

BIOENGINEERING



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James M. and Marsha McCormick Director of Biomedical Engineering

Engagement with Bio(**medical**)Engineering

- Who are we?
- Intellectual engagement with curriculum & students
 - New BME major
 - Future industry needs
- Strategic opportunities to engage with faculty & research
 - Entrepreneurship
 - Research partnership

Who are we?



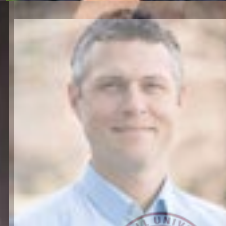
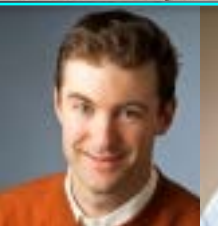
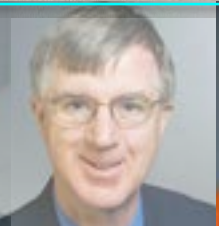
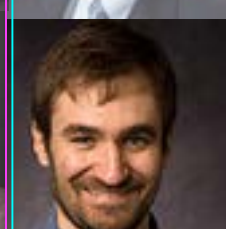
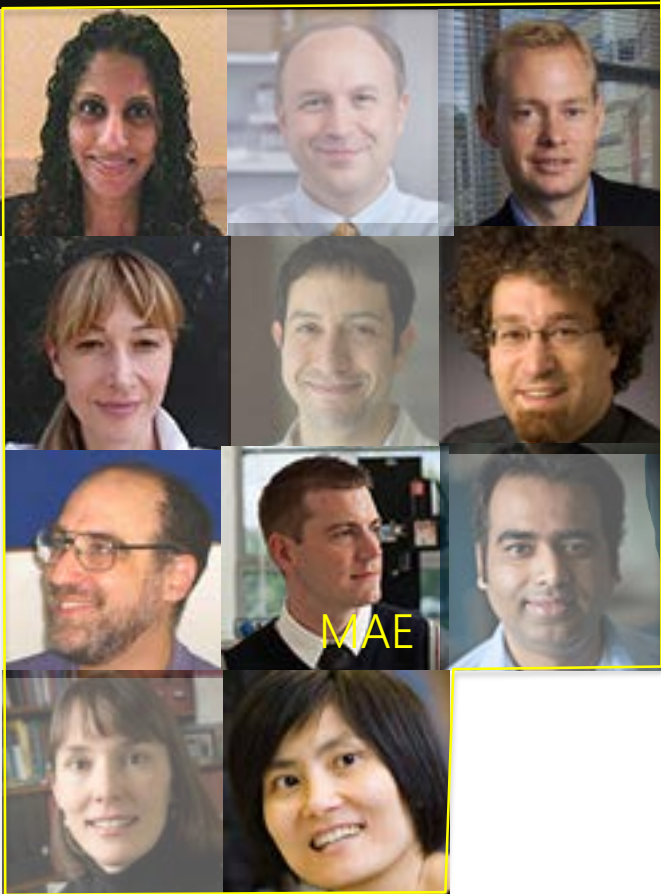
Cornell Engineering

Nancy E. and Peter C. Meinig School of Biomedical Engineering

Not included: EAS, ORIE



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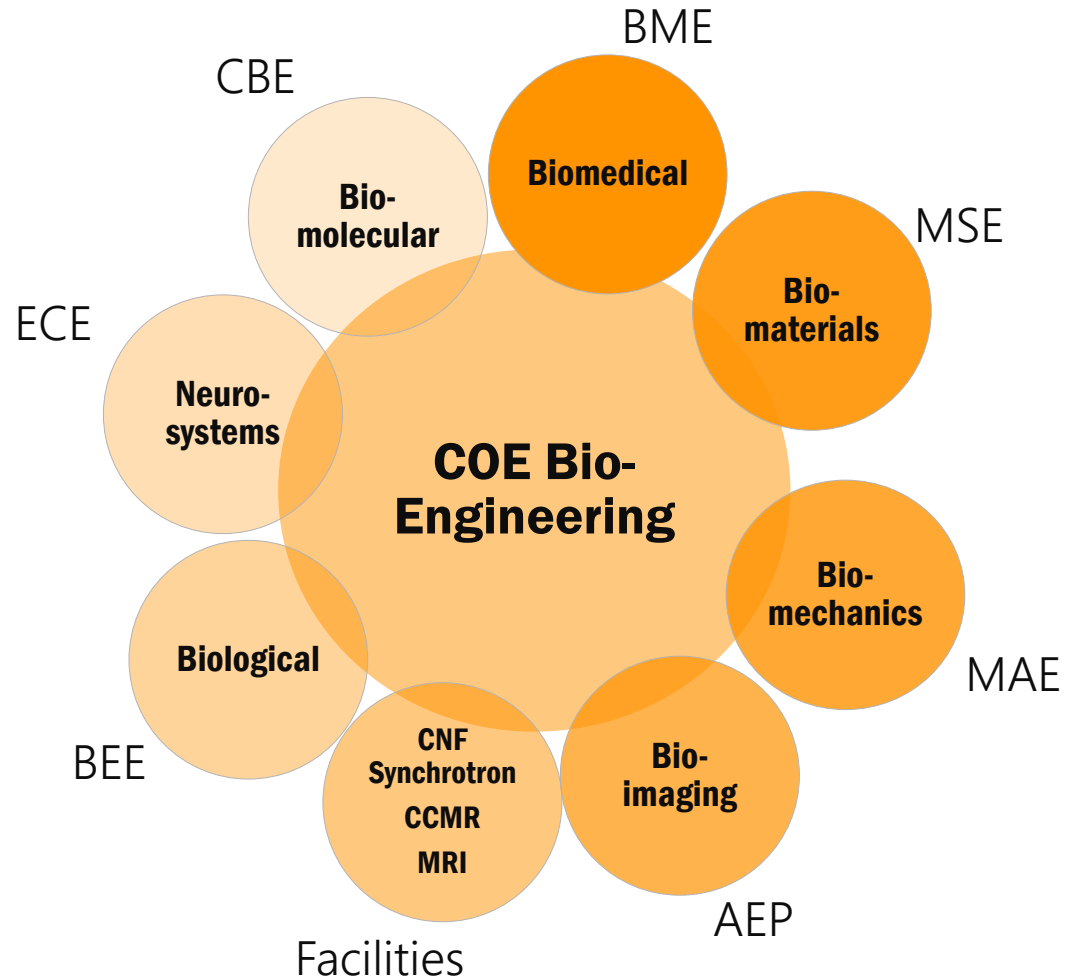
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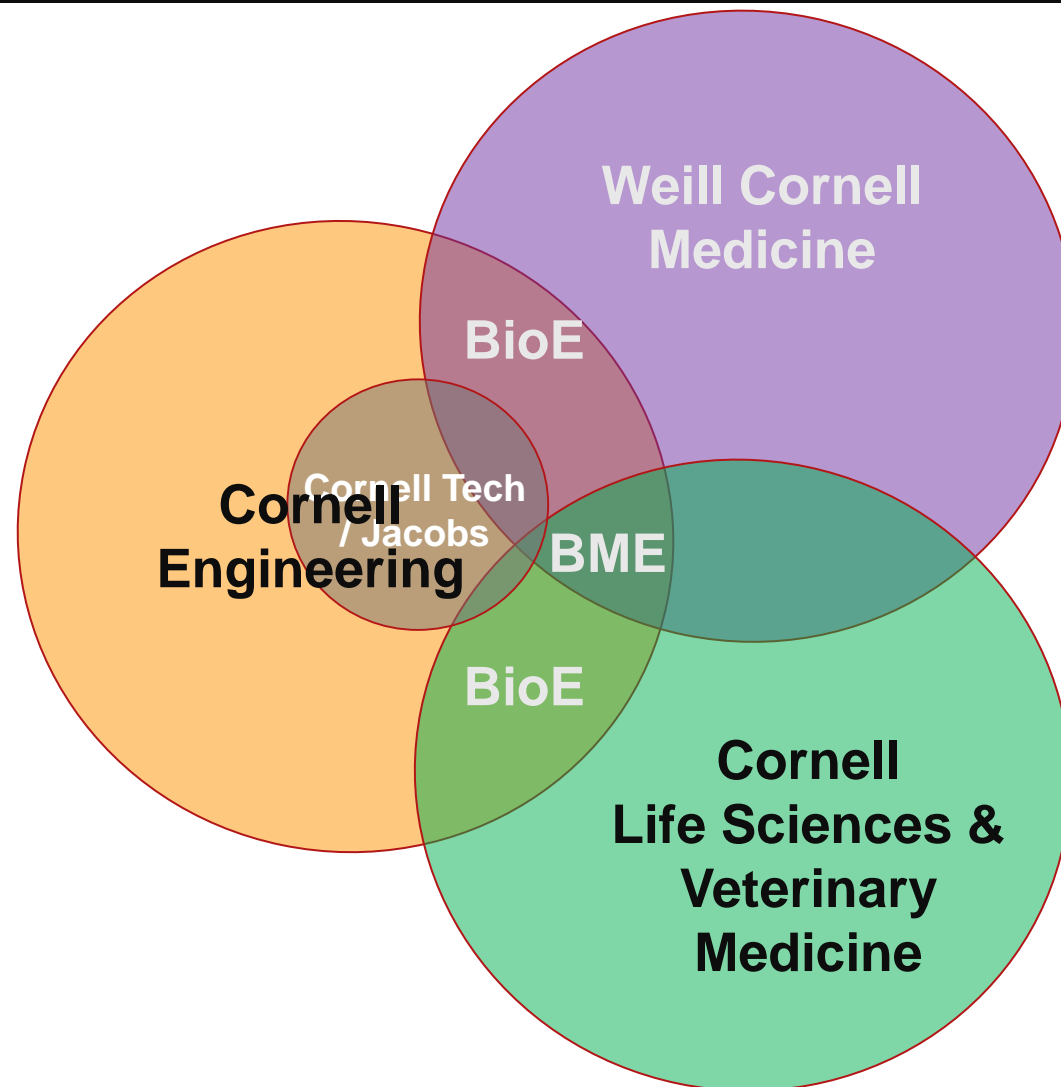
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Bioengineering in COE



Bioengineering Strategic Synergies



Biomedical Research Map: BME

| | Biomech | M/C/Tissue Enging | Biomat/ Drug Deliv | Imaging & Instrum | μ/nano Technol | Systems Biology |
|--------------------|---------|-------------------|--------------------|-------------------|----------------|-----------------|
| Cancer | Green | | | | | White |
| Cardio-vascular | Green | | | | White | White |
| Neural conditions | White | | | Green | | White |
| Musculo-skeletal | Green | | | | White | Green |
| Infectious disease | White | | Green | White | Green | |
| Other | White | Green | White | Green | White | Green |

Biomedical Research Map: COE

| | Biomech | M/C/Tissue Enging | Biomat/ Drug Deliv | Imaging & Instrum | μ/nano Technol | Systems Biology |
|--------------------|-------------|-------------------|--------------------|-------------------|----------------|-----------------|
| Cancer | Dark Green | | | Light Green | Dark Green | |
| Cardio-vascular | Light Green | | | | White | |
| Neural conditions | White | | | Dark Green | | |
| Musculo-skeletal | Dark Green | Light Green | Dark Green | Light Green | White | Light Green |
| Infectious disease | White | | Light Green | White | Dark Green | Light Green |
| Other | Dark Green | Light Green | Dark Green | Light Green | White | Dark Green |

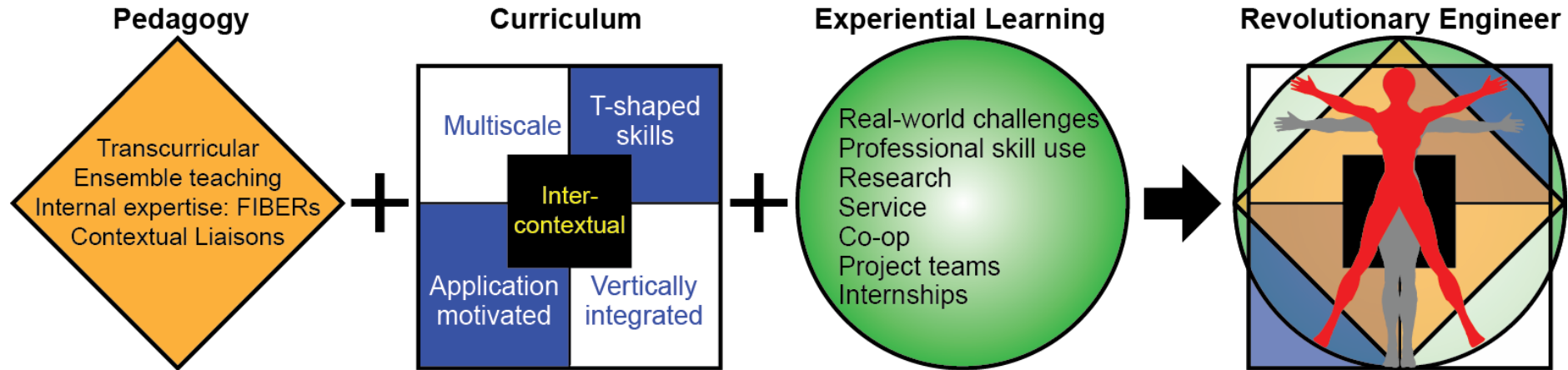
Engagement with Bio(**medical**)Engineering

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Curricular/Undergraduate Opportunities

- New BME major
 - Industry is our “customer” for these students
 - BME careers: internships, jobs
 - Alternate curricular paths remain: BEE, AEP, CBE, MAE
- Diversity
 - 75% female
- Experiential learning
 - Project teams
 - Key extracurricular skills

BME Major: Goals & Vision



- **Quantitative** approach to understanding biology **across length and time scales**, with a focus on **human health**
- Engineers that design and produce **robust** products and decisions **within highly variable, uncertain environments**
- Scientists who engage their community to lead at the interface of the physical and life sciences as related to the human condition

Undergraduate Program

- Major approved by NYS in June 2015
- First class affiliated in January 2016
- BME seniors, Class of 2018:
 - 74% female (14/19)
 - 11% URM (2/19)
- BME juniors, Class of 2019:
 - 82% female (28/33)
 - 7% URM (2/33)
- Sophomores affiliate in January 2018
 - ~n=70 anticipated

Experiential Learning

- Project Teams
 - iGEM
 - Engineers for Sustainable World
 - Engineering World Health
- Undergraduate Research Assistants
- Undergraduate Teaching Assistants
- Educational Outreach activities
 - K-12 Education
 - Ithaca Science Center
- Strength of Cornell Engineering
 - BME major capturing these experiences in curriculum

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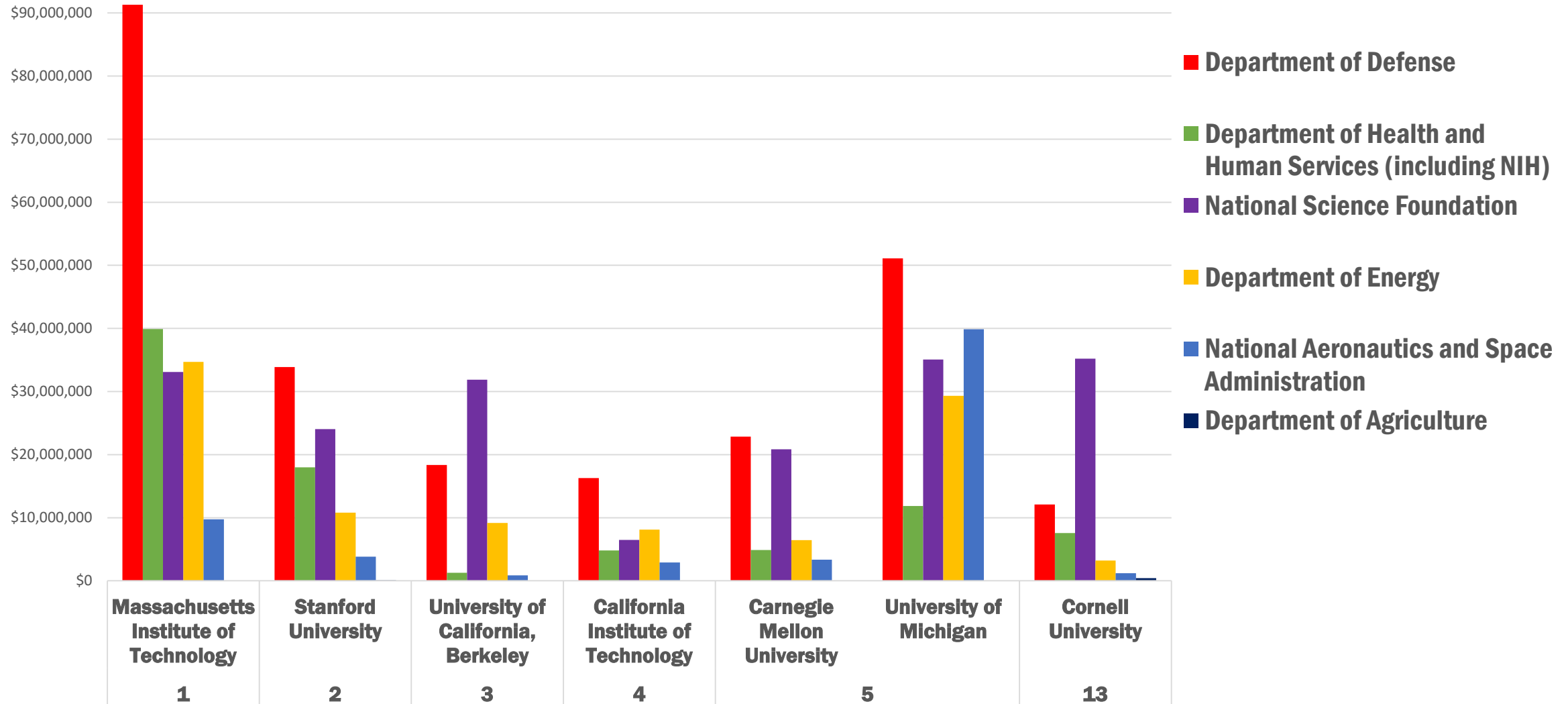
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Faculty/Research Opportunities

- Entrepreneurship
 - IP from research laboratories
 - Faculty start-up companies
- Research partnerships
 - Broad strength in biomaterials
 - Tissue engineering: priority for DOD/federal support
 - Industry relies on academic research
 - Federal support for research declining

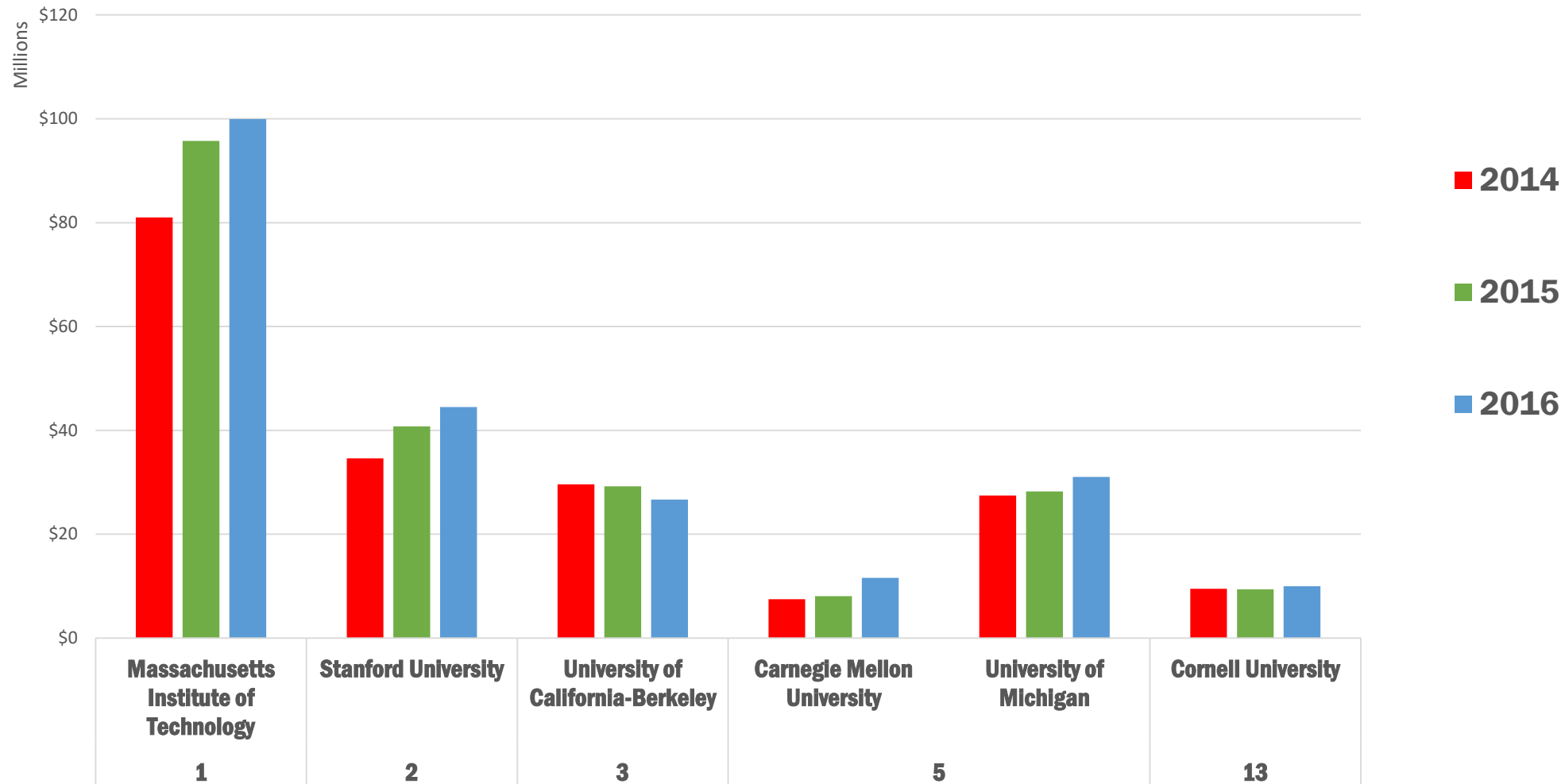
Federal Funding by Agency (2015)

USNWR Engineering Top 5 & Cornell



Industry Funding (2014-2016)

USNWR Engineering Top 5 & Cornell



Summary: Bioengineering in COE

- Strengths:

- Biomaterials/drug delivery
 - COE: BME, CBE, MAE, MSE
 - CALS: BEE
 - CHE: FS&A
- Optical imaging
 - AEP, BME
- Tissue engineering
 - BME, CBE, MAE, MSE
- Highly collaborative

- Opportunities:

- New undergraduate BME major
- New interdisciplinary areas
- Global health
- Entrepreneurial faculty
- Research partnerships

