LARS

Quality
Communication
Conservation
Efficiency

Laboratory Assessments for Research Sustainability

LARS

- Process, Results
- Management training
- Lab User Impact
- Student Involvement
- Next Steps
- Q&A

LARS

Educational Objectives

- Show Importance of Laboratory Occupants
- Show impact of occupant conservation
- Show assessment process
- Context of Laboratory Assessment in University Setting

Why *Laboratory* Conservation?

- Resources
- Global Demand
- Campus Sustainability
- Laboratory Consumption
- Management Experience
- Researcher Awareness and Practices **???**

Labs: Energy Hog or Golden Goose?

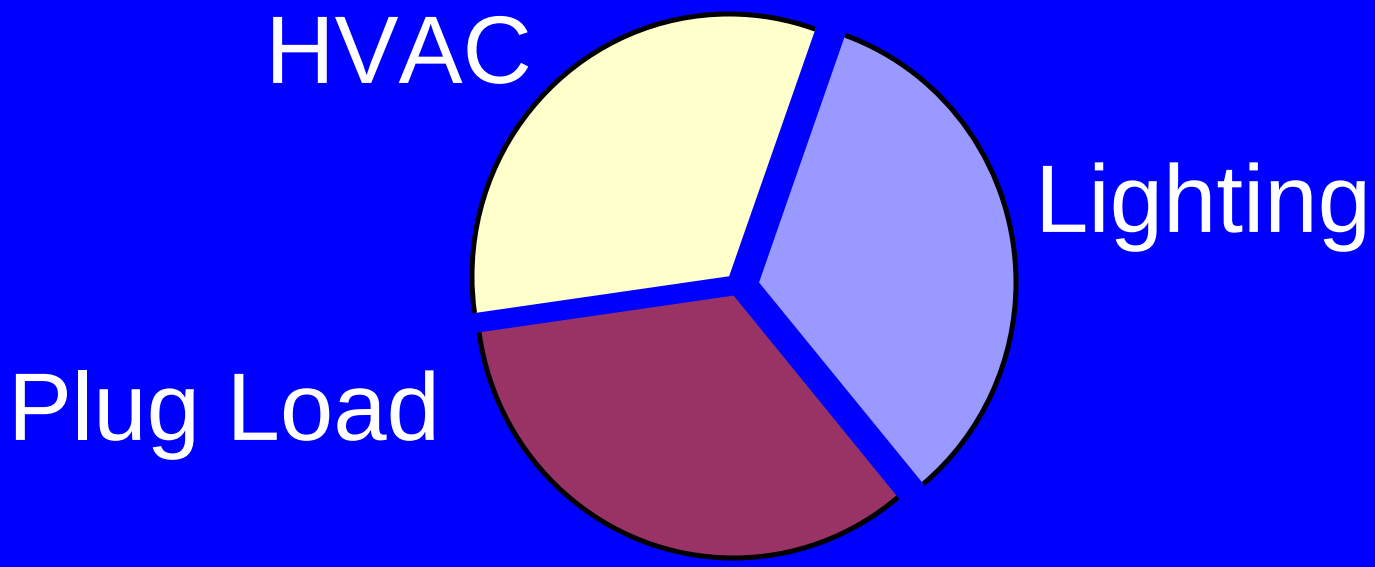
Laboratory Conservation…

Sure, it's "good" science,

But what's in it for my research?

- **Economics**
- **Environment**
- **Performance**
- **Mentoring**
- **Logical**
- **Credible**
- **Inspirational**
- **Necessary**

Why LARS? ***Energy***



"I have little control over plug load and lighting." Jim Dewey, UCSB Energy Manager

Utilities design and use

2 year old
vacuum failure

Commissioning

Freezer Door Frosted
Since Installation

Design & Renovation:
Faculty Support, LEED training; Labs21 features

Why LARS? Surplus Materials (*Dumpster Diving*)

Pollution Prevention & Recycling

LEED, Labs21 and LARS

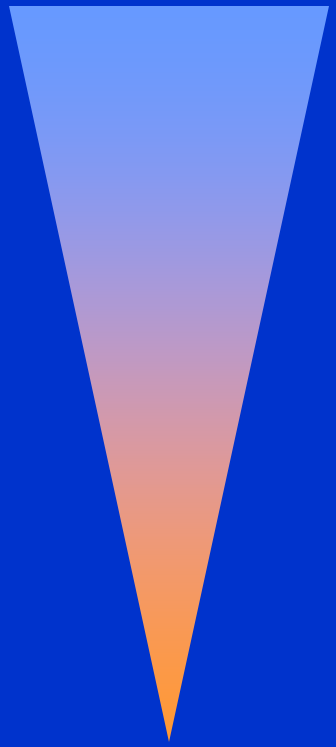
New Building	Existing Building
LEED-NC	LEED-EB
Labs21	**LARS**

LARS

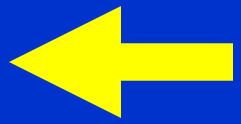
- **Comprehensive**
  - Energy, water, chemicals, materials…
- **Behavior**
  - easy choices

Strategy

Top-Down Bottom-Up



LARS



“Sustainable Research” LARS’ *Scope*

- **Conservation in lab**
- **Research topics**
- **Policy Analysis & Societal Involvement**
- **Curriculum**

LARS

Campus Connections

Academics

- Aware
- Credible
- Active

Operations

LARS

- Why
- **Who**
- How
- Impact

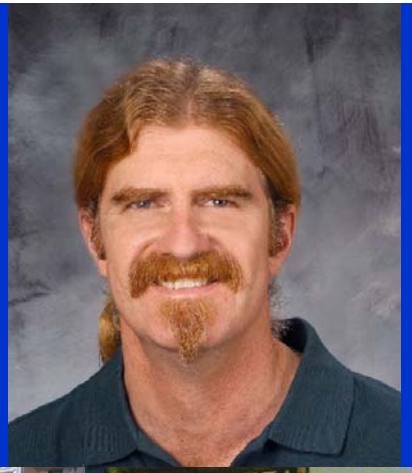
- Students
- Research Staff
- Administration



Who is LARS?

- 4 Undergraduate interns
- 2 Graduate students
- 2 Research Staff
- 1 Administrator

All "≤ ¼ time"

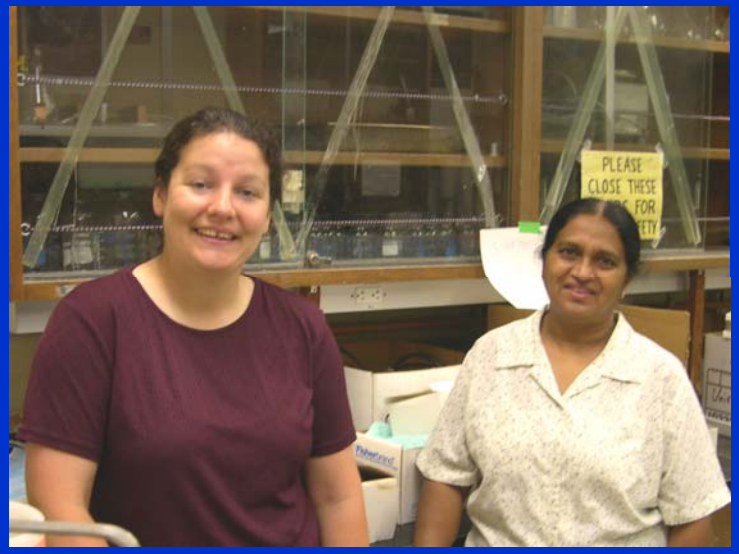





Who *HELPS* LARS?

UCSB Advocates

Shop Staff



Research Staff

Students
Faculty
Facilities
EH&S
Geography

HOW we assess:

- **Introduce:**
- **Inventory**
- **Interview**
- **Inquire**
- **Inform**
- **Inspire**

HOW we assess:

- Introduce
- **Inventory**
- Interview
- Inquire
- Inform
- Inspire

HOW we assess:

- Introduce
- **Inventory**
- Interview
- Inquire
- Inform
- Inspire

HOW we assess:

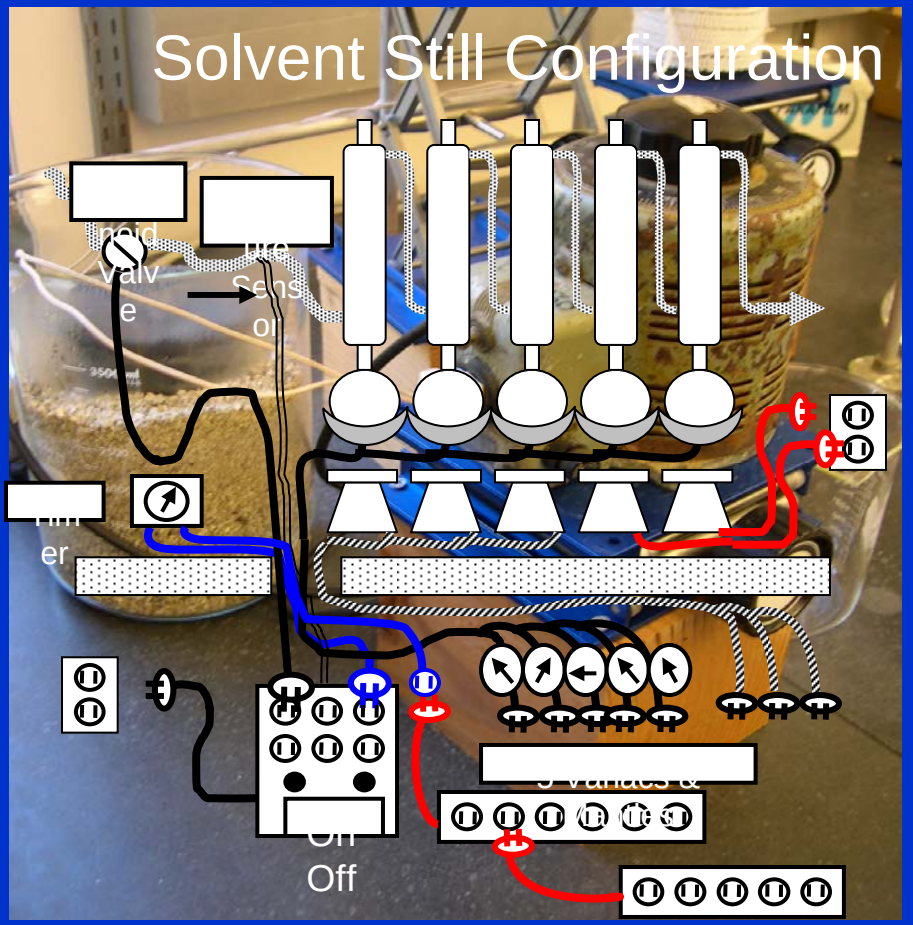
- Introduce
- Inventory
- **Interview**
- Inquire
- Inform
- Inspire

Laboratory Assessments (LARS)

- Introduce
- Inventory
- Interview
- **Inquire**
- Inform
- Inspire

Laboratory Assessments (LARS)

- Introduce
- Inventory
- Interview
- Inquire
- **Inform: *Hands ON!***
- Inspire

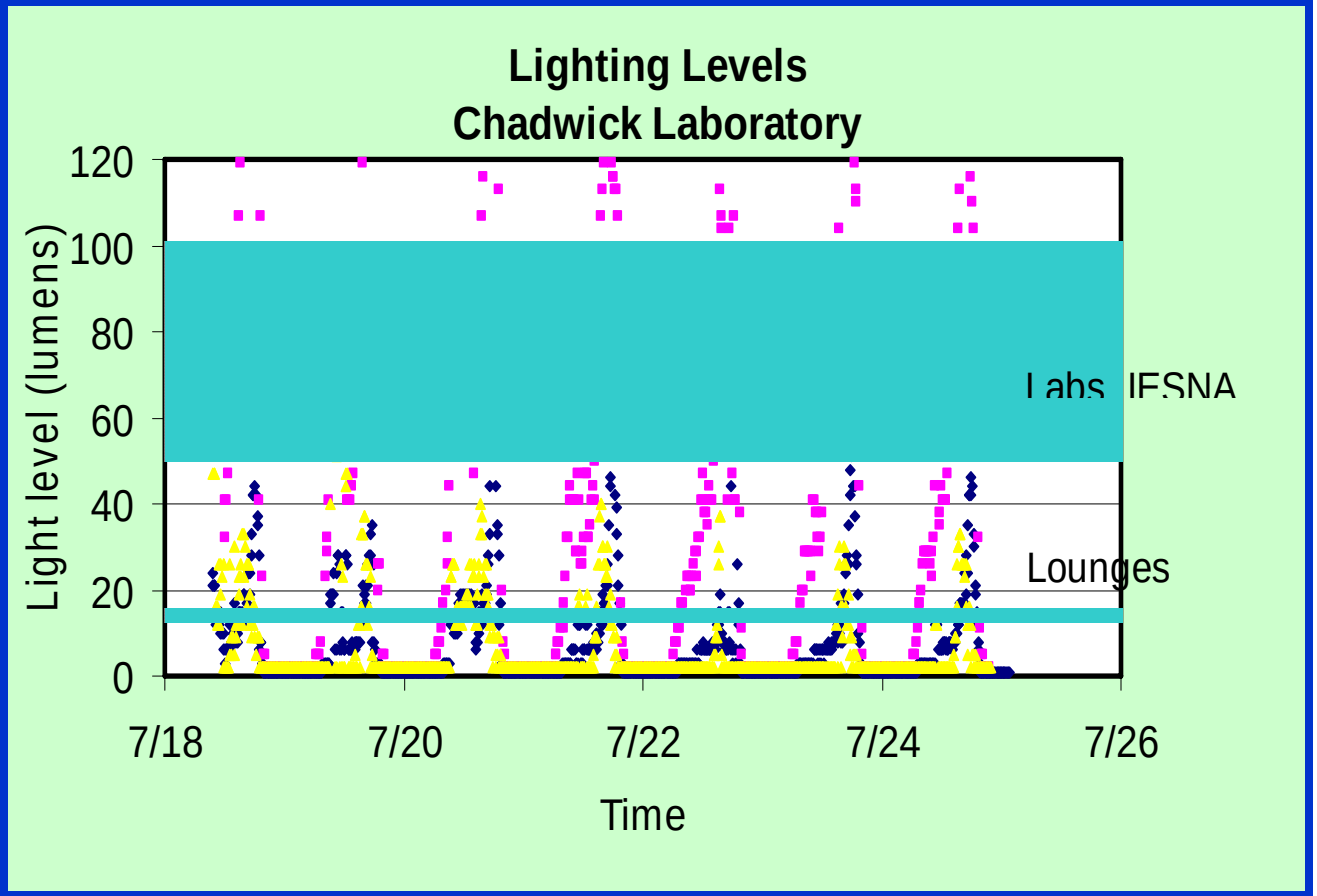


Laboratory Assessments (LARS)

- Introduce
- Inventory
- Interview
- Inquire
- **Inform**
- Inspire

Laboratory Assessments (LARS)

- Introduce
- Inventory
- Interview
- Inquire
- **Inform**
- Inspire



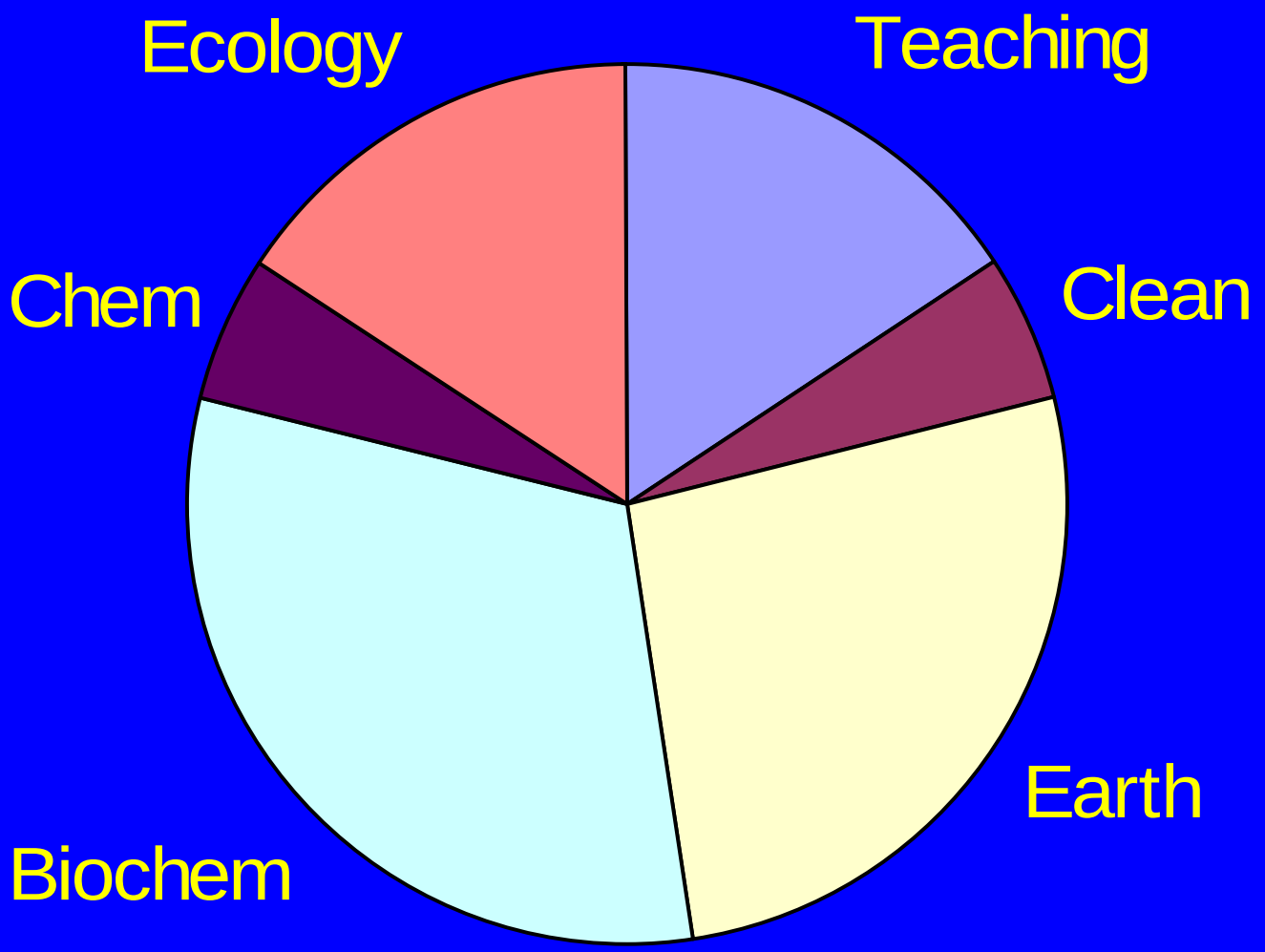
Laboratory Assessments (LARS)

- Introduce
- Inventory
- Interview
- Inform
- Inquire
- **Inspire**

Laboratory Assessments (LARS)

- Introduce
- Inventory
- Interview
- Inform
- Inquire
- **Inspire**

Results



Laboratory Types (n=19)

Results: Observations

- Labware washed
- Recycling attention & confusion
  - Disposable gloves?
- “Sustainability” unfamiliarity
- Water reclaimed; Hazmat avoided
- Time pressure very high

More Observations:

- Daylight used often vs. some rooms on 24/7
- No space heaters; One aspirator
- C offsets for field truck
- Bike & Bus to work
- Centrifuges off

Improvements

- ~5-10 kWh /d savings each lab
  (x 400 labs ~ 2-4 MW)
- 60,000 Lpy cooling water *one* lab
- Analytical Services info
- Chemical waste segregation
- Vacuum optimizing
- Incubators > Refrigerators

Unexpected Results:

- 20’ counter space donated
- Reliable DI water
- Faster isotope collection
- Reliable cold rooms
- Inventory process
- Washing procedures

Unexpected Results,
Free Equipment: $60-100 k

- HPLC
- Autosampler
- Chemical cabinets, solvents
- 4 Ultra-cold freezers
- Spectrometer
- Rotovap
- Refrigerated microcentrifuge
- High School supplies

Top Five Opportunities:

- Hoods 1, 2, 3,
- Refrigerators & Freezers
- Surplus & Salvage
- Lighting
- LEED / Labs21 Training

LARS Advantages:

- Conservation Expertise
- Operations Connections
- Equipment Knowledge
- Unique Lab needs and solutions
- Educate lab staff
- Pride

LARS Difficulties:

- Labor Intensive (6-10 h per lab):
  - Scheduling
  - data collection & evaluation
  - Interviews
  - Presentation
- Incentives
  - Reduced utilities =/= Low Overhead
  - Operating savings =/= Capital Investments

Lab Management Training and Sustainability:

John Galland
Laboratory Management Institute
UC Davis

Lab User Impact:

David Bothman, Engineering
UCSB

Testimonial:

"Painless and useful"
--Dan Little, Chemistry

Student Involvement:

Colin Dowling, Intern
Engineering '07

LARS Impact on Students

- Myriad of skills
- Critical thinking
- Professionalism
- Creativity
- Responsibility

Student Impact on LARS

- Fresh Perspective
- Maintain Energy
- Cohesiveness

LARS Follow-up

- **Hoods:** monitoring, voluntary shut-down
- **Website:** details & best practices
- **LabRATS** listserve: news, clinics, services, SAS

LARS, Next Steps

- Retail → Wholesale
- Surplus and Salvage (SAS)
- Adopt-a-Chemical
- Mercury Exchange
- Purchasing

Indus

ask fo


Thank you!