## How the Science Gateways Community Institute Supports Those Who Are Creating Websites to Access Shared Resources

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#### **ABSTRACT**

The Science Gateways Community Institute (SGCI) serves the gateway community with free, NSF-funded resources, services, experts, and ideas. Our community shares expertise, technologies, and best practices for creating and sustaining gateways. Gateways offer Web-based access to shared resources, including data, software, computing services, instruments, and educational materials. Gateways are also known by other names, including portals, virtual research environments or virtual labs, eScience, and research cyberinfrastructure.

#### **CCS CONCEPTS**

• Information systems ~ Web interfaces • Software and its engineering ~ Software implementation planning • Software and its engineering ~ Software development methods • Social and professional topics ~ Professional topics • Computing methodologies ~ Distributed computing methodologies

#### **KEYWORDS**

Science gateways, virtual research environments, research cyberinfrastructure, software development support, consulting services, professional development

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#### 1 Introduction

The Science Gateways Community Institute (SGCI; <a href="https://sciencegateways.org/">https://sciencegateways.org/</a>) was funded by the National Science Foundation in 2016 to provide free or low-cost services and resources to the science gateway community. Gateways offer Webbased access to shared resources, including data, software, computing services, instruments, and educational materials. Gateways are also known by other names, including portals, virtual research environments or virtual labs, eScience, and research cyber-infrastructure.

A perennial problem for gateways is that PIs may not have the resources or experience to implement their gateway projects, leading them to spend unnecessary time and money locating staff, identifying technologies, and reinventing software solutions. Because gateways are built for a wide range of academic fields, the creators are often unaware that others may be building or using existing technologies that would perfectly suit their goals. Moreover, the skill sets required to operate and sustain a gateway

may be unfamiliar, leaving many PIs unprepared to keep a gateway going for the long term.

The SGCI addresses this challenge in three main ways:

- Support for building and running gateways
- Education and training
- Community resources and networking

These services and resources bring together complementary experts, events, technologies, and online resources, as we describe in the following sections.

### 2 Support for Building and Running Gateways

This category of services and resources includes multiple consulting specialties (<a href="https://sciencegateways.org/consulting">https://sciencegateways.org/consulting</a>). Hands-on development consultants can build a gateway from scratch or enhance a gateway, including adding features or integrating existing technologies. SGCI also provides experts with specialized knowledge in a variety of areas applicable to gateway development, growth, and sustainability: usability and graphic design, cybersecurity, business and sustainability planning, and user engagement. As of April 2019, consultants have worked on 70 projects across 40 clients, with some clients benefiting from multiple areas of SGCI's expertise.

SGCI's consulting services can offer the equivalent of having a quarter-time staff member devoted to a project or an expert consultant providing guidance over several months, yet NSF's support allows these services to be offered for free. At any given time, we have the capacity to serve up to 12 software development projects, plus we offer 13 specialist consultants with expertise in other topics.

In addition, the Gateway Catalog provides a growing collection of gateways and software that's searchable and browsable (<a href="https://sciencegateways.org/resources/catalog">https://sciencegateways.org/resources/catalog</a>); visitors can look for a software component to use, browse gateway "role models" for inspiration, find gateways to use for research or educational purposes, or add their own gateways and software for others to find. As of April 2019, the Catalog has almost 600 entries, including more than 80 software components that can be reused in projects.

#### 3 Education and Training

SGCI's education and training services and resources include an array of formats and functions, both face-to-face and virtual. For example, the Science Gateways Bootcamp borrows concepts from entrepreneurship to offer an intensive, week-long workshop for gateway-development teams to learn how to effectively build and sustain gateways (<a href="https://sciencegateways.org/bootcamp">https://sciencegateways.org/bootcamp</a>). This program is open to all gateway projects twice a year, with additional "mini" versions and custom versions offered by request. This specialized training could easily cost \$5000 on the open market, yet participants only need to cover their travel, hotel, and a few meals. SGCI has already served 210 Bootcamp participants representing 36 projects.

Virtual learning formats are also available to the community. The monthly webinar includes a rotating selection of topics of interest, including technology presentations, best practices overviews, and a gateway showcase. These webinars, which began in January 2017, are recorded and archived on SGCI's website and have received nearly 4000 views to date (https://sciencegateways.org/engage/webinars).

The annual Gateways conference is another way that members of the community gather to learn from each other and share their experiences. Two days of peer-reviewed papers, demos, and panels cover a variety of topics and technologies while a full day of tutorials offers in-depth how-tos with a hands-on format. Each conference also features thought-provoking keynotes, social events, and plenty of opportunities for spontaneous connection. In the three years since it started, the conference has welcomed 335 attendees and more than 100 presentations archived for reference (https://sciencegateways.org/engage/annual-conference).

Student programs are offered during the summer and at events throughout the year. SGCI supports students to participate in eight-week summer internships working on the development of a gateway under the mentoring of experienced professionals as well as year-round internships focused on usability. A summer, four-week Coding Institute also introduces undergraduates to the skills and concepts necessary for building gateways. During the year, special programs are offered at major conferences, including PEARC, ADMI, and our own Gateways conference. At PEARC in 2019, SGCI is organizing the Hackathon portion of the PEARC Student Program. Educators are also a vital part of this community, and about 13% of 324 individuals who have participated in SGCI's Workforce Development programs have been faculty (https://sciencegateways.org/engage/annual-conference).

Finally, the Gateway Catalog also has a special "Education" tag to identify the 37 gateways (and counting) that are used in the classroom, and the Catalog more generally is an excellent way to learn about how gateways have been designed and the technologies behind them.

#### 4 Community Resources and Networking

A relatively new Community Forum, hosted through Google Groups (<a href="https://sciencegateways.org/community/forum">https://sciencegateways.org/community/forum</a>), has welcomed members of the community to post their questions and concerns to their peers. Correspondence is archived for future reference. A monthly newsletter and Twitter feed complements the Forum by announcing events, news, and opportunities of interest to the broader community

(https://sciencegateways.org/community/newsletter and https://twitter.com/sciencegateways).

Modeled on the successful XSEDE Campus Champions, the Gateway Ambassadors program is a brand-new initiative to spread awareness of and support for gateways. This program is designed to engage individuals at campuses throughout the US to provide a point of contact for their local community. Gateway Ambassadors are provided with materials, guidance, and the experience of their Ambassador colleagues to help them give presentations, advise

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local gateway creators, and connect gateways with expertise on their own campus or at SGCI

(https://sciencegateways.org/engage/gateway-ambassadors).

A Science Ambassadors program, now in its first year, was developed to offer financial support to domain scientists who want to spread the word about their work with gateways (<a href="https://sciencegateways.org/engage/ambassadors">https://sciencegateways.org/engage/ambassadors</a>). They receive travel funds to present their research or offer tutorials using a specific gateway.

Other vital parts of the community are SGCI's Partner and Affiliates Programs (<a href="https://sciencegateways.org/about/partners">https://sciencegateways.org/resources/affiliates-program</a>). SGCI's 11 Partners represent complementary services, resources, and/or community members, providing an open pathway for people and organizations to connect with each other and pursue additional opportunities. The 13 Affiliates agree to provide support to gateway projects that are interested in implementing their software tools, again expanding the range of expertise and resources available to members of the community.

In addition, SGCI offers searchable online resources, including publications, case studies, and learning materials, and welcomes community contributors to add their own listings to the collection (https://sciencegateways.org/resources/resource-search).

Gateway Catalog described earlier is also part of this collection of resources.

#### 5 Conclusion

Together, these three categories of services and resources help to optimize the gateway development process, creating a product that's more economical, scalable, and sustainable. By providing a way to connect, the SGCI hopes that the community may more easily share expertise, technologies, and best practices for all aspects of creating and sustaining gateways. Further information about all of these services is at <a href="https://sciencegateways.org/">https://sciencegateways.org/</a>.

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Are you developing websites and software that serve your discipline?

Do you wish you could connect with and learn from others doing the same thing?

We're funded to help you.

Gateways offer Web-based access to shared resources, including data, software, computing services, instruments & teaching materials.

SGCI can also help you build or enhance your:

- eScience
- Virtual Research
- Portal
- Tortal
- Virtual Lab
- eResearch
- Digital Scholarship
- Research
- Cyberinfrastructure

## Support for Building & Running Gateways



Get Hands-on Help



Ask for Advice

# Community Resources & Networking



Connect with the Community



Find Gateways, Software & Other Resources



Participate in Student Programs & Workshops



Engage with & Learn from Experts & Peers

Education & Training



You make the science happen.
We are funded to help optimize
your development process,
creating a gateway that's more
economical, scalable, and sustainable.



sciencegateways.org

The Science Gateways Community Institute (SGCI) serves the gateway community with free, NSF-funded resources, services, experts, and ideas. Our community shares expertise, technologies, and best practices for creating and sustaining gateways.

Figure 1: Poster about the SGCI