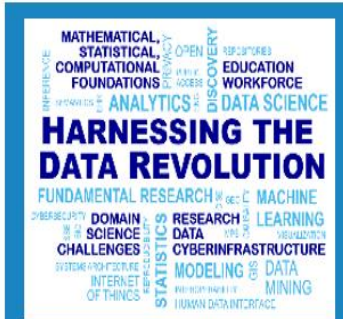


National Science Foundation (NSF) Convergence Accelerator November 13, 2019

Douglas Maughan (dmaughan@nsf.gov)



NSF's 10 Big Ideas



Harnessing the Data Revolution

The Future of Work at the Human-Technology Frontier

Navigating the New Arctic

The Quantum Leap: Leading the Next Quantum Revolution

Understanding the Rules of Life: Predicting Phenotype

Windows on the Universe: The Era of Multi-messenger Astrophysics



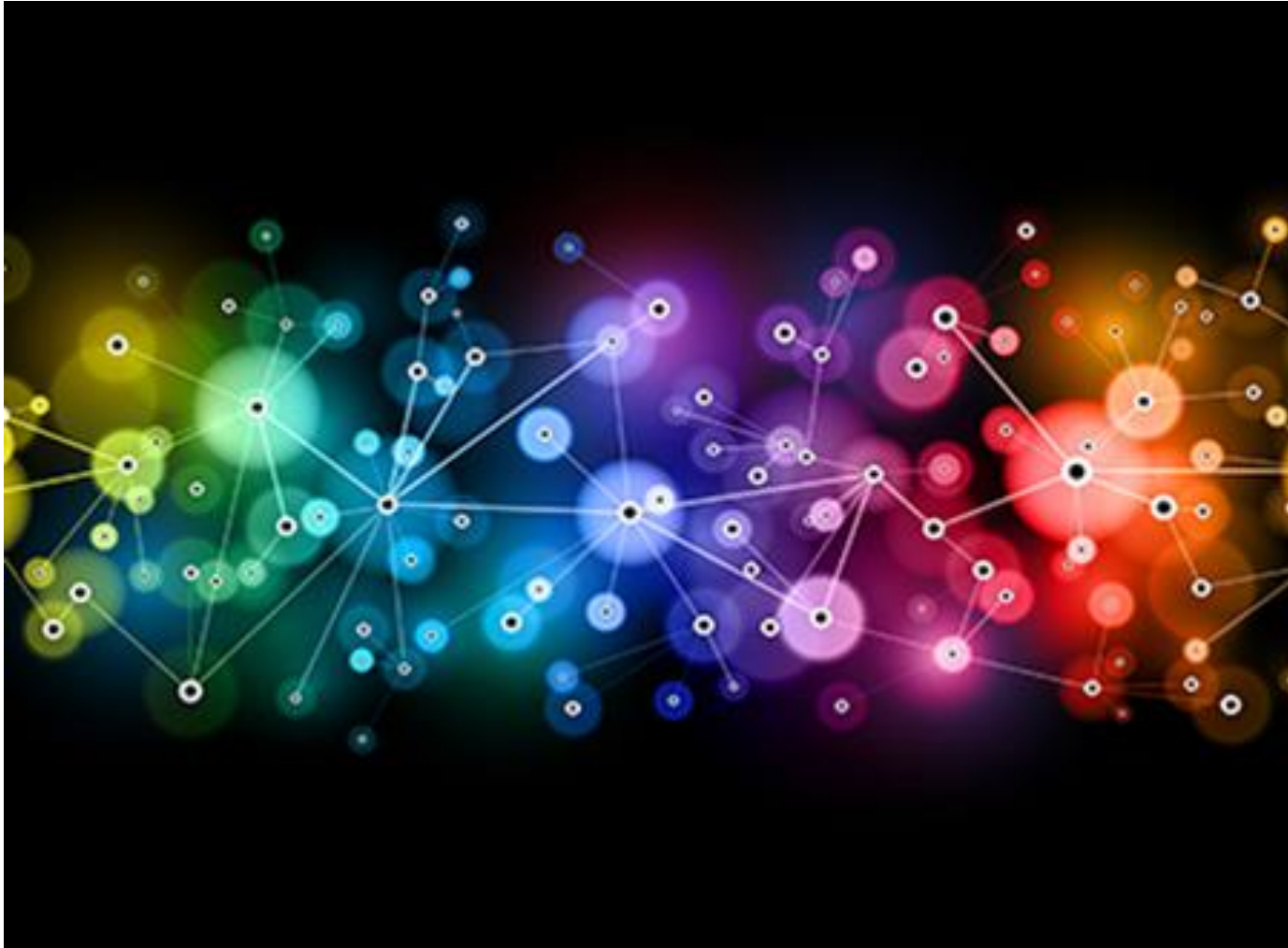
Mid-scale Research Infrastructure

NSF 2026: Seeding Innovation

Growing Convergence Research at NSF

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

Convergence Research



The grand challenges of today will **NOT** be solved by one discipline working alone.

They require

convergence:

the merging of ideas, approaches and technologies from widely diverse fields of knowledge to stimulate innovation and discovery.

Convergence Accelerator

WHY: Leverage the science across all fields of NSF research to produce outcomes in an accelerated timeframe, with streamlined operations allowing for nimbleness to support the most innovative results

WHAT: A new organizational structure to *accelerate* the transition of convergence research into practice, in areas of national importance

Characteristics

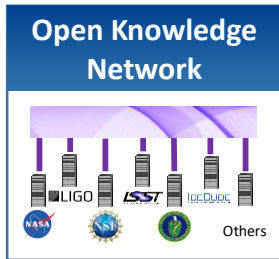
- Use-inspired research
- Testbeds, tools, living labs...
- Larger, national scale
- Requires partnerships with industry
- Clear goals, milestones, directed deliverables

Management

- Time-limited “tracks”
- Teams and Cohorts
- Cooperation and Competition
- More directed management
- Mission-driven evaluation



Convergence Accelerator Tracks



Track A1

Goal: Enhancing scientific data discovery and use

Track: Open Knowledge Networks

Big Idea: Harnessing the Data Revolution



Track B1

Goal: Connecting, retraining and reskilling for jobs using AI

Track: AI & Future Jobs

Big Idea: Future of Work at the Human Technology Frontier



Track B2

Goal: Building STEM talent in a changing workplace

Track: National Talent Ecosystem

Big Idea: Future of Work at the Human Technology Frontier

Vertical: Challenges *specific to different topical domains* such as geosciences, education, smart health, finance, and manufacturing.

Horizontal: Challenges that *apply to all domains*, such as developing the underlying representation of facts or developing secured access capabilities.

Accelerator “Track A1”: HARNESSING THE DATA REVOLUTION



- Advanced science data infrastructure that is interoperable and has an open architecture (makes it easier to access and link heterogeneous data products)
- Open Knowledge Network – an open semantic information infrastructure to discover new knowledge from multiple disparate knowledge sources
- Create a nonproprietary shared knowledge infrastructure, with a particular focus on publicly available U.S. Government and similar public datasets. Challenges include underlying representation of facts, services that perform reasoning tasks, and secured access. Domains include geosciences, education, smart health, and manufacturing.

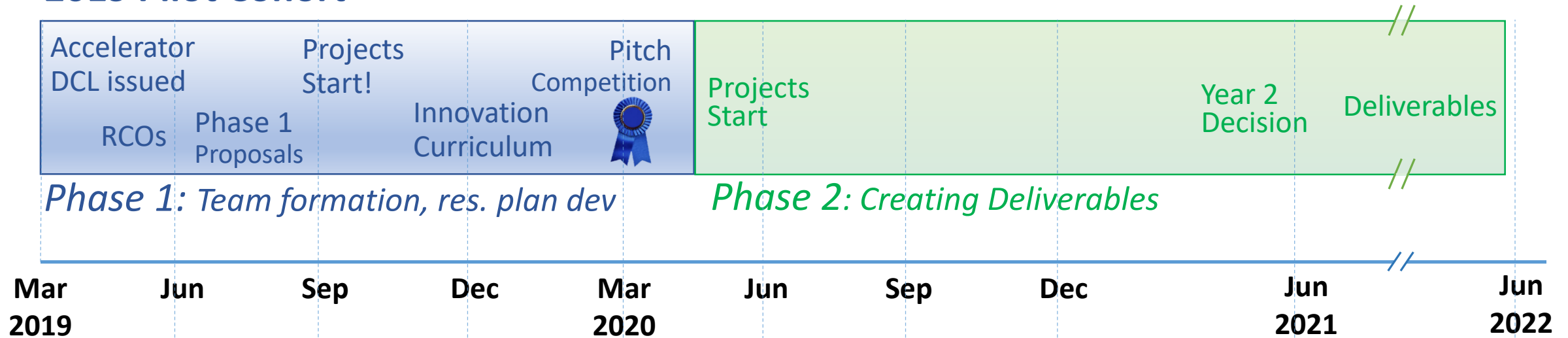
Accelerator “Tracks B1 and B2”: FUTURE OF WORK AT THE HUMAN-TECHNOLOGY FRONTIER



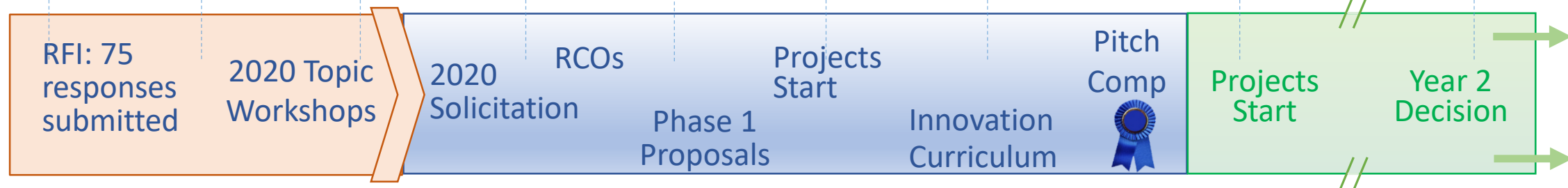
- **AI and Future Jobs.** The AI and Future of Jobs track will support the development of mechanisms that connect workers with jobs of the future, reflecting the need for re-skilling and lifelong learning, such as predictive artificial intelligence tools, economic and labor market analyses of needed skills for future workplaces, and educational technologies needed for adult learning. Ensuring fair and ethical treatment of workers will be a key principle for this effort. Projects may be focused on particular industries or regions, specific populations such as veterans, or particular workplace types such as small businesses, manufacturing, or K-12 schools.
- **National Talent Ecosystem.** Innovative approaches for employers to support workers seeking the skills required for 21st century work related to data science, predictive analytics, AI/machine learning, and other technologies of the future. Successful projects will prototype innovative approaches, such as learning environments, simulations and tools for analysis or assessment, and vehicles for recruitment and engagement, with the potential for wider implementation by industry, educational institutions, and other stakeholders engaging in the co-creation of a national talent ecosystem.

Timeline – Phase 1 and the Future

2019 Pilot Cohort

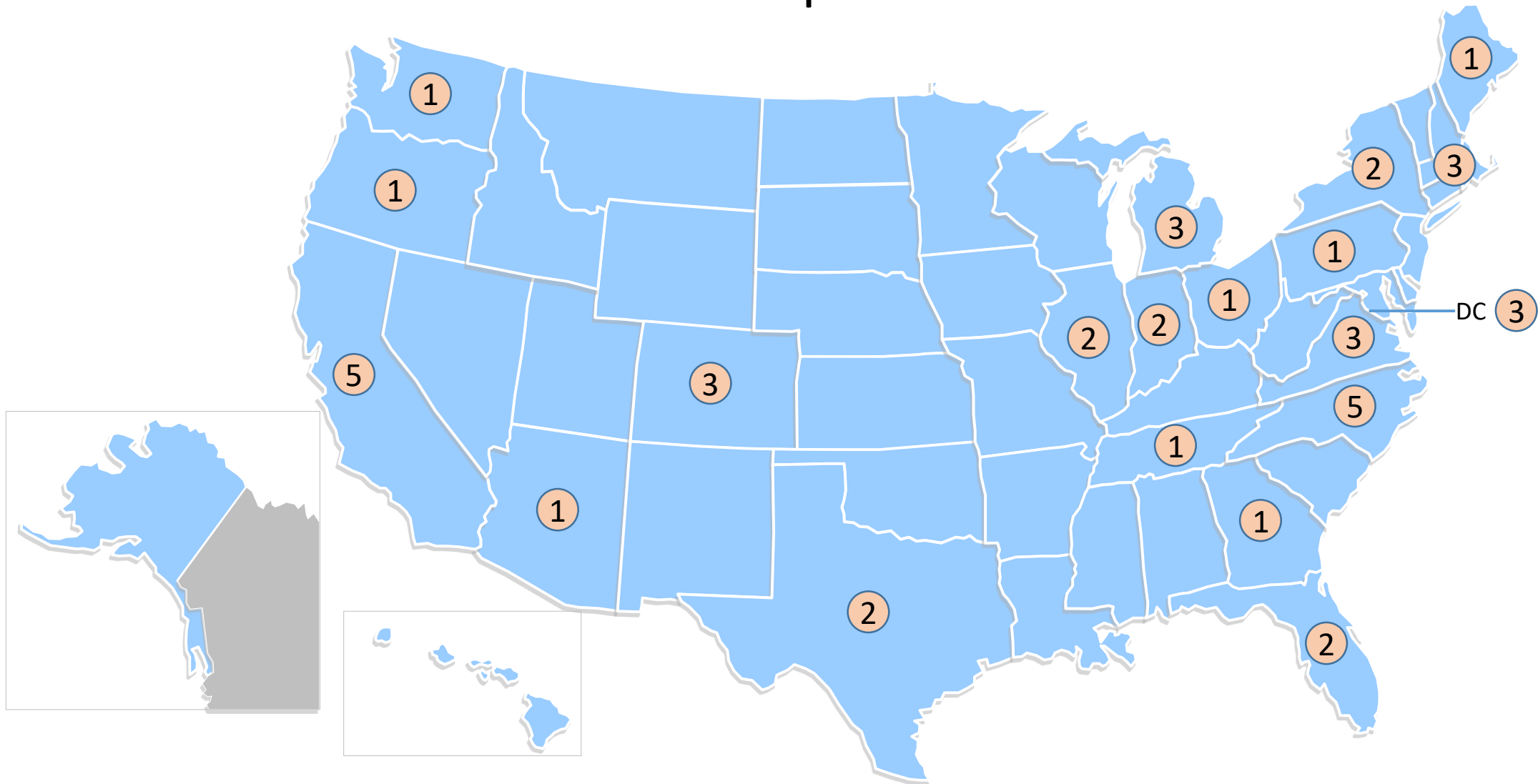


2020 Cohort: *new tracks*



2019 Convergence Accelerator Awards

43 Awards in 19 States plus District of Columbia



Track B - Clusters

B7026 - Machine learning-based national labor market information tools

B6970 – AI+AR platform for autism spectrum disorder workers

B6857 – AI-based job matching – veterans, disabled workers

B7068 – Documents competencies at the national level

B7118 – Connects data exchanges at state level

Existing Qualifications:

Education
Skills
Certificates



Prospective Employee

Worker-Work Matching



Prospective Employer

Existing needs:

Positions
Skill requirements
Locations

Workforce Training and Education Recommendations

B6947 – National microcredential system

B7063 – Microcredential system for industrial robotics technicians

B6992 – AI-enabled assessment + training plan for displaced miners

B7037 – AI-driven skill gap diagnostics + recommendation engine for manufacturing

B7010 – Assessment/Prediction/Learning – smart sensing/mixed reality

B6968 – Machine learning based tools for gig economy workers

B6956 – AI-driven tool for career management in STEM fields

B7888 – Fostering a diverse AI workforce

Curricula and Skills Training Development

B6894 – Upskilling/reskilling for digital technologies

B6656 – Design based research + analytics identifies skill gaps and designs training

B7833 – Deep learning predicts future jobs + training for hospitality industry

B6915 – Deep learning predicts future jobs + training for manufacturing

B6997 – Training platform for autonomous systems

B7053 – Advanced robotics for training next gen emergency responders

B7019 – Cloud-based platform trains for future jobs in architecture, construction

B7061 – Develops ROI measurement for training programs for policymakers

B7036 – Low cost AR training content development platform for SMEs



Education/Training

Future needs:

Emerging jobs
Growth projections
Market demands



Workshops: Sep-Nov 2019

- 9/16-18/2019 QLWG Quantum Simulators
 - Alexandria, VA
- 10/21-22/2019 QLWG Quantum Computing Lab
 - Alexandria, VA
- 10/24 & 11/15/2019 HDR /CISE FPF Education and Innovation Foundation
 - NYC, NY & San Francisco, CA
- 10/25-27/2019 ERE Landscape Carbon Sequestration for Atmospheric Recovery (NCSAR)
 - Eugene, OR
- 10/31-11/1/2019 QLWG Quantum Interconnects
 - Alexandria, VA
- 11/13/2019 FW-HTF UIDP – Future of Work Listening Tour Results
 - Boston, MA
- 11/21-22/2019 HDR/CISE Associated Universities Inc/National Radio Astronomy Observatory
 - Green Bank Observatory, WV
- 12/3-4/2019 HDR/CISE AI-Driven Disaster Response
 - Columbia, SC
- 2/2020 UROL Synthetic Biology
 - Emeryville, CA (UCB)

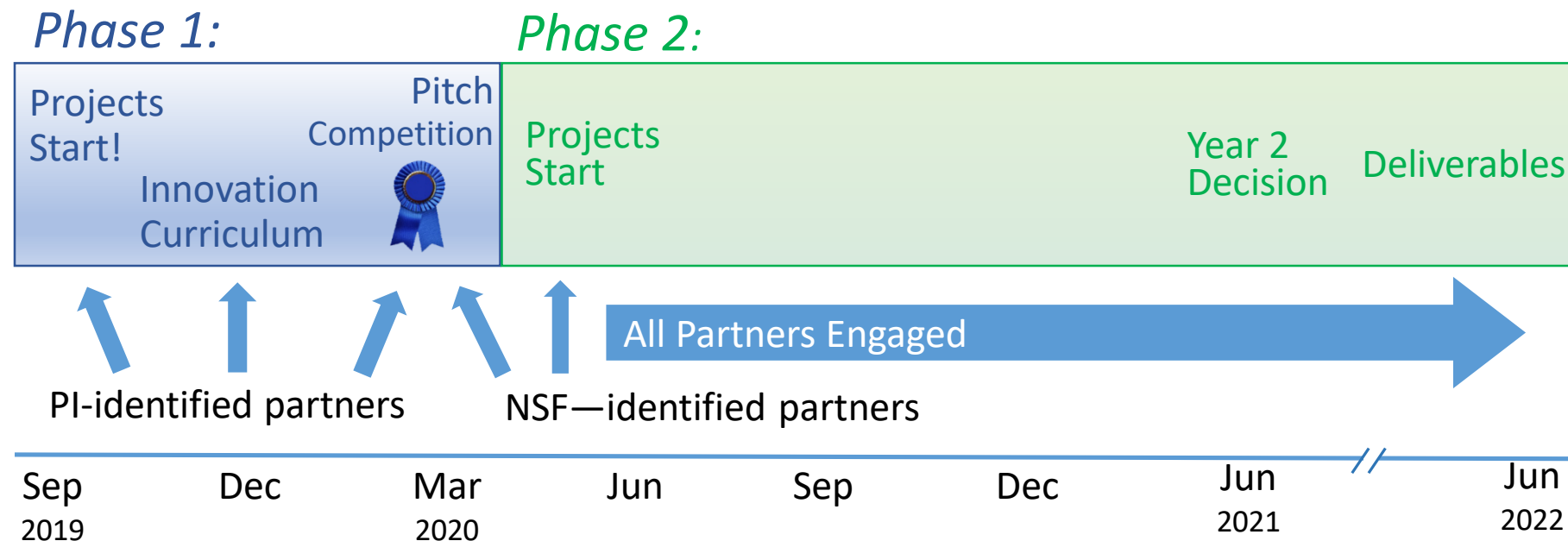
NSF Charge – Workshops for 2020 Solicitation

- What?
 - Suggestions for future topics that build on the foundational research previously funded by NSF and other research organizations
 - Breadth and depth should be similar to the 3 tracks in the 2019 Dear Colleague Letter (DCL), which are broad enough to support a set of related research teams, working together as a cohort, possibly taking different approaches
 - Suitable for a multidisciplinary, convergence research approach
 - Address a national-scale grand challenge problem
 - Must have the potential to leverage partnerships between industry and academic researchers
 - Must have a high probability of resulting in deliverables that will benefit society within a short time period
- Why?
 - Opportunities for future funding in the 2020 solicitation
- Outcomes
 - White Paper / Report on the workshop that can be considered by NSF for inclusion in the 2020 solicitation
- Future of Work – Human-Technology Frontier
 - Need to ensure that content is different from Tracks B1 and B2 from the 2019 DCL

Partnerships

Two approaches to partnerships:

- **PI-identified partners:** identified by teams, integrated into Phase 1 proposals
- **NSF-identified partners:** proactively engaged by NSF Convergence Accelerator staff
 - CA partner-planning team formed: identify, create track-specific partner engagements
 - Possible workshop: co-sponsored with foundations, based on similar workshop at NSF (May 2015, led by MPS)





THANKS!!!

Douglas Maughan

Office Head

NSF Convergence Accelerator

O: 703-292-2497

C: 571-451-8748

E: dmaughan@nsf.gov