NSF
Civil, Mechanical and Manufacturing Innovation

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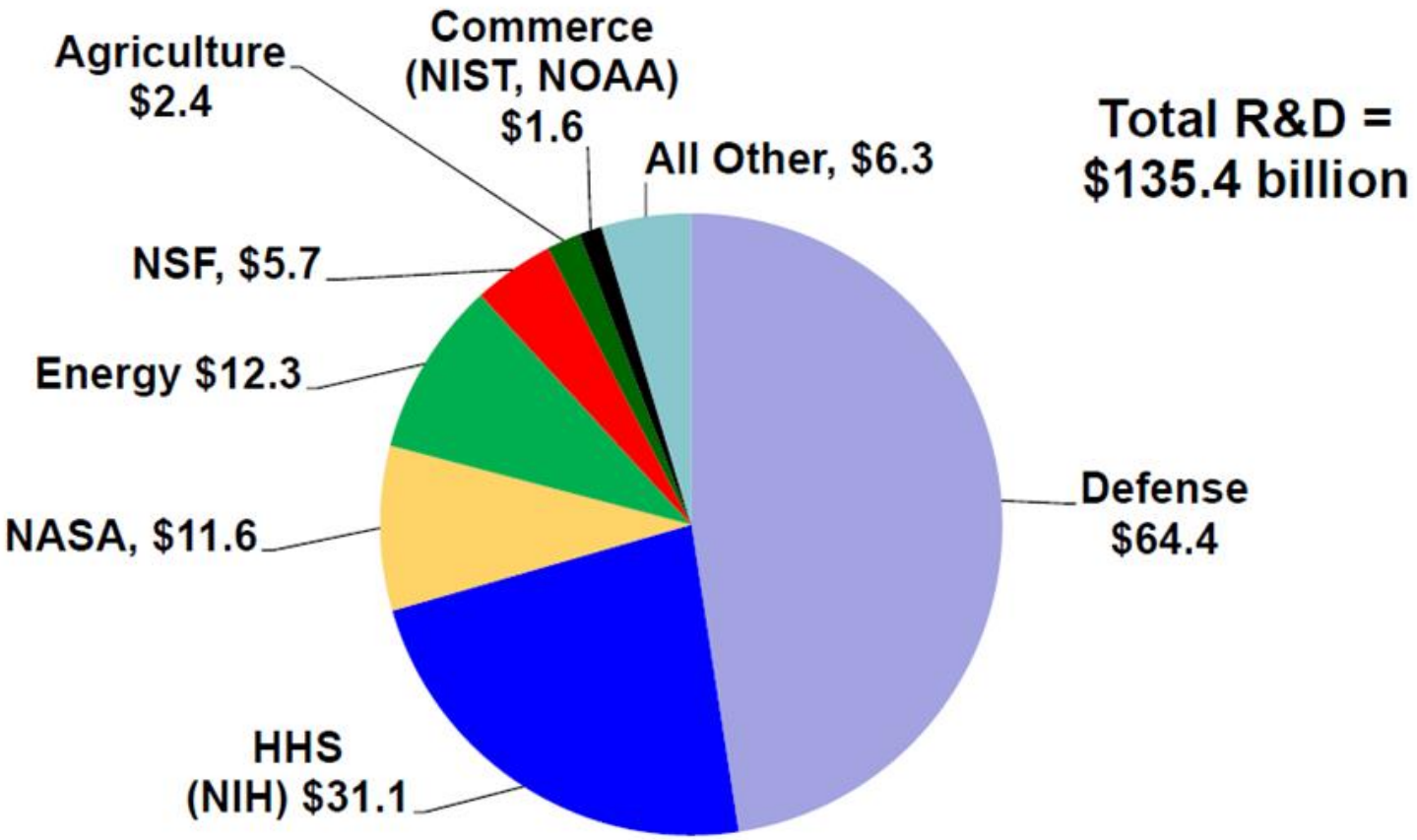
Division Director, CMMI

NSF Mission

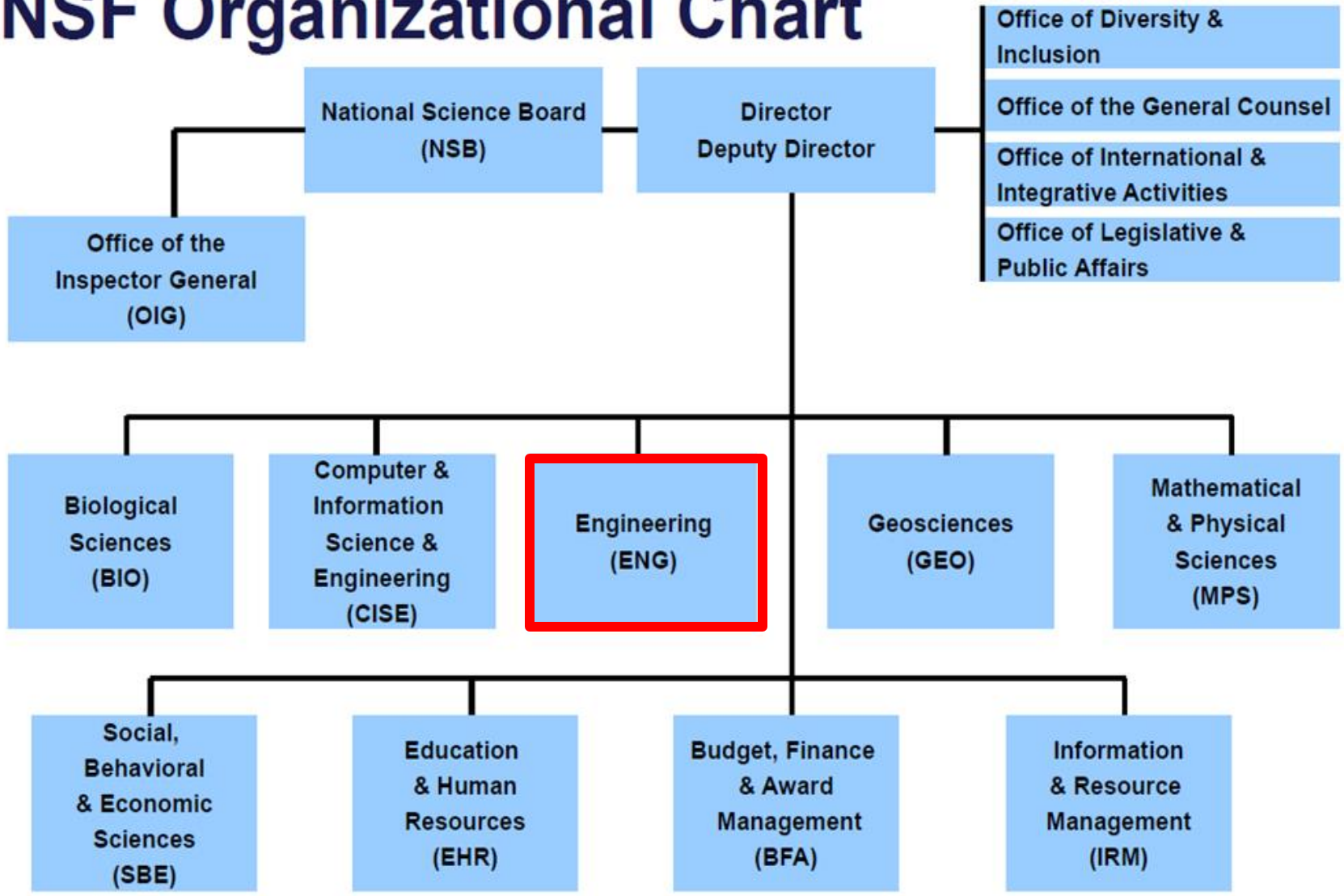
"To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...."

FY 2015 Request: Total R&D by Agency

Budget Authority in Billions of Dollars



NSF Organizational Chart



NSF Directorate for Engineering (ENG)

CMMI Overview

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- civil, mechanical, industrial and manufacturing engineering, and materials design

- reduction of risks and damage from earthquakes and other natural and technological hazards

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- civil, mechanical, industrial and manufacturing engineering, and materials design
- reduction of risks and damage from earthquakes and other natural and technological hazards
- cross-cutting technologies including adaptive systems, nanotechnology, and simulation
- encourage cross-disciplinary research partnerships

Civil, Mechanical, & Manufacturing Innovation

- Advanced Manufacturing
  - Manufacturing Machines and Equipment
  - Materials Engineering and Processing
  - NanoManufacturing
- Mechanics and Engineering Materials
  - Biomechanics and Mechanobiology
  - Mechanics of Materials and Structures
  - Design of Engineering Materials Systems
- Resilient and Sustainable Infrastructures
  - Civil Infrastructure Systems
  - Engineering for Natural Hazards
  - Geotechnical Engineering & Materials
  - Infrastructure Management and Extreme Events
  - Structural & Architectural Engineering
  - Natural Hazards Research Infrastructure
- Operations, Design and Dynamical Systems
  - Engineering and Systems Design
  - Systems Science
  - Dynamics, Control & Systems Diagnostics
  - Service, Manufacturing & Operations Research

Advanced Manufacturing

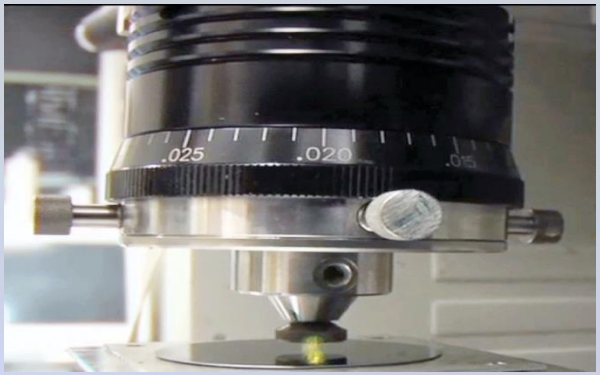
- 3 programs: MME, MEP, NM
- For next generation production and optimization
- For application-driven development of materials systems
- For fabrication of novel devices and systems

Advanced Manufacturing

- 3D printed device removes toxins in blood

Diseased Liver Credit: Big Stock Photo

- Integrating lasers into machining to soften hard materials



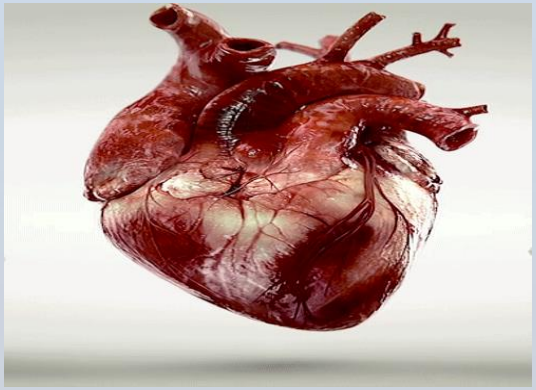
Micro-MAM Credit: Western Michigan State

Mechanics & Engineering Materials

- 3 programs: BMMB, DEMS, MOMS
- For integrating design and materials systems
- For optimizing response of novel materials
- For investigating mechanics of biological systems

Mechanics & Engineering Materials

- Personalized treatment of heart disease



Heart Credit: Giphy

- Printing liquid metal

Liquid Metal Credit: NSF

Resilient & Sustainable Infrastructures

- 6 programs: CIS, GEM, IMEE, SAE, ENH, NHERI
- For civil infrastructure: from day-to-day to extreme hazards conditions
- For infrastructure resilience & sustainability across lifecycle
- For systems-level design to withstand multi-hazards
- For economic and societal resilience in the face of disaster

Resilient & Sustainable Infrastructure

- Evaluating progress in reducing damage from extreme hazards

Christchurch, NZ earthquake, 2011Credit: Reuter Pictures

Moore, OK tornado, 2013 – Credit: NSF

Experimental Testing Facilities (NHERI)

- Tsunami wave tank

Credit: NEES Hub

- Earthquake testing of five story building

Credit: NEES Hub

Operations, Dynamics, & Design of Systems

- 4 programs: SMOR, SYS, ESD, DCSD
- For decision-making models: from fundamental operations to complex applications
- For theoretical foundations for design & systems engineering
- For enhancing performance of dynamic systems through data integration and modeling

Operations, Dynamics, & Design of Systems

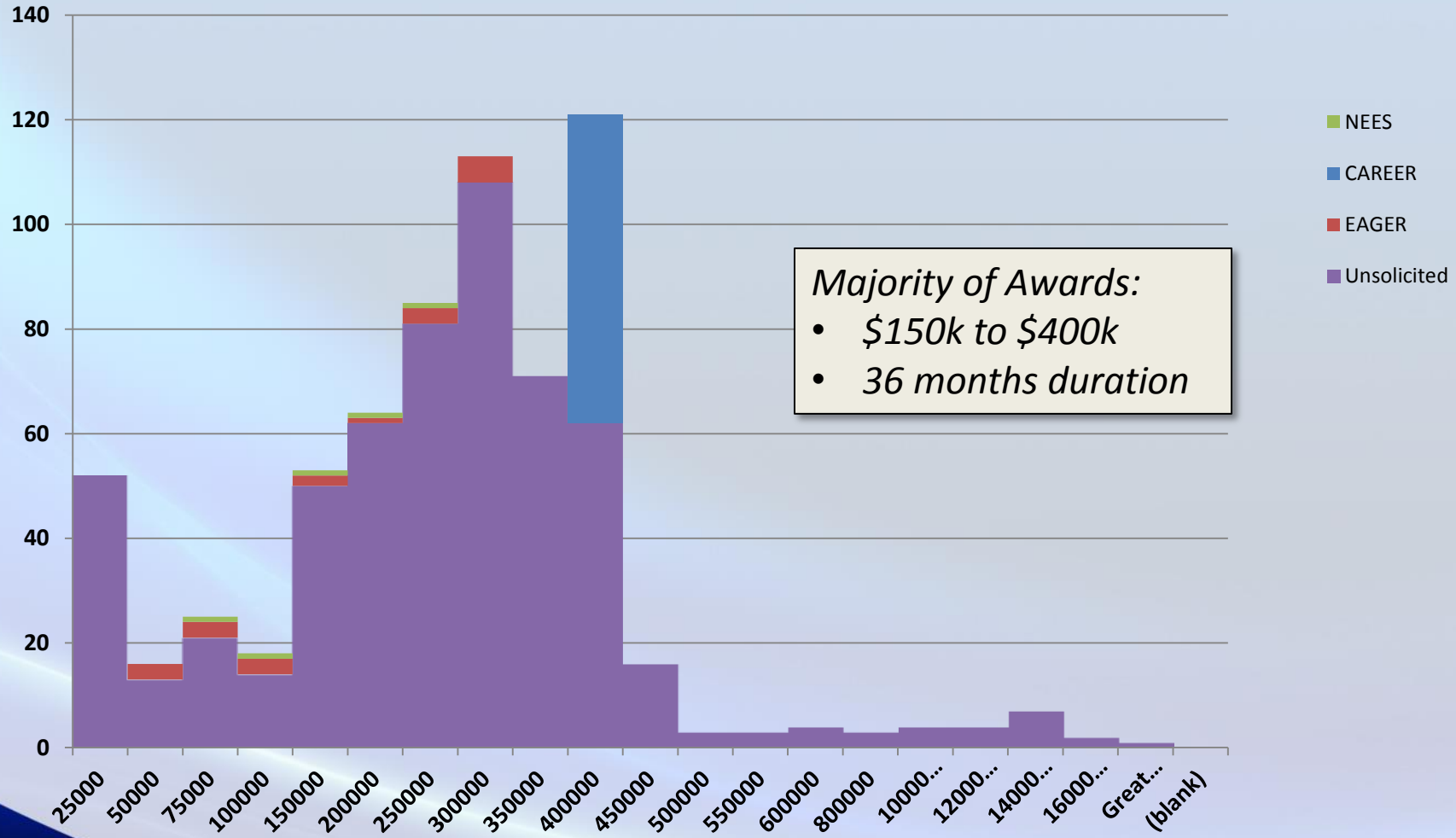
- Genetic algorithms drive better solar cells

Credit: big Stock Photos

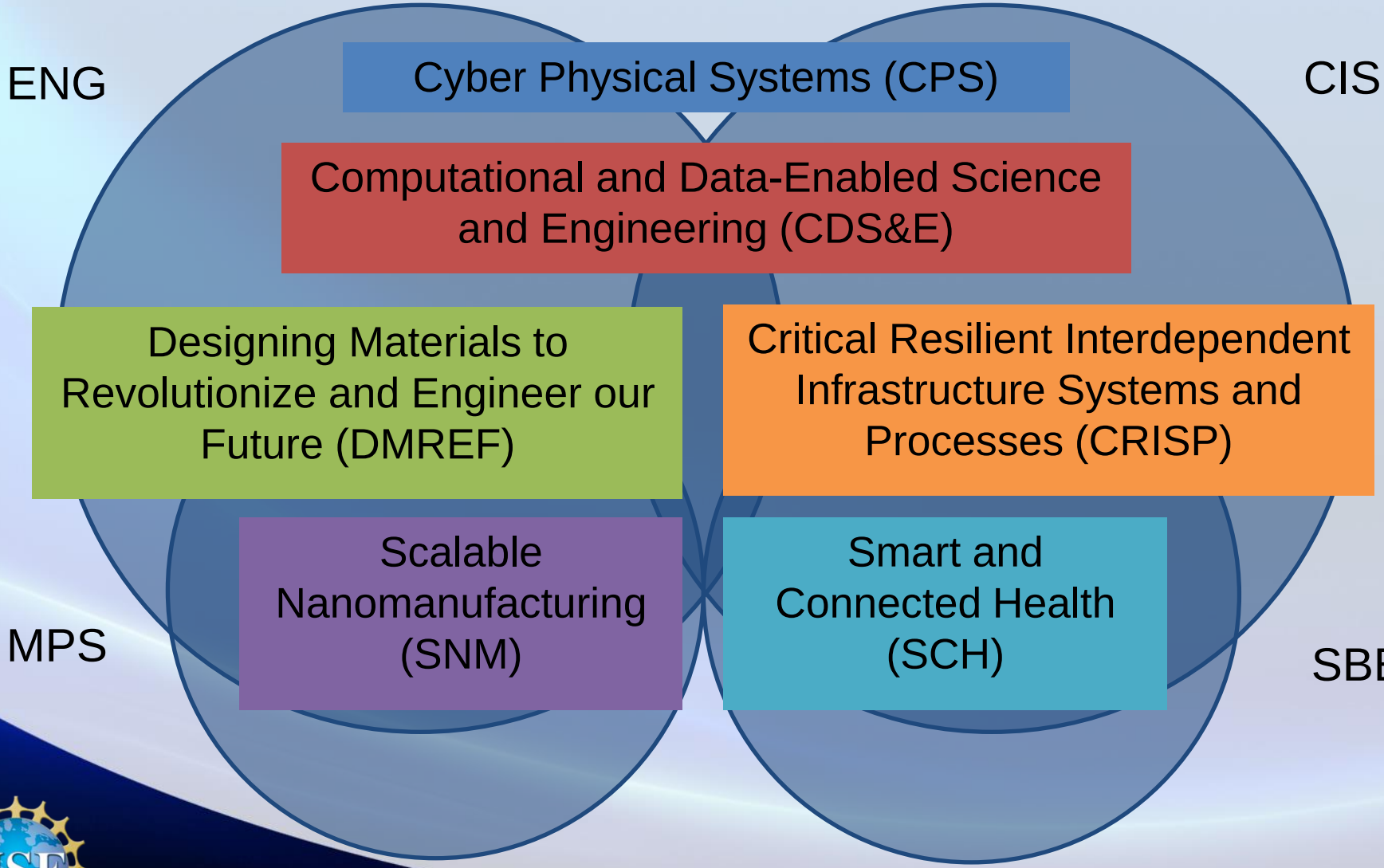
- Models better service delivery

Credit: Big Stock Photos

CMMI Award Profile



Cross-Directorate Initiatives



Broader Impacts

- Advance society
- Innovate for future
- Integrate research and education
- Build diverse STEM talent
- Engage wider audience