

Tracy Miranda, Kichwa Coders, NOBUGS 2016

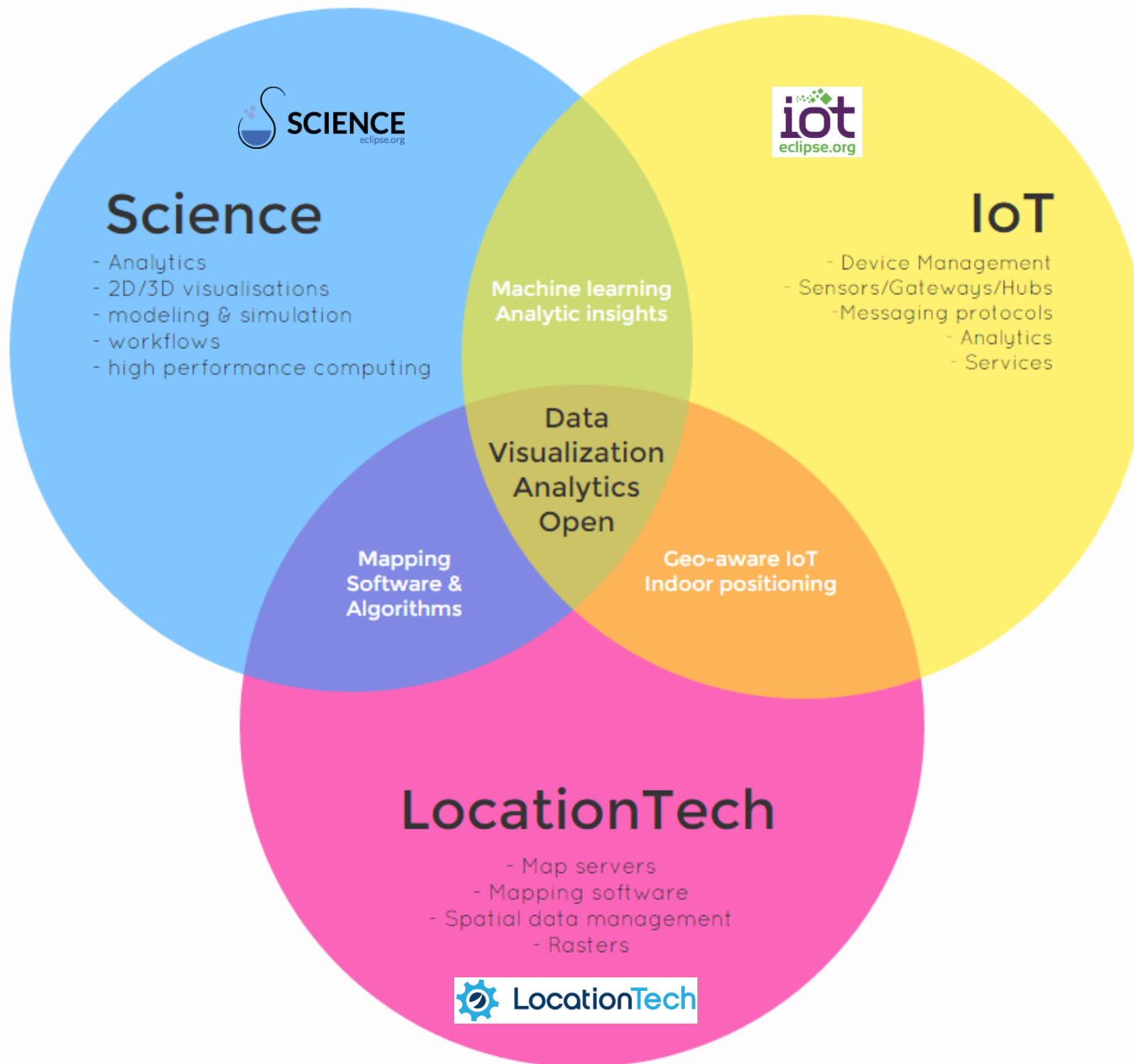
Advancing Science with Open Source Software

The Story Of Eclipse...

- Late '90s Tool Landscape
 - Microsoft vs Java
- IBM /Object Technology International (OTI)
 - Release an open source Eclipse IDE in 2001
- Eclipse Foundation created
 - EclipseCon 2004, eclipse community developed
 - 8 Strategic members, >100 other members

Eclipse Working Groups

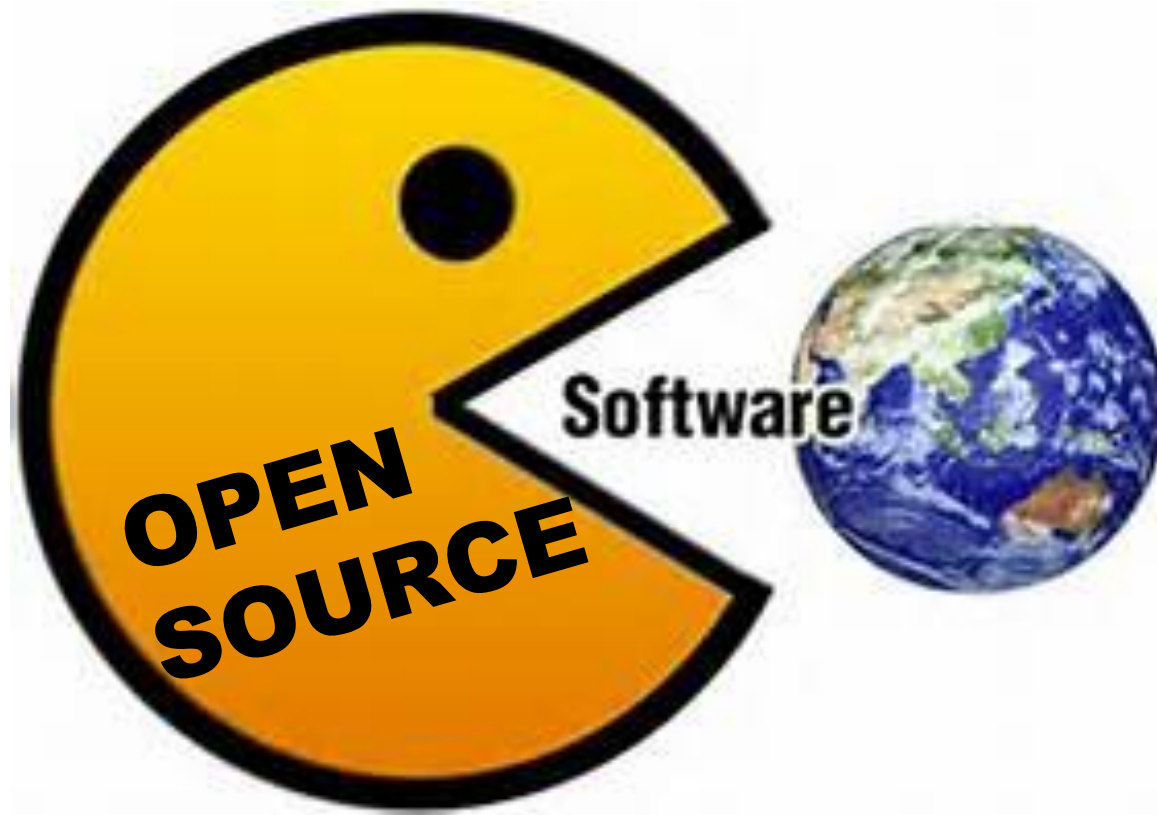




Software Is Eating The World



Open Source Has Won



Open Source Software Trends

CLOSED



INCLUSIVE

OPAQUE



TRANSPARENT

CENTRALIZED



DECENTRALIZED

TOP DOWN



BOTTOM UP

What About Science?

CLOSED



INCLUSIVE

OPAQUE



TRANSPARENT

CENTRALIZED



DECENTRALIZED

TOP DOWN



BOTTOM UP

Eclipse Working Groups



Eclipse Foundation

“Open Source Governance”

- IP Management
- Development Processes
- Licensing Model
- Forge & Build
- Community
- Member Network

Challenges for Scientific Software

- Integration
- Scaling for bigger quantities of data
- Reproducibility
- Resources

Science Working Group

Steering Committee



Participating



5 Great Scientific Workbenches

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5 Eclipse tools for processing and visualizing data

Posted 25 Apr 2016 by [Tracy Miranda](#)

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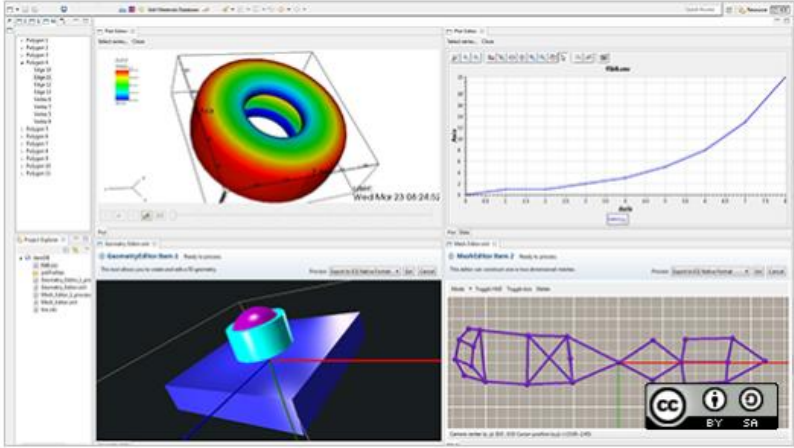


Image credits :
[UT-Battelle](#): Photo of Eclipse Advanced Visualisation Project with plots, 3D data, geometry and mesh editors.

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Tracy Miranda is a software developer and founder of Kichwa Coders, a software consultancy specializing in Eclipse tools for scientific and embedded software. Tracy has been using Eclipse since 2003 and is actively involved in the community, particularly the Eclipse Science Working Group. Tracy has a background in electronics system design. She mentors young coders at the festival of code for Young Rewired State. Follow Tracy on Twitter @tracymiranda.

[» More about me](#)

2015 AVAILABLE NOW

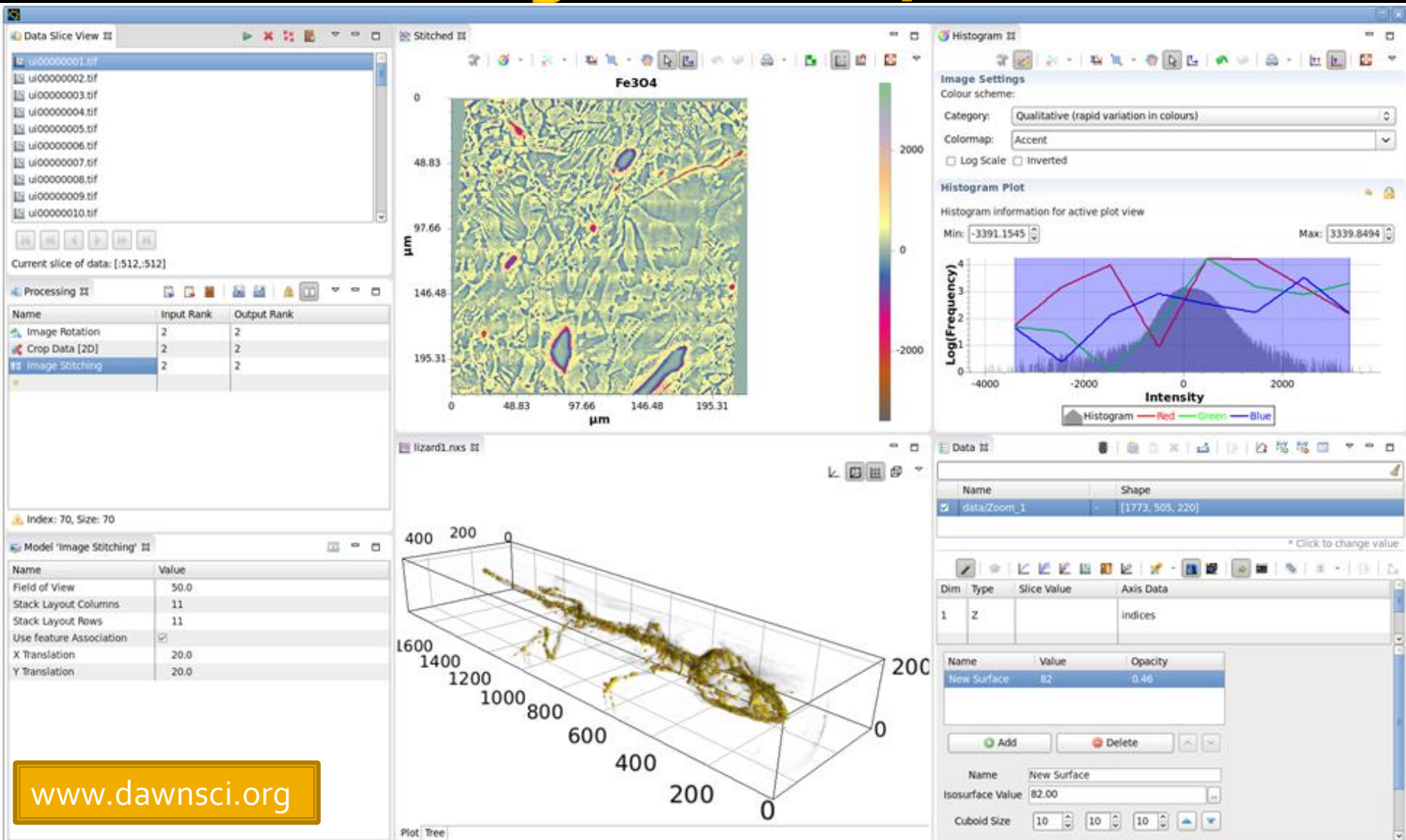
OPEN SOURCE

YEARBOOK

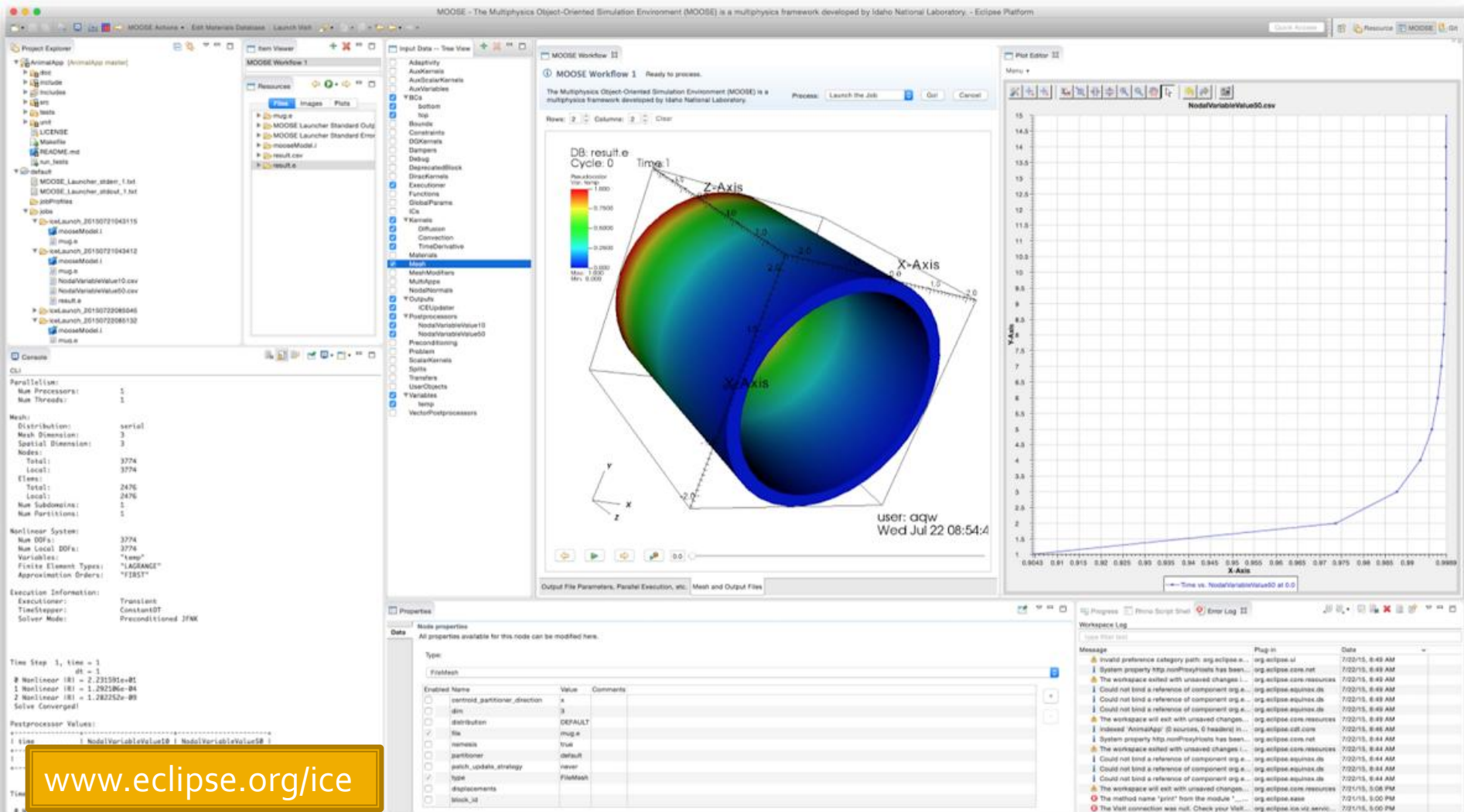


Data Analysis Workbench

- Diamond Light Source, UK



Integrated Computing Environment – Oakridge National Labs, US



Architect R IDE - Belgium

The screenshot displays the Architect R IDE interface, which is a web-based environment for running R code. The interface is divided into several panels:

- Project Explorer:** Located on the left, it shows a list of files in the project, including `between.R`, `plus.R`, `shift.R`, `transpose`, `which.fir`, `ALLS4.R`, `c.factor`, `duplicate`, `data.table.R`, `check_for_seq`, `data.table.R`, `fcst.R`, `fmelt.R`, `foverlaps.R`, and `fcst.D`. The file `duplicate.R` is currently selected.
- Code Editor:** The central panel shows the R code for the `duplicate` function. The code is as follows:

```
1 duplicated.data.table <- function(x, incomparables, fromLast, by, ...)  
2   if (!cedta()) return(NextMethod("duplicated"))  
3   if (!identical(incomparables, FALSE)) {  
4     .NotYetUsed("incomparables != FALSE")  
5   }  
6   if (nrow(x) == 0L || ncol(x) == 0L) return(logical(0))  
7   if (is.na(fromLast) || !is.logical(fromLast))  
8     query <- .duplicated.helper(x, by)  
9   # fix for bug #5405 - unique on null data table  
10  # however, in this case we can bypass having to  
11  if (!length(query$by)) return(logical(0))
```
- Console:** Located at the bottom center, it shows the output of the R code. The output includes the AIC value (27.032), the number of Fisher Scoring iterations (3), and the results of the `glm` function. The console also shows the command `glm> ## Not run:` and the command `glm> ##D ## for an example of the use of`. The console output is as follows:

```
AIC: 27.032  
  
Number of Fisher Scoring iterations: 3  
  
glm> ## Not run:  
glm> ##D ## for an example of the use of  
glm> ##D demo(glm.vr)  
glm> ## End(Not run)  
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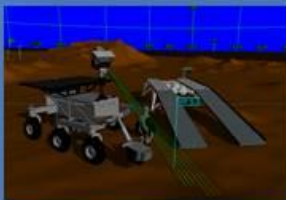

Apogy – Canadian Space Agency



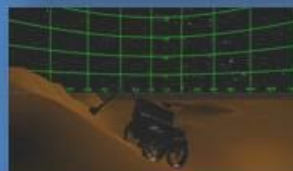
MULTI-MISSION OPERATIONS & PLANNING SOFTWARE FRAMEWORK



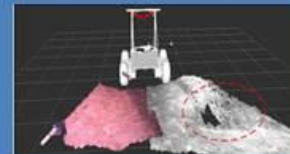
Systems



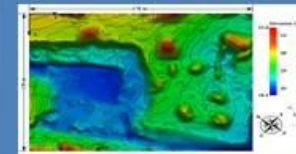
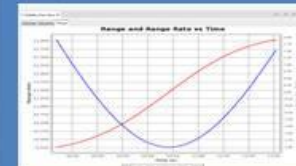
Environment



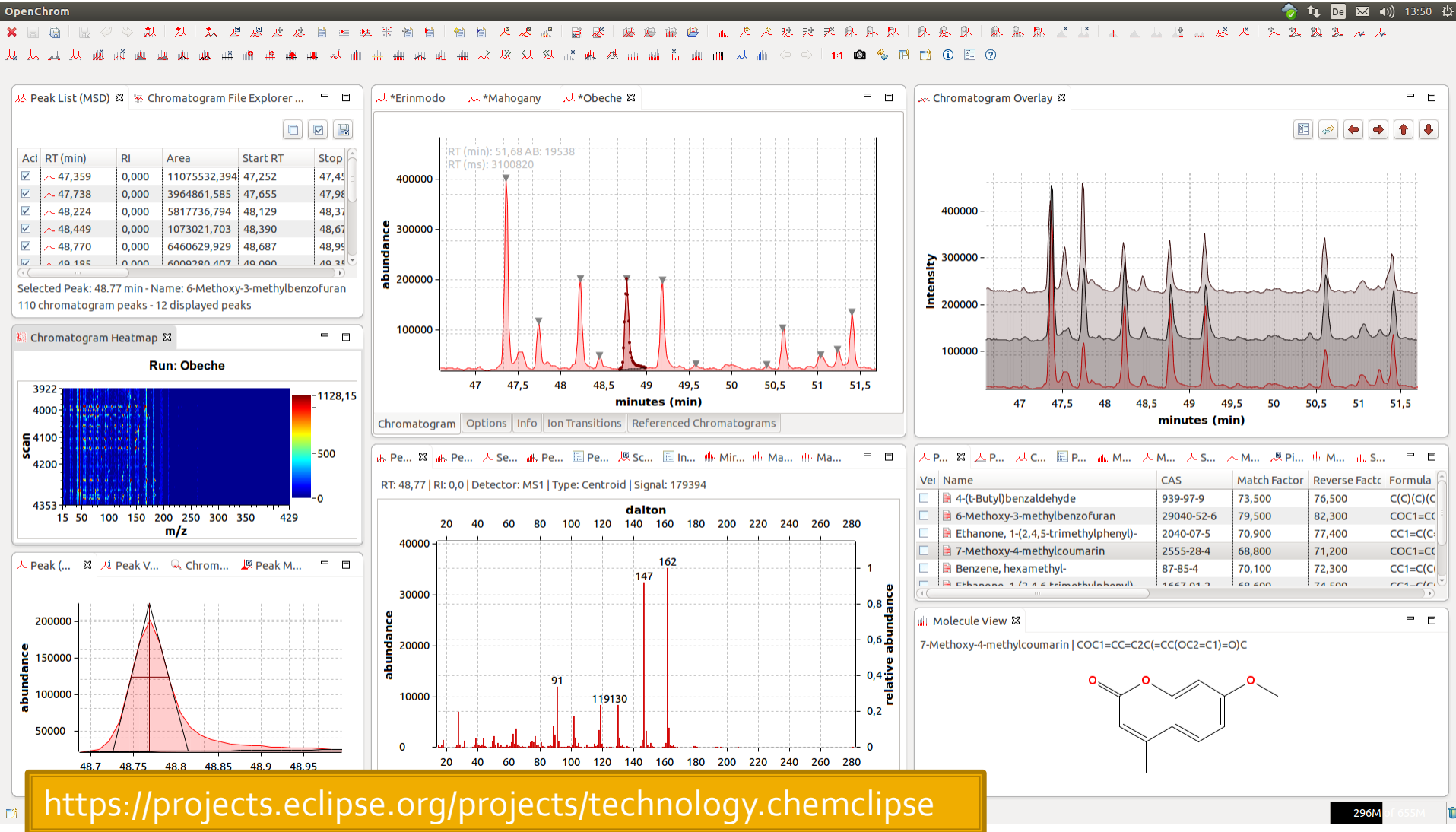
Operations



Data



ChemClipse



Reusable Modular Building Blocks

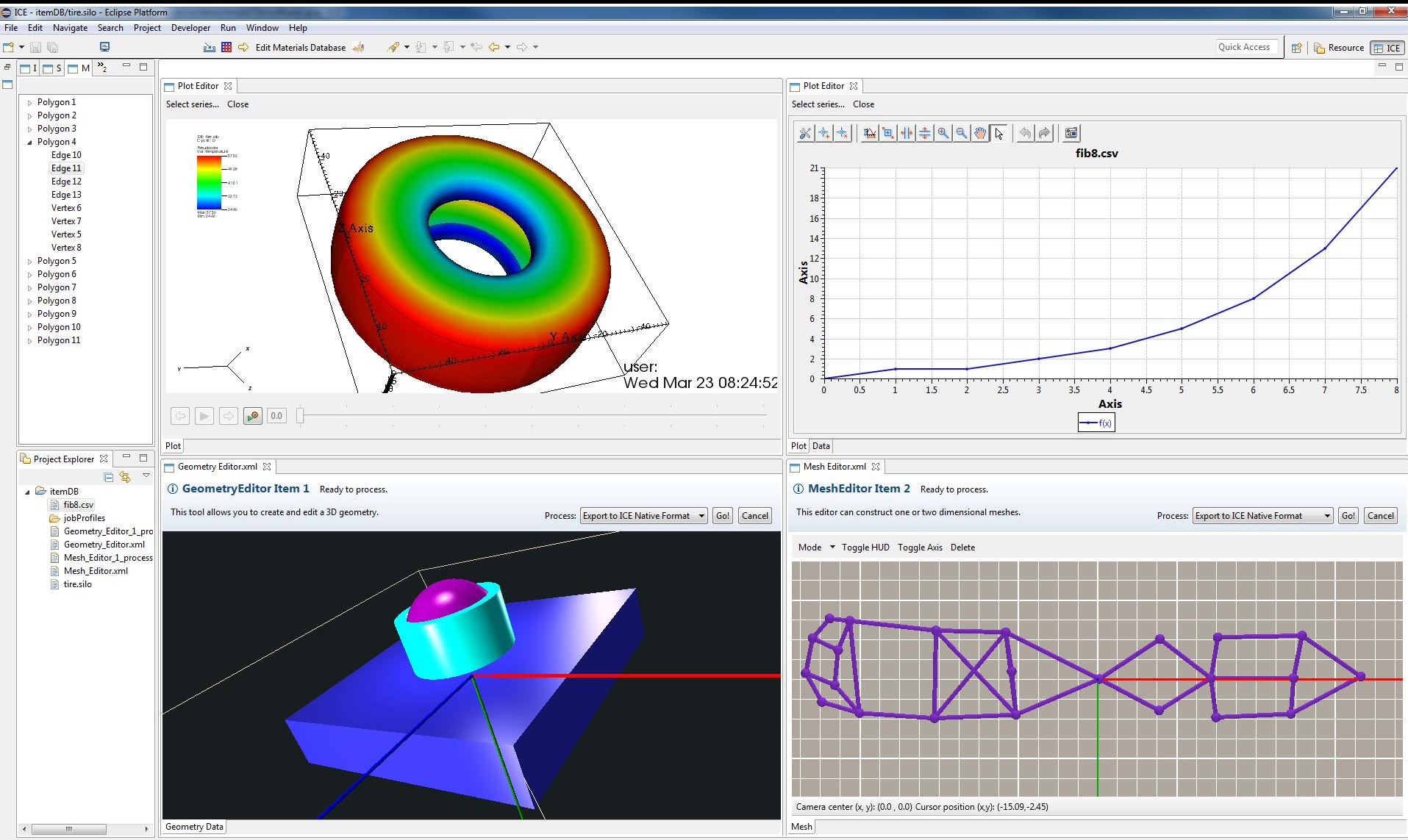
Data
Structures

Python
Scripting

Visualisations
(2D, 3D)

Workflows

1. Eclipse Advanced Visualization Project (EAVP)



2. Data Structures

Project January (JAVa NUmerical ARraYs)

- Numerical data structures, such as n-dimensional arrays (“numpy for Java”)
- Common data structures for science, such as CSG Trees

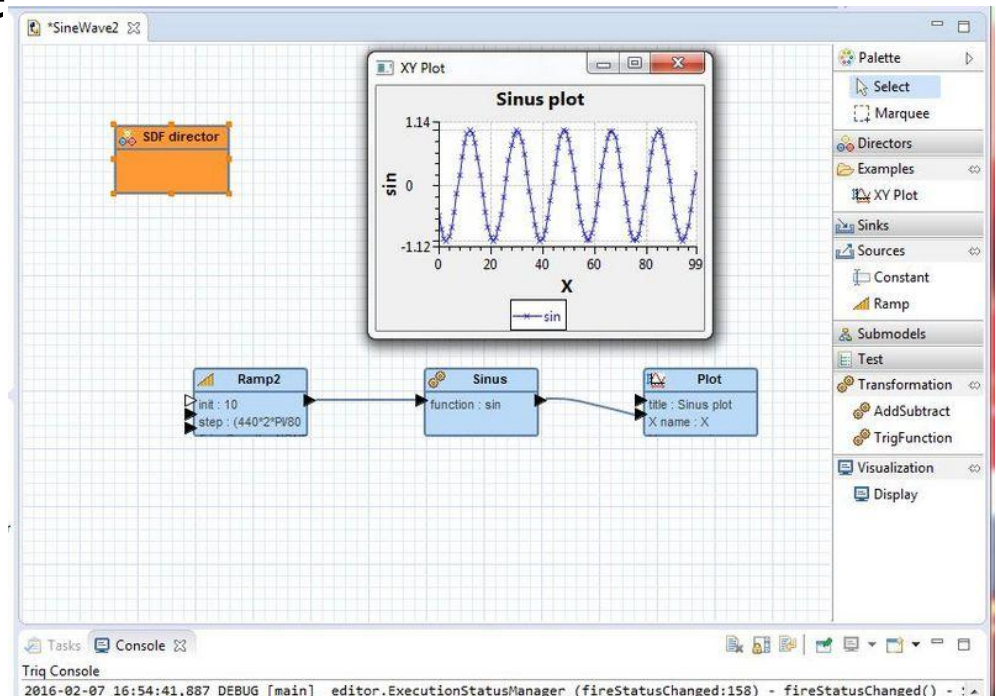
Standardized building blocks will be the key to integration between projects

3. Python Scripting

- Tight integration of Java and Python using Py4J
- Script Java from Python
 - Controlling the user interface from the console
- Extend Java with Python libraries
 - Ability to pass arrays and data from Java to Python

4. Workflows

- Triquetrum Project
- Focus on reproducible data processing



October Science Release 1.0

1. Eclipse ICE
2. ChemClipse
3. EAVP - Visualisations
4. January – Common Data Structures
5. Triquetrum – Workflows

<https://science.eclipse.org/>

October Science Release 1.0

“Open source is having tremendous impact on both productivity and innovation in industry, government, and academia.

The Eclipse Science Working Group is a great example of how world-leading scientific research organizations like Oak Ridge National Laboratory, Diamond Light Source, and others can collaborate on delivering free software that will enable the next major scientific breakthrough.”

– Mike Milinkovich, Director Eclipse Foundation

Get Involved

Lurker

- Sign up to science-iwg mailing list or individual project mailing list

Contributor

- Provide feedback, report bug, provide patches, documentation, etc
- Join in at events

Committer

- Develop new features, maintain projects, evangelize, etc

Strategic

- Institutional level, voting rights, PMC, Steering Committee, etc

Software To Advance Science



**Reusable,
Open- Source
Software Tools
and Services**

The End – Questions?

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