Clinical decision support

Power grid control center

Farming and agriculture

Learning environments

NSF and TEAM SCIENCE

Geoscience research

Autonomous trucks

Fire fighting

Manufacturing

Convergence

Argument:

The grand challenges of today require convergence: the merging of ideas, approaches and technologies from widely diverse fields of knowledge to stimulate innovation and discovery.

Convergence blends scientific disciplines in a coordinated, reciprocal way and fosters the robust collaborations needed for successful inquiry.

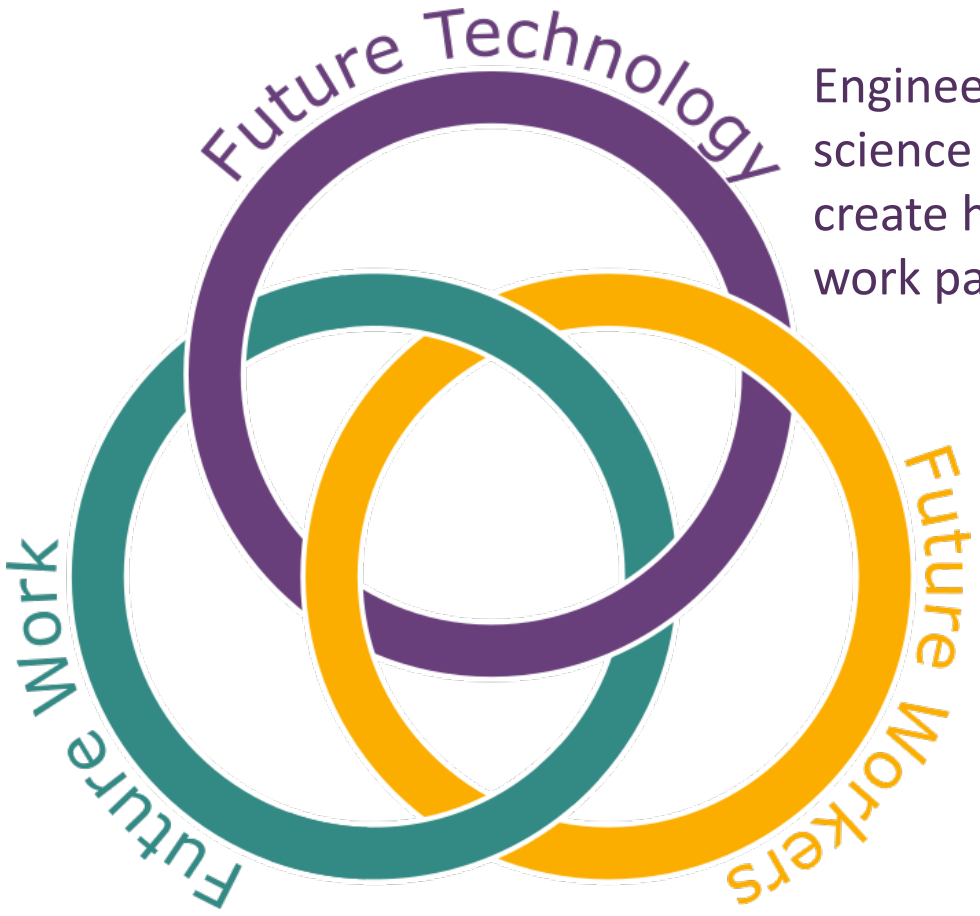
Growing convergence is one of NSF's 10 Big Ideas, with significant funding.

Not just an interdisciplinary team

- Two or more disciplines a requirement, typically expected to be cross-directorate
- Problem focused (complex and compelling problems focusing on a specific scientific question or pressing societal need (more recent emphasis on the latter)
- Deep integration within the research team: Integrating methods, knowledge, expertise from different disciplines and forming novel frameworks
- Some programs asking for nonacademic partners/team members

An illustrative Program: Future of Work at the Human Technology Frontier

Supports convergent teams for integrative research

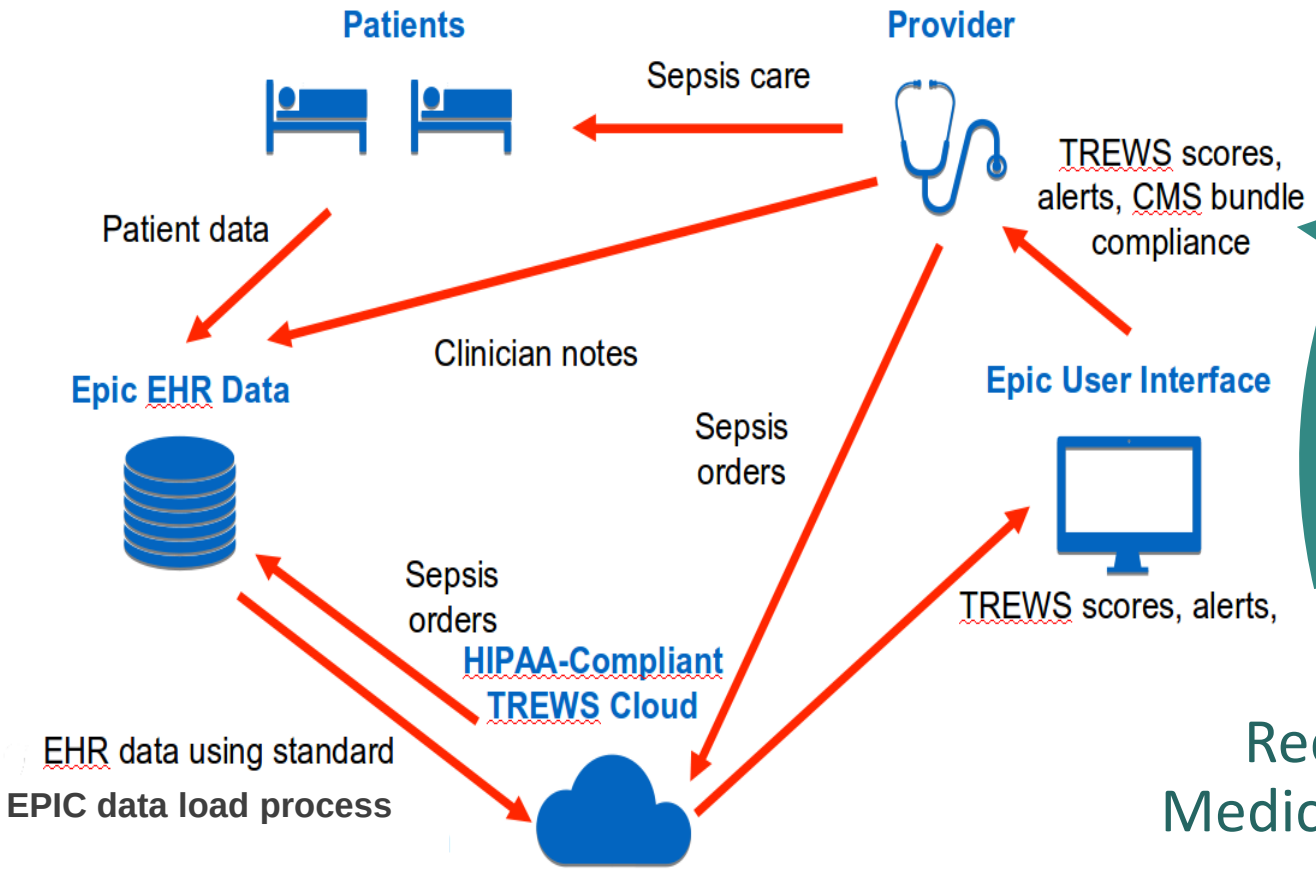


Engineering & computer science technologies to create human-technology work partnerships

Fundamental principles and support of individual workers, work teams, workplaces, and work organizations

Analyses of societal, economic, and national contexts, including benefits and risks

Example Project: Human-Machine Learning for Medical Decision Making



Adaptive Clinical Decision Support (Sepsis Prediction)

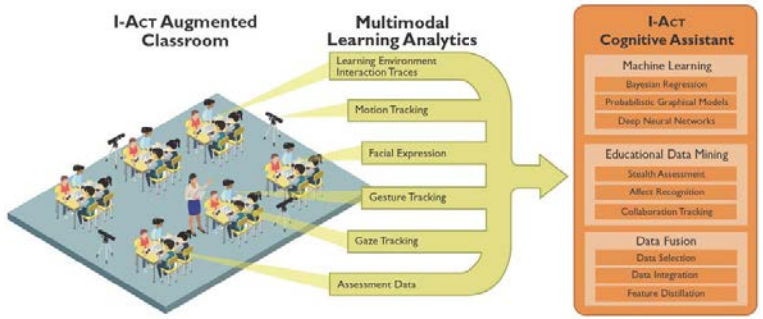
Modifies behavior based on clinician response (ignore or treat, explanation), giving more useful and less intrusive predictions (timing, medical context)

Reduce Medical Errors
(3rd leading cause of death in US)

Reduce Medical Costs

Better Medical Outcomes

Example Project: Perceptive & Assistive Classrooms



Teacher/classroom partnership

Pedagogical planning, adaptation, & revision

Teacher performance & job satisfaction

STEM education outcomes & workforce retention

Multimodal sensing & inference

Another illustrative Program: Convergence Accelerator

What is a convergence accelerator?

- Use-inspired and application oriented convergent team
- Fed by basic research & discovery (“translational research”)
- Integrated teams including industry, academics, not-for-profits, government entities, and others
- Fixed term, with a focus on deliverables
- Intensive education and mentorship (looking for curriculum)
- Proactively and intentionally managed

2019 topic A

- Part of Harnessing the Data Revolution Big Idea
- **Open Knowledge Network (OKN)**. 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.

2019 Topic B

- Part of Future of Work at the Human-Technology Frontier Big Idea.
- **AI and Future Jobs**. Develop tools to link workers with future jobs.
- **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.

Upcoming deadline for 2020, June 24

- NSF 19-065 Request for Information on Future Topics for the NSF Convergence Accelerator