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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Award Number
ACI-1547611
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

### What services would be helpful?

<table>
<thead>
<tr>
<th>Proposed Service</th>
<th>% Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation, impact analysis, website analytics</td>
<td>72%</td>
</tr>
<tr>
<td>Adapting technologies</td>
<td>67%</td>
</tr>
<tr>
<td>Web/visual/graphic design</td>
<td>67%</td>
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<tr>
<td>Choosing technologies</td>
<td>66%</td>
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<tr>
<td>Usability Services</td>
<td>66%</td>
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<tr>
<td>Visualization</td>
<td>65%</td>
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<tr>
<td>Developing open-source software</td>
<td>64%</td>
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<tr>
<td>Support for education</td>
<td>64%</td>
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<tr>
<td>Community engagement mechanisms</td>
<td>62%</td>
</tr>
<tr>
<td>Keeping your project running</td>
<td>62%</td>
</tr>
<tr>
<td>Legal perspectives</td>
<td>61%</td>
</tr>
<tr>
<td>Managing data</td>
<td>60%</td>
</tr>
<tr>
<td>Computational resources</td>
<td>59%</td>
</tr>
<tr>
<td>Mobile technology</td>
<td>59%</td>
</tr>
<tr>
<td>Database structure, optimization, and query expertise</td>
<td>59%</td>
</tr>
<tr>
<td>Data mining and analysis</td>
<td>58%</td>
</tr>
<tr>
<td>Cybersecurity consultation</td>
<td>57%</td>
</tr>
<tr>
<td>Website construction</td>
<td>57%</td>
</tr>
<tr>
<td>Software engineering process consultation</td>
<td>53%</td>
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<tr>
<td>Source code review and/or audit</td>
<td>51%</td>
</tr>
<tr>
<td>High-bandwidth networks</td>
<td>45%</td>
</tr>
<tr>
<td>Scientific instruments or data streams</td>
<td>44%</td>
</tr>
<tr>
<td>Management aspects of a project</td>
<td>38%</td>
</tr>
</tbody>
</table>
Science Gateways Survey 2014

Well-designed gateways require a variety of expertise

- Usability Consultant: 34% wished, 16% had
- Graphic Designer: 36% wished, 30% had
- Community Liaison/Evangelist: 20% wished, 18% had
- Project Manager: 17% wished, 45% had
- Professional Software Developer: 31% wished, 44% had
- Security Expert: 26% wished, 14% had
- Quality Assurance and Testing Expert: 42% wished, 15% had

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
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.

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
- MolISI 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

- Typical Research Team
- Extended Research Team
- Shared On-Campus Team

- Q&A Expert
- Security Expert
- Usability Expert
- Graphic Designer
- Professional Software Developer
- Postdoc
- PhD Student
Sustainability via On-Campus Teams

Potential salary cost distribution

- Typical Research Team
- Extended Research Team
- Shared On-Campus Team

Increase of quality of application and efficiency of software development

- Q&A Expert
- Security Expert
- Usability Expert
- Graphic Designer
- Professional Software Developer
- Postdoc
- PhD Student
Sustainability via On-Campus Teams

Potential salary cost distribution

- Typical Research Team
- Extended Research Team
- Shared On-Campus Team

Increased possibility of research team to focus on research

- Q&A Expert
- Security Expert
- Usability Expert
- Graphic Designer
- Professional Software Developer
- Postdoc
- PhD Student
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 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

Software Integration & Community Contribution
- Docking mechanisms for community-contributed software, including NSF SI2
- Incorporate community standards

Engage Other Areas of Institute
- Support projects leverage Collaborative components
- Framework evolves as a result of gateway engagements
- Community outreach
Scientific Software Collaborative

• Gateway catalog: initial release with 50 gateway projects
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

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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