

MIPortal®

Efficiently archiving and distributing experimental data



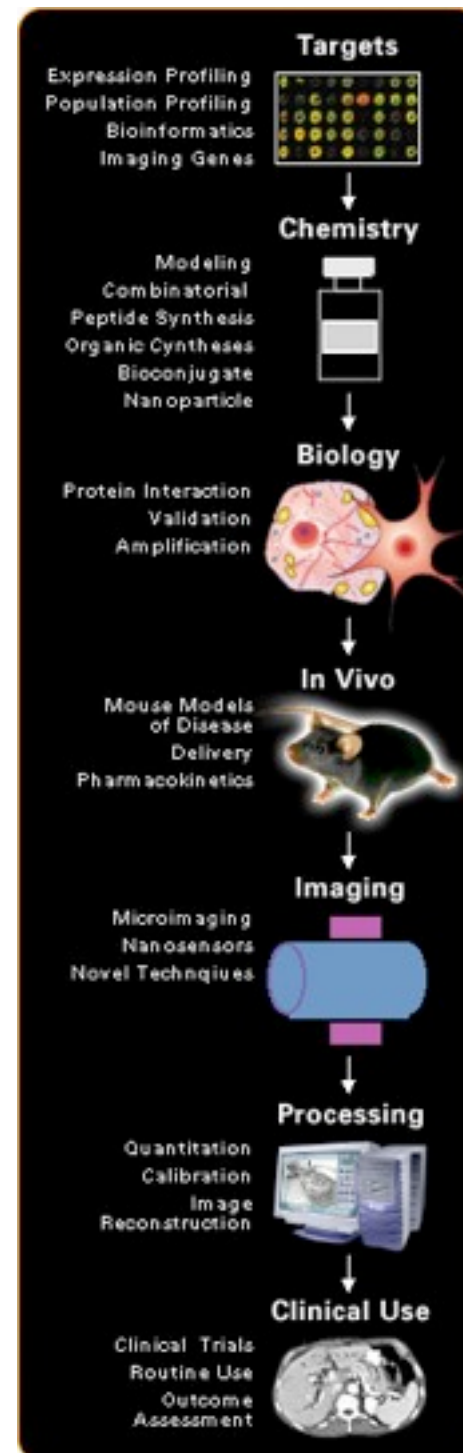
CSB - Multidisciplinary research center



The mission of the Center is to analyze at a systems level how biological molecules, proteins and cells interact in both healthy and diseased states

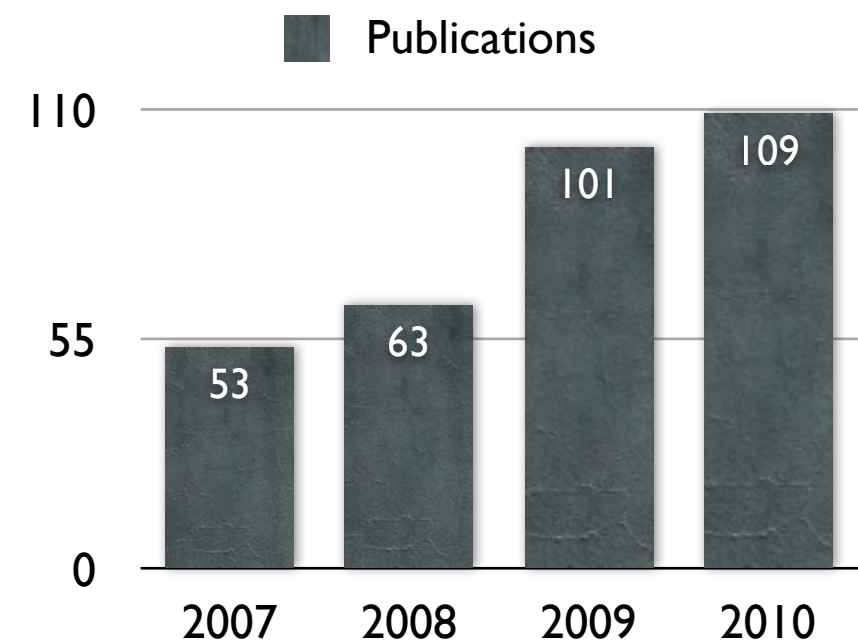
- ★ 8 Programs
 - ✦ Cardiovascular
 - ✦ Cancer
 - ✦ Diabetes
 - ✦ Clinical
 - ✦ Nanotechnology
 - ✦ Immunology
 - ✦ Membrane Biology
 - ✦ System Pharmacology

- ★ 3 Platforms
 - ✦ Bioimaging
 - ✦ Chemical Biology
 - ✦ Biocomputing

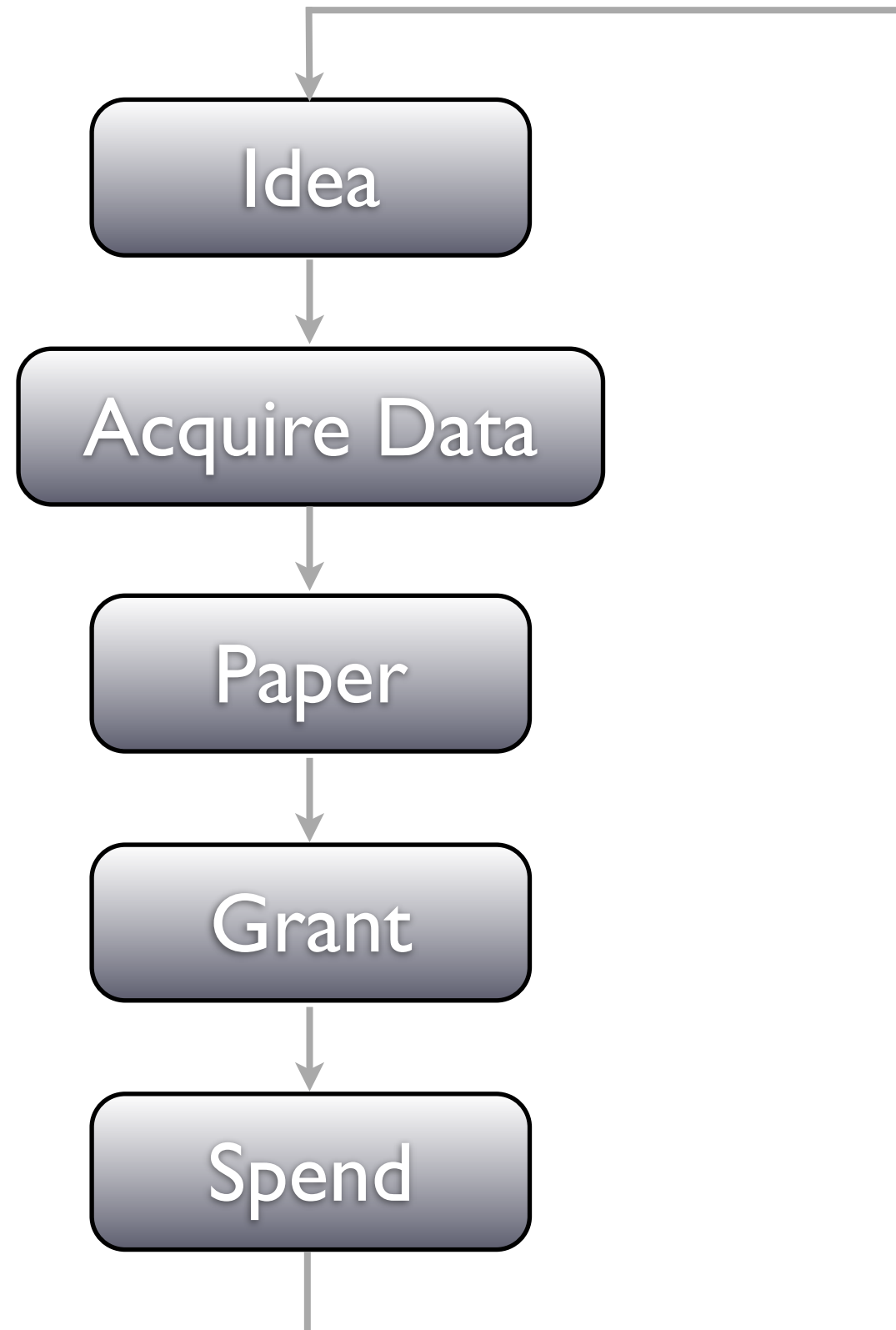


- ★ 34 Faculty
- ★ 175 employees
- ★ 10 Associate Members

- ★ 3 Main Facilities



Research Life Cycle



Bioinformatics Platform



Programs Support

- people
- meetings
- technical protocols
- specialized applications

Finances

- grants and projects
- spending estimates
- expenses and charges

Equipment

- repair history
- on-line manuals
- resources calendar

e-Mice

- animal ordering
- protocols
- charges tracking
- breeding colonies

Lab Inventory

- cell lines and antibodies
- imaging agents
- molecular libraries

Personnel

- employees, applicants
- attendance
- mailing lists
- lab notebooks tracking

Publications

- automatic feed of abstracts
- talks
- journal covers
- access to pdf

Experimental Data

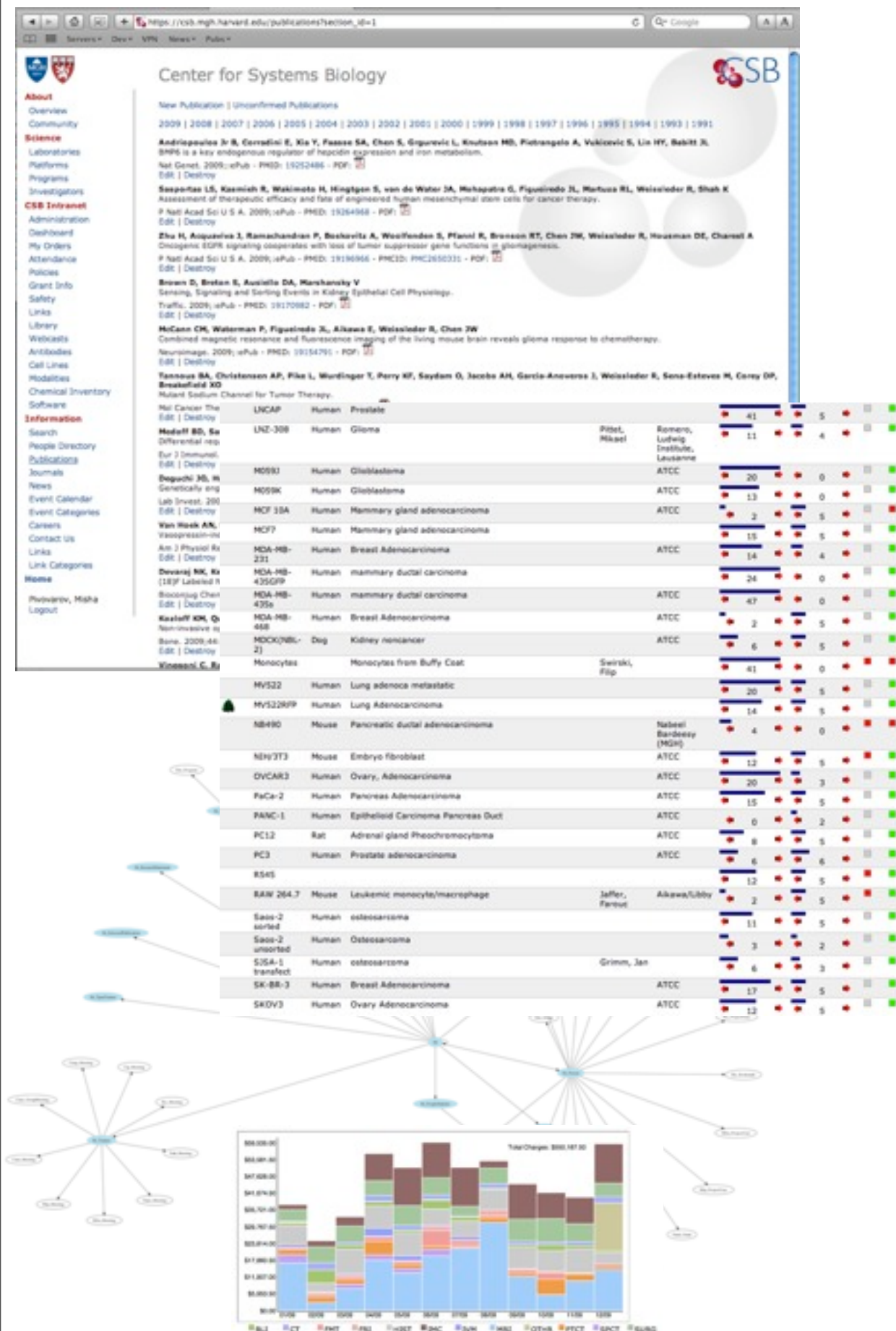
- Imaging (MIPortal®)
- High-throughput screening
- Biodistribution

Security

- Partners authentication
- page-level access control
- admin UI

Content Management

- wiki
- faculty pages
- internal documents



Data Management Problems



Where is my data?

What project/study/session/paper does this file belong to?

How can I open this image?

PostDoc left 2 month ago, how can I find his files?

The hard drive on a Microscopy computer is full - we need to delete some files.

How can I email data if one study is 256MB?

I got all data on a CD/DVD, but I can't read it...

I submitted a paper with post-processed images and now I need original files for additional analysis...

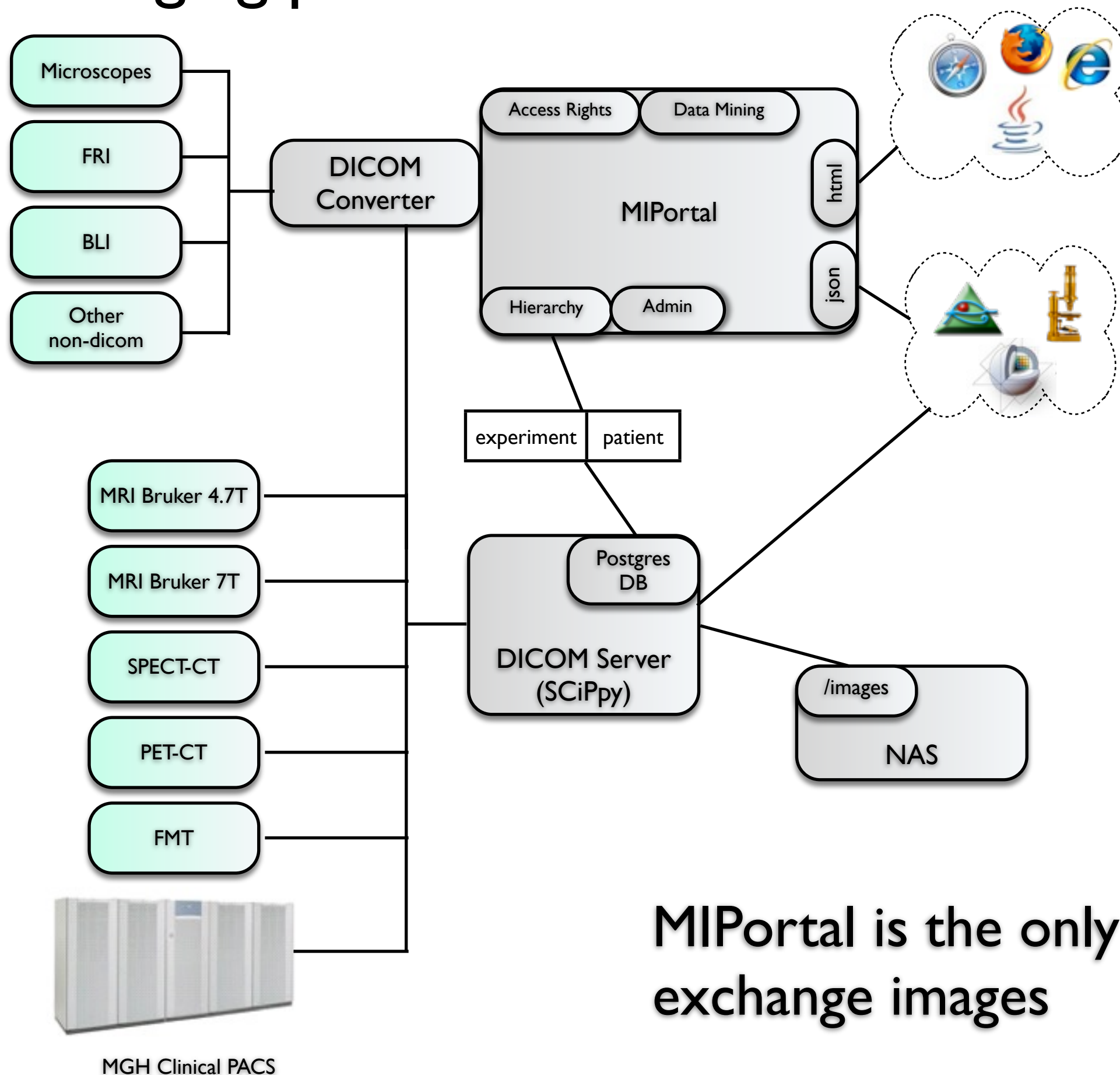
I searched for file "Mouse1.tiff" and got 357 hits.

Estimated Data Volumes

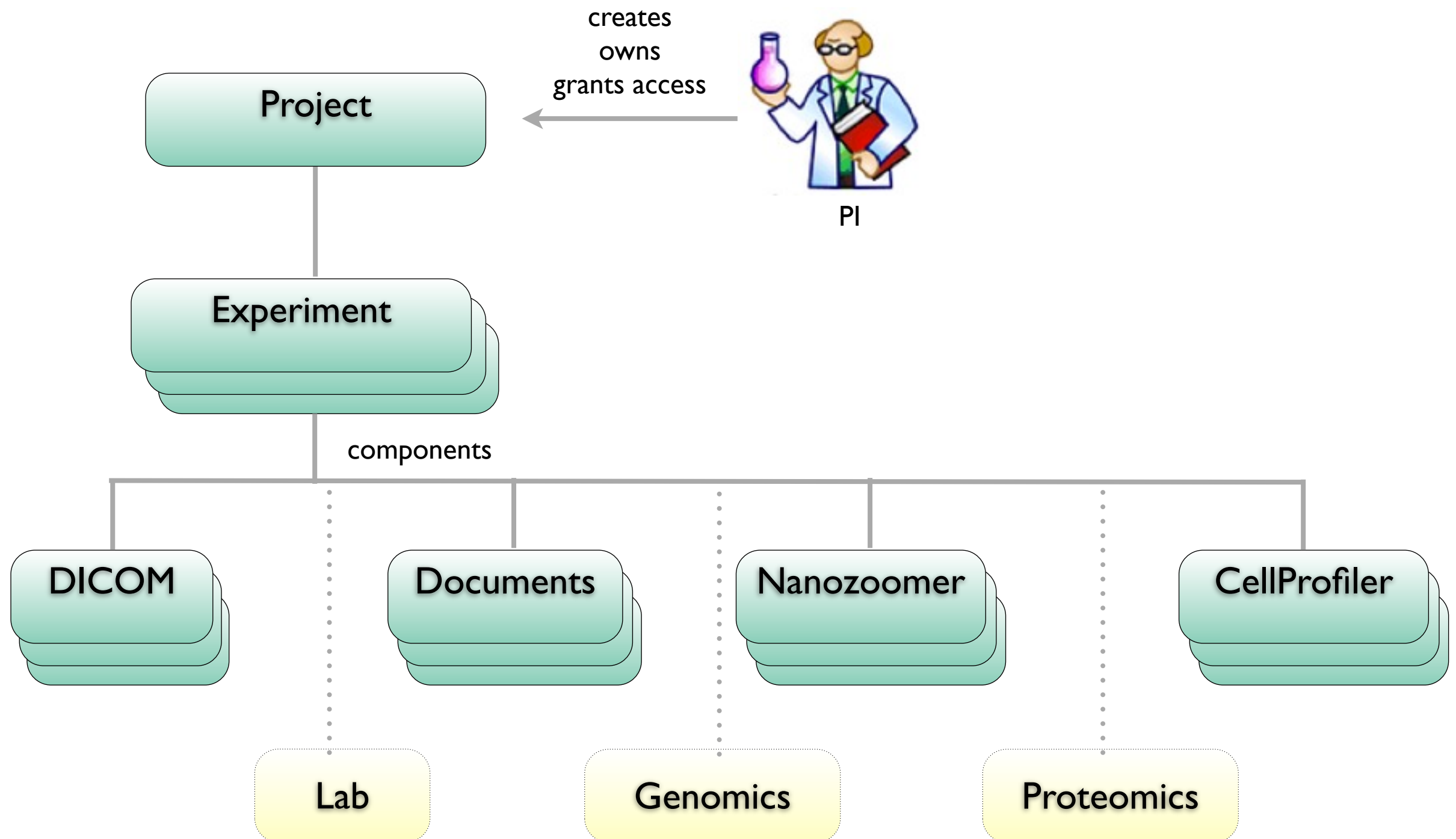
Imaging Source	MB/ study	studies/ day	MB/ day
Optical	20	30	600
MRI	50	30	1,500
SPECT	10	5	50
PET	10	5	50
CT	256	10	2,560
Histology	50	20	1,000
BLI	10	30	300
Other	20	20	400
Clinical MRI	50	5	250

6.7 GB per day
40 GB per week
2 TB per year.

Mouse Imaging portal



MIP Hierarchy



DICOM backend



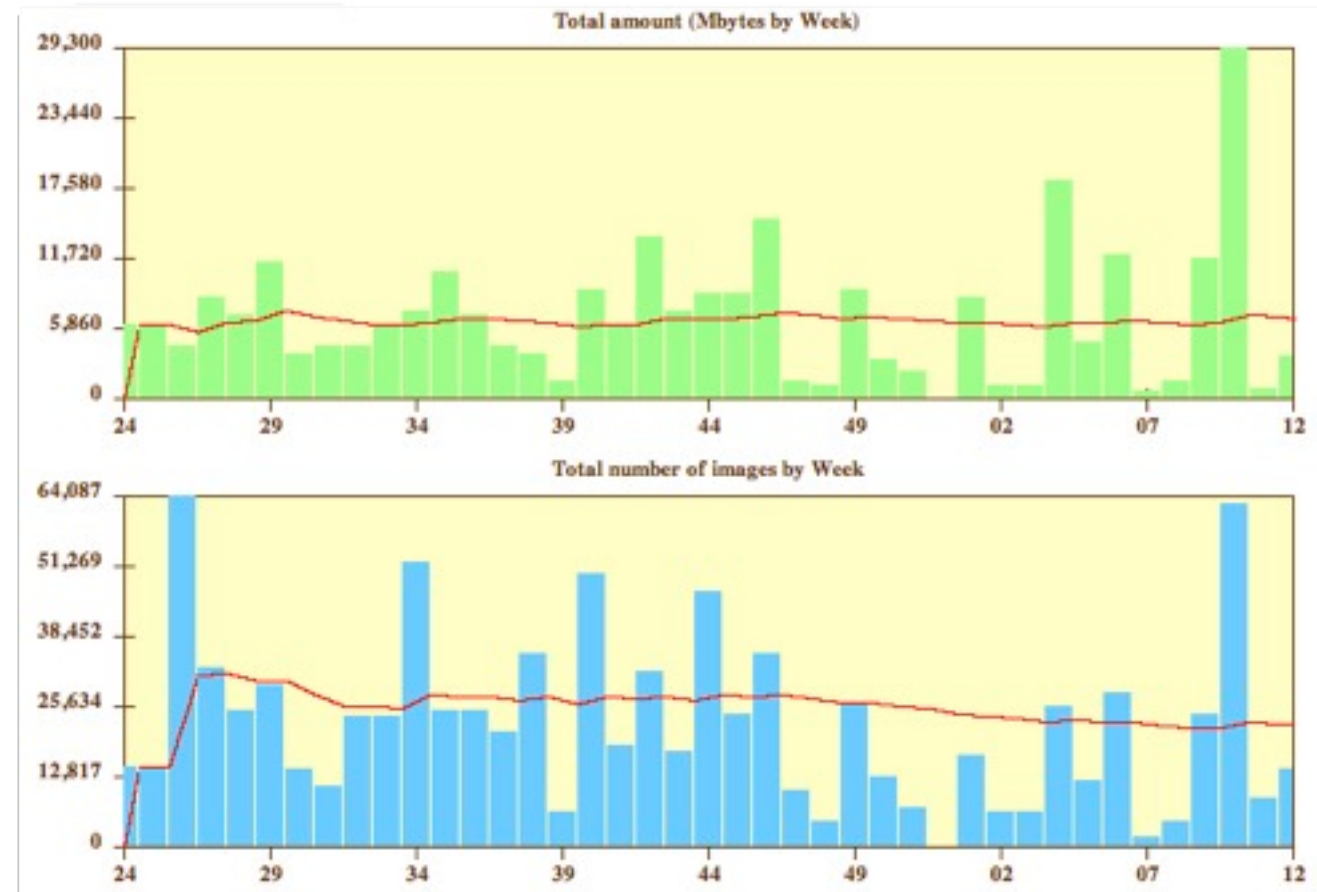
- SCSiPpy - full-featured DICOM server
 - DICOM Converter
-
- Flexible, Configurable, Customizable, and Reliable
 - Based on Open-Source - Linux, Postgres, dicomlib, ImageMagick, Boost, LibTIFF, etc.
 - Full DICOM support (sync and async communications)
 - Anonymization
 - Autoforward to another DICOM node
 - Autoforward to FILE node for backup
 - Web-based control
 - Dynamic settings change
 - Detailed logging, audit trail and statistics
 - Advanced searching
 - Automatic creation of thumbnails
 - Used as a back-end server for all image storage and retrieval
 - Custom rules for “not-so-standard” DICOM nodes
 - Plugin architecture for converter

A screenshot of a web browser showing the 'CMIR DICOM-Server:Studies' interface. The browser address bar shows 'http://cmir-scippy.mgh.harvard.edu/scippy/control/scippy_studies.php'. The interface includes a 'Main menu' button, a date/time filter (2009-03-23 00:00 to 2009-03-23 24:00), and various search filters for Source, Name, MRN, Study ID, Study description, Series description, and Study #. Below these are buttons for 'info', 'Create DD/thumb', 'forward to', 'Move to', 'Expand All', 'Convert to FMT', and 'Convert to OFF'. A status bar indicates 'Totally 76 series' with a legend for 'New incomplete images', 'DICOMDIR file failed', 'expanded block', 'anonymized', and 'New both anonymous and named images'. The main table has columns: Anonym, DD, Time, Source, Target, Name, MRN, Study date, Study ID, Pat. #, Study #, Series #, Images, Size, K, Description, and Loc. The table contains 16 rows of data, mostly for 'Gutierrez/PDAC Doxy Withdrawal' and 'Mahmood/Houltius'. A 'Total' row at the bottom shows '16 studies', '76 series', '3,065', and '165,435 K'.

CSB MIPortal Stats



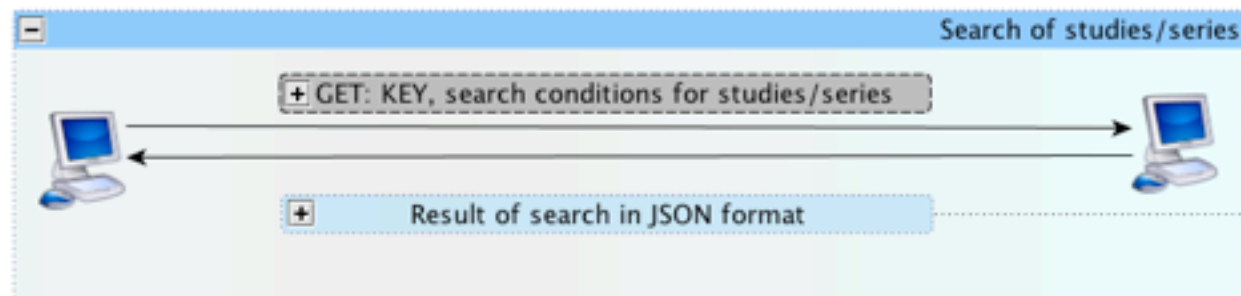
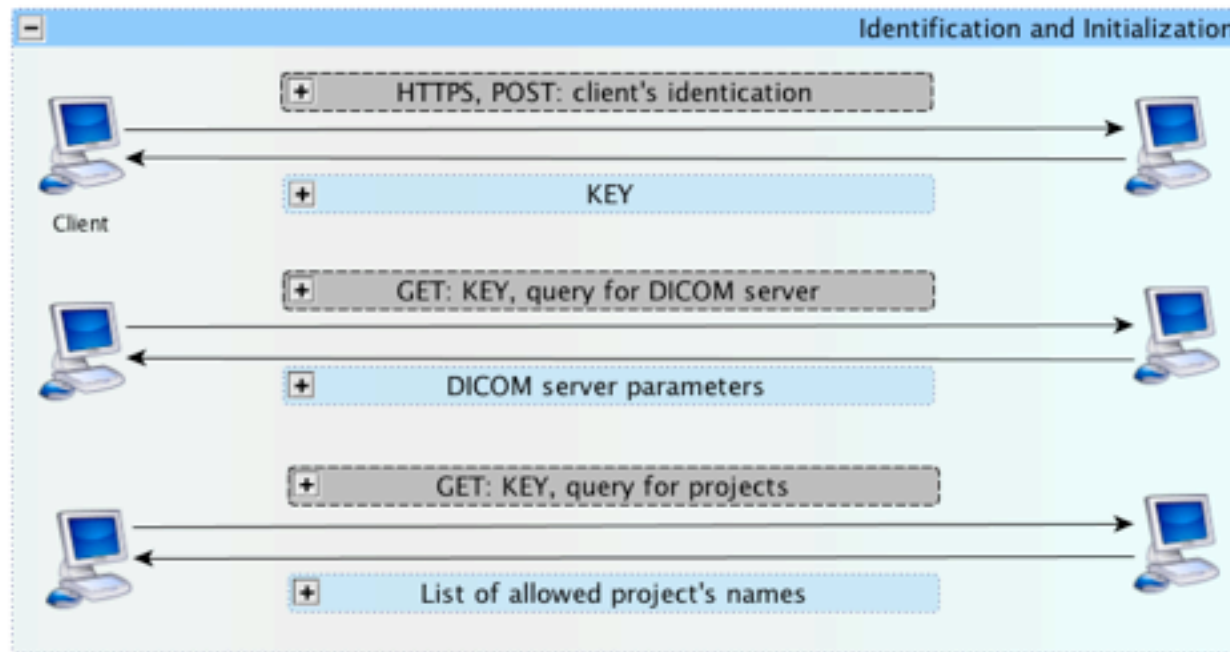
- ▶ Over 200 active users across Harvard
- ▶ Lab Experiments and Clinical Trials
- ▶ 70 active projects, 407 completed projects
- ▶ over 3,000 experiments
- ▶ Over 35,400 DICOM studies
- ▶ Over 6,300,000 DICOM images
- ▶ Over 3,750 NanoZoomer data sets
- ▶ Over 3 TB
- ▶ Modalities:
 - * MRI: Bruker 4.7T, 7T, 9.4T
 - * PET-CT: GammaMedica, Inveon
 - * SPECT-CT: GammaMedica
 - * Optical: BonSAI, FMT, Kodak, BLI
 - * Confocal (Olympus IV100, OV100, FV1000)
 - * Cell microscopy (DeltaVision)
 - * Histology (Nanozoomer)
 - * MGH DICOM Network (MRs, CTs, PET)
- ▶ DICOM Converter
 - * Over 2,500,000 images processed to date



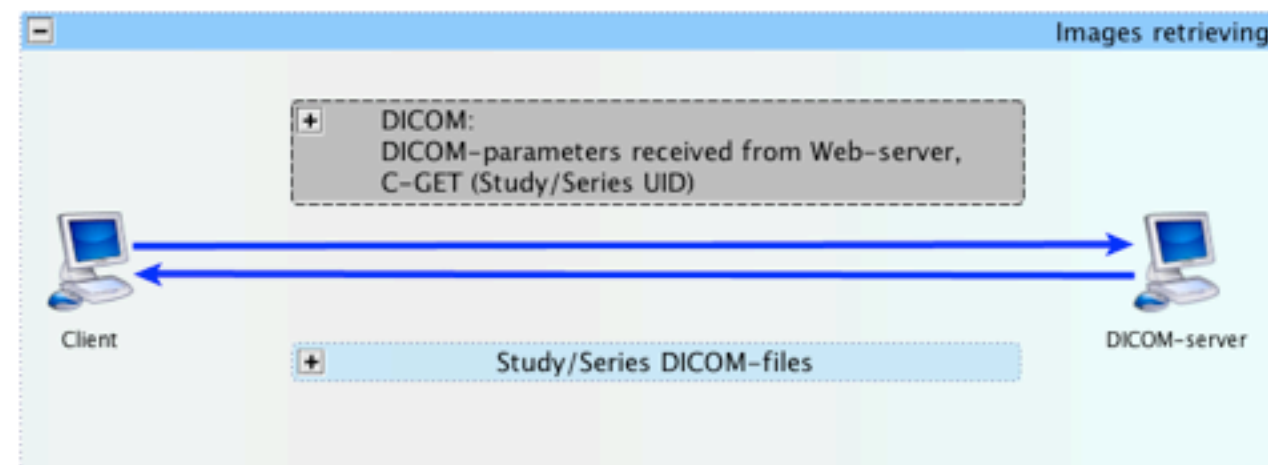
Total: 282GB 928,942 Images 06/15/2010 - 3/31/2011

Client - Server Interface

<Client> - <Web-server> dialog



<Client> - <DICOM-server> dialog



```

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Let's Take a Look

