

Telecontrol of Ultra-High Voltage Electron Microscope over Global IPv6 Network

Toyokazu Akiyama¹, Shinji Shimojo¹, Shojiro Nishio¹, Yoshinori Kitatsuji²,
Steven Peltier³, Thomas Hutton⁴, Fang-Pang Lin⁵

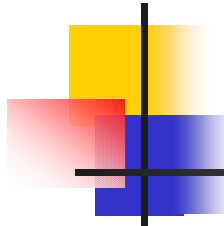
¹ Cybermedia Center, Osaka University

² KDDI R&D Laboratories Inc.

³ National Center for Microscopy and Imaging Research,
University of California, San Diego

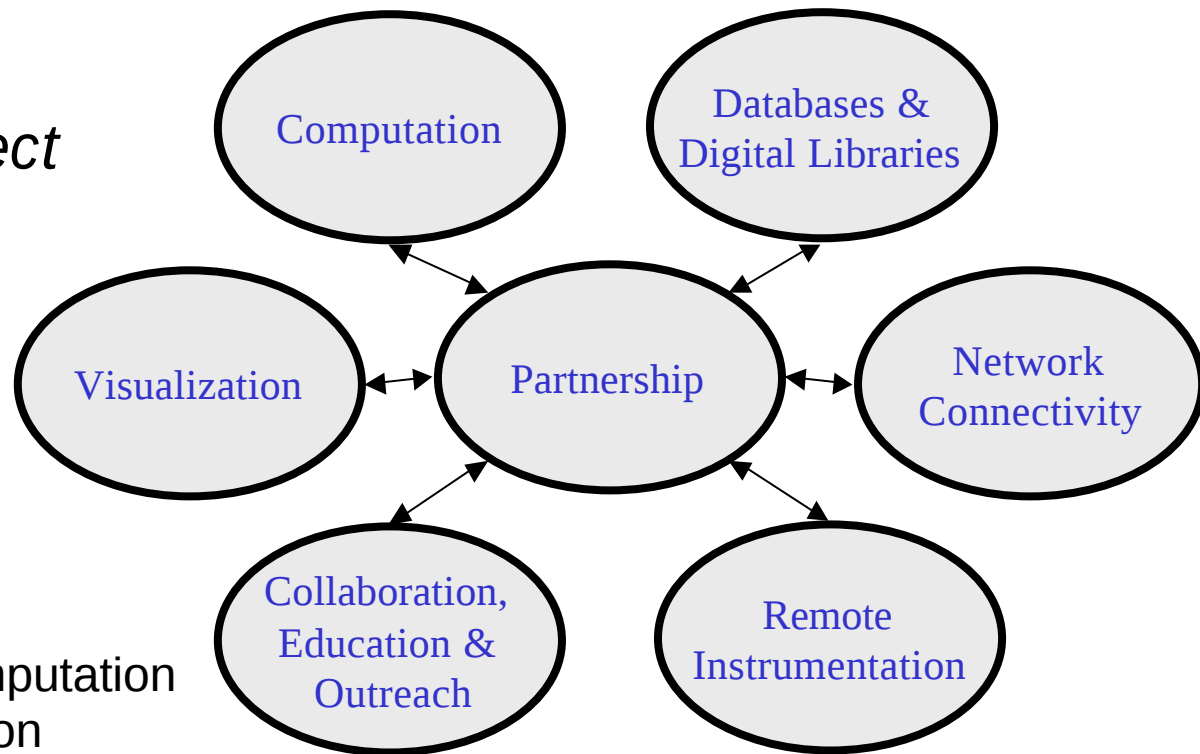
⁴ San Diego Supercomputer Center, University of California, San Diego

⁵ National Center for High Performance Computing, Taiwan, R.O.C.



Background

Telescience Project

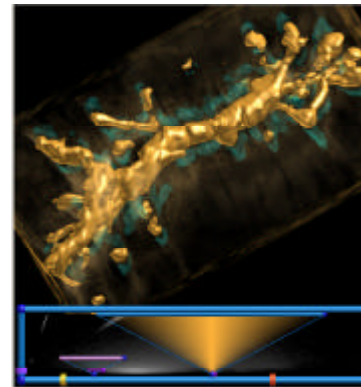
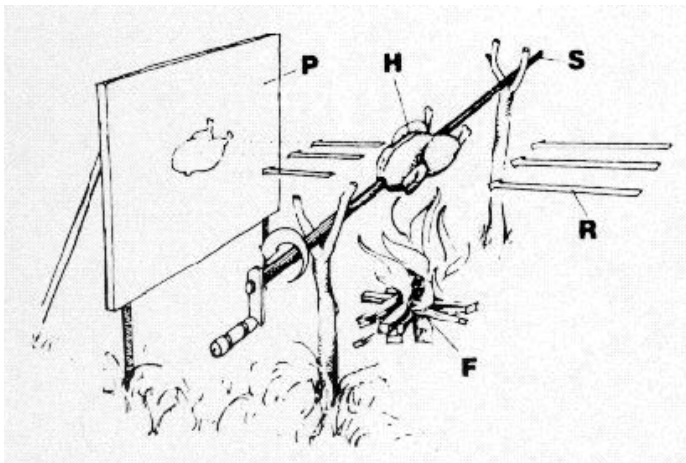


- Telemicroscopy
- Globus Enabled Computation
- Advanced Visualization
- Advanced Networking
- SRB Enabled Access to Distributed/Federated Databases
- Environment that Promotes Collaboration, Education and Outreach

Source: Steven Peltier

Ultra-High Voltage Electron Microscope

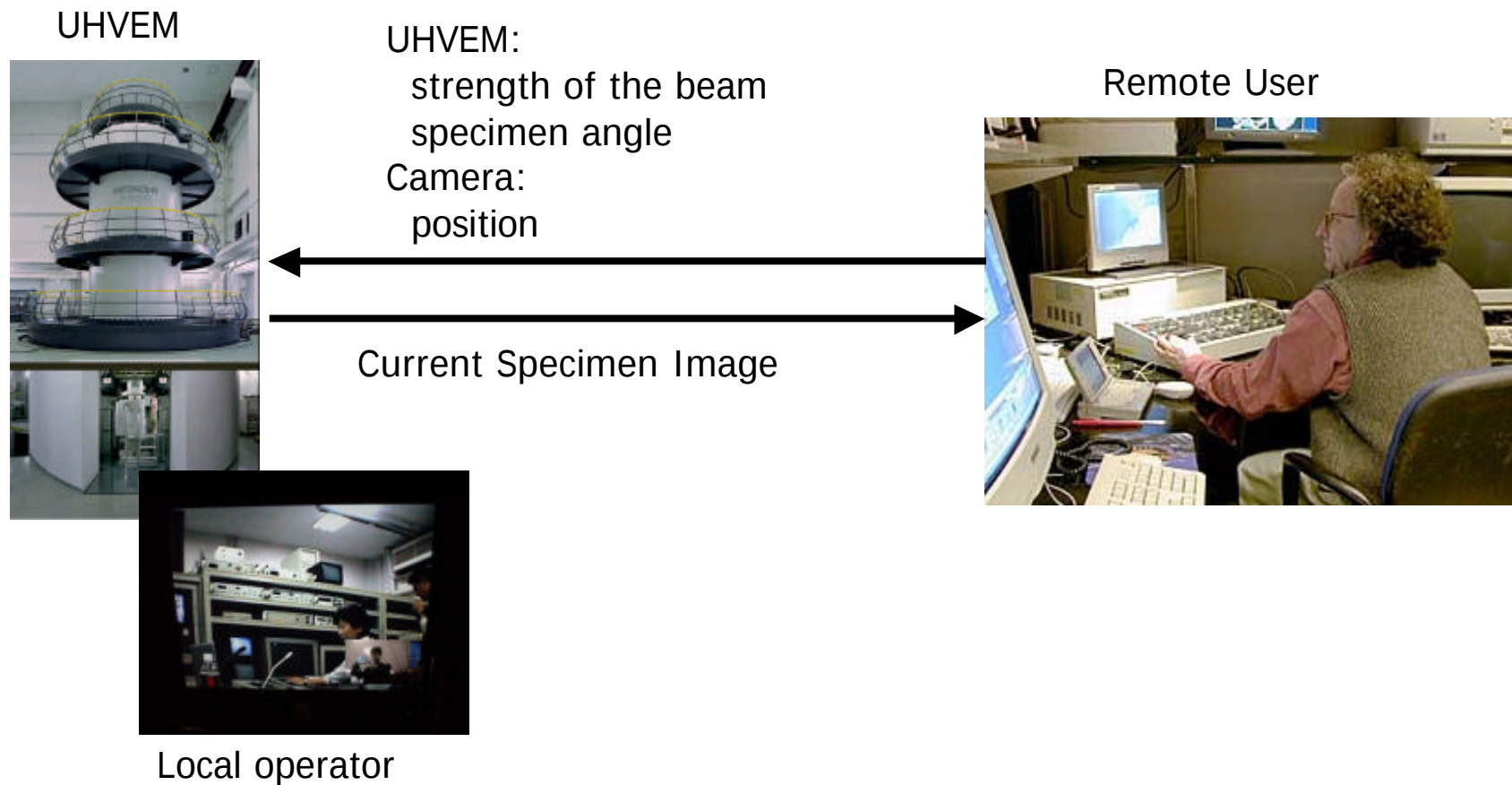
- 3MV Ultra-High Voltage
 - Thick specimen observation



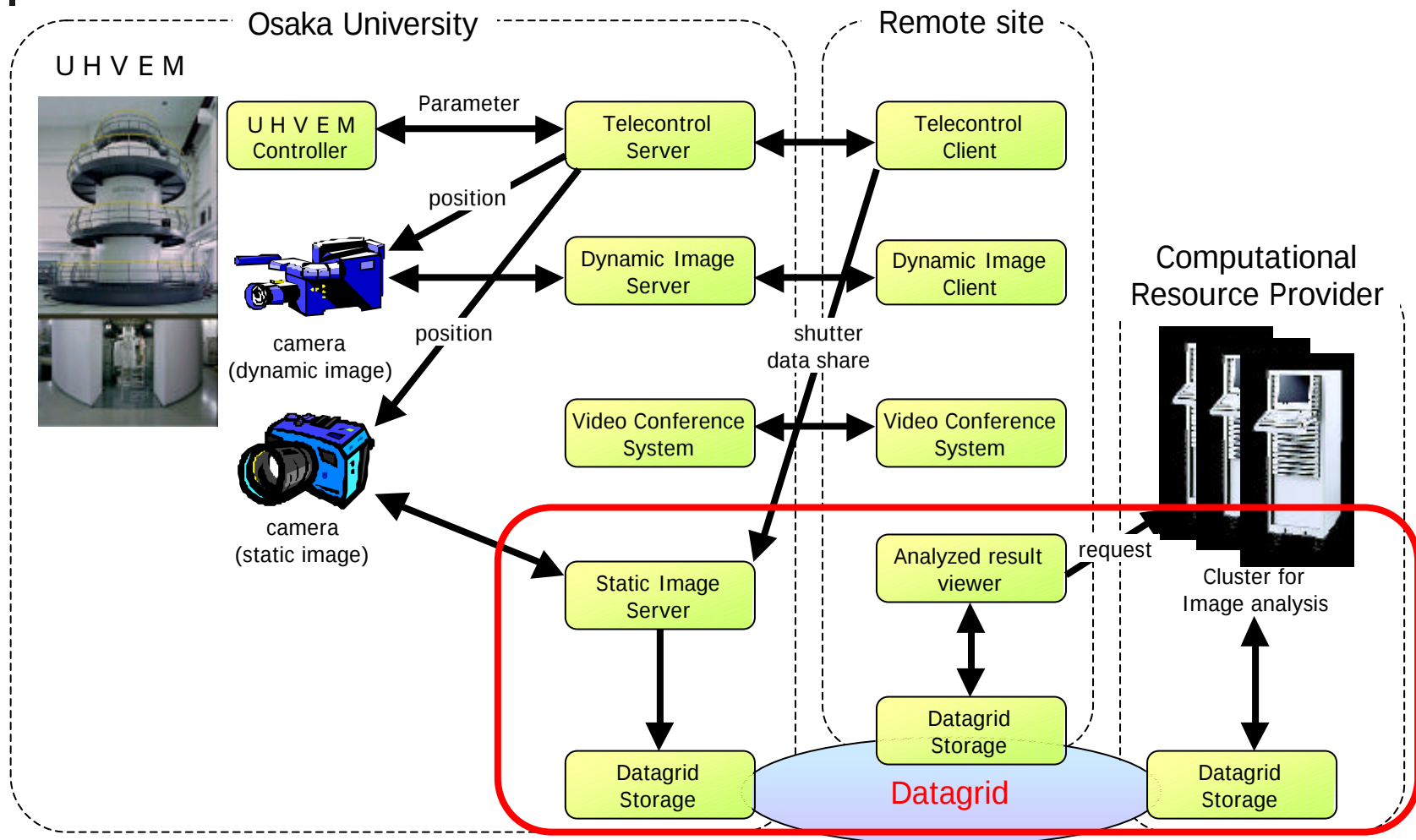
Tomography technique enables detailed analysis

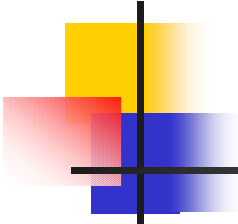


Telemicroscopy



Telemicroscopy





Current status

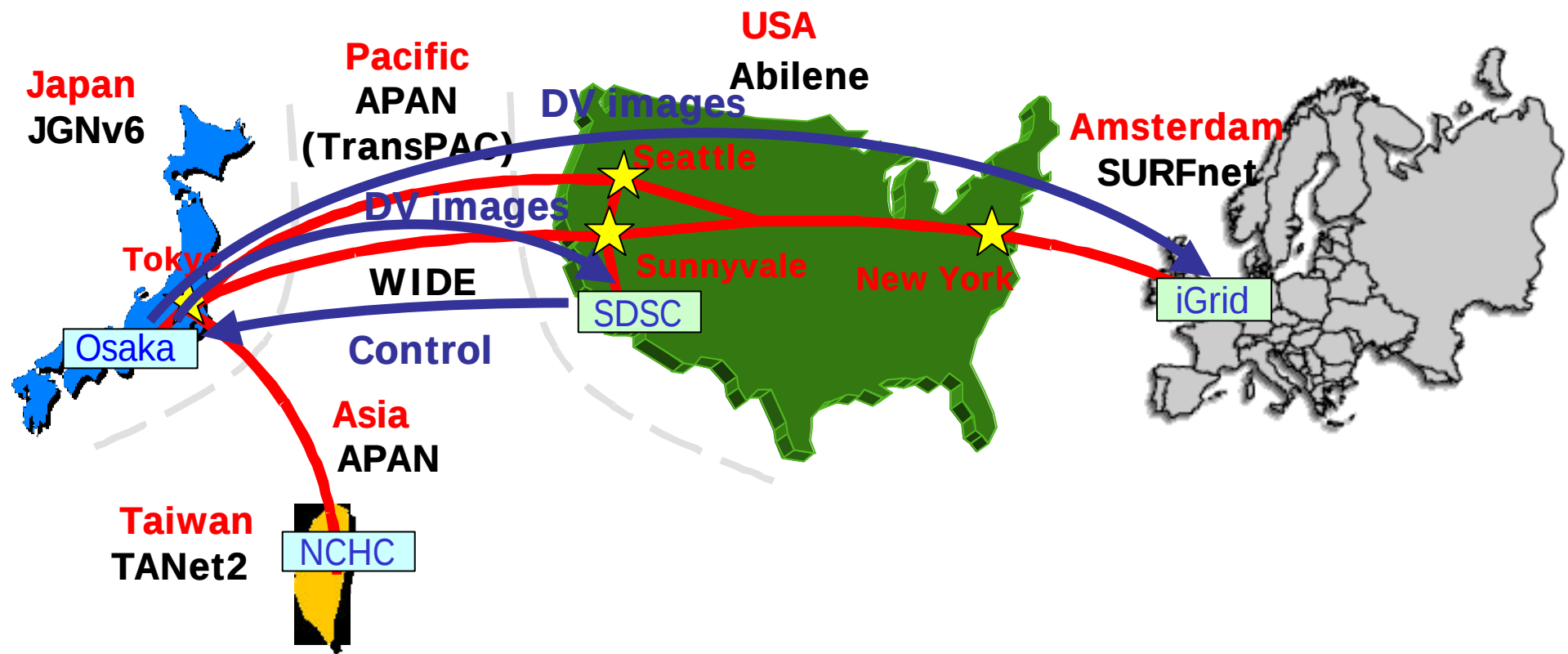
- Challenges on dynamic image transfer
 - iGrid2002
 - SC2002
- New equipments installation
 - Datagrid System
- Telescience Portal

iGrid2002

- Telecontrol from Amsterdam and SDSC over global IPv6 network.
- DVTS over IPv6
- Participants
 - NCMIR, SDSC(US)
 - NCHC(Taiwan)
 - Research Center for UHVEM, Cybermedia Center(Japan)



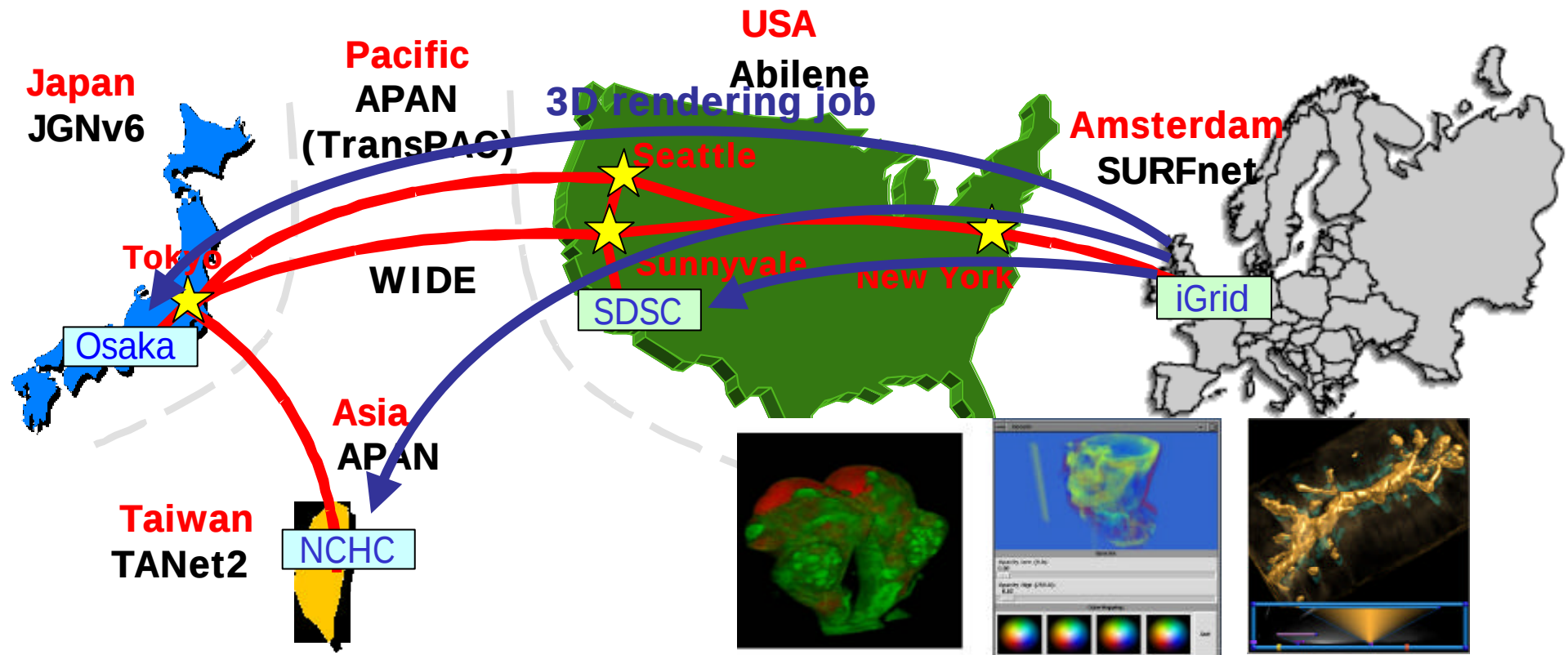
Demonstration configuration



27 Jan. 2003

SAINT2003 Workshop

Demonstration configuration



27 Jan. 2003

SAINT2003 Workshop

SC2002

- Telecontrol from Baltimore
- HDTV over IPv6
- Bandwidth Challenge
- Participants
 - NCMIR, SDSC
 - KDDI R&D Laboratories Inc.
 - Research Center for UHVEM, Cybermedia Center



HDTV Codec & Network Adapter



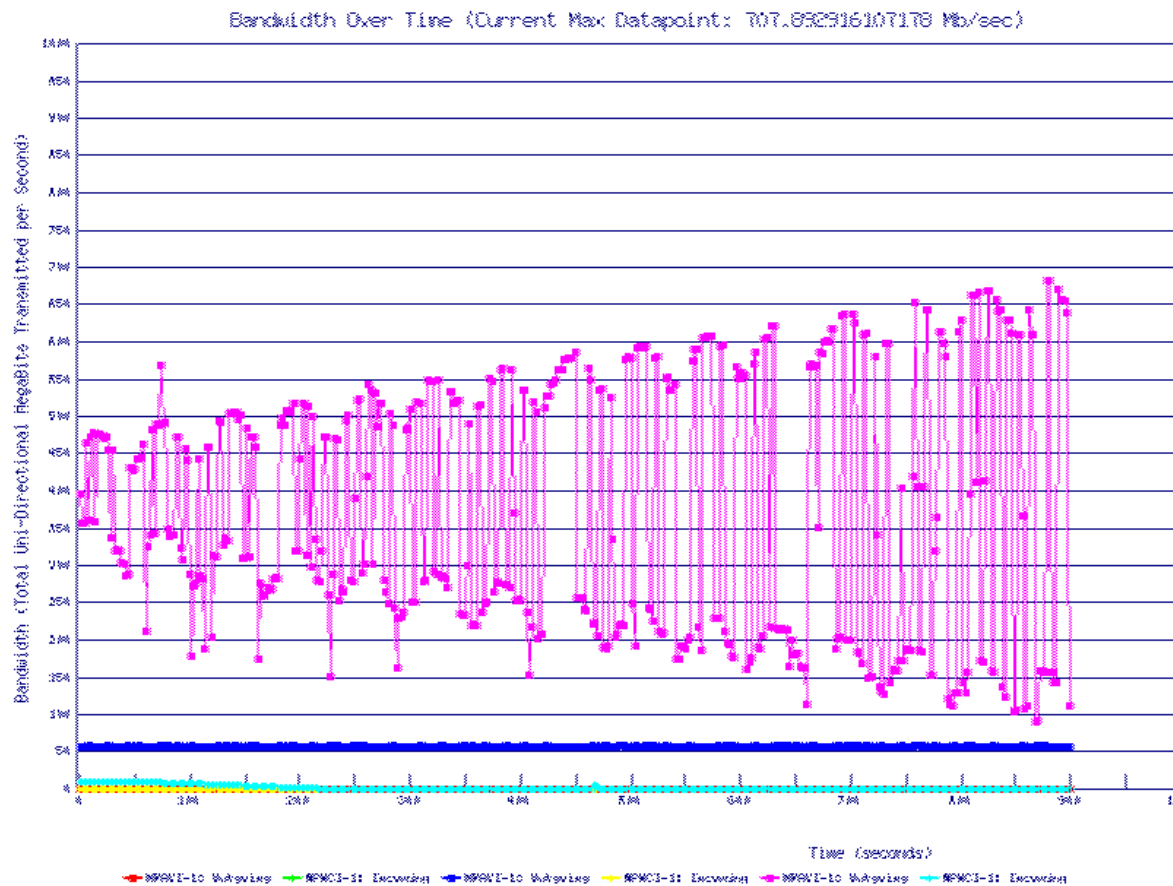
KH-300N



MPTS LINK

- HDTV over IPv6 requirements
 - 1 . 100Mbps bandwidth (including 4ch sound)
 - 2 . Under 10^{-5} error rate (for business use spec)

Bandwidth challenge results



Datagrid System

Cybermedia Center, Osaka University

Cybermedia Center (Suita)

Datagrid analysis system & storage

SGI Onyx300
 CPU: 16CPU
 485 SPECfp2000
 474 SPECint2000
 Memory: 16GB
 Graphics pipe: 3
 Texture memory: 256MB/pipe
 Frame buffer: 160MB/pipe
 Network: 1000SX x 4
 Other I/O: Fibre Channel x 4, Ultra160SCSI
 Software: IRIX, AVS/Express for CAVE,
 C, C++, Fortran, Globus Toolkit 他

RAID disk:

Disk space: 11TB (RAID5)
 Controller: 4
 Cache: 128MB/Controller
 Interface: Fibre Channel x 4

Datagrid visualization system

CAVE system
 Screen: 4
 Projector: Christie Digital Systems
 Marquee8500/3D

Institute of Laser Engineering

Datagrid visualization client

IBM Intellistation MPro
 CPU: Intel Xeon 2.20GHz
 Memory: 2GB
 Network: 100BT, 1000BT
 Other I/O: Ultra 160 SCSI
 Software: Windows 2000
 SGI OpenGL Vizserver Client

Datagrid high speed network switch

Extreme Summit5i
 I/F: 1000SX x 12, 1000LX x 1, 1000SX x 2
 Protocol: RIP, RIPv2, OSPF

Datagrid high speed network switch

Extreme Summit5i
 I/F: 1000Tx 12, 1000LX x 1
 Protocol: RIP, RIPv2

Super Computer (SX-5)



NEC SX-5

Biogrid System

NEC Blade Server
 Express5800/ISS for PC-Cluster (X/2.2G(512)) 8 nodes
 Blade Server 78 nodes(156CPU)
 AlphaServer GS80 68/1001 model8 Tru64 UNIX
 Express5800/140Ra-4(-Xeon/700(2M)) 3nodes

ODINS

Research Center for Ultra-High Voltage Electron Microscopy

Datagrid high quality image generator

HITACHI H-3000 UHVEM
 High quality image recording system H-3061DS



H-3000形 UHVEM

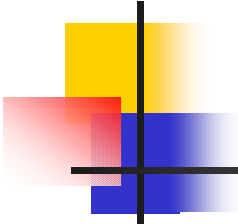
Datagrid shared view

Icemap IH-S01

Datagrid dome visualization system

Panasonic CyberDome1800

Cybermedia Center (Toyonaka)

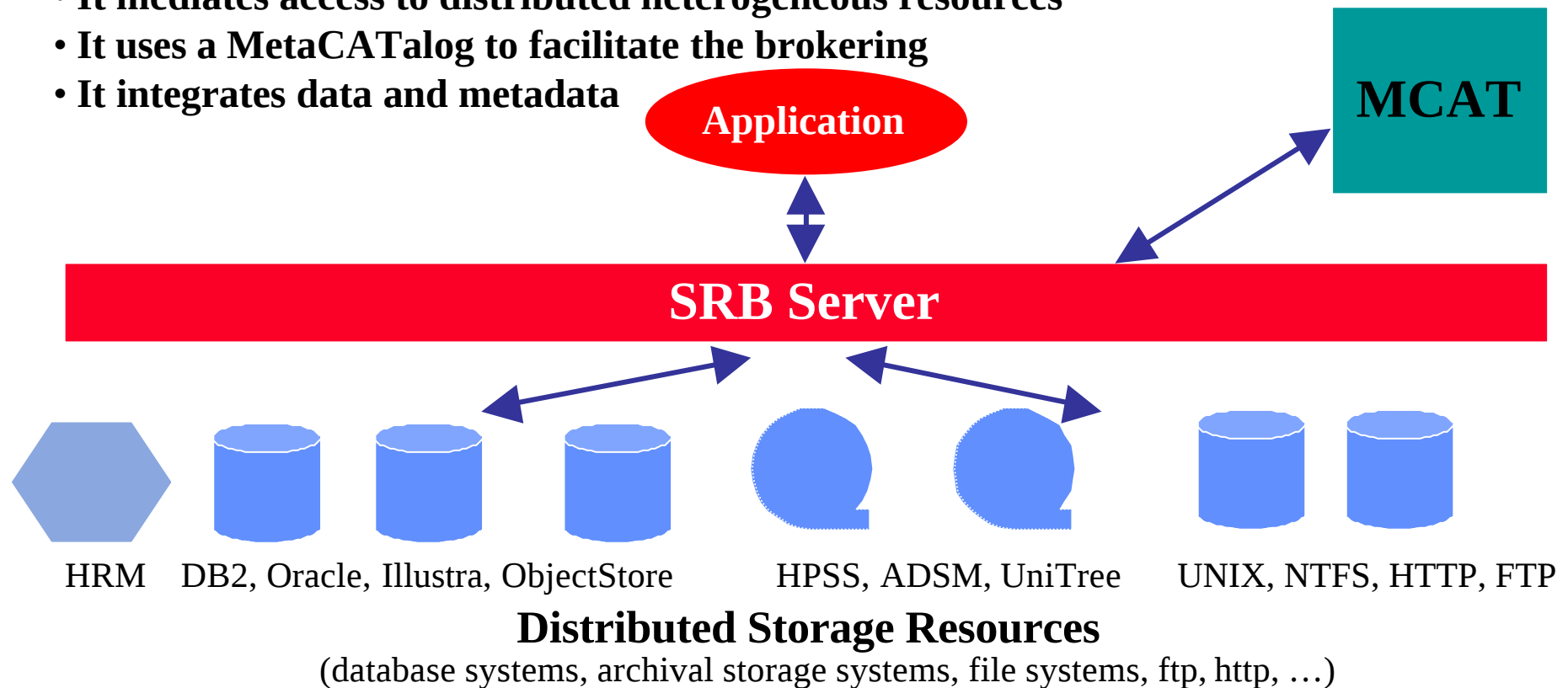


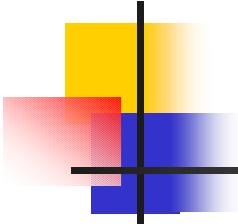
Data Grid Requirements

- Seamless access to data and information stored at local and remote sites
- Virtualization of data, collection and meta information
- Handle Dataset Scaling – size & number
- Integrate Data Collections & Associated Metadata
- Handle Multiplicity of Platforms, Resource & Data Types
- Handle Seamless Authentication
- Handle Access Control
- Provide Auditing Facilities
- Handle Legacy Data & Methods

Storage Resource Broker

- The Storage Resource Broker is a middleware
- It virtualizes resource access
- It mediates access to distributed heterogeneous resources
- It uses a MetaCATalog to facilitate the brokering
- It integrates data and metadata





Telescience Portal (1)

■ Tomography workflow

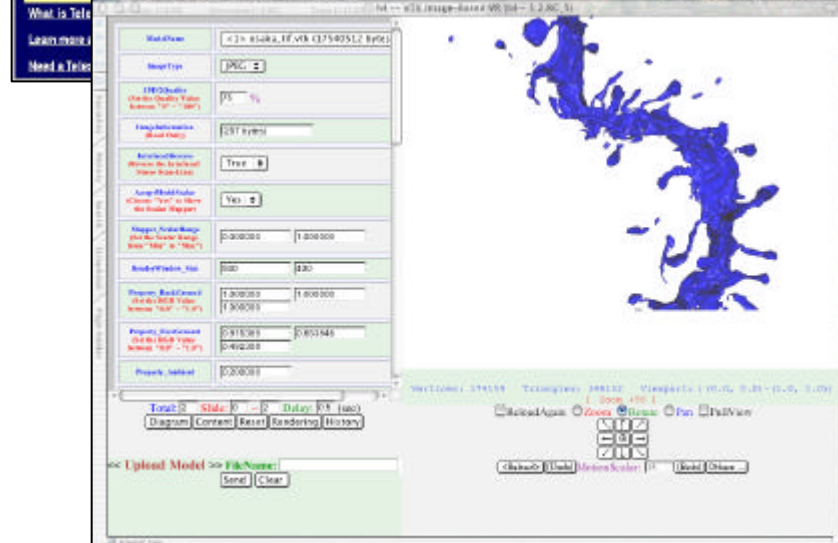
Sequence of steps required to acquire, process, visualize, and extract useful information from a 3D volume.

Problems with non-Portal “traditional” workflow:

- (~20) heterogeneous and platform specific tools:
 - Simple shell scripts
 - Parallel Grid enabled software
 - Commercial software
- Administration is responsibility of the user
- Manual tracking, handling of data

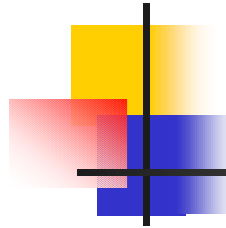
Advantages of workflow managed by Telescience Portal:

- Progress through the workflow can be organized and tracked
- Automated and transparent mechanisms for the flow of data
- Centralize tools and enhance operations with uniform GUIs to improve usability



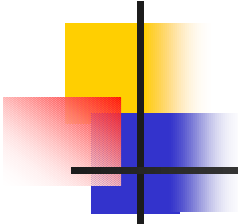
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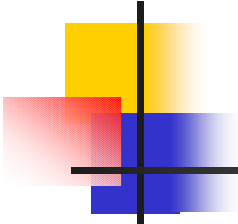
Summary

- Introduction of Telescience Project
 - Telemicroscopy
 - Dynamic image transfer challenges
 - New equipments (Datagrid system)
 - Telescience Portal



Future works (1)

- IPv6 enabled grid environment
 - IPv6 enabled Globus (<http://www.biogrid.jp/>)
 - Globus Toolkit 3
- Security for grid resources
 - Usability <-> Security
 - Firewall filter
 - Not peer-to-peer
 - IPsec
 - Management



Future Works (2)

- Development of data sharing and visualization environment
- Integration of telemicroscopy system
 - Telescience portal
- Development of QoS enabled environment