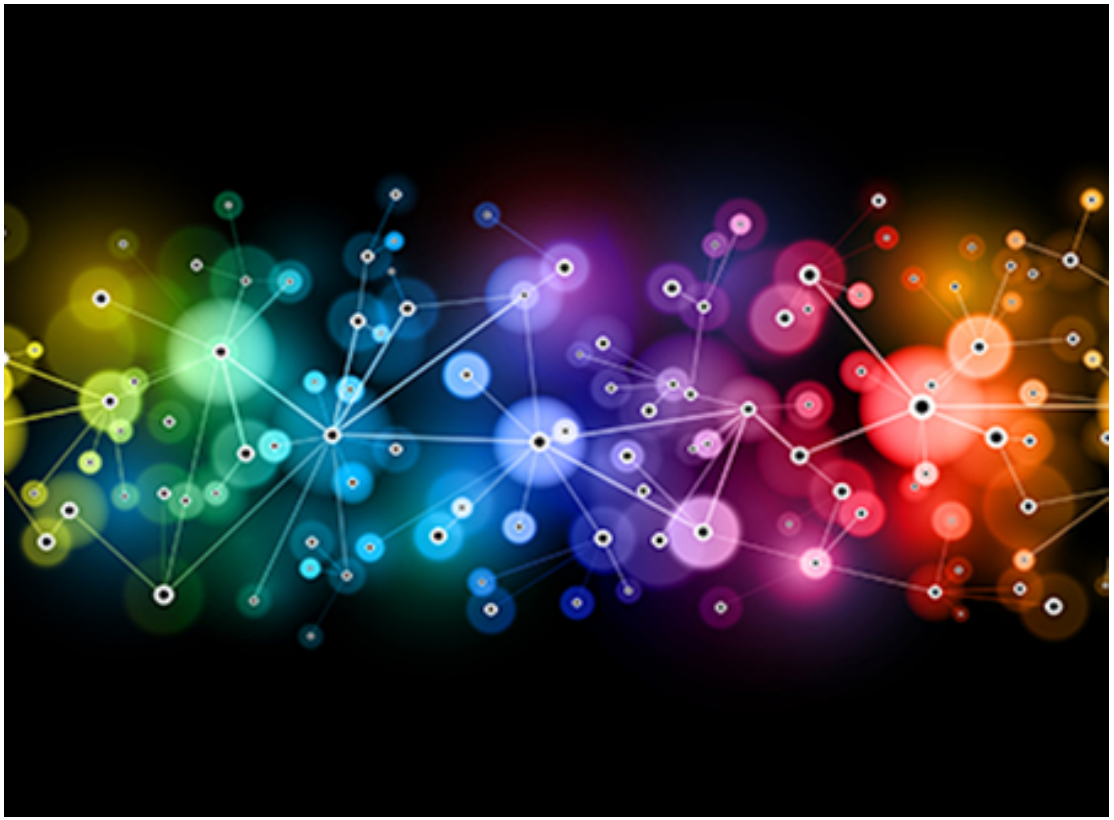
NSF Convergence Accelerator

Chaitan Baru
Senior Science Advisor, Convergence Accelerator Office
Office of the Director, NSF
(on assignment from SDSC, UC San Diego)

NSF Big Ideas

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

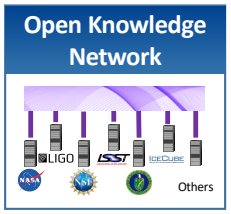
Characteristics

- 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 Pilot 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.

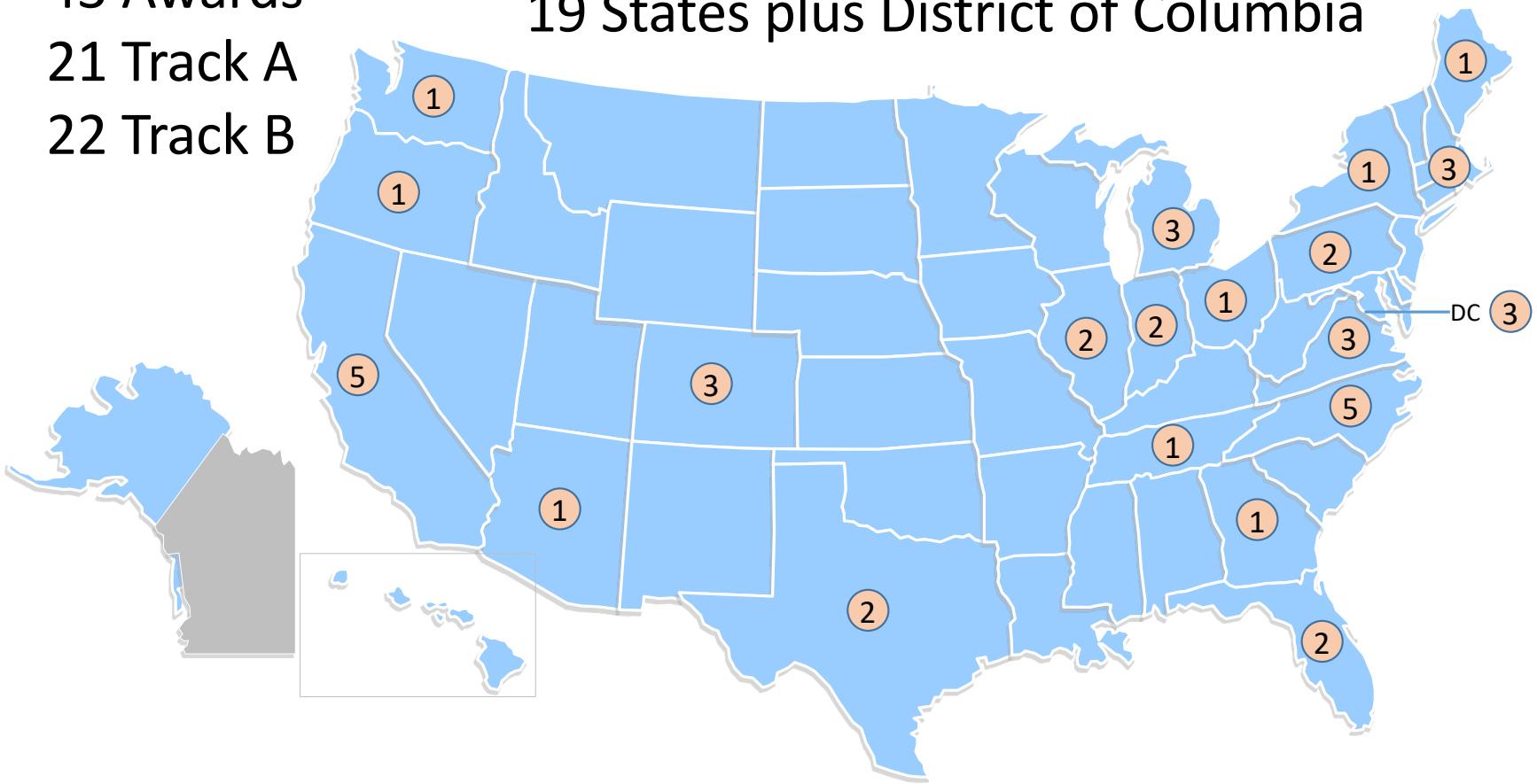
Accelerator “Tracks B1 and B2”:
FUTURE OF WORK AT THE HUMAN-TECHNOLOGY FRONTIER

- **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.

2019 Convergence Accelerator Pilot Awards

43 Awards
21 Track A
22 Track B

19 States plus District of Columbia



Track A1 - Clusters

Open Knowledge Network (21 projects)

Horizontal Projects

A7143 Information Credibility

A6940 Knowledge Application Development Environment

A6677 Spatial Data Models/Methods

A7136 Federated Search

A7165 Internet Structure & Security

A6731 Web Data Extraction/Integration

A7908 Spatial Decision Support

Vertical Projects

A7160 Precision Medicine

A7017 Molecular Data

A7134 Intelligent Textbooks

7043 Design & Manufacturing

A7095 Census

A7033 Public Policy Data

A7099 Urban Flooding

A7123 Court Records

A7153 Finance

A7152 Space Sciences

A7115 Civil Infrastructure

A6884 Mobility

A7137 Energy Systems

A6950 Ocean Resources

Projects should

- Seek “track integration”;
- Collaborate with industry;
- Encouraged to collaborate/link with other relevant efforts in the community

Track B1/B2 - 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

Worker-Work Matching

Prospective Employee

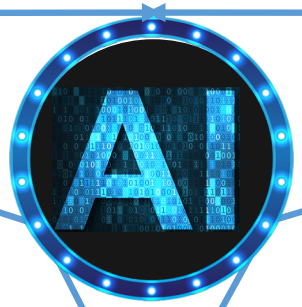
Prospective Employer

Existing needs:
Positions
Skill requirements
Locations

Future needs:
Emerging jobs
Growth projections
Market demands

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

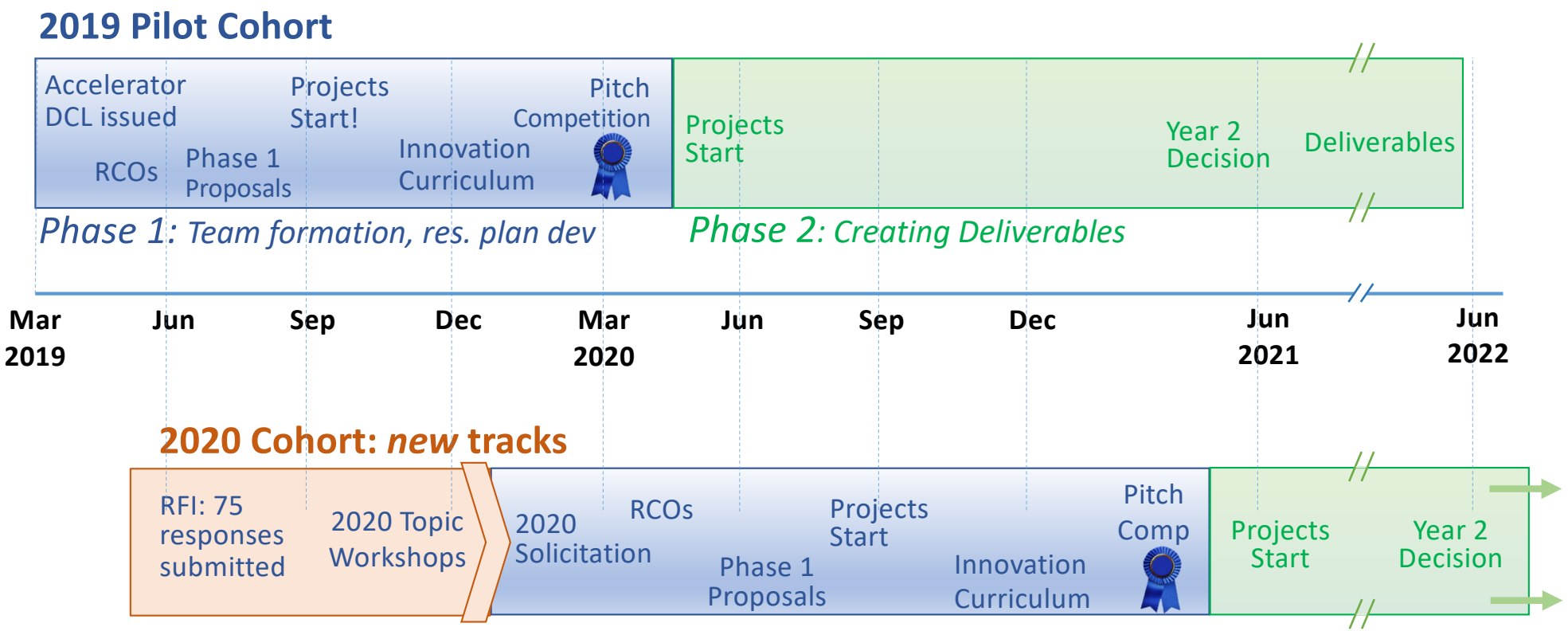


Education/Training

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

Timeline – Phase 1 and the Future



Program Structure: Phase I – Planning

- September 2019 – May 2020 (March 2020)
- Upto $1M for ~9 months, for planning, team formation, participating in meetings and Convergence Accelerator curriculum
- CA Curriculum
  - User-centered design. Provided by IDEO.
  - Team Science
  - Domain-specific interactions with potential collaborators
- Teams are assigned a coach from a team of coaches
  - Can meet with any of the other coaches, if they wish.

Phase I – Planning…

- Monthly meetings with the full cohort (43 teams x 3 per team)
- September 2019: Webinar
- October 2019: Kickoff in DC. Interaction with government agencies.
- November 2019: Webinar
- December 2019: Face-to-face in San Francisco. Interact with industry.
- January 2020: Webinar
- February 2020: Face-to-face in San Francisco. Interact with foundations, VCs
- March/April 2020: Submit Phase II proposal
- April/May 2020: Make a “pitch” to a group from NSF, other potential funders, Foundations, VCs, …

Phase II – Implementation

- June 2020-May 2022. Upto $5m ($3M + $2M)