

Perspectives and Future Trends on Instructional Technology in a Research University

**T3 - Information Technology Applications in the Chemical
Process Industries**

**[18] - Information Technology Education in Chemical
Engineering**

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Office of Information Technology
UCLA

“Preparing for the Revolution: IT and the Future of the Research University”

IT is changing all activities of the research university and its organization, management and financing as well as impacting the broader higher-education enterprise.

- **A new knowledge and learning industry**
- **Fundamental changes in the relationship between people & knowledge**
- **Transformation of focus from teaching to learning**
- **New social dynamics from networks of people & cultures**
- **Changing student--faculty relationships**
- **Fundamental changes in the way education is delivered**

National Research Council, 2002

National Educational Trends

(particular UCLA emphasis)

- **Science of Learning**
- **Digital Promise**
- **Integrating research and teaching**
- **Learning beyond the classroom**
- **Online network of learning environments**
- **Libraries of materials, particular for science, technology, engineering and mathematics**
- **New learning tools [customized; flexible; intelligent]**
- **Active Learning**
- **Blended or hybrid learning: best of IT & best of traditional formats**

State of California Drivers

- Enrollment increases
- Budget shortfalls
- Unequal opportunity and preparation for college
- Shortage of experienced teachers
- Time to degree
- Commitment to technology economies of the future
- Training and re-training for jobs
- UCLA - extending research into instruction

Education Trends Affecting the Student

- Post-secondary Education
 - *Increased number of choices*
 - *Increased expectations for lifelong learning and training*
- High school trends
 - *Virtual high schools*
 - *Students take one or more online courses*
 - *Classes include global experience*
- K-8 trends
 - *Laptops increasingly common place*
 - *Point & click before writing (or walking!)*
 - *Digital readers & writers*

Students Have a Wider Choice of Educational Providers and Modalities

Expect to mix-and-match:

- Community Colleges
- Virtual Colleges & Universities
- Corporate Continuing Education
- Professional organizations
- Credentialing bodies
- No-credit courses

Using classroom, blended and on-line learning environments

The New Student Knows How to Use Computers and the Internet

A survey of 804 10-17 year olds, in Silicon Valley, in fall 2002

- 83-86% go to public school
- 99% have used a computer; 83% of those by the age of 10
- 93 % have been online; 86% of those by the age of 11
- 63% have an internet-connected computer in their bedroom
- 5.5 hours is the mean average hours spent online weekly
- 72% use instant messaging one more times/week
- 96% think knowing how to use computers and the Internet is very or somewhat important to their future education

“Growing up Wired”, San Jose Mercury News/Kaiser Family Foundation, 5/03

Beloit College Mindset for Class of 2007

- “Ctrl + Alt + Del” is as basic as “ABC
- Paul Newman has always made salad dressing
- An automatic is a weapon, not a transmission
- Gas has always been unleaded
- Computers have always fit in their backpacks
- They have never gotten excited over a telegram, a long distance call, or a fax
- Three-point shots from “downtown” have always been a part of basketball
- Test tube babies are now having their own babies
- Adam and PC Junior computers had vanished from the market before this generation went online
- They have always had a PIN number
- Directory assistance has never been free
- They have always been able to make photocopies at home
- Banana Republic has always been a store, not a puppet government in Latin America
- Yuppies are almost as old as hippies
- Michael Eisner has always been in charge of Disney
- Garrison Keillor has always been live on public radio and Lawrence Welk has always been dead on public television
- They have always been able to make phone calls from planes
- They have been “dissing” and “burning” things all their lives

UCLA Bruin 2010

- Always on; mobile; multi-processing; intuitive
- Expect to control information, schedule and activities
- Impatient and selective consumer
- Focus on future practical goal [job or study]
- Technology is not technology
- Expect more from technology
- Assume they will create, contribute, publish
- Will add UCLA to already complex lives
- Will take courses elsewhere while at UCLA



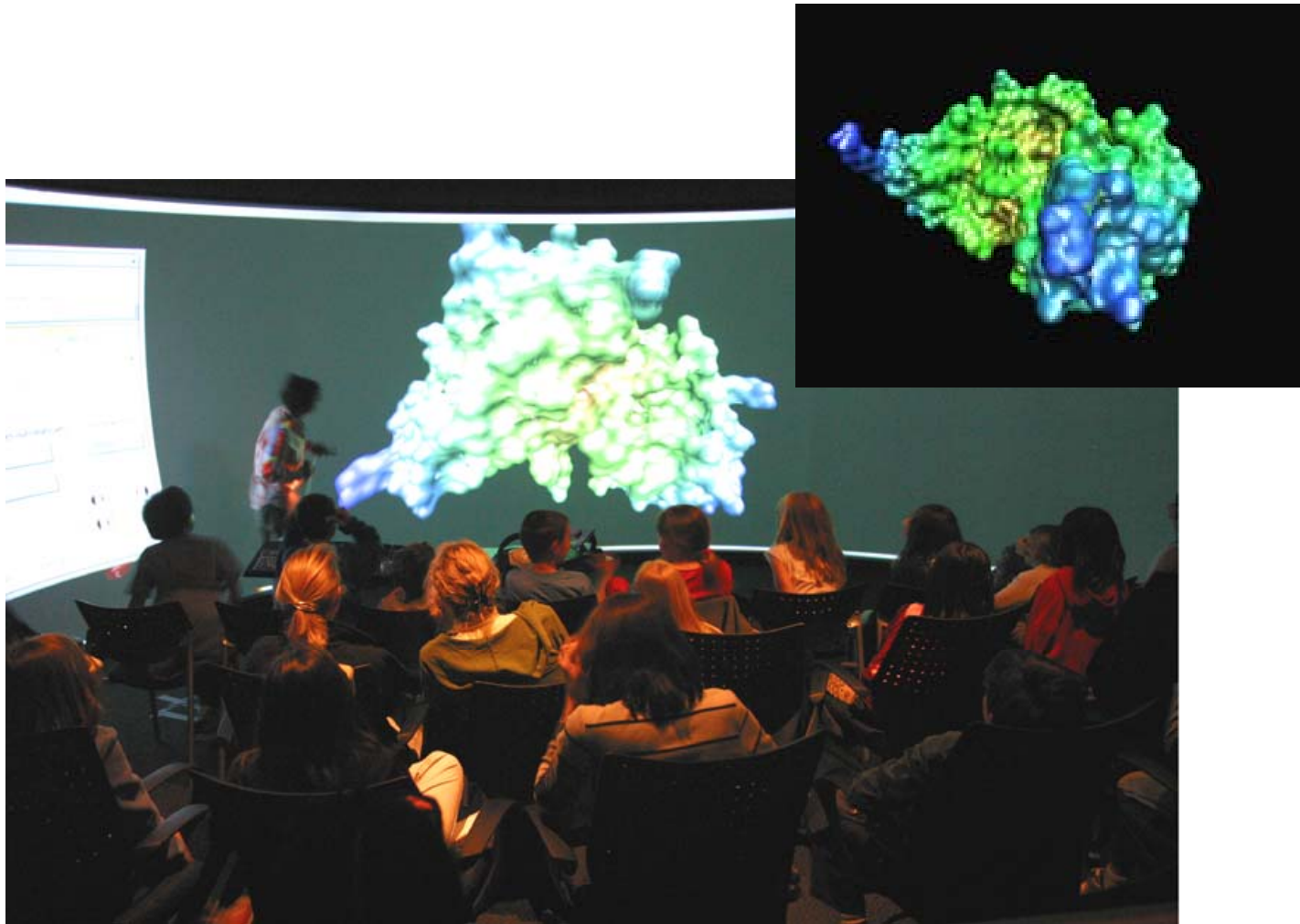
Use the Internet to Support Centers for Scholarly Interaction both to Engage Students and to Enhance External Access to UCLA

- Develop worldwide scholarly collaboration that will enrich and broaden bodies of knowledge.

Scholarly Interaction and the Undergraduate

Where research leads, teaching and learning will not be far behind:

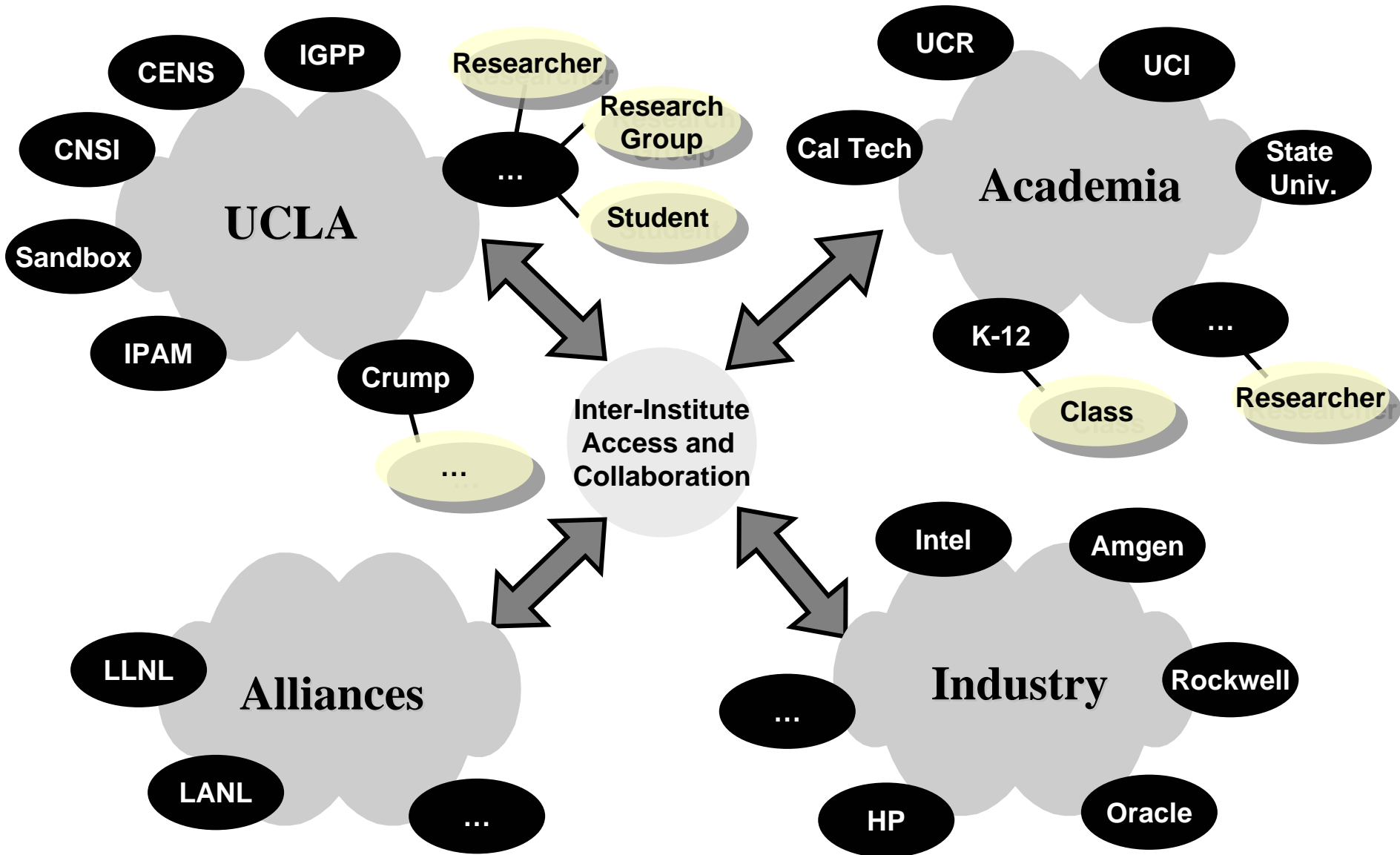
- Content: curriculum includes new areas of research
- Participation: experience doing “real research” using real data, technologies, and processes
- Community: access to information and to researchers
- Creation: produce research papers
- Publish: add to the global body of knowledge



Distributed and Multi-disciplinary Research Institutes

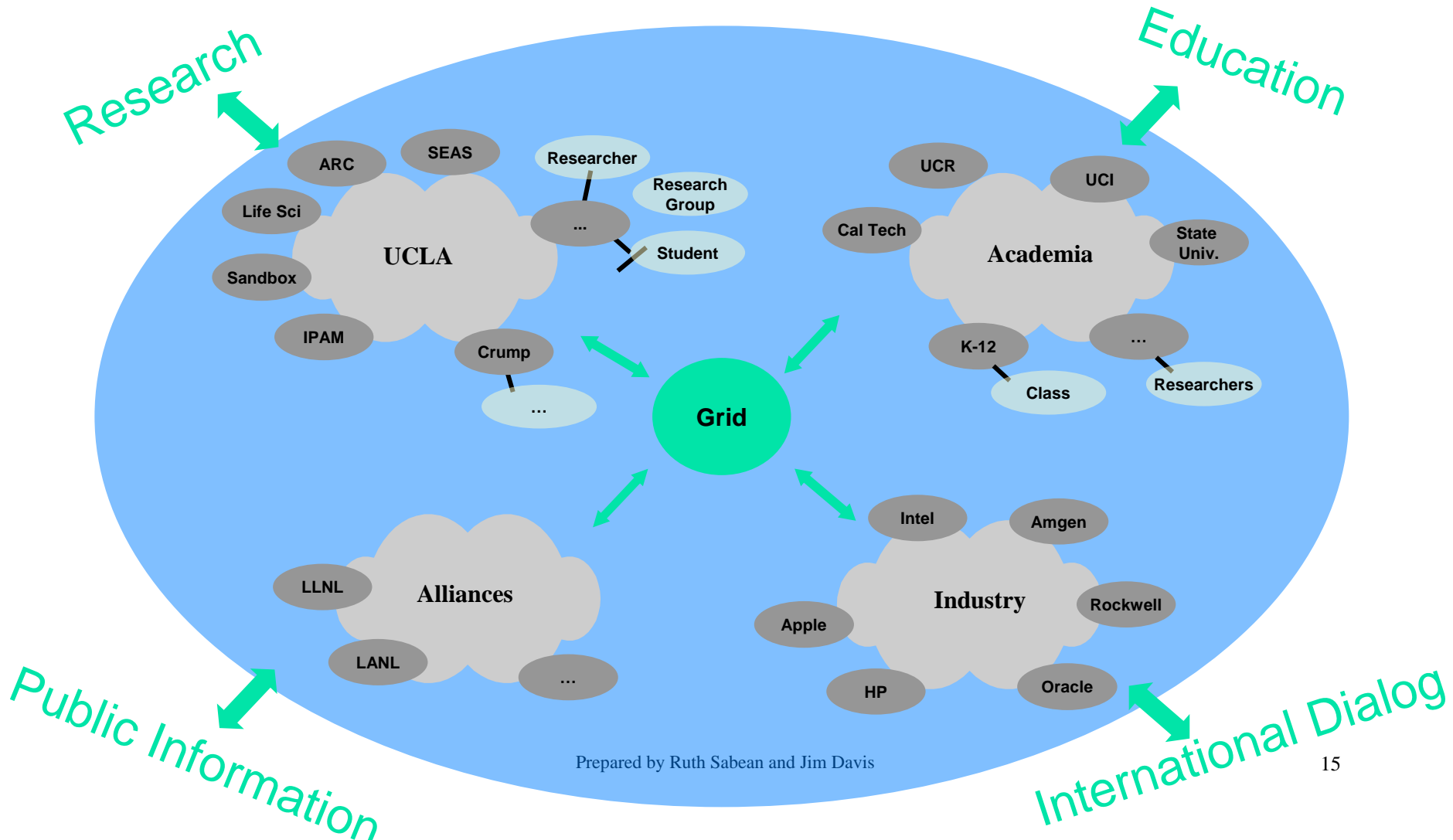
- California Nanosystems Institute (CNSI) - \$100M State funding to be matched 2-1 by Federal and Private funding
- Cell Mimetic Institute for Space Exploration (CMISE) \$40M/10 yrs NASA Funding. UCLA/Caltech/UCI/Arizona State
- Center for Embedded Networked Sensing (CENS) \$40M/10 yrs NSF Funding. UCLA/USC/UCR/JPL/CSU/CalTech
- Laboratory of Neuro Imaging Institute (LONI)
- Plasma Science and Technology Institute (PSTI)
- Institute of Geophysics and Planetary Physics (IGPP)
- The Center for Nanoscience Innovation for Defense (CNID) \$20M/3 yrs. Defense Advanced Research Project Agency (DARPA) and Defense MicroElectronics Activity (DMEA) UCLA/UCSB/UCR
- Center for Scalable and Integrated NAno Manufacturing (SINAM)\$18M/5 yrs – UCLA/UCB/UCSD/Stanford/UNC/HP
- Functional Engineered Nano Architectonics Focus Center (FENA) \$13.5M/3 yrs. Semiconductor Industry Association (SIA) and the Department of Defense. UCLA/UCB/UCSB/UCR/USC/MIT

Research Vision



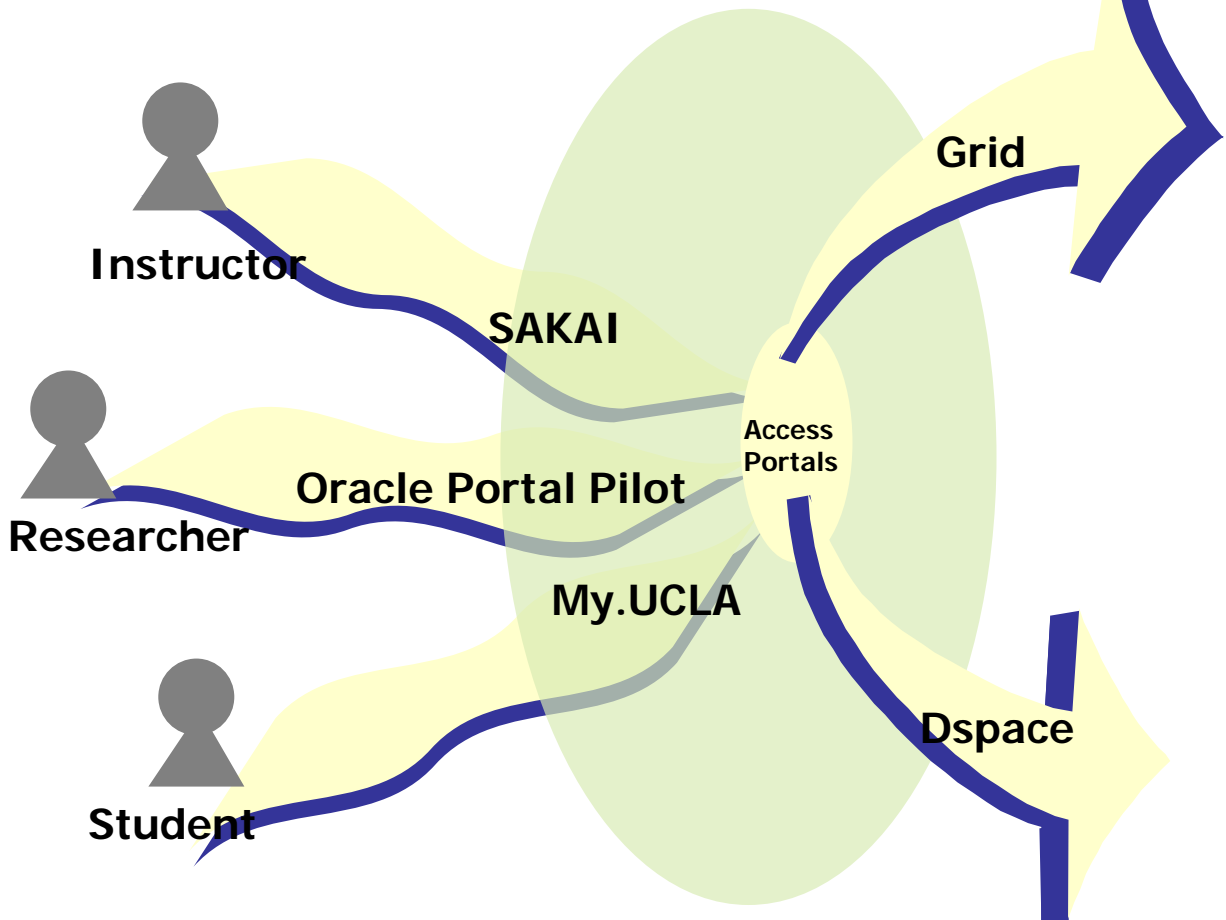
Centers for Scholarly Exchange Research and Education Sweet Spot

**Computation
Distributed Data Storage
Collaboration
Managed Access**

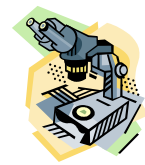


Prepared by Ruth Sabeen and Jim Davis

Scholarly Interaction



Rights & Roles, Affiliations, Relationship to Resource (Authentication, Shibboleth...)

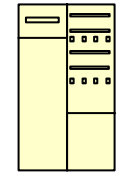


Instrumentation



Collaborative Tools:

- Whiteboards
- Discussion
- Calendar
- Search



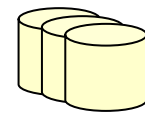
Computational Resources

- Clusters
- Supercomputers

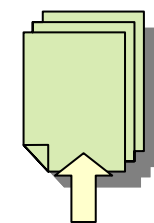


People:

- Directories
- Bios
- Relationships



Datasets



Repositories:

- White Papers
- Publications
- Documents



Working Area:

- Project Descriptions
- Drafts
- Annotation

CENS Portal

Static Content

*Updated by
Webmaster*

- Headers
- Footers
- Page layout
- Site Structure
- Static Content
 - About CENS
 - Welcome
 - base research page content

Semi Static

*Update access
based on privileges*

- **Research Area**
 - Overview
 - Objectives
 - Internal
- **Research Project**
 - Overview
 - Approach
 - Accomplishments
 - Future Directions
 - Systems/Experiments
 - Internal

Dynamic Content

*Derived from Search
of Repositories*

- **Research Area**
 - Project List
 - Publications
 - Technologies
 - Presentations
 - People

- **Research Project**
 - Publications
 - Technologies
 - Presentations
 - People

• People Page

• Latest Events

• Latest News

Repositories

*Access to submit
based on privileges*

Bibliography

- Pubs
- Tech Reports
- Presentations
- Technologies

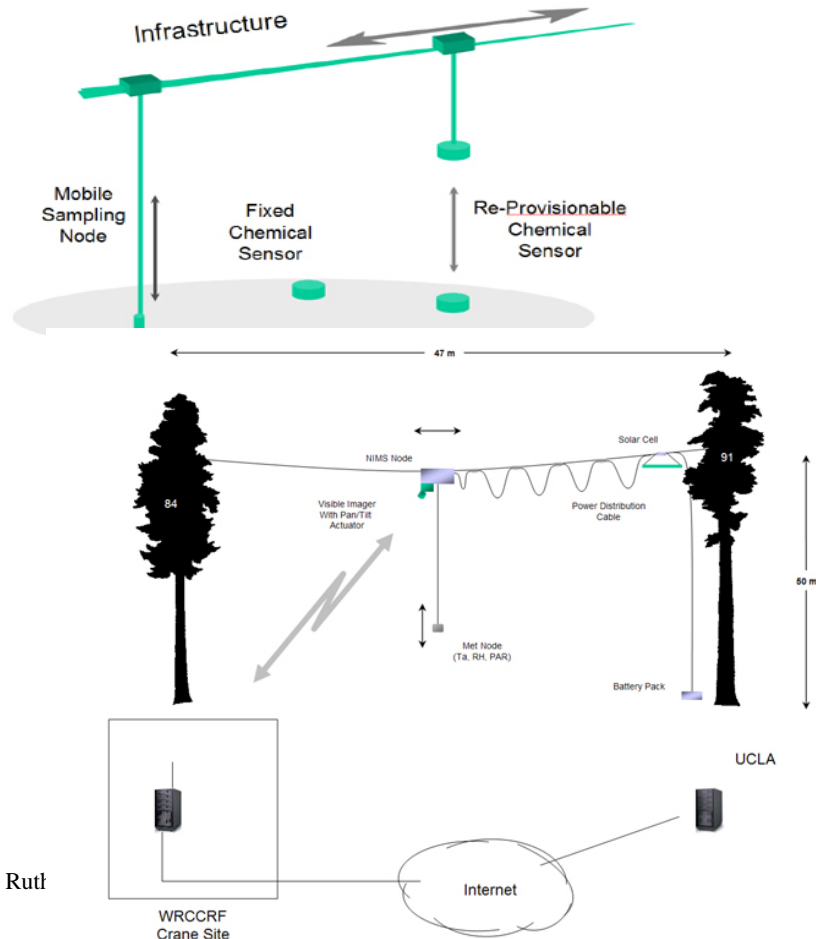
People

Events

News

Prepared by Ru

Center for Embedded Network Networked Inomechanical Systems (NIMS) – Prof. William Kaiser Sensing (CENS)



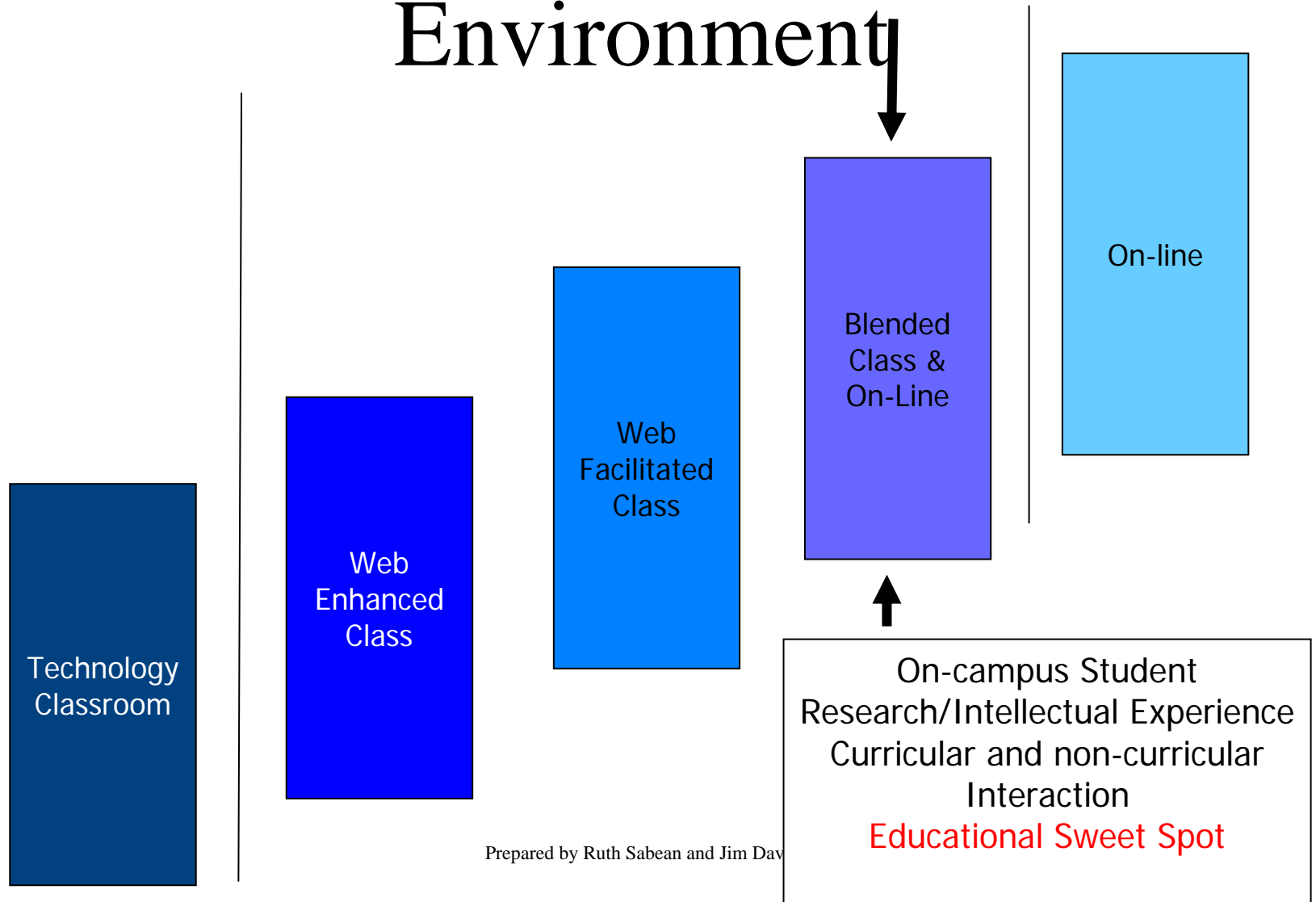
“A fearless mobile robot is helping scientists monitor environmental changes in forests.” - BBC
Prepared by Rut



Integrate Students into an IT-Enhanced, Individualized Teaching, Learning and Research Environment

- Stimulate the cultural, social, and educational changes that will enhance the UCLA academic experience.
 - Blended instruction
 - Faculty-student interaction
 - Student-student interaction
 - Research experience
 - Communicate about curriculum
 - Forge group activities
 - Ensure student, faculty, staff skills

Integrate Student IT Enhanced Environment



Life Sciences: Microbial Genome Sequencing

Undergraduates as researchers will:

- Isolate and physically characterize DNA fragments from the genome in the wet lab

...and then using digital technology:

- Retrieve an image of the gel
- Run the DNA sequencing
- Verify the assignment is correct
- Remove the vector region of the sequence
- Carry out bioinformatic analysis of their DNA sequence
- Write a scientific paper on their novel DNA sequence discovery.

Faculty-Student Interaction

MyUCLA Portal - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <https://be.my.ucla.edu/courses.asp>

Courses WebMail Notices Services Calendar Logout

INFOSEEK SEARCH: UCLA the Internet

UCLA Basketball Set

UCLA Directory
Update Your MyUCLA Roles

BRUIN, JOSIE **Undeclared-Life Science**

Class of '99

Help

- About MyUCLA
- About the IEI
- Computer Labs On Campus
- Frequently Asked Questions
- Feedback
- DPR FAQs

MyUCLA Features

- Address Book
- Appointments
- Bookmarks
- Calendar
- Chat
- Class Planner

My Study List for Term 02S **NEW!** Grid Go

Class Planner **Schedule of Classes**

INTRODUCTORY PSYCH (000-000-000)
PSYCH 10 - LEC 1

[Classmates](#) [Grades](#) [Textbooks](#)

Time: TR 9:30 A - 10:45 A
Location: MOORE 100

Final Exam: Tuesday, June 12, 2001
3:00:00 PM - 6:00:00 PM
Location: MOORE 100

INTRO-COMMCTN STDS (000-111-111)
COM STD 1 - LEC 2

[Classmates](#) [Grades](#) [Textbooks](#)

Done

Start

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Microsoft PowerPoint - [S... MyUCLA Portal - Micro...

Internet 12:38 PM

Scheduling/
tracking
appointments

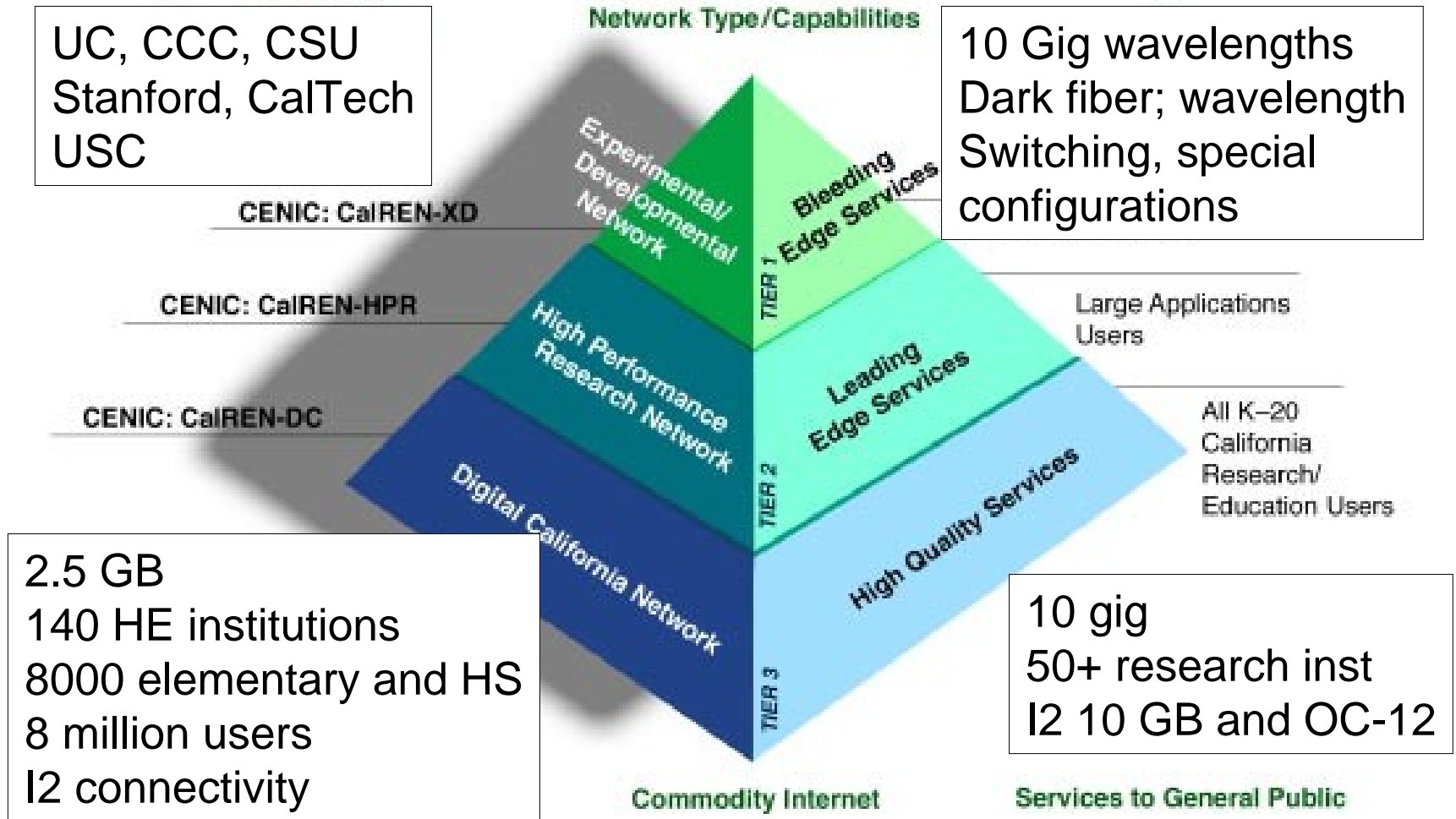
Recommendation
letters

On-line grading

NETWORK DEVELOPMENT AND EVOLUTION

FOR CALIFORNIA RESEARCH AND EDUCATION COMMUNITY

Committee on Education Network Initiatives in California



*“Education for Tomorrow Needs **Innovation** Today”*

“After years of rhetoric about how information technology would revolutionize education, the nation’s education and training institutions have not delivered anything approaching the promised change.”

The fundamental research challenge: how to design the most effective learning strategy for each subject and each student.

Henry Kelly, Federation of American Scientists, Spring 2003, Carnegie Reporter