



# Connection and Convergence: Education, Training, and Data Science

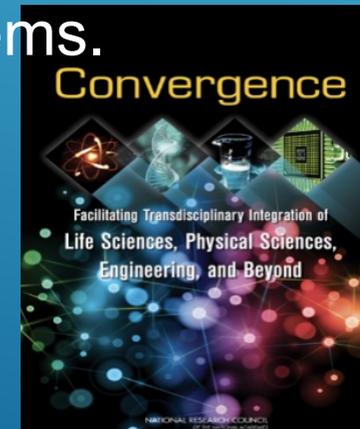
Sylvia J. Spengler, PhD  
Program Director, Information and Intelligent Systems,  
Directorate for Computer & Information Systems,  
National Science Foundation

- ▶ [http://sites.nationalacademies.org/DEPS/BMSA/DEPS\\_192400](http://sites.nationalacademies.org/DEPS/BMSA/DEPS_192400)
- ▶ Join the Webcast: <https://nasem.zoom.us/j/397579857>

ROUNDTABLE ON DATA SCIENCE  
POSTSECONDARY EDUCATION  
MEETING#11: DATA SCIENCE EDUCATION  
AT TWO-YEAR COLLEGES

# CONVERGENCE

The grand challenges of today -- protecting human health; understanding the food, energy, water nexus; exploring the universe at all scales -- will not be solved by one discipline alone. Convergence blends scientific disciplines in a coordinated, reciprocal way and fosters the robust collaborations needed for successful inquiry. Convergence builds and supports creative partnerships and the creative thinking needed to address complex problems.



# WHAT WE MEAN BY CONVERGENCE:

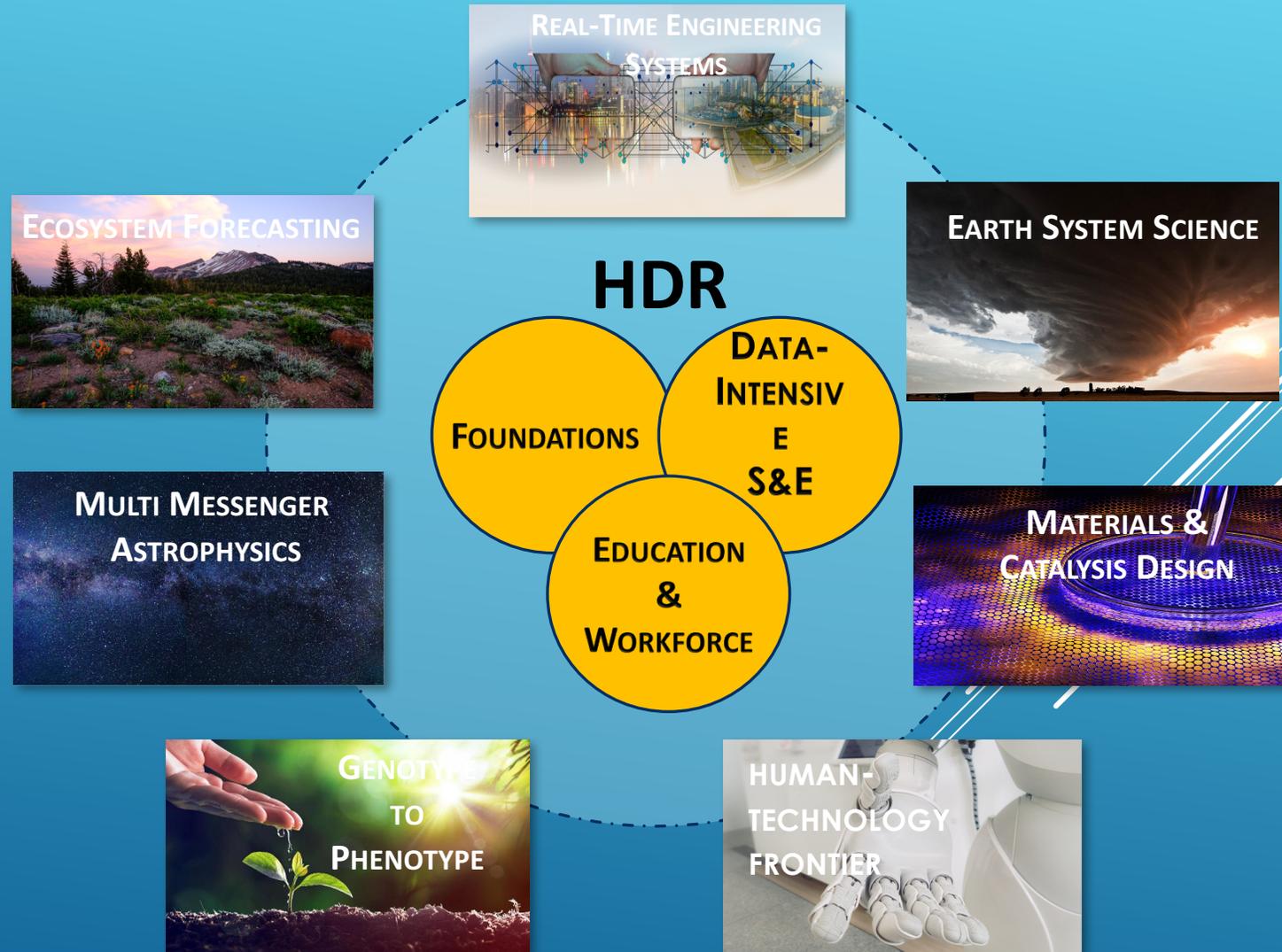
- ▶ A specific and compelling problem, science or societal
- ▶ Deep integration across disciplines

MADE FOR DATA SCIENCE  
AND ANALYTICS!



# HARNESSING THE DATA REVOLUTION VISION

*HDR will enable new modes of data-driven discovery that will allow fundamental questions to be asked and answered at the frontiers of science and engineering.*



# HARNESSING THE DATA REVOLUTION (HDR): OVERVIEW

## COMPONENTS OF THE HDR VISION

- ▶ FOUNDATIONS OF DATA SCIENCE
- ▶ EDUCATION AND WORKFORCE DEVELOPMENT
- ▶ DATA-INTENSIVE SCIENCE AND ENGINEERING
  - ▶ MS AND SYSTEMS FOR DATA SCIENCE
  - ▶ DATA CYBERINFRASTRUCTURE

## HDR PROGRAMMATICS

- ▶ HDR TRIPODS (FY19)
- ▶ DATA SCIENCE CORPS (FY19)
- ▶ HDR INSTITUTES (FY19)
  - ▶ CONCEPTUALIZATION (FY19)
    - ▶ IDEAS LABS
    - ▶ FRAMEWORKS
  - ▶ COORDINATION (FY20)
  - ▶ CONVERGENCE (FY21)



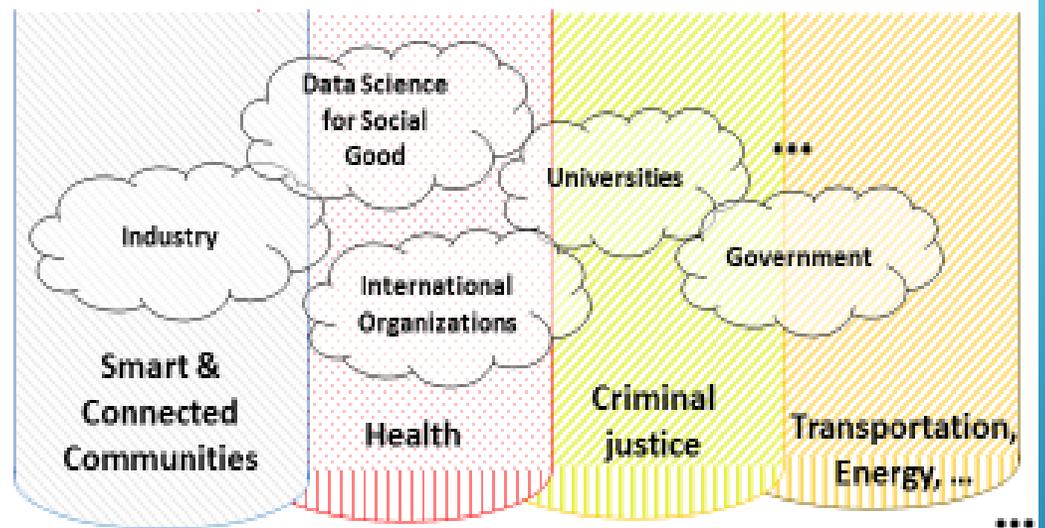
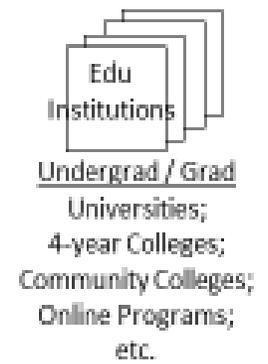
# Data Corps

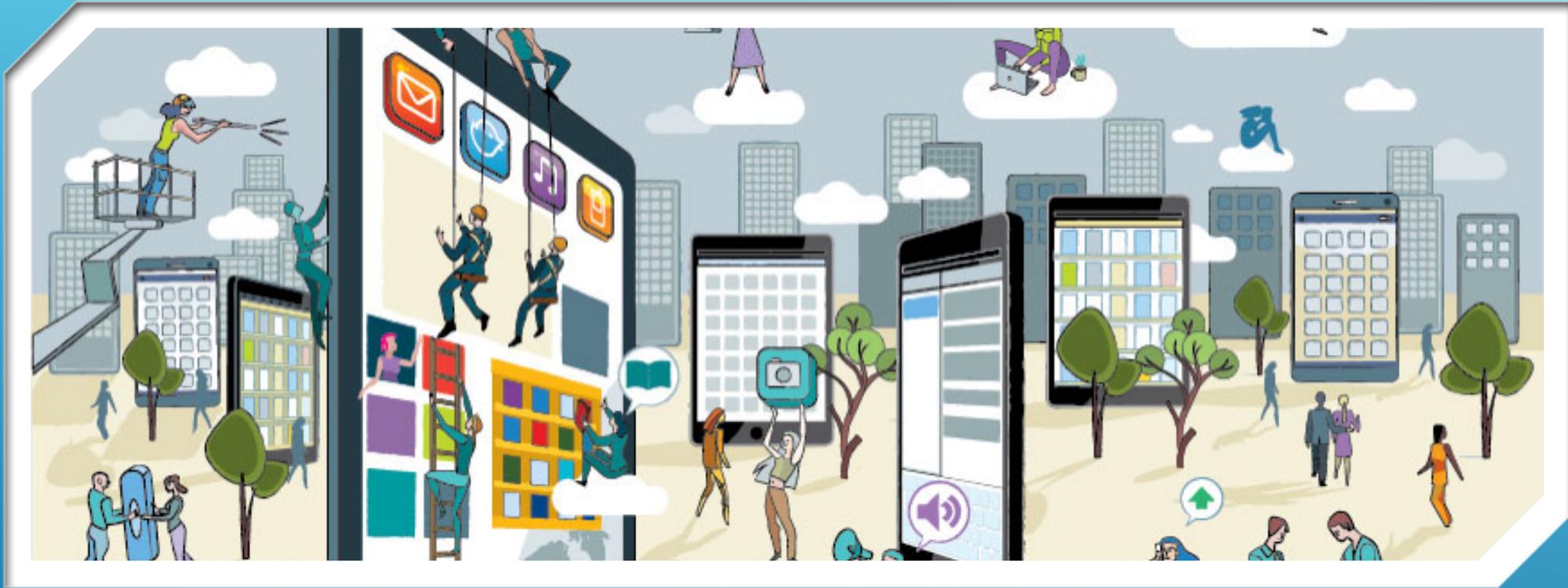
Data Corps Volunteers / Volunteer Organizations

Data Corps Projects / Project Organizations

**Professionals  
from Industry, NGOs**

**Students  
from Academic Institutions**





# THE FUTURE OF WORK AT THE HUMAN-TECHNOLOGY FRONTIER

- ▶
- ▶ Building the human-technology partnership
- ▶ Augmenting human performance
- ▶ Illuminating the socio-technological landscape
- ▶ Fostering lifelong learning.



# RESEARCH THEMES

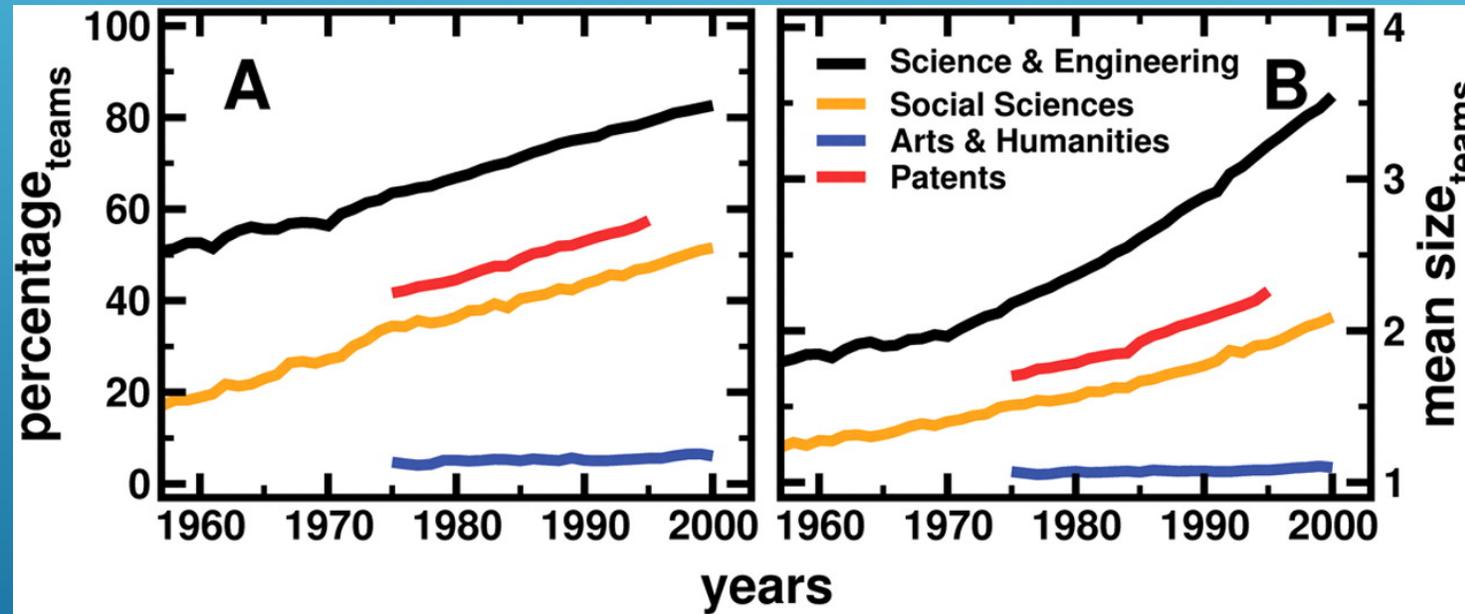
# Siloed Sciences



# REASONS TO COLLABORATE

- ▶ “Wicked problems” – can’t be solved by a single discipline
  - ▶ Access to expertise or particular skills
  - ▶ Access to equipment, resources, or funding
  - ▶ Enhancing trainee education
  - ▶ **Impact**
- 

# RESEARCH INCREASINGLY DONE BY INVESTIGATOR TEAMS



Over the last 50 years, the proportion of science and engineering publications authored by teams (vs. solo authorship) has increased more than 60%

# LEVELS OF TEAM SCIENCE

## Unidisciplinary

- Researchers from a single discipline work together to address a shared research problem

## Multidisciplinary /Interdisciplinary

- Researchers from different disciplines work independently, sequentially from own disciplinary perspective to address a shared research problem

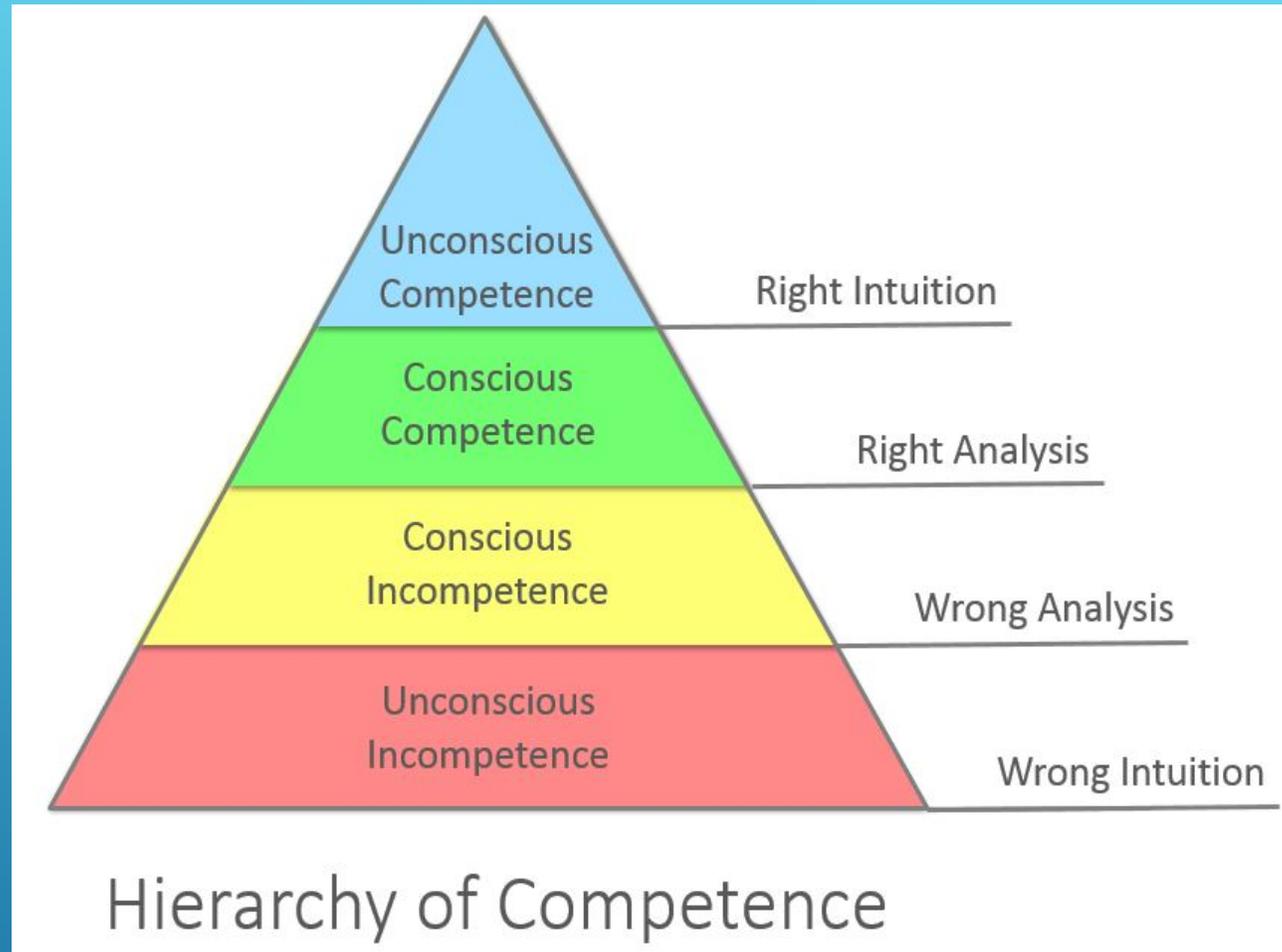
## Transdisciplinary

- Researchers from different disciplines work together to integrate theory, methods or concepts that extend discipline-specific language and models

- ▶ **The global supply of information-technology professionals with advanced analytics skills is projected to double between late 2018 and late 2020 to one million workers...\***
- ▶ **Even in the US, it is doubling.**

\*Bain & Co. quoted in WSJ, April 30, 2019

# DATA SCIENCE TRAINING BEGINNING TO CATCH UP



# COMPETENCE & SYNERGY

MY HOPE:

THINK EDUCATION, NOT JUST  
TRAINING

THINK NEXT GENERATION,  
NOT NEXT YEAR

THINK CONVERGENCE



NOT YET, BUT YOU CAN MAKE IT  
HAPPEN!

# Thank you!

**SYLVIA SPENGLER**

PROGRAM DIRECTOR, INFORMATION INTEGRATION AND INFORMATICS  
DIRECTORATE FOR COMPUTER & INFORMATION SCIENCE & ENGINEERING  
NATIONAL SCIENCE FOUNDATION

TEL: 703-292-7364

EMAIL: [SSPENGLER@NSF.GOV](mailto:SSPENGLER@NSF.GOV)

