep
Plenary Report Out**

3:00 Return to Plenary

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(as of February 18, 2020)

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Council on Competitiveness

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Arizona State University, and
University Vice-chair
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Mr. Thomas R. Baruch

Managing Director
Baruch Future Ventures



Tom Baruch currently invests in early-stage companies focused on resource-scarce and climate-sensitive markets out of his family office, Baruch Future Ventures (BFV). Tom founded Formation 8 in 2011, a venture capital fund with \$950M under management

and currently serves as an Emeritus Partner. Tom earlier formed CMEA Capital in 1988 with New Enterprise Associates (NEA) and 3M Corp. Tom was responsible for managing a total of \$1.2B of capital across seven funds at CMEA, where he personally led investments resulting in 15 IPO's, including Aclara Biosciences, Codexis, Inc.; Entropic Communications; Flextronics, Inc.; Intermolecular; and Symyx Technologies; and eight M&A transactions, including Silicon Spice, acquired by Broadcom (BRCM).

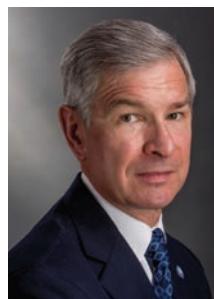
Earlier in his career, Tom worked at Exxon Mobil for 12 years and later founded Microwave Technology, Inc., where he served as CEO for 6 years. Currently, he serves on the boards of Codexis, Inc. (NASDAQ: CDXS) and numerous privately held companies and public service entities.

Tom was a founding member of Obama's National Advisory Council on Innovation and Entrepreneurship, where he advised the U.S. Department of Commerce and the White House. He is a member of the Executive Committee of the Council of Competitiveness

and a member of the Steering Committee of its Energy, Security, Innovation and Sustainability Initiative and the U.S. Manufacturing Competitiveness Initiative. Tom is an advisor to Eight VC, ClearSky Power & Technology Fund and KCK Fund, a family office from the U.K. Tom has an engineering degree from Rensselaer Polytechnic Institute, where he currently serves as a Trustee, and a J.D. degree from Capital University, and is a registered U.S. Patent Attorney.

Dr. Mark P. Becker

President
Georgia State University



Since beginning his tenure as Georgia State University's seventh president in 2009, President Mark P. Becker has led Georgia State through a dynamic period of growth and advancement, and put it on a trajectory to reshape itself and its region. Under his

leadership, the university has pursued a 10-year strategic plan through which Georgia State has emerged as one of the nation's leading higher education institutions.

Georgia State's consolidation in 2016 with Georgia Perimeter College, a two-year institution with five campuses in metro Atlanta, raised its student population to 53,000 and made it the largest university in Georgia and one of the largest in the nation.

One of the most diverse universities in the United States, Georgia State is a national model for student success, setting records for its graduation rates and the number of students it graduates, and leading the country in eliminating disparities in student achievement based on race, ethnicity and income. In 2017, Dr. Becker was honored by the Carnegie Corporation of New York with their Academic Leadership Award in recognition of the University's achievements in "eliminating disparities in graduation rates based on race, ethnicity, income level and first-generation status." Most recently, President Becker was the 2019 recipient of the TIAA Institute Theodore M. Hesburgh Award for Leadership Excellence in Higher Education.

Under Dr. Becker's leadership, Georgia State has built a burgeoning research enterprise, growing sponsored research at more than twice the national rate. Through the rapid development of its campus and its engagement with civic and business leaders, the university has been recognized as a major catalyst for the revitalization of downtown Atlanta and the economic vitality of its region.

Adding to Georgia State's increasing national profile, Dr. Becker has fostered the development of NCAA Division 1 athletics. The university's intercollegiate teams have won nine conference championships since rejoining the Sun Belt Conference in 2013, and Georgia State's football team made its first bowl appearance in 2015. With MLB's Atlanta Braves' decision to vacate Turner Field in downtown Atlanta, he led the university's acquisition and renovation of the stadium that became the home for Georgia State football in 2017.

Dr. Becker attended Harford (Md.) Community College, earned his bachelor's degree in mathematics from Towson State University in 1980 and his doctoral degree in statistics from Pennsylvania State University in 1985. He grew up in Havre de Grace, Md., near Baltimore.

Dr. Michael M. Crow

President
Arizona State University, and
University Vice-chair
Council on Competitiveness



Michael M. Crow became the sixteenth president of Arizona State University on July 1, 2002. An academic leader and educator, designer of knowledge enterprises, and science and technology policy scholar, he is guiding the transformation of ASU into one of the nation's leading public metropolitan research universities—an institution that combines the highest levels of academic excellence, inclusiveness to a broad demographic, and maximum societal impact in a model he terms the "New American University."

Under his direction, the nation's youngest major research institution and largest university governed by a single administration pursues teaching, research, and creative excellence focused on the major challenges of our time, as well as those central to the quality of life, sustainable development, and

economic competitiveness of Arizona and the nation. He has committed the university to academic enterprise, transdisciplinarity, sustainability, social embeddedness, and global engagement, and championed initiatives leading to record levels of diversity in the student body.

Under his leadership, ASU has established more than a dozen new transdisciplinary schools and large-scale research initiatives such as the Biodesign Institute; Global Institute of Sustainability (GIOS), incorporating the School of Sustainability (SOS); Mary Lou Fulton Teachers College; Learning Sciences Institute; and initiatives in the humanities and social sciences, including the Center for the Study of Religion and Conflict. During his tenure the university has tripled research expenditures, completed an unprecedented infrastructure expansion of more than 11M square feet, and announced the eight largest gifts in the history of the institution, including three \$50M gifts endowing the W. P. Carey School of Business; Ira A. Fulton Schools of Engineering; and Mary Lou Fulton Teachers College.

Crow was previously executive vice provost of Columbia University, where he also was professor of science and technology policy in the School of International and Public Affairs. As chief strategist of Columbia's research enterprise, he led technology and innovation transfer operations, establishing Columbia Innovation Enterprises (renamed Science and Technology Ventures), the Columbia Strategic Initiative Program, and Columbia Digital Media Initiative, as well as advancing interdisciplinary program development. He played the lead role in the creation of and served as the founding director of the Earth Institute at Columbia University, and in 1998 founded the Center for Science, Policy, and Outcomes (CSPO) in Washington, D.C., a consortium of scholars and policymakers dedicated to linking science and technology to optimal social, economic, and environmental outcomes. In 2003, CSPO was reconstituted at ASU as the Consortium for Science, Policy, and Outcomes, based in both Phoenix and Washington.

In national service, Crow has been an adviser to the U.S. departments of State, Commerce, and Energy, and various defense and intelligence agencies on matters of science and technology policy related to intelligence and national security. He is a fellow of the American Association for the Advancement of Science (AAAS) and National Academy of Public Administration, and member of the Council on Foreign Relations and U.S. Department of Commerce National Advisory Council on Innovation and Entrepreneurship. The author of books and articles analyzing science and technology policy and the design of knowledge enterprises, Crow received his Ph.D. in Public Administration (Science and Technology Policy) from the Maxwell School of Citizenship and Public Affairs, Syracuse University.

Dr. Mehmood Khan

Chief Executive Officer
Life Biosciences, Inc., and
Chairman
Council on Competitiveness



Mehmood Khan, M.D., is Chief Executive Officer and Board Member of Life Biosciences Inc. In his role as CEO, Dr. Khan provides strategic direction and operational oversight across Life Biosciences and its six daughter companies. His vision of a more

efficient and effective drug development pathway will drive innovation in the science and technology Life Biosciences advances. By leveraging his diverse experience in pharmaceutical, clinical, and consumer industries, Dr. Khan is the ideal leader for Life Biosciences through its evolution and emergence as a global leader in longevity research and product development.

Dr. Khan previously served as Vice Chairman and Chief Scientific Officer of Global Research and Development at PepsiCo, a Fortune 50 company employing upwards of 250,000 employees across

22 brands. At PepsiCo, Dr. Khan played a pivotal role in the company's global R&D efforts to create breakthrough innovations in food, beverages and nutrition, including the incorporation of healthier and more nutritious offerings across its portfolio. Dr. Khan also oversaw PepsiCo's global sustainability initiatives based on the belief that success in business is inextricably linked to the sustainability of the world we share. Prior to joining PepsiCo, Dr. Khan served as President of Global R&D at Takeda Pharmaceuticals, leading the global efforts of one of the largest pharmaceutical companies in the world by revenue.

Before moving into industry, Dr. Khan had a distinguished medical career as a faculty member in endocrinology at the Mayo Clinic and Mayo Medical School where he served as Director of the Diabetes, Endocrine and Nutritional Trials Unit. He also spent nine years leading programs in diabetes, endocrinology, metabolism and nutrition for the Hennepin County Medical Center in Minneapolis.

Dr. Khan is a member of the Board of Directors of Reckitt Benckiser, Indigo Ag, the Foundation for Food and Agricultural Research at the U.S. Department of Agriculture. He also serves as Chair of the U.S. Pakistan Business Council and Chairman of the Council on Competitiveness in Washington, D.C.

Dr. Khan earned his medical degree from the University of Liverpool Medical School, England, and completed a fellowship in clinical endocrinology and nutrition in the Department of Medicine and Food Science and Nutrition at the University of Minnesota, Minneapolis. He is a Fellow of the Royal College of Physicians, London and a Fellow of the American College of Endocrinology.

Mr. Edward Jung

Founder and CEO
Xinova, LLC



Edward Jung is one of the top 15 inventors in history, holding more than 1,000 patents worldwide across healthcare, computing, networking, energy and material sciences. As an entrepreneur, he founded or co-founded multiple companies, including

Terrapower, Kymeta, Vigilance and Benemilk. He advises several others.

Edward founded Intellectual Ventures in 2000 after leaving Microsoft, where he was Chief Architect. At Microsoft, he founded projects in semantic web, adaptive UI and artificial intelligence, and co-founded Windows NT, Office, Microsoft Research, mobile and consumer products. While leading Microsoft Research, he oversaw a budget of \$4.5 billion.

Before joining Microsoft, Edward founded Deep Thought Group (his third startup), working on neural network chips. In the 1980s, he was personally recruited by Steve Jobs to work on projects at Apple and NeXT. His biomedical research has been published in *Proceedings of the National Academy of Sciences*, *Journal of Biological Chemistry* and others. Edward continues to be a sought after keynote speaker globally, discussing innovation strategy, technology trends and mega-scale, cross-border collaboration.

Edward currently serves as the CEO at Xinova, where he visits innovators, companies and governments around the world connecting problems to solutions. In 2005, Edward founded the predecessor to Xinova and co-managed it until 2008. Xinova is based in Seattle, with offices in Seoul, Beijing, Bangalore, Israel, Singapore, Sydney and Tokyo.

Mr. Chris Musselman

Head of U.S. Commercial Business
Palantir Technologies



Chris Musselman is the Head of U.S. Business at Palantir Technologies. Palantir Technologies partners with companies to transform business decision making and operations through combining the power of data with human expertise.

He started out at the Naval Academy, after which he served for over 21 years with the Navy SEALs. He holds a Master's in International Public Policy from The Johns Hopkins University.

Dr. M. David Rudd

President
University of Memphis



Beginning his sixth year as president, Rudd's tenure has witnessed record-breaking improvements in student retention and graduation rates. He has spearheaded efforts to create a new division of Student Success; developed the University's first integrated enrollment, retention and graduation plan; and offered need-based funding for the first time in U of M history. Rudd has led efforts to grow community partnerships, including the LiFE: Learning Inspired by FedEx program, which offers eligible FedEx Hub employees a chance to earn a potentially tuition-free degree online; the UMRF Research Park; and launched UMRF Ventures, a private company held by the U of M Research Foundation. Ventures hosts several FedEx Call Centers, a data analytic center, and an IT command Center. It employs 300 students, and its gross revenue approached \$4M in only its second year. The U of M set a record for total fundraising in his first year at \$37.9M and broke that record this past year, with a total over \$41M. The last two years have seen consecutive records for academic fundraising at \$23M and \$26M. During

a five-year period, \$164M has been raised. More than \$500M is being invested on campus and in the University Neighborhood District (more than \$140M in private funds). Under Rudd's leadership, the campus has continued to expand, with the Laurie-Walton Family Basketball Center; the nearly-completed Pedestrian Cable Bridge, Parking Garage and Plaza; and the forthcoming Scheidt Family Music Center and Center for Wellness and Fitness. He has a bachelor's degree from Princeton and master's and Ph.D. degrees in psychology from the University of Texas.

Dr. Elisa Stephens

President
Academy of Art University



Dr. Elisa Stephens became President of the Academy of Art University in 1992, the third-generation Stephens to lead the university since its founding by her grandparents in 1929.

Under her leadership, Academy of Art University has become the largest accredited private university of art and design in the United States, with more than 11,000 undergraduate and graduate students on a unique urban campus in downtown San Francisco, and throughout the world online.

Dr. Stephens has pioneered the creation of online education programs in art and design, and expanded the curriculum to stay on the leading edge of new technologies and industry trends. Her visionary work has propelled Academy of Art University to be the first choice for students seeking a world-class education and the first choice for those seeking to employ artists globally.

During Dr. Stephens's tenure, Academy of Art University has helped thousands of aspiring artists and designers pursue their educational goals through its scholarships programs, like the popular Pre-College Art Experience that gives high school students

a tuition-free opportunity to jump-start their art and design education while earning money toward their college degree.

Dr. Stephens actively supports a wide spectrum of community outreach programs and makes it possible for students from the Academy of Art University to contribute their artistic and community efforts for maximum impact. Current and past beneficiaries include Fleet Week, KIPP Schools, SFMOMA, MoAD, and the de Young Museum.

Dr. Stephens is a Smithsonian National Board Alumni Member and served on the Smithsonian Institution National Board from 2014-2017. She is a member of the Prince of Wales Foundation, Young Presidents Organization Gold, Vistage International, the Council on Competitiveness, Committee on Jobs, San Francisco Chamber of Commerce, Belizean Grove, San Francisco City Club, Metropolitan Club and the San Francisco Opera Guild.

Dr. Elisa Stephens received a Bachelor of Arts degree in political science from Vassar College and a J.D. from the University of San Francisco. She is a member of the California Bar Association. She also completed the Foundations curriculum at the Academy of Art University.

The Honorable Deborah L. Wince-Smith

President & CEO
Council on Competitiveness



The Honorable Deborah L. Wince-Smith is the President & CEO of the Council on Competitiveness, a non-partisan leadership coalition of CEO's, University Presidents, Labor Union Leaders and National Laboratory Directors, all committed to developing policy solutions

and national initiatives to drive future productivity growth, prosperity for all Americans and the global success of American business. She has more than 20 years of experience as a senior U.S. government official, as the first Senate-confirmed Assistant Secretary for Technology Policy in the U.S. Depart-

ment of Commerce in the administration of President George H.W. Bush, and as the Assistant Director for International Affairs in the White House Office of Science and Technology Policy in the Reagan Administration. She served as a Senate-confirmed member of the Oversight Board of the Internal Revenue Service in the administrations of President George W. Bush and President Barack H. Obama.

Ms. Wince-Smith is also the President and Founder of the Global Federation of Competitiveness Councils (GFCC). She previously served on the Smithsonian National Board, the Secretary of State's Committee on International Economic Policy, the U.S. Naval Academy Foundation, and the Board of Governors of Argonne National Laboratory. She served as Chairman of the World Economic Forum's Global Agenda Council on Competitiveness and as a Public Director of NASDAQ-OMX.

Ms. Wince-Smith currently serves as a Commissioner on the Commission on the Theft of American Intellectual Property and as a member of the Council of Japan's Science and Technology in Society (STS) forum. As an expert in technology commercialization, Ms. Wince-Smith serves on the Board of Directors of Aerolase, Inc., and Q-Net Security, Inc.

Ms. Wince-Smith graduated magna cum laude and Phi Beta Kappa from Vassar College and earned a Master's Degree in Classical Archaeology from King's College, Cambridge University. She has received Honorary Doctorates from Michigan State University, the University of Toledo, the Queens University Belfast, Worcester Polytechnic Institute and the University of South Carolina.

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Dr. Bernard Arulanandam

Vice President for Research, Economic Development, and Knowledge Enterprise
Jane and Roland Blumberg Professor of Biology
The University of Texas at San Antonio



Dr. Bernard Arulanandam is the Vice President for Research, Economic Development, and Knowledge Enterprise (REDKE) at The University of Texas at San Antonio (UTSA). Since 2016, Dr. Arulanandam has directed the research enterprise at UTSA, leading to

its highest research expenditures to date, and in 2018, added economic development to his portfolio. The same year, he fostered the creation of UTSA's National Security Collaboration Center.

He is an established Immunologist and directs a research program that is focused on elucidating host-microbial interactions, and the cellular and molecular mechanisms involved in the induction of immune responses against infectious diseases. Work from his laboratory has provided new insights into the development of vaccines against *Chlamydia trachomatis*, the leading cause of sexually transmitted bacterial disease, and the creation of a potential live attenuated vaccine against multidrug-resistant *Acinetobacter baumannii*, identified as an important nosocomial pathogen. His research has also advanced several animal models for vaccine development against *Francisella tularensis*. Dr. Arulanandam's interdisciplinary research accomplishments

are demonstrated by his funding from the National Institutes of Health, U.S. Department of Defense and U.S. Department of Homeland Security; extensive list of research publications; and issued patents. Dr. Arulanandam has successfully mentored many students and post-doctoral fellows who have now developed independent productive careers in government, industry and academia.

From 2012 to 2016, Dr. Arulanandam served as the Director of the South Texas Center of Emerging Infectious Diseases, and currently is the Scientific Director of the Vaccine Development Center of San Antonio. Dr. Arulanandam serves as the Councilor for the Oak Ridge Association of Universities, a member of the Board of Directors for Biomed SA, and represents UTSA at the UT System Office of Federal Relations National Security Advisory Group (NSAG).

Dr. Arulanandam was appointed the Assistant Vice President for Research Support. He was named the Interim Vice President for Research in June 2016, and was selected as the official Vice President for Research Economic Development, and Knowledge Enterprise in October 2019. In this capacity, he is involved in promoting and supporting research and scholarly activities at UTSA. In 2015, Dr. Arulanandam was named a fellow of the American Association for the Advancement of Science (AAAS) and received the Fulbright International Education Administrator Award in 2016. In 2017, Dr. Arulanandam was elected as a fellow of the American Academy of Microbiology (AAM). Most recently, he was inducted as a fellow to the National Academy of Inventors (NAI) in 2019.

Dr. Bernard Arulanandam obtained a Ph.D. in Microbiology and Immunology at the Medical College of Ohio, and received a postdoctoral fellowship at the Albany Medical College in New York and an executive M.B.A. at The University of Texas at San Antonio.

Mr. C. Michael Cassidy

Director, Emory Biomedical Catalyst
Woodruff Health Sciences Center
Emory University



Mike Cassidy joined Emory University in October of 2018 in a new position designed to provide vision and leadership in promoting biomedical innovation and enhancing the university's economic engagement in the Atlanta region and beyond. As director of

the new Emory Biomedical Catalyst, Cassidy leads efforts to enhance innovation, entrepreneurship and development of intellectual property.

Previously, Mike engineered and led the emergence of the Georgia Research Alliance (GRA) as one of the nation's premier organizations for technology-based economic development. In his 25-year tenure with GRA, Mike developed the vision and charted the strategic direction of the public-private organization, expanding its role and the potential of university research and entrepreneurship as a strategy to grow Georgia's economy. He generated broad-based support for GRA's mission, building and sustaining the nonprofit's powerful relationships with companies, economic development organizations, universities, and leaders at the local, state, and national levels. In 2009, he co-founded the GRA Venture Fund, LLC, a public-private investment fund that invests in the most promising start-ups launched around scientific discovery at Georgia's research universities.

On the national level, Mike has been instrumental in strengthening the policy and practice of technology-based economic development. As a member of the SSTI board of directors, he played a defining role in launching the Innovation Advocacy Council, which advances the cause of public investment in

scientific research and entrepreneurship. Mike has advised technology-based economic development organizations throughout the United States and frequently speaks and contributes opinion pieces on the workings and issues of American innovation and entrepreneurial science. Mike is a Senior Fellow with the Council on Competitiveness and serves on the boards of the SSTI (emeritus), the Health Care Ethics Consortium, The Primary Care Innovation Fund, the Global Center for Medical Innovation, Atlanta Emerging Markets Inc., and Georgia's Bio/Med Investor Network. He is a Past Commodore of the Lake Lanier Sailing Club. He holds a master's degree in Technology and Science Policy from Georgia Tech and a BBA in Marketing from Georgia State University.

Dr. Lee Cheatham

Director, Technology Deployment and Outreach
Pacific Northwest National Laboratory



Lee Cheatham has an extensive track record of leadership in advancing science, technology and commercialization in the U.S. Department of Energy national laboratory system, academia and private industry. He (re)joined Pacific Northwest

National Laboratory (PNNL) in 2017 as Director of Technology Deployment and Outreach, focusing on industrial partnerships to expand the economic impact of PNNL's science and technology.

Previously, Lee launched and led Brookhaven National Laboratory's (BNL) Office of Strategic Partnerships, where he expanded and diversified BNL's research portfolio and oversaw technology commercialization and economic development. Prior to BNL, he served as Chief Operating Officer and General Manager of Commercialization for the Biodesign Institute at Arizona State University. Lee also served as Executive Director of the Washington Technology Center, connecting Washington State companies with research institutions to promote economic growth.

Lee began his professional career at PNNL as a computer engineer and manager, including leading a \$40M-a-year, nationwide, joint industry-government research project addressing supply chain efficiencies. In the private sector, he has served as VP of worldwide engineering for a market-leading software company and launched businesses in commercialization consulting and software sales.

Lee holds degrees in electrical engineering: a Ph.D. from Carnegie-Mellon University, an MS from Washington State University and a BS from Oregon State University, where he is a member of the Academy of Distinguished Engineers. He serves on the National Science Foundation Director's Business and Operations Advisory Committee.

Ms. Megan C. Clifford

Chief of Staff

Argonne National Laboratory



Megan C. Clifford is Chief of Staff at Argonne National Laboratory. She serves as an advisor to Laboratory Director Paul Kearns to drive forward the laboratory's vision and stakeholder relationships. Working with leaders across the laboratory, Clifford stewards Argonne's

change initiative to deliver lasting impact through science and technology leadership, research and operations excellence, and people development. She promotes a culture of diversity and inclusion within the laboratory through values-based leadership.

Clifford joined Argonne in November 2013. Prior to becoming Chief of Staff, she served as Director of Strategy and Innovation for the Global Security Sciences division. In this role, she developed strategies and programs with multidisciplinary teams to address a range of energy and global security challenges.

Clifford's career of 20 years has focused on national security and resilience policy and analysis, strategic planning, and program design. Her involvement in the national security mission dates back to the establishment of the U.S. Department of Homeland Security, where she helped to create the foremost national preparedness doctrine.

Clifford previously held a senior executive position at Booz Allen Hamilton Inc. in Washington, D.C., where she served on the leadership team responsible for performance of the firm's Justice and Homeland Security business.

Clifford received a BA in international business from The George Washington University and an MBA from Northwestern University's Kellogg School of Management.

Dr. William E. Conaway

Director of Planning, Analysis, and Evaluation
Lawrence Livermore National Laboratory



Bill Conaway provides the Laboratory Director and senior management team with analyses to better inform institutional planning, policy formulation, and decision making. As the Director of Planning, Analysis, and Evaluation, his responsibilities include conducting technical reviews, organizing strategic and operational assessments, developing and applying quantitative models, evaluating alternatives, and communicating results to a variety of internal and external stakeholders. Recommendations are intended to identify factors, opportunities, and trends with the potential to impact the Laboratory and to develop options, mitigations, and strategies. He brings an extensive program execution perspective to his position, having previously served in a variety of technical management and scientific roles at the Laboratory.

Conaway has more than 33 years of experience at the Laboratory, joining LLNL as a staff scientist in November 1986. Prior to his appointment as Director of Planning, Analysis, and Evaluation, he served as a deputy program manager responsible for applying the Laboratory's technical capabilities to address current, high-priority challenges facing the intelligence, military, and foreign policy communities. His professional experience includes representing the Laboratory on temporary duty assignments in Washington, D.C., at the U.S. Department of Energy, the National Nuclear Security Administration, and other federal agencies.

Conaway earned a B.S. in chemistry from Case Western Reserve University in 1982 and a Ph.D. in physical chemistry from Stanford University in 1987.

Dr. Peter K. Dorhout

Vice President for Research
Kansas State University



Dr. Peter K. Dorhout serves as Professor of Chemistry and Vice President for Research at Kansas State University, where he had also served four years as dean of the College of Arts & Sciences. Prior to coming to Kansas State in 2011, he served as the Interim

Provost at Colorado State University-Pueblo, preceded by 20 years at Colorado State University-Fort Collins as Vice Provost for Graduate Studies, Assistant Vice President for Research, and Professor of Chemistry. He has served as a collaborator at Los Alamos National Laboratory since 1987. He has led professional organizations and foundations as a member of the Boards of Directors for the American Chemical Society, where he was the 2018 President; the Research Corporation for Science Advancement; the Kansas State University Research Foundation; Colorado Nanotechnology Alliance; and the Coronado Council BSA Executive Board.

He is a recognized expert in solid state and nuclear materials science and environmental chemistry. He has had active research programs in solid-state f-element and radiochemistry, and nanomaterials science. He has published more than 120 peer-reviewed journal articles, book chapters, and reviews, and has presented more than 130 international and national invited lectures on his chemistry. Dr. Dorhout earned a bachelor's degree in chemistry from the University of Illinois at Urbana-Champaign and a doctorate in inorganic chemistry from the University of Wisconsin-Madison. His list of professional awards includes Fellow of the American Chemical Society, Fellow of the American Association for the Advancement of Science, Research Corporation Cottrell Scholar, Camille Dreyfus Teacher-Scholar,

A. P. Sloan Foundation Fellow, National Science Foundation CAREER Fellow, and the ACS-ExxonMobil Faculty Award in Solid State Chemistry.

Ms. Michele Fite

Chief Commercial Officer
Motif FoodWorks, Inc.



Formerly President of Kerry's Dairy and Culinary segment, Michele brings nearly 30 years of diverse experience across food and consumer goods, including infant formula, weight management, sports nutrition, medical foods and dietary supplements.

She has held leadership roles at a number of companies, including DuPont, Solae and Nestle. Fite was the founding CEO at Cadena BioSciences, a start-up focused on gut microbiomes. Michele has deep, proven experience heading global strategy, planning, operations and P&L responsibility for multi-billion-dollar portfolios.

Dr. Alex Fowler

Associate Provost for Research and Economic Development
University of Massachusetts Dartmouth



Dr. Fowler joined the faculty at UMass Dartmouth in 1994, where he received tenure in 2000 and was promoted to Professor of Mechanical Engineering in 2007. During that time, he also served as a Research Fellow in the Department of Surgery at Harvard

Medical School and as a Faculty Affiliate for the Center for Engineering in Medicine at Massachusetts General Hospital.

His prior administrative experience includes serving as Chairperson of Mechanical Engineering, as the founding director of the Biomedical Engineering and Biotechnology Ph.D. program, as Associate Provost for Graduate Studies and as Associate Provost for Graduate Studies and Research Development.

Dr. Fowler also served brief periods as the Interim Provost and Vice Chancellor for Academic and Student Affairs and as Interim Director of the Advanced Technology and Manufacturing Center.

Mr. Joseph K. Goodwin

Senior Vice President, Public Policy Executive I
Bank of America



After graduating college in 2001, Joe joined the U.S. Army in the days following 9/11. After training, he spent time deployed in Iraq and Afghanistan and was awarded the bronze star for exemplary performance in combat. Between military tours, Goodwin was selected

to join the General Electric Company's elite Junior Officer Leadership Program (JOLP). Goodwin is a recent graduate of Harvard Law School. He ran for the Massachusetts State Senate seat that opened as a result of Susan Fargo's retirement. He is the son of Pulitzer Prize-winning presidential historian Doris Kearns Goodwin and presidential advisor and speechwriter Richard N. Goodwin. He received a Doctorate in Law from Harvard in 2013 and a BA from Harvard in History and Literature in 2001.

Mr. Stuart Hadley

Associate Vice President and Deputy Chief of Staff
Arizona State University



Prior to his current position, Stuart Hadley was the Assistant Vice President for Policy Affairs and Executive Director of Federal Relations. For the Office of Policy Affairs, he was charged with coordinating and managing ASU's relationships with various national

organizations and represents President Crow when needed at national organization events. He was ASU's registered lobbyist with the U.S. House and Senate and was in charge of ASU's Hill advocacy efforts and assists in facilitating ASU specific initia-

tives for both authorization and appropriations processes. He also helps coordinate ASU's approach to various federal agencies.

He received education from Iowa State University and Arizona State University

Mr. William Haldeman

Senior Assistant to the President
University of Minnesota



Mr. Jovan N. Jovanovic

Founding Partner
The Watson IP Group, PLC



Jovan N. Jovanovic is a founding partner of the Watson IP Group. He focuses his practice on U.S. and International patent, trademark, copyright and unfair competition matters. His practice is heavily involved with patent and trademark portfolio management

and development, risk assessment and mitigation, and serving as outside general counsel. For more than 25 years, Mr. Jovanovic has prosecuted patents and trademarks in the United States and directed prosecution internationally. Additionally, Mr. Jovanovic is actively involved in litigation matters, post grant procedures and opposition/cancellation matters.

Mr. Jovanovic holds a law degree (JD) from the University of Illinois, College of Law (1994), and a B.S. in Mechanical Engineering from the University of Illinois, Urbana-Champaign (1991). He is admitted to practice law in Illinois and Michigan. Additionally, he is a registered patent attorney, admitted to practice before the U.S. Patent and Trademark Office.

Mr. Jovanovic has appeared as lead counsel in a number of courts throughout the United States, and is admitted to the Court of Appeals for the Federal Circuit, as well as the Northern District of Illinois (trial bar), the Western District of Michigan and the Eastern District of Michigan.

He is a frequent speaker, both in the United States and internationally, on topics of interest in intellectual property. Most recently, Mr. Jovanovic spoke in Dubai at two different IP conferences and in San Francisco at a Venture Capital event. Mr. Jovanovic is also an advisor to ACRE Ag Tech.

Mr. Jovanovic is fluent in several languages of the Former Yugoslavia (Serbian, Croatian, Bosnian and Montenegrin), and has a working knowledge and understanding of the Spanish language.

Mr. Raaj Kurapati

Executive Vice President for Business and Finance, and Chief Financial Officer
University of Memphis



Mr. Kurapati is Executive Vice President for Business and Finance and Chief Financial Officer at the University of Memphis. Before joining the University of Memphis, Raaj Kurapati previously held the positions of Vice President for Finance and Chief Financial Officer for Texas A&M University—Kingsville and Associate Vice Chancellor for Financial Services and Business Operations for the University of Alaska in Fairbanks. He also served as Vice President & Chief Financial/Compliance Officer/Vice President & Chief Internal Auditor for the Bank of FSM in Pohnpei, Micronesia, and Senior Auditor for Deloitte & Touche in Saipan and Guam/Micronesia.

Kurapati earned his bachelor of business administration (BBA) from East Texas Baptist University with a concentration in management and accounting. He is an accredited investment fiduciary, as well as an accredited investment fiduciary analyst, and serves on various finance and education boards.

Mr. Don Medley

Head of Government and Community Relations
Lawrence Berkeley National Laboratory



Don Medley has more than 25 years of experience in federal government relations with a particular focus on research and development funding and strategic program development. As the senior government and community relations official at

Lawrence Berkeley National Lab, Don manages a great team focused on local, state and federal government issues, community relations, and K-12 STEM education programs. He is the Lab's main liaison to the U.S. Congress and other key policymaking entities. Don earned his undergraduate degree from the University of Alabama and received a Master of Arts in Law and Diplomacy from the Fletcher School of Law and Diplomacy at Tufts University.

Dr. Prasant Mohapatra

Vice Chancellor for Research
University of California, Davis



Dr. Prasant Mohapatra is serving as the Vice Chancellor for Research at University of California, Davis. He is also a Distinguished Professor of Computer Science. He served as the Dean and Vice-Provost of Graduate Studies at the University of California, Davis during 2016-18, Associate Chancellor during 2014-16, and the Interim Vice-Provost and CIO of UC Davis during 2013-14. He was the Department Chair of Computer Science during 2007-13, and held the Tim Bucher Family Endowed Chair Professorship during that period.

In the past, Dr. Mohapatra has been on the faculty at Iowa State University and Michigan State University. He has also held Visiting Scientist positions at Intel Corporation, Panasonic Technologies, Insti-

tute of Infocomm Research (I2R), Singapore, and National ICT Australia (NICTA). He has been a Visiting Professor at the University of Padova, Italy, and Yonsei University, and KAIST, South Korea.

Dr. Mohapatra was the Editor-in-Chief of the *IEEE Transactions on Mobile Computing*. He has served on the editorial board of the *IEEE Transactions on Computers*, *IEEE Transactions on Mobile Computing*, *IEEE Transaction on Parallel and Distributed Systems*, ACM WINET, and Ad Hoc Networks. He has served as the Program Chair and the General Chair and has been on the program/organizational committees of several international conferences. He has been a Guest Editor for IEEE Network, *IEEE Transactions on Mobile Computing*, *IEEE Communications*, *IEEE Wireless Communications*, and the IEEE Computer.

Dr. Mohapatra received his doctoral degree from Penn State University in 1993 and received an Outstanding Engineering Alumni Award in 2008. He is a recipient of the Distinguished Alumnus Award from the National Institute of Technology, Rourkela, India. He also received the Lifetime Scientific Excellence Award from the State of Odisha, India.

Dr. Mohapatra received an Outstanding Research Faculty Award from the College of Engineering at the University of California, Davis. He received the HP Labs Innovation awards in 2011, 2012 and 2013. He is a Fellow of the IEEE and a Fellow of AAAS.

Dr. Mohapatra's research interests are in the areas of wireless networks, mobile communications, cybersecurity, and internet protocols. He has published more than 350 papers for reputed conferences and journals on these topics. Dr. Mohapatra's research has been funded through grants from the National Science Foundation, the U.S. Department of Defense, U.S. Army Research Labs, Intel Corporation, Siemens, Panasonic Technologies, Hewlett Packard, Raytheon, ARM Research, and EMC Corporation.

Mr. Greg Pellegrino

Principal, Customer & Marketing Strategy
Deloitte Consulting LLP



Greg Pellegrino designs breakthrough business strategies for public sector clients and for private industry entering and operating in the public sector. Leaders from Capitol Hill to the global C-Suite know Greg as a business innovator and seek out his creative insights to address persistent and emerging challenges, from national security to economic competitiveness.

Greg is a Customer Strategy & Applied Design Principal at Deloitte Consulting, LLP, and serves as the Lead Client Service Principal responsible for Deloitte's relationships with the U.S. Department of Veterans Affairs (VA) and the White House. Greg is also leader of the Government & Public Service industry election planning and government relations liaison to Deloitte's Policy & Government Relations office in Washington, D.C. With more than 35 years working with clients in government and private industry, his roles include responsibility for business operations, client delivery and business performance. He focuses on helping his clients navigate complexity, boost performance and anticipate change.

Greg's work shifts paradigms, driving performance improvements with models that break the mold and answering uncertainty with entrepreneurial endeavor. He has led large-scale, system-wide transformation efforts in critical areas such as public safety, cybersecurity, transportation, and counter-terrorism. Greg helped to redesign and consolidate the civil aviation security systems for the U.S. government after 9/11, and his team was also tasked with leading the creation of the web portal for the U.S. Department of Homeland Security.

In 2016, Greg led a team serving the VA in an effort to create a Chief Veteran Experience Office, along with the accompanying strategy to transform the VA to become more veteran-centric through improved veteran customer experiences.

Throughout his career, Greg has demonstrated a rare ability to take a strategic, systems-based approach to big, complex issues in order to mitigate risk, improve governance and break new ground. He has helped to remodel highway and motor-vehicle transportation systems across the nation to shorten wait times and save human lives. His contribution to the overhaul of the national organ transplantation system received the prestigious Smithsonian Award for the application of technology to the public sector. A coalition of leading philanthropists engaged Greg to develop a strategy for community-based approaches to safe drinking water. He was also a pioneer in early efforts at e-government and helped to bring the nation's classrooms online.

Greg has earned a deep appreciation for the dynamics of the public sector, the opportunities it presents and the resilience it requires. He has written widely on the theme, advising companies and governments around the world on political and economic shifts. As Chairman of the Board of Directors of the Homeland Security and Defense Business Council, Greg helped strengthen the role of private industry in meeting the needs for national security and disaster response; and for the Council for Excellence in Government, he co-chaired a group for the U.S. Department of Homeland Security to look at privacy and security issues from the citizen's perspective. He has also played a key role in establishing Deloitte's own presence in the federal market.

As a leader, Greg takes a collaborative, consensus-driven approach, always challenging teams to get beyond polarizing issues so they can focus on the choices they have to make. He attracts and mentors high potential, diverse professionals who seek to create their own impact on the market and the world.

Greg has advised both business and governments on how to gain advantage from changing talent demographics and presented his research on the economics of women in the workforce at such places as Harvard University and the United Nations.

He always challenges the teams he leads as well as the clients he serves to define the leading edge and create what's next.

Mr. Jeff Peoples

Senior Vice President of Employee Services and Labor Relations, Alabama Power;

Executive Vice President, Chief Administrative Officer and AGL Services President, Southern Company Gas; and

Senior Vice President of Operations Services, Southern Company



Jeff Peoples is senior vice president of Employee Services and Labor Relations for Alabama Power. Peoples also serves as executive vice president, chief administrative officer and AGL Services president for Southern Company Gas and senior vice president of Operations Services for Southern Company. In addition, Peoples provides leadership for West Region Human Resources at Southern Company, which includes Alabama Power, Mississippi Power, Southern Power and Southern Company's Operations organization.

At Alabama Power, Peoples is responsible for labor relations, safety, wellness, health and disability management functions and delivery of human resources products and services to Alabama Power employees. At Southern Company Gas, he is responsible for labor relations, environmental health and safety, technical training and corporate services. In his role with Operations Services, Peoples is responsible for Southern Company's Safety and Health Council, human performance and the industrial and contract relations organizations. In addition, Peoples leads Southern Company system efforts for labor relations, safety, and Power Delivery and Generation technical training.

Peoples began his career with Southern Company in 1984 as a chemical technician at Alabama Power's Plant Miller. He progressed through a number of positions of increasing responsibility in the areas of compliance, human resources, training, workforce development and technical field services. In 2017, Peoples facilitated the negotiation of a national labor agreement between North America's Building Trades

Union and local contractors. The agreement provides favorable working conditions, significantly increases opportunities to build political capital with national labor partners and allows for stronger governance at the local level with state labor leaders and contractors. In 2018, Peoples became a founding member of the Alabama Power Council on Culture and Inclusion, which focuses on strengthening a workplace environment of inclusion, respect and fairness, leveraging the diverse talents of all employees.

Peoples serves on the board of directors for the Alabama Power Foundation, the Southern Company Gas Charitable Foundation, Southeast Labor and Management Public Affairs Committee, the National Utility Industry Training Fund, CPWR—the Center for Construction Research and Training, and the Alabama Governor’s Labor-Management Conference. He continues to serve as a leader on the Alabama Power Council on Culture and Inclusion.

Peoples holds a bachelor’s degree in chemistry and biological science from Lee University in Cleveland, Tennessee. He and his wife, Rhoda, live in Hoover, Alabama. They have two daughters, Katelyn and Caroline.

Mr. Toby Redshaw

SVP, Enterprise Innovation & 5G Solutions
Verizon



Toby Redshaw is a global IT business transformation leader who impacts P&L and improves business process and performance across multiple industries. He is known for driving competitive advantage through innovative, real-world IT strategy and speed-of-execution in high growth, high service, and high technology environments. With expertise in modernizing IT and driving innovation across large scale, complex, global channel and retail environments, he consistently demonstrates that transformation anchored in technology creates sustainable growth. Toby’s business and operational expertise includes hands-on M&A, acquisition integration,

multi-billion dollar procurement, risk and regulatory, eCommerce/marketing leadership, product development leadership at the enterprise and start-up levels, and venture capital/Silicon Valley experience.

Ms. Mary Remmler

Vice President for Strategic Planning and Analysis
University of Delaware



Currently, at the University of Delaware, Remmler works with President and Vice Presidents to implement the goals and objectives as outlined in the Strategic Plan. She also oversees the Office of Institutional Research and Effectiveness (OIRE), which is responsible for supporting executive decision-making and university planning by providing the president, provost, senior administrators and deans with timely information and data analysis. In addition, OIRE provides a variety of statistical information, such as reports and data about the university.

At Stony Brook University, Remmler oversaw the fiscal operations and financial planning of academic affairs. She was responsible for developing, reviewing and managing multiple budgets, advised the provost on fiscal policy matters and worked closely with the provost and deans on preparation of the annual and long-term budgets in collaboration with the university’s central budget office. She was also responsible for analyzing financial, enrollment and other planning data to track progress toward the institution’s strategic objectives.

Remmler worked at Stony Brook since 1990, when she was first hired as an instructional support technician in the Pulmonary Division of the School of Medicine. After serving as assistant to the chief in the Pulmonary Division, she became assistant dean of biological sciences in 1994 and then assistant dean for operations in the College of Arts and Sciences in 1996. She joined the Provost’s Office in 1997.

At Stony Brook, she chaired and served on numerous committees, including committees on campus information security and on implementation of the campus budget model, among others. She served on the Provost's Advisory Group, a senior leadership team focused on strategic planning within Academic Affairs, and a number of committees associated with the Project 50 Forward Operational Excellence initiative, which aimed at supporting the university's future growth through administrative efficiency and incentivizing academic entrepreneurship.

Remmler holds an undergraduate degree in history and a master of science degree in management and policy, all from Stony Brook University.

Dr. Sara T. Rosen

Dean, College of Arts & Sciences
Georgia State University



Sara T. Rosen, Ph.D., is dean of the College of Arts & Sciences and professor of applied linguistics at Georgia State University. Dr. Rosen's career in academic leadership began at the University of Kansas, where she served as chair of the Department of

Linguistics (2000–2007), dean of graduate studies (2007–2011), senior vice provost of academic affairs (2011–2016), and interim provost and executive vice chancellor (2016) before coming to Georgia State in August 2016. As an academic leader, Dr. Rosen is known for promoting innovation in strategic planning and implementation, academic program review, student support and administrative services, career preparation, undergraduate curriculum reform, graduate education, supporting growth of impactful research across the disciplines, and diversity and equity initiatives.

At Georgia State, Rosen has led the College of Arts & Sciences through organizational change in the dean's office to support strategic direction and faculty development, developed a comprehensive five-year strategic plan, and launched corporate partnerships to enhance student experiential learning opportunities.

Rosen earned her bachelor's and master's degrees from the University of North Carolina at Chapel Hill. She holds a Ph.D. in linguistics and cognitive science from Brandeis University.

Her primary research is in theoretical syntax, focusing on the clausal functional architecture and its contribution to argument and event interpretation. Her most recent work has been on the inflectional agreement patterns and the structure of the verb phrase and noun phrase across diverse languages, but particularly in Blackfoot, a Plains Algonquian language spoken in northern Montana and southern Alberta.

Dr. John Sarrao

Deputy Director—Science, Technology & Engineering,
and Chief Research Officer
Los Alamos National Laboratory



John Sarrao serves as the Deputy Director—Science, Technology, and Engineering, and Chief Research Officer at Los Alamos National Laboratory (LANL). He leads the Laboratory's mission and enabling science, technology, and engineering capabilities. DDSTE spans

the Laboratory's directorates for Chemistry, Earth & Life Sciences, Global Security, Physical Sciences, and Simulation and Computation. John also has programmatic responsibility for LANL's global security (non-proliferation, counter-proliferation, emerging threats), DOE-Office of Science, and applied energy programs. John stewards LANL's Laboratory Directed Research & Development (LDRD) program and other institutional capability initiatives, including the Laboratory's student and post-doc programs.

Previously, John was the Principal Associate Director for Science, Technology, and Engineering (PADSTE) at LANL, leading the Laboratory's STE capabilities in supporting the Laboratory's national security mission, and prior to PADSTE, was Associate Director for Theory, Simulation, and Computation.

John has also held a number of leadership positions within LANL's materials community. His primary research interest is in the synthesis and characterization of correlated electron systems, especially actinide materials.

John was the 2013 winner of the Department of Energy's E.O. Lawrence Award and is a Fellow of the American Association for the Advancement of Science (AAAS), the American Physical Society (APS), and Los Alamos National Laboratory.

John's personal research and technical leadership career has emphasized national security science from plutonium physics research to advanced materials design and discovery to stewarding LANL's high performance computing resources and simulation capabilities.

John received a Ph.D. in physics from the University of California, Los Angeles, based on thesis work performed at LANL. He also has a M.S. in physics from the University of California, Los Angeles, and a B.S. in physics from Stanford University.

Dr. Lawrence C. Schuette

Director of Global Science and Technology Engagement
Lockheed Martin



Dr. Lawrence C. Schuette currently serves as the Director of Global Science and Technology. He joined Lockheed Martin on September 11, 2017, as the Director of Global Science and Technology Engagement. In this position, Dr. Schuette is respon-

sible for creating and utilizing a global network of technical relationships to enhance Lockheed Martin's engagement in the worldwide science, technology and innovation ecosystems, transition advanced technology into the corporation, and accelerate customer technology adoption to create new and disruptive mission capabilities.

Dr. Schuette joined Lockheed Martin after 33 years of federal service in the U.S. Departments of Defense and Health and Human Services, the last ten as a member of the Senior Executive Service. Most recently, he was the Director of Research (DOR) at the Office of Naval Research (ONR), where he led the Discovery and Invention portfolio for the U.S. Navy and U.S. Marine Corps. In this capacity, he led a \$1B/year investment portfolio of basic and applied research and sponsored research in academia, government and industry labs in the United States and across the globe. He also served as the Science, Technology, Engineering and Math (STEM) Director for the Department of the Navy, providing leadership and management of the department's STEM investment. Prior to this role, he was the Director of Innovation at ONR, where he successfully delivered high-payoff game-changing technology for the warfighter through management of the Navy's high-risk science and technology portfolio.

He earned a bachelor's degree, master's degree and a doctorate in Electrical Engineering from Catholic University of America and is a 2009 Seminar XXI Fellow from the MIT Center for International Studies.

His awards include the Secretary of Defense's award for Exceptional Civilian Service, the Department of the Navy Distinguished Civilian Service Award, the Department of the Navy Superior Civilian Service Award, the Department of the Navy Meritorious Civilian Service Award, the Naval Unit Commendation, the Naval Meritorious Unit Commendation and the American Red Cross Certificate of Extraordinary Personal Action.

Dr. Edward Seidel

Vice President for Economic Development
and Innovation
University of Illinois System



Edward Seidel is the Vice President for Economic Development and Innovation for the University of Illinois System. The System is the state's largest and most comprehensive public university system, with universities in Urbana-Champaign, Chicago, and

Springfield. The System's three universities offer more than 500 academic programs to more than 80,000 students. The System's interactions with state, federal and local governments, and the private sector are significant and diverse. It is a \$5.6B enterprise, with an economic impact of almost \$14B annually, and a sponsored research portfolio of nearly \$1B.

As Vice President for Economic Development and Innovation, Dr. Seidel works closely with the president of the System to engage potential public and private partners and strengthen the links between higher education, research, and business to drive innovation and stimulate economic development across the state of Illinois. He oversees the System's commercialization pipeline that helps bring ideas to market, which includes the Offices of Technology Management at Urbana-Champaign and Chicago; the early-stage technology investment firm, IllinoisVENTURES; EnterpriseWorks, the business incubator in Urbana-Champaign; and the U of I Research Park.

Seidel is an award-winning researcher with a long record of leadership experience that includes three years as director of the National Center for Supercomputing Applications in Urbana-Champaign, where he was among the original co-principal investigators for Blue Waters, a federally funded project that brought one of the world's most powerful supercomputers to Urbana-Champaign. He is also a Founder

Professor in the Department of Physics and a professor in the Departments of Astronomy and Computer Science, and at the Institute for Sustainability, Energy, and Environment (iSEE) at Urbana-Champaign.

Prior to returning to the University of Illinois, Seidel served as the senior vice president for research and innovation for the MIT Skoltech Initiative at the Skolkovo Institute of Science and Technology in Moscow. Previously, he directed the Office of Cyberinfrastructure and served as assistant director for Mathematical and Physical Sciences at the U.S. National Science Foundation. He also led the Center for Computation and Technology at Louisiana State University and directed the numerical relativity group at the Max Planck Institute for Gravitational Physics (Albert Einstein Institute) in Germany.

Seidel is a fellow of the American Physical Society and of the American Association for the Advancement of Science, as well as a member of the Institute of Electrical and Electronics Engineers (IEEE) and the Society for Industrial and Applied Mathematics. His research has earned a number of awards, including the 2006 IEEE Sidney Fernbach Award, the Association for Computing Machinery's Gordon Bell prize, and the Heinz Billing Prize of the Max Planck Society. He received his Ph.D. in relativistic astrophysics from Yale University, earned a master's degree in physics at the University of Pennsylvania, and received a bachelor's degree in mathematics and physics from the College of William and Mary.

Dr. Rodolfo H. Torres

Vice Chancellor for Research and Economic Development
University of California, Riverside



Rodolfo H. Torres is the Vice Chancellor for Research and Economic Development at the University of California, Riverside (UCR). Before arriving to UCR in 2019, he was University Distinguished Professor of Mathematics at the University of Kansas

(KU), where he served for more than six years in the Office of Research—first as Associate Vice Chancellor and then as Interim Vice Chancellor for Research and President of the Kansas University Center for Research Inc. (KUCR). He is also a former Faculty Senate President at KU. He is currently co-chair of the Human Resources Advisory Committee and a member of the Board of Trustees of the Mathematical Sciences Research Institute (MSRI), Berkeley, California; and member of the Board of Directors of the Institute for Research on Innovation in Science (IRIS), Ann Arbor, Michigan. Torres did his undergraduate studies at the Universidad Nacional de Rosario, Argentina, received his Ph.D. in Mathematics from Washington University in St. Louis, and held postdoctoral positions at the Courant Institute of Mathematical Sciences of New York University and the University of Michigan, Ann Arbor, before moving to KU.

Torres' research interests include Fourier analysis and its applications in partial differential equations, signal analysis, and biology. He specializes in the study of singular integrals, function spaces, and decomposition techniques and is most recognized for his work with various collaborators on several foundational aspects of the multilinear Calderón-Zygmund theory. Torres has collaborated with biologists to explain structural coloration phenomena in the tissues of animals, a work that received considerable scientific media attention, including articles in *The New York Times*, *Science Magazine*, and Discovery Channel online. In addition, he recently collaborated with an economist and computer scientists on the

use of machine learning techniques to automatize an award classification process related to the Higher Education Research and Development Survey (HERD) collected annually by the National Science Foundation (NSF). Torres' research has been supported by grants from the NSF, and he has given numerous lectures and taught short courses around the world. He has also received several awards for his efforts with students, including a Kemper Foundation Excellence in Teaching Award. In 2013, Torres was elected to the inaugural class of Fellows of the American Mathematical Society (AMS); in 2017, he was featured in the Lathisms Calendar of Latinxs and Hispanics in Mathematical Sciences and the AMS; and in 2019, he presented a Congressional Briefing, invited by the AMS and the MSRI.

Dr. Marianne Walck

Deputy Laboratory Director for Science and Technology, and Chief Research Officer
Idaho National Laboratory



Dr. Marianne Walck provides strategic leadership, direction and integration for research, science and technology at Idaho National Laboratory in her role as deputy lab director for Science and Technology and Chief Research Officer. Formerly vice president of Sandia National Laboratories' California laboratory, she has more than 25 years of DOE national laboratory technical leadership experience, including technical program leadership; research leadership; and line, personnel and site management. As vice president of Sandia's California laboratory, Dr. Walck was responsible for principal programs including nuclear weapons stewardship; homeland security with a focus on defending against weapons of mass destruction; combustion, transportation and hydrogen energy research; biology; and advanced computational and information systems. Dr. Walck also served as vice president in charge of Sandia's Energy and Climate Program, which encompasses a wide variety of energy technology programs, including renewable energy systems and energy infrastruc-

ture, climate and engineered systems, fossil energy, nuclear and fuel cycle, and transportation energy systems. Earlier, she held a variety of research and management positions at Sandia. She served on the Sandia Research Leadership Team; created and led the Geoscience Research Foundation; was director of the Geoscience, Climate and Consequence Effects Center; and was director of the Nuclear Energy and Global Security Technologies Center.

Dr. Walck serves on several advisory boards for universities and technical institutes, including the Texas A&M Energy Institute, and is a Senior Fellow of the California Council on Science and Technology. She holds memberships in the American Geophysical Union, the Seismological Society of America, the Association for Women Geoscientists, the American Nuclear Society, and the American Association for the Advancement of Science. She earned Ph.D. and M.S. degrees in geophysics from the California Institute of Technology and a bachelor's degree in geology/physics from Hope College.

She and her husband have two sons. She volunteers as a mentor, and enjoys judging student science fairs and performing as a violinist in community orchestras.

Mr. Brian Wall

Associate Vice President for Research, Innovation & Economic Impact
Oregon State University



Brian is OSU's Associate Vice President for Research, Innovation, and Economic Impact. In this role, he oversees the OSU Advantage initiative, a leading resource and steward for creating a strategic innovation economy in Oregon and beyond. He provides strategic leadership and directs operational oversight for innovation and entrepreneurship, intellectual property licensing and corporate agreements for Oregon State University's research enterprise.

Brian also chairs the OSU Venture Development Fund Advisory Council. Over the past nine years, he has worked collaboratively with the OSU Foundation to raise more than \$6M in gap funding and supported 35+ projects inside and outside of OSU.

Previously, he led the Office for Commercialization and Corporate Development (OCCD) at OSU, as well as holding numerous other roles since 2001. He created OSU's first equity policy, negotiated OSU's first equity license, built a team whose agreements have quadrupled license revenue in the past ten years and another team who have completed agreements generating tens of millions in research, implementing national best practices throughout the office. He also co-developed and launched OSU's Accelerator as its first Interim Co-Director, bringing ideas to market by connecting innovators and entrepreneurs to the resources they need for success. In 2013, *Entrepreneur* named Corvallis as one of the top five best cities for entrepreneurs, citing the OCCD as a driver.

Brian has a passion for maximizing OSU's innovation and economic impact through educational programs, start-up commercialization and industry engagement.

Launch Conference Participant Bios

Outreach and Engagement Committee

Ms. Diane Brown

Vice President, Global Business Operations
Verizon Business Group.



Diane is an accomplished executive with extensive experience in leading global operations for Verizon Business Group, a \$32B business unit within Verizon.

Ms. Brown's achievements span across 30 years at Verizon, and she has delivered proven success

in leading cross-functional teams of executives to drive breakthrough results and strategic transformation in operations across all business segments. She gained expertise in B2B sales, marketing and operations across the SMB, Public Sector and Enterprise Markets. During her tenure at Verizon, Diane has served as a thought leader and advised C-level executives during pivotal moments of strategic transformation. As an effective communicator across all levels of the organization, she demonstrates the ability to listen and respond to a wide variety of stakeholders to build trust, cultivate effective strategic relationships across lines of difference and conflict, and bring people together to operate in an efficient way in pursuit of Verizon's mission. Since joining Verizon, Diane has accumulated 19 years of Director-level and above experience in a variety of positions, including Sales Leadership, Segment Marketing, Marketing Operations, Business Intelligence and Analytics, and Global Operations.

In her current role, Diane is leading the Verizon

Business Group Global Business Operations team. Her responsibilities include Global Sales Operations across all B2B Business Units (SMB, Large Enterprise and Public Sector), Global CRM and Sales Technology and Automation, Global Strategic Customer Segmentation, Business Transformation and Enablement, Global Sales Recognition Programs, and Customer Engagement.

Diane constantly fosters strong teamwork across the organization and has a strong ability to bring people together to work toward a common goal—dedicated to ensuring that the right people across the business are working and collaborating to produce the best outcomes. Diane's overall mission is to drive a culture of professionalism, financial discipline, success substantiated by measurable results, while managing customer growth and continuity across key business development initiatives.

Diane is dedicated to driving employee engagement initiatives, embracing diversity and inclusion and believes that a transparent organizational culture is the key to evolving Verizon's business model and processes to deliver value for customers and shareholders. She earned her Bachelor of Science in Marketing and Human Resource Management from the McIntire School of Commerce at the University of Virginia. In addition, she completed Project Management courses through George Washington University. Diane is an executive mentor in Verizon's Diverse Supplier Program, and she serves as the Executive Chair for the Northeast Boys & Girls Club Youth of the Year Gala.

Mr. Glenn Carter

Vice President for Marketing and Communications
University of Delaware



Glenn Carter currently serves as the Vice President for Communications and Marketing at the University of Delaware. Reporting directly to the President, he is responsible for the vision, implementation and management of the University's overarching communication operations, including a recent institution-wide rebranding initiative. In this capacity, he oversees an enterprise-wide team responsible for storytelling and content development, design, editorial, brand strategy, publicity, issues management, executive communications, media production, digital amplification and engagement.

Prior to his current position, Carter was at 3M Company in St. Paul, Minnesota, where he held several leadership positions in global marketing communications at the product, brand and corporate levels. Most recently, he was responsible for elevating external and internal visibility of design as a competitive global platform to strengthen 3M product quality, business growth, customer experience and brand reputation. Previous roles focused on enhancing 3M corporate brand awareness/relevance among target audiences, as well as division-level B2C and B2B strategic and creative communications responsibilities supporting and driving customer acquisition, retention, brand loyalty and sales. He earlier held

positions with the Abernathy MacGregor Group Inc., the Charles A. Dana Foundation and the Paley Center for Media. A cum laude graduate of Vanderbilt University with a degree in English, Carter earned his master of science degree in integrated marketing communications, with a specialty in corporate public relations, from Northwestern University.

Ms. Sarah Chilton
Governmental Affairs Specialist
Idaho National Laboratory

Ms. Mary Larson Diaz

Interim Vice President for University Relations
and Chief of Staff to the President
The University of Texas at San Antonio



Diaz served on the executive leadership teams at several of her past institutions, including the University of Missouri Kansas City (UMKC), where she was Chief of Staff from 2005–2007, and Texas Tech University, where she was Associate Vice President for External Relations and Chief Communications Officer from 2009–2012.

More recently, Diaz served as Special Assistant to the President for External Relations at The University of Alabama, and Vice President for Marketing and Communications at Baker University in Baldwin, Kansas. At earlier points in her career, Diaz worked as a special assistant to Kansas City's mayor (now

U.S. Congressman) Emanuel Cleaver, and in various community affairs roles at Kansas City Power & Light Company.

Currently Diaz is Vice President for Strategic Partnerships at Two West Advisors, a financial services firm in Overland Park, Kansas. Her work there involved assisting with the launch of their higher education division and developing partnerships with the National Association of Intercollegiate Athletics (NAIA) and statewide higher education associations.

Diaz's career distinctions include serving as the presidential representative on committees of the Association of Public and Land Grant Universities (APLU) and The Coalition for Urban Serving Universities. Her ability to build relationships within the university community and among local civic leadership has had impactful results, including the creation of Time to Get it Right, a strategic plan for UMKC's role as Kansas City's urban serving university.

While at UMKC, Diaz worked under Dr. Guy Bailey—UTSA's Provost from 1998–2005 and current president of The University of Texas Rio Grande Valley—where she first became familiar with UTSA.

Diaz holds a Masters of Science in Management from Baker University, and a Bachelor of Arts from Hastings College in Nebraska. She and her husband Paco Diaz have a 21-year old son, Ryan, who is attending college in Kansas City.

Mr. Paul Doucette

Executive Director of Government Relations
Battelle



Paul Doucette is Executive Director of Government Relations at Battelle, the world's largest nonprofit research and development organization. In addition to managing Battelle's government relations team and overseeing the operation of the Battelle Washington Office, he is responsible for issues related to the U.S. Department of Energy's Office of Science and the National Nuclear Security Administration, and

advises corporate leadership and the directors of the Battelle-affiliated national laboratories on relevant policy and budget matters.

Before joining Battelle in 2008, Paul was Legislative Director and science and technology advisor to U.S. Representative Judy Biggert (R-IL), a senior member of the House Science and Technology Committee, former chairman of its Energy Subcommittee during the 108th and 109th Congresses, and co-founder of the House Research and Development Caucus. In this capacity, Paul worked closely with senior scientists and management at Argonne National Laboratory—located in Biggert's district—to identify and advance the laboratory's legislative priorities.

Paul joined Biggert's staff in 1999 after serving as a legislative aide in the Washington, D.C., office of Illinois Governor Jim Edgar, where he was responsible for state-federal relations on energy and environmental issues. Originally from Rochester, Minnesota, and now residing in Alexandria, Virginia, Paul received a Bachelor of Science in Business and Public Administration in 1997 from Drake University, and now serves on its Board of Trustees.

Mr. Mark Harris

Director of External Engagements and Partnerships,
Discovery Partners Institute
University of Illinois, Chicago



Mark Harris is the director of external engagements and partnerships at the Discovery Partners Institute (DPI)—a collaborative institute led by the University of Illinois System striving to be a central hub for R&D and talent.

Previously, Mark served as president & CEO of the Illinois Science & Technology Coalition (ISTC), a member-driven nonprofit that measures, connects and advocates for the Illinois innovation community. He also led the creation and growth of the affiliated Illinois Science & Technology Institute (ISTI), which runs impactful education

programs that connect companies and universities with high school youth through research and problem-based learning.

Mark also served as deputy chief of staff for the State of Illinois, was an associate director for the Polsky Center for Entrepreneurship at the University of Chicago Booth School of Business, and served in senior positions at the Illinois Department of Commerce and Economic Opportunity (DCEO).

Mark holds a BS from the University of Illinois Urbana-Champaign and a MA from the University of Chicago. He serves on the board of Energy Foundry and the Albany Park Theater Company, is a founding member of the Steering Committee of the Illinois Business Immigration Coalition, and is a member of the Economic Club of Chicago.

Mark is also an adjunct lecturer at the University of Illinois-Chicago Department of Public Administration.

Dr. Pam Henderson

Founder and CEO
NewEdge, Inc.



Pam Henderson, Ph.D., is founder and CEO of NewEdge, Inc, a growth strategy and design firm strategizing in Opportunity Thinking to create growth opportunities for start-ups through to Fortune 500 companies. Pam pioneered Disruptive Market Research, a

unique approach to identifying opportunities for disruptive innovation.

Originally on the faculty at Carnegie Mellon University, Pam later worked with the national laboratory system and Washington State University to commercialize early stage technologies. She publishes widely on market insight, business and innovation strategy, and design and has received recognition in the *Harvard Business Review*, *Wall Street Journal* and NPR, and speaks internationally.

Pam lives with her husband, three children, and dogs in Washington State.

Ms. Sarah Higgins

Deputy Director of Government Relations
Argonne National Laboratory



Sarah Higgins is the Deputy Director of Government Relations at Argonne National Laboratory. Based in Washington, D.C., Sarah interacts with government agencies, congressional offices and committees and assists in the development of collaborations

between industries, universities and other organizations. Prior to joining Argonne, Sarah worked on Capitol Hill in the U.S. House of Representatives and the U.S. Senate as a senior advisor for appropriations, as well as science, technology and energy policy. She received a BA in Political Science and International Studies from Loyola University Chicago. In 2019, Sarah was selected to participate in the Strategic Laboratory Leadership Program at the University of Chicago Booth School of Business.

Mr. Rob Le Bras-Brown

Founder
MaisonLBB Consulting



Rob is the founder of MaisonLBB Consulting, working alongside CEOs in Europe and the United States to help develop their business strategy—delivering marketing leadership with a focus on brand purpose, positioning and narrative that informs emo-

tive storytelling, exceptional communications and brilliant creative.

Rob teaches a masterclass on marketing and is an advisor at The Refiners in San Francisco and The Camp in Aix-en-Provence. He is an angel investor to a number of start-ups he advises in Boston, Silicon Valley and Los Angeles.

Previously, Rob was a member of the leadership team of Nokia Technologies, a global leader in creating the technologies at the heart of the connected world. Rob led Nokia's consumer digital health business based in Paris as a product-focused General Manager responsible for all product marketing, engineering development, operations, sales and marketing, overseeing one of the broadest ranges of consumer-connected health devices. Prior to this, Rob was CMO of Nokia Technologies with responsibility for the overall marketing & design strategy.

Before joining Nokia, Rob was Global Head of Marketing, Digital Experience and Innovation for HP Inc., a \$50B+ business that includes 3D and 2D printers, graphics solutions, managed-print services, personal computers and workstations. Rob was responsible for global marketing of PCs and Print across consumer and commercial channels, leading a 600+ marketing team activating end-to-end programs in 100+ markets across all major brands. In addition, Rob led Customer Experience & Design developing ID, UI and UX across all print platforms.

Prior to joining HP, Rob was Vice President at PepsiCo in R&D and marketing, and before that, he was Vice President of Marketing at Revlon Cosmetics in New York City.

Rob studied Mechanical Engineering to Master's Level at Birmingham University in England and completed his post graduate studies in Advanced Design, Manufacture and Management at Cambridge University.

Rob holds numerous patents in functional utility and design. He works between Aix-en-Provence, New York, and San Francisco.

Ms. Sophia Magill

Director of Federal Relations, Office of the President
Iowa State University



Sophia Magill serves as Director of Federal Relations in the Office of the President at Iowa State University. She advocates on behalf of University priorities involving federally sponsored research and higher education policy, traveling regularly to from Ames to Wash-

ington, D.C.

Before joining the Office of the President in 2013, Sophia served as Special Assistant at the U.S. Agency for International Development's Bureau for Management in Washington, D.C. Sophia has professional experience in government, higher education, and the non-profit sector, including work in the Office of Admissions at Iowa State University, the Iowa House of Representatives, Iowa's Office of the Governor, and the White House.

She has an undergraduate degree in Political Science from Iowa State University, where she had the pleasure of serving as Student Body President. Sophia also holds a Master of Public Administration from the University of Illinois at Chicago. She is active in a variety of university and civic boards and organizations, holding a variety of leadership roles.

Sophia is Chair-Elect of the APLU Council on Government Affairs (CGA) and serves as the CGA Liaison to the Board on Human Science.

Ms. Katie Paquet

Vice President of Media Relations and Strategic Communications
Arizona State University



Katie Paquet is the Vice President of Media Relations and Strategic Communications at Arizona State University. She has responsibility for planning, developing and implementing strategies to further the awareness and appreciation of ASU with diverse constituencies

through a variety of mediums.

Prior to joining ASU, Paquet was the Vice President of Public Affairs and External Relations for the Arizona Board of Regents. She oversaw all communications and government relations activities for the board, serving as liaison with media, policymakers and the business, civic and educational community.

She previously held leadership positions with AT&T Inc., the Chicago-based public affairs firm Jasculca Terman and Associates, and the Office of the Illinois Lieutenant Governor. She graduated from DePaul University with a bachelor's degree in political science.

Dr. Sue Peterson

Chief Government Relations Officer, Assistant to the President
Kansas State University



Sue serves as Chief Government Relations Officer, Assistant to the President of Kansas State University. She has served in this capacity since 1989, moving to her alma mater from the Office of Kansas Governor Mike Hayden. In her role at K-State, Sue has direct

responsibility for all Kansas State University liaison activities with the Kansas Legislature, Kansas executive branch agencies and the Kansas Congressional delegation. As K-State's Director of Governmental

Relations, Sue works with the campus to establish K-State's state and federal legislative requests and priorities in consultation with the President.

Sue is a founding member of the Kansas Board of Regents Council on Governmental Relations. She also helped found the Big XII Council of Governmental Relations Officers. Sue serves as a member of the Association of Public and Land Grant Universities Council on Governmental Affairs (CGA), including three terms on the Executive Committee and two terms as Secretary. Sue also served as the Agriculture Authorization Team Lead and as a member of the Agriculture Committee on Legislative Planning, which provides recommendations to Congress for upcoming Farm Bills. In 2012, Sue was awarded the Marvin D. "Swede" Johnson Achievement Award, which is administered by the AACC, AASCU, APLU and CASE.

Since the fall of 1992, Sue has served as an instructor in the Kansas State University Political Science Department.

Sue earned a Bachelor of Science degree from Kansas State University, a Masters in Public Administration from the University of Kansas, and a Doctor of Philosophy from Kansas State University.

Sue is married to Charlie, Senior Associate Athletic Director for K-State. They reside in Manhattan.

Dr. Melanie Roberts

Director of State and Regional Affairs
Pacific Northwest National Laboratory



Melanie joined Pacific Northwest National Laboratory (PNNL) in 2018 as director of state and regional affairs. She interfaces with state government, associations, and other partners to boost regional leadership in science, technology, engineering, and mathematics (STEM) research, education, and innovation and to identify opportunities for the region to help advance PNNL's mission.

Roberts began her career as a scientist. However, she soon transitioned to policy after being awarded a science and technology policy fellowship by the American Association for the Advancement of Science (AAAS) to work in the U.S. Senate and the National Science Foundation. During the last decade, Roberts has helped scientists and engineers collaborate across disciplines and sectors to tackle complex challenges. She founded and directed an AAAS-hosted national leadership program that recruited teams of graduate students to address issues in their communities. She also spent time as assistant director of the BioFrontiers Institute at the University of Colorado and as an independent consultant.

Roberts has served on numerous advisory committees, including the Committee on Graduate STEM Education for the 21st Century at the National Academy of Sciences. She is a 2018 graduate of Leadership Tomorrow, a program that cultivates civic leaders in the Puget Sound region.

Roberts earned her Ph.D. in neuroscience from the University of Washington.

Ms. Gabrielle Serra

Director of Federal Affairs, Government Relations
Oregon State University



Gabrielle Serra joined Oregon State University's Government Relations team in fall of 2014 to serve as Director of Federal Affairs. In her role, Gabrielle works with the administration and federal agencies and federal legislators, as well as national partner organizations.

Her focus is to engage federal policy makers and program officials on issues and opportunities important to the success and potential of OSU and our community, including priorities ranging from student access, fundamental and applied research, to outreach and extension.

Gabrielle brings more than a decade of experience working with the federal government in Washington, D.C. She began her career with the U.S. Department of Agriculture, where she served for nearly

seven years in several capacities related to federal food and nutrition policy. She focused primarily on child nutrition program and policy development. Her tenure with the USDA culminated in a year assignment serving as a policy advisor and special assistant to the Under Secretary of Food, Nutrition, and Consumer Services, with responsibilities related to administering the 15 federal nutrition programs and the Center for Nutrition Policy and Promotion, as well as engaging with the U.S. Congress and the administration. Gabrielle then went to the House of Representatives, where she served for the 111th Congress as a policy advisor to the Chairman of the Committee on Education and Labor. During this time, Gabrielle oversaw the development and enactment of comprehensive legislation authorizing the federal child nutrition programs. And, after leaving the Hill, Gabrielle oversaw federal government relations for a national non-profit organization focused on public health.

Originally from Florence, Oregon, Gabrielle graduated from OSU in 2003 with a degree in public health. She holds a master's degree in food policy and economics from Tufts University, the Friedman School of Nutrition Science and Policy.

Ms. Dana Topousis

Chief Marketing and Communications Officer,
Strategic Communications
University of California, Davis



Dana Topousis is chief marketing and communications officer at the University of California, Davis. She leads the Strategic Communications department for the Davis campus, including undergraduate admissions marketing, and oversees UC Davis Health Public

Affairs & Marketing on the Sacramento campus. She is a member of the Chancellor's Leadership Council.

In 2018, Dana's team was recognized with four national Circle of Excellence awards (one gold, two silver and one bronze) and 11 regional awards (six gold, three silver, two bronze) from the Council for Advancement and Support of Education (CASE).

Dana serves as chair of the Association of Public and Land-grant University's Council on Strategic Communications.

In her previous role leading public affairs at the National Science Foundation in Arlington, Va., Dana and her team launched and expanded a variety of science communication and social media platforms, created the agency's first free iPad app, and developed the agency's first public communications and media policy. She also accompanied journalists to Antarctica and participated in the launch of a \$200M research vessel.

She worked as the first communications director for the National Oceanic and Atmospheric Administration (NOAA) National Marine Protected Areas Center. She is proud to have served as a Peace-Corps volunteer in Kenya, where she worked with a microcredit organization in a small community outside Nairobi.

Dana earned her master's degree in writing from Johns Hopkins University and her bachelor's degree in business and communication from the College of St. Scholastica in Duluth, Minnesota.

Mr. Ted Townsend

Chief Economic Development and Government Relations Officer
University of Memphis



Ted Townsend joined The University of Memphis in 2018 as the first ever Chief Economic Development and Government Relations Officer and serves on the President's Council. Ted leads the University's economic development activities in Memphis and Jackson to include attracting and retaining university-area businesses that provide internship and workforce opportunities for students. He also oversees the University Neighborhoods Development Corporation, the UMRF Research Park and the Government Relations and Policy Division. In this role, Ted leads a team that is dedicated to the vibrancy and mission fulfillment of the university through business and policy development.

Ted previously served as Deputy Commissioner & Chief Operating Officer for the State of Tennessee Department of Economic and Community Development (TNECD), where he oversaw the department's day-to-day affairs. During his nearly seven years with the Haslam Administration, TNECD announced over 1,100 projects committing 155,000 new jobs backed by more than \$32B in private sector capital investment.

Prior to his becoming Chief Operating Officer, Ted was Assistant Commissioner of Strategy, where he provided management over multiple divisions to include Innovation, Small Business, Rural Development, Federal Programs and the department's Center for Economic Research in Tennessee (CERT). Governor Haslam appointed Ted as his board designee to the Delta Regional Authority and the Appalachian Regional Commission. Governor Haslam also appointed Ted as his proxy to the State Workforce Development Board where he served for two years in that capacity. Mr. Townsend also served the department as TNECD first Regional Director over the Greater Memphis Region.

Before joining TNECD, Ted was the co-founder and Chief Operating Officer of arGentis Pharmaceuticals, Inc., of Memphis, a privately-held bio-pharmaceutical company involved in the licensing, development and commercialization of therapies for auto-immune and ophthalmic diseases. During his tenure, the company successfully raised \$2M in capital from angel and institutional investors, obtained Orphan Drug Designation in the United States and EU, and assisted in the build-out of the company's international patent portfolio.

He is a proud graduate of the University of Memphis and was a member of Leadership Tennessee Class V and the Leadership Memphis Executive Program 2019. Ted presently serves on the board of directors of arGentis, as Secretary/Treasurer of the Economic Club of Memphis, the YMCA of Memphis & The Mid-South, Leadership Memphis, the Memphis Urban League Guild and is the current Chairman of the Board for Life Science Tennessee.

Launch Conference Participant Bios

Working Group 1: Developing & Deploying at Scale Disruptive Technologies

Dr. Ramprasad Balasubramanian

Associate Provost for Decision Support and Strategic Initiatives
University of Massachusetts Dartmouth



Dr. Ramprasad Balasubramanian (Ram Bala) is the Associate Provost for Decision Support and Strategic Initiatives at the University of Massachusetts Dartmouth. In his capacity, he is implementing evidence-based decision processes on all aspects of the

university operations from enrollment, retention, budget-allocation and program evaluations. He created and leads the University's Marine and UnderSea Technology (MUST) Research Program. MUST was created in collaboration with the Naval Undersea Warfare Center (NUWC), Newport, RI, in an effort to unify academic research and industry collaborations to meet the needs of the U.S. Navy. He has extensive academic administrative experience serving as an Associate Dean and Interim Dean of the College of Engineering at UMass Dartmouth, overseeing all aspects of academic administration and taking seven programs through ABET accreditation in the fall of 2016. He has built an externally-funded research program in excess of \$5M. His specializations include Artificial Intelligence, Computer Vision and Mobile Robotics. He specifically works on data visualization methods, decision support systems, pattern recognition, computer vision, autonomous systems, mobile robotics and multi-vehicle auton-

omy. He has worked on several externally funded projects focusing on integration of wireless sensors into decision-support systems, sensor processing, sensor fusion and autonomous underwater vehicles autonomy. His research work has been well funded, primarily by the Office of Naval Research (ONR), the National Science Foundation (NSF) and the U.S. Department of Transportation (USDOT). He is a member of IEEE, IEEE Computer Society and ACM. He received his BSc in Mathematics from the University of Madras, Chennai, India, an MS in Applied Mathematics from the University of Toledo, an MS in Operations Research from the University of Kentucky, and Ph.D. in Computer Science and Engineering from the University of South Florida, and holds the rank of Professor in the Department of Computer and Information Science at UMass Dartmouth.

Ms. Margaret Brooks

Sr. Manager, Enterprise Innovation and 5G Solutions
Verizon



Margaret Brooks is currently a Sr. Manager in the Enterprise Innovation and 5G Solutions team responsible for working with our customers and partners on how 5G solutions will improve their business in the future, enhancing customer's innovation capabilities with customer labs, assisting with sales enablement and planning for the future horizons with 5G. Prior to joining the 5G team, Margaret was responsible

for developing and leading the governance, risk and compliance program for direct sales and channel partners in a newly formed Operational Assurance team. Margaret initiated and executed an integrity program experienced by more than 5,000 employees in Verizon Enterprise Solutions, resulting in excellent feedback and improvements in integrity awareness and willingness to call for help. Margaret's initial role at Verizon was as the customer success lead for the sales SVP, turning around challenged accounts, improving relationships and resolving customer issues on assigned accounts.

Margaret has 25+ years of senior leadership experience. While at CA Technologies, she held Vice-President Positions in solution sales, pre-sales, customer success, technology partners, product management and professional services. While responsible for more than 40 global online communities, Margaret was a co-author of a book on developing B2B social communities.

Margaret has her B.S. in Health Education from the University of Alabama. She has participated on the Advisory Council for the Council on Competitiveness's Energy and Manufacturing Competitive Partnership Cybersecurity initiative and is a member of the Working Group team for the National Commission on Innovation & Competitiveness Frontiers. Margaret is the Chairman of the Scholarship Committee for the local Bama in Atlanta Chapter, awarding five scholarships each year.

Mr. Dave Copps

CEO

Hypergiant Sensory Sciences



Dave Copps is a self-described serial entrepreneur, technologist and start-up guy focused on the role that Machine Learning and AI will play in transforming markets and the world. For the past 15 years, he has founded, launched and sold two companies focused on machine learning and artificial intelligence.

Today, he serves as CEO of Hypergiant Sensory Sciences (formerly BamAI!). He is re-joining long-time business partner, Chris Rohde, in a company that is on a mission to change the way machines see and sense the world.

Sensory Sciences is an independent software company that is part of the Hypergiant AI industrial complex, a syndicate of AI companies dedicated to building the world's best brand for AI products and services. Both the commercial and federal practices of Hypergiant Industries will be partners with Sensory Sciences, helping to take our products to market. They are also building a shared services layer across the companies helping with sales, marketing, PR and solutions services. Dave's good friend Ben Lamm, who founded Hypergiant, is also a founding member of Sensory Sciences and a member of our Board of Directors.

Dave Copps received his BA from the University of North Texas in Industrial Anthropology/Corporate Culture. He is an invited member of the Aspen Institute's Roundtable on AI and a frequent speaker at MIT's EmTech conferences and other events centered around machine learning, AI, Augmented Intelligence and disruptive technologies.

He is an active mentor of the Partner Fund at Capital Factory, an investor at the Health Wildcatters, and Dallas Entrepreneurs Center (DEC) and an Entrepreneur in Residence at the University of Texas, Dallas.

Ms. Candace Culhane

Program/Project Director
Los Alamos National Laboratory



Candace Culhane is an employee of Los Alamos National Labs and provides strategic coordination of the National Strategic Computing Initiative for LANL. She previously worked at DARPA to help launch the High Productivity Computing Systems Program, which stimulated industry to produce the Cray CASCADE line of supercomputers.

She obtained her MS in Computer Science from the University of Maryland at College Park and is a member of the Advisory Board for the ACM's Special Interest Group on High Performance Computing (SIGHPC).

Dr. Jennifer Curtis

Distinguished Professor of Chemical Engineering and Dean of the College of Engineering
University of California, Davis



Jennifer Sinclair Curtis is Distinguished Professor of Chemical Engineering and Dean of the College of Engineering at the University of California, Davis. Her research focuses on the development and validation of particle flow models which have been

extensively adopted by both commercial and open source CFD software packages. She is a Fellow of AAAS, AIChE and ASEE. Major awards include AIChE's Particle Technology Forum's Lifetime Achievement Award, a Fulbright Senior Research Scholar Award, AIChE's Thomas-Baron Award in Fluid-Particle Systems, ASEE's Chemical Engineering Lectureship Award, ASEE's CACHE Award for Excellence in Computing in Chemical Engineering Education, ASEE's Sharon Keillor Award for Women in Engineering, and the NSF Presidential Young Investigator Award. Professor Curtis received her Ph.D. in Chemical Engineering from Princeton University (1989) and her BS in Chemical Engineering from Purdue University (1983), where she has been awarded Distinguished Engineering Alumnae.

Mr. Eric Cylwik

Virtual Construction Engineer, Sr.
Sundt Construction



Eric Cylwik is a virtual construction engineer for Sundt Construction. Before working exclusively for the Heavy Civil division, Cylwik focused on adapting Building Information Modeling (BIM) models from the office to the field for Sundt's Concrete Group. He now

focuses on creating virtual construction models that highlight technology's capability to enhance the way construction is performed in the field. Focusing on infrastructure, Cylwik has been able to capitalize on parametric modeling to create construction-quality models that are used in the office and on the jobsite. Cylwik helped Sundt procure more than \$1B of alternative delivery method projects. He graduated from Arizona State University with a degree in design studies with an emphasis in digital visualization.

Mr. Andre Doumitt

Director of Innovation Development, iLab
The Aerospace Corporation



Andre Doumitt is the Director of Innovation Development in the iLab at The Aerospace Corporation. Previously he served as president and founder of Digital AdopXion LLC, a consulting company focused on transitioning R&D technology in the airborne and space-based data collection and processing domain into new commercial and military programs. Doumitt served as President and CEO of Geosemble Technologies, an In-Q-Tel funded start-up spun out of the University of Southern California's Computer Science department. Geosemble developed and sold technology to automatically integrate open source text into satellite imagery and maps, and was acquired in 2012.

Previous to that role, Doumitt spent five years with BAE Systems in a variety of executive management roles focused on fly-by-wire flight control systems, integrated GPS/navigation sensor systems and digital map systems with U.S. and international aircraft operators. Before that, Doumitt spent two years with the Italian/U.S. joint venture Bell Helicopter/Agusta Aerospace, and four years with The Boeing Company developing industrial relationships with international suppliers for Boeing's military and civilian helicopter programs.

Doumitt spent three years as a principal of technology start-up company Ecotech International where, as Director of Business Development, he created new joint ventures and licensing agreements for his U.S.-based commercial customers. As a technology start-up, Ecotech was part of the Arizona Technology Incubator and successfully graduated from that program. Doumitt has also held several international positions, including a market research consulting role at an Australian research firm based in Hong Kong; a Japanese prefectural government position in Tokyo; a consular support staff role at the U.S.

Embassy in Paris; and positions at the U.S. Department of Commerce and with the Coordinating Committee for Multilateral Strategic Trade Control.

Dr. Gloria Gonzalez-Rivera

Professor of Economics
University of California, Riverside



Gloria Gonzalez-Rivera is Professor of Economics at the University of California, Riverside. She has been the Chair of the Economics Department (2003–2008) of UC Riverside, and she is the President and elected director to the board of the International Institute of Forecasters. Professor Gonzalez-Rivera received her Ph.D. from the University of California San Diego, where she wrote her dissertation under the supervision of 2003 Nobel Laureate Professor Robert F. Engle. Her research focuses on the development of econometric and forecasting methodology, with applications in financial markets, volatility forecasting, risk management and agricultural markets. Her research has been published in top venues such as *Journal of Econometrics*, *Journal of Business and Economic Statistics*, *Journal of Applied Econometrics*, *International Journal of Forecasting*, and the *Handbook of Empirical Economics and Finance*, among others. She has also written a textbook in forecasting, *Forecasting for Economics and Business*, published by Routledge/Taylor and Francis Group, which has received great reviews.

Professor Gonzalez-Rivera is a Fulbright Scholar, and she was awarded the UC Riverside University Scholar distinction (2007–2011) for her research and teaching contributions as well as several teaching awards at UC San Diego. In 2015, she was awarded an honorary Chair of Excellence by Banco de Santander/Universidad Carlos III, Madrid (Spain). She is Associate Editor for the *International Journal of Forecasting* and for *The American Statistician*, and a guest co-editor for *Advances in Econometrics*. Her research has been funded by the National

Science Foundation, the California Native Indian Gaming Association, the International Institute of Forecasters/SAS, the University of California ANR, and the A.P. Giannini Foundation. She is also a member of the Scientific, Technical, and Modelling Peer Review Advisory Group to the South Coast Air Quality Management District in Southern California. She is an active referee and reviewer for many economic, business, and statistics journals and for national and international agencies such as the USA National Science Foundation and the European Research Council. She has been a consultant for the hedge fund industry, and the government-sponsored enterprise in topics such as mortgage securitization, subordinated debt, and risk management.

Mr. Ryan Haines

Virtual Construction Application Developer
Sundt Construction



Ryan Haines is a Virtual Construction Developer with Sundt Construction, building and delivering frontline solutions to the business. He is an innovator and builder at heart. Ryan's career in construction began some 15 years ago, working in the field with his father

on residential and commercial projects. He went on to achieve his BS degree in Mathematics from Arizona State University. Now coupling his formal education in mathematics with his field experience in construction, Ryan enjoys connecting the digital to the physical. He believes in automating traditionally pain-staking tasks to drive business results, including worker engagement.

Outside of work, Ryan enjoys being in nature, including hiking, hunting and fishing.

Ms. Maggie Hallbach

Vice President—State, Local & Education Markets
Verizon Business Group



Maggie Hallbach is vice president of state, local, and education markets for Verizon. In this role, she manages a nationwide team responsible for developing solutions to address the increasingly complex requirements of state government, local government,

and education clients. Maggie and her team focus on using Verizon's industry-leading portfolio of advanced communications and IT solutions, including cloud, security and networking, to meet the needs of these public sector customers and the citizens they serve.

With more than 20 years with Verizon, Maggie has held a variety of roles where she has responsibility for delivering customer experience enhancements and increasing shareholder value. She also headed Verizon's Lean Six Sigma efforts to drive ongoing business transformation and process improvement across Verizon Enterprise Solutions.

Maggie earned a Master of Business Administration in marketing and finance from the University of Maryland's Robert H Smith School of Business and holds a Bachelor of Arts in history from Brown University.

Dr. Alan R. Hevner

Distinguished University Professor and Eminent Scholar
Citigroup/Hidden River Chair of Distributed Technology
Information Systems and Decision Sciences
Muma College of Business
University of South Florida



Alan R. Hevner is a Distinguished University Professor and Eminent Scholar in the Information Systems and Decision Sciences Department in the Muma College of Business at the University of South Florida. He holds the Citigroup/Hidden River Chair

of Distributed Technology. Dr. Hevner's areas of research interest include design science research, digital innovation, information systems development, software engineering, distributed database systems and healthcare systems. He has published more than 250 research papers on these topics and has consulted for a number of Fortune 500 companies.

Dr. Hevner received a Ph.D. in Computer Science from Purdue University. He has held faculty positions at the University of Maryland and the University of Minnesota. Dr. Hevner is a Fellow of the American Association for the Advancement of Science (AAAS), a Fellow of the Association for Information Systems (AIS), and a Fellow of IEEE. He is a member of ACM and INFORMS. Additional honors include selection as a Parnas Fellow at Lero, the Irish software research center, a Schoeller Senior Fellow at Friedrich Alexander University in Germany, and the 2018 Distinguished Alumnus award from the Purdue University Computer Science Department. From 2006 to 2009, he served as a program manager at the U.S. National Science Foundation (NSF) in the Computer and Information Science and Engineering (CISE) Directorate.

Dr. Nathan Hillson

Computational Staff Scientist and Department Head of Biodesign
Lawrence Berkeley National Laboratory



Dr. Hillson earned his Ph.D. in Biophysics from Harvard Medical School. He did his postdoctoral work in Developmental (Micro) Biology at Stanford University School of Medicine. Dr. Hillson's work has spanned the realms of the private (notably as co-founder

and Chief Scientific Officer at TeselaGen Biotechnologies, Inc.) and public biotechnology sectors. As Department Head of BioDesign within the Biological Systems & Engineering Division, Dr. Hillson leads scientists and engineers within Lawrence Berkeley National Laboratory whose domain expertise spans synthetic biology, metabolic engineering, microbiology, microbial communities, software engineering, and laboratory automation engineering. As overall Principal Investigator of the U.S. DOE Agile Biofoundry, Dr. Hillson leads an even broader group of scientists and engineers distributed across seven U.S. DOE National Labs toward the development of a public infrastructure that enables the private sector to reduce the cost and accelerate bioprocess commercialization timelines (from conception to process scale up and deployment). This infrastructure complements discovery engines (such as the Joint Genome Institute, to which Dr. Hillson also contributes), by enabling the discovered (yet small scale, low titer/rates/yields) pathways to be more quickly and reliably optimized and scaled. Efforts are supported by DOE-funded entities, including the DOE Agile Biofoundry, DOE Joint BioEnergy Institute and DOE Joint Genome Institute, as well as by industry-sponsored collaborations.

Mr. Raaj Kurapati

Executive Vice President for Business and Finance,
and Chief Financial Officer
University of Memphis



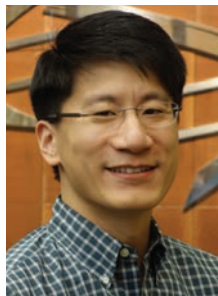
Mr. Kurapati is Executive Vice President for Business and Finance and Chief Financial Officer at the University of Memphis. Before joining the University of Memphis, Raaj Kurapati previously held the positions of Vice President for Finance and Chief Financial Officer for Texas A&M University—Kingsville and Associate Vice Chancellor for Financial Services and Business Operations for the University of Alaska in Fairbanks. He also served as Vice President & Chief Financial/Compliance Officer/Vice President & Chief Internal Auditor for the Bank of FSM in Pohnpei, Micronesia, and Senior Auditor for Deloitte & Touche in Saipan and Guam/Micronesia.

Kurapati earned his bachelor of business administration (BBA) from East Texas Baptist University with a concentration in management and accounting. He is an accredited investment fiduciary, as well as an accredited investment fiduciary analyst, and serves on various finance and education boards.

Kurapati earned his bachelor of business administration (BBA) from East Texas Baptist University with a concentration in management and accounting. He is an accredited investment fiduciary, as well as an accredited investment fiduciary analyst, and serves on various finance and education boards.

Dr. Kelvin H. Lee

Gore Professor of Chemical and Biomolecular Engineering
University of Delaware, and
Director
National Institute for Innovation in Manufacturing
Biopharmaceuticals



Dr. Kelvin H. Lee is Gore Professor of chemical and biomolecular engineering at the University of Delaware. He currently serves as Director of the National Institute for Innovation in Manufacturing Biopharmaceuticals (a Manufacturing USA Institute), and he previously served as director of the Delaware Biotechnology Institute. Dr. Lee received a B.S.E. in chemical

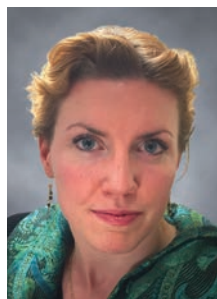
engineering from Princeton and both his M.S. and Ph.D. in chemical engineering from Caltech. He also completed a postdoc in Caltech's Biology Division and spent several years at the Biotechnology Institute at the ETH in Zurich Switzerland.

Previously, he was on the faculty at Cornell University, where he held the titles of Samuel C. and Nancy M. Fleming Chair Professor, Professor in the School of Chemical and Biomolecular Engineering, Director of the Cornell Institute for Biotechnology, and Director of the New York State Center for Life Science Enterprise.

He is a Fellow of the American Association for the Advancement of Science and of the American Institute for Medical and Biological Engineers. His research expertise is in systems and synthetic biology applied to biopharmaceutical manufacturing, as well as in the diagnosis and treatment of Alzheimer's disease.

Dr. Edlyn Levine

Lead Physicist, Emerging Technologies Group
The MITRE Corporation, and
Research Associate, Department of Physics
Harvard University



Edlyn V. Levine, Ph.D. is a Lead Physicist in the Emerging Technologies Group at the MITRE Corporation. Her research at MITRE focuses on tackling advanced technical challenges and expanding scientific frontiers in the interest of National

Defense. She leads MITRE's Academic Engagement effort, focused on building research relationships across universities and Federally Funded Research and Development Centers. She holds these positions jointly with a Research Associateship in the Department of Physics at Harvard University.

Dr. Levine has been awarded for her scientific work with nationally competitive fellowships—the NSF Graduate Research Fellowship and the National Defense Science and Engineering Graduate Fellowship—and is a multi-year awardee of the MITRE

Innovation Program grant. She serves as a member of the Executive Committee for the American Physical Society (APS) Forum for Industrial and Applied Physics, and as an Associate Editor of the *Harvard Data Science Review*.

Dr. Anthony J. Margida

CEO
TechGrit



Dr. Anthony J. Margida, Ph.D., Founder & CEO, visionary and accomplished entrepreneurial ecosystem architect, brings energy and expertise to customizing start-up programming for communities, universities and corporations. His depth of experience spans

business accelerator design, equity investment, private/public partnerships, company formation, and organization sustainability. As CEO of Akron Global Business Accelerator, he envisioned and spearheaded its transformation into an entrepreneurial super-hub, creating 450 new jobs and securing \$75M in equity investment while winning \$10M in grant funding to ensure multi-year operations.

His career in innovation has focused on developing/commercializing new technologies and the creation of companies spanning the specialty chemical, advanced material, cleantech/energy, nano-tech, IT and medical device industries. As Director of Technology at HB Fuller, he led development and global commercialization of a water-based footwear adhesive offering an alternative to a highly abused toluene based staple. His Magnetorheological Fluid (MR) patents are widely cited and are core to GM's Magneride suspensions on more than one million vehicles.

A nationally recognized thought leader, Dr. Margida serves on the Council on Competitiveness, a non-partisan recommending organization for U.S. policy. He is President of LaunchTown Experience™, a program designed to promote entrepreneurship for Ohio's college and university students. He has served on the Akron ARCHAngels Deal Flow Committee and the University of Akron Research Foundation Spark Fund

Board focusing on investment of University technologies. A Phi Beta Kappa graduate of the College of Wooster, Dr. Margida received a Ph.D. in organic chemistry from the University of Akron and his business education from the University of North Carolina's Kenan-Flagler Business School.

Dr. Carolyn C. Meltzer

William P. Timmie Professor
Chair of Radiology and Imaging Sciences
Executive Associate Dean of Faculty Academic Advancement, Leadership and Inclusion
Emory University School of Medicine



Dr. Meltzer is the William P. Timmie Professor and Chair of Radiology and Imaging Sciences and Executive Associate Dean of Faculty Academic Advancement, Leadership and Inclusion at Emory University School of Medicine. She is a neuroradiologist and nuclear

medicine physician whose translational research has focused on serotonin-mediated brain function in normal aging, dementia and other late-life neuropsychiatric disorders. She is also involved in oncologic imaging research and, while at the University of Pittsburgh, oversaw the clinical evaluation of the world's first combined PET/CT scanner. Dr. Meltzer has authored approximately 200 publications and lectured nationally and internationally.

Reflective of her commitment to academic medicine, Dr. Meltzer has served in numerous national leadership roles and professional and advisory boards, including the administrative board of the AAMC Council of Faculty and Academic Societies, Advisory Council for the National Institute for Biomedical Imaging and Bioengineering, American College of Radiology Board of Chancellors, Radiological Society of North America R&E Foundation Board, Secretary-Treasurer for the Society for Chairs of Academic Radiology Departments, and Executive Committee of the International Society of Strategic Studies in Radiology. She is a past president of the American Society of Neuroradiology and Academy for Radiology and Biomedical Imaging Research. Her contri-

butions to academia have been recognized with the AUR Gold Medal, ASNR Outstanding Researcher Award, ASNR Gold Medal, and RSNA Outstanding Contributions in Research Award.

Highly engaged in professional and leadership development and promoting inclusion, Dr. Meltzer has individually mentored more than 60 pre- and post-doctoral trainees and junior faculty. Under her leadership, the Emory Radiology Leadership Academy was founded and has now graduated more than 100 professionals.

Dr. Meltzer received her medical degree from The Johns Hopkins School of Medicine and completed her postdoctoral medical training at The Johns Hopkins Hospital in Baltimore, Maryland. She is board-certified in both Diagnostic Radiology and Nuclear Medicine, with subspecialty certification in Neuroradiology and advanced training in positron emission tomography (PET), and participated as a Fellow in the prestigious Hedwig van Ameringen Executive Leadership in Academic Medicine Program for Women (ELAM). She is a fellow of the American College of Radiology and the American College of Neuropsychopharmacology.

Mr. Gregory Morin

Director for Strategy
Argonne National Laboratory



Greg Morin is the Director for Strategy for Argonne National Laboratory, a U.S. national laboratory located outside Chicago, Illinois. Mr. Morin leads Argonne's strategic planning, institutional investment, and risk programs. He is responsible for ensuring development and implementation of Argonne's strategic efforts and positioning the laboratory as a world-class destination for scientific discovery and innovation.

Prior to Argonne, Mr. Morin worked with Gillum Strategy Partners, leading a variety of client engagements solving business strategy and commercialization challenges; was a Program Manager for Northrop Grumman on the P-8 Poseidon program, and completed a Navy career as a P-3 Orion flight officer, leading a variety of research and development activities on advanced P-3 avionics and software programs.

Mr. Morin holds a B.S. from the U. S. Naval Academy, an M.S. in Aeronautical Engineering from the Naval Postgraduate School and an M.B.A. from the University of Chicago Booth School of Business.

Mr. Marcus Owenby

AVP Innovation and Customer Experience
AT&T VRIO Corporation



Marcus Owenby is responsible for Product Management and Development at AT&T's VRIO Corporation. VRIO Corporation is focused on bringing the highest quality Sports and Entertainment to all of Latin America. Marcus has developed and built a high performing teams and platforms that drive adoption of Multi-Screen Over The Top Television, Addressable Advertising across Latin America. With regionally popular mobile & web applications such as DirecTV Sports and Play and the newly launched DIRECTVGO this role is critical for Revenue Growth and Market Penetration for PayTV in Latin America

Marcus continues to promote and evangelize an Agile framework into non-traditional areas such as Product Management and Product Development. He has built responsiveness, agility, and execution speed into all areas of his responsibility.

Dr. Sethuraman Panchanathan

Executive Vice President
ASU Knowledge Enterprise Development, and
Chief Research and Innovation Officer
Arizona State University



Sethuraman “Panch” Panchanathan leads the knowledge enterprise development at Arizona State University, which advances research, innovation, strategic partnerships, entrepreneurship, global and economic development at ASU. His leadership has led to many accomplishments at ASU, including quintupling research performance over the last decade (to over \$635M in 2018), placing it as the fastest-growing research university in the United States. ASU has also been ranked as the most innovative university in the nation by *U.S. News & World Report* for the last five years, ahead of Stanford and MIT.

In 2014, Dr. Panchanathan was appointed by the U.S. President to the U.S. National Science Board (NSB) for a six-year term. He is the first American of Indian origin to be appointed to the NSB. He served as Chair of the Committee on Strategy and currently serves on the External Engagement and National S&E Policy committees of NSB. Additionally, he was appointed by the former U.S. Secretary of Commerce to the National Advisory Council on Innovation and Entrepreneurship (NACIE). Dr. Panchanathan is Vice President for Strategic Initiatives and Membership of the National Academy of Inventors. He was Chair of the Council on Research (CoR) of the Association of Public and Land-grant Universities and Co-Chair of the Extreme Innovation Taskforce of the Global Federation of Competitiveness Councils. (GFCC). Dr. Panchanathan was appointed Arizona Governor Doug Ducey’s Senior Advisor for Science & Technology in 2018, and in October 2019, he was asked to testify before the U.S. Senate Subcommittee on Science, Oceans, Fisheries and Weather during a hearing titled, “Research and Innovation: Ensuring America’s Economic and Strategic Leadership.”

Dr. Panchanathan is a Fellow of the NAI, American Association for the Advancement of Science (AAAS), the Canadian Academy of Engineering (CAE), the Institute of Electrical and Electronics Engineers (IEEE) and the Society of Optical Engineering (SPIE). He was the editor-in-chief of the *IEEE Multimedia Magazine*, and is also an editor/associate editor of several international journals and transactions.

Dr. Panchanathan’s research interests are in the areas of human-centered multimedia computing, haptic user interfaces, person-centered tools and ubiquitous computing technologies for enhancing the quality of life for individuals with disabilities, machine learning for multimedia applications, medical image processing, and media processor designs. Dr. Panchanathan has published more than 485 papers in refereed journals and conferences and has mentored more than 150 graduate students, post-docs, research engineers and research scientists who occupy leading positions in academia and industry. He has been a chair of many conferences, a program committee member of numerous conferences, an organizer of special sessions in several conferences, and an invited speaker and panel member in conferences, universities and industry symposiums.

Lieutenant Colonel Stewart Parker

Senior Military Fellow
Center for a New American Security



Lieutenant Colonel Stewart J. Parker is a Senior Military Fellow at the Center for a New American Security (CNAS).

Colonel Parker is a career Special Tactics Officer who was previously assigned to the Joint Staff. He prepared briefings and position papers for the Deputy Director for Special Operations, Counterterrorism and Detainee Affairs, and he advised senior leaders on employment of Special Operations Forces.

Colonel Parker was commissioned through the U.S. Air Force Academy in May 2002. He is qualified as a jumpmaster, combat diver and joint terminal attack control instructor, and he was previously designated as the subject matter expert on fire support for Air Force Special Operations Command. He also served as Director of Operations, 23rd Special Tactics Squadron, and as Commander, 21st Special Tactics Squadron. He has conducted multiple combat deployments, performing reconnaissance, strike and personnel recovery missions.

Dr. William A. Pike

Division Director, Computing and Analytics
Pacific Northwest National Laboratory



Bill Pike is the Director of the Computing and Analytics Division at Pacific Northwest National Laboratory (PNNL). His division leads research and development in advanced computing, data analytics, cybersecurity and software engineering. As Division Director,

he is responsible for technical strategy, talent development, capability growth, and facilities and infrastructure across PNNL's national security computing portfolio. His division also maintains a growing footprint in downtown Seattle and works to connect U.S. government missions with the innovation ecosystem in the Pacific Northwest.

Bill advises government organizations on emerging technologies and on R&D and talent development strategies to address national challenges that require advanced computing capabilities. He has led R&D programs in threat discovery, energy reliability, disaster response, cyber situational awareness, and identity management, and has commercialized many of these capabilities. He also launched early stage research investments in streaming analytics and human-computer interaction, and leads an internal Laboratory effort around accelerating innovation in a dynamic geopolitical environment.

Bill is a passionate advocate for data-driven decision making and has helped organizations enhance their innovation performance and strategic planning processes through new analytics and data products. His division has also been a leader in STEM outreach by innovating new ways to help computing professionals share their knowledge and passion with students and educators.

Prior to his role as Division Director, he was the Technical Group Manager for Visual Analytics at PNNL and the R&D coordinator for the National Visualization and Analytics Center, where he led research in human-computer interaction and organized R&D strategies across a portfolio of university partners. He has served as General Chair of the IEEE Visualization Conference and IEEE Visual Analytics Science and Technology Symposium.

Bill's technical background is in information visualization. He holds a Ph.D. from Penn State and a B.A. from Carleton College.

Dr. Albert (Al) P. Pisano

Dean and Walter J. Zable Distinguished Professor
Jacobs School of Engineering
University of California, San Diego



Albert P. Pisano was appointed Dean of the Jacobs School of Engineering at UC San Diego on September 1, 2013, where he holds the Walter J. Zable Chair. He was elected to the National Academy of Engineering in 2001.

Previously, Pisano served on the UC Berkeley faculty for 30 years where he held the FANUC Chair of Mechanical Systems and was co-director of the Berkeley Sensor & Actuator Center. Since 1983, Pisano has graduated more than 70 Ph.D. and 75 M.S. students. From 1997 to 1999, Pisano was a program manager for the MEMS Program at DARPA.

Pisano earned his undergraduate ('76) and graduate degrees ('77, '80, '81) in mechanical engineering at Columbia University. Prior to joining academia,

he held research positions with Xerox Palo Alto Research Center, Singer Sewing Machines Corporate R&D Center and General Motors Research Labs.

Pisano's research interests include: micro electromechanical systems (MEMS) wireless sensors for harsh environments (600°C) such as gas turbines and geothermal wells; and additive, MEMS manufacturing techniques such as low-temperature, low-pressure nano-printing of nanoparticle inks and polymer solutions. He is a co-inventor listed on more than 36 patents in MEMS and has co-authored more than 400 archival publications.

Dr. Ravi Prasher

Associate Laboratory Director, Energy Technologies Area, and Division Director, Energy Storage and Distributed Resources Division
Lawrence Berkeley National Laboratory



Ravi is the Associate Lab Director of the Energy Technologies Area and Division Director of the Energy Storage and Distributed Resources Division at Lawrence Berkeley National Laboratory (Berkeley Lab). He is also an adjunct professor in the Department of Mechanical Engineering at the University of California, Berkeley.

Ravi joined Berkeley Lab in June, 2015. Previously, he was vice president of product development of Sheetak Inc., a start-up developing solid state thermoelectric energy converters. He relocated to India for a while to develop these technologies for the rural Indian market. Ravi earlier worked as one of the first program directors at the Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E). While there, he created the Building Energy Efficiency Through Innovative Thermodevices (BEET-IT) and the High Energy Advanced Thermal Storage (HEATS) programs. Prior to joining ARPA-E, Ravi was the technology development manager of the thermal management group at Intel. He was also an adjunct professor in the school of engineering

at Arizona State University (ASU) from 2005–2013, where his research was funded by the National Science Foundation and the Office of Naval Research.

Ravi has published more than 90 archival journal papers in top science and engineering journals such as *Nature Nanotechnology*, *Physical Review Letters* and *Journal of Heat Transfer*. He holds more than 35 patents in the areas of thermoelectrics, microchannels, heat pipes, thermal interface materials, nanostructured materials and devices. He has served on the Ph.D. committee for students at Stanford and ASU. He is a fellow of the American Society of Mechanical Engineers, and a senior member of the Institute of Electrical and Electronics Engineers (IEEE). He was the recipient of an Intel achievement award (the highest award for technical achievement in Intel). He is also a recipient of the outstanding young engineer award from the components and packaging society of IEEE. He has served on the editorial committee of *Annual Review of Environment and Resources*, *Nano and Microscale Thermophysical Engineering*, the *IEEE Components, Packaging and Manufacturing Technology Society* and *ASME Journal of Heat Transfer*. He has given multiple invited talks all over the world on nano to macroscale thermal energy process and systems. More information about Ravi's research can be found on his group website, prasherlab.lbl.gov

Ravi obtained his B.Tech. from the Indian Institute of Technology Delhi and Ph.D. from Arizona State University.

Dr. Gary Pratt

Chief Information Officer
Kansas State University



Gary L. Pratt is the Chief Information Officer at Kansas State University. Joining K-State in October of 2017, Gary is charged with leading strategic change across the institution's technology environment and is responsible for all information technology operations throughout the university, including enterprise

systems, network and telecommunications, data center, information security, technology support functions, academic and research technology, application development, business intelligence and analytics, emerging technology and innovation, enterprise architecture, and technology planning.

Prior to KSU, he served as vice president for Information Technology and CIO at Eastern Washington University for 10 years; associate provost for Information Technology and CIO at Northern Kentucky University for seven years; and director for Information Technology and CIO, Registrar, director of Institutional Research, and math faculty at Front Range Community College in Colorado for 13 years.

Gary has reorganized technology units into comprehensive organizations; led IT and institutional strategic planning; implemented smart classrooms, enterprise resource planning (ERP) systems, customer relationship management (CRM) systems, media production systems, data center and network operations, and cloud-first solutions. In addition, he has volunteered for many statewide leadership positions in Washington and Kentucky.

In 2006, he was awarded with the Best Collaboration in IT Award in Kentucky and was commissioned by the Governor as a Kentucky Colonel, a statewide award for service and collaboration. In 2012, his team won a CASE award for best website development. In 2015, he won a CASE award for excellence in communication for the development of the Eastern Washington University Institutional Strategic Plan. In 2019, his team won a national award for Leadership in Cloud Innovation from E&I, and a CSO50 award for innovation in research data security (will be awarded in early 2020).

Pratt has a Doctor of Management and Organizational Leadership from the University of Phoenix, a Master of Arts from the University of Denver, and a Bachelor of Science from Colorado School of Mines.

Dr. Arun Rai

Regents' Professor

J. Mack Robinson College of Business, and
Director, Center for Digital Innovation
Georgia State University



Arun Rai is Regents' Professor of the University Systems of Georgia, holds the Robinson Chair, and is Director of the Center for Digital Innovation at the Robinson College of Business at Georgia State University. He has held visiting appointments at universities in

Australia, France, Germany, Hong Kong and Slovenia. He is a Fellow of the Association for Information Systems, Distinguished Fellow of the INFORMS Information Systems Society, and recipient of the Association for Information Systems LEO Award for lifetime exceptional contributions to the Information Systems discipline.

Arun's research for more than 30 years has focused on the development and deployment of information systems to drive innovation and create value. His research has contributed to understanding the digital transformation of organizations and supply chains; governance of IT investments and digital-platform ecosystems; and deployment of digital innovations at scale to empower individuals and address thorny societal problems, including poverty, health disparities, infant mortality and digital inequality. His current work examines the behavior of AI systems arising from the interactions of AI with human and other machine agents, and the digital transformation of innovation ecosystems and value-creation processes.

His research has involved close engagement with organizations across sectors (e.g., Apollo Hospitals, China Mobile, Daimler-Chrysler, Emory Healthcare, Gartner, Georgia-Pacific, Grady Hospital, IBM, Intel, SAP, SunTrust, UPS), and has been sponsored by government agencies, corporations and thought leadership forums. His work has been published extensively in premier journals in Information Systems and other disciplines, has received several best paper awards, and has been extensively cited across disciplines.

Arun has played leadership roles in developing research programs and curricula related to digital innovation, supply chain management, analytics and artificial intelligence. He is serving as Editor-in-Chief of the *MIS Quarterly*, widely regarded as the premier scholarly journal in information systems. He has served as Senior Editor and Associate Editor for top scholarly journals such as *MIS Quarterly*, *Information Systems Research* and *Management Science*; as Panelist for the National Science Foundation; and on the Board of Directors of major corporations.

Dr. Charles G. Riordan

Vice President, Research, Scholarship and Innovation
University of Delaware



Charles ("Charlie") G. Riordan serves as the University of Delaware's Vice President for Research, Scholarship and Innovation, with responsibility for advancing the research enterprise, including oversight of seven research institutes, numerous core

facilities, technology transfer and business development, the University's federal relations office and developing public-private research partnerships to drive economic development.

Riordan is a chemist, whose laboratory has been supported by the National Institutes of Health and the National Science Foundation, the latter including a National Young Investigator Award. He is an elected fellow of the Royal Society of Chemistry and the American Association for the Advancement of Science (AAAS). Riordan serves on a variety of boards, including the Delaware Innovation Space, Inc., the University of Delaware Research Foundation and the EPSCoR/IDeA Coalition. He earned his bachelor's degree at the College of the Holy Cross, his Ph.D. at Texas A&M University and was a post-doctoral fellow at the University of Chicago.

Dr. Gene E. Robinson

Director, Carl R. Woese Institute for Geonomic Biology
University of Illinois at Urbana-Champaign



Gene E. Robinson is the Director of the Carl R. Woese Institute for Geonomic Biology. He holds a Swanlund Chair at the University of Illinois at Urbana-Champaign, where he has been since 1989. He also holds affiliate appointments in the Department of Cell &

Developmental Biology, the Program in Ecology, Evolution and Conservation Biology, and the Beckman Institute of Science and Technology. He received his Ph.D. from Cornell University and was an NSF Post-doctoral Fellow at Ohio State University.

Dr. Robinson's research group uses genomics and systems biology to study the mechanisms and evolution of social life, using the Western honey bee, *Apis mellifera*, as the principal model system along with other species of bees. The research is integrative, involving perspectives from evolutionary biology, behavior, neuroscience, molecular biology, and genomics. The goal is to explain the function and evolution of behavioral mechanisms that integrate the activity of individuals in a society, neural and neuroendocrine mechanisms that regulate behavior within the brain of the individual, and the genes that influence social behavior. Research focuses on division of labor, aggression and the famous dance language, a system of symbolic communication. Current projects include: 1) nutritional regulation of brain gene expression and division of labor; 2) gene regulatory network analysis in solitary and social species to determine how brain reward systems change during social evolution; 3) brain metabolic plasticity and aggression; 4) automated monitoring of bee behavior with RFID tags and barcodes; and 5) learning and memory in relation to division of labor. In social evolution, the sophistication of neural and behavioral mechanisms for the essentials of life—food, shelter and reproduction—stems from increased abilities to communicate and synchronize behavior with conspecifics. Social insects, especially

honey bees, are thus exemplars for the discovery of general principles of brain function, behavior and social organization.

In addition to serving as IGB Director, Dr. Robinson is also the director of the Bee Research Facility, as well as serving as director of the Neuroscience Program from 2001–2011, leader of the IGB research theme Neural and Behavioral Plasticity from 2004–2011, and interim IGB Director from 2011–2012. He is the author or co-author of more than 275 publications, including 27 published in *Science* or *Nature*; has been the recipient or co-recipient of over \$50M in funding from the National Science Foundation, National Institutes of Health, U.S. Department of Agriculture and private foundations; led the effort to gain approval from NIH for the sequencing of the honey bee genome; pioneered the application of genomics to the study of social behavior; and founded the Honey Bee Genome Sequencing Consortium. Dr. Robinson serves on the National Institute of Mental Health Advisory Council and has past and current appointments on scientific advisory boards for academic organizations and companies with significant interests in genomics.

Dr. Robinson's honors include: University Scholar and member of the Center of Advanced Study at the University of Illinois; Burroughs Wellcome Innovation Award in Functional Genomics; Founders Memorial Award from the Entomological Society of America; Fulbright Senior Research Fellowship; Guggenheim Fellowship; NIH Pioneer Award; Fellow, Animal Behavior Society; Fellow, Entomological Society of America; Fellow, American Academy of Arts & Sciences; member of the U.S. National Academy of Sciences and the U.S. National Academy of Medicine; and recipient of the Wolf Prize in Agriculture.

Mr. Guy Snodgrass

CEO

Defense Analytics



A native of Colleyville, Texas, Guy Snodgrass graduated from the U.S. Naval Academy in 1998 with a Bachelors of Science degree in Computer Science. Immediately following graduation, he attended the Massachusetts Institute of Technology, where he earned

Masters of Science degrees in both Nuclear Engineering and Computer Science while conducting research at Los Alamos National Laboratory on nuclear weapon design and testing. Previously a Navy F/A-18 Pilot, Mr. Snodgrass led combat sorties in support of forces on the ground during OPERATION IRAQI FREEDOM. Subsequently selected as a U.S. Navy Fighter Weapons School (TOPGUN) Instructor, he served as the Air-to-Air Mission Planning subject matter expert for the U.S. Navy and Marine Corps. Mr. Snodgrass then transferred to Atsugi, Japan, where he served as a Training Officer and Department Head with the "Diamondbacks" of VFA-102, supporting multinational operations in the Asia-Pacific region. During this tour, the Diamondbacks were awarded the Safety "S" and Battle "E" awards for command excellence.

Mr. Snodgrass was also selected as the 2008 Strike Fighter Wing Pacific Pilot of the Year, 2009 Strike Fighter Wing Pacific Tactical Aviator of the Year, 2010 Naval Air Forces Pacific Michael G. Hoff Attack Aviator of the Year, and for the peer-awarded 2010 Naval Air Forces Pacific Navy and Marine Corps Leadership Award. After his overseas deployment with Carrier Air Wing FIVE, Mr. Snodgrass attended the U.S. Naval War College in Newport, Rhode Island. Selected as a Mahan Scholar, he completed additional studies in areas of national strategic significance, including nuclear deterrence, cyber warfare, and the employment of space systems. At the completion of his studies, he graduated first in his class, earning a Masters of Art degree in National Security and Strategic Studies (Highest Distinction). He was also the President's Honor Graduate and

was selected for the Admiral William Sims Award as the college's Distinguished Graduate.

Mr. Snodgrass was subsequently selected for the U.S. Navy's 2014 Quadrennial Defense Review team, where he assessed U.S. Navy force structure and made recommendations regarding future fleet design. During this tour, he was selected to serve as Speechwriter to Admiral Jonathan Greenert, the U.S. Navy's 30th Chief of Naval Operations.

Following his tour in the Pentagon, then-Commander Snodgrass returned to Atsugi, Japan, where he had command of an F/A-18E Super Hornet squadron. During this tour, he created the 2015 Far East Commanders Conference; the Commander, U.S. Pacific Fleet's 2016 Pacific War fighter Symposium; and the "Benkyoukai Initiative," a tactical-level partnership with Japanese Air Self Defense Force squadrons. During this period, the men and women of the "Dambusters" earned the 2017 Battle Efficiency award as the finest Super Hornet squadron in the Western hemisphere.

After his command tour, Mr. Snodgrass reported to the Pentagon as Director of Communications and Chief Speechwriter to Secretary Jim Mattis, the 26th Secretary of Defense, where he was responsible for leading the Speech Team and coordinating all testimony and public remarks. In this role, he served as the Senior Advisor to the Secretary of Defense for Communication, assisting the Secretary of Defense and senior Department of Defense leaders as they formulated, articulated, and refined strategic messages and policies.

During his time as a Naval Officer, Mr. Snodgrass logged more than 2,784 total flight hours, 2,390 F/A-18 flight hours, 719 carrier landings, and was presented with the Defense Superior Service Award at retirement. Mr. Snodgrass is a member of the U.S. Naval Institute's Board of Directors, a member of the U.S.-Japan Leadership Program, and is a member of the MIT Seminar XXI Cohort for the 2018-19 academic year.

Dr. Roland Stephen

Director, Center for Innovation Strategy and Policy
SRI International



Roland Stephen, Ph.D., has more than 20 years of leadership and project management experience in policy analysis, strategic planning, and program design and evaluation. His work employs mixed methods to address complex questions in the areas of technology-based innovation and technology-intensive skills. Recent projects include an evaluation of a national program that supports energy audits, and a national program that supports innovation and entrepreneurship. He has also used a novel skills-based analysis to understand the impact of a STEM education initiative, and to measure a specialized engineering workforce. Other work has focused on economic development, including recommendations for a state-wide economic development strategy, and a diversification plan for an industrial city in the Middle East.

His international work supports governments and large enterprises who want to invest wisely in applied research programs and institutions. He provides guidance on the design, management and measurement of advanced research. Prior to joining SRI, Dr. Stephen lead several programs at the Institute for Emerging Issues, at North Carolina State University, where he was an associate professor in the School of Public and International Affairs. Dr. Stephen holds a Ph.D. in international and comparative political economy from UCLA, and a B.A. in history and economics from the University of Cambridge (UK).

Dr. Gilroy Vandentop

Director, Corporate University Research
Intel



Gilroy Vandentop is the Director of Corporate University Research, where he is responsible for university investments and working with students and professors across disciplines toward optimizing their impact on industry through partnerships with Intel.

He previously joined the SRC management team in 2012 and served as the Executive Director of STARnet. Gilroy was on assignment from Intel since 1990 and most recently formed the Novel Materials group, within the Components Research organization. Gilroy managed Intel's EUV program from 2006 through 2011 and transferred the program from the research stage into technology development. From 2000 to 2006, he was responsible for the Packaging Research group in Chandler, AZ. During his first 10 years at Intel, Gilroy worked in Logic Technology Development on silicon process development in the etch and photolithography areas.

Gilroy completed his Ph.D. in physical chemistry at U.C. Berkeley and his B.Sc. in honours chemistry at the University of Alberta.

Mr. David Vasko

Director, Advanced Technology
Rockwell Automation



Dave is director of Advanced Technology at Rockwell Automation. He is responsible for applied R&D and Global Product Standards and Regulations within Rockwell. He is responsible for developing and managing technology to enable the future of industrial automation—this includes Augmented Reality,

Artificial Intelligence, Digital Twins, Digital Transformation, IoT, Collaborative Robotics and Blockchain

Dave has held leadership positions in development and research groups while at Rockwell. He managed the Distributed Control Research lab, where agent-based control systems and digital twins were first developed and successfully deployed in industrial applications. He managed the Architecture Development group and contributed to the development of the Control Logix Architecture and CIP (Common Industrial Communication Protocol/IEC 61158), which is currently used by more than 300 vendors in more than 20M industrial devices. He led the team that developed the international standard for functional safety networking, the CIP Safety communication protocol (IEC 61784-3).

Dave is a member of the NIST VCAT (Visiting Committee on Advanced Technology). He is on the boards of the Smart Manufacturing Leadership Coalition (SMLC) and the Milwaukee Institute. He is a member of the Wisconsin Technical Council, the U.S. National Committee, and the MFOresight Leadership Council, and serves on Technical Advisory Groups in the U.S. National Committee for industrial control and communications. He serves in leadership positions within the IEC and is a senior member of both the IEEE and ISA.

He holds more than 130 U.S. and international patents in industrial communications, distributed control, agent technology, security and functional safety; has authored 20 papers, and contributed to three books. He was recognized as Rockwell Automation's Engineer of the Year in 2005 for his contribution to the development of a CIP Safety communication protocol.

Dr. James Weyhenmeyer

Vice President for Research and Economic
Development
Auburn University



James Weyhenmeyer, Ph.D., joined Auburn University in April 2019 and serves as the institution's vice president for research and economic development. In this role, Dr. Weyhenmeyer provides leadership to various research and economic development units,

including sponsored programs, proposal services and faculty support, research compliance, the university veterinarian, the electronic research administration, innovation advancement and commercialization, external engagement and support, and university-based start-ups.

Working with the university's administration, including academic units, research centers and institutes, the Alabama Agricultural Experiment Station and the Alabama Cooperative Extension System, Dr. Weyhenmeyer directs the strategic development and implementation of university-wide, research-related programs and creative activities.

Dr. Weyhenmeyer joined Auburn from Georgia State University (GSU), where he served as vice president for research and economic development and as chair of the Research Foundation board of directors. At GSU, Dr. Weyhenmeyer managed the university's research portfolio, economic development activities and information technology operations. Before joining GSU, he was the senior vice provost for research and economic development at the State University of New York and the vice president for research at the State University of New York Research Foundation.

Dr. Weyhenmeyer also has held several executive administrative appointments, including posts as the vice president for technology and economic development at the University of Illinois. He was the founding managing director and CEO of Illinois VENTURES, LLC, an early-stage venture capital firm focused on the development of technology-based companies. His area of investment expertise is in the life sciences sector, including therapeutics, diagnostics and medical devices.

A serial entrepreneur, Dr. Weyhenmeyer has served in management positions for companies in the medical device, drug delivery and drug development sectors. He continues to serve as a scientific advisor for technology-based companies and a consultant for early-stage investment due diligence and business start-ups. Dr. Weyhenmeyer currently serves on a number of public and private boards of directors and

lead an effort for the American Heart Association to launch a Science and Technology Accelerator Fund to reduce the time to market for groundbreaking discoveries impacting the diagnosis and treatment of cardiovascular disease and stroke.

Dr. Weyhenmeyer has published widely in the areas of cardiovascular disease and stroke. He has been funded by the National Institutes of Health, the National Science Foundation, the American Heart Association, the PHARMA Foundation and private industry. He has received many awards and honors for his research, most recently the American Heart Association's Meritorious Achievement Award for research and service. He is a professor of neuroscience and biology at Georgia State and continues to hold an appointment as adjunct professor of cell biology, neuroscience and pathology at the University of Illinois. He is professor of anatomy/physiology/pharmacology, biological sciences, and chemical engineering at Auburn University. He is also a member of several honorary societies, including the Royal Academy of Engineering Sciences. Weyhenmeyer received his B.A. from Knox College, a Ph.D. from Indiana University and did his postdoctoral training in the Departments of Medicine and Physiology and Biophysics at the University of Iowa.

Dr. Neal Woodbury

Professor and Director, School of Molecular Sciences, and
Chief Science Officer, Knowledge Enterprise
Arizona State University



Professor Neal Woodbury received his B.S. degree from UC Davis and his Ph.D. degree from the University of Washington, Seattle, in 1986. He then performed postdoctoral research at the Carnegie Institution of Washington, and later at Stanford University. He joined the Chemistry and Biochemistry Department (now the School of Molecular Sciences) at Arizona State University in 1988.

Neal Woodbury advises the executive vice president on issues related to major research activities on campus. He is responsible for developing new, large-scale, collaborative research projects. Additionally, he facilitates broader interactions between the Knowledge Enterprise and ASU's academic units.

Woodbury is director of and professor in the School of Molecular Sciences in the College of Liberal Arts and Sciences, a Senior Sustainability Scientist with the Julie Ann Wrigley Global Institute of Sustainability, and a faculty member in both the Biodesign Center for Innovations in Medicine and the Global Security Initiative at ASU.

Woodbury is also the co-founder of HealthTell with Professor Stephen Johnston. HealthTell is a company based on a diagnostic technology called immunosignaturing and involves fabrication of large numbers of peptides or related heteropolymers on silicon wafers. The resulting peptide arrays are the basis of a diagnostic platform that generates a comprehensive profile of circulating antibodies.

Another aspect of Woodbury's work involves the collaborative study of photosynthetic systems, with the goal of understanding the role that protein dynamics plays in protein-mediated chemistry. His group works to translate some of the ideas that have come out of the study of photosynthesis and enzymology to create nanoscale devices based on DNA nanostructures and nanophotonic systems. This work has made it clear that mimicking biology's ability to organize catalysis at the nanoscale is a very powerful approach to directing both chemical and photochemical reactions in specific ways

Launch Conference Participant Bios

Working Group 2—Exploring the Future of Sustainable Production and Consumption, and Work

Ms. Charlotte Alexander

Associate Professor of Law and Analytics
 Connie D. McDaniel WomenLead Chair, Institute
 for Insight
 J. Mack Robinson College of Business
 Georgia State University



Charlotte Alexander is an Associate Professor of Law and Analytics and the Connie D. McDaniel WomenLead Chair in the Institute for Insight, the data analytics unit at Georgia State University's J. Mack Robinson College of Business. She holds secondary

appointments in the Department of Risk Management and Insurance and the College of Law. She founded and directs GSU's Legal Analytics Lab, which brings together data science and law faculty to take on legal questions and problems using the tools of data analytics. For this work, she was selected one of 2019's Fastcase 50, which recognizes the top legal innovators of the year.

Alexander's scholarship focuses primarily on employment law and civil litigation, and she uses a variety of empirical and computational methods in her research. She is a graduate of Columbia University and Harvard Law School, and has published in a wide variety of journals, including the *NYU Law Review*, *Minnesota Law Review*, *Indiana Law Journal*, *American Business Law Journal*, *Industrial Relations*, *Yale Journal of Law and Technology*, and the *Harvard Civil Rights-Civil Liberties Law Review*.

She is a former Skadden Fellow and staff attorney at the Farmworker Rights Division of the Georgia Legal Services Program.

Dr. Carlotta M. Arthur

Director, The Clare Boothe Luce Program
 for Women in STEM
 Henry Luce Foundation



Carlotta M. Arthur, Ph.D, is Director of the Henry Luce Foundation's Clare Boothe Luce (CBL) Program, one of the most significant sources of private support for women in STEM higher education in the United States, having awarded more than \$200M in

grants to support 2,500+ women at 200 institutions. Dr. Arthur has worked to significantly increase the number of minority-serving institutions supported by the program. She also provides strategic leadership in identifying initiatives with the potential to transform STEM higher education, such as the National Academies of Sciences, Engineering, and Medicine's Sexual Harassment of Women study and related activities, which Luce has supported since the initial scoping workshop. Prior to joining Luce in 2012, Dr. Arthur directed the Mellon Mays Undergraduate Fellowship and Diversity Initiatives Programs at the Andrew W. Mellon Foundation. While at Mellon, she led the crafting of the Foundation's diversity, equity and inclusion (DEI) grantmaking strategy.

Dr. Arthur was the first African American woman to earn a B.S. in Metallurgical Engineering from Purdue University. Following nearly a decade in the aerospace and automotive industries, she went on to complete a Ph.D. in Clinical Psychology (Psychophysiology emphasis) at SUNY Stony Brook. Dr. Arthur was a member of the inaugural cohort of W.K. Kellogg Scholars in Health Disparities at the Harvard School of Public Health, examining psychosocial determinants of health with a focus on translation of research to policy and practice. She has also served as an Assistant Professor at Meharry Medical College, an Historically Black College in Nashville, TN; and as an Adjunct Assistant Professor at the Dartmouth Geisel School of Medicine.

Dr. Arthur is a Licensed Psychologist and founder of a professional LLC which provides strategic expertise and guidance on diversity, equity and inclusive excellence, including psychosocial determinants of, and life course perspectives on, inequity.

Further interests include DEI and social and behavioral sciences in the innovation ecosystem. Dr. Arthur is a member of the Society of Women Engineers Research Advisory Committee, and a member of the American Psychological Association Leadership Institute for Women in Psychology Advisory Committee.

Ms. Cara Bader

Senior Economic Advisor
Illinois Department of Commerce & Economic Opportunity



Cara Bader is Senior Economic Advisor at the Illinois Department of Commerce and Economic Opportunity (DCEO), which strives to support and maintain a climate that enables a strong economy by keeping, attracting and growing businesses, maintaining a skilled workforce and enhancing communities. Prior to joining DCEO, she served in a variety of roles in policy and operations for Chicago Mayors Rahm Emanuel and Lori E. Lightfoot and at World Business Chicago.

She received a Master in Urban Planning and Policy from the University of Illinois at Chicago and a Bachelor of Arts in economics and international studies from the University of Iowa. Cara lives in the East Humboldt Park neighborhood in Chicago.

Mr. Leslie Boney

Vice Provost, and
Director, Institute for Emerging Issues
North Carolina State University



Leslie Boney leads the Institute's efforts to identify key issues of importance to the state and develop consensus for action to address. Prior to joining the Institute, Leslie was Vice President for International, Community and Economic Engagement at the UNC system office, coordinating efforts to extend university expertise and services throughout the state.

While serving in the NC Department of Commerce and Governor's Office, Leslie coordinated the state's efforts to redesign rural development policy, increase volunteerism and reform welfare. At the nonprofit MDC, he managed a two-state effort to help rural communities recover from manufacturing job loss. A former teacher and reporter, Leslie serves on the boards of the Food Bank of Central and Eastern North Carolina and the Rural Economic Development Center. He received a B.A. from Amherst College.

Dr. Marcelle Chauvet

Professor of Economics
University of California, Riverside



Marcelle Chauvet is a Professor of Economics at the University of California, Riverside. Prior to that, she worked at the Ministry of Industry in Brazil, where she served as a research economist and policy adviser. She has also worked as a senior economist and associate policy adviser for the Research Division at the Federal Reserve Bank of Atlanta. She

has served as a consultant and visiting scholar for several international institutions and corporations, including the Central Bank of Brazil and the International Monetary Fund. Marcelle has been one of the seven members of Economic Cycle Dating Committee in Brazil since 2005. Marcelle is also the director of the Center for Research on Economic and Financial Cycles.

Marcelle Chauvet's research focuses on macroeconomics and econometrics, and she is particularly interested in measuring and predicting business cycles and financial markets, and in modeling and predicting the interactions between monetary policy, financial markets, and the real economy. Marcelle has an extensive list of publications in major academic journals and is serving or has served on the editorial board of several journals. She has recently been appointed as one of the Fellows of the International Association for Applied Econometrics, and serves as one of its directors.

Marcelle received her BSc in Economics and MSc in Economic Policy from the University of Brasilia, and an MA and Ph.D. in Economics from the University of Pennsylvania.

Dr. Sue Clark

Chief Science and Technology Officer, Energy and Environmental Directorate
Pacific Northwest National Laboratory



Sue Clark, Ph.D., holds the positions of Chief Scientist and Technology Officer and Battelle Fellow in the Energy & Environment Directorate (EED) at Pacific Northwest National Laboratory (PNNL). She also holds the title of Regents Distinguished Professor

of Chemistry with tenure at Washington State University (WSU) in Pullman, Washington. In this joint appointment, she advances innovation in PNNL's energy and environmental sectors by driving discretionary investments in emerging technology areas. She also serves as the Director of the PNNL-led Energy Frontier Research Center focused on Inter-

facial Dynamics in Radioactive Environments and Materials (IDREAM), funded by the Department of Energy's Office of Science. This Center is a partnership between PNNL, WSU, University of Washington, Oak Ridge National Laboratory, Georgia Institute of Technology, and Notre Dame University that is providing a strong technical foundation to support advances in nuclear materials processing.

Prof. Clark is a Fellow of both the American Association for the Advancement of Science (AAAS) and the American Chemical Society (ACS). She is the recipient of the 2020 Glenn T. Seaborg Award for Nuclear Chemistry and the 2012 Francis P. Garvan-John M. Olin Medal (both from ACS). She is an elected member of the Washington State Academy of Sciences, where she currently serves as a Board Member. She has served on the National Research Council's Nuclear and Radiation Studies Board, and has served on numerous National Academies committees on topics ranging from radioactive waste management to isotopes for medical applications to nuclear security. Prior to joining PNNL in her current joint appointment, Prof. Clark held a Presidential appointment to the U.S. Nuclear Waste Technical Review Board, appointed by President Barack Obama (2011–2014). She earned a BS degree in Chemistry from Lander College (Greenwood, SC) and MS and Ph.D. degrees in Chemistry from Florida State University (Tallahassee, FL).

Ms. Martha Delehanty

Senior Vice President, Human Resources
Verizon Operations



Martha Delehanty is senior vice president of human resources for Verizon Operations. In this position, she leads a team of HR professionals responsible for implementing and managing human resources policies and programs for 135,000+ Verizon employees around the globe. Delehanty provides strategic counsel and guidance to the business on HR-related matters to support our talented workforce and strengthen our winning culture.

Prior to her current assignment, Delehanty was vice president of human resources for Verizon Wireless, with responsibility for all human resources strategies and programs, including employee relations, compensation and benefits, training and development, staffing, diversity and human resources for 80,000 employees. Delehanty joined Verizon Wireless in 2000, serving as executive director of employee relations and overseeing employee workplace programs and policies, including all human resources communications.

Previously, Delehanty was a field director for GTE Wireless. She joined GTE in 1991 through their Leadership Development Program and held a variety of positions of increasing responsibility and authority with the company's products, directories, telephone operations and wireless groups.

She serves on the board of trustees for 180 Turning Lives Around, a non-profit organization dedicated to eliminating domestic violence.

Delehanty holds a bachelor's degree in psychology from Mount Holyoke College and a master's degree in business from the University of Texas at Austin.

Dr. Jasbir Dhaliwal

Executive Vice President for Research and Innovation
University of Memphis



As the chief research and innovation officer of the University, Dr. Jasbir Dhaliwal is responsible for the planning and implementation of the university's strategic research plan. He provides leadership to all efforts relating to the university's goal of being an

internationally recognized research institution with the highest level of research activity with a special focus on leading through innovation in relation to its urban metropolitan context. This includes serving as the executive director of the FedEx Institute of Technology which, as the front door to the university's research capabilities and infrastructure, pro-

motes interdisciplinary research clusters, corporate engagement and technology commercialization. He also leads strategic innovation priorities for the President's Office to modernize the university's academic and research culture. He provides strategic leadership to the University of Memphis Research Foundation in his role as its executive director and is the founding president of its wholly-owned innovation subsidiary, UMRF Ventures, Inc. Prior to these roles, he served the university as its Vice Provost of Academic Affairs and the Dean of the Graduate School, overseeing all aspects of the university's portfolio of 122 graduate programs that enroll about 4,500 graduate students in studies at the doctoral, masters and graduate certificate levels.

His research has appeared in scholarly journals such as *Information Systems Research*, *IEEE Transactions on Engineering Management*, *International Journal of Electronic Commerce*, *International Journal of Production Economics*, *Journal of Organizational Computing and Electronic Commerce*, *Knowledge Acquisition*, *Information & Management*, as well as in the proceedings of numerous international research conferences. He has also co-authored a book on E-Business Innovation that is published by Prentice-Hall/Pearson Education and has served as Program Chair of the Pacific Asian Conference on Information Systems.

His diverse international academic management experience includes: being the founding director of the first Canadian university-based research center/incubator for electronic commerce at the Technical University of British Columbia (now Simon Fraser University); serving as Deputy Director of the Centre for Management of Technology at the National University of Singapore; directing a graduate program in information management at the Norwegian School of Management in Oslo; and serving as Chair of the Department of Information Systems at Northern Kentucky University, where he launched an offering of the university's Master of Science in Information Systems program in Moscow, Russia. He has also served as Associate Dean for Research and Academic Programs of the Fogelman College

of Business & Economics, and prior to that, as the Chair of the Department of Management Information Systems at the University of Memphis.

He is also active internationally as an executive trainer and technology advisor, completing projects for organizations such as FedEx, the U.S. Department of Defense, Johnson & Johnson, Dehart Group, Medtronics, Unilever, Cynergy, Trans-link Logistics, Anderson Consulting, Ericsson Telecommunications, Sapura Advanced Systems, IBM, Port of Singapore Corporation, Norsk Hydro, Kontena Nasional, Alcatel Bell Shanghai, McDonnell-Dettwiler Canada, Guinness Anchor, Den Norsk Bank, Asia Pacific Institute for Information Technology, Canadian Federation of Innovation and the ASEAN-European Union Management Center.

His other interests focus primarily on modern immigrant narratives, post-national identities, nurturing global mindsets, and investing in new technology ventures.

Dr. Helene R. Dillard

Dean of the College of Agricultural and Environmental Sciences
University of California, Davis



Helene R. Dillard was appointed dean of the College of Agricultural and Environmental Sciences at UC Davis in January 2014. Dr. Dillard is the chief academic and administrative officer of the college and oversees fourteen departments, several centers and institutes with

more than 7,400 undergraduate students, 1,100 graduate students, 800 staff and 380 faculty. The College has achieved a No. 1 ranking in agriculture in the nation the past five years. Global challenges of food, health, ecosystems and human communities require concerted coordinated efforts to effect innovative and transformative solutions. Faculty expertise in the college lies at the nexus of many of the most pressing and critical crosscutting issues facing society. Dillard is actively developing the strengths of the college

in research, teaching, extension and outreach, and maintaining strong relationships with the broad range of stakeholders in California, nationally and globally.

In addition to her responsibilities as dean, Dr. Dillard has programmatic responsibilities for the college's Agricultural Experiment Station and Cooperative Extension. Dillard has national and international leadership experience, including invited consultations, presentations and scientific exchanges in Asia (China, Thailand, Singapore and Philippines), Central America (Honduras and Nicaragua), South America (Argentina, Brazil and Chile), the European Union (Netherlands, Sweden and United Kingdom) and Zimbabwe. She has collaborated extensively with U.S. Department of Agriculture programs and the National Institute for Food and Agriculture (NIFA).

Prior to her appointment at UC Davis, Dillard served on the faculty at Cornell University from 1984 to 2014 as a professor of plant pathology, carrying a 50 percent research and 50 percent extension assignment. Her research focused on the biology, ecology and management of fungal pathogens that cause diseases in vegetable crops. Her interests include sustainable disease management strategies, integrated pest management, epidemiology and host/pathogen/environment interactions. Dillard was recognized for her contributions in plant pathology by the American Phytopathological Society (APS), receiving the Excellence in Extension Award in 1992 and being named an APS fellow in 2006. She received the New York Farmers Medal and the Outstanding Faculty Award from CALS in 2013. While on the faculty at Cornell, Dillard served in leadership capacities as Chair of Cornell's Department of Plant Pathology in Geneva, as Director of Cornell Cooperative Extension for the State of New York, and as Associate Dean in the College of Agriculture and Life Sciences at Cornell and in the College of Human Ecology.

Helene Dillard was born and raised in San Francisco, California. She completed her B.S. degree in biology of natural resources at UC Berkeley, an M.S. degree in soil science at UC Davis, and a Ph.D. degree in plant pathology at UC Davis.

Mr. Frank Frontiera

Director of Supply Chain Operations
Verizon



Frank Frontiera is the Director of Supply Chain Operations at Verizon, responsible for manufacturing quality, capacity and operations for the Network and Fios products. He has 25 years of telecommunications experience encompassing center operations, special services, finance and supply chain.

Frank is currently driving sustainable manufacturing efforts by introducing post-consumer recycled (PCR) plastic into the build of Fios products. He is also looking to incorporate ocean-bound plastics along with the PCR to greatly reduce the amount of virgin plastic used in Fios routers and set-top boxes. Additionally, Frank is focused on removing all plastic packaging from Verizon's reverse supply chain processes.

With respect to risk mitigation, Frank has been driving the effort to move product manufacturing out of China in order to reduce tariff impact and geopolitical risk. He is also working with the DoD and DHS to identify and reduce hardware security risk for Verizon's network supply chain.

Frank holds a master's degree in data communications from Boston University and a bachelor's degree in Economics from the University of Massachusetts Lowell.

Dr. Michael Goodman

Professor of Public Policy, and
Executive Director, Public Policy Center
University of Massachusetts Dartmouth



Michael Goodman is Professor of Public Policy and Executive Director of the Public Policy Center at the University of Massachusetts Dartmouth. The Public Policy Center is the University's applied social science research, technical assistance,

and public service unit based in the College of Arts and Sciences and affiliated with its Department of Public Policy. An interdisciplinary applied public policy research and technical assistance provider, the Center seeks to inform evidence-based policy-making at the state, regional and local level through collaborative engagements with public, private and non-profit partners. Professor Goodman joined the faculty at UMass Dartmouth in 2009 after serving for eight years as the Director of Economic and Public Policy Research at the UMass Donahue Institute. Between 2009 and 2014, he served as the Chair of the Department of Public Policy and the Graduate Program Director of the Master of Public Policy (MPP) program. A leading analyst of the Massachusetts economy, he has authored or co-authored more than 50 professional publications on a wide range of public policy issues, including regional economic development and housing policy as well as demographic and other applied social science research topics. He has supported this research by generating more than \$5M in external grant and contract funding from a diverse array of public and private sources. An economic sociologist, Professor Goodman is a three time past president of the New England Economic Partnership, a nonprofit organization made up of leading regional analysts that produces semi-annual economic forecasts of the economic outlook for each of the six New England states. He currently serves as Co-Editor of *MassBenchmarks*, the journal of the Massachusetts economy published by the UMass Donahue Institute in cooperation with the Federal Reserve Bank of Boston. Dr. Goodman earned his MA and Ph.D. at Boston University.

Dr. Gary T. Henry

Dean of the College of Education and Human Development, and Professor, School of Education and the Joseph R. Biden, Jr. School of Public Policy & Administration University of Delaware



Gary T. Henry is dean of the University of Delaware's College of Education and Human Development and professor in the School of Education and the Joseph R. Biden, Jr. School of Public Policy & Administration.

A renowned researcher in the field of education, Henry specializes in education policy, educational evaluation, educator labor markets, and quantitative research methods. He has received more than \$27M dollars of sponsored research funding from the Institute of Education Sciences, U.S. Department of Education, Spencer Foundation, Lumina Foundation, National Institute for Early Childhood Research, Walton Family Foundation, John and Laura Arnold Foundation, and numerous state legislatures, governors' offices and agencies.

He is currently examining the effects of state efforts to reform their lowest performing schools. In Tennessee, he has evaluated the effectiveness of the state's Achievement School District and local Innovation Zones, finding the latter to have positive effects on student average achievement gains in all subjects over six years. In North Carolina, he recently evaluated the effects and implementation of the state's third round of reform of its lowest performing schools.

He has also published several articles on teacher preparation, including a study that finds Teach For America teachers to be effective in raising students test scores. Other research found negative effects on student achievement from teacher turnover, mainly due to teachers who leave during the school year.

Prior to joining UD in August 2019, Henry was the Patricia and H. Rodes Hart Chair and Professor of Public Policy and Education and Director of Graduate Studies in the Department of Leadership, Policy and Organization at Vanderbilt University.

He also held the Duncan MacRae '09 and Rebecca Kyle MacRae Distinguished Professorship of Public Policy in the Department of Public Policy and directed the Carolina Institute for Public Policy at the University of North Carolina at Chapel Hill.

A Kentucky native, Henry became a first-generation college graduate, earning bachelor's and master's degrees from the University of Kentucky before attaining a Ph.D. from the University of Wisconsin. From there, he began conducting evaluations for the Virginia General Assembly and ultimately served as the state's deputy secretary of education and chief deputy superintendent of education.

Ms. Ciannat Howett

Director of Sustainability Initiatives
Emory University



Howett became Emory's first Director of Sustainability Initiatives in 2006, managing a university-wide effort to ensure that Emory's actions and policies support environmental, social and economic systems that provide a healthy, productive and meaningful life for current and future generations. She is also an Adjunct Professor at Emory's Rollins School of Public Health.

Howett networks with and facilitates internal and external resources to the goals of Emory OSI. She leads the development, implementation and evaluation of sustainability initiatives across the University, while also building partnerships with surrounding communities and key Atlanta institutions.

Howett attended Emory University as an undergraduate, receiving her B.A. in 1987. She then worked in fundraising at Emory until 1989, and then earned a law degree from the University of Virginia. She practiced environmental law with Kilpatrick Stockton and the U.S. Environmental Protection Agency and served as Director of the Southern Environmental Law Center's Georgia and Alabama office. She is a frequent regional and national speaker on sustainability issues and serves on many community leadership boards and commissions.

Dr. Chauncy Lennon

Vice President for the Future of Learning and Work
Lumina Foundation



Workforce expert and New York-based leader in corporate philanthropy, Chauncy Lennon joined Lumina Foundation in the newly created role of vice president for the future of learning and work in 2018, helping build out new ideas to advance the foundation's attainment agenda.

Lennon came to Lumina after nearly five years as a managing director and head of workforce strategy at JPMorgan Chase & Co., where he drove the firm's \$350M investment in philanthropic initiatives. He previously led large portfolios of work at Ford Foundation related to economic advancement and workforce development. Since 2015, Lennon has served on the national advisory board of the College Promise Campaign, a nonpartisan national initiative to build public support for funding the first two years of higher education for working students, beginning with community colleges. He also serves on the New York City Workforce Development Board, providing oversight of the city's policies and services for youth, adult learners, job seekers and employers.

Lennon is a graduate of Williams College, where he earned a bachelor's degree in anthropology. He was awarded a master's in social sciences from the Uni-

versity of Chicago and a doctorate in anthropology from Columbia University. He taught urban studies at Barnard College and Columbia's School of International and Public Affairs.

Ms. Amy Lientz

Director for Energy Industry Supply Chain
Idaho National Laboratory



Amy Lientz is an executive with Idaho National Laboratory (INL) responsible for university, workforce and economic development, regional affairs, communications, governmental affairs and policy. She leads teams in Idaho Falls, Washington, D.C., and Boise.

Lientz has helped lead INL's transformation to a multipurpose laboratory fostering growth in energy research and national security interests by providing leadership in public policy; promoting and building upon INL STEM interests; leading public affairs and emergency communications; assisting in lab strategy; hosting visitors from around the globe; standing up a new events center; growing partnerships with industrial clients; and securing and nurturing relations with elected officials.

Prior to INL, she served as senior vice president of government, outreach and project management for CH2M Hill, where she successfully led high-profile projects in business development, energy siting, municipality projects, sustainability and waste management, and natural resource and restoration initiatives. She also held senior project management and research positions with Northrop Grumman and EG&G.

Her successful track record of managing difficult and "never-been-done-before projects" and attracting new multimillion-dollar business interests have led to long-term, trusted relationships statewide, nationally, locally and with partners in education, community and industry.

When her busy schedule allows, she enjoys guest lecturing on energy policy at universities and has developed and delivered curriculum for courses in industrial engineering and sustainability. When not working, you can find her fly fishing, skiing, rafting, hiking and golfing.

She is currently on the board for Idaho Public Television, McClure Policy Center, Idaho Technology Council, Idaho Falls City Club, Elks, The Nature Conservancy in Idaho and Idaho Business for Education.

Ms. Lientz earned a B.S. from Boise State University in environmental science, and an M.S. from the University of Idaho College of Engineering in industrial technology.

Ms. Stacy Lippa

Group Vice President, Food Supply Chain
Target



Stacy Lippa is Group Vice President, Food Supply Chain for Target. She oversees supply-chain optimization and holds fiscal responsibility for five Food Distribution Centers and for management of a third-party logistics provider. She builds strong partnerships across the enterprise to ensure efficient and consistent freight flow and proactively identify challenges. Previously, Stacy held various operational positions with escalating leadership roles at Target and led logistics, replenishment and supply chain initiatives.

Prior to joining Target in October 2002, Stacy was the General Manager for J&L Structural Steel, Crossmember Division, with responsibility for operational performance, fulfillment and transportation of semi-finished products and specialized structural steel beams.

Stacy earned a bachelor's degree in International Business/Marketing from Grove City College.

Dr. Kathleen Merrigan

Executive Director, Swette Center for Sustainable Food Systems
Arizona State University



Kathleen Merrigan is the inaugural Executive Director of the Swette Center for Sustainable Food Systems at Arizona State University and the Kelly and Brian Swette Professor of Sustainable Food Systems, with appointments in the School of Sustainability, College of Health Solutions, and School of Public Affairs. She came to ASU after four years as Executive Director of Sustainability at George Washington University, where she led the GW Sustainability Collaborative, GW Food Institute, and was Professor of Public Policy, with appointments in the schools of public policy and public health.

From 2009–2013, Dr. Merrigan served as U.S. Deputy Secretary and Chief Operating Officer of the U.S. Department of Agriculture, a \$150B, 110,000 employee institution. As Deputy Secretary, Dr. Merrigan created and led the Know Your Farmer, Know Your Food Initiative to support local food systems; was a key architect of First Lady Michelle Obama's Let's Move! campaign; and made history as the first woman to chair the Ministerial Conference of the Food and Agriculture Organization (FAO) of the United Nations. Before joining the USDA, Dr. Merrigan was a professor at the Friedman School of Nutrition Science and Policy at Tufts University, where she directed the M.S./Ph.D. Agriculture, Food and Environment Program. Her prior career includes a variety of agriculture policy positions, including Administrator of the USDA Agricultural Marketing Service and senior staff on the U.S. Senate Committee on Agriculture, Nutrition and Forestry, where she wrote the law establishing national standards for organic food.

Currently, Dr. Merrigan serves as Co-Chair for AGree, Board Director for the World Agroforestry Centre, Stone Barns Center for Food and Agriculture, Food-Corps, and Center for Climate and Energy Solutions (C2ES), as well as a Steering Committee member

for the United Nations Environment Programme-led initiative TEEB AgriFood. Dr. Merrigan is a partner in Astanor Ventures and an advisor to S2G Ventures, two firms investing in ag-tech innovations.

Recognizing the history and scope of her work, *Time Magazine* named Dr. Merrigan among the “100 most influential people in the world” in 2010.

Dr. Eric Rasmussen

CEO

Infinitum Humanitarian Systems



Eric Rasmussen is the CEO for Infinitum Humanitarian Systems (IHS), a multinational consulting group built on a profit-for-purpose model. He is an internal medicine physician with both undergraduate and medical degrees from Stanford University and a European

Master's degree in disaster medicine from the UN World Health Organization's affiliate CEMEC (Centre European pour la Medecin des Catastrophes) in Italy. He was elected a Fellow of the American College of Physicians in 1997 and a Fellow of the Explorer's Club in 2014.

Rasmussen is also a Research Professor in Environmental Security and Global Medicine at San Diego State University and has been an instructor in disaster medicine at both the International Disaster Academy in Bonn, Germany, and the Institute for Disaster Preparedness at Tsinghua University in Beijing. He holds an additional appointment as Core Faculty at Singularity University (within the NASA Ames Research Center) for Disaster Resilience and Global Health, focused on issues associated with Human Security and with a special interest in climate adaptation for vulnerable populations.

He served in the U.S. Navy for 25 years aboard nuclear submarines, amphibious ships and aircraft carriers. His positions included Joint Task Force Surgeon (Forward) for the Hurricane Katrina response, Team Lead for the Banda Aceh Tsunami Response from the Office of the Secretary of Defense, Fleet

Surgeon for the U.S. Navy's Third Fleet, director of an Intensive Care Unit, and Chairman of an academic department of medicine in Seattle.

While on active duty, Dr. Rasmussen was selected as a Principle Investigator by DARPA, the Defense Advanced Research Projects Agency. His work, on machine-based language translation, civil-military support to humanitarian operations, and soft-power operations for the reduction of social unrest in conflict zones, led to his selection as Principal Investigator of the Year for DARPA in 2003.

His wartime deployments included Bosnia three times, Afghanistan twice, and Iraq for nine months. Lessons from those deployments informed his Directorship of three international disaster response demonstrations called the Strong Angel series. Those events reproduced, in a remote setting, challenges faced by both civilian and military participants in both disasters and wars. Lessons from those events were later incorporated into civil legislation, DoD policy, and military training.

After retiring from the Navy, he was appointed the Founding CEO for the TED Prize awarded to Dr. Larry Brilliant, then Executive Director of Google.org.

Since 2014, Rasmussen has also led the Global Disaster Response Team for the Roddenberry Foundation, supported by the Star Trek franchise and in partnership with MIT's Lincoln Laboratories and Schweitzer Engineering Laboratories. That team provides permanent water purification and renewable power to displaced populations and has deployed to Super typhoon Haiyan in the Philippines, the Nepal earthquake, Hurricane Mathew in Haiti, and three times to Puerto Rico after Hurricane Maria.

He has an appointment as a Senior Fellow at the Rocky Mountain Institute with Amory Lovins, and serves pro bono as Chairman of the Board for two NGOs—one specializing in anti-slavery/anti-trafficking efforts for refugees and the recipient of the UN's ID2020 award in 2018, the other focused on outbreak epidemiology for One Health initiatives in Southeast Asia. He's a Permanent Advisor to the

UN Secretary-General's High-Level Expert Panel on Water Disasters and has been a member of the U.S. National Academy of Science's Committee on Grand Challenges in Global Development since 2012.

Mr. Jason Smith

President & CEO
Manhattan Area Chamber of Commerce



Smith most recently had worked since August 2015 at Norman (Okla.) Economic Development Coalition. NEDC is a joint effort of Oklahoma University, City of Norman, Moore Norman Technology Center and Norman Chamber of Commerce.

Smith was president/CEO for NEDC. His extensive economic development and Chamber experience extends to Abilene, Texas; Lincoln, Nebraska; and McAlester, Oklahoma. He spent nearly 10 years with the Lincoln Chamber as VP Economic Development and cooperated jointly with a 14-member oversight committee to Lincoln Partnership for ED, as well as President of the Abilene Chamber of Commerce, where he oversaw economic development, tourism and military affairs.

Smith has led award winning programs, including in 2012 when Business Facilities named Lincoln the top economic development program in the country and ACCE, Association of Chamber of Commerce Executives, named Lincoln as a national finalist for Chamber of the Year. He has served in a variety of leadership roles, including President of the Nebraska Economic Developers Council and on the board of the Oklahoma Economic Development Council.

He has a Bachelor's degree in Communication, Journalism and Related Programs from Cameron University.

Dr. James R. Stock

Co-Director, Monica Wooden Center for Supply Chain Management & Sustainability, and Distinguished University Professor and Frank Harvey Endowed Professor of Marketing
Muma College of Business
University of South Florida



James R. Stock is Co-Director of the Monica Wooden Center for Supply Chain Management & Sustainability and USF Distinguished University Professor and Frank Harvey Endowed Professor of Marketing at the University of South Florida. He was elected as an AAAS Fellow of the American Association for the Advancement of Science in 2017. Professor Stock was also the Fulbright-Hanken Distinguished Chair of Business & Economics at the Hanken School of Economics in Helsinki, Finland, on a flex Fulbright Award in 2016 and 2017. He has been an invited speaker on programs in more than 45 countries. He is the author or co-author of over 150 publications including books, monographs and articles. Professor Stock has co-authored several textbooks on supply chain management, logistics management and reverse logistics. He received the CSCMP Distinguished Service Award in 2011, Armitage Medal (1988) and the Eccles Medal (2003) from SOLE—The International Society of Logistics, and Lifetime Achievement Awards from the Reverse Logistics Association (2016) and Yasar University/IX International Logistics and Supply Chain Congress in Turkey (2011). His research interests include reverse logistics/product returns, supply chain sustainability and customer satisfaction. His background includes holding faculty positions at the University of Notre Dame, University of Oklahoma, Air Force Institute of Technology and Michigan State University. He received B.A. and M.B.A. degrees from the University of Miami (FL) and a Ph.D. from The Ohio State University.

Mr. Luke Tate

Associate Vice President and Executive Director, Opportunity Initiatives, Office of the President
Arizona State University



Luke Tate serves as associate vice president and executive director of opportunity initiatives at Arizona State University, leveraging emerging scientific and technological innovations to expand economic opportunity for all Americans. He is also professor of practice in ASU's School for the Future of Innovation in Society, a senior sustainability scholar at ASU's Julie Ann Wrigley Global Institute of Sustainability, and a non-resident fellow at the Urban Institute.

Professor Tate most recently served as Special Assistant to the President for Economic Mobility on the White House Domestic Policy Council, where he ran a team working on economic mobility, urban policy, poverty, technology and access to opportunity, open data, housing, homelessness, and long-term disaster recovery. He previously served at the U.S. Department of Housing and Urban Development (HUD) as senior advisor for urban policy, and as special assistant to the U.S. Secretary of Housing and Urban Development. Luke was a member of the Presidential Transition team. Prior to joining the Obama Administration, he worked on community policy in the Office of the Governor of Arizona. He grew up in central Phoenix, Arizona, and is a graduate of Harvard University.

Dr. Michelle R. Weise

Chief Innovation Officer
Strada Institute for the Future of Work, and
SVP, Workforce Strategies
Strada Education Network



Michelle R. Weise is Strada Education Network's Senior Vice President of Workforce Strategies and serves as Chief Innovation Officer for the Strada Institute for the Future of Work, which is dedicated to advancing understanding of the future of learning and work

to build the learning ecosystem of the future. Weise's research focuses on the future of the workforce and how to connect learners more directly to meaningful employment pathways throughout their working lives.

She is a senior adviser to Entangled Solutions and serves on the Commission on Digital Innovation and Lifelong Learning for Massachusetts Gov. Charlie Baker, the Commission on the Future of Higher Education for the American Academy of Arts and Sciences, and the education advisory board for Village Capital.

Before joining Strada, she designed and led the Sandbox CoLABorative, the innovation lab of Southern New Hampshire University. Earlier in her career, Weise was the senior research fellow in higher education at the Clayton Christensen Institute for Disruptive Innovation, vice president of academic affairs at Fidelis Education, and taught at Skidmore College and Stanford University. Her book, *Hire Education: Mastery, Modularization, and the Workforce Revolution*, co-authored with Christensen, describes the disruptive potential of online competency-based education aligned to workforce needs. Weise's commentaries and research have been featured in *The Economist*, *The Wall Street Journal*, *Harvard Business Review*, *Bloomberg Businessweek*, *The Boston Globe*, *Inside HigherEd*, *The Chronicle of Higher Education*, and on PBS Newshour. She is a former Fulbright Scholar and graduate of Harvard University and Stanford University.

Launch Conference Participant Bios

Working Group 3: Optimizing the Environment for the National Innovation System

Mr. Aditya Bhasin

CIO, Consumer & Small Business & Wealth Technology
Bank of America



Dr. Robert H. Bishop

Dean of Engineering, and Founder, President & CEO of the Institute of Applied Engineering
The University of South Florida



Dr. Bishop is the Dean of Engineering and the Founder, President & CEO of the Institute of Applied Engineering (IAE) at the University of South Florida, where he holds a full professor position in the Department of Electrical Engineering. He has been in academia for

29 years, including 20 years in leadership positions. Prior to academia, he was a member of the technical staff at the Charles Stark Draper Laboratory.

An entrepreneurial-minded academic leader, Dr. Bishop founded and leads the IAE as a research and education center of excellence dedicated to

seeking solutions to the security and economic challenges facing the nation. Building on a relationship fostered over the past three years with U.S. Special Operations Command, the IAE has a clear mission and vision that is captured in their motto *Ad veritatem velociter* (translated as “seeking truth at high velocity”).

As an active researcher and scholar, Dr. Bishop is a specialist in the area of systems theory, guidance and control of spacecraft, and navigation and estimation theory with applications across a broad range of aerospace challenges. His current research interests are in the area of small satellites, advanced navigation algorithm development with fast-to-flight characteristics, integrated navigation and guidance for planetary precision landing, and the development of navigation and communication strategies applicable to spacecraft formation constellations. He co-authors one of the world’s leading textbooks in control theory, and has authored two other textbooks, edited two handbooks, and authored/co-authored more than 135 journal and conference papers.

Dr. Bishop received his Ph.D. from Rice University in Electrical & Computer Engineering and his MS and BS from Texas A&M University in Aerospace Engineering. He is a Fellow of the American Institute of Aeronautics and Astronautics (AIAA), Fellow of the American Astronautical Association (AAS), and Fellow of the American Association for the Advancement of Science (AAAS).

Dr. Gerald C. Blazey

Vice President for Research and Innovation
Partnerships
Northern Illinois University



Gerald (Jerry) C. Blazey received his doctoral degree in experimental particle physics from the University of Minnesota in 1986. He is an author of over 500 papers and is a Fellow of the American Physical Society. Since joining Northern Illinois University

in 1996, he has been appointed a Distinguished Research Professor and Director of the Northern Illinois Center for Accelerator and Detector Development and has been a principle investigator for federally funded grants from the National Science Foundation, the U.S. Department of Energy (DOE), the U.S. Department of Education, and the U.S. Department of Defense.

Dr. Blazey has extensive experience in scientific administration and policy. While participating in the Fermi National Accelerator Laboratory collider program, he served from 2002 to 2006 as co-Spokesperson of the DZero collaboration comprised of more than 600 physicists from more than 20 countries. From 2007 to 2010, he was the Program Manager for the International Linear Collider in the Office of High Energy Physics at the DOE. More recently, from 2011 to 2014, he was the Assistant Director for Physical Sciences in the Office of Science and Technology Policy in the Executive Office of the President of the United States. Since 2015, he has served as the Vice President for Research and Innovative Partnerships at Northern Illinois University.

Dr. Branden Brough

Deputy Director, The Molecular Foundry
Lawrence Berkeley National Laboratory



Branden Brough is the Deputy Director of the Molecular Foundry, a U.S. Department of Energy (DOE) supported nanoscale science research facility at Lawrence Berkeley National Laboratory. As a national user facility, the Foundry provides cutting-edge

expertise and instrumentation to ~1,000 visiting researchers a year from academia, national laboratories and industry from around the world. In this role, Dr. Brough oversees the organization's operations, as well as the development of scientific plans and initiatives. Prior to joining the Foundry in 2013, Brough worked at the National Institutes of Health (NIH), where he led strategic policy and planning activities, as well as Congressional and public outreach efforts. Brough received his Ph.D. in Mechanical Engineering—focusing on micro/nanotechnologies—from UCLA before becoming a AAAS Science and Technology Policy Fellow in 2007.

Mr. Jim Carlisle

Senior Vice President, Federal Government Relations
Bank of America



Jim Carlisle is a Senior Vice President in the Federal Government Relations Department of Bank of America. In this role, Jim has responsibility for managing the bank's relationship with federal elected officials, working closely with business units to analyze

the impact of pending legislation, and developing strategies to promote public policies that benefit the bank's customers, associates and shareholders. Jim focuses primarily on tax issues.

Prior to joining Bank of America in 2008, Jim was a Director with the Federal Policy Group, a consulting firm representing businesses before Congress and the U.S. Department of the Treasury on federal tax legis-

lative and regulatory matters. From 1991 to 2002, Jim served in the Washington National Tax Services office of Price Waterhouse and PricewaterhouseCoopers, where he consulted with corporate tax executives and Washington representatives on emerging U.S. tax developments affecting businesses.

Jim began work in Washington in 1989 as a reporter and news editor with the Prentice Hall Information Network's *Daily Tax Update* and Prentice Hall's weekly *Tax Bulletin*, covering Congressional tax and budget developments. Jim was born in Greensboro, North Carolina. He has a B.A. and an M.A. in English from the University of North Carolina. He lives in Alexandria, Virginia, with his wife Kim and their three children, Grace, James, and John.

Dr. Russell Carrington

Chief Technology Transfer Officer
Lawrence Berkeley National Laboratory



Dr. Russell Carrington is the Chief Technology Transfer Officer of Lawrence Berkeley National Laboratory. In this role, Russell oversees Berkeley Lab's technology transfer activities, including managing the lab's IP portfolio of inventions and software, and

partnering with the private sector to commercialize the IP portfolio. He's also responsible for developing an entrepreneurial ecosystem for lab scientists and implementing commercialization programs funded by the U.S. Department of Energy and others.

Prior to Berkeley Lab, Russell co-founded a start-up developing thermal energy storage technology and headed operations at another start-up offering behavioral economics-inspired financial incentives for health and wellness. He started his career with a tour of duty with a management consulting firm.

Russell holds a Ph.D. in Mechanical Engineering, a certificate in Management of Technology from UC Berkeley, and a BS in Mechanical Engineering from Rice University.

Dr. Lee Cheatham

Director, Technology Deployment and Outreach
Pacific Northwest National Laboratory



Lee Cheatham has an extensive track record of leadership in advancing science, technology and commercialization in the U.S. Department of Energy national laboratory system, academia and private industry. He (re)joined Pacific Northwest

National Laboratory (PNNL) in 2017 as Director of Technology Deployment and Outreach, focusing on industrial partnerships to expand the economic impact of PNNL's science and technology.

Previously, Lee launched and led Brookhaven National Laboratory's (BNL) Office of Strategic Partnerships, where he expanded and diversified BNL's research portfolio and oversaw technology commercialization and economic development. Prior to BNL, he served as Chief Operating Officer and General Manager of Commercialization for the Bidesign Institute at Arizona State University. Lee also served as Executive Director of the Washington Technology Center, connecting Washington State companies with research institutions to promote economic growth.

Lee began his professional career at PNNL as a computer engineer and manager, including leading a \$40M-a-year, nationwide, joint industry-government research project addressing supply chain efficiencies. In the private sector, he has served as VP of worldwide engineering for a market-leading software company and launched businesses in commercialization consulting and software sales.

Lee holds degrees in electrical engineering: a Ph.D. from Carnegie-Mellon University, an MS from Washington State University and a BS from Oregon State University, where he is a member of the Academy of Distinguished Engineers. He serves on the National Science Foundation Director's Business and Operations Advisory Committee.

Ms. Ji Mi Choi

Associate Vice President, Entrepreneurship and Innovation, Office of Knowledge Enterprise Development
Arizona State University



Ji Mi Choi is an associate vice president at Arizona State University leading Entrepreneurship + Innovation in service to schools and units across the institution, and the greater community.

Previously, Ji Mi served in various fast-paced and evolving roles at New York University: early in her career at the Interactive Telecommunications Program at the Tisch School of the Arts before new media was new media; later at the Polytechnic University (now the Tandon School of Engineering at NYU), first serving as the chief of staff to the president and vice president for strategic initiatives, then later serving as the senior director of integration, leading the merger between the two institutions; and subsequently serving as the assistant vice president for global programs planning. Ji Mi has also served at the world-renowned Earth Institute at Columbia University, ultimately as chief of staff and assistant deputy director.

A long-time New Yorker by way of Seoul and an avid internationalist, Ji Mi has served in a leadership role for the United Nations Development Programme and in various capacities for numerous start-up organizations, both not-for-profit and for-profit (helping take a company public in the days of the dot-com boom), and has been involved in political campaigns.

Ji Mi serves on the board of the StartupAZ Foundation and numerous advisory boards locally and nationally.

Ji Mi received her B.A. in English literature and communications from Marymount Manhattan College and her M.S. in strategic communications from Columbia University.

Mr. Thomas Dailey

Founder
Dailey Strategic Advisors LLC



Tom Dailey is an innovative business strategist, policy pioneer and general counsel with more than 25 years of expertise in internet law and regulation focused on content and technology convergence, regulatory reform, cybersecurity, privacy and compliance in

the U.S. and abroad. With a unique ability to connect dots across the legal, regulatory and geopolitical landscape, he sees issues holistically and synthesizes complex matters to create a path that adapts to rapidly changing technology and regulatory environments, while providing pragmatic, results-oriented business and legal advice. He is a proven leader on the forefront of internet, security, supply chain, and 5G technology and policy development who builds consensus across organizations and industries. A creative and insightful thinker, he is a trusted advisor at the highest levels of business.

As Verizon's SVP and General Counsel for International, Tom was responsible for all legal, regulatory, policy and compliance matters affecting business operations outside the United States. He led a diverse team of more than 75 lawyers and professionals, located on five continents around the globe. Living in London for more than 3 years, Tom gained perspectives into the international cultural, political, trade and regulatory issues that drive business and policy. He helped lead a variety of new technologies to market, including international enterprise 5G. He also represented the company as a global spokesperson and developed responses to major geopolitical issues, including U.S.-China cybersecurity and trade relations issues and Brexit preparations.

Tom previously served as lead counsel to Verizon's Chief Strategy Officer as Vice President and Deputy General Counsel from 2010–2014. He provided strategic guidance in critical areas, including media convergence and content distribution, as well as on net neutrality and other key regulatory and policy

issues. To help protect the exponential growth of digital content, in 2011 he helped create and chaired the Center for Copyright Information, the first-ever, industry-wide collaboration between content owners and distributors focused on innovative anti-piracy awareness and education initiatives. He also developed and evolved Verizon's international public policy function, working with the U.S. State and Commerce Departments and major international regulatory bodies, including the ITU and ICANN, among others.

As General Counsel for Verizon Online from 1998–2006, Tom played a key role in driving the rapid growth of the company's start-up internet access and ISP services from 40,000 dial-up subscribers to more than 6M broadband customers. He served as lead counsel on every major transaction and reviewed cutting-edge product development efforts. During this pivotal time, Tom recognized the need for a corporate voice in the creation of national internet policy and regulation. He helped develop Verizon's internet public policy practice and co-founded and served as Chair of the U.S. Internet Service Provider Association to assist in shaping laws and policies with a focus on cybersecurity, online safety, and data protection for the then nascent internet.

Throughout his career, Tom has focused on understanding the business and technologies that underlie the policies on which he advocates, which allows him to distill and communicate complex information to a variety of audiences. He is a frequent public speaker around the world on topics including the 5G industrial revolution, regulatory reform and technology convergence. He has testified before Congress three times on copyright and internet safety issues and has been deeply engaged with law enforcement regarding online child protection.

Tom and his wife Mia have two adult sons. An avid outdoorsman, he has climbed Mt. Rainier and enjoys cycling, tennis, back-country skiing and traveling to out-of-the-way locations around the world to learn more about global cultures.

Dr. Peter K. Dorhout

Vice President for Research
Kansas State University



Dr. Peter K. Dorhout serves as Professor of Chemistry and Vice President for Research at Kansas State University, where he had also served four years as dean of the College of Arts & Sciences. Prior to coming to Kansas State in 2011, he served as the Interim

Provost at Colorado State University-Pueblo, preceded by 20 years at Colorado State University-Fort Collins as Vice Provost for Graduate Studies, Assistant Vice President for Research and Professor of Chemistry. He has served as a collaborator at Los Alamos National Laboratory since 1987.

He has led professional organizations and foundations as a member of the Boards of Directors for the American Chemical Society, where he was the 2018 President; the Research Corporation for Science Advancement; the Kansas State University Research Foundation; Colorado Nanotechnology Alliance; and the Coronado Council BSA Executive Board.

He is a recognized expert in solid state and nuclear materials science and environmental chemistry. He has had active research programs in solid-state f-element and radiochemistry, and nanomaterials science. He has published more than 120 peer-reviewed journal articles, book chapters and reviews, while presenting more than 130 international and national invited lectures on his chemistry.

Dr. Dorhout earned a bachelor's degree in chemistry from the University of Illinois at Urbana-Champaign and a doctorate in inorganic chemistry from the University of Wisconsin-Madison. His list of professional awards includes Fellow of the American Chemical Society, Fellow of the American Association for the Advancement of Science, Research Corporation Cottrell Scholar, Camille Dreyfus Teacher-Scholar, A. P. Sloan Foundation Fellow, National Science Foundation CAREER Fellow, and the ACS-ExxonMobil Faculty Award in Solid State Chemistry.

Ms. Laure Bachich Ergin

Vice President and General Counsel
University of Delaware



Laure Bachich Ergin joined the University of Delaware in 2010 and was appointed Vice President and General Counsel in November 2015. Prior to joining the University of Delaware, she served for 13 years as an attorney in the General Counsel's Office at Drexel

University, also serving for four of those years as Drexel's chief compliance officer.

Laure is an arbitrator for the Philadelphia Court of Common Pleas, has lectured for Drexel's School of Education, and is a member of the Philadelphia Bar Association, the National Association of College and University Attorneys and the Association of Governing Boards. She earned her undergraduate and law degrees from Saint Louis University.

Mr. Bill Johansen

Senior Advisor to the Deputy Laboratory Director
Lawrence Berkeley National Laboratory



Bill Johansen is currently Senior Advisor to the Deputy Laboratory Director at Lawrence Berkeley National Laboratory (LBNL).

A proud second generation UC employee, Bill first started working at LBNL in 1987 as a student assistant in the Technical Information

Department when he was a junior in high school. He continued to work in various positions while attending UC Berkeley, where he received a BA in Political Science in 1991. In 1993, he left LBNL to work in Washington, D.C., first on Capitol Hill and later as Deputy Director for the Council of State Administrators of Vocational Rehabilitation. When he returned to California in 1996, he returned to LBNL, initially supporting the Life Sciences Division Director before taking on a series of new roles, including Manager of the Biosciences Proposal Development Center, Senior Business Manager and Division Dep-

uty for Operations of the Life Sciences Division. He was named Senior Advisor to the Deputy Laboratory Director in 2012.

Bill served from 2004–2006 as LBNL's delegate to the Council of UC Staff Assemblies (CUCSA). He also served as the Chair of CUCSA's Policy and Procedures Committee from 2005–2006. In 2006, he was unanimously elected to serve on CUCSA's executive board, one year as Chair-Elect followed by a year as Chair. During his tenure in CUCSA's leadership, the Council focused its efforts on vital issues to the University, including examining staff diversity as well as looking at succession planning through leadership training. In 2007, Bill served as the inaugural CUCSA representative to the UC Staff Diversity Council.

In 2007, Bill was appointed by then-UC President Bob Dynes to serve as 2007–2009 Staff Advisor to the Regents. During his time as Staff Advisor, the scope and role of the Staff Advisor continued to grow including by expanding its presence on additional permanent and ad hoc Regental Committees, such as Long Range Planning.

Bill continues to be very proud of the opportunities he had to provide a voice for staff to the entire University community during his time with CUCSA and also as Staff Advisor to the Regents.

Dr. Robert K. Kazanjian

Asa Griggs Candler Professor of Organization and Management, and
Senior Associate Dean for Strategic Initiatives
Emory University



Robert K. Kazanjian is the Asa Griggs Candler Professor of Organization and Management, having served on Emory University's Goizueta Business School faculty for more than 30 years. Prior to his appointment at Emory, Rob was a faculty member at the

Graduate School of Business, University of Michigan. More recently, he was a Visiting Professor at the Amos Tuck School of Business at Dartmouth

College. He is currently serving as Senior Associate Dean for Strategic Initiatives, and earlier served as Interim Dean and Vice Dean for Programs at Goizueta. Rob received his Ph.D. in Organization and Strategy, as well as an MBA from The Wharton School of the University of Pennsylvania. He has a BA in economics (with honors) from Hamilton College.

Rob has authored a number of articles in such journals as *Management Science*, *Strategic Management Journal*, *Academy of Management Journal*, *Academy of Management Review*, *Journal of Business Venturing*, and the *Organization Studies*. He is the co-author of *Strategy Implementation: Structure, Systems and Process* with Jay R. Galbraith (West Publishing) and co-editor of *The Search for Organic Growth* with Ed Hess (Cambridge University Press). Since 1999, he has received 15 Teaching Excellence awards from MBA and Executive MBA students at Goizueta. Rob is a member of the editorial board of the *Strategic Management Journal* and previously was on the editorial board of the *Journal of Business Venturing*. He is also a member of the Strategic Management Society and of the Academy of Management.

His research interests center broadly on the interface of strategic intent and organization design. This includes issues of organizational capability creation, innovation processes and entrepreneurship. He has a continuing research interest in the organizational issues associated with growth in firms at early stages of development. This has extended into the role of founder background and experience in the success of new enterprises.

Rob has consulted and done executive education work in the areas of strategy, strategic change, organization design and innovation with firms such as General Electric, General Motors, The Home Depot, Boston Scientific Corporation, Goldman Sachs, Honeywell, Singapore Airlines, IBM, Acer, Westinghouse, Abbott Labs, Exxon, SunTrust, Lockheed Martin, International Paper, Tyco and Siemens North America. He has regularly taught in senior executive programs across the United States, as well as in Asia.

Ms. Vickie Lonker

Vice President, Global Networking Product Management
Verizon Business Group



Victoria Lonker is the Vice President of the Product Management organization responsible for delivering global products on and above the network layer leveraging technologies such as 4G/5G, internet, MPLS, wave and ethernet. Her portfolio supports all routes to business markets—Public Sector, Enterprise, Small Business and Wholesale—and encompasses wireless/wireline connectivity, wireless business products (including Private LTE, 5G mobile and 5G fixed wireless access), Edge Solutions, and managed and virtualized services, including SDN and Software Defined Perimeter. Her team of outstanding humans have innovation and life-cycle responsibilities for these portfolios and deliver integrated service offerings to enable business outcomes for Verizon Business Group customers.

Prior to this role, Vickie held other Product Management roles, including VP Integrated Network & Security Solutions, Executive Director of Network & Virtual Services, and Director of PIP, SCI, Mobile Private Network and Access. Vickie's career has included leadership roles in Product Management, Finance (Pricing & Contract Management), Solutions Architecture/Deal Development (GID), Marketing, Sales and Sales Engineering. Her tenure at GTE and Bell Atlantic included roles in Customer Network Engineering, Network Planning, Transmission Engineering & Switching Engineering.

Dr. Sorin Lungu

Professor, National Security and Industrial Base Department, Eisenhower School of National Security and Resource Strategy
National Defense University



Dr. Sorin Lungu is a Professor in the Department of National Security and Industrial Base at the Eisenhower School of National Security and Resource Strategy at the National Defense University (Washington, D.C.). During August 2010–July 2017, he was

the faculty lead for the Aircraft Industry Study program (where he taught also Industry Analytics and the International Comparative Defense Business Environments modules). He also developed and leads (since fall 2010) the (Indo-Pacific focused) Long-Term Strategy electives concentration program, where he teaches courses in diagnostic net assessment, defense strategic planning, military technology diffusion and Asian defense markets dynamics, and directs research. He served as the Chair of the Department of National Security and Industrial Base during August 2017–July 2019, when he advised, led and implemented the redesign and refocus of the Industry Studies program and Industry Analysis course in support of the strategic imperatives of the 2017 NSS and 2018 NDS. During AY 2019-2020, he will serve as an HOE on a detail at the Pentagon supporting the J7 Joint Force Development Directorate.

Before joining the National Defense University in October 2006, he previously taught at the U.S. Air War College in the Department of Joint Military Operations (July 2005–October 2006). He earned his Ph.D. in International Affairs from the Fletcher School of Law and Diplomacy at Tufts University (1999–2005), with a dissertation titled *European Defense Market Integration: The Aerospace Sector in 1987–1999*. He holds an MA in National Security Affairs (Western Europe concentration) from the U.S. Naval Postgraduate School at Monterey (1997–1998) and a BS/MS in Mathematics from the University of Bucharest, Romania (1987–1992).

A naturalized U.S. citizen, he also attended the Vienna-based Austrian Diplomatic Academy (1994–1995) and was awarded research fellowships by the WEU Security Studies Institute (Paris, 2001) and the Konrad Adenauer Foundation (Germany, 2001–2002). He was a fellow in MIT's Seminar XXI program (September 2007–May 2008). During 2006–2018, he was a member of the London-based International Institute for Strategic Studies. His articles appeared in *The RUSI Journal*, *Comparative Strategy*, *Defense and Security Analysis*, *American Diplomacy*, and *Strategic Insights*. From 1992–1994, he was a broker at the Romanian Commodities Exchange (Bucharest), and then a member of the Romanian diplomatic corps (1994–1998). During the 2012–2013 academic year, he was on sabbatical as a William C. Foster Fellow with the U.S. Department of State (in the Regional Security and Arms Transfer Office, Bureau of Political Military Affairs). He participated in the 2013 SAIS Hertog Summer Study and completed executive education programs focused on global strategic management (Harvard Business School) and competitive strategies (Wharton School of Business). He has very good working proficiency in German and French.

Dr. Cheryl Martin

Founder
Harwich Partners



Dr. Cheryl Martin currently leads Harwich Partners, a consulting firm she founded to engage public and private sector entities on implementing solutions for complex problems, especially those related to energy, sustainability, urban development and technology adoption. Until November 2018, she was a member of the Managing Board at the World Economic Forum, where she was responsible for a range of business and innovation initiatives. Previously, Dr. Martin served as the Acting Director of the U.S. Department of Energy (DOE) Advanced Research Projects Agency–Energy (ARPA-E). In addition, she was the Deputy Director for Com-

mercialization at the agency where she developed the Technology-to-Market program, which helps breakthrough energy technologies succeed in the marketplace.

Prior to joining ARPA-E, Dr. Martin was an Executive in Residence with the VC firm Kleiner Perkins Caufield and Byers, and interim CEO of Renmatix, a start-up company focused on renewable materials. She also spent 20 years with Rohm and Haas Company in roles ranging from technology development to finance and business management and where, most recently, she had been the General Manager for the Paint and Coatings business in Europe, Middle East and Africa.

Dr. Martin earned a B.A. in chemistry from the College of the Holy Cross and went on to earn a Ph.D. in organic chemistry from MIT. She is a non-resident Fellow at the Center on Global Energy Policy at Columbia University. Dr. Martin serves on the board of Enbala, an early stage company focused on making the electric grid more sustainable by harnessing the power of distributed energy.

Ms. Christina P. Orsi

Associate Vice President for Economic Development University at Buffalo



Christina Orsi serves at the Associate Vice President for Economic Development at the University at Buffalo (UB). UB is among the largest and most comprehensive research Universities in New York State. Bringing strong leadership skills and more than two decades

of experience, she guides university-wide economic development efforts. Orsi oversees the Business and Entrepreneur Partnerships office to help businesses connect with UB researchers and resources, and leads UB's technology commercialization, all with a goal of having a positive impact on the region's innovation economy. Her portfolio at UB includes: leading technology transfer, entrepreneur support services, including an investment fund and incubators, as well as several technology centers focused on academ-

ic-industry collaboration. The Centers include Buffalo Institute for Genomics and Data Analytics, New York State Center of Excellence in Bioinformatics and Life Sciences, and New York State Center of Excellence in Materials Informatics.

Prior to joining UB, she provided strategic direction for the Western New York Regional Economic Development Council and played an integral role in NYS State Governor Cuomo's Buffalo Billion economic development plan. Both initiatives focused on building Western New York's economy in three targeted industry sectors advanced manufacturing, life sciences through strategic investments in workforce development, smart growth and entrepreneurship.

Her leadership as Regional Director of WNY Empire State Development was instrumental in attracting new businesses, encouraging entrepreneurial ventures, focusing job training and transforming the region by capitalizing on its assets. During her tenure at Empire State Development, she oversaw more than \$1B in New York State financial assistance to leverage \$8B in private investment and help create and retain more than 12,000 jobs. Notable projects include the launch of 43 North, the nation's largest business plan competition, and Buffalo Manufacturing Works, a one-stop shop to help manufacturers grow through innovation, process improvement and launching the Better Buffalo Fund to support revitalization in distressed areas.

Prior to Empire State Development, Orsi was part of the leadership team at Buffalo Niagara Enterprise, a regional business attraction development organization, where she helped companies including GEICO, Yahoo, Fed Ex Trade Networks, New Era Cap Company and Citicorp to invest and grow in Western New York.

Buffalo Business First has recognized Orsi as a "Woman of Influence" in the public policy category and, for the past four years, also has named her to its Power 250 list, an annual ranking of influential people who live and work in Western New York.

Orsi serves on the boards of 43 North, Excelsior Growth Fund, Evans Bank, Invest Buffalo/Niagara and The Racial Equity Roundtable. She holds an MS

in public affairs and urban planning from the University at Buffalo and a BA in political science from Fredonia.

Mr. Greg Pellegrino

Principal, Customer & Marketing Strategy
Deloitte Consulting LLP



Greg Pellegrino designs breakthrough business strategies for public sector clients and for private industry entering and operating in the public sector. Leaders from Capitol Hill to the global C-Suite know Greg as a business innovator and seek out his creative insights

to address persistent and emerging challenges, from national security to economic competitiveness.

Greg is a Customer Strategy & Applied Design Principal at Deloitte Consulting, LLP, and serves as the Lead Client Service Principal responsible for Deloitte's relationships with the U.S. Department of Veterans Affairs (VA) and the White House. Greg is also leader of the Government & Public Service industry election planning and government relations liaison to Deloitte's Policy & Government Relations office in Washington, D.C. With more than 35 years working with clients in government and private industry, his roles include responsibility for business operations, client delivery and business performance. He focuses on helping his clients navigate complexity, boost performance and anticipate change.

Greg's work shifts paradigms, driving performance improvements with models that break the mold and answering uncertainty with entrepreneurial endeavor. He has led large-scale, system-wide transformation efforts in critical areas such as public safety, cybersecurity, transportation, and counter-terrorism. Greg helped to redesign and consolidate the civil aviation security systems for the U.S. government after 9/11, and his team was also tasked with leading the creation of the web portal for the U.S. Department of Homeland Security.

In 2016, Greg led a team serving the VA in an effort to create a Chief Veteran Experience Office, along with the accompanying strategy to transform the VA to become more veteran-centric through improved veteran customer experiences.

Throughout his career, Greg has demonstrated a rare ability to take a strategic, systems-based approach to big, complex issues in order to mitigate risk, improve governance and break new ground. He has helped to remodel highway and motor-vehicle transportation systems across the nation to shorten wait times and save human lives. His contribution to the overhaul of the national organ transplantation system received the prestigious Smithsonian Award for the application of technology to the public sector. A coalition of leading philanthropists engaged Greg to develop a strategy for community-based approaches to safe drinking water. He was also a pioneer in early efforts at e-government and helped to bring the nation's classrooms online.

Greg has earned a deep appreciation for the dynamics of the public sector, the opportunities it presents and the resilience it requires. He has written widely on the theme, advising companies and governments around the world on political and economic shifts. As Chairman of the Board of Directors of the Homeland Security and Defense Business Council, Greg helped strengthen the role of private industry in meeting the needs for national security and disaster response; and for the Council for Excellence in Government, he co-chaired a group for the U.S. Department of Homeland Security to look at privacy and security issues from the citizen's perspective. He has also played a key role in establishing Deloitte's own presence in the federal market.

As a leader, Greg takes a collaborative, consensus-driven approach, always challenging teams to get beyond polarizing issues so they can focus on the choices they have to make. He attracts and mentors high potential, diverse professionals who seek to create their own impact on the market and the world.

Greg has advised both business and governments on how to gain advantage from changing talent demographics and presented his research on the economics of women in the workforce at such places as Harvard University and the United Nations.

He always challenges the teams he leads as well as the clients he serves to define the leading edge and create what's next.

Dr. Kenneth E. Poole

Chief Executive Officer/President

Center for Regional Economic Competitiveness



Dr. Kenneth (Ken) E. Poole is the Chief Executive Officer of the Center for Regional Economic Competitiveness. Dr. Poole has managed economic development research, analysis and technical assistance efforts for 35 years.

Dr. Poole co-founded CREC in

January 2000 as an independent non-profit focused on assisting policy-makers use data to develop a stronger understanding of how state and regional economies can compete effectively in the evolving, knowledge-based economy.

Dr. Poole manages the organization's strategic planning, information sharing, research and professional training activities, including the development of customized training in regional economic research techniques. At CREC, he has assisted in dozens of research, planning and technical assistance consulting projects for clients across the United States, including:

- **National foundations** (e.g., Pew Charitable Trusts, Ewing Marion Kauffman Foundation, Lumina Foundation, Laura and John Arnold Foundation, U.S. Chamber of Commerce Foundation);

- **Federal economic and workforce development agencies** (e.g., U.S. NIST Manufacturing Extension Partnership, U.S. DoD Office of Economic Adjustment, U.S. Economic Development Administration, Appalachian Regional Commission, U.S. Treasury Department, U.S. Census Bureau, U.S. Bureau of Economic Analysis);
- **State economic and workforce development agencies** (e.g., Arizona Commerce Authority, North Carolina Department of Commerce, Georgia Governor's Office of Workforce Development, Louisiana Economic Development, Pennsylvania Department of Labor & Industry, Virginia Economic Development Partnership, Wisconsin Economic Development Corporation);
- **Regional economic and workforce development organizations** (e.g., 7 Rivers Regional Alliance WI, Centralina Council of Governments, Momentum West Wisconsin EDC, Nashville Area Chamber of Commerce, Western Piedmont (NC) Council of Governments, Texoma Regional Consortium, Roanoke Valley-Allegheny (VA) Regional Council);
- **Educational institutions** (e.g., Henry Ford Community College, Catawba Valley Community College, Western Iowa Technical and Community College, University of North Carolina); and
- **Local government agencies** (e.g., Erie County PA Planning, City of El Paso Planning and Economic Development, Knox County Metropolitan Planning Organization).

In those projects, Dr. Poole has conducted quantitative and qualitative analyses of economies and program impacts and facilitated strategic leadership planning sessions, as well as provided technical assistance on economic and workforce development program design and strategy.

As Executive Director of the national nonprofit membership organizations, the Council for Community and Economic Research (C2ER), the Labor Market Information Institute, the Association of Public Data Users and the Projections Managing Partnership, Dr. Poole oversees all program development activities, including information dissemination about news related to the federal statistical agencies, and the development of research and professional training activities, as well as organizing national conferences for the different professional networks. Building on his vision and leadership, C2ER and the LMI Institute have become national leaders in providing regional economic analysis training to economic and workforce development analysts serving federal, state and local agencies. At the same time, APDU has become a national resource for the federal statistical system.

Before establishing CREC, Dr. Poole served six years as the Director of Domestic Economic Development for the National Association of State Development Agencies and eight years as the Director of Technical Assistance and Research for the National Council for Urban Economic Development (now the International Economic Development Council). He serves on the editorial board of *Economic Development Quarterly (EDQ)* and on the Bureau of Labor Statistics' Data Users Advisory Council. In 2017–2018, Dr. Poole edited a special issue of the *EDQ* focused on manufacturing policy issues. Dr. Poole also speaks frequently to national and state-level audiences of policy-leaders and economic development professions on the challenges of data-driven regional economic planning and development. Ken obtained

a Doctor of Philosophy degree in Public Policy with a concentration in Regional Development Policy from George Mason University, a Master in Public Administration degree from American University and a Bachelor of Arts degree from UNC at Chapel Hill. In 2016, he received the Innovation in Local Employment Dynamics Award from the U.S. Census Bureau.

Ms. Irene Qualters

Associate Laboratory Director for Simulation and Computation
Los Alamos National Laboratory



Irene Qualters serves as the Associate Laboratory Director for Simulation and Computation at Los Alamos National Laboratory. She is responsible for directing programs that provide cutting-edge tools to guide and interpret experiments and further

the fundamental understanding and predictive capabilities of complex systems.

Prior to her tenure at Los Alamos she served in leadership roles at the National Science Foundation (NSF). In her nearly nine years at NSF, she had responsibility for developing NSF's vision and portfolio of investments in Advanced Cyberinfrastructure to enable science and engineering at the frontiers of research. She also played a leadership role in interagency, industry and academic engagements to advance computing.

Prior to her NSF career, Irene had a distinguished 30-year career in industry, with a number of executive leadership positions in research and development in the technology sector. During her 20 years at Cray Research, she was a pioneer in the development of high performance parallel processing technologies to accelerate scientific discovery. Subsequently as Vice President, she led Information Systems for Merck Research Labs, focusing on international cyberinfrastructure to advance all phases of pharmaceutical R&D.

Dr. M. David Rudd

President

University of Memphis



Beginning his sixth year as president, Rudd's tenure has witnessed record-breaking improvements in student retention and graduation rates. He has spearheaded efforts to create a new division of Student Success; developed the University's first integrated enrollment, retention and graduation plan; and offered need-based funding for the first time in U of M history. Rudd has led efforts to grow community partnerships, including the LiFE: Learning Inspired by FedEx program, which offers eligible FedEx Hub employees a chance to earn a potentially tuition-free degree

online; the UMRF Research Park; and launched UMRF Ventures, a private company held by the U of M Research Foundation. Ventures hosts several FedEx Call Centers, a data analytic center, and an IT command Center. It employs 300 students, and its gross revenue approached \$4M in only its second year. The U of M set a record for total fundraising in his first year at \$37.9M and broke that record this past year, with a total over \$41M. The last two years have seen consecutive records for academic fundraising at \$23M and \$26M. During a five-year period, \$164M has been raised. More than \$500M is being invested on campus and in the University Neighborhood District (more than \$140M in private funds). Under Rudd's leadership, the campus has continued to expand, with the Laurie-Walton Family Basketball Center; the nearly-completed Pedestrian Cable Bridge, Parking Garage and Plaza; and the forthcoming Scheidt Family Music Center and Center for Wellness and Fitness. He has a bachelor's degree from Princeton and master's and Ph.D. degrees in psychology from the University of Texas.

Ms. Sara Sutton

Founder and CEO
FlexJobs



Sara Sutton has long been passionate about helping people find jobs. She started her career in 1995 when she co-Founded Job-Direct, the first online entry-level job service (sold to Korn|Ferry International in 2000), and for the past 12+ years, she has been the

CEO and Founder of FlexJobs, the leading service for professional remote and flexible job opportunities.

Sutton is an expert and speaker on a wide variety of topics related to the future of work, such as the impact of remote work, the hybridization of the workforce (freelance v. employee), gender equity, economic development, unemployment and underemployment, and entrepreneurship. On these topics, she has appeared in hundreds of media pieces, including with *Time*, *Marketplace Money*, *The Wall Street Journal*, Fast Company, CNN, NBC, Forbes, Inc., and many others.

Sutton believes a modern workplace should address the needs of today's workforce, and that utilizing workplace technology to support telecommuting, freelance, part-time and flexible work will achieve societal, environmental and economic benefits for both employees and employers. As a result, she is committed to providing education and awareness about the viability and benefits of

remote working and work flexibility. So in addition to FlexJobs, she has also launched an advocacy initiative, 1 Million for Work Flexibility; a resource for integrating remote work into business models, Remote.co; and The TRaD* Works Forum (*Telecommuting, Remote, & Distributed), a conference that brings together thought leaders, policy makers and organizations looking to further leverage the diverse benefits of remote and distributed teams.

For her work in the employment and technology fields, she was named as a Young Global Leader (YGL) by the World Economic Forum and is honored to serve on the Advisory Group for the YGL program. Sutton holds a BA in Society, Technology, and the Environment from the University of California at Berkeley and resides in Boulder, Colorado, USA.

Ms. Anne Tucker

Professor of Law
Georgia State University



Anne Tucker, Professor of Law, researches corporate law, recently focusing on issues related to institutional investors and retirement investors. Tucker's research focuses on how pooled investments are regulated, but also on their power to achieve important personal and social ends, such as retirement security and private funding for social entrepreneurship.

Her most recent work incorporates traditional empirical methodologies, as well as new techniques available through data science (Legal Analytics). Professor Tucker's current projects examine impact investing contract terms and cash flows, Index ESG funds, investment companies' risk and investment strategy disclosures, and text mining docket sheets to understand litigation pathways. Professor Tucker has published more than 20 book chapters and articles, including in journals such as *Harvard Business Law Review*, the *Yale Law Journal: Forum*, *Journal of Corporate Law*, and the *Columbia Business Law Review*.

Professor Tucker serves as the Faculty Director of the Legal Analytics & Innovation Initiative (LAI) at the College of Law. Through the LAI, Professor Tucker teaches innovative courses on law and technology, including the Applied Legal Analytics Lab, which is a part of the Legal Analytics Certificate. Professor Tucker conducts onsite workshops and information audits for community legal partners, as well as engages in sponsored research through the Legal Analytics Lab in partnership with the at the J. Mack Robinson College of Business Institute for Insight. She has a secondary appointment with the Institute for Insight.

Dr. Rao Unnava

Dean of the UC Davis Graduate School of Management
University of California, Davis



Dean and Professor H. Rao Unnava's research focuses on issues related to brand loyalty, consumer response to advertising and sales promotions, and consumer memory. His work has appeared in the *Journal of Marketing Research*, *Journal of Consumer Research*, *Marketing Letters*, *Personality and Social Psychology Bulletin*, *Journal of International Consumer Marketing* and *Advances in Consumer Research*. He is on the editorial review boards of the *Journal of Consumer Research* and *Journal of Consumer Psychology*.

Unnava's teaching experience includes courses at the undergraduate and graduate levels, including marketing management and strategy, marketing research, consumer behavior, promotional strategy, human memory processes and international marketing. He was named Outstanding Undergraduate Teacher by the student chapter of American Marketing Association seven times, won the Westerbeck Undergraduate teaching award twice and was awarded the Bostic-Georges service award in 2014.

Unnava joined the Graduate School of Management in June 2016 following 32 years at The Ohio State University's Fisher College of Business, where he earned his Ph.D. and most recently served as the W. Arthur Cullman professor of marketing. At the Fisher College of Business, Unnava also served as the associate dean of undergraduate programs, associate dean of executive education and director of doctoral programs in business.

Unnava is also one of the founders of Angie's List. He is on the board of directors of the American Marketing Association and serves on the board of the Bay Area Council, the largest business-centric public policy organization in the San Francisco region

Unnava earned his Ph.D. in business administration from The Ohio State University's Fisher College of Business, his Post Graduate Diploma in management from the Indian Institute of Management Calcutta, and his B.Tech. in electronics engineering from Jawaharlal Nehru Technological University.

The Honorable Olin Wethington

Founder and Principal
Wethington International LLC



An expert in economic policy, Wethington has served in a variety of senior positions in the U.S. Treasury Department, including special envoy on China in 2005, counselor to the secretary of the treasury and assistant secretary for international affairs. In addition,

he was director of economic policy for the Coalition Provisional Authority in Baghdad, Iraq, special assistant to the president and executive secretary to the Economic Policy Council (President George H.W. Bush), and deputy undersecretary for international trade at the U.S. Department of Commerce.

Wethington is a member of the Council on Foreign Relations, the author of various publications on financial markets and recipient of the Alexander Hamilton Award, the highest honor of the U.S. Department of the Treasury. He currently heads an investment and business advisory firm and is also a Senior Fellow at the Atlantic Council and its Scowcroft Center for Strategy and Security.

Ms. Julie Meier Wright

Strategic Advisor
Collaborative Economics



Julie Meier Wright is the retired chief executive of the San Diego Regional Economic Development Corporation, formerly California's first Secretary of Trade & Commerce and a member of Governor Pete Wilson's Cabinet. She is a Senior Fellow of the Council on

Competitiveness and the California Council on Science & Technology.

Since her retirement in 2011, she has consulted on public affairs, marketing and advocacy, serving as Strategic Advisor to Collaborative Economics of San Mateo, California, and for five years as a consultant to the California Council on Science & Technology. With the founder and chairman of Collaborative Economics, she conceived the California Economic Summit, now in its ninth year. She is an advisor to the Okinawa Institute of Science & Technology and, earlier, to the STS forum, both founded by Japan's former Minister of Science & Technology Koji Omi.

She is currently CEO of a San Diego start-up spun out of the University of California San Diego Supercomputer Center, Integrative Insights, that provides deep data analytics, and is an advisor to Ceresti Health, a San Diego startup that provides technology, coaching and analytics to empower family caregivers for dementia and Alzheimer's patients.

She currently serves on the Board of Directors of Sharp HealthCare, San Diego's largest healthcare system, where she serves on the Nominating and Governance Committee (former chair), the Audit and Compliance Committee, and the Advocacy Committee. Earlier she served on the Board of Directors of Maxim Systems, a privately held defense systems engineering company sold to Accenture in 2007, and the Advisory Board to Retirement Capital Group, an executive compensation and benefits company, and its successor company, Clark Bardes Consulting. She was named Director of the Year for Not-for-Profit boards and Director of the Year for Companies in Transition by the Corporate Directors Forum.

She has also served on a wide array of university, not-for-profit and civic boards, and continues on the board of the Jacobs School of Engineering as well as the California Institute for Advanced Information Technology at the University of California San Diego.

Ms. Wright is a graduate of the University of Maryland (BA in Criminology) and the Stanford University Advanced Management College.

Launch Conference Participant Bios

Council on Competitiveness and Other Staff

Mr. Chad Evans

Executive Vice President and Secretary to the Board
Council on Competitiveness



As Council EVP overseeing all programs and initiatives, Chad develops and manages the Council's policy agenda and work-stream, including: development of the Council's new, flagship National Commission on Innovation & Competitiveness Frontiers;

creating both the Building University-Industry-Lab Dialogue for Advanced Computing effort and the Exploring Innovation Frontiers Initiative with the National Science Foundation; forming the American Energy & Manufacturing Competitiveness Partnership with the U.S. Department of Energy; and, helping to shape and launch the National Engineering Forum.

In addition, Chad has built and shepherded over the past decade the Council's Technology Leadership and Strategy Initiative, engaging Fortune 500 chief technology officers, university vice presidents of research, and national laboratory deputy directors to make the policy and business cases for America's innovation-enabling investments in talent, technology and infrastructure.

He has also helmed C-suite innovation summits, dialogues and immersions across Latin America, Europe, Asia and Oceania. Has focused, in particular in Brazil and Australia—having created 4 U.S.-Brazil Innovation Summits and 20+ innovation learning laboratories across both nations; and having launched the first-ever U.S.-Australia CTO Dialogue series.

Chad holds an M.S. from the Georgetown University School of Foreign Service, with an Honors concentration in International Business Diplomacy from Georgetown's Landegger Program. He has a B.A. in Political Science and International Affairs from Emory University.

He is Secretary to the Board of the Council on Competitiveness; Treasurer to the Board of the Global Federation of Competitiveness Councils; a member of the Texas A&M Engineering Experiment Station Advisory Board; an ARCS Foundation National Science and Engineering Advisory Council member; a U.S. German Marshall Fund Fellow; and a past member of the Lawrence Livermore National Laboratory Industry Advisory Council and the World Economic Forum Advisory Board on Russian Competitiveness.

Mr. William C. Bates

Executive Vice President and Treasurer to the Board Council on Competitiveness



Bill Bates is Executive Vice President of the Council on Competitiveness and was the founding Executive Director of the Global Federation of Competitiveness Councils. Recently, he led multi-year initiatives to explore the economic opportunity for advanced manufacturing in the United States and the development of a national cybersecurity agenda. Bill is the chief architect of the Council's National Competitiveness Forum (NCF), the annual C-suite conversation that sets a pro-growth agenda for U.S. policymakers. He is a frequent speaker both nationally and internationally on a range of competitiveness and innovation topics, from education to technology policy to advanced manufacturing.

Beginning in 2019, Bill will be spearheading a new Council initiative, the University Leadership Forum, to draw greater attention to higher education's role in driving U.S. competitiveness through collaboration on game changing technologies and development of the next generation of entrepreneurs.

As the first Executive Director of the Global Federation of Competitiveness Councils (GFCC), Bill helped establish and build a network of more than 30 competitiveness councils from around the world.

He managed the Council's role as the secretariat to the GFCC, oversaw membership engagement and outreach and directed the development of annual policy reports, including *Best Practices in Competitiveness Policy*.

Dr. Roberto Alvarez

Executive Director, Global Federation of Competitiveness Councils



A recognized expert in international development and innovation, Dr. Roberto dos Reis Alvarez is the Executive Director of the Global Federation of Competitiveness Councils (GFCC), a global network of more than 30 organizations around the world devoted to accelerating global competitiveness and prosperity. Dr. Alvarez is the co-creator of the GFCC's Competitiveness Decoder™ (decoder.thegfcc.org), a first-of-its-kind, data-based tool to visualize the key drivers of national competitiveness.

Prior to joining the GFCC and ASU, Dr. Alvarez was the Senior Manager of the Analysis and Strategic Projects Unit with the Brazilian Agency for Industrial Development (ABDI)—an organization that he joined in 2005 and where he held several other positions. During his time at ABDI, Dr. Alvarez coordinated ABDI's bilateral innovation initiatives with the United States, Sweden and Germany, as well as economic

integration initiatives with Africa and Latin America. He co-developed the C-Suite U.S. Brazil Innovation Summits and Innovation Learning Laboratory series, designed to spark business and research partnerships between the western hemisphere's two largest economies.

Dr. Alvarez has worked as a management and operations consultant for manufacturing and logistics and has co-founded three tech companies. He has taught graduate courses at various Brazilian universities and appeared in the media in Brazil and abroad (including in India, Sweden, Uruguay, the United States, and Venezuela).

He currently sits on the boards of Global Urban Development, a global network of thought leaders concerned with world's urban problems. He is an active angel investor and a former columnist for Startupi, Brazil's leading media vehicle on start-ups and technology. He is also a research scholar at Arizona State University (ASU).

Dr. Alvarez was trained in Quality Control and Productivity Technique at the Japan Productivity Center and in exponential technologies and entrepreneurship at the NASA AMES-based Singularity University. He holds a B.S. degree in Civil Engineering and an M.Sc. in Industrial Engineering from the Federal University of Rio Grande do Sul, as well as a Ph.D. in Industrial Engineering from the Federal University of Rio de Janeiro.

Ms. Kathy Trimble

Vice President
Council on Competitiveness



Kathy Trimble is Vice President, Council on Competitiveness, focused on numerous innovation initiatives, including the National Commission on Innovation & Competitiveness Frontiers. She brings more than 20 years of government and private sector experience at the intersections of technology, innovation,

policy and industry.

Prior to joining the Council, Kathy served in multiple U.S. Department of Defense offices and most recently at the Joint Chiefs of Staff. She concentrated on advanced and emerging capabilities, research and development and acquisition cycles, industrial base trends and competitive strategies.

Her experience in the aerospace and defense sector focused on long-term future technology trends in domestic and international markets. She developed corporate-level strategic plans and competitive assessments of commercial and military investments and capabilities.

She is a Distinguished Graduate from the Eisenhower School at National Defense University, where she received a Masters of Science in National Resource Strategy. Kathy was also a Seminar XXI Fellow with the Massachusetts Institute of Technology. She received her undergraduate Bachelor of Science of Foreign Service degree from Georgetown University. Kathy volunteers and serves as the Director for National Programs at the Defense Entrepreneurs Forum.

Mr. Michael Bernstein

Senior Policy Director, Innovation Policy and Programs
Council on Competitiveness



As Senior Policy Director at the Council on Competitiveness, Michael is responsible for managing Council initiatives in its innovation portfolio, including the Exploring Innovation Frontiers Initiative (EIFI) funded by the National Science Foundation, the

National Engineering Forum, the American Energy and Manufacturing Competitiveness Partnership (AEMC) and the Technology Leadership and Strategy Initiative (TLSI). This is Michael's second stint at the Council on Competitiveness, having interned at the Council between 2009 and 2010.

Prior to joining the Council, Michael worked with CEB to uncover, hone and develop exportable management practices as part of the Applications Leadership Council. Before CEB, Michael worked in Management Consulting supporting the work of the U.S. Department of Energy, the U.S. Department of Defense, the American Council for an Energy Efficient Economy, and regional resilience and emergency planning firms.

Michael holds an MS in Environmental Policy from the Bard Center for Environmental Policy, where he focused on the changing definition and interpretations of “sustainability” over time and wrote his thesis on Advancing the Role of High Performance Computing in Sustainable Energy Solutions.

Michael holds an M.S. in Environmental Policy from Bard College and a B.A. in Geology from Colgate University. Michael also organized the Council’s softball team.

Ms. Yasmin M. Hilpert

Senior Policy Director
Council on Competitiveness



Yasmin Hilpert is joining the Council on Competitiveness from its sister organization, the Global Federation of Competitiveness Councils (GFCC), where she has served as the Senior Director of Policy and Engagement since 2017. Yasmin comes from an

extensive labor background, with experience in strategic development, labor issues and workforce development. She brings close to ten years of experience as a trainer and educator with a vocational training institute in Germany. With an interdisciplinary background in political science and metropolitan industrial policy with a focus on Industry 4.0, she worked as a strategic advisor to human rights and labor organizations to develop strategies for Industry 4.0 and workforce automation in light of technology innovation. As

an advisor to labor leaders, she engaged in high-level negotiations on a national and European level with employers and multi-national corporations, and is regularly invited as a contributor to meetings of labor, business and government leaders in Germany, the UK and the EU as a whole. She is an expert on metropolitan and regional development, innovation infrastructure and sustainable industrial policy.

Yasmin holds a Masters from Humboldt University Berlin and is graduating with her Ph.D. thesis in Spring 2020 from Humboldt University Berlin and George Mason University.

Mr. Joshua Oswald

Policy Analyst
Council on Competitiveness



Joshua Oswald has been a Policy Analyst at the Council on Competitiveness since August 2018, where he provides senior executives with research, and strategic and operational support to facilitate the development of policy reports, multilateral national and international partnerships, and stakeholder engagement in key technology and economic policy issue areas.

He additionally manages membership and participation records for all innovation portfolio programs and assists with the creation of comprehensive political, economic and programmatic briefing materials for C-suite delegations attending major international summits and conferences to amplify key strategic relationships with innovation partners in Brazil, Japan and Australia.

Mr. Oswald received his Master of Public Policy from George Mason University in May 2018 and his Bachelor of Arts from the University of Virginia with a history major and astronomy minor in December 2015.

Mr. Timothy Planert

Policy Analyst
Council on Competitiveness



Tim Planert joined the Council on Competitiveness as a Policy Analyst in October 2019. He comes to the Council from the Congressional Research Service, where he served as an intern on tax and fiscal policy. Prior to that, he interned at the Committee for

a Responsible Federal Budget as a policy analyst and at the U.S. Government Accountability Office as an analyst in Strategic Issues. He has also performed consulting work on workforce development policy for Associated Equipment Distributors, a trade association of dealers of agricultural and heavy machinery.

Mr. Planert attended the College of William & Mary, where he graduated with bachelor's degrees in Economics and History and a master's degree in Public Policy. He served as an editor of the *William & Mary Policy Review* in graduate school, and as an undergraduate, he designed and conducted a research project on political and economic institutions in Eastern Europe.

Ms. Carmel Lynn

Customer Success Manager
Hivebrite



Carmel Lynn is a Customer Success Manager for Hivebrite. Carmel helps customers enhance their presence by building powerful online communities with global reach. By turning business needs into technical solutions, Carmel ensures customers continue to gain maximum value within the product. A veteran in the start-up environment, Carmel helps budding companies dominate the U.S. marketplace.

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**Council on
Competitiveness**

About the Council on Competitiveness

For more than three decades, the 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.

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