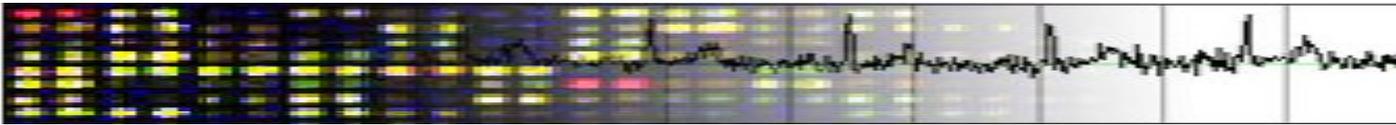


Biomedical Information Technology

2.771J BEH.453J HST.958J Spring 2005

Lecture 1 March 2005

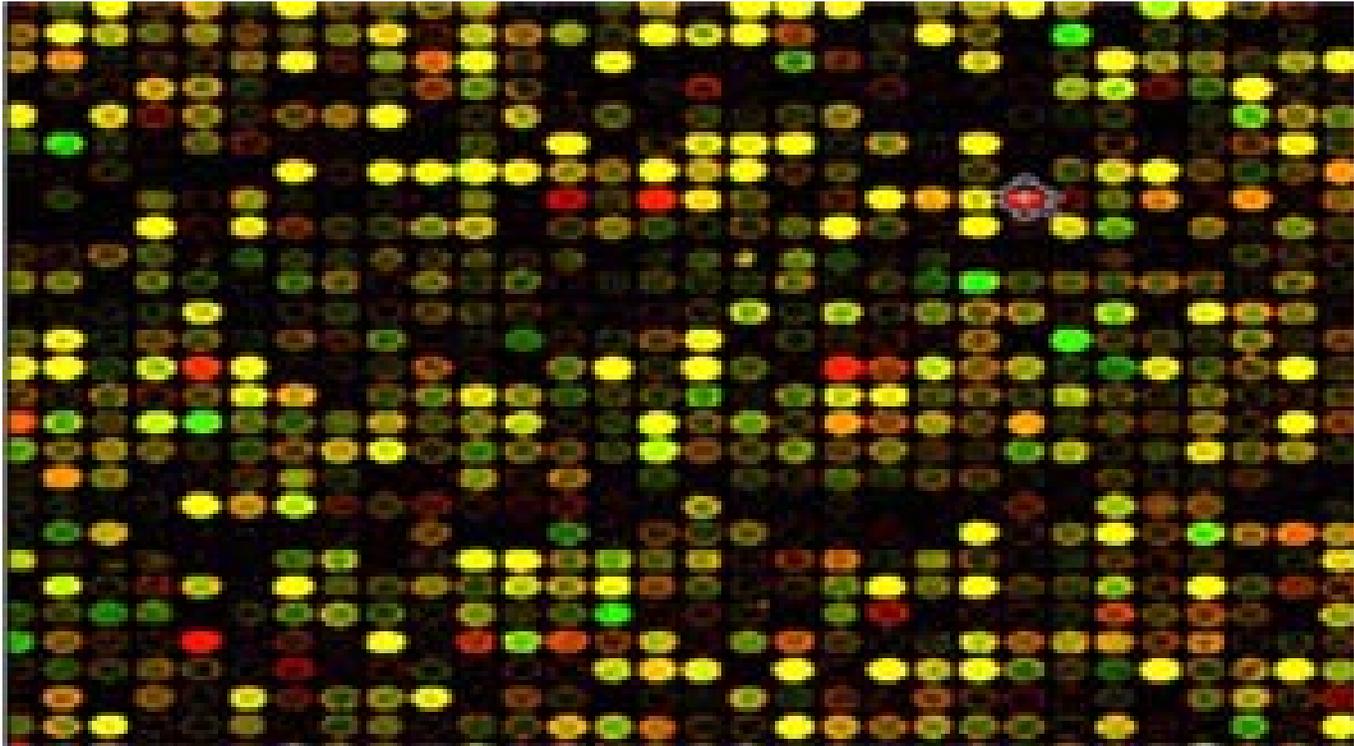
Medical Imaging Information I



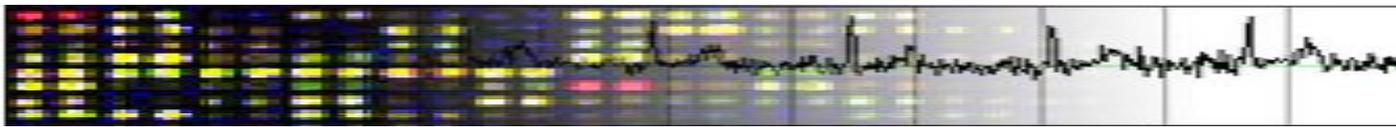
Medical Imaging Information I

- *Motivation: who needs it?*
- *Construction of a Information Object Definition (IOD)*
- *The DICOM international standard*
- *Implementation examples*
- *The patient-study-series image hierarchy*

What are the data sources?



Courtesy of NIST.

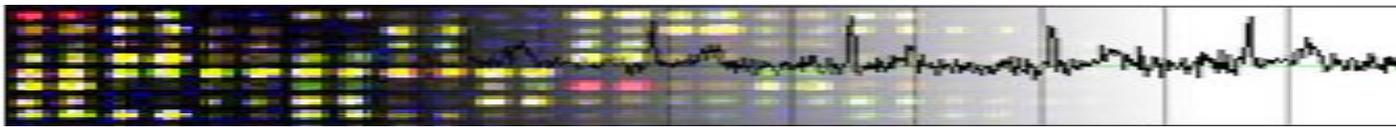


What are the data analysis tools?

Example: Amersham Biosciences

ArrayVision™ software provides automated analysis of radioisotopic or fluorescent macro- and microarrays.

- ***Robust algorithm for spot finding and quantification, quality metrics, and use of pre-made protocols***
- *Choices for background correction, normalization, and ratio calculation*
- *Wizard guides simplify operation.*
- *Automatic batch processing increases throughput and saves time.*

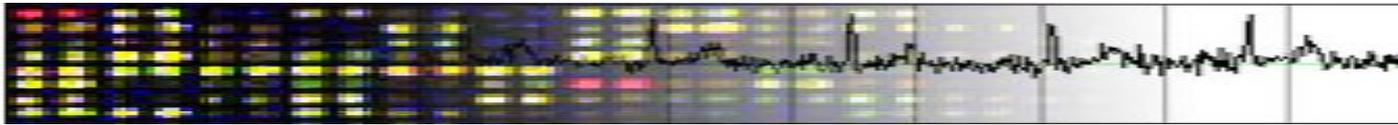


Amersham Biosciences ArrayVision™ (contd.)

- *Data easily exported to Microsoft™ Excel or database programs for flexibility in reporting.*

“ArrayVision™ is the premier software for automated analysis of genome arrays. The software accepts any type of array (isotopic, fluorescent/luminescent, macro or micro).”

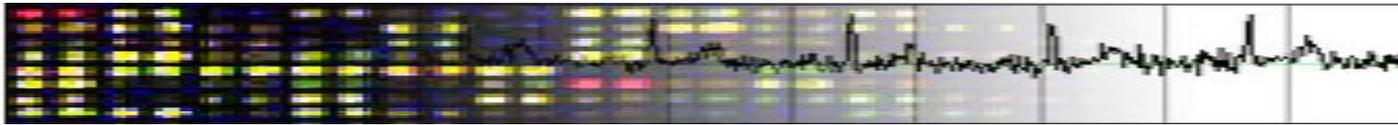
“ArrayVision™ features include automated alignment to accommodate imperfect arraying or warped specimens; automated analyses of array stacks; direct comparisons between discrete fluor images and discrete array images; comprehensive normalization and background correction.”



Creating storable results

The basic issue is to define the scope and extent of the metadata and make provisions for storing ALL of the appropriate information.

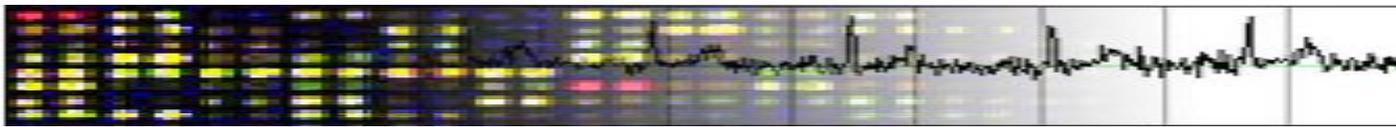
- Inclusiveness doesn't cost a lot
- Standards are the key to interoperability
- Can also use applets that run in a browser window



The NCI LIMS environment

The NCI system is available to the public at no charge. The design is well thought out. See the web site for additional details.

<http://lpglims.nci.nih.gov/tutorials/>



The LIMS History

❖ Yesterday's LIMS

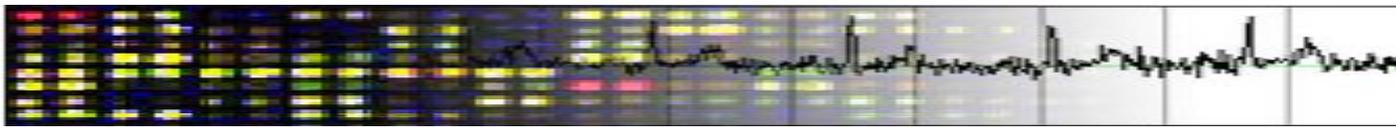
- Equipment and vendor dependent
- Lack of inventory control
- Disorganized experiment results
- Little or no collaboration
- MS Excel based
- Non-existent or notebook based
- Non-secure

● Today's LIMS

- Equipment Integration
- Inventory Management
- High Throughput Data Management
- Project Management
- Project Collaboration
- Data Security

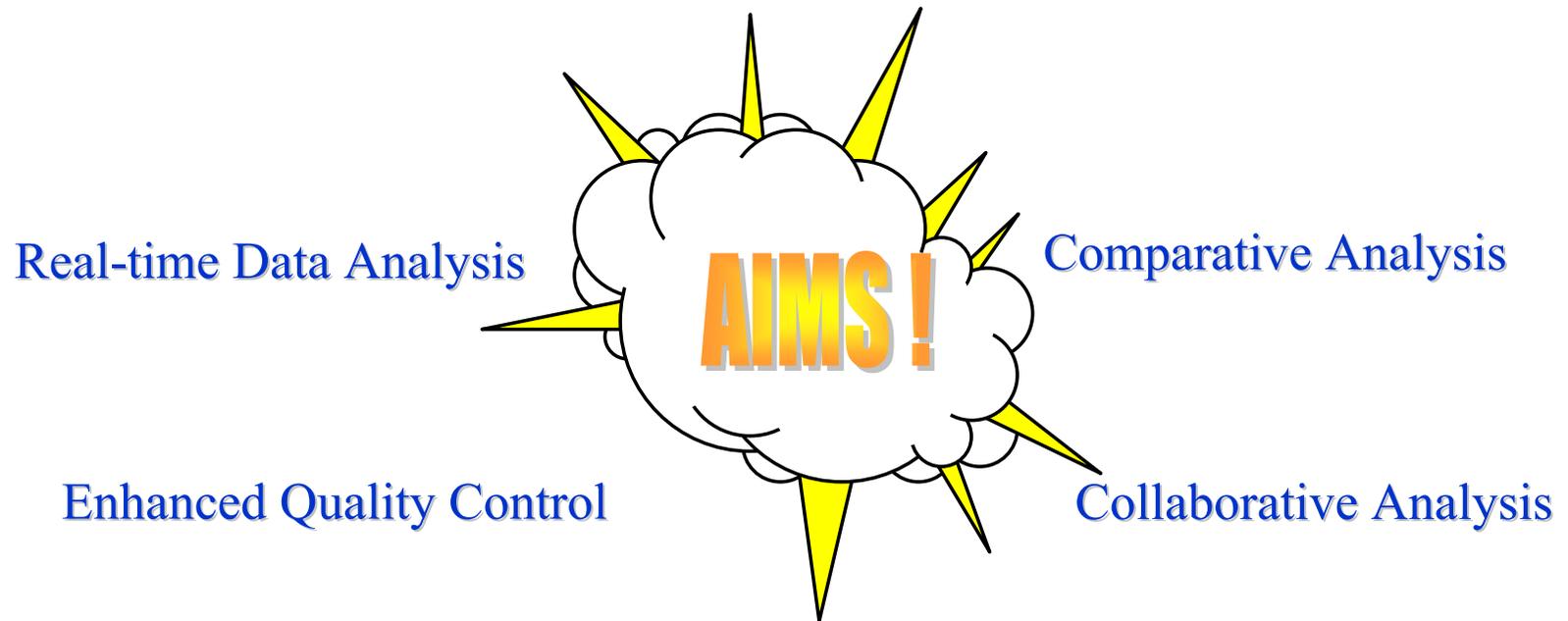
Sharon Settnek January 22nd, 2001
Science Applications International Corporation (SAIC)

Courtesy of Sharon Settnek. Used with permission.



The LIMS Future

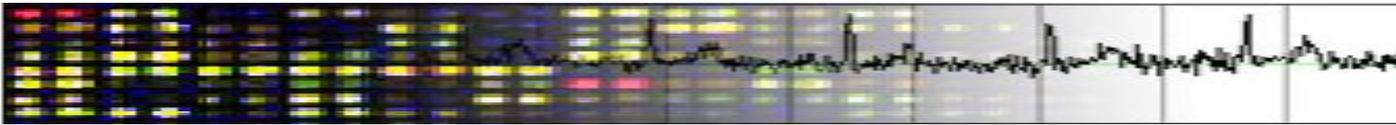
Experiment and Analysis Data Integration



Analysis Information Management

Sharon Settnik January 22nd, 2001
Science Applications International Corporation (SAIC)

Courtesy of Sharon Settnik. Used with permission.



Provenance: The Semantic Web

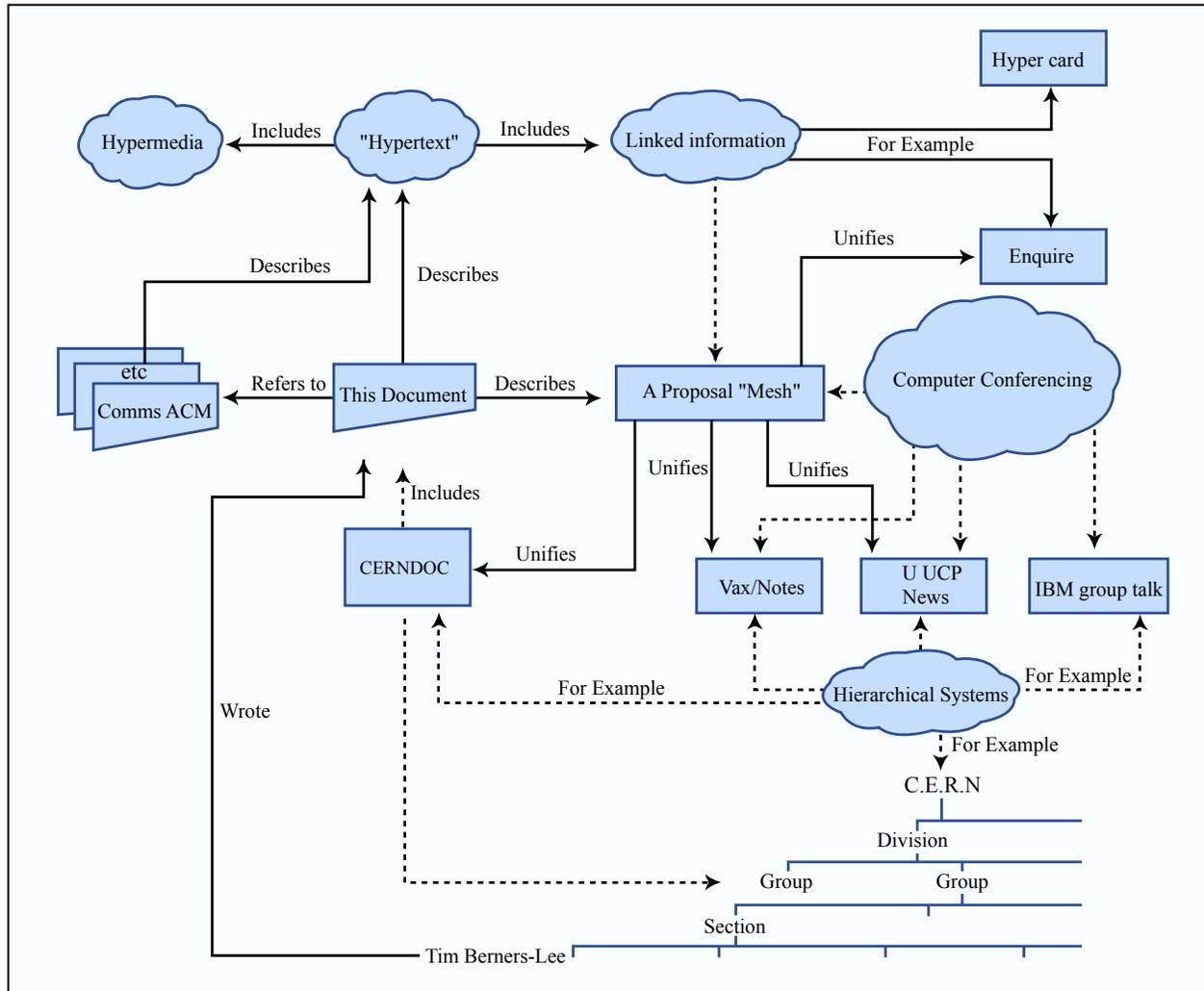
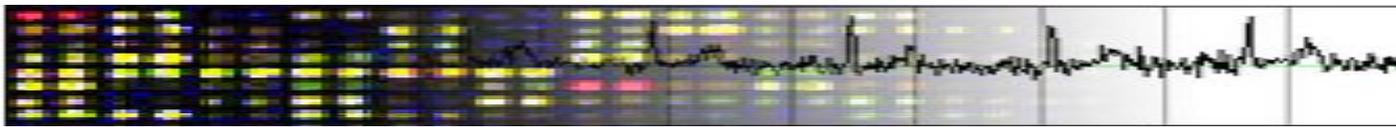


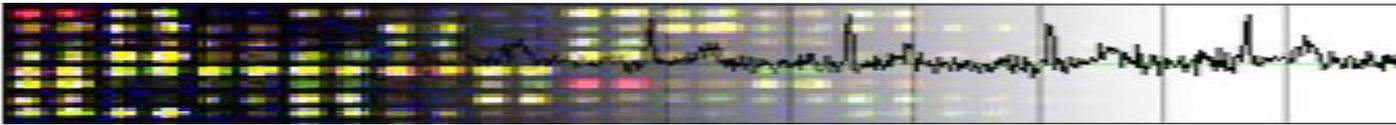
Figure by MIT OCW.

Ref: P. Lord, U. Manchester, W3C Conf. 2004



LSID's

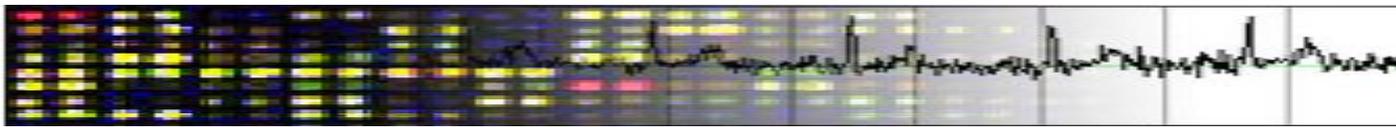
- ❖ Standard identifier mechanism, aimed at the life sciences
- ❖ Has standard resolution mechanism by which the data can be obtained.
- ❖ Has semantics for versioning
- ❖ Has standard association with metadata



LSID Definition

The LSID declaration consists of the following parts, separated by double colons:

- "URN"
- "LSID"
- authority identification
- namespace identification
- object identification
- optionally: revision identification. If revision field is omitted then the trailing colon is also omitted.



LSID Examples

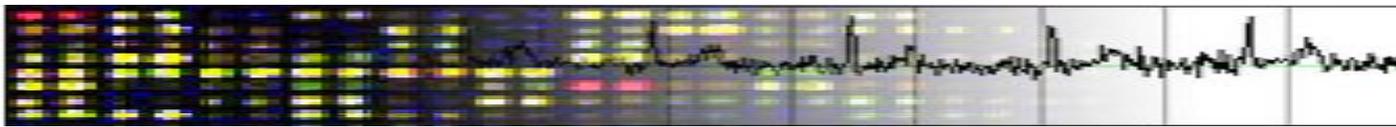
URN:LSID:ebi.ac.uk:SWISS-PROT.accession:P34355:3

URN:LSID:rcsb.org:PDB:1D4X:22

URN:LSID:ncbi.nlm.nih.gov:GenBank.accession:NT_001063:2

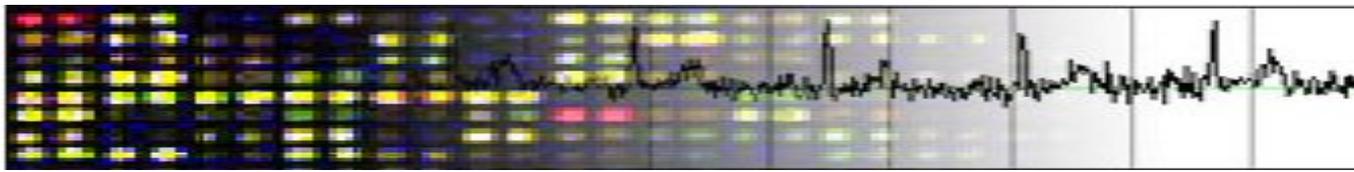
LSIDs must be assigned to at most one resource, and are never reassigned.

It is intended that the lifetime of an LSID be permanent. That is, the LSID will be globally unique forever, and may be used as a reference to an object well beyond the lifetime of the object it identifies.



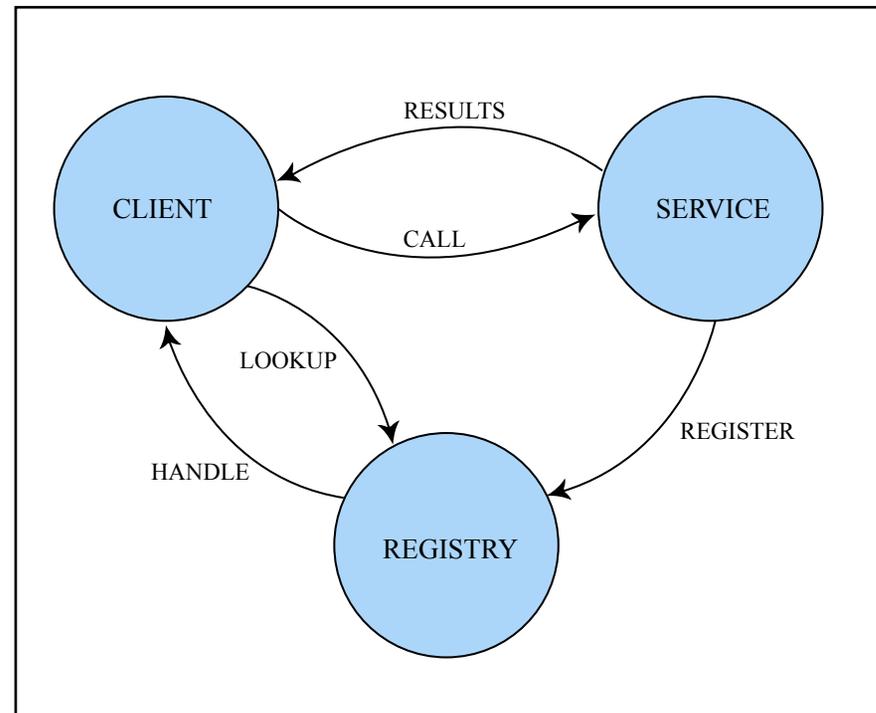
OWL – Web Ontology Language

- *An expressive and uniform way of defining meaning for terms used to transmit data*
- *Can be used for many key purposes*
 - *Guarantee that two definitions are the same*
 - *Discover that two terms are synonymous*
 - *Encode complete object descriptions*
 - *Define unambiguous database schema*
- *Comes in multiple flavors*
 - *OWL Lite -*
 - *OWL*



The Global Grid Forum

- *Grid computing resources are coming*
- *Need robust and secure access*
- *Different business models*



See the web site <http://www.globalgridforum.org>

Figure by MIT OCW.