

*Connecting people and resources to
accelerate discovery by empowering the
science gateway community*



Toward a National Software Ecosystem: One perspective on institute contributions

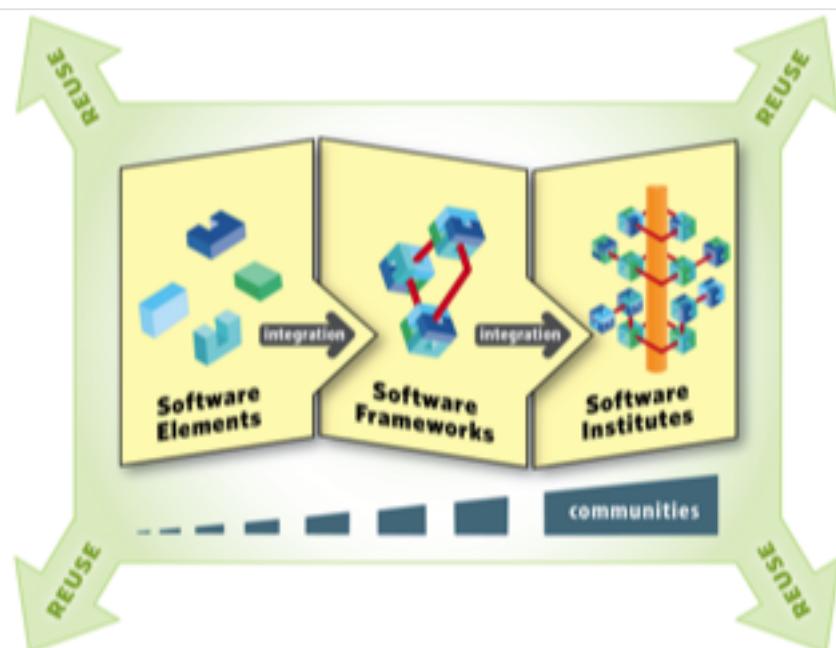
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Award Number
ACI-1547611

Scientific Software Innovation Institutes -> Community Cyberinfrastructure Implementations

- Then



- Now

Elements: Small groups - create & deploy robust capabilities for demonstrated need to advance science & engineering.

Framework Implementations: Larger teams organized around the development and application of common infrastructure aimed at solving common research problems, resulting in a sustainable community framework serving a diverse community or communities.

Planning Grants for Community Cyberinfrastructure: Focus on long-term capabilities in cyberinfrastructure to serve a research community of substantial size and disciplinary breadth.

Community Cyberinfrastructure Implementations: Focus on long-term hubs of excellence in cyberinfrastructure and technologies, to serve a research community of substantial size and disciplinary breadth.

Long-term hubs of excellence

Serving a community of substantial size and disciplinary breadth

- First conceptualization awards (13) made in 2012
- First implementation awards made in 2016
 - Science Gateways Community Institute (\$15M/5 years)
 - Molecular Sciences Software Institute (\$19.4M/5 years)
 - Both renewable to 10 years, but sustainability and ramped down funding is emphasized
- Several new conceptualization phase awards
 - Geospatial Software Institute
 - US Research Software Sustainability Institute
 - S2I2 Institute for High Energy Physics
 - Computational Fluid Dynamics Software Infrastructure

SGCI and ecosystem development

- Recognize importance of the interlocking pieces of the community
- Recognize current obstacles to healthy growth
- Devise and implement solutions
- Assess results and adapt

I Spy an Ecosystem!



Source: askabiologist.asu.edu/

Science gateways: why is this ecosystem important? Changing the face of science!

The collage includes:

- A screenshot of the i-TASSER protein structure prediction server homepage.
- A screenshot of a Google search results page for "i-tasser".
- A screenshot of a Nature journal article about a new deep-sea species of Xenoturbella.
- A screenshot of the National Science Foundation (NSF) website featuring a "Contributor to BRAIN Initiative" badge.
- A photograph of a young man at a science fair booth.

Budding Scientist Wins State Fair Prize Using CIPRES Science Gateway

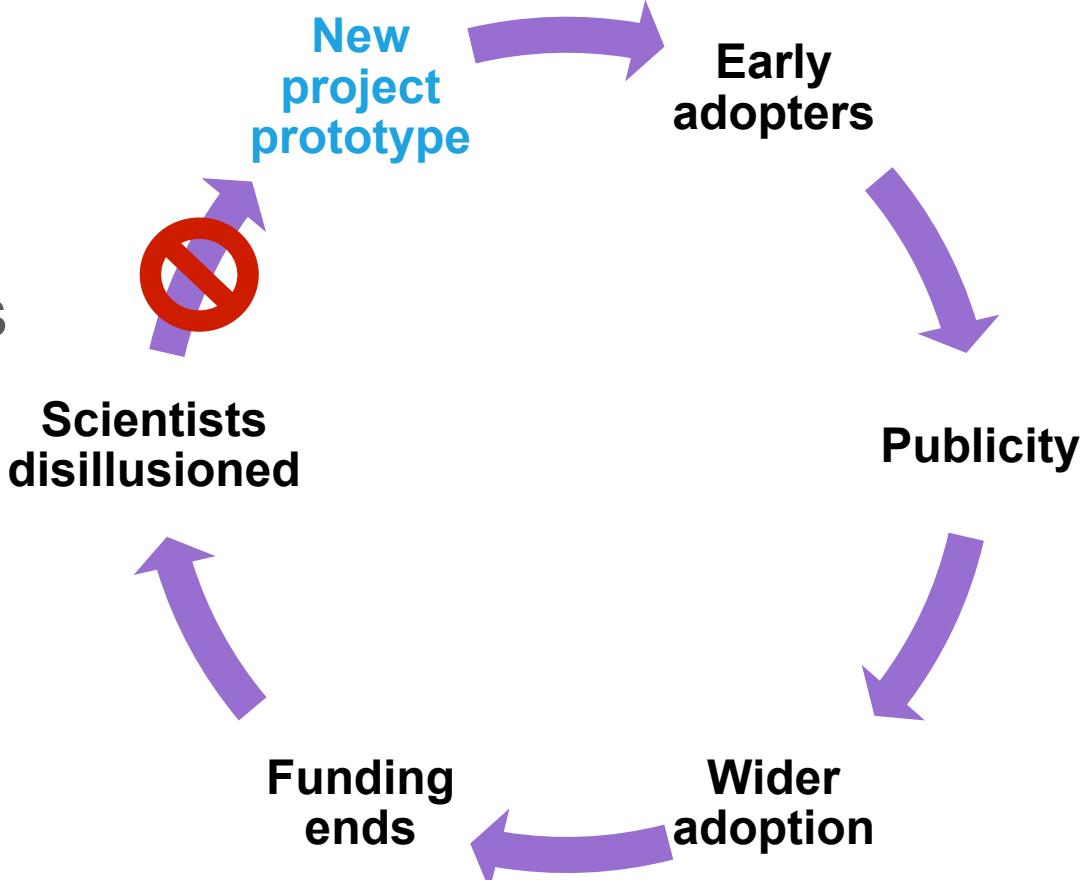
10th Grader Creates Timeline, Map of How HIV Spreads

SCCI

But, there was a problem with this ecosystem

Species operating in isolation

- Developers typically
 - work in isolation
 - must bridge to variety of resources
 - need building blocks in order to focus on higher-level functionality
 - struggle to secure sustainable funding



So we studied the problem And studied it some more

2009-2012
EAGER

Focus groups

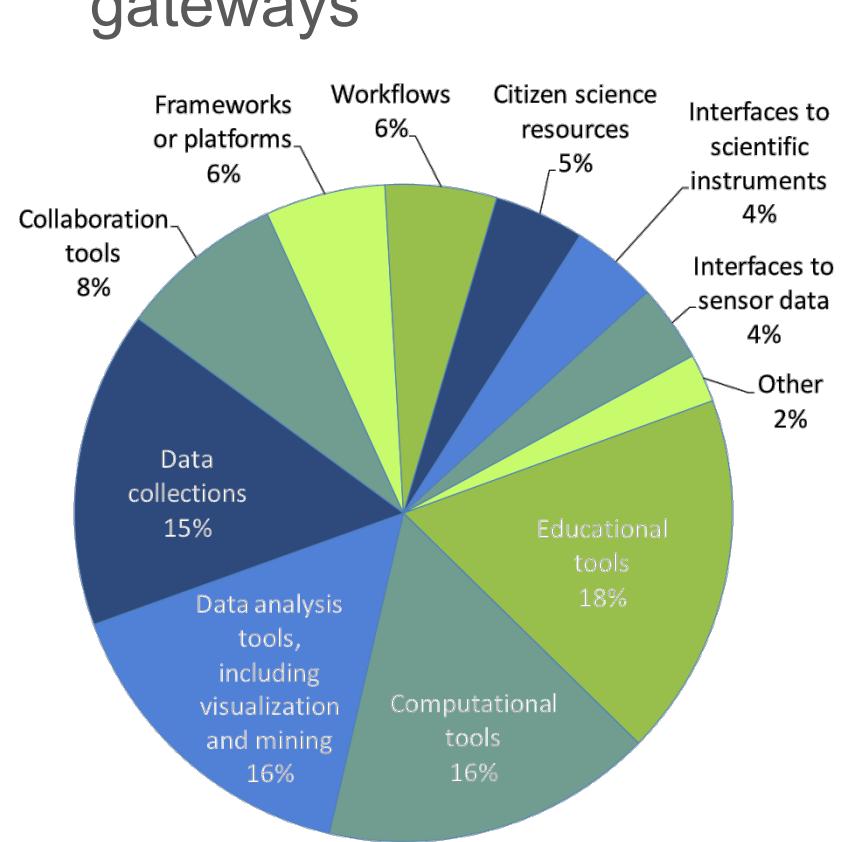
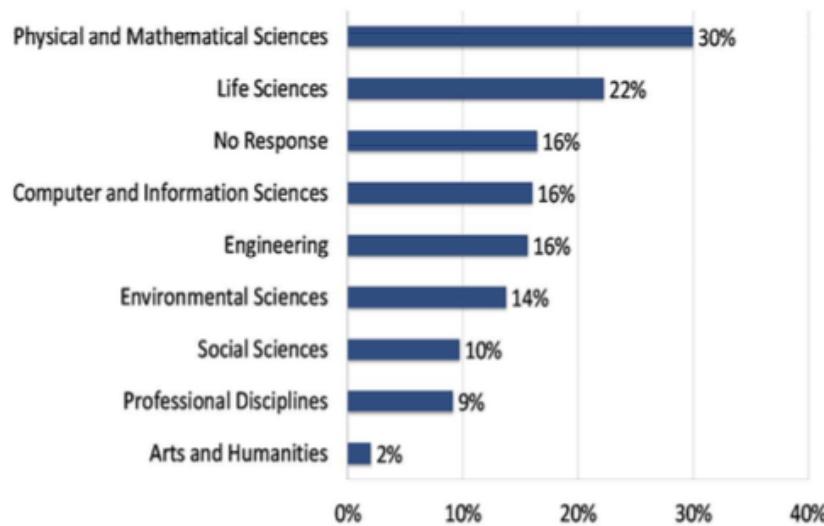
2012-2015
Concept.
phase

- More focus groups
- Survey with 5000 responses

2016
Software
Institute!

Turns out there was a community of gateway developers

- 5000 respondents from across domains
- Building all manner of gateways

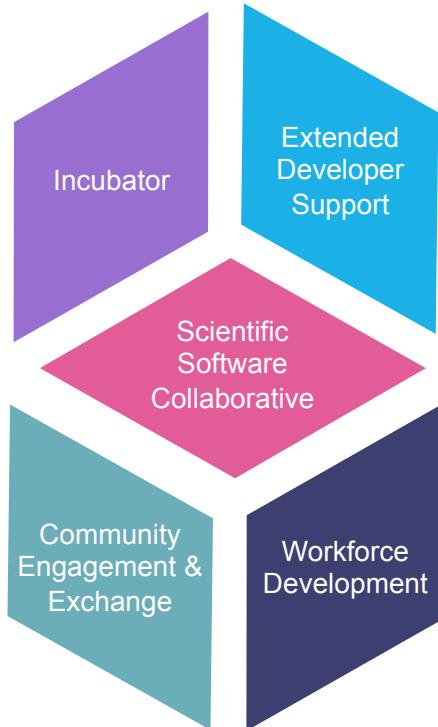


With common needs

Service	% Interest
Evaluation, impact analysis, website analytics	72%
Adapting technologies	67%
Web/visual/graphic design	67%
Choosing technologies	66%
Usability Services	66%
Developing open-source software	64%
Support for education	64%
Keeping your project running	62%
Legal perspectives	61%
Managing data	60%
Cybersecurity consultation	57%
Website construction	57%
Software engineering process consultation	53%
Source code review and/or audit	51%
High band-width networks	45%
Scientific instruments or data streams	44%
Management aspects of a project	38%

A vision for an institute emerged

A holistic, service-based institute



- Diverse skills, on demand
- Hands-on help building gateways
- An app store for gateways!
- Interactions with others building gateways
 - Gateways conference
 - Special journal issue with int'l partners
- Opportunities for students

A unique platform-independent approach to gateway development.
We recommend what's best for the client.

Planning has paid off

Activities at 18-months

575

webinar
attendees &
registrants



220

conference
attendees

65

letters of
collaboration

38

Bootcamp
attendees

86

tutorials &
outreach
presentations



18

Incubator
consultations

180

student &

21

faculty
participants



8

partners

20

Extended
Developer
Support
projects



10

Campus Gateway Group
engagements

402

Gateway Catalog entries



Early gateway-building clients

Software as a Service

COSMIC2

Michael Cianfrocco, University of Michigan

LSU Systems Biology

Michal Brylinski, Louisiana State University

SimCCS

Kevin Ellet, Indiana Geological and Water Survey

ChemCompute

Mark Perri, Sonoma State University

nSides

Rami Vanguri, Columbia University

Interactive Parallelization Tool

Ritu Arora, University of Texas

Cyberinfrastructure

Galaxy CloudLaunch

Enis Afgan, Johns Hopkins University

Data Distribution

Coastal Emergency Risk Assessment

Carola Keiser, LSU and Jason Fleming, SCS

CitSci.org

Greg Newman, Colorado State University

ENIGMA

Lisa Eyler, University of California, San Diego

Ocean Observatories Initiative

Ivan Rodero, Rutgers University

Aquavit

Jack Smith, Marshall University

Collaboration

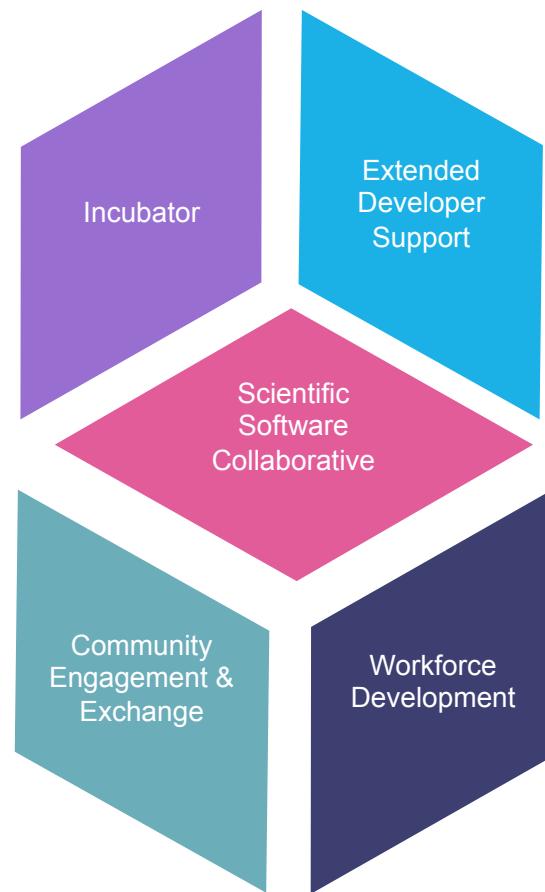
QUBES

Drew LaMar, William & Mary

Ecology Plus

Teresa Mourad, Ecological Society of America

Is this an ecosystem?



Only if the organisms interact

ec·o·sys·tem

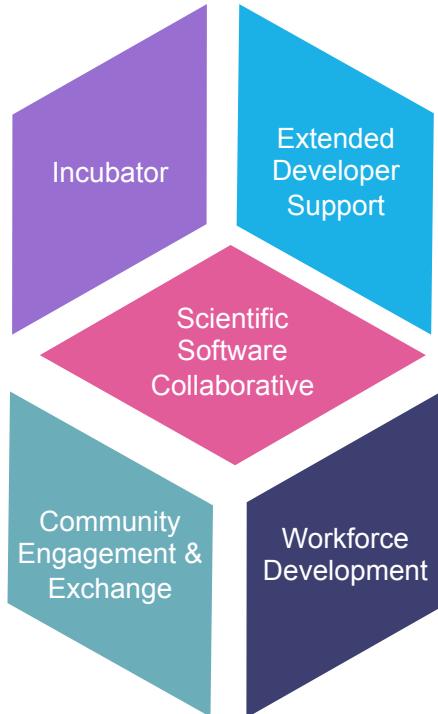
/'ēkō,sistəm/

noun ECOLOGY

a biological community of interacting organisms and their physical environment.

- (in general use) a complex network or interconnected system.
"Silicon Valley's entrepreneurial ecosystem"

How are we encouraging interaction in our own community?



- Ongoing cohort connections
- Case studies, developers helping one another
- Find a gateway or an expert
 - Affiliates program
- Gateway conference, publishing opportunities
 - Mini institutes on campuses!
- Internships, job listings, career paths

Keys to growth

- Do what you do well
- Set up structures that allow others to do what you do well
- Maintain a leadership position
- Establish a value proposition that allows you to keep growing

How are we interacting with peer organisms?

Trusted CI and SGCI co-fund an SGCI staff member

MolSSI and SGCI have jointly organized workshops and co-authored a paper

SGCI has attended planning events for Geospatial Software Institute and US Research Software Sustainability. Has advised other groups.

SGCI is interdisciplinary, interactions across groups easy for us.

Interesting commonalities developing

These look like components of an ecosystem

	Supporting software	Supporting people	Supporting the community
Hands-on development support (short term small project support)	X		
Consulting (expert advice on specialty topics)	X		
Training (courses & guides)	X	X	
Policy (research & campaigns)		X	X
Community (fellowships, workshops, conferences, blogs, website)	X	X	X

Adapted from: Dan Katz, URSSI workshop

Next steps

- **Interoperation amongst institutes**
 - SGCI attendance/presentation at several institute planning workshops
 - Lunch meeting today
- **Engagement with S2I2 and CSSI projects**
 - Would love to work with you as an SGCI affiliate
 - Increase the reach of your software by working with our clients

Thank you

Shameless plug for SGCI

- Request **services**
 - Short term consulting, longer term gateway building
- Find or list gateways or gateway building software
 - catalog.sciencegateways.org
- Come to **Gateways 2018**
 - Austin, TX, short submissions due 5/16
- Request a **Letter of Commitment** to leverage existing SGCI offerings in proposal
- Become involved as a **partner** or **affiliate**
 - Engaging with SGCI clients
- Train students via the **internship** program

www.sciencegateways.org



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