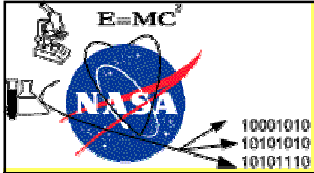


Collaborative Software Engineering Workshop

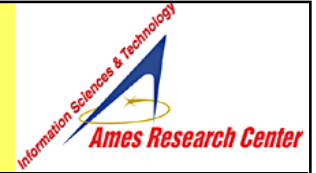
ScienceOrganizer: A Collaborative Information Management Tool for Scientific Teams

Richard M. Keller, Ph.D.

***Information Sharing and Integration Group
Collaborative and Assistant Systems Tech Area
Computational Sciences Division
NASA Ames Research Center***



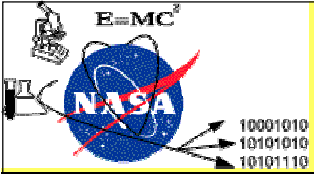
ScienceDesk Project Staff



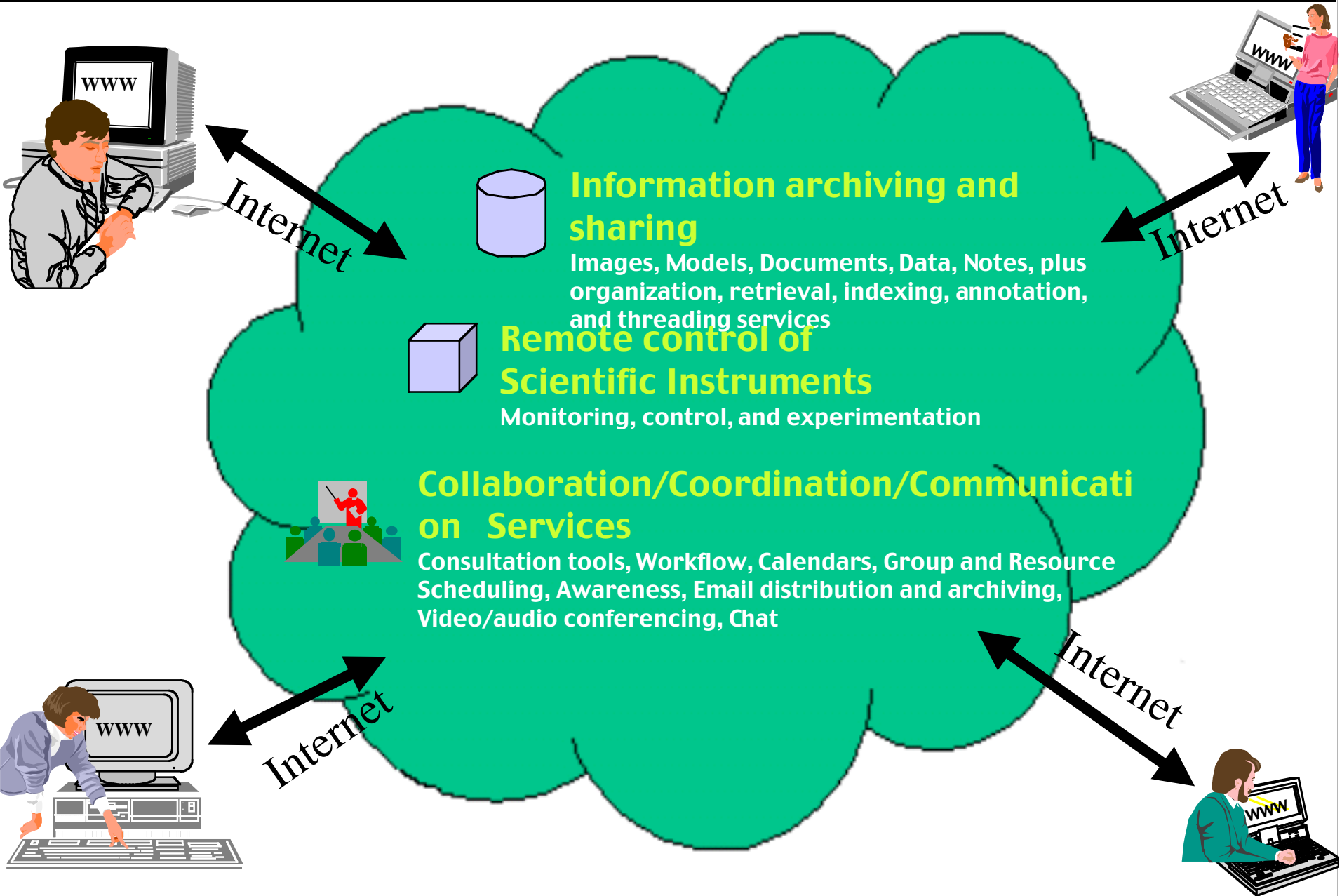
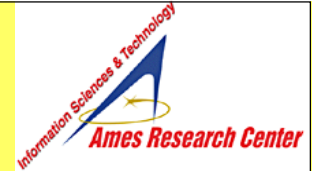
Rich Keller
Shawn Wolfe
David Hall, QSS
Robert Carvalho
Steve Rich, SAIC
Deepak Kulkarni
Dan Berrios, RIACS

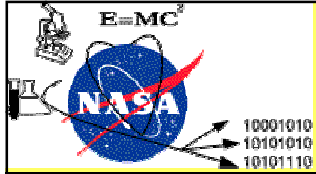
Sergey Yentus, QSS
Keith Swanson
Ian Sturken, QSS
Ling-Jen Chiang, QSS
David Nishikawa
Linda Andrews, RIACS

Computational Sciences Division
NASA Ames Research Center



ScienceDesk Project: Infrastructure support for distributed scientific teams



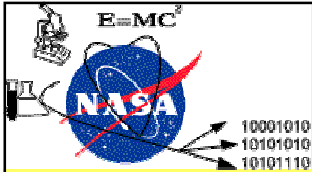


Research Areas

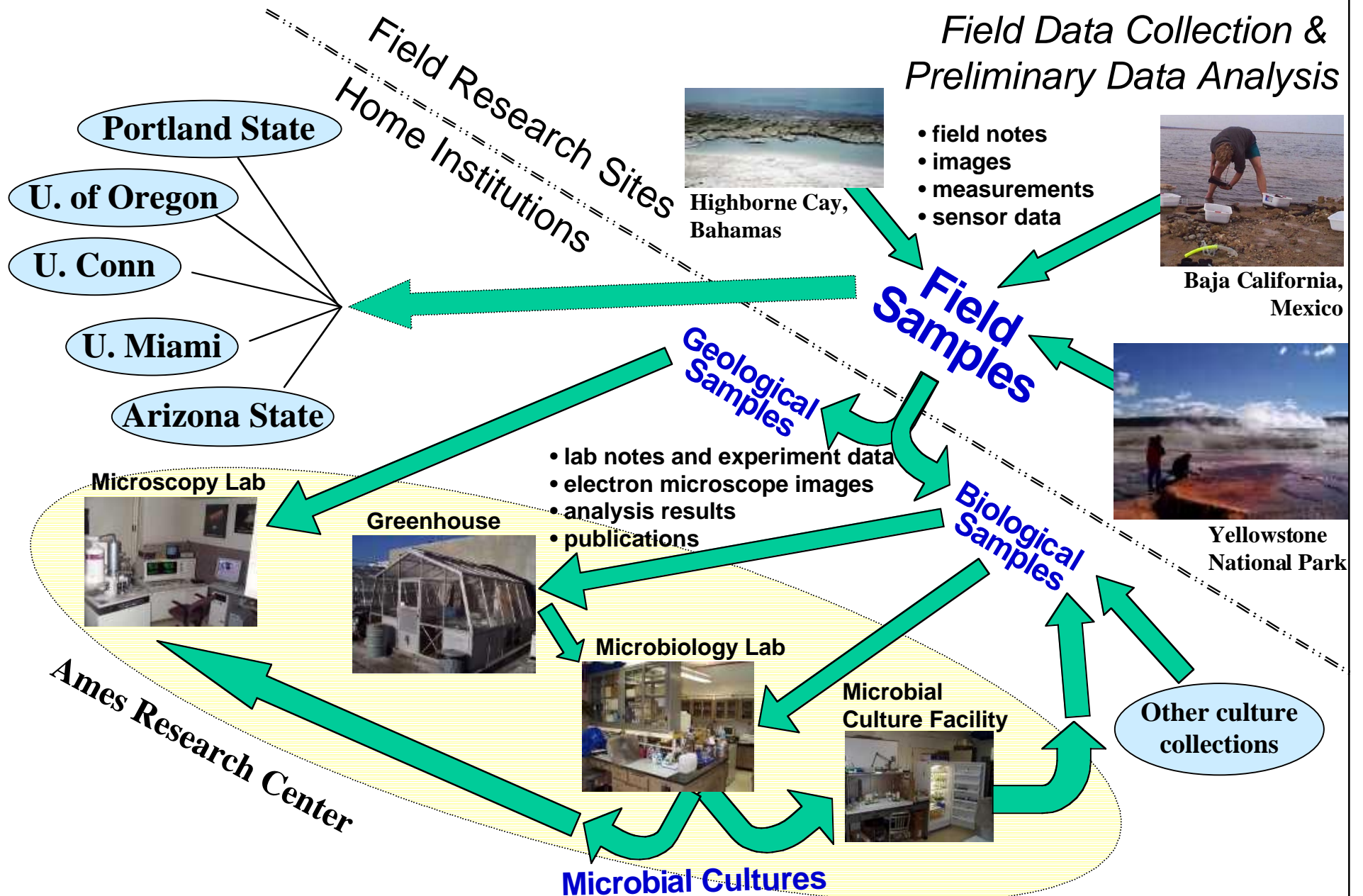
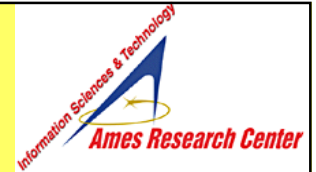


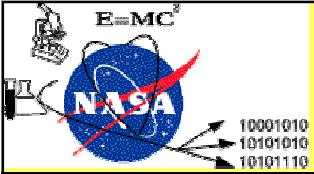
- **Scientific Knowledge Management:** capture, preservation, traceability of scientific knowledge
- **Intelligent Information Access:** intelligent indexing, visualization, and navigation
- **Collaboratories:** asynchronous and synchronous collaborative scientific teamwork
- **Agent-assisted Remote Experimentation:** intelligent monitoring and control

<http://sciencedesk.arc.nasa.gov>

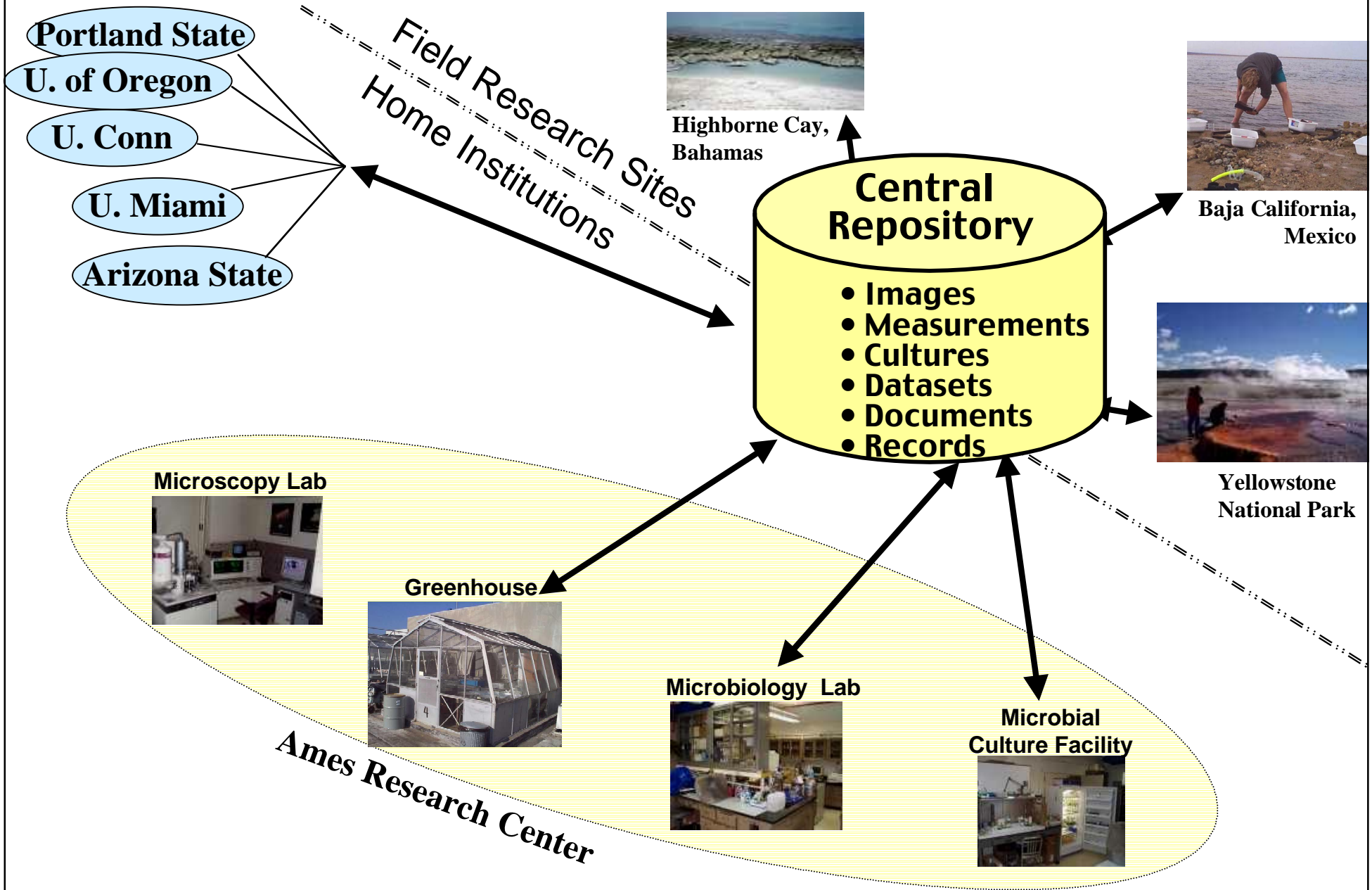
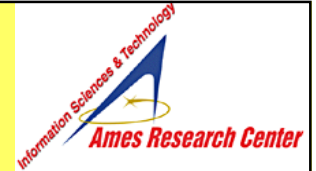


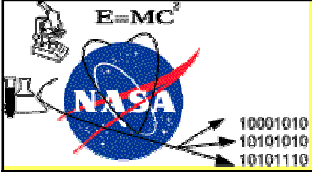
Motivation: Distributed Scientific Field and Lab Work





Science Organizer Information Repository





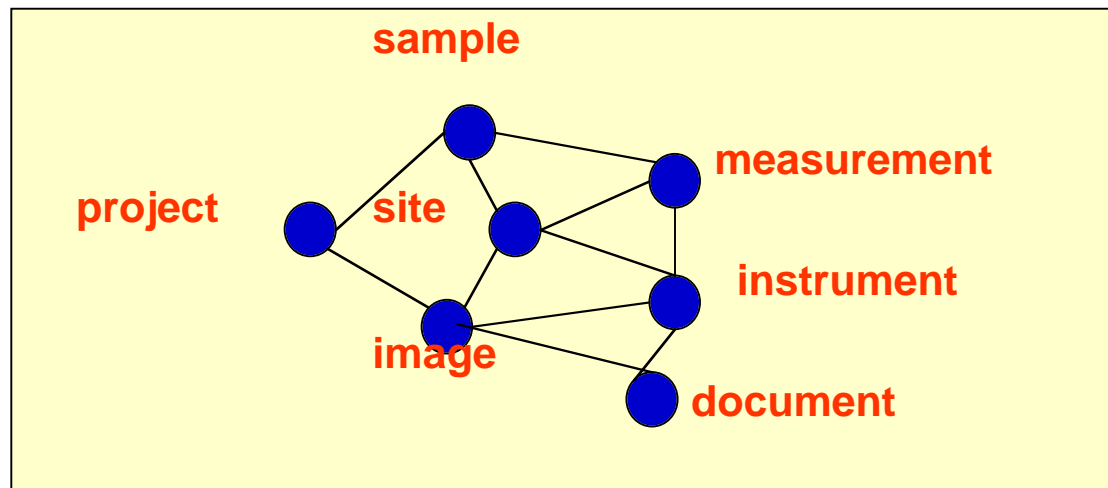
What is ScienceOrganizer?



- **An information repository / digital library for distributed scientific project teams:** stores heterogeneous project information products -- *images, datasets, documents, and various types of scientific records (describing samples, field sites, measurements, instruments, microbial cultures, etc.)*
- **A hybrid tool combining the functionality of:**
 - a database
 - a document-sharing system
 - a hypermedia information space
 - a semantic network
- **Features cross-linkage:** enables rapid access to interrelated information
- **A “project memory” system:** tracks history of project team’s fieldwork, labwork, and associated data collection activities

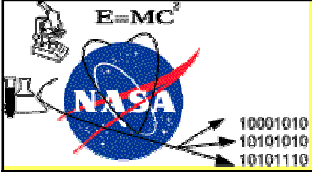
The ScienceOrganizer “Project Information Web”

ScienceOrganizer maintains project information in an interconnected network or “information web”

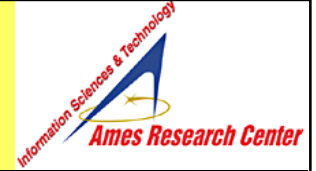


- Nodes: *information resources*
- Links: *relationships among resources*

Semantic hypermedia system



Information Resources (“nodes”)



- **Describe various types of project-specific information: People, Places, Events, Devices, Measurements**
(e.g., field sites, labs, trips, samples, images, documents, instruments etc.)
- **Contain metadata (categorical, text, or numeric)**
- **Can have “attached” files (e.g., images, documents, datasets)**

Examples of Information Resources:

Microbial-Culture-123

Cultivated-by: R. Smith
Genus: microcoleus ch.
Growth medium: ASN
Date isolated: 03-04-00
field5: ...

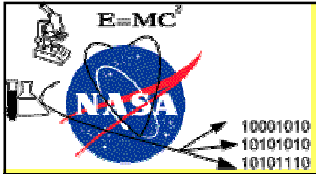
Microbial-Mat-Sample -654

Collected-by: S. Jones
Collection date: 1/24/00
Collection site: Pond 6:
field4: ...

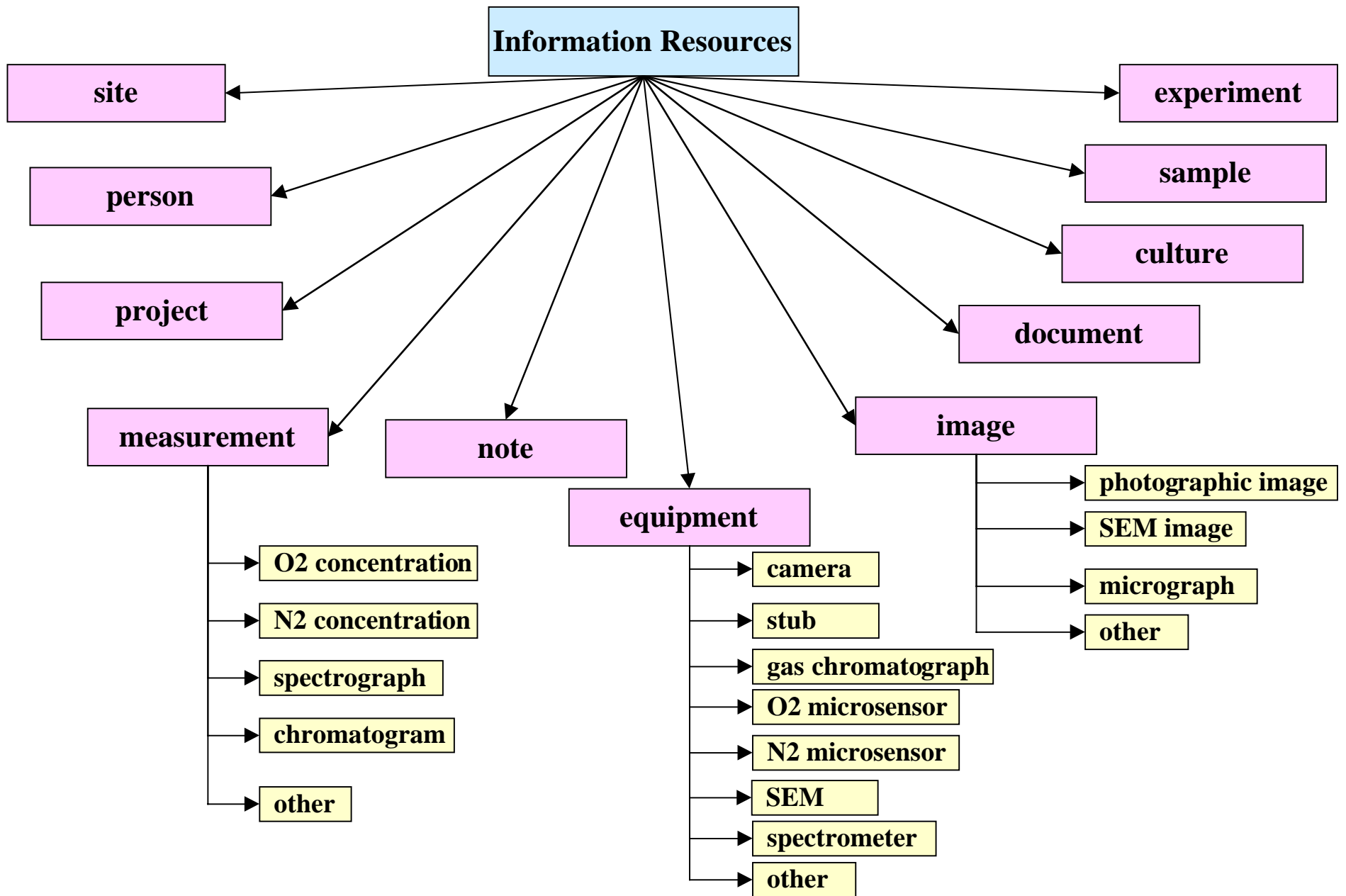
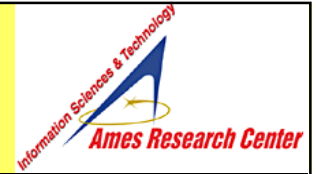
SEM-Image -654

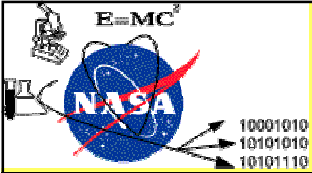
Taken-by: R.Smith
Image date: 1/24/00
Equipment:
Image File: _____



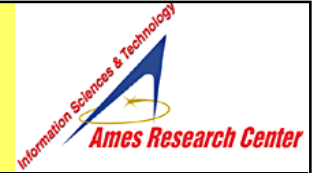


Types of Science Organizer “Information Resources” (partial)

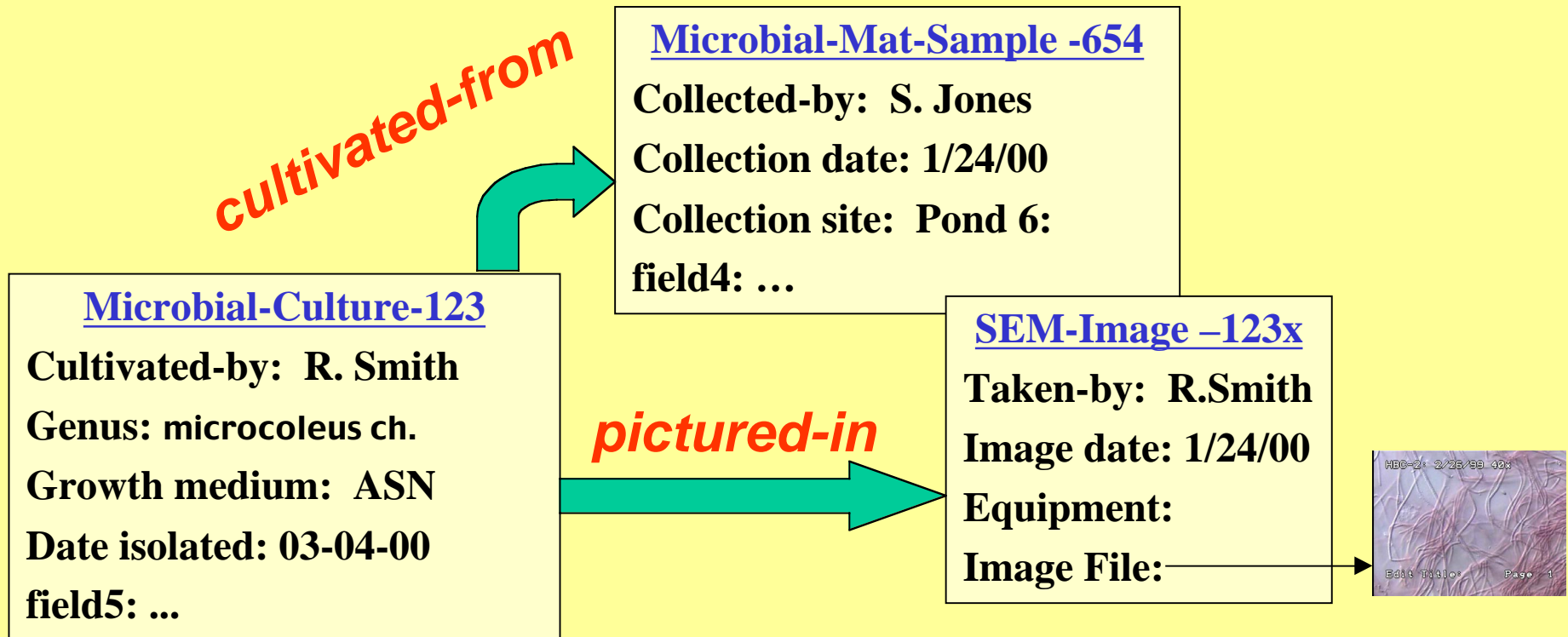




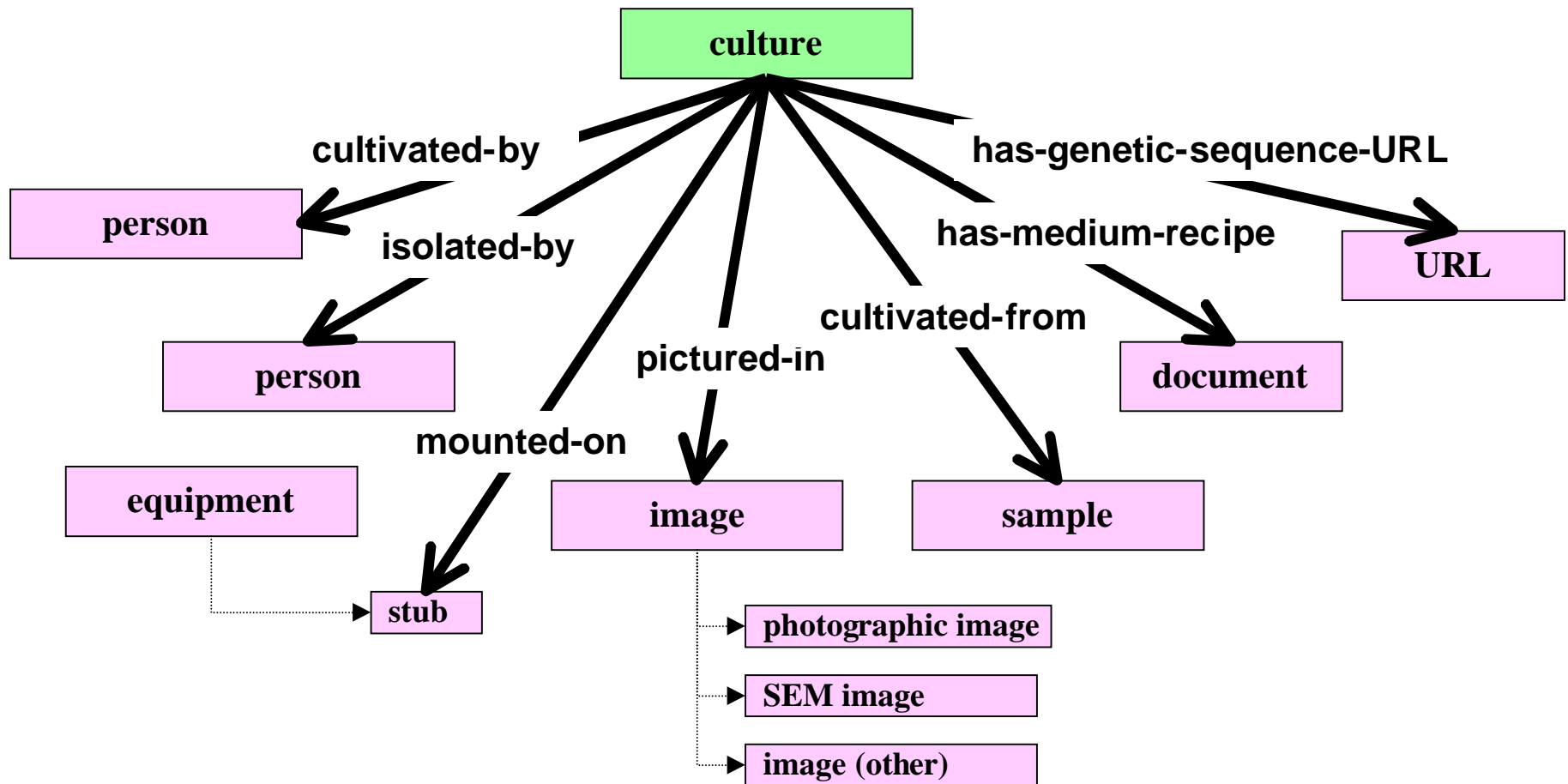
Relationships among Resources ("links")

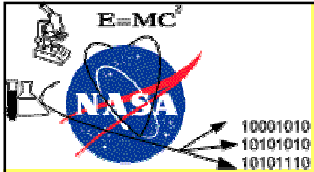


- Information Resources are interrelated by means of named links that characterize the nature of the relationship
- Relationships are customized to a project team based on an analysis of the information resources in the scientific domain

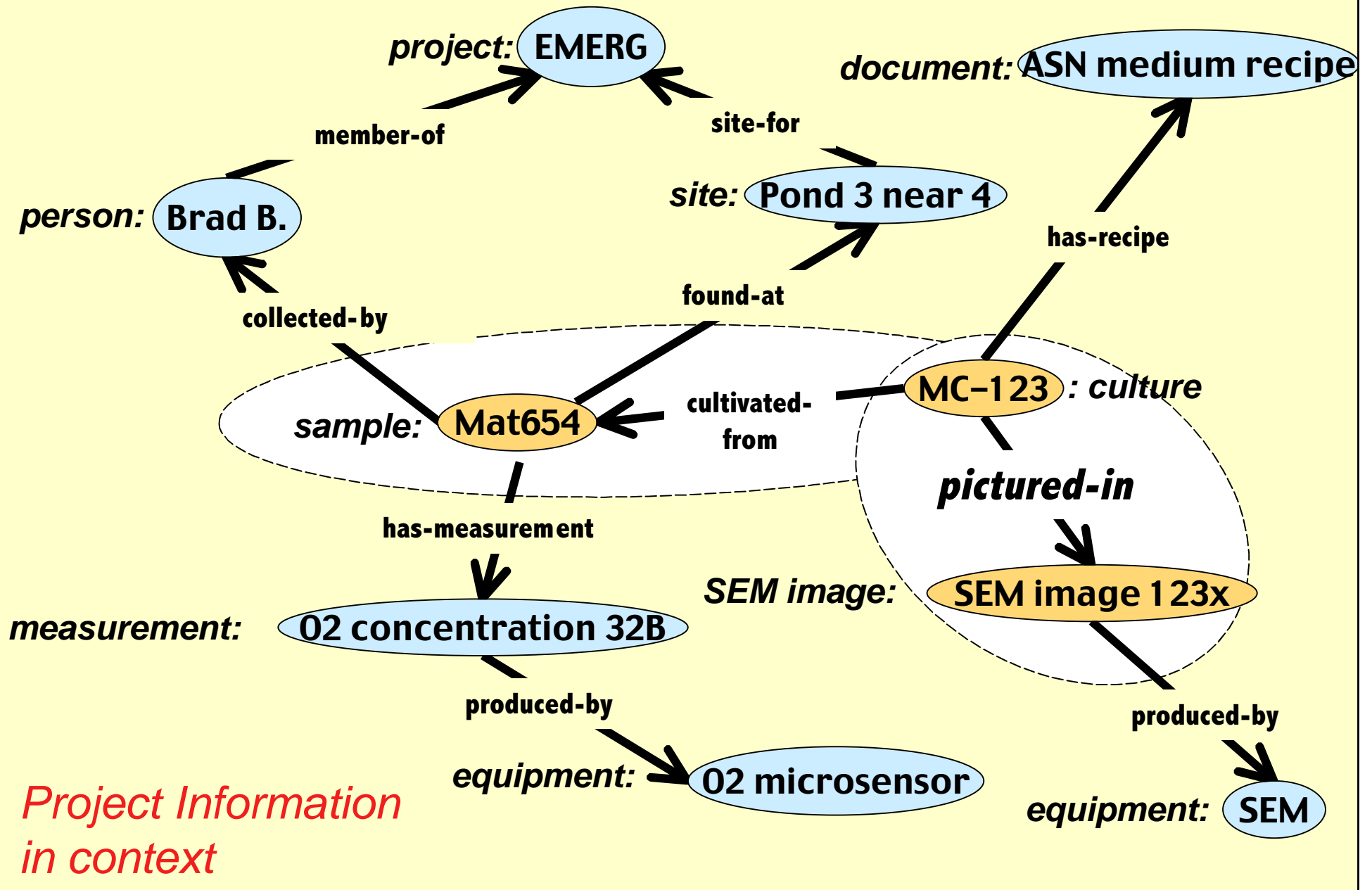
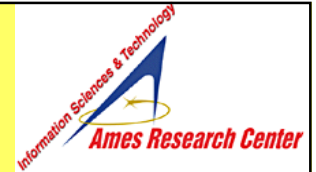


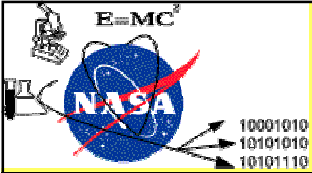
Sanctioned Links between “culture” and other types of resources



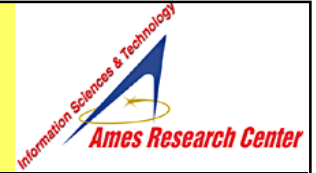


Evolving Web of Project Information





ScienceOrganizer Browser



[search for records](#) [create new links](#) [icon identifies record type](#) [modify records](#)
[create new records](#)

Web-based, platform independent access

Links to Related Records

- convenient navigation
- predefined links
- information traceback

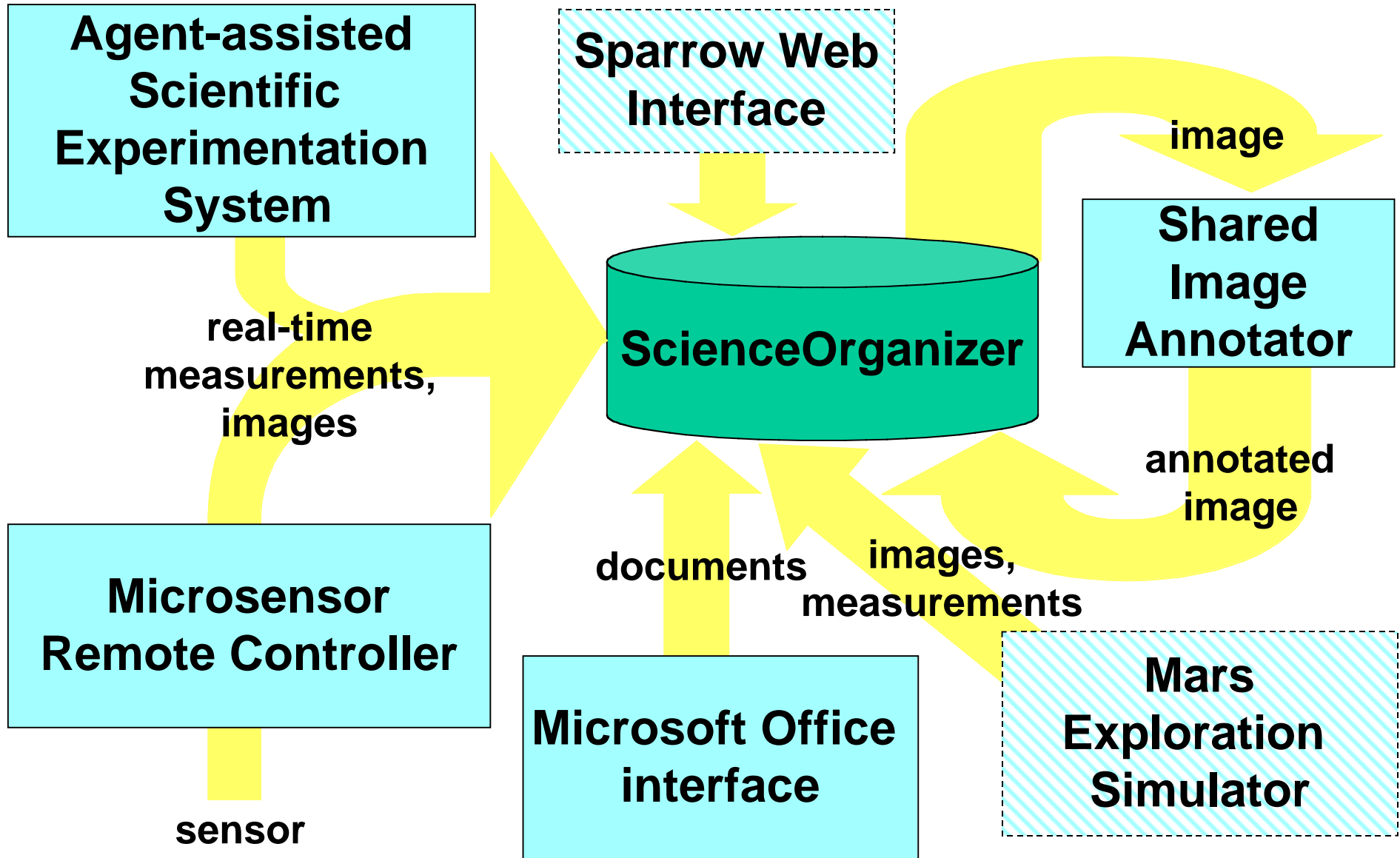
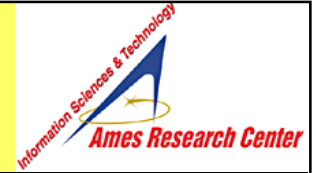
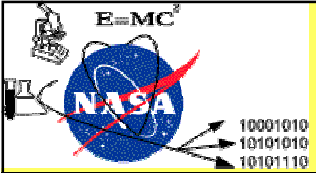
click to navigate

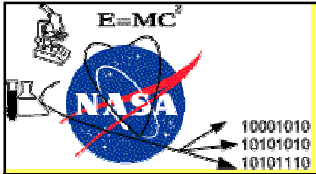
Project Information Record

- images
- datasets
- *cultures*
- samples
- field sites
- measurements
- instruments
- lab notes
- publications
- spreadsheets

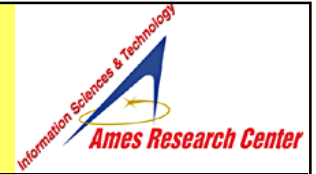
data fields

Interfacing Software

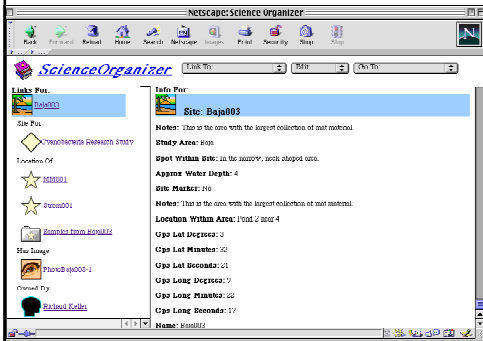




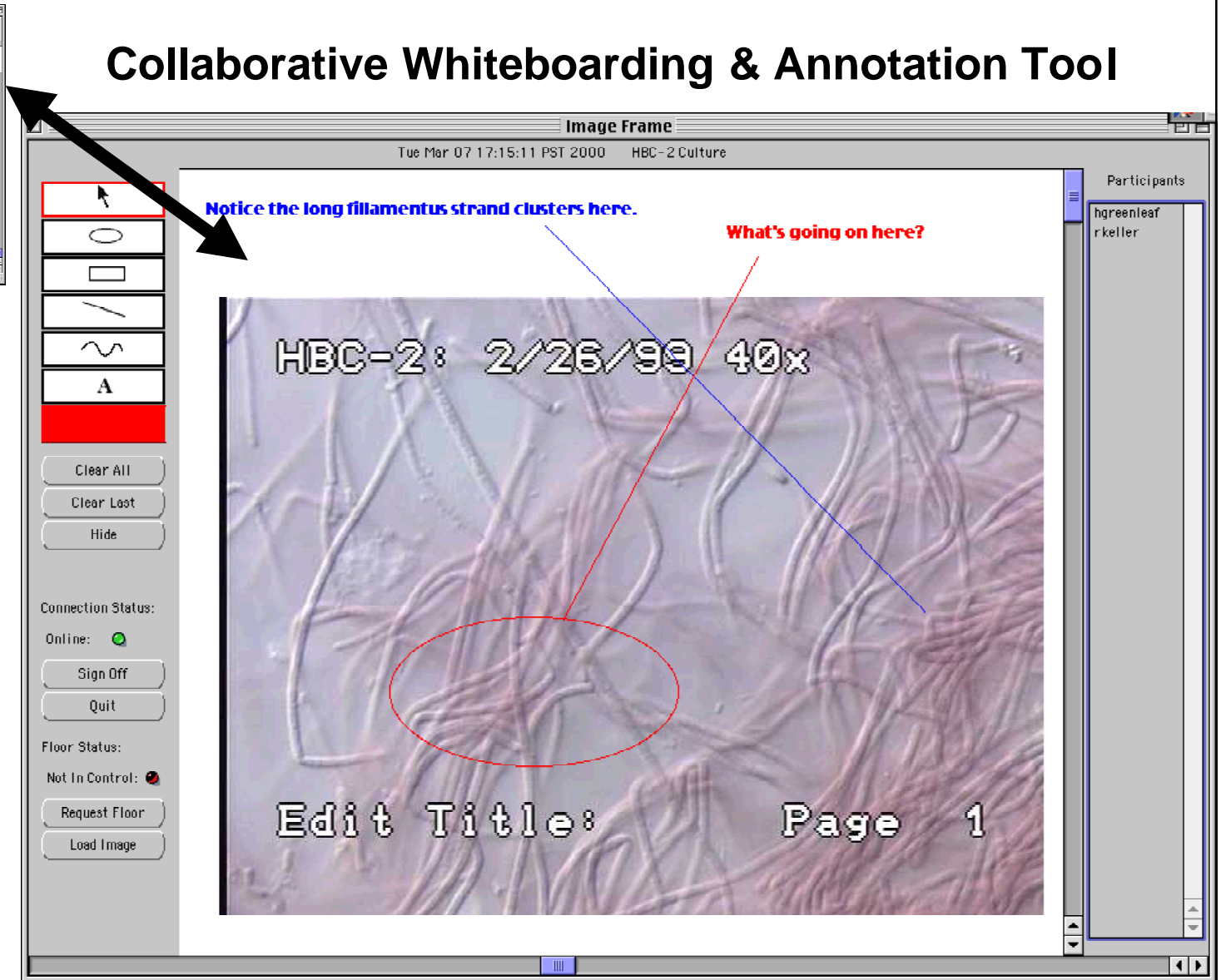
Shared Image Annotator



Collaborative Whiteboarding & Annotation Tool

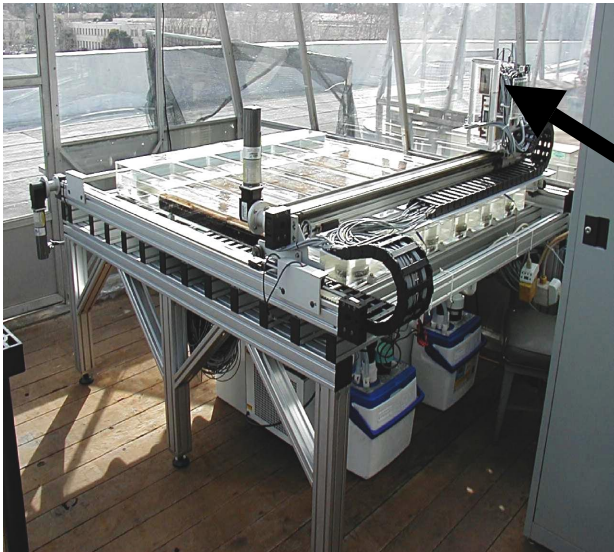


ScienceOrganizer

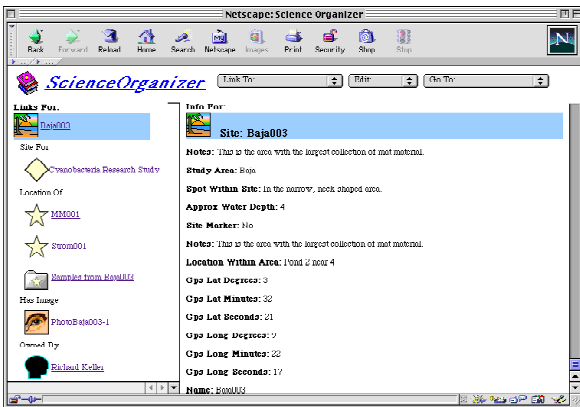


Microsensor Remote Controller

O₂ Microsensor & positioning table



ScienceOrganizer



ScienceDesk Oxygen Microsensor Client - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Stop

Location: http://hopper.arc.nasa.gov/scidesk/matsticker/

Connections

Login: rkeller [Connect] [Disconnect]

Michael M Compton
Richard M Keller

Data Acquisition Controls

[Go] [Stop] [Save to Organizer]

Steering Parameters

Relative Position to Spot Profile: 500

Penetrate to a Depth of (µm): 5000

Step Size: 300

Save To Disk

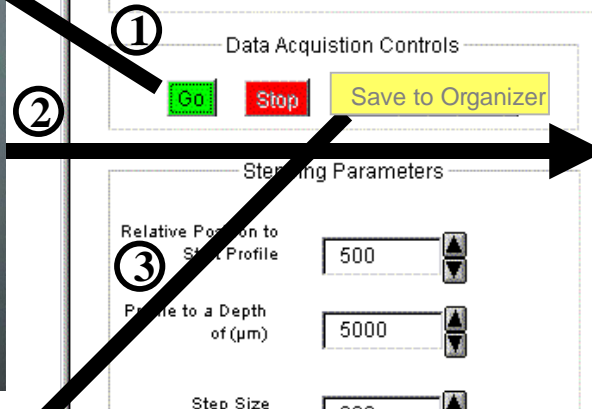
Data File Title: Low nutrient Mat from Pond 1A

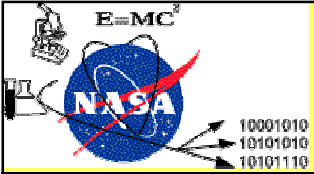
Graphical Display

Oxygen Microsensor Data
● Series1

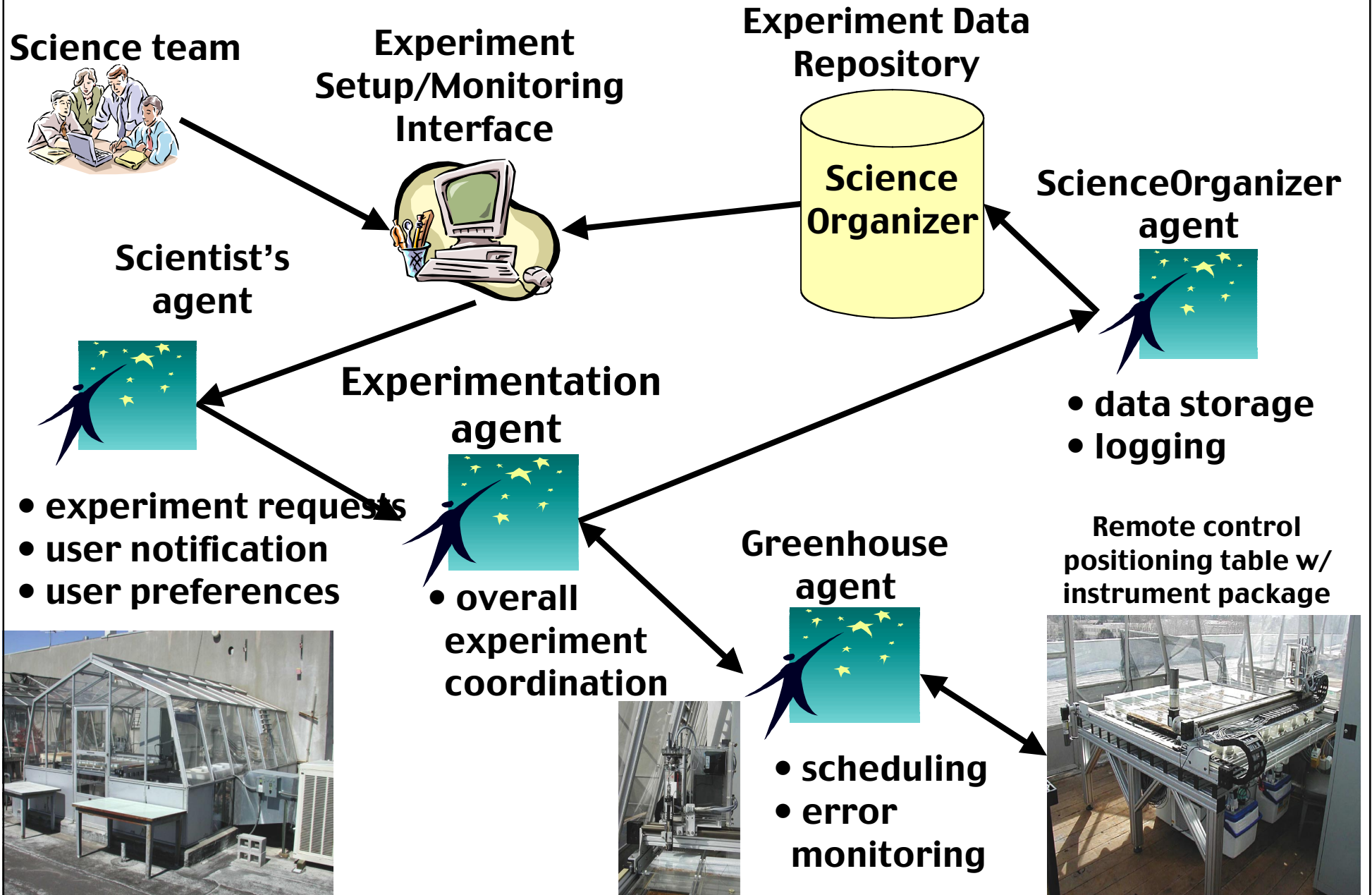
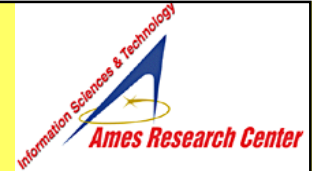
Status: System idle without data

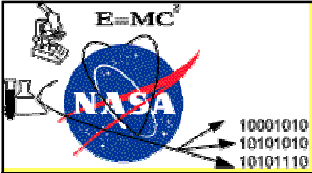
Reading file... Done



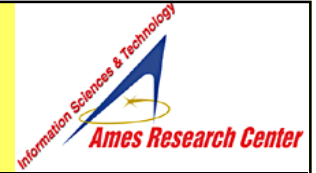


Agent-assisted Scientific Experimentation System





ScienceOrganizer Customers



more
mature



less
mature

Pilot Users:

- ARC Microbial Ecosystems Group
- NAI Ecogenomics Focus Group
- ECS Mishap Investigation
- ARC Electron Microscopy Lab
- JSC Astrobiology Institute for the Study of Biomarkers
- NIH/NASA Malaria Control Study (via Fundamental Biology Program)
- Mars simulation and analog studies (via Mobile Agents Project)
- ASU/NSF Desert Microbial Survey

Users

- Frequent
- Moderate
- Infrequent

