

SAGE2<sup>TM</sup>

Birds of a Feather Meeting  
2017



Laboratory for Advanced Visualization & Applications

University of Hawai'i at Mānoa & Hilo

Jason Leigh, Dylan Kobayashi, Francis Cristobal, Jared McLean

Electronic Visualization Laboratory

University of Illinois at Chicago

Maxine Brown, Luc Renambot, Lance Long,

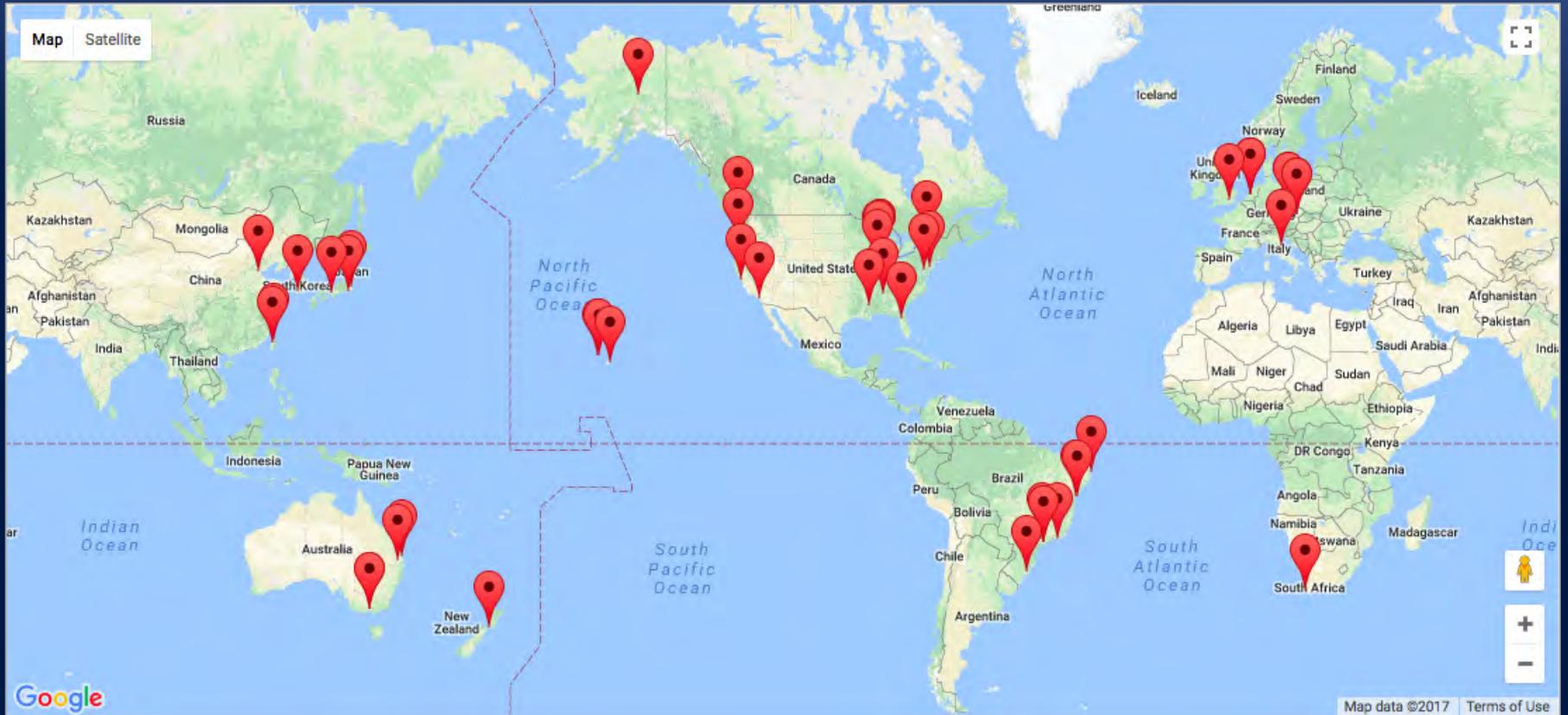
Arthur Nishimoto, Krishna Bharadwaj, Andrew Burks, Victor Mateevitsi

Kristine Lee

# SAGE2 Community Update

# SAGE2 User Community 2017

84 Sites: 42 International + 42 National



# SAGE2 User Community 2017

## 84 Sites: 42 International + 42 National

### AUSTRALIA

- Monash University
- RMIT, (VX)Lab
- University of Sunshine Coast (3)
- University Southern Queensland
- University of Technology Sydney

### BRAZIL

- Bahia School Medicine & Public Health
- Catholic University of Salvador
- Federal University Paraíba, LAViD
- Federal Univ. Rio Grande do Sul
- 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

### CHINA

- Tianjin University of Technology

### CZECH REPUBLIC

- CESNET and Czech Technical University, SAGElab
- CESNET, Mobile SAGE
- Masaryk University, Cyber-Exercise & Research Platform Proj.
- Masaryk University, Lab of Adv. Networking Technologies (2)
- Mavenir, Network Ops Center

### ITALY and SWITZERLAND

- University Urbino and ETH Zürich

### JAPAN

- National Institute of Advanced Industrial Science & Technology (2)
- NTT Network Innovation Labs
- Osaka Univ., Cyber Media Center

### KOREA

- Gwangju Institute of Science & Tech

### NETHERLANDS

- Air France-KLM, CIO Tech Office
- SURFsara, Collaboratorium
- University of Amsterdam, SNE

### NEW ZEALAND

- REANNZ

### SOUTH AFRICA

- University of Cape Town, Informatics and Visualisation Lab

### TAIWAN

- National Center for High-performance Computing
- National Chung Hsing University

### UNITED KINGDOM

- Imperial College London

### UNITED STATES

- Adler Planetarium
- Argonne National Laboratory, ALCF
- Caterpillar Inc.
- Catherine Cook School
- Chaminade University of Honolulu
- Digital Manufacturing and Design Innovation Institute (DMDII)
- Hawaii State Energy Office
- Jackson State University, ECE
- Kamehameha School
- NASA Marshall Space Center, SPoRT
- Northwestern University, iCAIR
- Stanford University, HIVE
- University of Alaska Fairbanks, DTN
- Univ. of Calif, San Diego, Calit2-QI
- Univ. of Florida Gainesville, ACIS
- University of Hawai'i at Hilo (3)
- Univ. of Hawai'i Mānoa, C-MORE
- University of Hawai'i Mānoa, HIGP
- University of Hawai'i at Mānoa, Information Technology Center
- University of Hawai'i Mānoa, i-LAB
- Univ. of Hawai'i at Mānoa, LAVA (3)
- University of Hawai'i at West Oahu, Academy for Creative Media
- University of Illinois Chicago, ACM/LUG Student Chapters
- University of Illinois Chicago, Comm.
- Univ. of Illinois Chicago, EVL (5)
- University of Illinois Chicago, Maker Space
- University of Illinois at Chicago, Innovation Center
- Univ. Illinois Chicago, Ophthalmology
- Univ. Illinois Chicago, Pathology (2)
- Univ. Illinois Urbana-Champaign, NCSA
- University of Maryland, Baltimore County, ARC
- University of Oregon
- Univ. of Pennsylvania, Idea Factory

# SAGE2 User Sites 2017 Examples International



AUSTRALIA, Monash Univ.,  
Monash Immersive  
Visualisation Platform



CHINA, Tianjin University of  
Technology



JAPAN, National Institute of  
Advanced Industrial Science  
and Technology (AIST)



TAIWAN, National Chung Hsing  
University

# SAGE2 User Sites 2017 Examples

## National



USA, Caterpillar Inc.



USA, Univ. Alaska Fairbanks,  
Decision Theater North



USA, University of Florida  
Gainesville, ACIS



USA, University of Hawai'i at  
Hilo, Mookini Library



USA, Univ. of Hawai'i Mānoa,  
Information Technology Center  
**SAGE BOF 2017**



USA, University of Illinois  
at Chicago, Innovation  
Center



USA, Univ. Oregon, Allan  
Price Science Commons &  
Research Library



USA, Univ. Pennsylvania,  
Biomedical Informatics, Idea  
Factory  
[www.sagecommons.org](http://www.sagecommons.org)

# 2017 Survey Statistics

- 67% educational institutions, ~10% national labs, ~10% companies
- 40% of organizations have more than 1 wall
- Evenly spread between Windows & Linux
- Over 55% use 1 PC
- Main uses are for lecturing, presentations, holding meetings
- Favorite Features: Ability to drag content from laptop to wall, desktop sharing, collaborative interaction, ease of deployment, multiple pointers, web-based, remote interaction, ability to create custom 3D (WebGL) applications

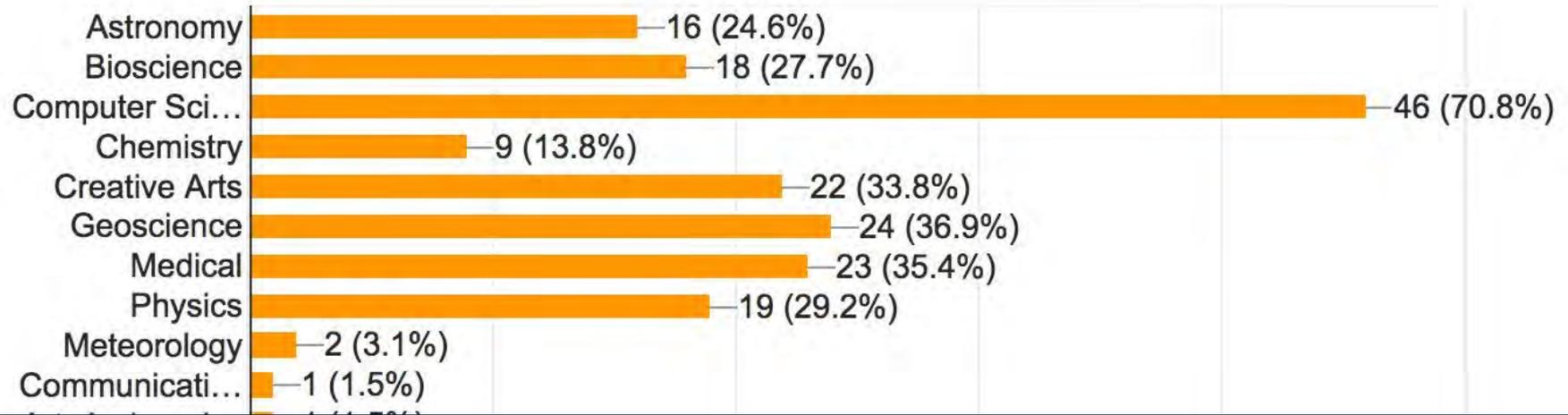
For more survey results: <http://bit.ly/2z2vAYg>

# Type of Content

## What type of content is displayed on your wall?

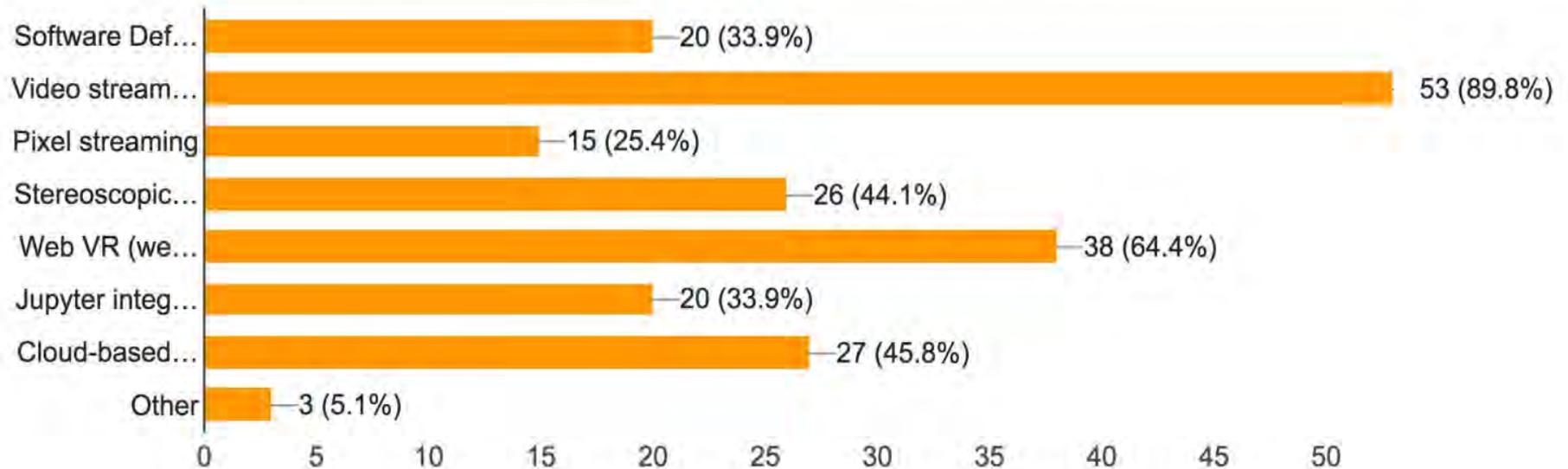


65 responses



# Desired Future Features

Are there new SAGE2 capabilities you would like to see? (59 responses)



# Web Apps Survey

<http://sage2.sagecommons.org/SAGE2-Apps-edited.htm>

Agricultural Research Service, AgroClimate, Appear.in, ArcGIS open data portal, Arctic DEM Explorer (ArcGIS), AWWapp, Bio.js, BoxDICOM, Canva, ChartAccent, Chicago Data Portal, Circos, Cornerstone, Crime Mapping, CyberGIS, CytoScape, D3.js Snippet, Earth: Wind, Weather, Ocean map, Emperor, Epiviz, Excellence, Networks, Exoplanet Data Explorer, FleetMon, Flowing Data, Google Docs, Google Hangout, Google Public Data Explorer, Google streetview, Grafana, Institute of health metrics and evaluation, JBrowse, Jupyter, MetaViz, Nano Hub, NASA Worldwind, National Academies Press, NGL Viewer, NOAA History Hurricane Track, NORSE, Ocean Data View, Ocean Data Viewer, Open Health Imaging Foundation, Open Street Map, Papaya, Pathway diagrams, Pileup.js, Polar Geospatial Center, Potree, Protein Data Bank (PDB), PubMed, Shadertoy, ShareLaTeX, SizzLine, Skype, Slack, SlideShare, Smelly Maps, SuAVE, Terrafly, The Climate Explorer, Tinkercad, United States Census - DataViz, USGS latest earthquakes map+data, VTK.js, Weather underground, Worldwide Telescope html5 version

# SAGE2 v3 - Waipi'o



# Integration with Scientific Workflows

Jupyter

# Jupyter



Andrew Burks (UIC)

- **Jupyter** is becoming a popular data science platform
- **JupyterLab** aims to build on **Jupyter Notebooks** to provide a powerful, extendable interface
- We provide an extension to **JupyterLab** to integrate **SAGE2** into Jupyter-based data science workflows



[ <http://jupyter.org> ]



**SAGE2**<sup>TM</sup>

**Scalable Amplified Group Environment**

# User Interface Improvements

Voice Commands  
Remote Pointers

# Voice Commands

- Users can control SAGE wall and applications like Siri.
- Three types of commands:
  - Wall
    - Tile content, launch application, restore session
  - Application
    - Maximize, share, context menu entries
  - User Interface
    - Time, help



Dylan Kobayashi  
UH Manoa



**SAGE2**<sup>TM</sup>

**Scalable Amplified Group Environment**

# Remote Pointers

Improves distance collaboration by enabling remote users to simultaneously point at things in shared documents.

**SAGE2**<sup>TM</sup>

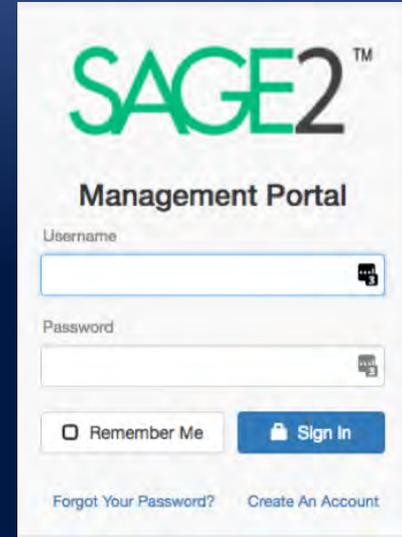
**Scalable Amplified Group Environment**

# Management Capabilities

## Cloud-based Installation Performance Monitoring

# SAGE2cloud

- Simplify SAGE2 deployment
  - One click SAGE2 server installation and configuration
  - Monthly SAGE2 version selector
  - One-click updater
  - Support for multiple users and machines
- Provide a scalable environment for deploying and managing multiple SAGE2 servers



The screenshot shows the SAGE2 Management Portal login interface. At the top, the SAGE2 logo is displayed in green and black. Below the logo, the text "Management Portal" is centered. The login form includes a "Username" field with a search icon, a "Password" field with a search icon, a "Remember Me" checkbox, and a blue "Sign In" button. At the bottom of the form, there are links for "Forgot Your Password?" and "Create An Account".

Victor Mateevitsi, UIC



# SAGE2cloud Implementation

## Single Machine



## Multiple Machines

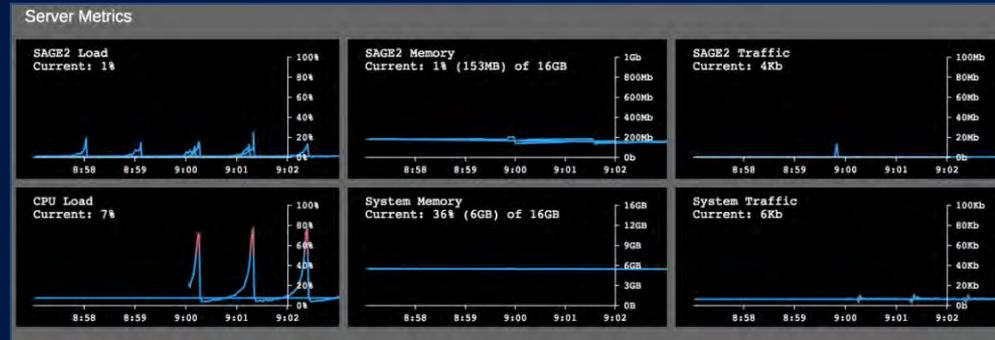
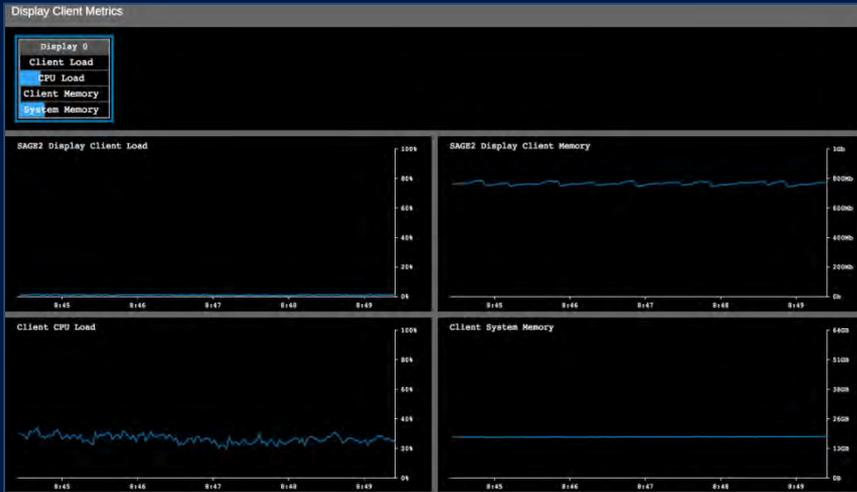


**SAGE2**<sup>TM</sup>

**Scalable Amplified Group Environment**

# SAGE2 Performance Monitoring

Performance monitoring tool to monitor the general “health” of the SAGE2 system- to quickly pinpoint the cause of bottlenecks.



Krishna Braradwha,  
UIC

# Application Development

Synchronized Movieplayer

Chemistry Viewer

Notepad

Unity3D

# Synchronized Movie Control

Control of multiple video players together to allow synchronized views of pre-rendered scientific visualizations.

Thank you National Center for High Performance Computing (Taiwan) for the idea and feedback.

**NAR Labs**

National Applied Research Laboratories

National Center for  
High-performance Computing

Dylan Kobayashi  
UH Manoa



**SAGE2**<sup>TM</sup>

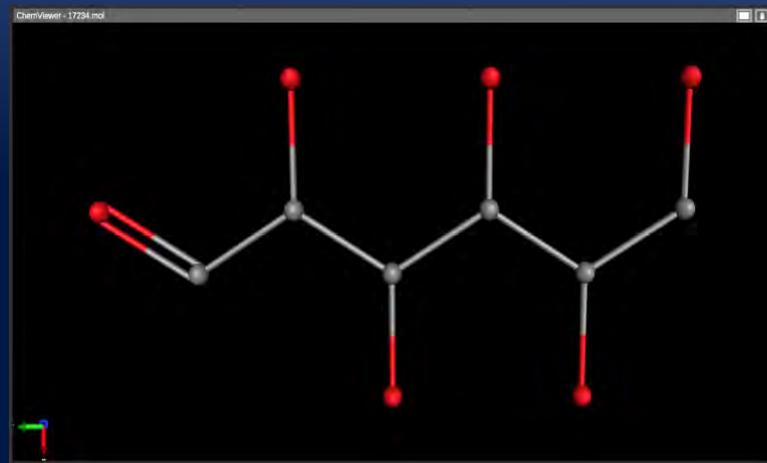
**Scalable Amplified Group Environment**

# ChemViewer Updates

Expanded to show information from

<http://www.ebi.ac.uk/chebi/>

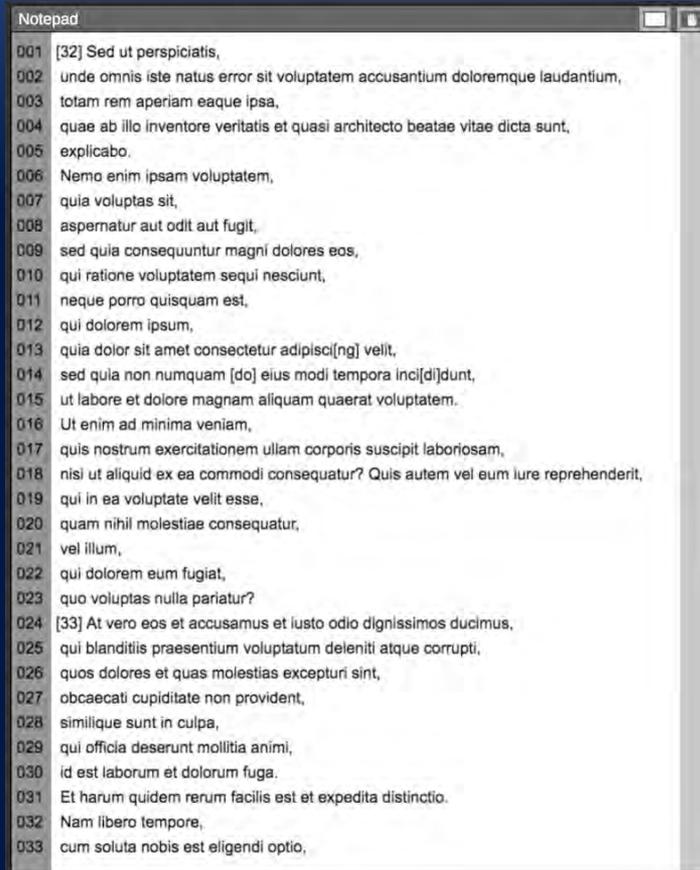
The screenshot shows the ChEBI website homepage. At the top, there is a navigation bar with links for Home, Advanced Search, Browse, Documentation, Download, Tools, About ChEBI, Contact us, and Submit. Below the navigation bar is a search bar with a search button and a dropdown menu for search filters (e.g., 'only', 'All in ChEBI'). The main content area includes sections for Documentation, Downloads, News, and Tweets by @chebi. The 'Entity of the month' section highlights Psilocybin, dated 1st November 2017, with a corresponding chemical structure image. The footer contains links for EMBL-EBI, Services, Research, Training, Industry, and About us.



Jared McLean  
UH Hilo

# Notepad Update

Now supports text scrolling



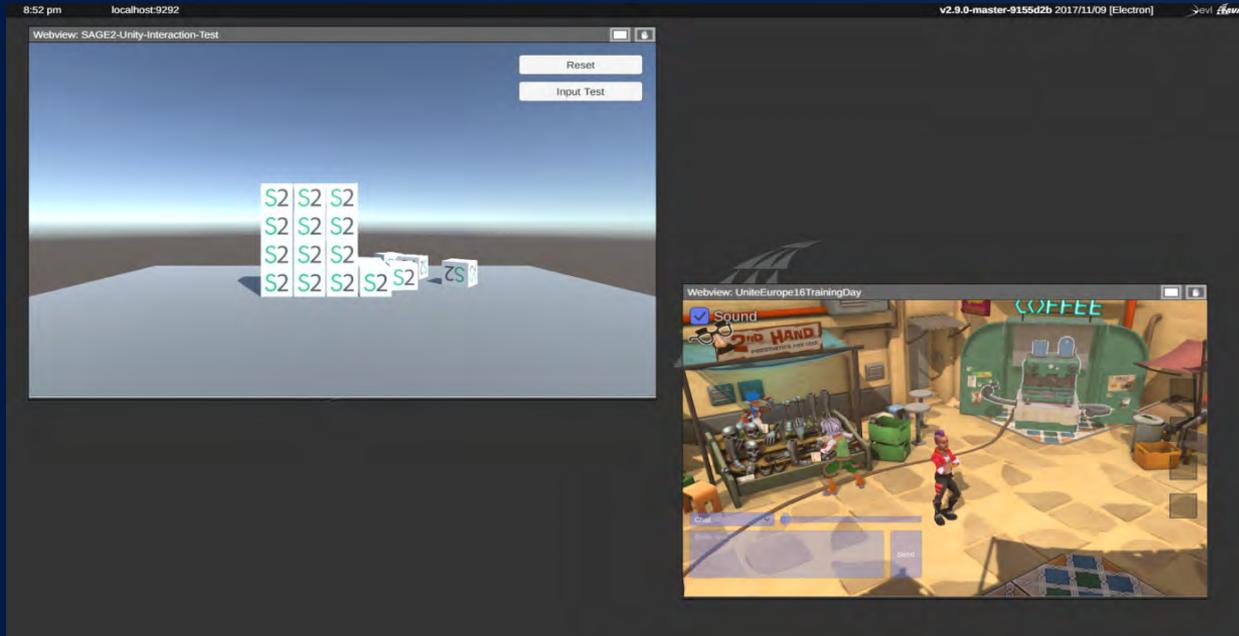
```
Notepad
001 [32] Sed ut perspiciatis,
002 unde omnis iste natus error sit voluptatem accusantium doloremque laudantium,
003 totam rem aperiam eaque ipsa,
004 quae ab illo inventore veritatis et quasi architecto beatae vitae dicta sunt,
005 explicabo.
006 Nemo enim ipsam voluptatem,
007 quia voluptas sit,
008 aspernatur aut odit aut fugit,
009 sed quia consequuntur magni dolores eos,
010 qui ratione voluptatem sequi nesciunt,
011 neque porro quisquam est,
012 qui dolorem ipsum,
013 quia dolor sit amet consectetur adipisci[ng] velit,
014 sed quia non numquam [do] eius modi tempora inci[di]dunt,
015 ut labore et dolore magnam aliquam quaerat voluptatem.
016 Ut enim ad minima veniam,
017 quis nostrum exercitationem ullam corporis suscipit laboriosam,
018 nisi ut aliquid ex ea commodi consequatur? Quis autem vel eum iure reprehenderit,
019 qui in ea voluptate velit esse,
020 quam nihil molestiae consequatur,
021 vel illum,
022 qui dolorem eum fugiat,
023 quo voluptas nulla pariatur?
024 [33] At vero eos et accusamus et iusto odio dignissimos ducimus,
025 qui blanditiis praesentium voluptatum deleniti atque corrupti,
026 quos dolores et quas molestias excepturi sint,
027 obcaecati cupiditate non provident,
028 similique sunt in culpa,
029 qui officia deserunt mollitia animi,
030 id est laborum et dolorum fuga.
031 Et harum quidem rerum facilis est et expedita distinctio.
032 Nam libero tempore,
033 cum soluta nobis est eligendi optio,
```



Jirayu Roungsuriyaviboon  
Mahidol University,  
Thailand

# Unity WebGL in SAGE2

Framework to allow developers to create Unity applications and use SAGE2 to display the application at the full resolution of the display wall



Arthur Nishimoto  
UIC

Under Development

User Access Control  
Application Data Sharing

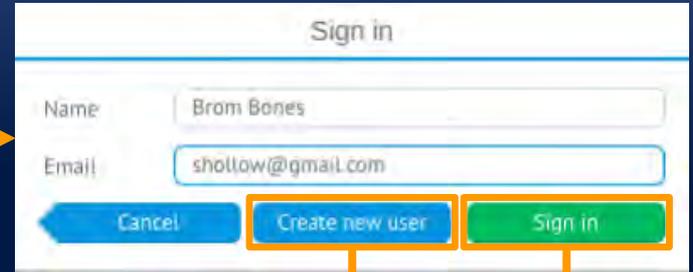
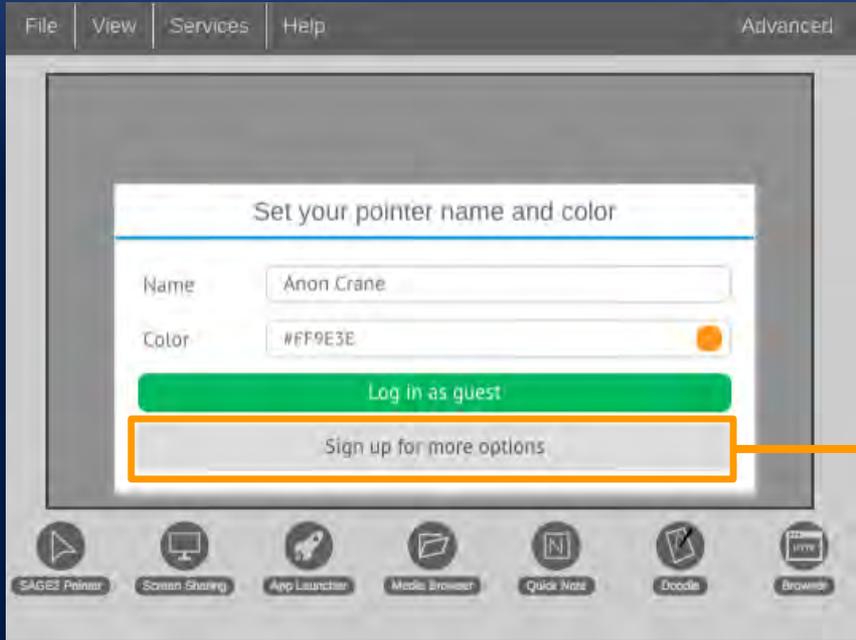
# User Access Control

- Distinguish between people using SAGE2
  - Access and authorization
  - Log activity—who did what
  - Scenarios and roles, e.g.
    - Group meeting with a leader
    - Teachers / students

Kristine Lee, UIC



# User Access Control

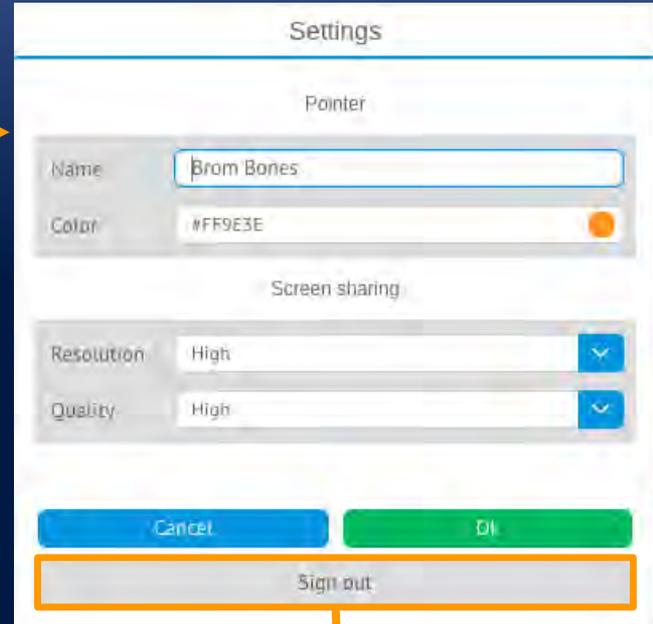
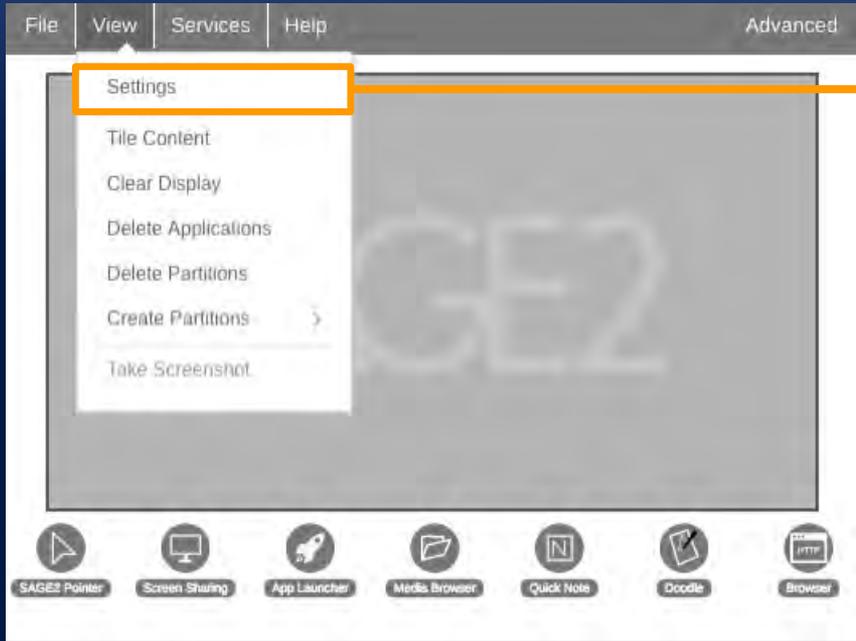


Create  
new user

Sign in  
existing  
user

Anonymous guests are prompted to log in

# User Access Control



User can also sign in/out in View > Settings

Sign out

# User Access Control



Open the User Console via the Advanced menu

The screenshot shows the User Console interface. It has two tabs: 'Users' (selected) and 'Log'. The 'Users' tab contains a table of connected users and a permissions table.

| Pointer name | User name        | Role  | IP address           |
|--------------|------------------|-------|----------------------|
| Luc          | Luc Renambot     | admin | 127.0.0.1:55153      |
| Anon Duck    |                  | guest | 127.0.0.1:55206      |
| Brom Bones   | Brom Bones       | user  | 127.0.0.1:55253      |
| klee         | Kristine         | user  | 127.0.0.1:55279      |
| Anon Walrus  |                  | guest | 131.193.76.123:55305 |
| Arthur       | Arthur Nishimoto | user  | 131.193.76.123:55307 |

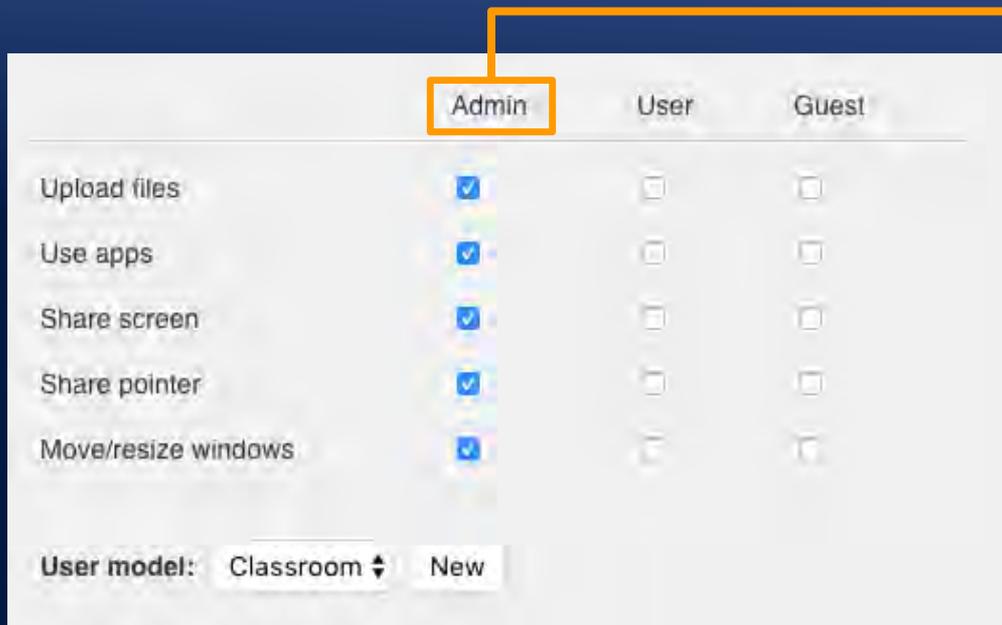
|                     | Admin                               | User                     | Guest                    |
|---------------------|-------------------------------------|--------------------------|--------------------------|
| Upload files        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Use apps            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Share screen        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Share pointer       | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Move/resize windows | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

User model: Classroom | New

See who's connected

Manage roles and permissions

# User Access Control



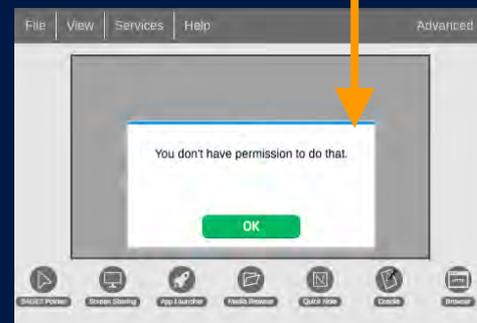
|                     | Admin                               | User                     | Guest                    |
|---------------------|-------------------------------------|--------------------------|--------------------------|
| Upload files        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Use apps            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Share screen        | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Share pointer       | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Move/resize windows | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

User model: Classroom

Example scenario: only the teacher (admin role) has permission to use the wall



| Pointer name | User name    | Role  |
|--------------|--------------|-------|
| Luc          | Luc Renambot | admin |
| Anon Duck    |              | guest |
| Brom Bones   | Brom Bones   | User  |



Actions by unauthorized users are disabled

# SAGE User Access Model

## Next Features

- Secure authentication
  - Currently using username/email as login keys
  - Integrate Passport/Express
- Authorized access to user console
- Extended role creation
  - Currently limited to admin/user/guest

# Application Data Sharing

- Data sharing was added to SAGE2 application API to allow multiple applications to work as one large application
- Also enable applications to be designed like components that other developers can utilize
- Applications are able to launch other applications
- This allows not only data passing, but window manipulation

Dylan Kobayashi (UHM),  
Jason Haga (AIST)



# SageRDI

## Sage River Disaster Information

Laboratory for Advanced Visualization & Applications  
University of Hawai'i at Mānoa

[lava.hawaii.edu](http://lava.hawaii.edu)



# SAGE2 v3 - Waipi'o

- Available now!!!!
- Download Windows binary
- Standalone binaries for Display and UI clients available
  - Windows, macOS, Linux
- Install scripts for major Linux distribution
- Docker image on Docker Hub
  - <https://hub.docker.com/r/sage2/master/>

# Documentation

<http://sage2.sagecommons.org/instructions/>

- Installation documentation
- New features in V3
- Introduction to SAGE2
- User Interface walkthrough
- SAGE2 Security
- Mouse and keyboard operations and shortcuts
- Voice commands
- Developer documentation
- SAGE2 code and API
- Command line operation

# SAGE2 @ SC17

Center for Data Intensive Science Booth 1653

AIST Booth 1211

SCinet



# For Help

- Web
  - [sagecommons.org](https://sagecommons.org)
- Google group
  - <https://groups.google.com/forum/#!forum/sage2>
- Slack
  - [sage2.slack.com](https://sage2.slack.com)



# Thank You



NSF #OAC-1441963 SAGE2  
NSF #OAC-1550126 CENTRA

NSF #OAC-1450871 StarLight SDX  
NSF #CNS-1530873 MRI CyberCANOE

