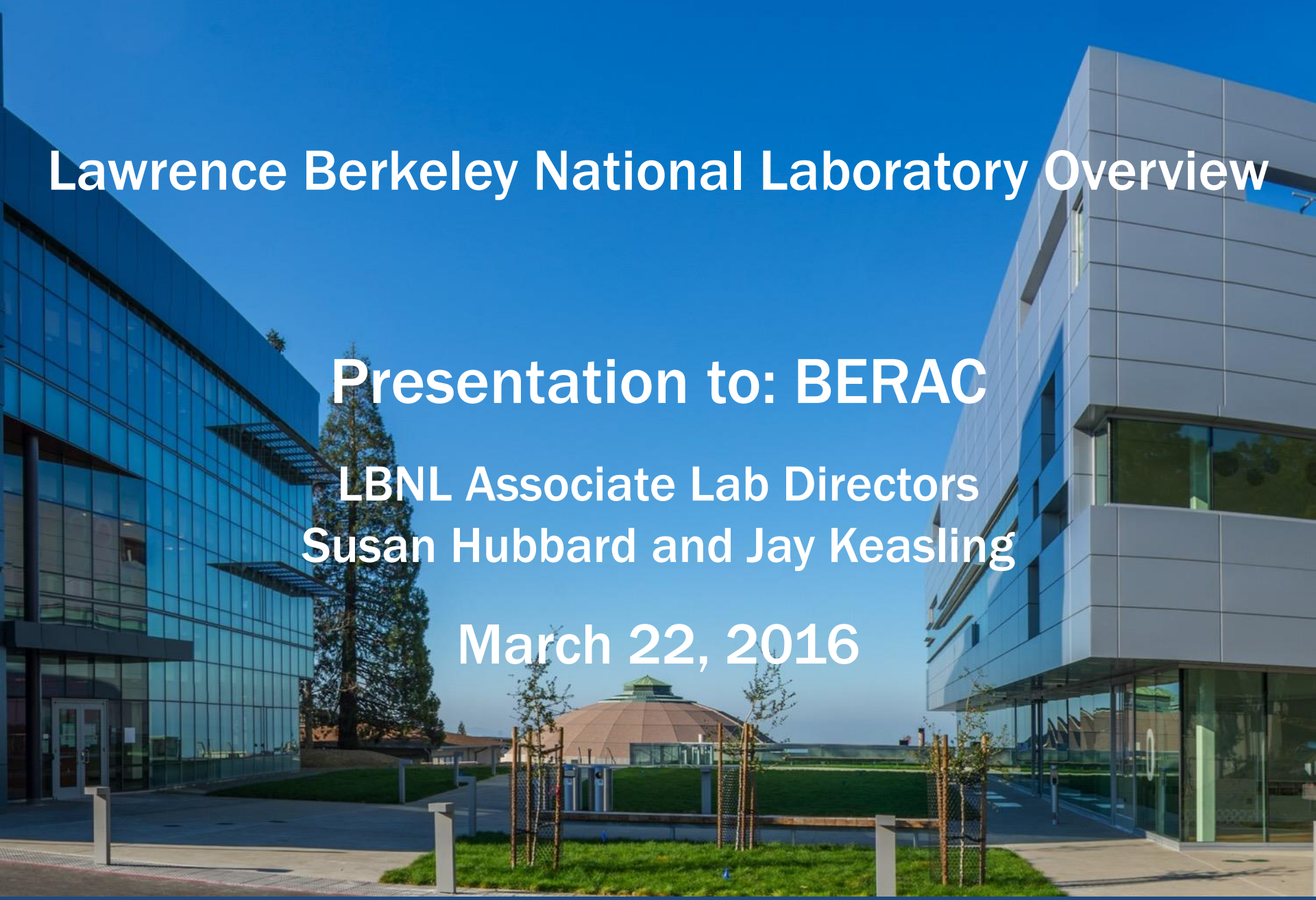


Lawrence Berkeley National Laboratory Overview

Presentation to: BERAC

LBNL Associate Lab Directors
Susan Hubbard and Jay Keasling

March 22, 2016

Berkeley Lab Vision & Characteristics

Joint Genome Institute

NERSC

Advanced Light Source

Energy Sciences Network

Molecular Foundry & NCEM

- Pioneering research that brings energy and environmental solutions to the world
- Open, Connected and Sharing
- Interdisciplinary, big team-science… since Day 1
- Berkeley Lab User Facilities Enable Science Community to Discover, Learn and Create - *over 10k users each year*
- Office of Science Multi-Program Laboratory
- Operated by University of California
- Co-location of BER science to center of Berkeley Lab campus
- Two of Berkeley's Six Science Areas aligned with BER

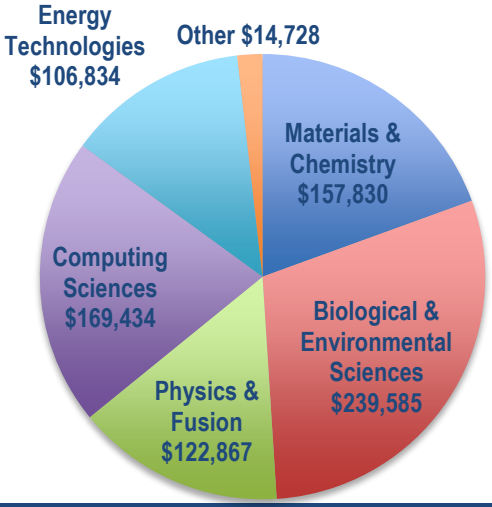
BioSciences

EARTH & ENVIRONMENTAL SCIENCES

- 3,304 FTE
- 245 Joint faculty
- 476 Postdoctoral researchers
- 330 Graduate students
- 149 Undergraduates
- 10,798 Facility users
- 2,170 Visiting scientists and engineers

FY 2015 Funding: $811.276M (excluding ARRA funding)

Costs by Direct Funding Source by Division, FY'15 ($K)



BERKELEY LAB

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Four DOE Defined Core Capabilities & Two Key Facilities

BSSD

Biological Systems Science: Integrates functional genomics, multi-scale imaging, metabolomics, computational biology, microbiology/metagenomics and plant science to understand how complex biological communities function

Biological and Bioprocess Science and Engineering: New core capability is focused on the engineering of biological systems and processes to solve challenges in energy and environment

CESD

Environmental Subsurface Science: Provides foundation to understand and predict watershed functioning relevant to water resources, environmental remediation, agriculture and biogeochemical cycling.

Climate Change Science and Atmospheric Science: Provides the foundation to acquire a range of atmospheric and terrestrial observations and to develop robust predictions of ecosystem, water-energy and climate system long-term behavior.

FACILITIES

JGI:

- BER-funded User Facility
- Largest producer of plant & microbial genomes
- Innovative DNA analysis algorithms
- DNA design and synthesis program

ABPDU:

- EERE-funded User Facility
- Bioprocess engineering for biofuels & bioproducts
- Scale-up to demonstrate commercial viability

Six Strategic Science Priorities

BSSD

① **Predictive Integrative Genomics:** Scalable measurement technologies for predictive modeling of molecular, cellular and ecosystem functions. Integration of genomics with multi-scale imaging, structural biology, metabolomics, and computations.

② **Biofoundry Enabled Discovery Science:** Open source foundational tools for efficient engineering of biological systems to speed biological construction and testing. Biological components & hosts that can be recombined and reused

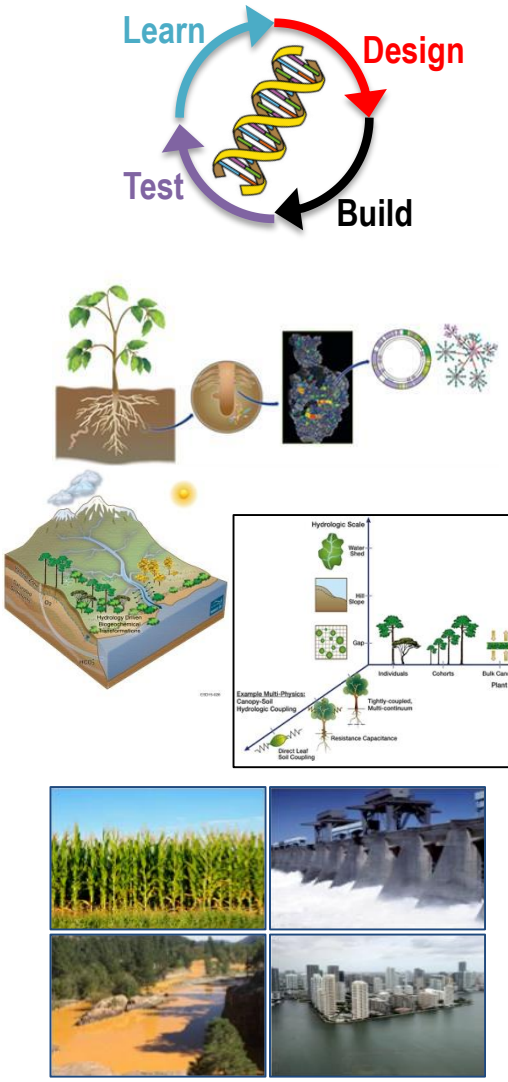
③ **Harnessing Microbial Communities for Environment and Energy Benefits:** Developing a predictive understanding of microbial community interactions with host biomes across a range of critical length scales and environmental conditions, with a particular focus on soil-microbe-plant biomes.

CESD

④ **Predicting Future Watershed and Ecosystem Behavior**: New approaches to quantify and simulate ecosystem feedbacks to climate as well as the influence of climate and other disturbances on watershed function and dynamics.

⑤ **Climate Action**: Developing robust predictions of future hydroclimate behavior at scales useful to guide actionable management.

⑥ **Resilient System Science**: Coupling of natural and human systems to provide the scientific foundation for optimal management of water, energy, urban and agricultural systems



Strategic Partnerships Important for Berkeley Lab Vision

- Many **Universities** and **National Labs,** including UC Berkeley and UC Davis
- **BER** and other **DOE Offices**
  - **ASCR:** Widely heterogeneous datasets and exascale vision for prediction
  - **BES:** Key facilities and leveraged projects
  - **EERE:** ABPDU & FutureBio
- **California State Agencies:** Water, energy, climate, healthy soils
- **Industry,** esp. biotech
- **International partners,** esp. those associated with water-energy, climate modeling, global carbon cycling and Mission Innovation

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Thank You