

This is an Author's Accepted Manuscript of a chapter to be published in *How to STEM: Science, Technology, Engineering, and Math Education in Libraries*. Carol Smallwood, Vera Gubnitskaia, co-editors. Forthcoming from Scarecrow Press.

Celebrating Geographic Information Systems through GIS Day @ Your Library

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Overview

GIS Day celebrates geographic information systems (GIS), a technology that incorporates elements from all four STEM subject areas. Not only does GIS provide a valuable multidisciplinary tool for STEM educators, it is also an opportunity for libraries to highlight their GIS resources for STEM students and professionals. Organizing a GIS Day event at your library will educate the general public, schools, and academic communities about GIS technology and applications, which make a difference in their lives.

This chapter includes:

- An introduction to GIS and its importance
- The connection between GIS and STEM education
- GIS Day @ Your Library: a step-by-step guide
- Helpful resources

GIS: An Introduction

GIS technology is a multidisciplinary tool used to organize, manipulate, and analyze spatial information. Any data that has a spatial component can be visualized using GIS. Here are a few basic facts to help you understand GIS technology and its importance.

1) GIS utilizes layers of geographic data. These data layers are linked to tables, which include specific attributes in addition to geographic coordinates. Multiple layers of geo-referenced information allow the user to identify and study spatial relationships.

2) GIS is a problem-solving tool. Almost every major issue we are facing today is spatially relevant. Crisis management, environmental modeling, urban planning, and wildlife conservation are among the many diverse fields that use GIS to study and solve critical issues.

3) GIS is on the rise. The use of GIS in interactive online maps, such as GoogleMaps, has increased interest in geography-based technologies. GIS puts the power of map creation into the hands of the public, including educators and students. The wide use of global positioning systems (GPS) in smartphones and other navigational devices has also increased public awareness. One common misconception is that GIS and GPS are interchangeable terms. However, GPS is a specific technology which uses transmitters and trilateration to get exact locations on the earth via a network of satellites. GPS is used for navigation and to collect location-based data. The geographic data that is used in GIS is often collected through the use of GPS technology.

Making the connection between GIS and STEM Education

Advancements in science, technology, engineering, and mathematics were vital to the development of GIS technology. However, GIS also gives back to each of the STEM fields by creating new avenues for study and advancement. For instance, Gilbrook (1999, 34) highlights the importance of GIS to engineering, “GIS can help engineers analyze vast amounts of data

from a variety of disciplines to create comprehensive, accurate, and efficient environmental reports for transportation projects.”

Studies also suggest that GIS enhances the understanding of STEM subjects by students (Wai, Lubinski, and Benbow 2009, 817) and that “spatial thinking is associated with skill and interest in STEM fields” (Newcombe 2010, 29). GIS is STEM applied. GIS allows practical application of STEM subjects in a problem solving context while encouraging critical and analytical thinking. GIS enables STEM students to practice what STEM professionals do in their jobs everyday (Baker 2012).

GIS Day @ Your Library

GIS data collections and services are now being offered in many libraries. As purveyors of information, libraries have the responsibility to educate their users about GIS technology and its application. According to Weimer, Olivares, and Bedenbaugh (2012, 42), “Global events like GIS Day...afford excellent opportunities to promote both the library itself and specific services where they exist.”

Every November, the Wednesday of Geography Awareness Week is dedicated to celebrating GIS and educating the public about its application. This is an opportunity for libraries to take the lead in introducing STEM students to GIS technology. Libraries can be a central place for many in the community to learn about GIS.

The Steps

First of all, you do not have to be an expert in GIS to organize a GIS Day. You just need to 1) understand why GIS is an important tool, 2) build your team (including experts), and 3)

focus on learning goals and having fun. Everyone has to start somewhere and it is the same for organizing your own GIS Day Event.

Phase 1: Defining the scope of your GIS Day Event

Step 1: Goals. The objectives of your GIS Day event should align both to the intended purpose of GIS Day as well as the mission of your library.

Some common goals are:

- To increase awareness of GIS including how it is being used in research and in practical applications to improve the community
- To provide a forum where local companies, organizations, agencies, and those who use GIS can share their work
- To provide educational outreach to schools and to build GIS technology knowledge and skill sets in students
- To highlight the usefulness of GIS to STEM students and professionals
- To promote GIS and geography-related collections and services to your library patrons

Step 2: Audience. In addition to the primary population you serve, you may consider broadening your audience to include other user groups in your community. For example, a university event could invite K-12 classes to attend. Defining your audience will guide your planning for specific activities and venue requirements for the event.

Step 3: Stakeholders. Understanding who the stakeholders might be will help determine your planning team and community partners. Gather information about who in your

community uses GIS and would potentially be interested in participating in the event. If you are focusing your GIS Day event on STEM subjects, remember to ask STEM professionals about how they use GIS. Stakeholders can be those who are directly or indirectly impacted by GIS.

Phase 2: Planning Your GIS Day

Step 1: Get administrative support. If possible, talk to your supervisor in person about your GIS Day proposal. Having a one page summary outlining the scope (goals, audience, and stakeholders) will help.

Step 2: Recruit your planning committee. The research you put into defining your stakeholders comes to fruition when recruiting your planning committee. It is important to get as wide a representation of interests on the committee as possible.

Possible members to include:

- Other library staff
- Academic faculty or graduate students interested in GIS
- Teachers who are interested in using GIS in their classrooms
- Members of special interest groups, such as a Geography Student Association or a geocaching club
- Volunteers from the public who are interested in GIS

Once you have recruited your planning committee, set up a planning meeting. During your meeting explain the scope of your project as defined during Phase 1.

Step 3: Brainstorming. There are multiple elements to your GIS Day which require input from your committee including who your community partners will be and which events you would like to include in your GIS Day. Below are just a few examples of community

partners and potential activities that you may want to consider for GIS Day @ Your Library.

Community Partners:

- **Schools:** Education plays a central role in any GIS Day celebration. For that reason, no matter what kind of library you work in, a GIS Day celebration often involves participation from one or more educational sectors, either primary, secondary (including AP classes), and/or higher education. Students can be invited to submit digital mapping projects or posters. Professors at universities can be encouraged to give their students extra credit for attending GIS Day events.
- **Commercial:** Local businesses can be helpful partners for GIS Day. Surveyors, GIS specialists, geologists, archeologists, civil engineers, and landscape engineering firms are just a few of the commercial professions that have an interest in GIS and furthering GIS education. Increasing awareness about what they do and how they do it can be a compelling reason to them to get involved.
- **Government:** Local city and county planners, water management districts, and other government agencies such as the United States Geological Survey and the Fish and Wildlife Service have GIS experts on staff that are often willing to be involved with a local GIS Day event.

- **Community Groups:** There may be special interest or student groups interested in participating in a GIS Day celebration. For instance, many communities have local geocaching groups. Geocaching has become a popular activity with the rise of smartphone and GPS technology and local groups involved in the hobby can help you plan a geocaching activity for your GIS Day. Student groups interested in STEM subjects are also a good source for collaboration.

Activities:

- **Speakers/Presentations.** Your stakeholders and community partners are good potential speakers and presenters. Remember that if you do not have money in the budget for honorariums, then your presenters will most likely have to be local. When thinking about what kinds of presentations you would like to include, be sure to consider your audience and their knowledge level and ask speakers to tailor their presentations to meet your needs. Consider giving them a theme that will connect all the speakers together, such as how GIS is used in STEM fields.
- **Career Fair.** With interest in GIS jobs on the rise, career and information fairs can generate a lot of interest. Contact businesses that employ GIS professionals well in advance if you would like to invite them to set up a booth at a career fair.
- **Games.** Fun and interactive elements for your GIS Day celebration could include geocaching (a scavenger hunt carried out using GPS units) and/or geodashing (a race using GPS units to find a predetermined location).

- Poster Sessions and Map Contests. Invited poster sessions from university students and faculty can be used to showcase a wide range of GIS applications in research. Maps contests are a great way for students to show off their work in GIS - but make sure you budget in some money for prizes!
- Workshops. Workshops can be a helpful way to serve a wide range of user needs. They can be used for a basic introduction to GIS or to cover more advanced topics. Libraries can also take advantage of workshops to highlight their GIS services and resources.

Step 4: Consider logistics. Once you have brainstormed events and partners and decided whom and what you want to include, it is time to figure out the venue, refreshments, and your budget.

- Venue. When considering a venue, the anticipated size of your audience and activities you will want to include are key factors. If you are having a speaker series, you will need a venue that includes a computer, projector, and screen along with presentation software. Workshops will need a computer lab with GIS software installed (see Helpful Resources). Remember, every activity does not have to happen in the same location and some things can happen simultaneously. For example, you may want to schedule a beginners GIS workshop and an advanced GIS workshop at the same time since the intended audiences don't overlap. Also, if possible, reserve the venue for your GIS Day the afternoon before. That way setting up chairs and hanging posters can be done beforehand.
- Refreshments. Refreshments can be a good way to draw in crowds and to offer a nice break for participants. If you have the money, consider getting a large cake

with the GIS Day logo printed on it. Cakes can feed a lot of people at an affordable price.

- Budget. Money will be a limiting factor in your GIS Day celebration. Since GIS has a lot of support in various fields, seek corporate or local business partners to cosponsor the celebration with the library.

Step 5. Establish a timeline. Officially, GIS Day is celebrated on the Wednesday of Geography Awareness Week every November. It is helpful from a marketing standpoint to tie it to the international event date, but if another date works better for your library, then do what works for you! Once you have decided on a date, it is best to begin the process up to 6 months in advance. The main considerations when forming your timeline are scheduling your speakers and venue(s). Additional time requirements will vary depending on what events you have decided to include.

Phase 3: Implementing your plan

Step 1: Contact stakeholders and form partnerships. As soon as possible, let your stakeholders and partners know about your plans. The quicker they can get an event onto their calendars the more likely it is that they will be able to participate. Continue to build support as you go along and continue to contact new stakeholders as you discover them.

You never know who your biggest champion will be!

Step 2: Marketing. Similar to listing books in a library catalog so that they can be found, marketing is necessary for your audience to find out about your event. Marketing ideas:

- Webpage. Having a dedicated page on your library website will naturally increase awareness of your event. Weimer et al. (2012, 52) suggests the following for GIS Day webpages:

- Write the pages in HTML so that they are accessible to search engines
- Include pictures and/or videos of people interacting with GIS technology
- Keep past GIS Day pages live once they have been created so that people searching for GIS Day events have a better chance of finding out about yours
- Register your GIS Day event on the official GIS Day website (search worldwide GIS Day celebration).
- Create a geocache. Having a geocache hidden on library grounds which people can find using clues and GPS devices is a good way to increase interest in GIS and related technologies. If you can, relate the “treasure” that they find to GIS Day. Be sure to register it on “Geocaching: The Official Global GPS Cache Hunt Site” so that interested people can find it!
- Mobilize your stakeholders. Don’t forget to reconnect with your stakeholders and remind them to spread the word to other interested parties. More than half the battle is getting information about your event to the right eyes and ears.

Step 3. Organize and Delegate

Organization and delegation should be occurring throughout the planning and implementing phases. However, here are some tips to help keep you on top of the event.

- Keep a contact list. A running list of names, contact information, and affiliations will help you keep in touch with the right parties as well as be a valuable resource for years to come.
- Continue to update your timeline. An established timeline is necessary in the planning phase (see Phase 2) but it doesn’t end there. As more specific

information comes to light about deadlines, keep your planning team updated through a shared calendar.

- Printing. Remember to print out signs, flyers, and evaluation forms well in advance of your event. Also, individualized itineraries for teachers who are bringing along classes of children can be helpful and cut down on confusion.
- Extra credit. Provide teachers with an example extra credit assignment on your webpage to further encourage participation.
- Speaker needs. If you are having a speaker series, make sure you get the presenters' biographical information before the big day. Ask them to send you their presentations via email as a backup and so that they can be preloaded onto the presentation computer.
- Delegate. Divide up responsibilities for specific activities among members of your team, such as the speaker series and geocaching game.

Step 4: Tackling the GIS Day Celebration

Finally, the big day arrives! There are always last minute things to take care of on the morning of a big event but at some point you just have to hold on and enjoy the ride.

Tips for the day:

- Have business cards ready
- Provide name tags and water for the presenters as well as for your helpers
- Make sure you test out AV equipment
- Don't forget the evaluation forms and assign someone to count attendees hourly rather than just once the entire day
- Have fun! It is very rewarding to see all your hard work come together

Phase 4: Wrap Up

Step 1: Thank You Letters. Send out thank you messages to those who actively participated in your GIS Day soon after the event. Stakeholders will appreciate your acknowledgement of their help and it will pave the way for future collaborations.

Step 2. Assessment of Feedback. Thoroughly analyze the feedback given on the evaluation forms to understand your audiences' reaction to the event and to get ideas for the future.

What to ask on the evaluation form:

- Which event activities did you attend?
- How did you hear about GIS Day?
- What information did you find the most useful? Least useful?
- What kinds of activities would you like to see at future GIS Day events?
- Did the event meet your expectations?
- How could this GIS Day event have been improved?

Step 3: Wrap-up meeting. Conduct a wrap-up meeting with your planning team. Discuss successes along with failures. Being able to admit shortcomings will help you improve your GIS Day event in the future.

Step 4: Pre-planning for next year. Since GIS Day is an annual event, look towards planning for next year. A one-page write-up of the event will help inform library administration about your successful outreach and will be a good marketing tool for next year's GIS Day.

Helpful Resources

There are resources available to help you feel fully prepared for your GIS Day event. One primary need is access to GIS, especially if you want to have hands-on workshops. The major provider of GIS software is Esri. They offer individual, student, and institutional site licenses for ArcGIS, their primary GIS software. Check with your institution to see if you already have access to ArcGIS. If it is not available, you can sign up for a personal account that will give you access to Esri's online resources including free-to-use GIS programs. The Esri website says that "with a free ArcGIS Online personal account you can create, store, and manage maps, apps, and data, and share them with others. You also get access to content shared by Esri and GIS users around the world" (ArcGIS Online Free Personal Account, 2012). Another option is to use other free online apps such as GoogleEarth to demonstrate GIS principles.

For additional help, visit the official GIS Day website - search: worldwide GIS Day celebration.

On the website you will be able to:

- Register your GIS Day event
- Get the official GIS Day logo for use on promotional items
- Get additional activity ideas
- Find information on past GIS Day events at other institutions around the world

Geocaching is a fun GIS Day activity. If you would like to conduct a geocaching game or set up a permanent geocache on your library grounds, look up "Geocaching - The Official Global GPS Cache Hunt Site". You will be able to find a helpful introduction to geocaching called "Geocaching 101," information on how to register your geocache, and other geocaches in your area.

Finally, to further study the connection between GIS and STEM subjects, check out these online resources.

- “GIS is STEM” from Esri Education Community. Information about the relationship between GIS and STEM, including examples of projects from STEM fields using GIS <http://edcommunity.esri.com/stem/>
- “Exploring GIS and STEM” from Esri Education Community. An educational map gallery showing “how GIS can be used in any STEM field.” <http://downloads2.esri.com/EdComm2007/gallery/STEM/index.html>
- “Geospatial Technologies” from National Center for Rural Science, Technology, Engineering & Mathematics Education Outreach-Lesson plans “designed to introduce and use GIS as a tool for middle school science and mathematics” <http://www.isat.jmu.edu/stem/curriculum.html>

Conclusion

While undertaking an event like GIS Day can seem daunting, there are many valuable outcomes that make it worthwhile. GIS Day @ Your Library will allow you to highlight GIS technologies as well as any GIS or geography-related services offered by your library. It will also show the value of GIS as a tool for STEM fields. Students studying STEM subjects will greatly benefit from understanding GIS and how they can utilize it in their research projects. Celebrating GIS through GIS Day @ Your Library can be a welcome addition to your library’s educational outreach programs.

Works Cited

“ArcGIS Online | Free Personal Account.” Esri, accessed 09/20, 2012,

<http://www.esri.com/software/arcgis/arcgisonline/features/free-personal-account>.

Baker, Tom. 2012. *Advancing STEM Education with GIS*. United States of America: Esri.

<http://www.esri.com/library/ebooks/advancing-stem-education-with-gis.pdf>.

Gilbrook, MJ. 1999. "GIS Paves the Way." *Civil Engineering* 69 (11): 34-39.

Lisichenko, Richard. 2010. "Exploring a Web-Based Pedagogical Model to Enhance GIS Education." *Journal of STEM Teacher Education* 47 (3): 49-62.

Newcombe, Nora S. 2010. "Picture this: Increasing Math and Science Learning by Improving Spatial Thinking." *American Educator* 34 (2): 29-35.

Todd, JL. 2008. "GIS and Libraries: A Cross-Disciplinary Approach." *Online* 32 (5): 14-18.

Wai, Jonathan, David Lubinski, and Camilla P. Benbow. 2009. "Spatial Ability for STEM Domains: Aligning Over 50 Years of Cumulative Psychological Knowledge Solidifies its Importance." *Journal of Educational Psychology* 101 (4): 817-835. doi:10.1037/a0016127.

Weimer, Katherine H., Miriam Olivares, and Robin A. Bedenbaugh. 2012. "GIS Day and Web Promotion: Retrospective Analysis of U.S. ARL Libraries' Involvement." *Journal of Map & Geography Libraries* 8 (1): 39-57. doi:10.1080/15420353.2011.629402.

<http://dx.doi.org/10.1080/15420353.2011.629402>.

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information librarian. In 2007, she organized the first ever GIS Day on the University of Florida campus and each year the library-hosted event continues to grow and improve. In November 2012, UF will be celebrating its 6th Annual GIS Day.