Birds of a Feather Meeting
2013

www.sagecommons.org

What is SAGE?

- SAGE – Scalable Adaptive Graphics Environment
- Operating System software for organizing visualizations and information on scalable display walls to help researchers deal with problems of scale and complexity in their data.
- Specializes in streaming visualizations from remote rendering servers / supercomputers.

The SAGE Team

Funding

- Began with NSF ITR (OptIPuter) grant in 2002.
- Supported with NSF STCI grant 2009-2013.
- New support with NSF SI2-SSI grant 2013-2018.
- Additional support from NTT Network Innovation Laboratories, Argonne National Lab, King Abdullah University for Science and Technology, Sharp Lab of America and Monsanto Research.

Agenda

- SAGE Update
- SAGE Applications in Research and Education
- SAGE Future Plans
- SAGE Commercialization

SAGE Update

SAGE User Community

Over 107 Sites (58 U.S. and 49 Global)

SAGE User Sites 2013

Australia
- AARNet
- Australian National University
- CSIRO Discovery Center
- CSIRO Information and Communication Technologies, Marsfield
- Monash University – Caulfield
- Monash University – Clayton
- Monash University – Clayton, eResearch Centre, CAVE2
- University of Melbourne
- University of Queensland

Belgium
- Katholieke Universiteit Leuven, IBBT

Brazil
- RNP (Brazilian R&E Network)
- University of Sao Paulo, Laboratory of Computer Architecture and Networks

Canada
- CANARIE
- Ciena Networks (2)
- Communications Research Centre
- Simon Fraser University

China
- Beihang University, State Key Lab of Software Environment Dev.
- Chinese Academy of Sciences, Computer Network Information Center

Czech Republic
- Czech Technical Univ in Prague
- Masaryk Univ, Lab of Advanced Networking Technologies (2)

Germany
- Braunschweig University of Technology, Institute of Computer and Network Engineering

India
- Monsanto Research Centre

Japan
- Cybernet Systems Co., Inc.
- Knowledge Capital, VisLab Osaka
- Kyoto University
- National Institute of Adv. Industrial Science and Technology (AIST)
- National Institute of Information and Communications Technology (NICT), Koganei, Japan (3)
- NICT, Keihanna Research Center
- NTT Advanced Technologies Corp
- NTT Network Innovation Laboratories, Yokosuka
- Osaka University, CyberMedia Center

Korea
- Gwangju Institute of Science and Technology (GIST)
- Korea Institute of Science and Technology Information (KISTI)

Mexico
- Ensenada Center for Scientific Research and Higher Education (CICESE)

Netherlands
- SURFsara
- SURFsara Collaboratorium
- University of Amsterdam, e-BioScience Laboratory
- University of Amsterdam, System and Network Engineering Research Group

New Zealand
- Victoria University of Wellington

Poland
- Poznan Supercomputing and Networking Center

Russia
- Russian Academy of Sciences, Science and Innovation Center
- Russian Academy of Sciences, Space Research Institute

Saudi Arabia
- King Abdullah University for Science and Technology (KAUST)

Taiwan
- National Center for High-performance Computing (NCHC)
- National Central University, GeoComputing Laboratory

United States
- Adler Planetarium & Astronomy Museum
- Argonne National Laboratory, Center for Nanoscale Materials (2)
- Argonne National Laboratory, Math and Computer Science
- Argonne National Laboratory, Transportation Research and Analysis Computing Center
- Calit2/U California, Irvine
- Calit2-QI/U California, San Diego (7)
- Casa Familiar
- Case Western Reserve University, Kelvin Smith Library
- Extreme Networks
- Florida International University, Center for Internet Augmented Research & Assessment (CIARA)
- Lakota Technical Solutions Inc
- Louisiana State University, Center for Computation and Technology
- Lucasfilm, Information Technology
- Michigan Technological Univ., Computer Science
- Monsanto (3)
- NASA Ames Research Center, Lunar Science Institute
- NASA Goddard Space Flight Center, Space Visualization Studio
- Naval Postgraduate School (7)
- Northwestern University, Int'l Center for Advanced Internet Research (iCAIR)
- Purdue University, Envision Center for Data Perceptualization
- Rincon Research Corporation
- Sharp Laboratories of America
- South Metro Career Center
- Texas A&M University, Computer Science
- Earth Resources Obs and Science
- United States Geological Survey
- Univ California, Davis, Institute for Ultra-Scale Visualization
- Univ California, San Diego Nat'l Ctr for Microscopy and Imaging Rsrh
- Univ California, San Diego, Scripps Institution of Oceanography
- University of Hawaii, Center for Microbial Oceanography: Research and Education (2)
- University of Illinois at Chicago (UIC), ACM Student Chapter
- UIC, Electronic Visualization Lab (EVL), CAVE2
- UIC, EVL, Cyber-Commons 3D
- UIC Graham Clinical Performance Center
- UIC Innovation Center
- UIC Pathology Department
- UIUC National Center for Supercomputing Applications
- University of Michigan, Dept. of Atmospheric, Oceanic & Space Sciences
- University of Michigan, Digital Media Commons
- University of Michigan, School of Information
- University of Texas at Austin, Texas Advanced Computing Center (TACC)
- University of Washington
- Zoom Digital Signage

New Comprehensive Documentation

- PDF file on SAGE site
- Overview
  - What is SAGE
  - User guide
  - Configuration
  - Developers
  - Troubleshooting

Improved Document Sharing Over Distance

- Document Sharing
  - Drag-and-drop documents between walls
- Copy the document to the remote wall
  - Start the application remotely:
    - Movies, Images, PDF: viewer launched
    - VNC: tries to connect to the laptop
    - Pixel-based apps: application will replicate pixels
- Support multiple destination
  - Sync'd playback prototype

Making Audio a First Class Citizen for Applications with Audio

- SAM: the Streaming Audio Manager
  - https://code.google.com/p/streaming-audio/
  - Michelle Daniels
    - Sonic Arts R&D at UC San Diego CalIT2
- One server per site
- RTP streams from an arbitrary number of clients
- Control data is exchanged via SAM and clients using Open Sound Control (OSC)

Support for Stereo 3D Animations

- New pixel format : PIXFMT_RGBS3D
- Left and right pixel next to each other
  - 6-byte format RGB: R1G1B1R2G2B2
- View
  - images3d [-lr|rl] <side-by-side-image>
    - Script to convert MPO, JPS, PNS, …
    - Container in file library
  - mplayer -vo sage:stereo <side-by-side-movie>
    - Scaling options for ‘youtube’ or ‘double-width’ files

SAGE Applications in Research and Education

NASA ENDURANCE

Environmentally **N**on-**D**isturbing **U**nder-ice **R**obotic **AN**tarcti**C** **E**xplorer

Class in CAVE2

4K 3D Movies Streamed from Poland to Chicago

US Ignite Application Summit in Chicago, June 25, 2013

- Poznan Supercomputing and Networking Center (PSNC) streamed 3D-interleaved 4K movies to EVL over the GLIF infrastructure.
- UltraGrid (CESNET and Masaryk University, Czech Republic) used to do the streaming. Streams averaged 3.4Gbps.
- SAGE used to push the movie frames onto 3D tiled display wall and open additional windows with supporting information.

Petr Holub
Masaryk University

UltraGrid

- www.ultragrid.cz, part of SAGE distribution
- HD/4K/8K video support, audio support
- Multi-channel audio/video support
- Uncompressed video/audio transmission
- Compression support:
  - CUDA-based GPU JPEG (http://sourceforge.net/projects/gpujpeg/)
  - low-latency H.264 (GPL, based on X264)
  - SILK for audio
- Wide range of capture/display options (HDMI/HD-SDI/OpenGL), including desktop capture for visualization apps

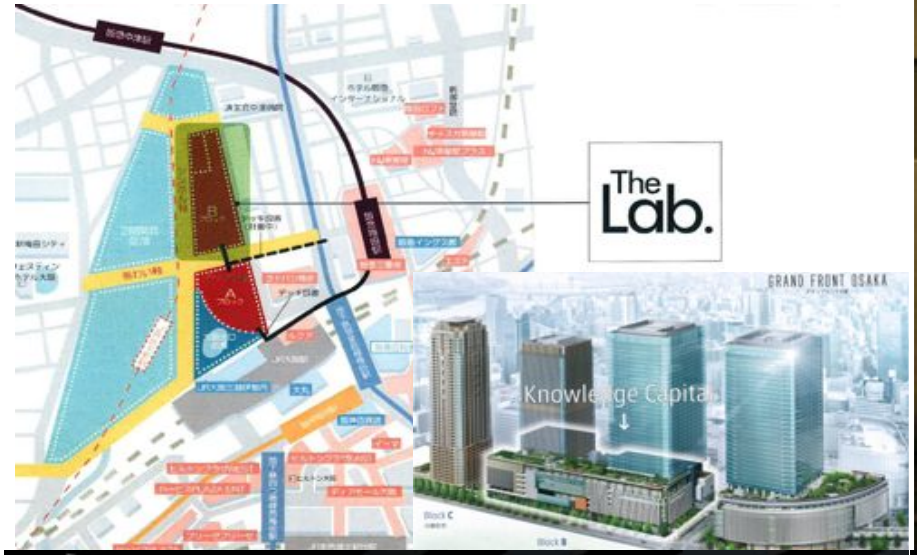
What's new in UltraGrid 1.2

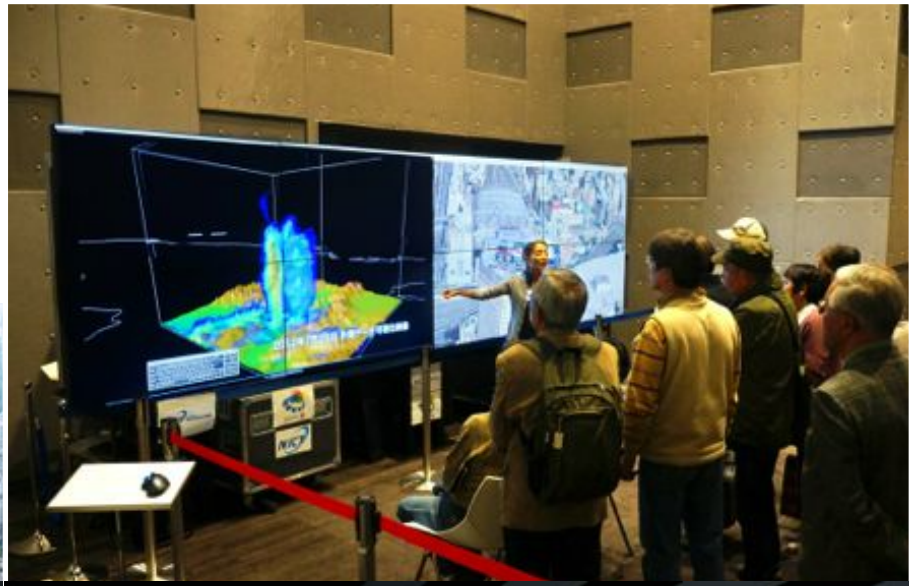
- Record/playback capability (file-based I/O)
- Software deinterlacer
- Full support for MS Windows, incl. DirectShow capture
- GPUJPEG performance optimizations
- Video4Linux2 capture module
- Software video mixer
- Recompression support in UDP packet reflector
- Support for image anonymization (blanking parts of image for medical apps)
- Control channel – e.g., for integration with CoUniverse and Bandwidth-on-Demand services (shown at AIST booth)
- Support for SAGE as a transport protocol (uv --sage -t <dev> <fsManager>)

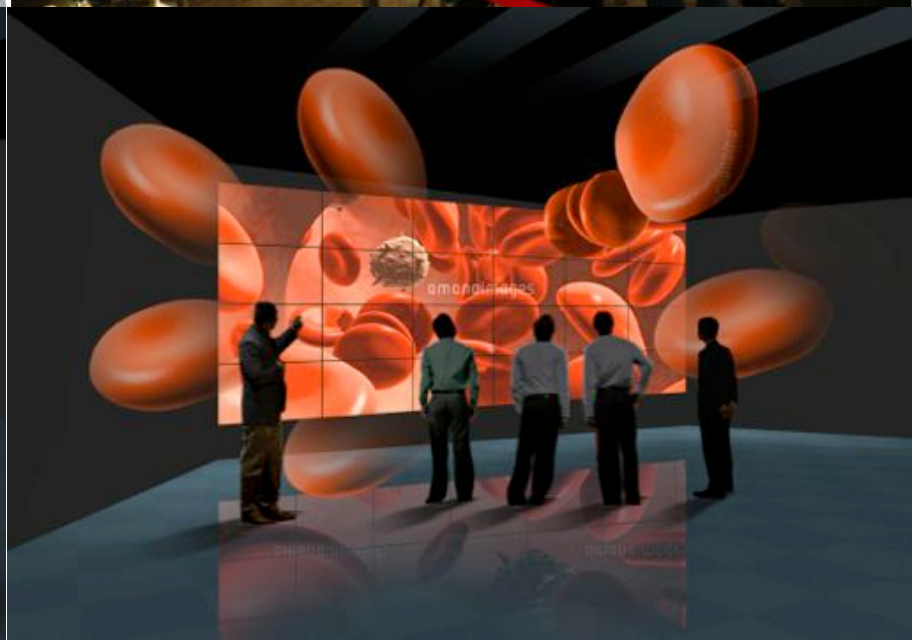
Shinji Shimojo

Osaka University and
National Institute of Information and
Communication Technology (NICT)

Vislab Osaka at Knowledge Capital

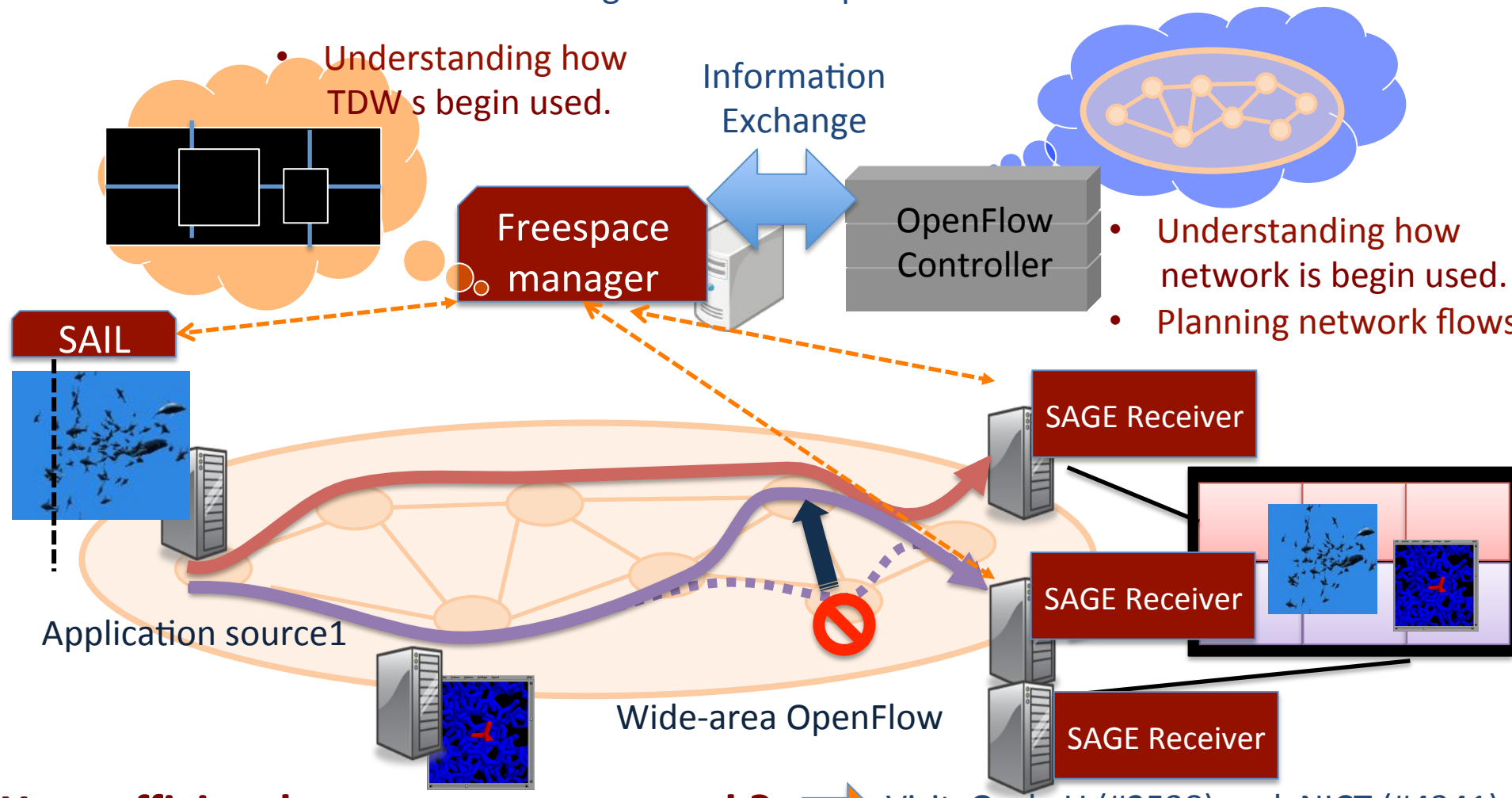






Visit OsakaU (#2538) and NICT (#4341) booth!

- Goal: dynamic flow control of multiple network streams from multiple sites for smooth user-interaction & visualization
- Approach: having SAGE interact with OpenFlow controller as a software program that controls the whole network against network parameters resulted from user interaction.



How efficiently can we use network? → Visit OsakaU (#2538) and NICT (#4341)

Paul Bonnington

eResearch Centre, Monash University, Australia

http://www.eng.monash.edu.au/news/shownews.php?nid=70&year=2013

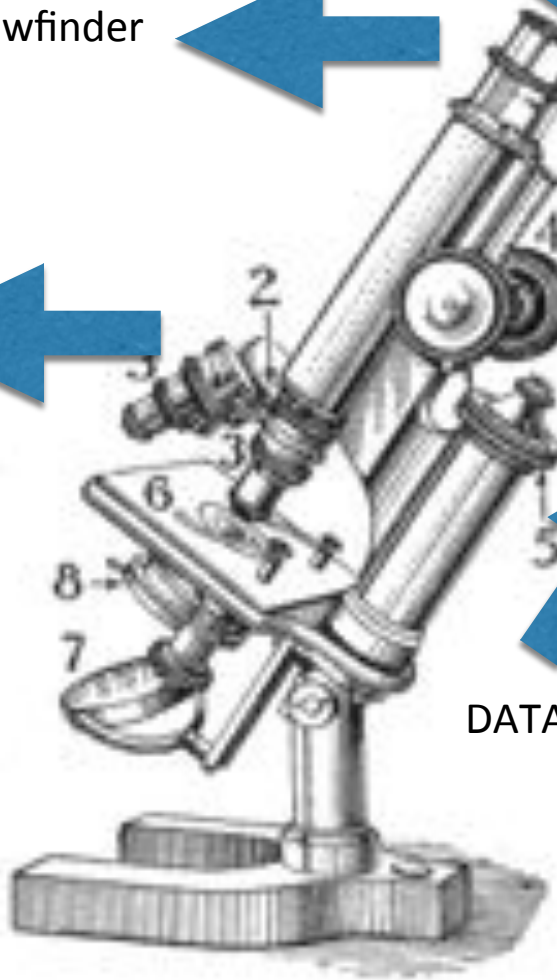
Components

KNOWLEDGE: Dissemination

INSIGHT: Lens/Viewfinder

ANALYSIS TOOLS: Filters, Adjustments

CAPTURE: Light Source, Samples



DATA

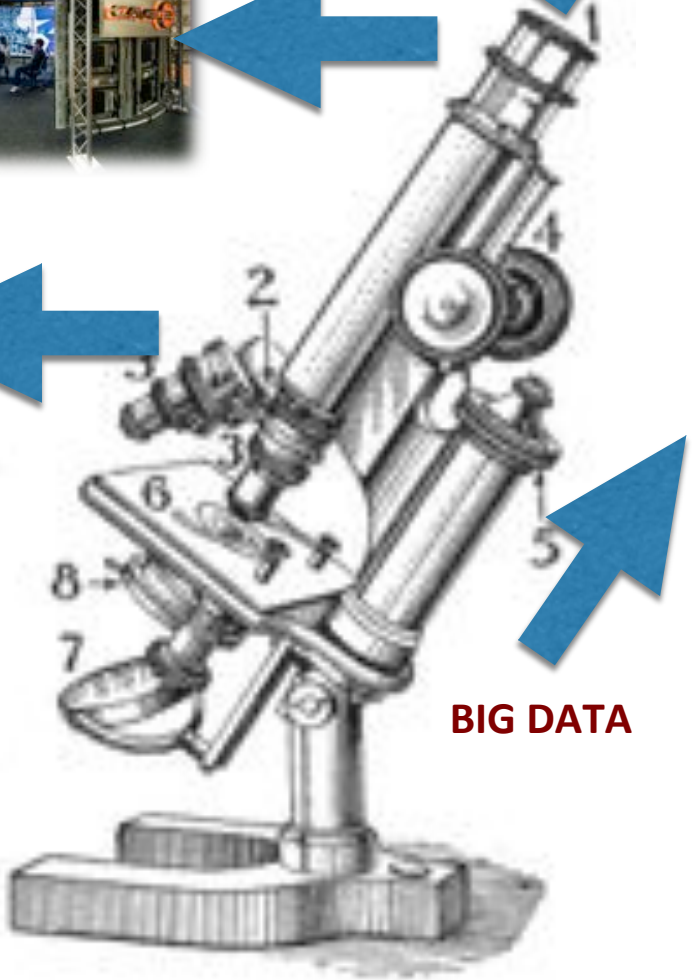
e-Components

Dissemination and Data Services

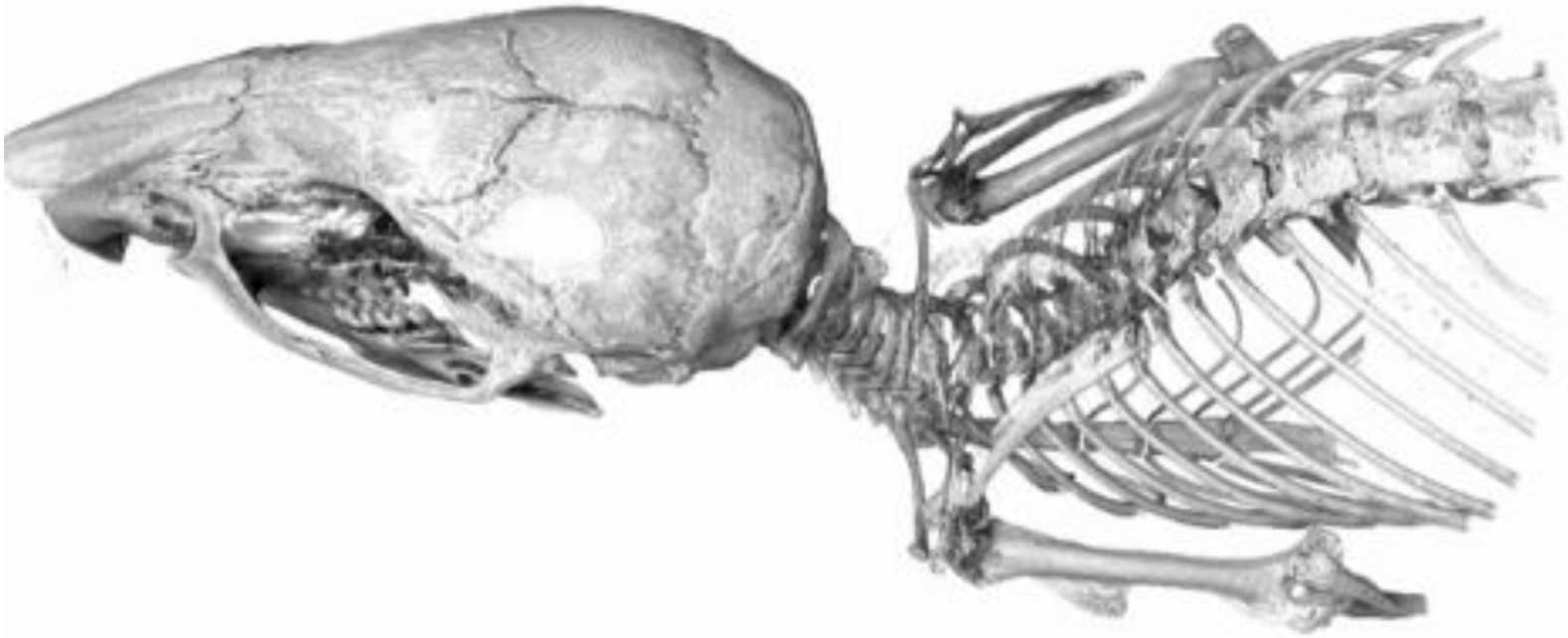
Immersive Visualisation

Data Processing and Analytics,
HPC, Tools

Data Capture
Instrumentation



BIG DATA

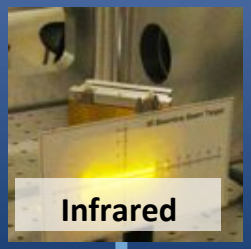


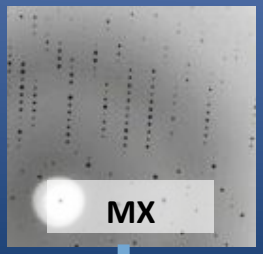
- Video: Synchrotron Mouse
- Video: 4D heart

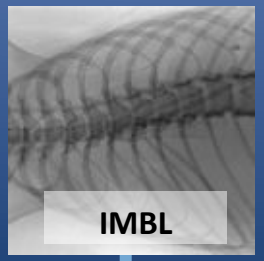
Clayton Innovation Precinct

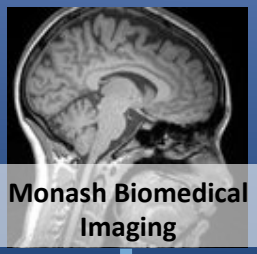
Australian Synchrotron

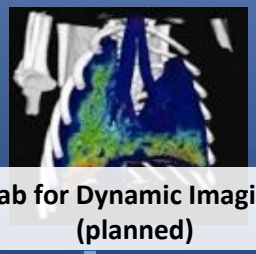
Monash Universityz











Analysis

Structural Determination

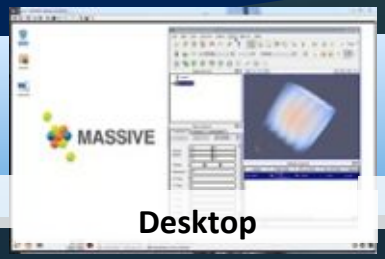
CT Recon.

Analysis and Vis.

CT Recon, Analysis & Vis

MASSIVE

HPC



Characterisation Virtual Laboratory

Cloud

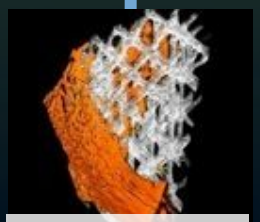
Australian Characterisation Council

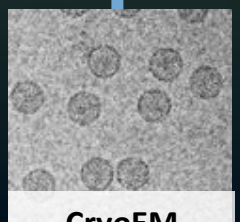
Analysis and Vis.

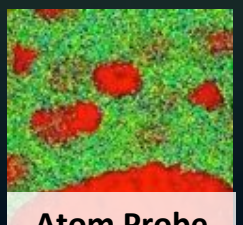
CT Recon, Analysis & Vis

Recon, Analysis & Vis

Recon, Analysis & Vis







MONASH University e-Research Centre

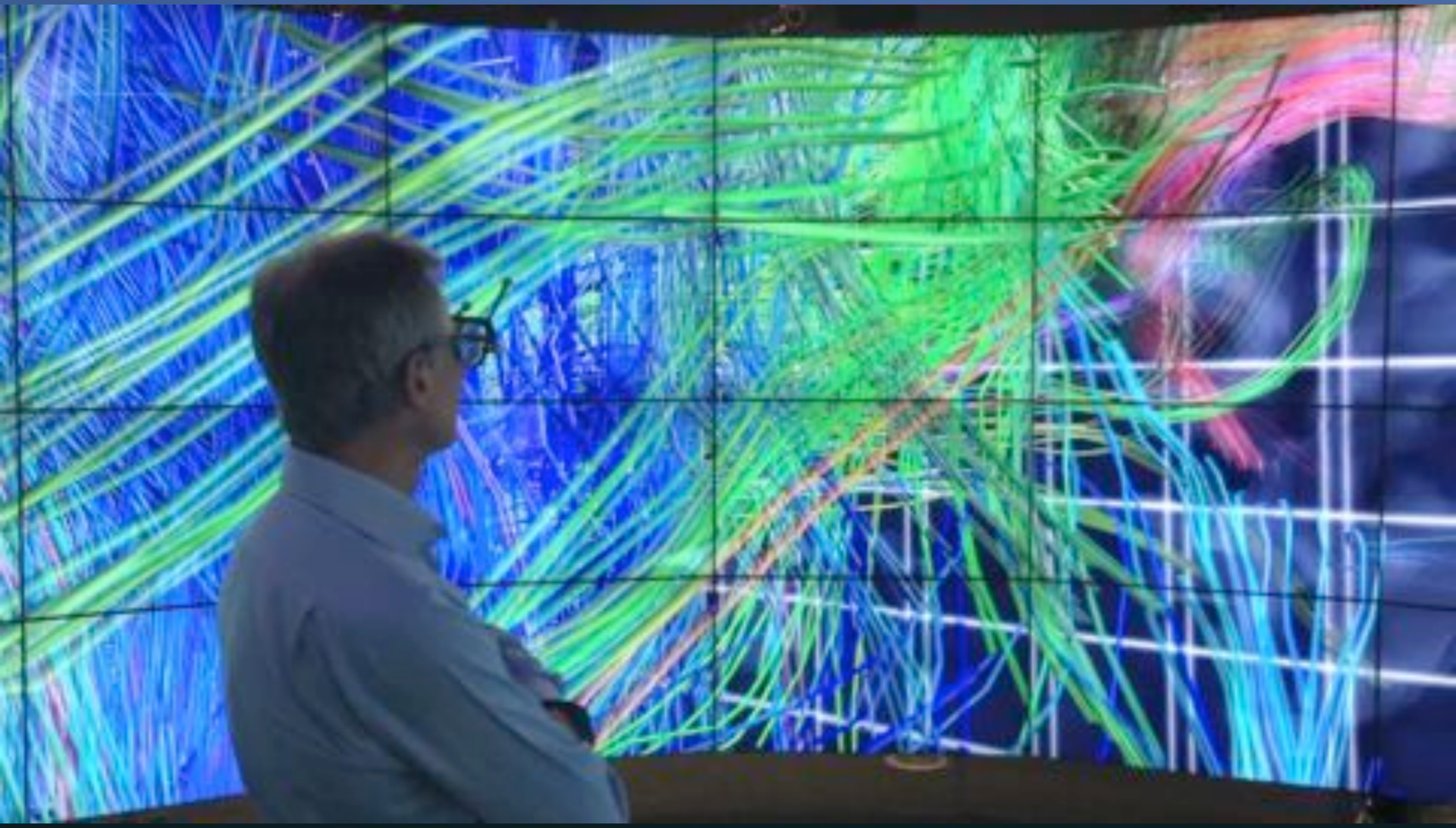
2013

www.sagecommons.org

MASSIVE Interactive Desktop

- Characterisation and Visualisation tools:
  - Paraview
  - Amira
  - Drishti
  - ImageJ
  - Seg3D
  - VolView
  - MayaVi
  - Etc.

MASSIVE | Multi-modal Australian ScienceS Imaging and Visualisation Environment



Future Plans

New SAGE Grant

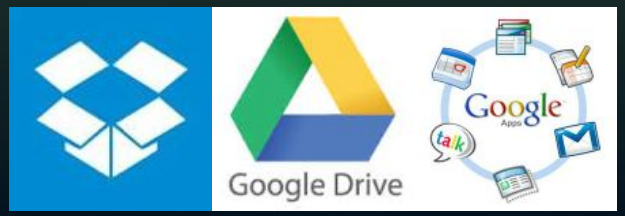
- Address Community requests:
  - Greater Reliability, Enabling Greater Integration of External Applications, Enhanced Collaboration Support, Improved User Interface.
- Leverage emerging technologies:
  - Cloud Services, Hybrid Reality Environments, Software Defined Networks.

1. Greater Reliability

- Partnership with Vadiza to dramatically improve reliability, including 24/7 phone and online support.
- Refactor SAGE framework for future expansion.
- Vadiza will provide turnkey solutions for end-users.

2. Greater Integration with External Applications

- Power of SAGE comes from being able to bring many visualization products together to see the BIG PICTURE.
- New focus is to create a light weight and open framework that will make it easier to integrate existing and new applications- both remotely streamed and native.
- Integrate with Cloud Computing services.



3. Enhanced Collaboration

- A wholly new interaction paradigm for distance collaboration between walls of different shapes and sizes.
- Integration with Software Defined Networking capabilities to improve data streaming such as synchronization between distributed sites.
- Leverage GLIF community efforts and infrastructures with partners.

4. New User Interface

- Redesign of User Interface for:
  - better managing large numbers of visualization products.
  - Supporting multiple collaboration teams.
- Intelligent support for 2D and 3D rendering in emerging Hybrid Reality Environments

SAGE Commercialization

John Thompson


Software, Appliances & Services for Visualization & Collaboration Environments

Vadiza

Agenda

- Company Purpose
- What have we done?
- What are we planning?
- Development Direction
- Our offer to you
- Summary

Vadiza

Company Purpose

- Provide technical support services to the global SAGE user base
- Publish & fulfill a development roadmap to achieve an
  - enterprise version of SAGE
  - satisfy commercial requirements
- Design & Sell integrated appliances with leading edge hardware & software
- Offer professional services for design, installation & implementation
- Facilitate a recognized global SAGE community of users, contributors and experts

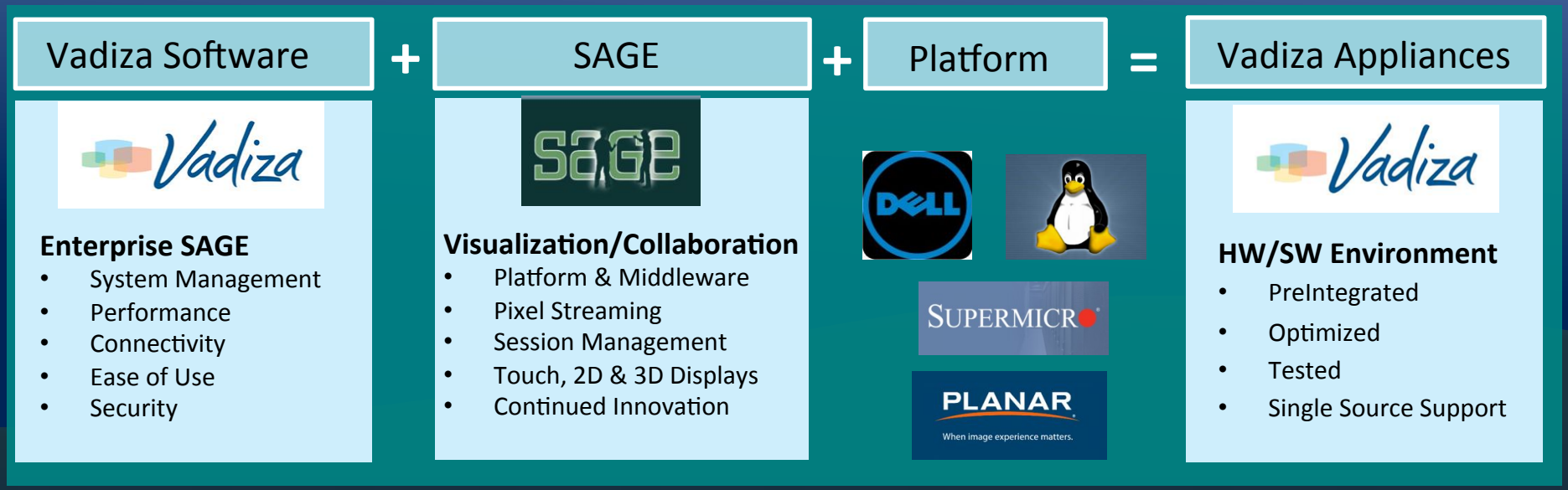
Vadiza

What Have We Done?

- Licensed SAGE.
- Transferred knowledge & info about bugs, function & feature requests.
- Planned development for next 18 months.
- Started developing software.
- Negotiated deals with hardware suppliers.
- Setup tech support call center.
- Calling SAGE installations now.
- Quoting appliances & support contracts now.

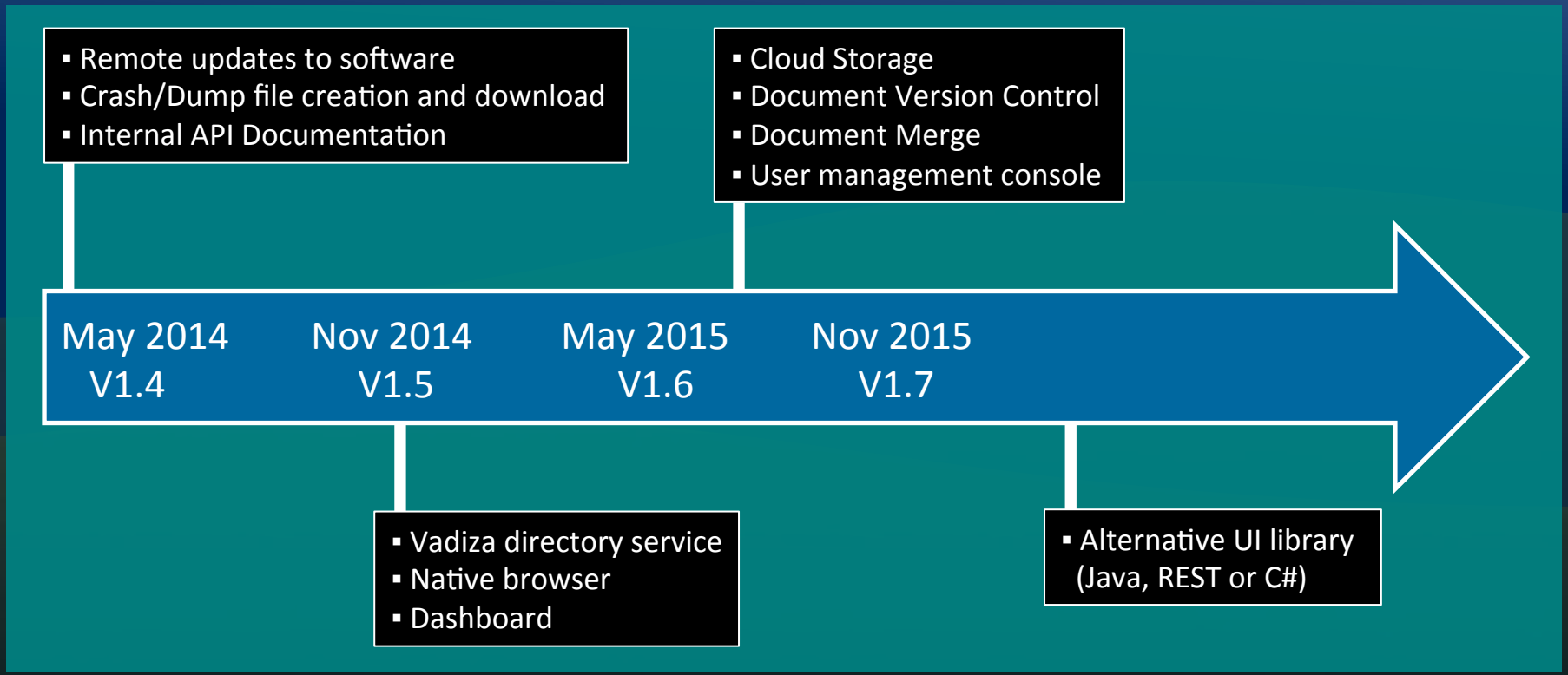
Vadiza

What We are Planning



- Vadiza branded appliances – leading edge hardware/software integrated for a reliable, high quality experience every time.
- Vadiza Software – commercially focused on market driven needs & innovations: connectivity, cloud storage, native browser, security, etc.
- Global Community – An annual event, social sites, open source support.

Development Direction



Vadiza

Our Offer to You

- Try Vadiza Tech Support for Free
- Call (855) 344-8400 or e-mail support@vadiza.com between now and January 1, 2014 for any Tech Support issue.
- Our team will assist you and your team for free.
- We will follow up to see:
  - How well we did
  - If we can help in the future

Vadiza

Software, Appliances & Services for Visualization & Collaboration Environments

Vadiza

Jason's New Digs

LAVA

c·more
center for microbial oceanography: research and education

LABORATORY FOR ADVANCED VISUALIZATION & APPLICATIONS

SAGE BOF 2013

www.sagecommons.org

Thank You

Please Evaluate this BOF

http://bit.ly/sc13-eval

VisTech Workshop at SC: Fri 8:30 in 205

Kelly Gaither, Jason Leigh, Eric Wernert, Falko Kuester