

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



The Science Gateways Community Institute: Going Beyond Borders

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9th International Workshop on Science Gateways (IWSG 2017)

19 June 2017

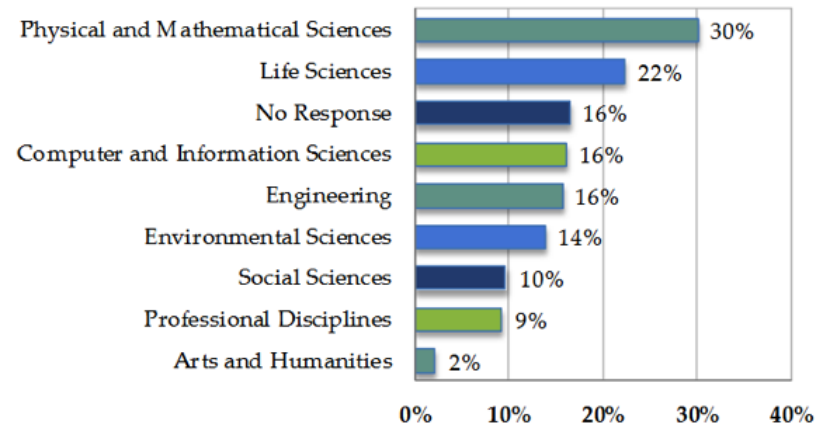


Award Number
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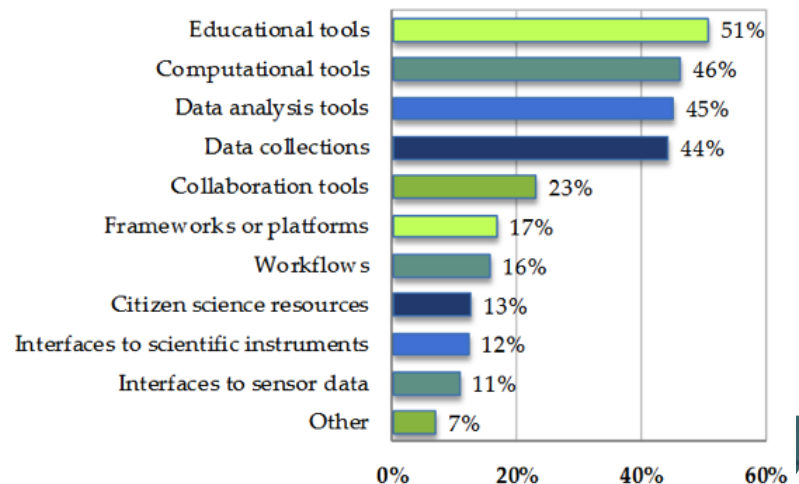
Science Gateways Survey 2014

- 29,000-person survey
- 4957 responses from across domains

Respondents'
domains

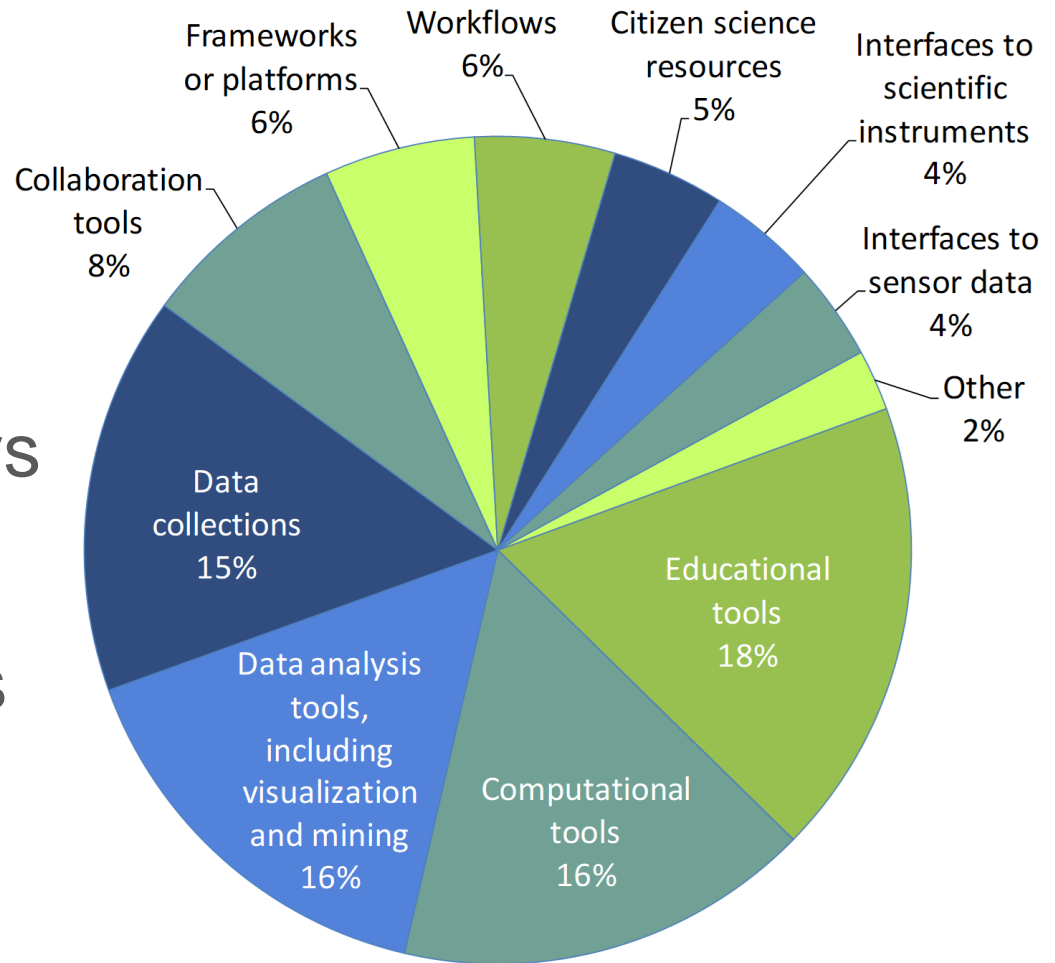


Areas of software
development



Science Gateway Survey 2014

57% played some role in gateway creation and these gateways were used for a variety of purposes



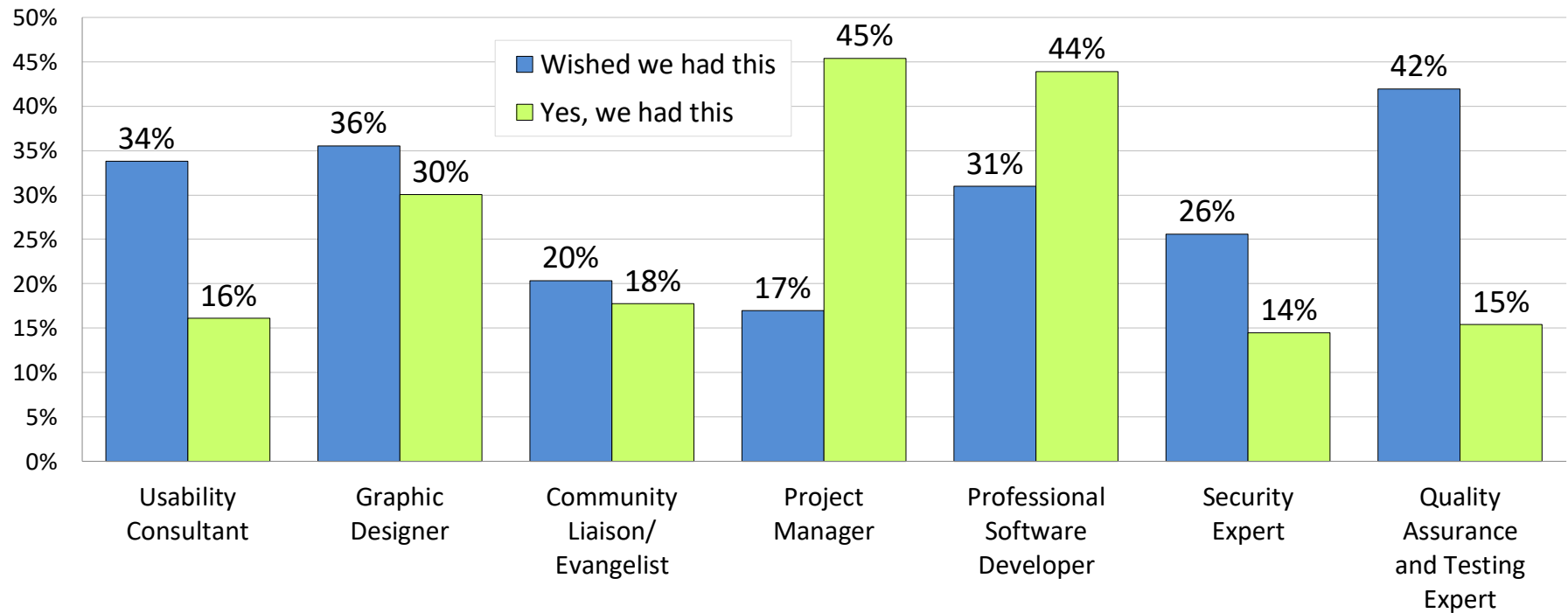
Science Gateways Survey 2014

Proposed Service	% Interest
Evaluation, impact analysis, website analytics	72%
Adapting technologies	67%
Web/visual/graphic design	67%
Choosing technologies	66%
Usability Services	66%
Visualization	65%
Developing open-source software	64%
Support for education	64%
Community engagement mechanisms	62%
Keeping your project running	62%
Legal perspectives	61%
Managing data	60%
Computational resources	59%
Mobile technology	59%
Database structure, optimization, and query expertise	59%
Data mining and analysis	58%
Cybersecurity consultation	57%
Website construction	57%
Software engineering process consultation	53%
Source code review and/or audit	51%
High-bandwidth networks	45%
Scientific instruments or data streams	44%
Management aspects of a project	38%

What services
would be helpful?

Science Gateways Survey 2014

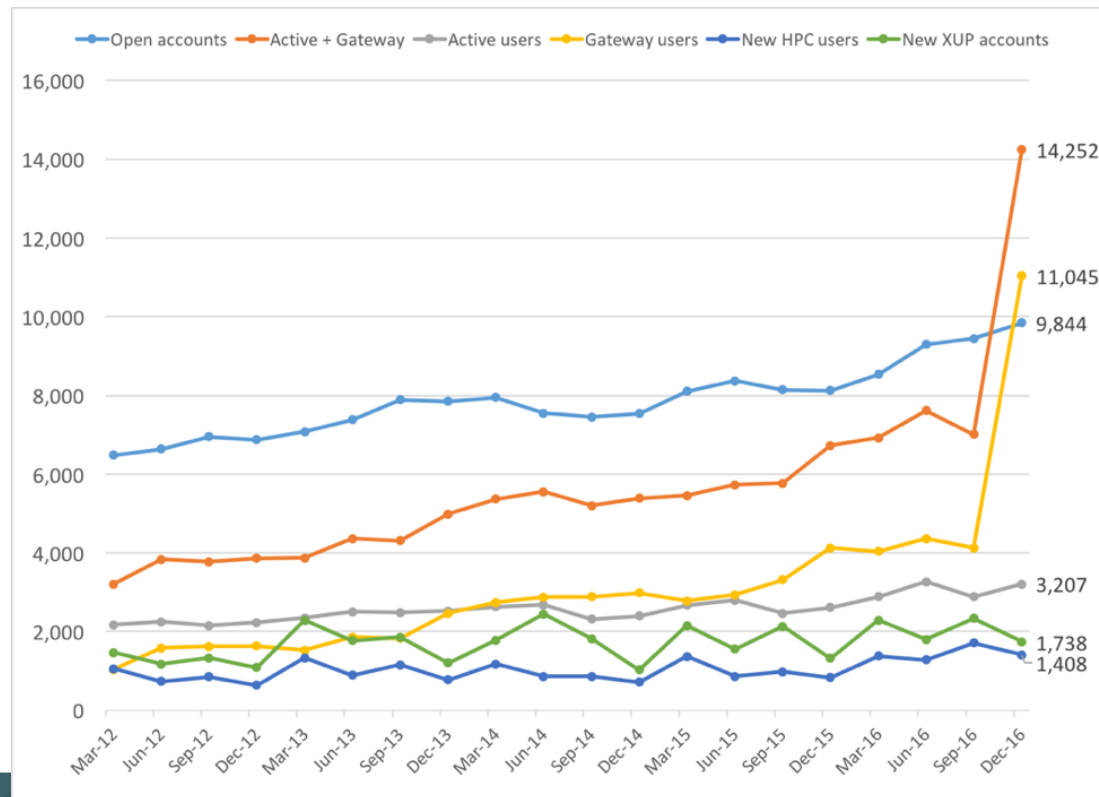
Well-designed gateways require a variety of expertise



Large Infrastructure Projects

- 2004 TeraGrid project director Rick Stevens recognized growth in scientific portal development and proposed the Science Gateway Program
- Followed up by XSEDE's Science Gateway Program

Gateway users are 77% of active XSEDE users in Q4 2016



All users

Gateways

Login

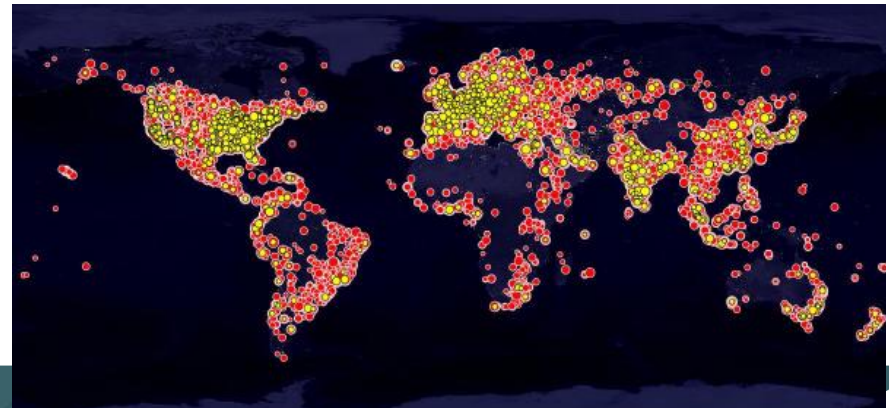
Technologies

- Widely used complete frameworks (Galaxy, HubZero, Open Science Framework etc.)
- RESTful APIs and support of multiple programming languages in widely used frameworks (Apache Airavata, the Agave platform, etc.)
- Reused interface implementations such as the one of CIPRES with its RESTful API (CIPRES has served more than 20,000 users to date)
- Science gateways as a service with provision of hardware in the background such as SciGap (Science Gateway Platform as a Service)

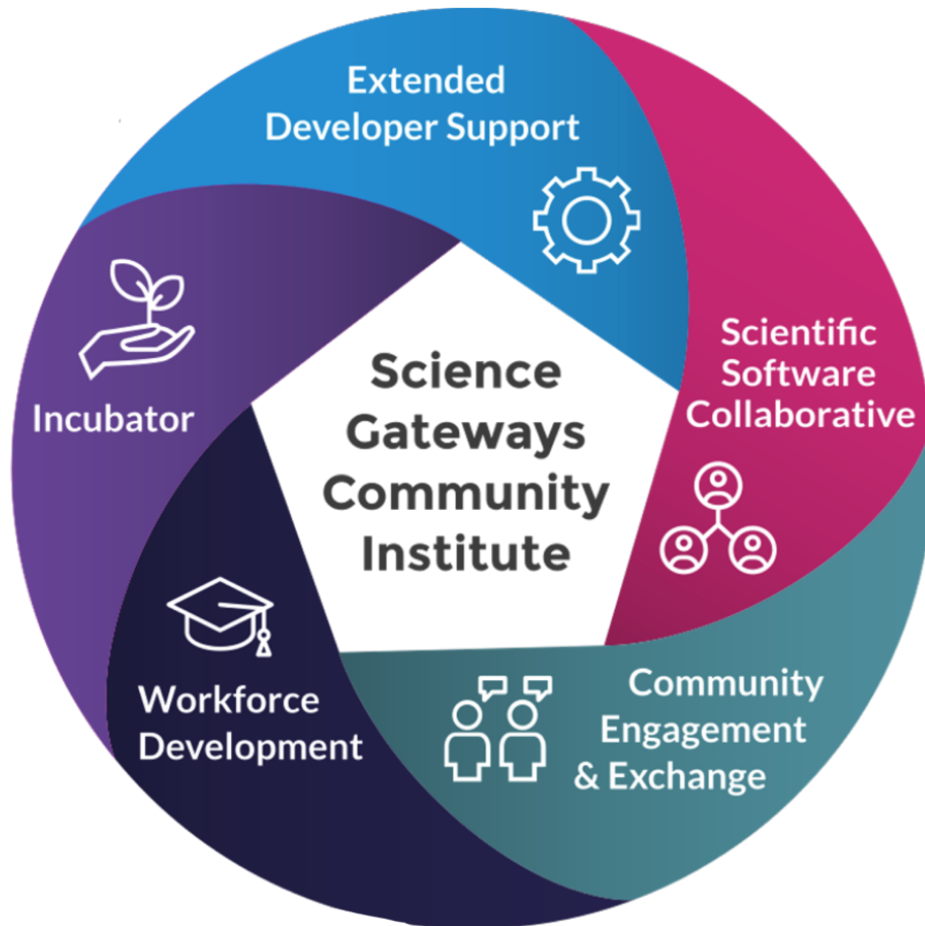
Lessons learned: approaches should be technology agnostic, using APIs and standard web technologies OR deliver a complete solution

Community Engagement is key

Global users of HUBzero



Science Gateways Community Institute



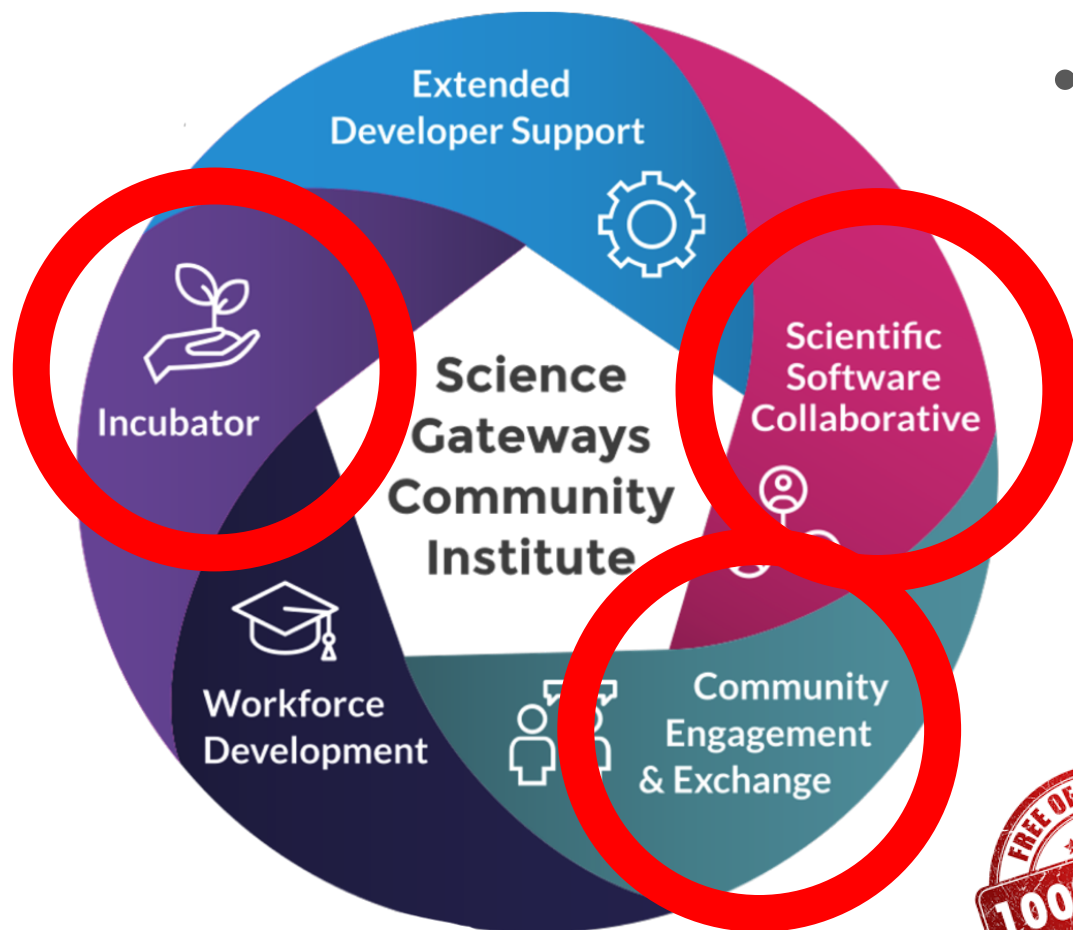
- Funded from 1 Aug 2016 – 31 Jul 2021 by NSF
- Diverse expertise on demand
- Longer term support engagements
- Software and visibility for gateways
- Information exchange in a community environment
- Student opportunities and more stable career paths

help@sciencegateways.org
<http://sciencegateways.org/>

Benefits of International Collaboration

- Improving national competitiveness
 - Supporting less developed countries by developing science, technology and innovation capabilities
 - Tackling global challenges such as climate change, health issues and sustainable energy resources
 - Creating good and stable diplomatic relationships (and indirectly ensuring international security)
-
- Globalization is not new but more and more evident in industrial research and the worldwide mobility of researchers
 - Smaller countries tend to collaborate internationally more often than bigger ones
 - Publications with international partners are more cited than publications with one author or a group of authors from one country.
- http://www.eurosfaire.prd.fr/7pc/doc/1266832886_drivers_of_international_cooperation_in_research.pdf

Science Gateways Community Institute



- International Collaborations



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Community Engagement and Exchange

Website Activities

- Discussion forums
- Gateway showcase with case studies
- Monthly webinar series
- Newsletters with 1,300 subscribers
- News: media coverage, related happenings, academic publications, job openings, events calendar
- Curated blog with guest authors
- Professional development: synchronous and asynchronous training
- Capture client/user feedback on web and through other areas

Annual Conference

- Tutorials and workshops
- Paper presentations
- Invited keynotes and panels
- Interactive elements: Open Space, poster session
- Travel support for students and campus IT staff

Builds on 10 years of experience with GCE and IWSG series

Outreach to Complementary NSF Initiatives

- NSF SI2 projects
- Large NSF projects
- Science and Technology Centers
- Engineering Research Centers
- MoISSI software institute collaboration

Campus Gateway Groups

- Task force builds campus-based expertise
- Channel for scaling institute services

Workshop Series GCE and conference series Gateways

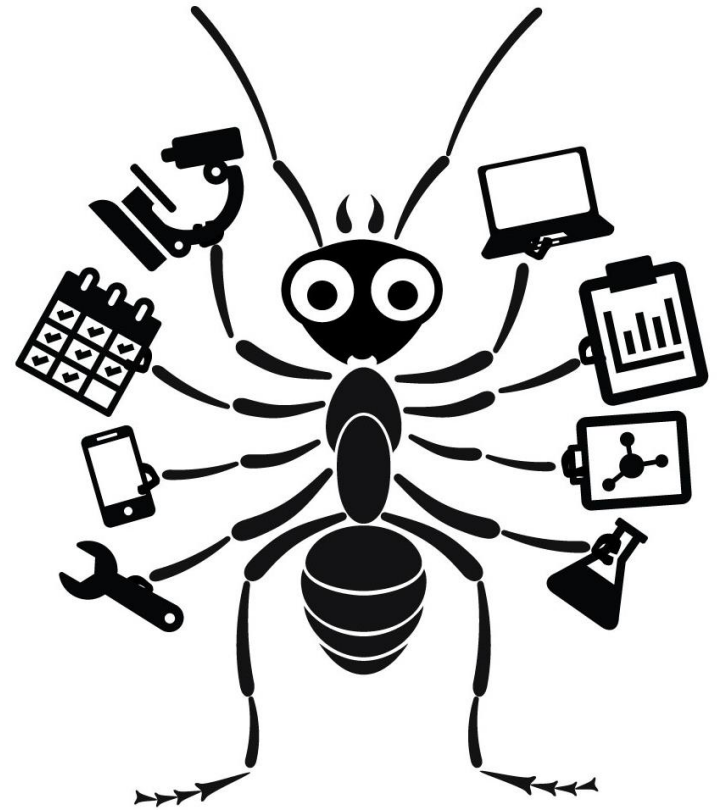
- 2006: GCE (Gateway Computing Environment) workshop series started – successful 10th anniversary in 2015
- since 2013: Partnering with European IWSG (International Workshop on Science Gateways) on yearly special issue
9th IWSG, 19-21 June 2017 in Poznań, Poland
- since 2015: Partnering with Australian IWSG-A (International Workshop on Science Gateways – Australia) on yearly special issue
3rd IWSG-A will take place 16-17 October in Brisbane, Australia
- 2016: GCE extended to Gateways conference with 120 participants at the first event
Gateways 2017 will take place 23–25 October 2017 in Ann Arbor, Michigan, USA

On-Campus Teams - Opportunities

- A breadth of interesting topics in the science gateway creation process
 - Novel frameworks and web applications
 - Inter- and multidisciplinary work
 - Contributing to grand challenges, e.g., Malaria eradication
 - ...
- A breadth of interesting roles
 - Designers, statisticians, librarians, machine learning experts, usability experts,...

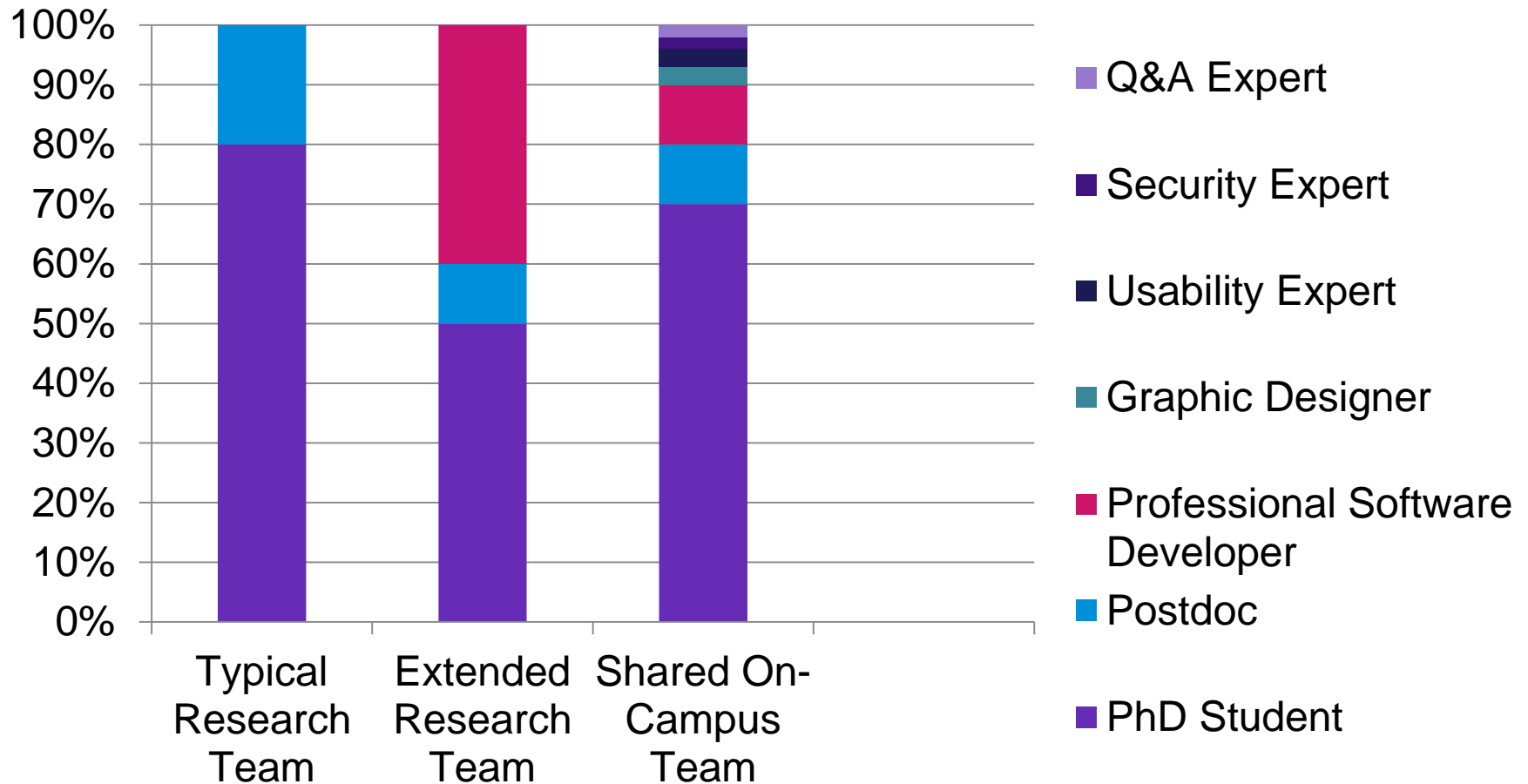
On-Campus Teams - Challenges

- Some topics and roles are only needed for part of the project
 - ⇒ Not fully funded positions via one project
 - ⇒ For diverse expertise, several different people are needed



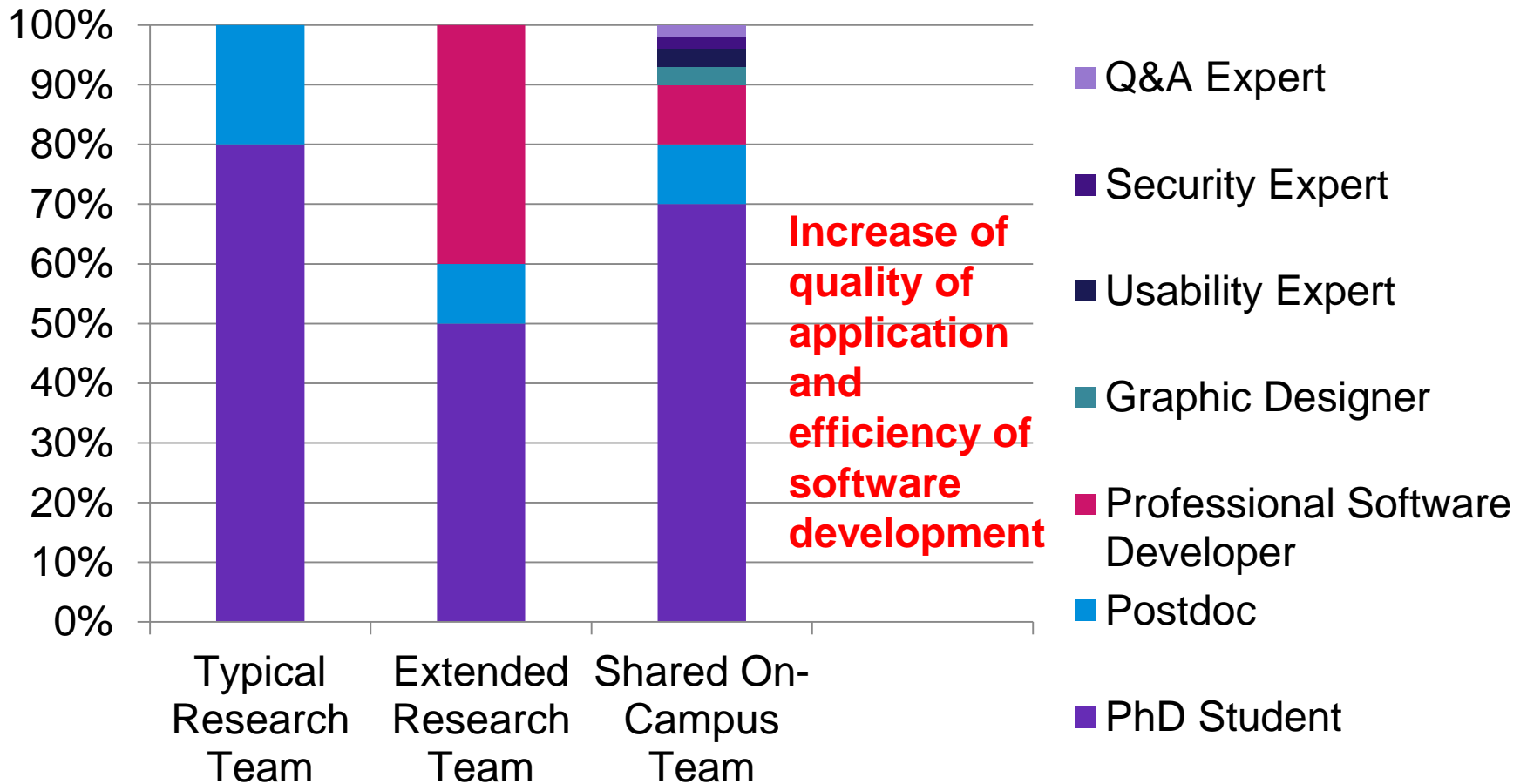
Sustainability via On-Campus Teams

Potential salary cost distribution



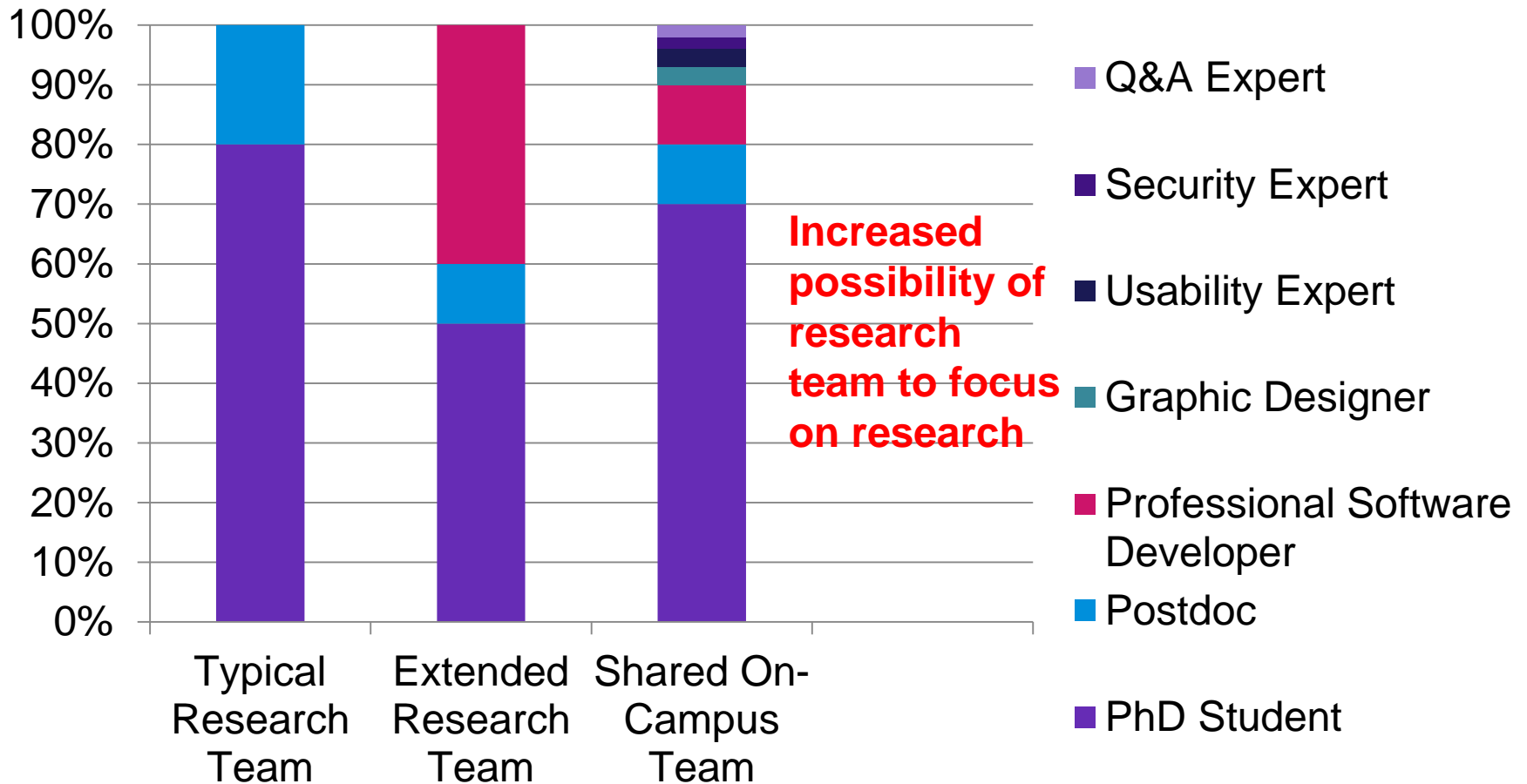
Sustainability via On-Campus Teams

Potential salary cost distribution



Sustainability via On-Campus Teams

Potential salary cost distribution



Sustainability via On-Campus Teams

- Great visibility for the institution's research activities
- Synergy effects between projects
- Shared resources, costs and expertise across departments
- Lower learning curves
- Expertise that is otherwise difficult for individual projects to obtain
- Ability to retain top-quality research computing support by providing interesting projects

Scientific Software Collaborative

End-to-End Solutions

- Serve a diverse set of scientific domains
- Out-of-the-box gateway solution that can be customized
- Based on Docker – executable images that are the skeleton for a secure and functioning gateway
- Portable and reproducible
- Community-contributed

Software Integration & Community Contribution

- Docking mechanisms for community-contributed software, including NSF SI2
- Incorporate community standards

Software Marketplace for Science Gateways

“Use-what-you-need”

- API integration
- Variety of services
 - Information
 - Security
 - Execution
 - Data
 - Event
 - Accounting
- Hosting opportunity

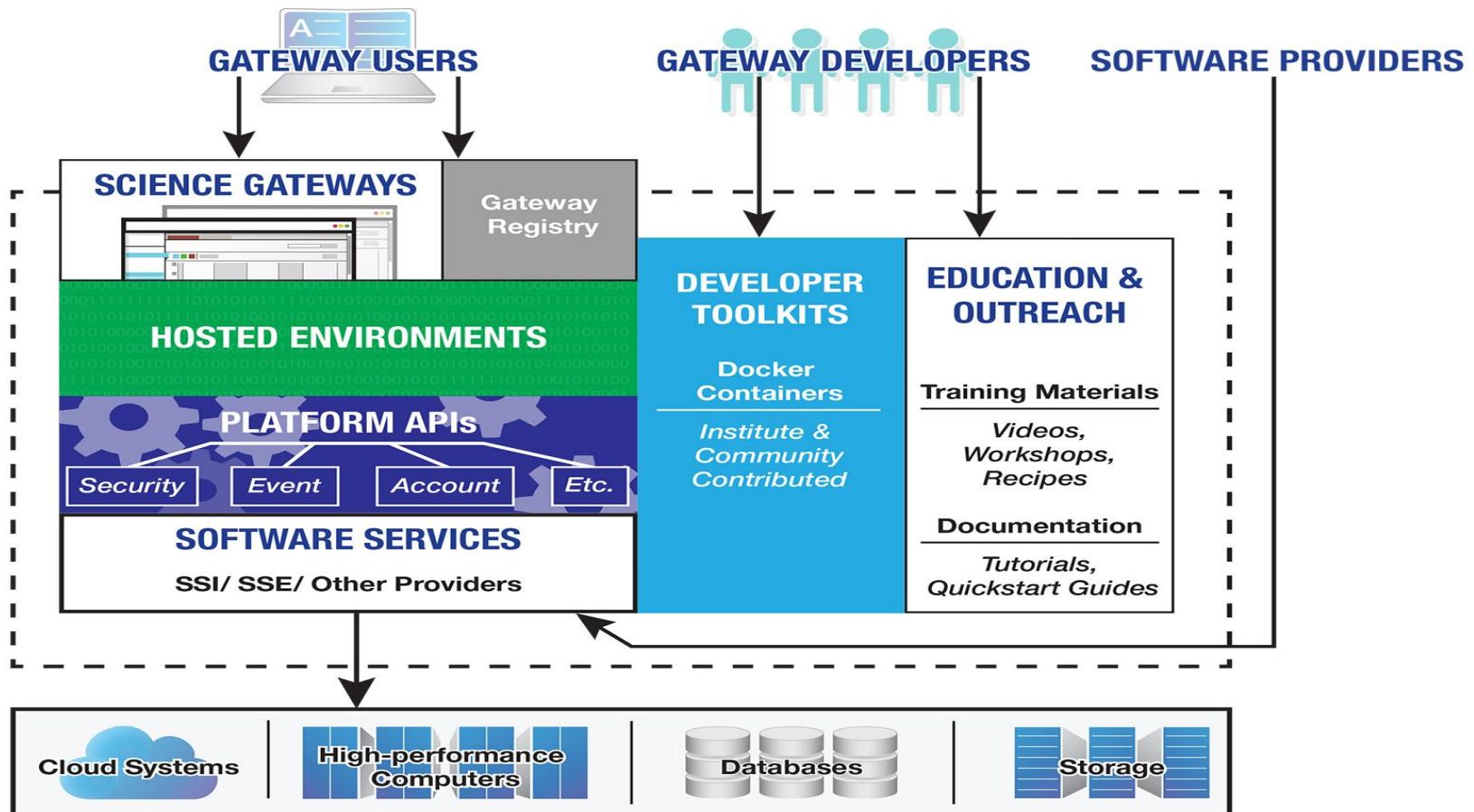
Gateway Discovery

- Open registry
- Promotes use of existing science gateways
- Community-contributed
- Admin approval
- Automated cleanup

Engage Other Areas of Institute

- Support projects leverage Collaborative components
- Framework evolves as a result of gateway engagements
- Community outreach

Scientific Software Collaborative



Scientific Software Collaborative

- Gateway catalog: initial release with 50 gateway projects

The screenshot displays the 'Science Gateways Catalog' website. On the left, a sidebar lists various scientific categories with their respective counts in parentheses:

- FORMAL (5)
 - Mathematics (5)
- PHYSICAL (18)
 - Chemistry (5)
 - Physics (7)
 - Earth Sciences (13)
 - Space Science (11)
- LIFE (11)
 - Biology (16)
- SOCIAL (14)
 - Political Science (1)
 - Psychology (2)
 - Education (12)
- APPLIED (29)
 - Engineering (25)
 - Healthcare (6)
- INTERDISCIPLINARY (13)
 - Environmental Science (2)
 - Statistics (1)

The main content area features a search bar and a list of gateway projects. Two projects are visible:

nanoHUB
Our mission is to support and grow the nanotechnology community and to generate new modes of discovery, innovation, learning, and engagement in the field.
Categories: Formal, Physical, Life, Applied, Interdisciplinary, Mathematics, Earth Sciences, Biology, Engineering
Software/Tools: HUBZero
Languages: C++, Java, PHP, Python
Frameworks: PHPUnit, DBUnit, webDAV
Documentation: Teaching Materials
Consulting support: Knowledge Base, Wishlist, Report Problems, Tickets
Integrations: Slack
Projects using this technology: HUBZero
Tags: computational, nanotechnology, research, educator, simulation, cyberinfrastructure, cloud
Buttons: HIDE

RNA World
RNA World (beta) is a distributed supercomputer that uses Internet-connected computers to advance RNA-related research. You can participate by downloading and running a free program on your computer.
Categories: Applied, Life, Biology, Healthcare, Medicine, Molecular Biology
Tags: RNA, program, supercomputer, BDINC
Buttons: MORE

Scientific Software Collaborative

- Gateway catalog: initial release with 50 gateway projects

Next steps:

- Published for community contributions and feedback
- Hosting environment: sandbox for developers to try new technologies and gateway tools
- Jetstream hosting solutions as a production-quality hosting environment for gateways.

Incubator Service

A Framework for Decision Making

Technology Planning

- Choosing technologies
- Cybersecurity
- Software engineering
- Interfaces to compute and data

Business Planning

- Business model development
- Financial planning
- Project management
- Software licensing
- Staff and sustainability planning

Client Interaction Planning

- Usability studies
- Web/visual/graphic design
- Impact measurement
- Community engagement
- Support for education

Specialized Expertise

- **Security**
- **Sustainability**
- **Evaluation & Impact Measurement**
- **Campus Resource Development**

Network / Cohort Formation

Common Experiences

- Training sessions
- Group interactions

Continuing Engagement

- Customized structure, content, goals
- Mentoring
- Pay It Forward

An Ongoing
Dispassionate
Ear

Science Gateways Bootcamps

- Inaugural bootcamp in April 2017

“The Science Gateways Bootcamp is useful to people involved at any stage of their science gateway project, and in any role. Their experts have you consider all aspects of sustainability, from understanding your unique value proposition and audience, through to best practices and standards in software development. They cultivate a lively, active, hands-on environment. A great experience overall.”

Steve Androulakis
Manager – Community Platforms,
NeCTAR.org.au, ANDS.org.au, RDS.org.au



Science Gateways Bootcamps

- Next 2-6 October 2017
- Teams per science gateway (lead and technical lead)
- Hands-on
 - Core-business strategy skills as they apply to leading an online digital presence
 - Technology best practices
 - Long term sustainability strategies

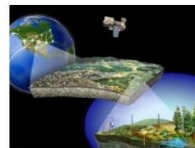
APPLICATIONS WILL BE ACCEPTED THROUGH 7/28/2017
LONG TERM SUSTAINABILITY STRATEGIES

Funding Bodies

Funding bodies such as NSF and NIH mention science gateways direct in solicitations and roadmaps!

OAC supports Research Cyberinfrastructure to uniquely enable collaboration and discovery frontiers at all scales

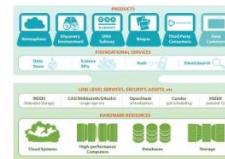
Shared resources, capabilities & services across the scientific workflow



CI-Enabled Instrumentation



Computing Resources



Gateways, Hubs, and Services

Cloud Resources & Services



Data Networks, Cybersecurity



Coordination & User support

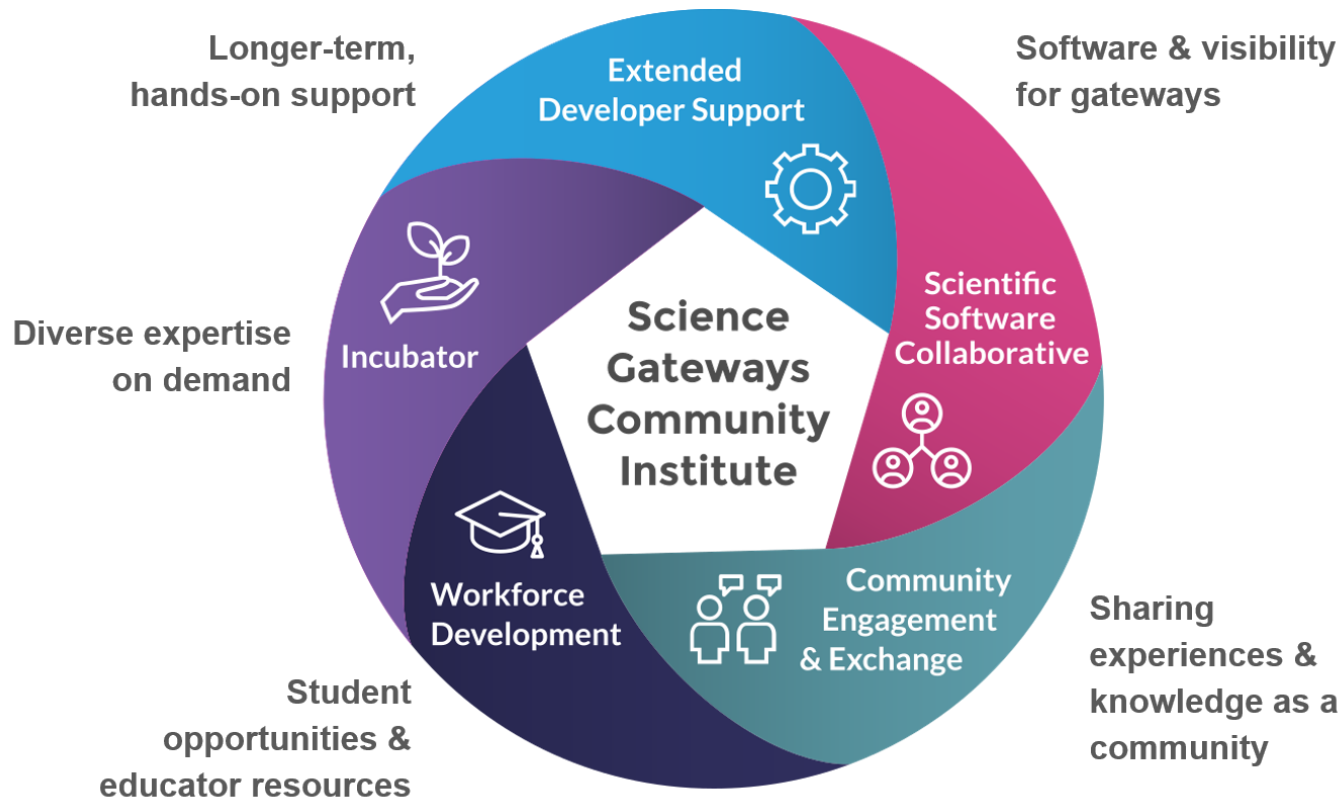


Software, Applications, Workflow Systems

Opportunities

- Partner with SGCI on your own projects, technologies and events
- Keep up to date on gateway developments
 - webinar series, gateways in the news, google scholar feed, case studies, annual conference, blog posts
- Learn how to set up a gateway group on your campus
- Find a working gateway or gateway development software in our catalog or add your own gateway
- Get advice (sustainability, usability, cybersecurity, other) on your existing gateway

Thanks for your attention!



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