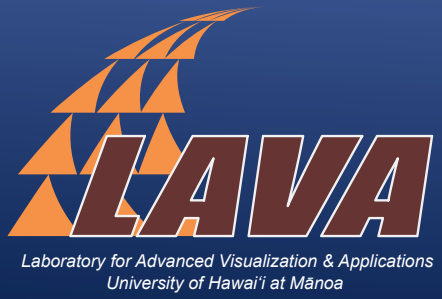
Birds of a Feather Meeting 2016



Laboratory for Advanced Visualization & Applications

University of Hawai‘i at Mānoa

Jason Leigh, Dylan Kobayashi

Electronic Visualization Laboratory

University of Illinois at Chicago

Maxine Brown, Luc Renambot, Lance Long,
Arthur Nishimoto, Krishna Bharadwaj,
Jillian Aurisano, Andrew Burks

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.
- Academy for Creative Media, University of Hawaii system

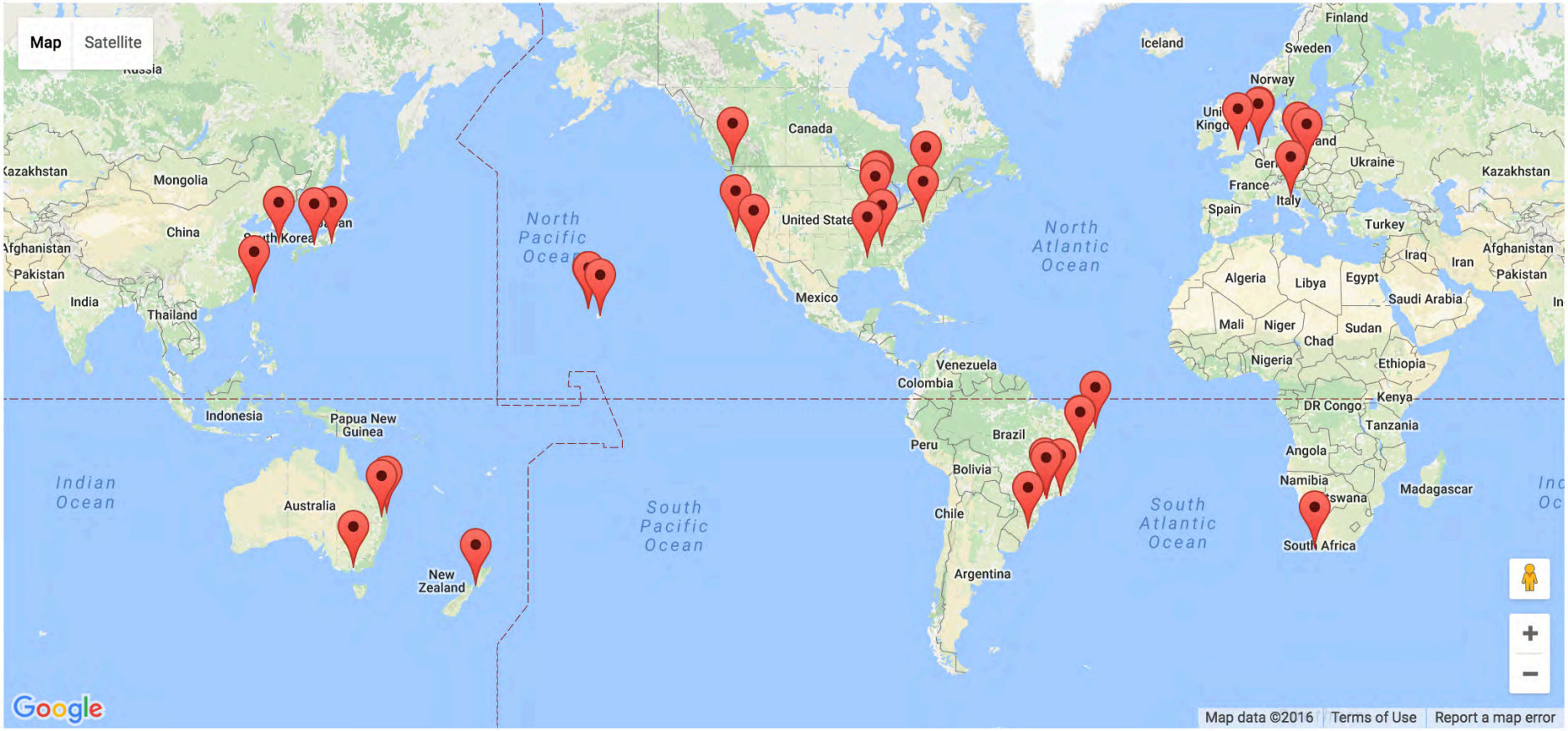
What is SAGE2?

Scalable Amplified Group Environment

- Middleware to access, display, and share high-resolution digital media on one or more scalable resolution tiled-display walls
- Uses web technologies (rewrite of SAGE: Scalable Adaptive Graphics Environment)
- Push laptop screens or digital media onto a wall
- Multi-user interaction

SAGE2 User Community 2016

67 Sites: 35 International + 32 National



SAGE2 User Community 2016

67 Sites: 35 International + 32 National

AUSTRALIA
- RMIT, (VX)Lab
- University of the Sunshine Coast (3)
- University Southern Queensland

BRAZIL
- Bahia School Medicine & Public Health
- Catholic University of Salvador (UCSal)
- Federal University Paraíba, LAViD
- Federal Univ. of Rio Grande do Sul, PRAV
- Mackenzie University, LabCine
- National Institute of Space Research
- RNP, Rio de Janeiro (2)
- University of Campinas, Cinema
- University of Sao Paulo, LARC
- University of Sao Paulo, LASSU (2)

CANADA
- Ciena Research Labs
- Simon Fraser University, IRMACS

CZECH REPUBLIC
- CESNET & Czech Technical Univ, SAGElab
- CESNET, Mobile SAGE
- Masaryk University, Cyber Exercise & Research Platform Project
- Masaryk Univ., Lab Adv. Ntwking Tech (2)

ITALY and SWITZERLAND
- University Urbino and ETH Zürich

JAPAN
- NTT Network Innovation Labs, Yokosuka
- Osaka Univ., Cyber Media Center

KOREA
- Gwangju Institute of Science & Tech.

NETHERLANDS
- Air France-KLM, CIO Group Tech Office
- SURFsara, Sci Vis Group, Collaboratorium
- University of Amsterdam, SNE

NEW ZEALAND
- REANNZ

SOUTH AFRICA
- University of Cape Town, Informatics and Visualisation Laboratory

TAIWAN
- National Center for High-performance Computing

UNITED KINGDOM
- Imperial College London, Data Science Institute

UNITED STATES
- Adler Planetarium
- Argonne National Laboratory, ALCF
- Catherine Cook School
- Digital Manufacturing and Design Innovation Institute (DMDII)

UNITED STATES
- Jackson State University, ECE
- NASA Marshall Space Flight Center, SPoRT
- Northwestern University, iCAIR
- Stanford University, HIVE
- Univ of California, San Diego, Calit2-QI, VROOM
- Univ of Hawai'i at Hilo, 'Imiloa Astronomy
- Univ of Hawai'i at Hilo, Computer Science
- Univ of Hawai'i at Mānoa, C-MORE
- Univ of Hawai'I Mānoa, HIGP
- Univ of Hawai'i at Mānoa, Information Technology Center
- Univ of Hawai'I Mānoa, i-LAB
- Univ of Hawai'i at Mānoa, LAVA (3)
- Univ of Hawai'I at West Oahu, Academy for Creative Media
- Univ of Illinois at Chicago, ACM/LUG Student Chapters
- Univ of Illinois at Chicago, Communications
- Univ of Illinois at Chicago, EVL (5)
- Univ of Illinois at Chicago, Eng Maker Space
- Univ of Illinois at Chicago, Ophthalmology
- Univ of Illinois at Chicago, Pathology (2)
- Univ of Illinois at Urbana-Champaign, NCSA
- Univ of Maryland, Baltimore County, π^2 Immersive Hybrid Reality Lab

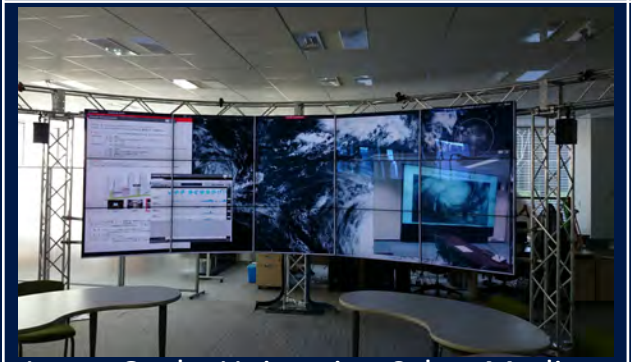
SAGE2 User Sites 2016 Examples

International

BRAZIL, Bahia School Medicine & Public Health

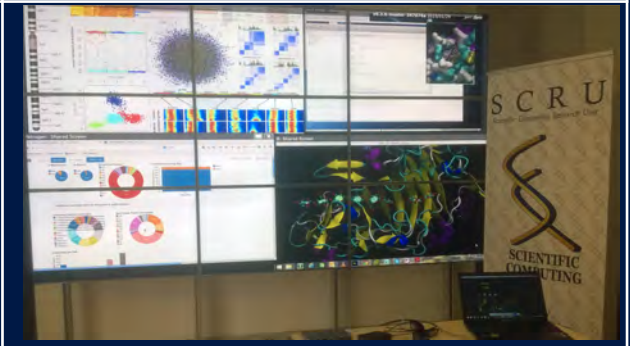
BRAZIL, Catholic University of Salvador (UCSal)

CANADA, Ciena Research Labs



JAPAN, Osaka University, Cyber Media Center

NETHERLANDS, Air France-KLM, CIO Group Tech Office

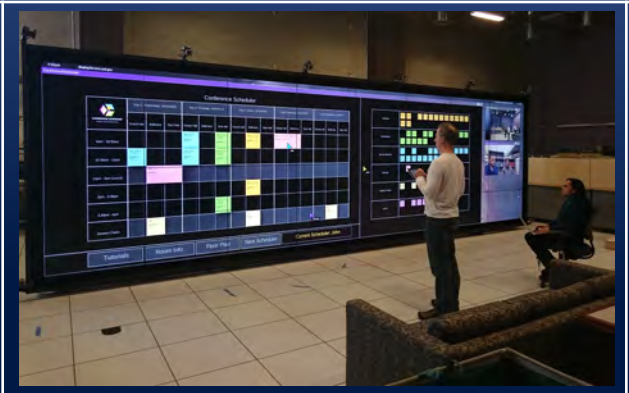


SOUTH AFRICA, Univ. Cape Town, Informatics and Visualisation Laboratory

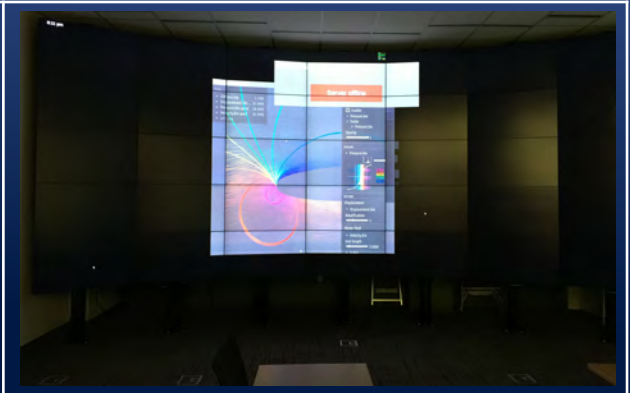
SAGE2 User Sites 2016 Examples

National

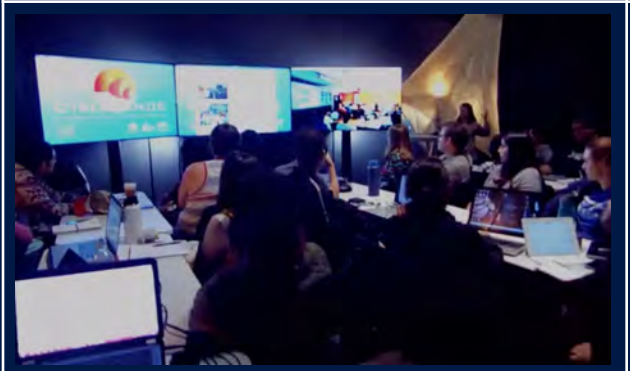
USA, Adler Planetarium



USA, Argonne National Lab, ALCF

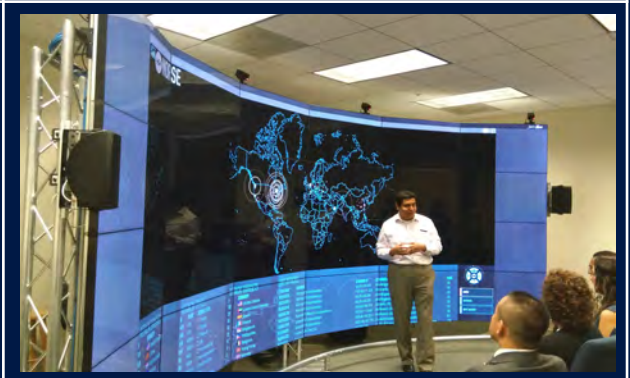


USA, Stanford University, HIVE



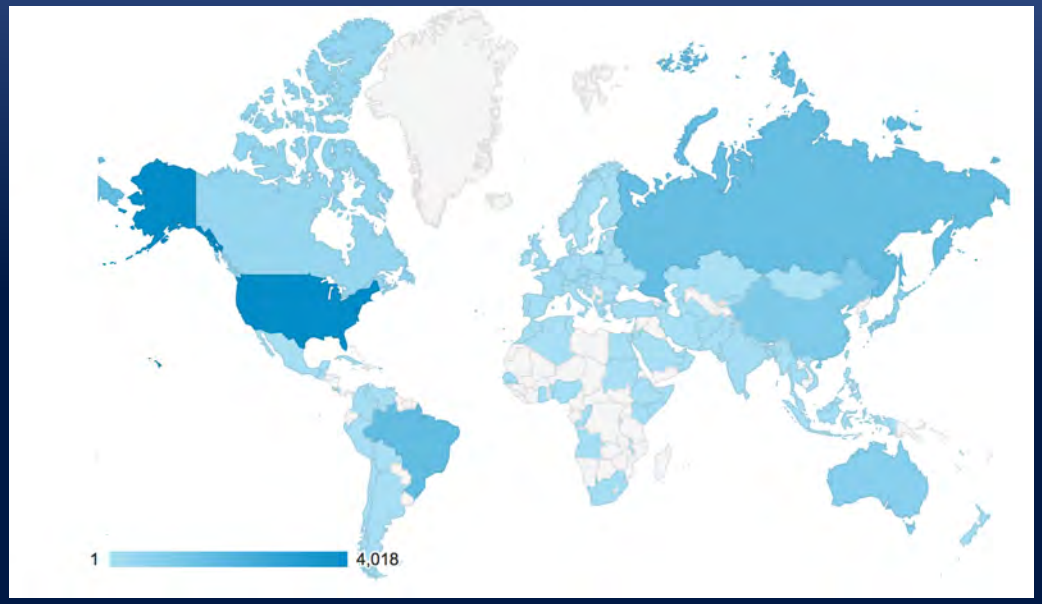
USA, University of Hawai‘i at Hilo, ‘Imiloa Astronomy

USA, University of Hawai‘i at Mānoa, Information Technology Center



USA, University of Maryland, Baltimore County, π^2 Immersive Hybrid Reality Lab

SAGE2 Global Community 2015-16



	Country	Sessions	Sessions
		13,225 % of Total: 100.00% (13,225)	13,225 % of Total: 100.00% (13,225)
1.	United States	4,018	30.38%
2.	Brazil	1,724	13.04%
3.	Russia	1,600	12.10%
4.	China	1,016	7.68%
5.	Australia	773	5.84%
6.	Japan	662	5.01%
7.	Canada	464	3.51%
8.	Czech Republic	423	3.20%
9.	France	202	1.53%
10.	Netherlands	200	1.51%

- *sagecommons.org*
- ~ 4,000 page views per month
- 7,000 users
- USA, Russia, Brazil, China, Australia, Japan, Canada, Czech, …

SAGE2 User Community 2016

- From November 2015
  - **v1.0.0-Koolau: 1,949 binary downloads**
  - Not counting sources download
- 36 registered developers
  - https://bitbucket.org/sage2/sage2
  - + 12 outside 'followers'
- 238 forum members
  - https://groups.google.com/forum/#!forum/sage2
  - ~ 50 posts per month (up to 120 last September)

Use Cases

Distributed Data Visualization Class

- Class between ‘Imiloa Astronomy Center at University of Hawai‘i at Hilo and LAVA at University of Hawai‘i at Mānoa
- Faculty from Marine Science, Computer Science, and Art and Creative Media

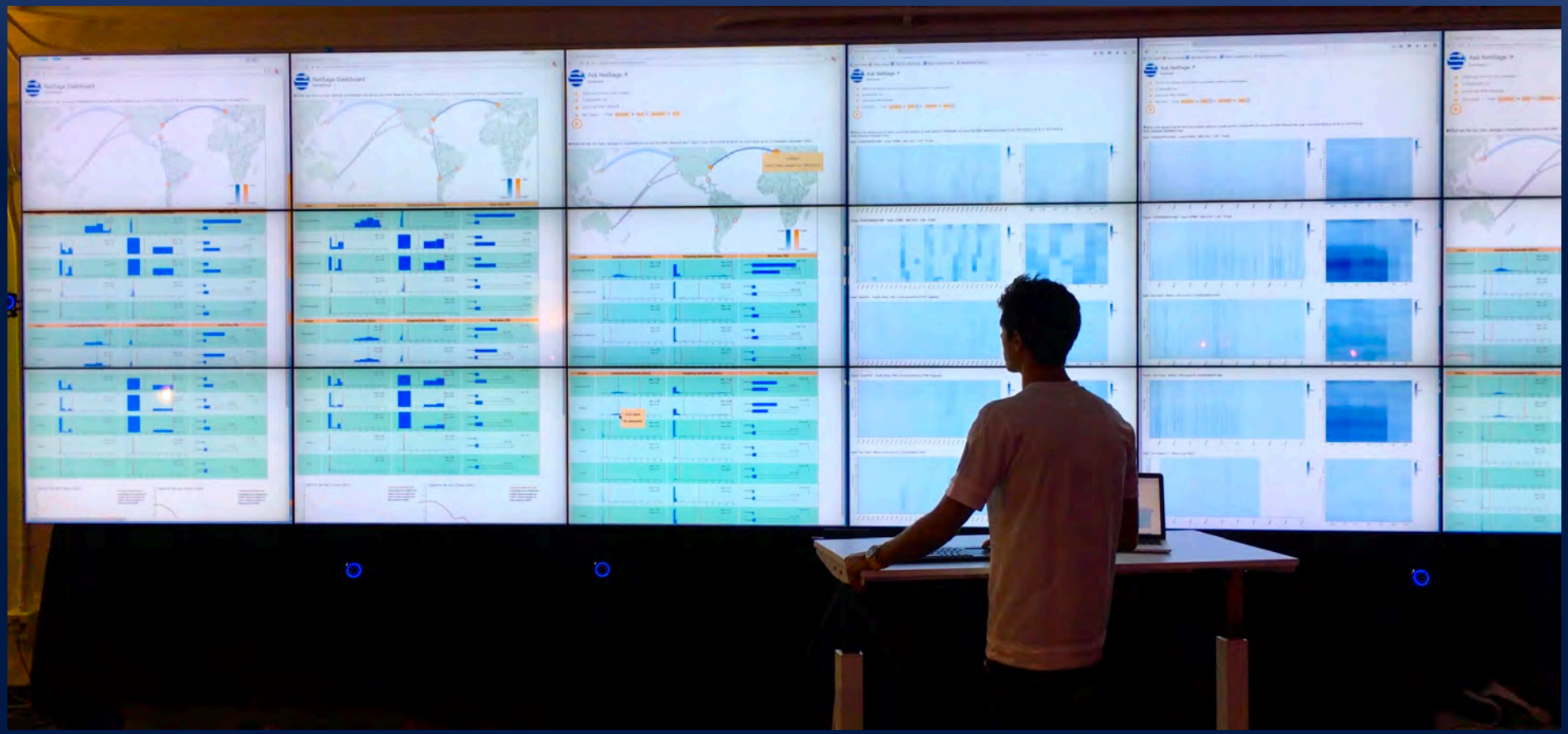
Kamehameha School:
Native Hawaiian pre-college school

NASA-funded SIMPLE Project

Sub-ice Investigation of Marine and Planetary-analog Ecosystems

SIMPLE is a collaboration of Georgia Tech, University of Illinois at Chicago, Louisiana State University, University of Texas, Stone Aerospace, Moss Landing Marine Laboratory and the University of Nebraska, Lincoln. http://schmidt.eas.gatech.edu/simple/

NetSage



http://www.netsage.global

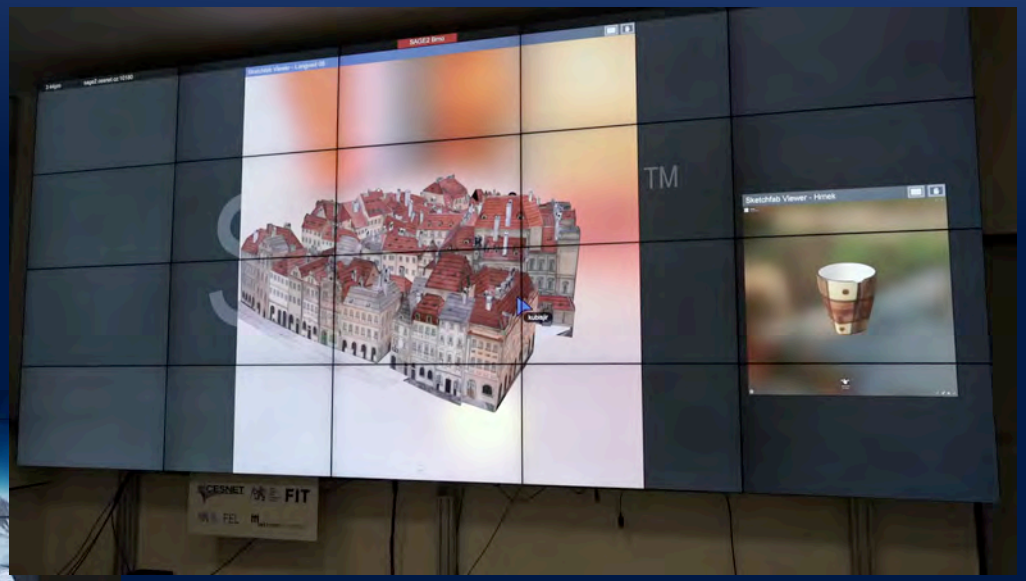
https://youtu.be/Bip-5t-KSLU

CESNET

Sketchfab Model Viewer and Gigapixel Viewer

Jiri Kubista
Sven Ubik

Sketchfab Viewer

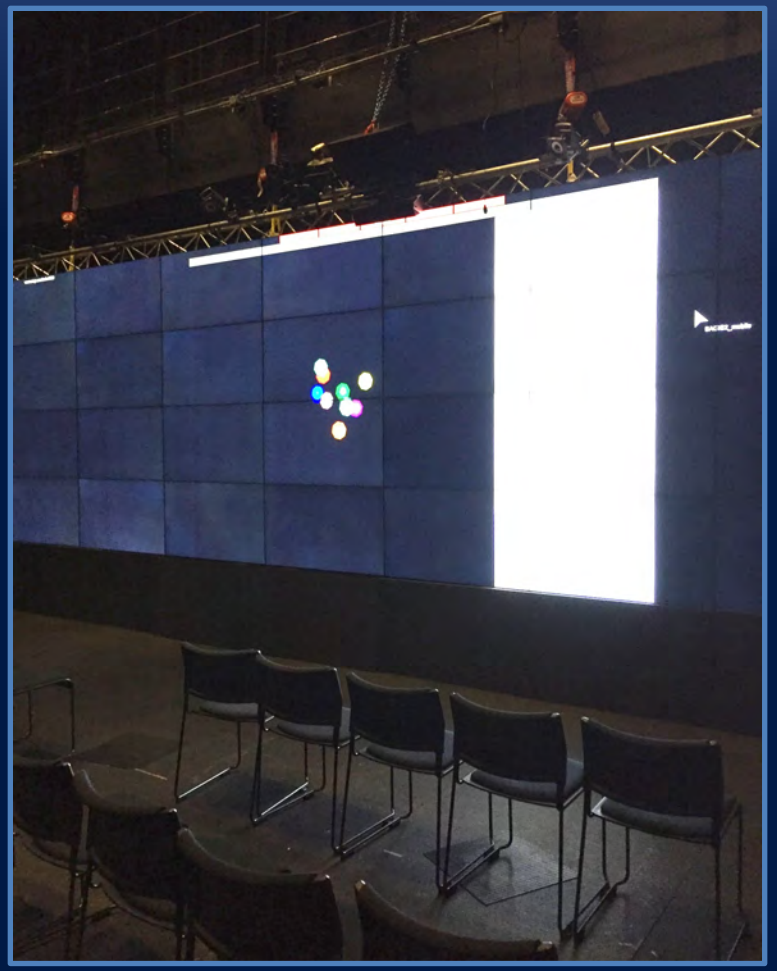


Deep Viewer + Leap Motion Controller

Emperor at UCSD/Calit2

Yoshiki Vazquez-Baeza

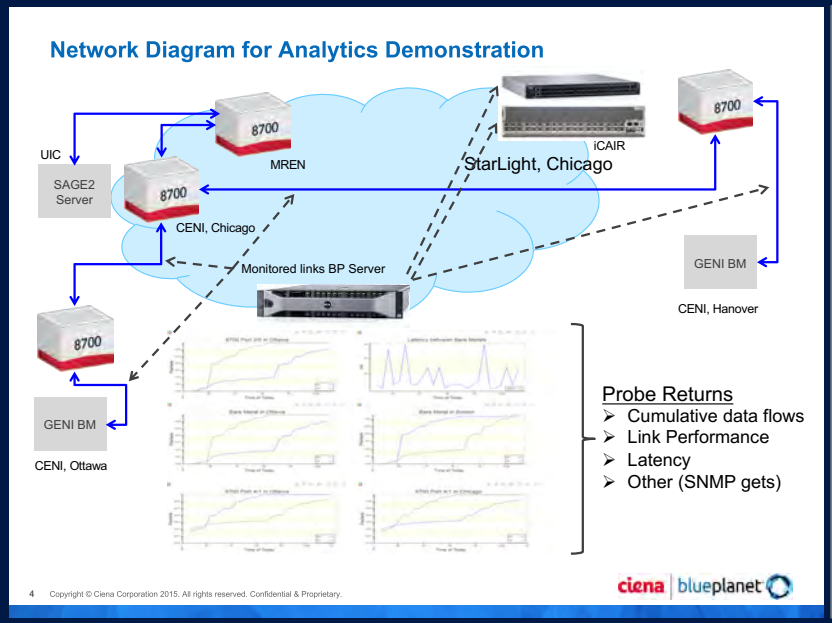
- Emperor is an interactive tool for the analysis, visualization and understanding of high throughput microbial ecology datasets.
- With SAGE2 we can collaboratively interrogate, and interact with the complexity characteristic of modern microbiome studies.
- Emperor used to visualize beta-diversity plots that succinctly summarize the community structure present in samples collected for microbiome studies.

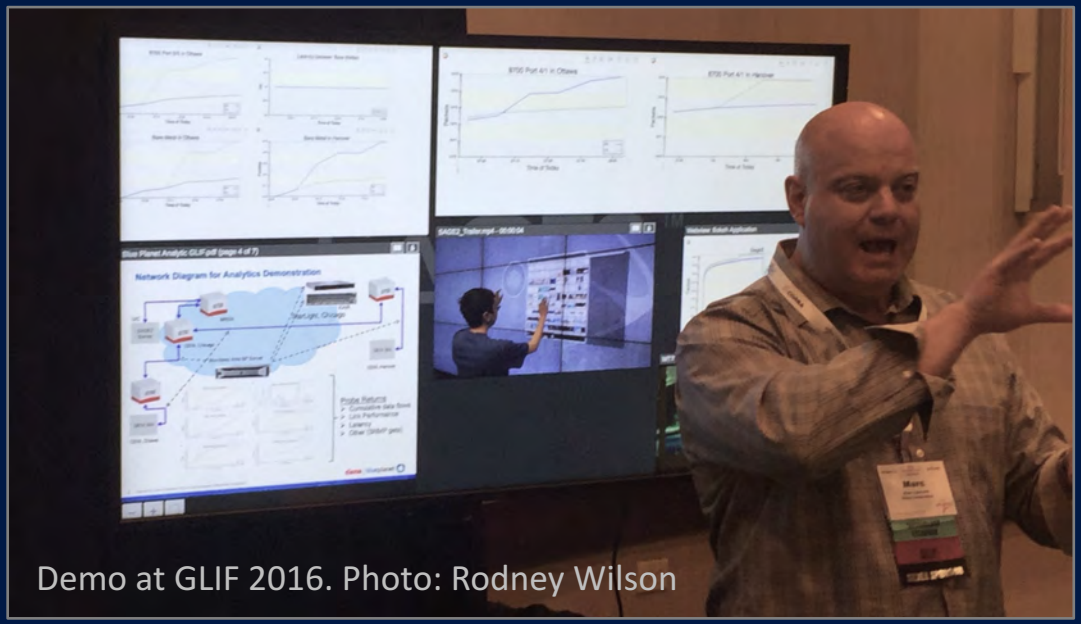


SC16 Ciena/Northwestern/EVL Demo

Demo Prototyped at GLIF 2016, Miami, in September

- A remote SAGE2 server is set up at University of Illinois at Chicago (UIC)
- A SAGE2 display monitor is set up at SC16
- A SAGE2 browser is used to access and display Ciena's Blue Planet web-based network monitoring charts from a server at Northwestern University, video streams from UIC, and PDFs and videos from a local laptop.




Demo at GLIF 2016. Photo: Rodney Wilson

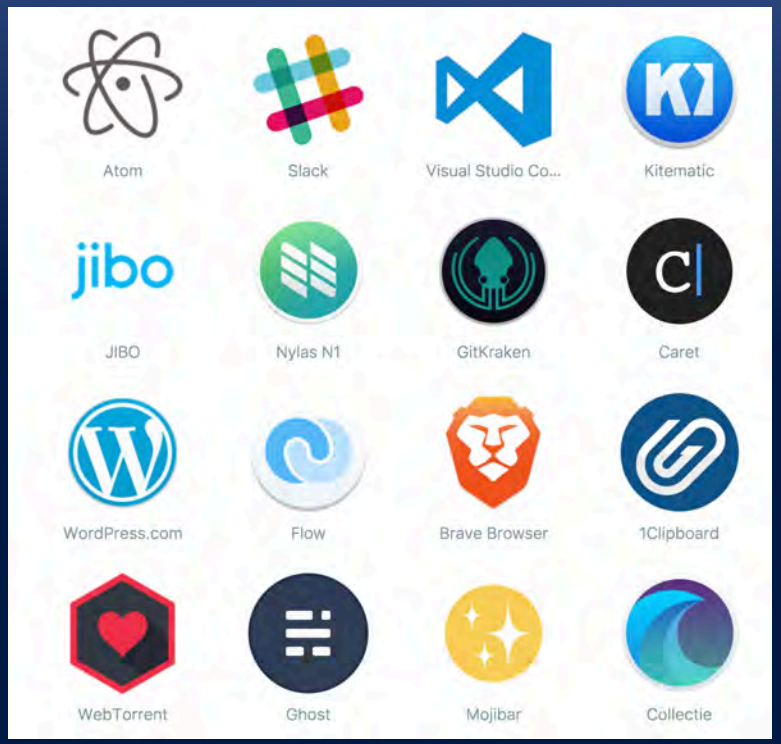
Visit Ciena Booth # 2523

What's New

SAGE2 V2
WRIGLEY FIELD
HOME OF
CHICAGO CUBS
HOME OF THE
CHICAGO CUBS
CUBS TIME 8:23
Wrigley
NEW
Available Now!

Electron technology

- Framework to build cross platform desktop apps with web technologies, using JavaScript, HTML, and CSS
- Combining **Chromium** and **Node.js** into a single runtime and apps can be packaged for **Mac, Windows, and Linux**
- Uses the rendering library from Chromium
- maintained by GitHub, open source



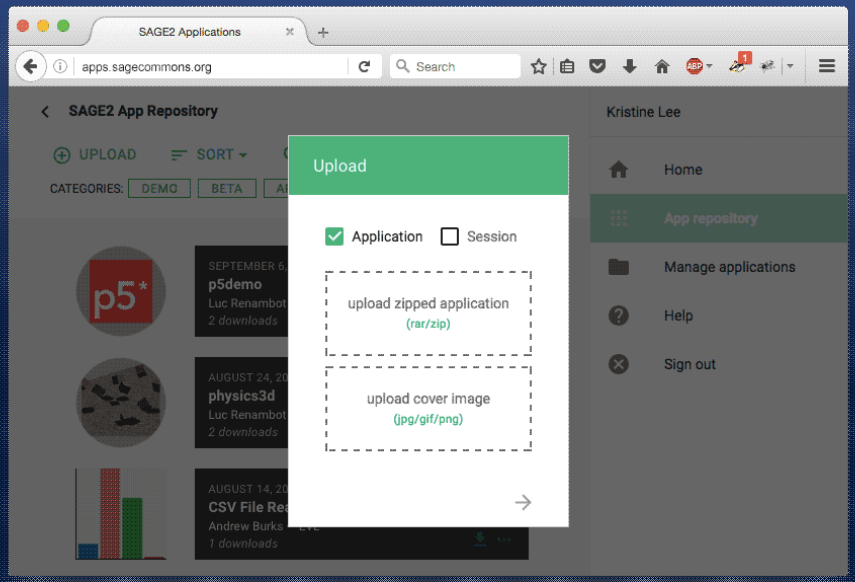
Electron capabilities

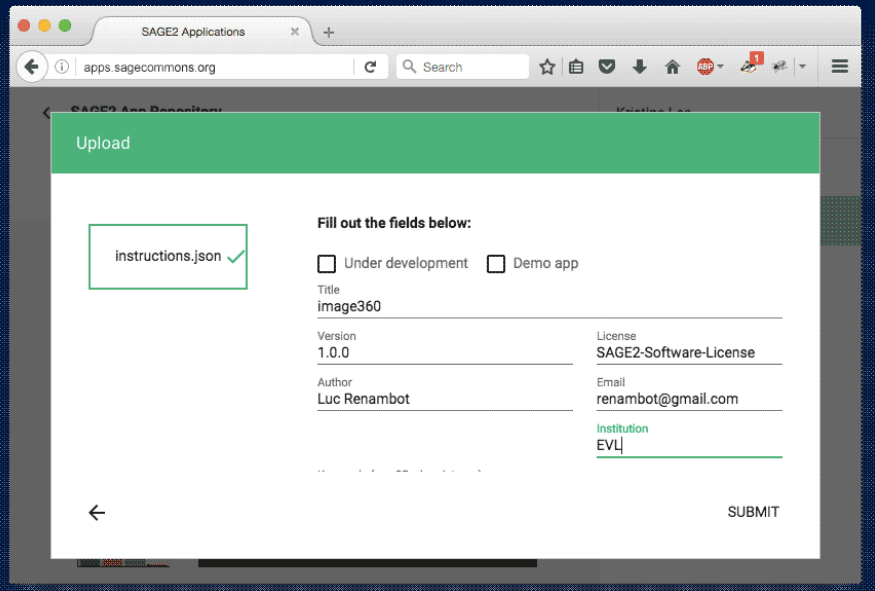
- Webview
  - Can create independent web windows easily
  - Views can be controlled by parent process
- Independent of Chrome installation
  - Packaged in the SAGE2 installer
  - No need for Chrome on the display machines
- Easier to control
  - Window position and size
  - Security

What the Transition to Electron Enabled

App Store

- Place for developers to share applications
- **apps.sagecommons.org**
- Login with Google
  - Open to all
- Zip and drag-drop
  - Manage your apps
- Monetization ?

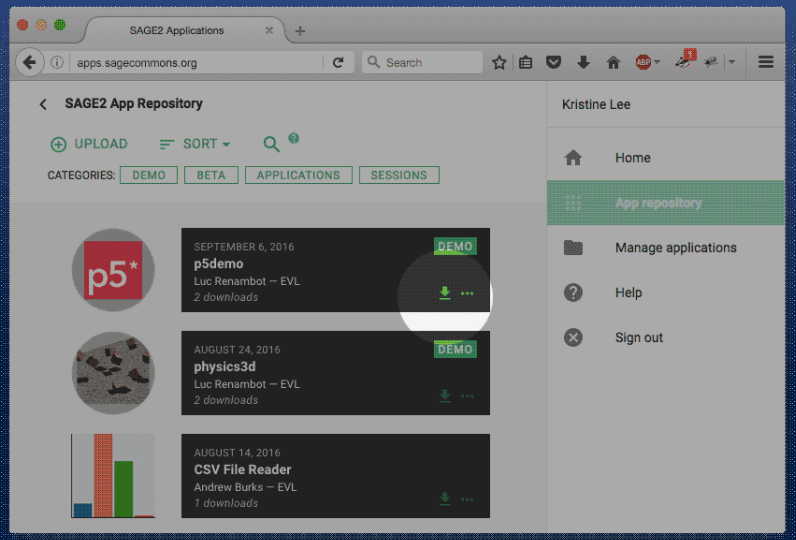


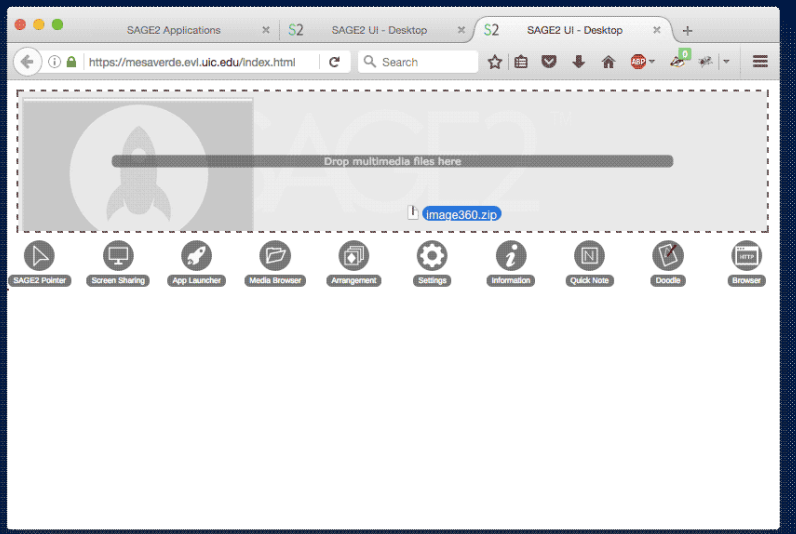


SAGE BOF 2016

App Store

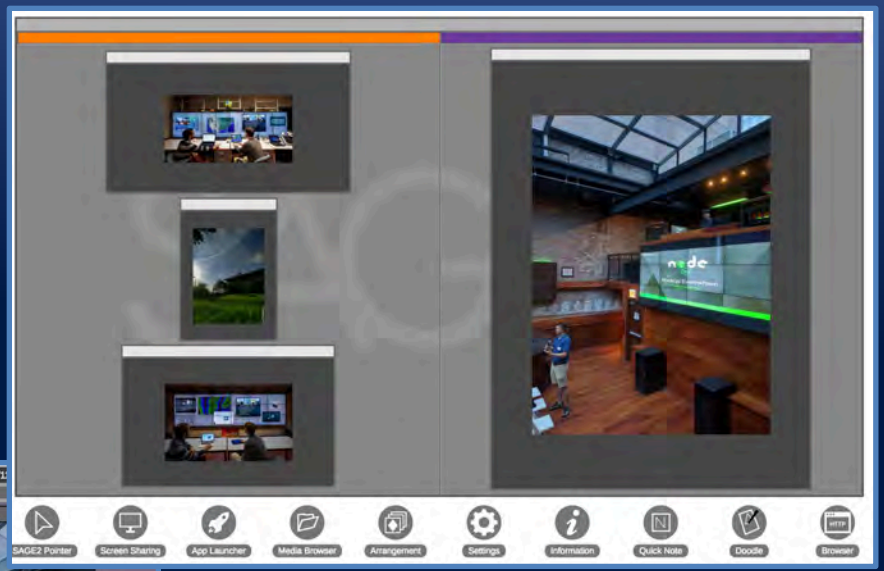
- Easy to use for end-users
- Search box
  - Keywords
  - Tutorials / Samples
- Click to download
  - Get a zip file
- Drop the zip onto your UI
- Application installed and usable immediately

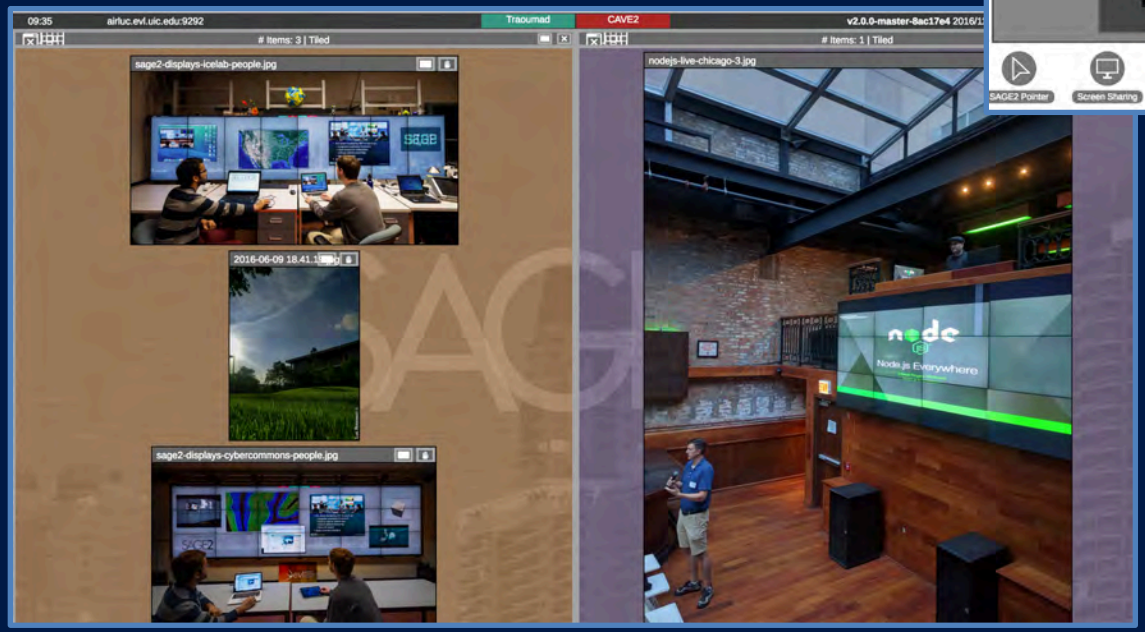




Screen Partition

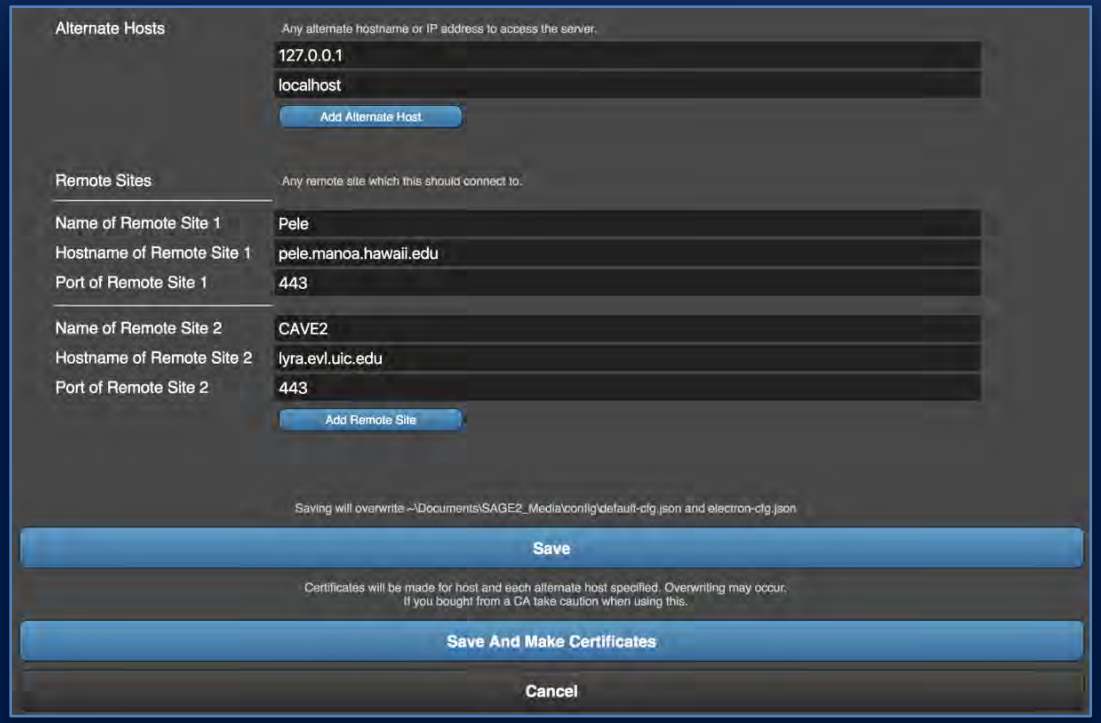
- Move and resize groups of applications, like giant poster boards





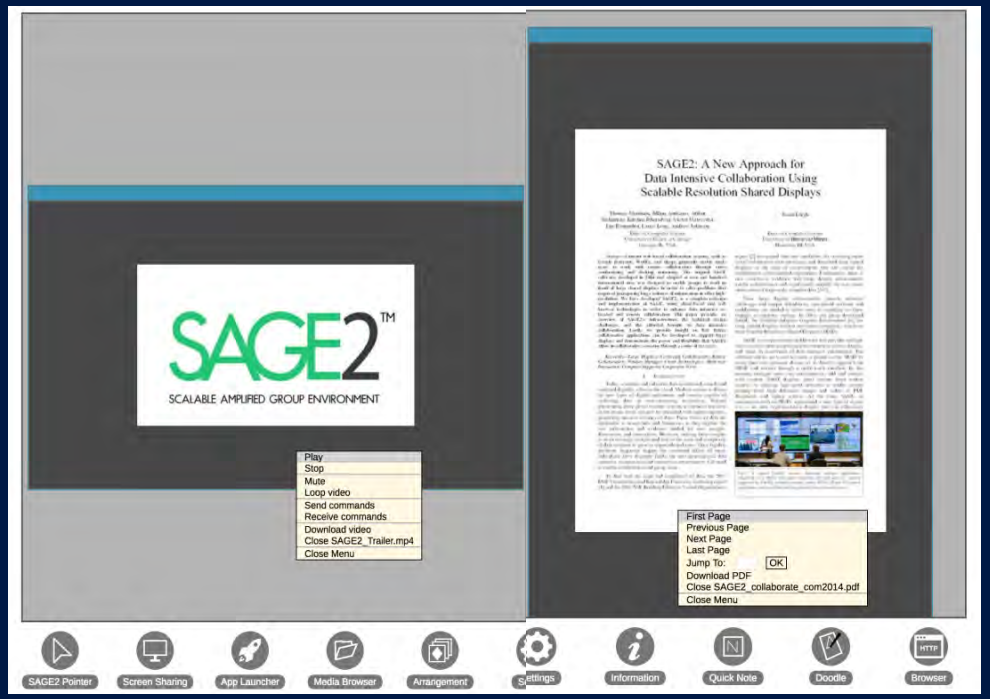
Extended Launcher

- Windows binary helper
  - To help with initial setup and editing of configuration
  - Starts **Electron** for display client and audio manager



Application Interface

- UI right-click context menu
  - app interaction without starting the pointer
- Basic key controls
  - Arrows for PDF
  - ‘p’ play movie
- Download the content directly from the wall



Automatic UI Scaling

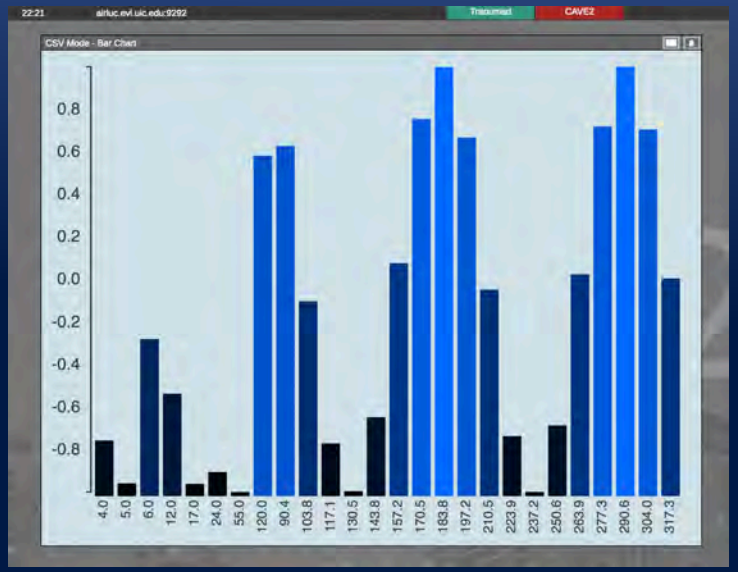
- Resizing of the UI widgets based on screen size, resolution and user distance
  - Basic
    - Screen diagonal distance, aspect ratio, and resolution
  - Advanced
    - Screen width/height, border thickness, and resolution
- Leverages screen size and resolution to optimize UI space and readability relative to typical user distance from screen

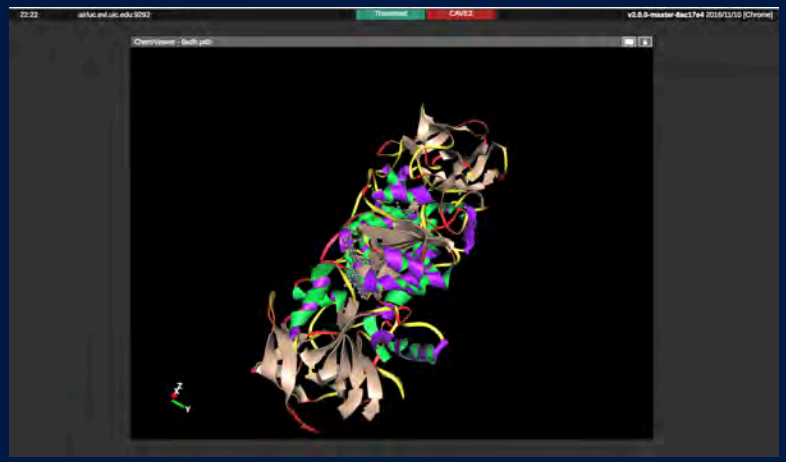
Mouse/Keyboard events

- SAGE2 pointer to mouse event conversion
- Reduce requirement of converting webpage to SAGE2 app
  - Use existing event handlers
- Automatic translation from SAGE2 to the web browser
- Works well for D3.js

New Applications

- CSV viewer
- ChemViewer
- PDF viewer
- Doodle and quick notes





Documentation

- Installation
- SAGE2 UI walkthrough
- SAGE2 API
- Screencast and how-to videos
  - Youtube channel
  - **https://www.youtube.com/channel/UCQs-iwHHGqg3xNHR6dDDi3A/**

Upgrade

- Download and unpack
  - how to upgrade
    - V1.0 to V2.0
    - copy the SSL/HTTPS keys
  - Windows non-cluster
    - Defaults to Electron for display
    - Chrome: legacy mode (without webview)
  - Linux & Mac
    - Instructions
    - Docker image

Beta Features

- Movie player
  - Synchronized group of movies
- Services
  - Image processing
    - Pyramidal processing and hosting
  - Video processing
    - MP4: 4K, HD, 720p
- Container
  - Docker
  - SAGE2 server on demand
- Jupyter integration
- ParaSAGE
- Linked visualizations

Future

- Inter-application communication
  - Group behavior
    - Play/pause several movies
  - Inter application messaging
    - Shared variables
  - Parent-child relationship
    - Hierarchy and multiple views
- SDN communication
  - Discovery, allocation, reservation of network resources for collaboration
- Portable sessions
  - Sharing sessions between sites
  - Uploadable to the app store

From the community

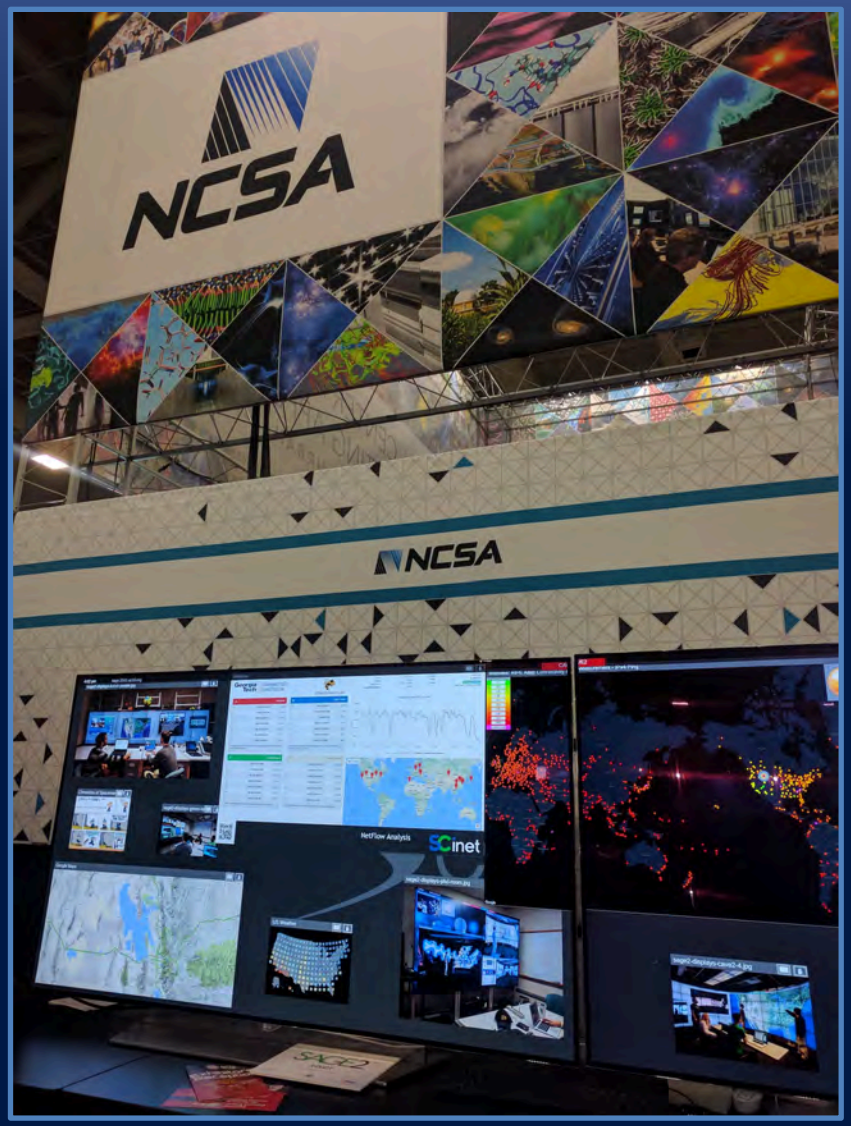
- Share your application via the app store
- Share your use cases and lessons learned
- Share pictures of your SAGE2 displays

Come see Wrigley on Showfloor

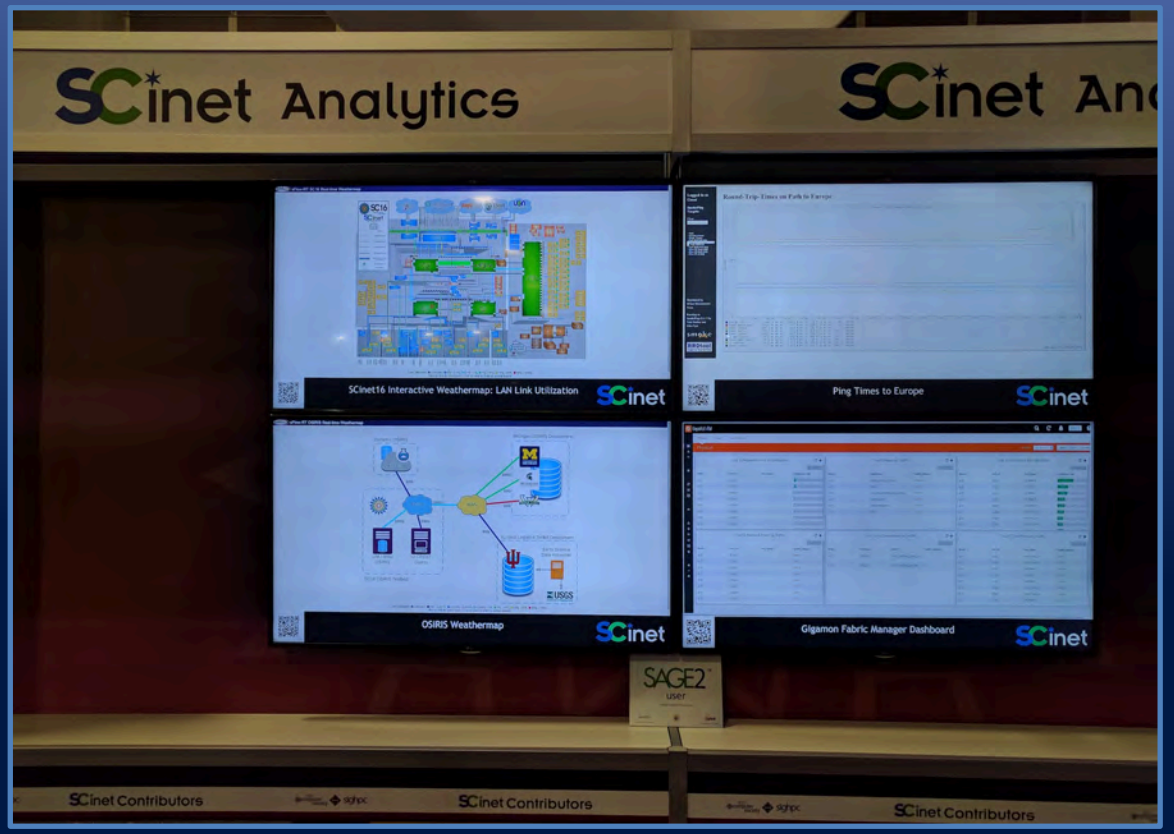
NCSA Booth 2501

2 x 65” 4K OLED Displays

Also at the Ciena booth and on SCInet displays



Ciena booth: blueplanet
Network monitoring



SCInet Analytics displays