Towards an Understanding of Sustainability of Web-Based Digital Mapping Projects

Executive Summary

The making of maps is no longer restricted to the rarefied realm of cartographers. Students, scholars, and researchers in all fields have recognized the power that maps can bring to data of many kinds. Architectural scholars can integrate digitized historical maps and demographic datasets to analyze changes over time in different neighborhoods; oceanographers can marry the bathymetric measurements to the configuration of the coastline and layer that with storm-related data to estimate storm surge in coastal communities. A historian explores geopolitical change over time, by layering political boundary lines and other features over a map of Africa. Thanks to easily available mapping software, it is increasingly easy to experiment with and build mapping projects to answer questions and share data.

And yet, many of the tools and platforms that make this possible are part of for-profit businesses, such as Google or ESRI. Others, like Mapzen, are open source, but subject to the same vagaries of many small organizations. Started in 2014 with over 70,000 users, Mapzen announced in 2018 that it would be ceasing operations, and its team disbanded, off to continue developing parts of the code, in the service of other organizations. Scholars and others in the academic sector whose work is built using these tools and platforms need solutions they can rely on to endure.

On May 30 and 31, 2019, Columbia University Libraries convened a group of 26 experts, practitioners, developers, and project leads from a range of disciplines to discuss the sustainability and preservation challenges specific to web-based digital mapping projects.[1] The meeting was designed as a series of discussions, brainstorming, and planning exercises, with the aim of identifying the issues and scope concerning the sustainability and preservation of web-based digital mapping projects. Workshop leaders sought to identify specific challenges, as well as some concrete types of solutions that might begin to address them.[2]

- The Summit involved lively full-group discussions, as well as significant time spent in small teamwork, defining the core challenges and solutions concerning the sustainability and preservation of web-based digital mapping projects. A discussion of **"What is a map?"** helped define some common terms when considering "web-based digital maps," including that the map must include some interactive element; we were not focusing on entirely static images
- The degree and type of interactivity considered was broad
- While some examples were critiqued for looking "out of date," it was acknowledged that they contained valuable data layers that would be difficult to recreate
- Some drew distinction between showing 'pictures' of images (points of interest) on maps, versus being dynamic maps themselves
- We discussed the importance of considering what elements of a project need to be sustained – the data layer(s)? The presentation layer? Algorithms and decision-making criteria?

Identifying Challenges and Solutions
The groups discussed challenges facing four different user/stakeholder groups: researchers and faculty; librarians and library staff; tech and preservation specialists; and funders and senior administrators. A

[1] A full listing of participants is available in Appendix II .
[2] The meeting agenda is provided in Appendix III. Findings from a survey of web-based digital mapping projects is available in Appendix VI.

prioritization exercise helped to sort the group into "solutions"-focused teams, which then developed ideas concerning the identified solutions. The approaches that teams addressed included:

- **Guidance, best practice**
    - Many suggestions emerged for ways to offer guidance to the community of builders/maintainers, including
        - **The Web-Based Digital Mapping Lifecycle**, demonstrating different paths throughout project creation
        - **Case studies of digital mapping projects** (by PIs, during the process; by independent research, retrospectively)
        - **Roadmap for new projects** Guidance to support PIs on choices concerning user experience, design, narrative and argument, sustainability paths and funding.

- **Infrastructure: Technology-related solutions**
    - Two interrelated strands emerged during this discussion:
        - Shared solution for **preservation of "finished" projects**
        - **Shared infrastructure that would support building** and facilitate maintenance of projects.
    - Discussion of sustainable, minimally viable platforms for different aspects of the map, in case the initial platform is deprecated.

- **Advocacy & making the case**
    - **Discussion of tactics and further data needed, including:**
        - Engaging with communities of practice already doing this work, e.g. RDA
        - Defining the value proposition of web-based digital maps (tools and data)
        - Incentives within and beyond the academy
        - Raising awareness of preservation problems as an educational effort
        - Adequately measuring the impact of these projects
- **Cross-institutional partnerships:**
    - **Developing a framework** for multiple institutions to work together to assess and potentially support or preserve maps or elements of them.

The findings of the workshop and post-workshop survey suggest a deep and growing interest not only in mapping tools for academia, but in exploring ways in which the academy itself can play an active and strategic role in supporting them. Certain details in our recommendations will be expanded in an addendum to this white paper after an in-person meeting of several Task Force members in January 2020 to continue developing the solutions outlined in that meeting, particularly the best practice/guidance and infrastructure solutions. This will be enabled by a no-cost extension on the Andrew W. Mellon Foundation grant that supported the conference.

Introduction & background

Since Google Maps was first introduced in 2005, scholars have benefitted from an increasingly rich array of affordable geospatial data, tools, and platforms that make it possible to create web-based digital mapping projects to further their research create new forms of scholarship. Today,

scholars and students in all disciplines increasingly make use of digital mapping, spatial data analysis, and visualization in teaching, learning, and research. While some web-based mapping projects may be undertaken by an individual scholar seeking to examine a specific question, others are built for and intended to be used by a much broader audience, whether a community of researchers or the wider public.

The notion of what a map is continues to evolve. Not limited to the static display of geographical or political boundaries in two dimensions, mapping initiatives in the academic sector span quite a range of fields, formats, and purposes. Maps created by scholars are being used for everything from tracking characters' progress through locations in a novel (WanderText), geolocating images and narratives (historical or new) onto maps (Photogrammar), assessing real-time risk of hurricanes to coastal cities (CERA Coastal Emergency Risks Assessment), to displaying historic inequality in relation to predicting future characteristics of cities. In recent years, academic libraries have made efforts to understand faculty needs and to supply faculty and students with the support they need to make use of existing tools for their work.[3]

The enthusiasm for building web-based digital mapping projects, however, has outpaced advances in understanding how to best preserve and sustain these complex initiatives. In some cases, the sustainability and preservation challenges of mapping projects resemble those of other digital initiatives in the academy[4]: unclear plans for long-term leadership; lower amounts of participation or engagement from a desired user base; a technical structure that often prioritizes the user-facing presentation over the long-term preservation of the underlying data; insufficient funding for ongoing operations.

But digital mapping projects also present several challenges that, while in evidence in some other digital initiatives, take on particular urgency here:

- Mapping projects often rely on an ad hoc mixture of proprietary data, software, and technology platforms, and the ownership and licensing terms of the many components of web-based digital mapping projects can be complex.
- Some components of a mapping project, such as underlying data created by a scholar, may have established preservation strategies including recommended file formats and metadata standards, while others, like the coding needed to animate the user interface, do not.
- Certain critical elements of a digital mapping project, such as the tile layer which forms the background image of a map, are often drawn from data that is hosted by a third party, external to the project. The data may sit on servers owned and hosted by

[3] See Rikk Mulligan, ARL SPEC Kit 350: Supporting Digital Scholarship (May 2016). https://publications.arl.org/Supporting-Digital-Scholarship-SPEC-Kit-350/ and Ann L. Holstein, (2015). Geographic Information and Technologies in Academic Research Libraries: An ARL Survey of Services and Support. *Information Technology and Libraries*, *34*(1), 38-51. https://doi.org/10.6017/ital.v34i1.5699

[4] For a discussion of sustainability challenges to digital initiatives in the academic and cultural sectors, see Nancy L. Maron and Sarah Pickle, "Sustaining Our Digital Future: Institutional Strategies for Digital Content." (Ithaka S+R, 2013) http://sr.ithaka.org?p=22547; Maron and Loy, "Revenue, Recession, How Funders' Practices Influence the Future of Digital Resources," (Ithaka S+R, 2011); and Maron, Smith and Loy, "Sustaining Digital Resources: An On-the-Ground View of Projects Today," (Ithaka S+R, 2009).

commercial entities who may not share the Libraries' commitment to long-term preservation.
- Having elements of the map entirely beyond the researcher's control introduces a significant element of risk, should the third party change its business model, significantly alter or cease operations. This is the case whether the third party is a commercial entity like GoogleMaps, ESRI's ArcGIS, or MapBox, an open source effort like Mapzen, or a government agency like NASA.

While these maps provide powerful and accessible public facing scholarship, this potential instability threatens to diminish both the near-term impact of this scholarship and reduce the long-term preservation and sustainability, impeding the re-use of data and related research. There is a growing need to provide better recommendations for preserving and sustaining web-based digital mapping projects and enabling preservation for every stage of a project's lifecycle.

Some of this complexity is due to the fact that web-based digital maps are comprised of three distinct elements:

- **Basemap (or tile layer)** The images ("tiles") that together form the visual background of any web-map may be downloaded from an external provider, such as Google or provided as part of a mapping software package like Esri's ArcGIS.
- **Geospatial data** are information about objects, events, or other (markers) tied to a specific location. "Geospatial data combines location information (usually coordinates on the earth), attribute information (the characteristics of the object, event, or phenomena concerned), and often also temporal information (the time or life span at which the location and attributes exist)."[5]
- **Software code.** This includes the scripts that enable the functionality of the map, from zooming in/out, to rendering pop-ups and other visualization features. While the geospatial data may contain the content of a pop-up box associated with a specific geospatial feature that appears when the user clicks on it, the mechanism itself for generating and revealing the pop-up is a piece of software code, not part of the data and outside any data preservation scheme.

While these elements are structurally distinct, they function in very close coordination to produce what we think of as a web-based digital map. The geospatial data rely on supplemental software code to make the web-map possible, and the web-map itself is only part of the user experience (UX) of the project as a whole, which can often feature components outside of the web-map, like text, data visualizations, or images, that nevertheless interact with the web-map and should be preserved alongside the geospatial data and code.

It is critical to the future of scholarship based on web-based digital mapping projects to address the preservation and sustainability of new forms of scholarship based on new tools, methods, and approaches to geospatial information.

[5] "Geospatial Reasoning with Open Data," Kristin Stock, Hans Guesgen, in Automating Open Source Intelligence, 2016. via SciDirect blog.

Currently, Columbia follows the Library of Congress's National Digital Information Infrastructure and Preservation Program guidelines for preserving geospatial data. But we know that preserving and sustaining web-based digital mapping projects demands guidelines not just for data, but for the software code and UX, as well. In 2018, Columbia University Libraries identified a need for a focused effort to identify areas of greatest concern, develop a strategy to address these issues, and work at a national level to address both the near- and long-term preservation and sustainability of web-based digital mapping initiatives.

Additionally, though there are established procedures for archiving web sites statically, such as through the Library of Congress's snapshot-based Web Archive Program, the full range of interactivity of a web-based digital mapping project eludes the capabilities of web snapshot software.

Sustaining interactivity between technology layers is an issue across many domains of digital preservation. Because digital maps present a significantly complex instance of this issue within a scoped technical environment, it presents a compelling testbed for developing sustainability approaches that can transfer to other domains.

With support from the Andrew W. Mellon Foundation, Columbia University Libraries, in partnership with other libraries and web-based project preservation experts, explored the sustainability issues presented by web-based digital mapping projects, with the aim to mobilize a diverse group of scholars and preservationists to propose solutions that address the issue of preserving and sustaining web-based digital mapping projects at every stage of the project lifecycle. The need to preserve this scholarship is critical to the reproducibility of research in the academy as well as enabling public scholarship and projects used in critical decision making in times of crisis. A recent example of web-based digital mapping's central role in crisis response were the maps devoted to tracking the 2019 wildfires in California.

Scope and Scale of the Problem

One of the challenges in addressing the question of the sustainability of web-based digital mapping projects is in determining the outlines of the problem. What exactly constitutes a "digital map" or for that matter, the significance of having it be web-based? And certainly, once those lines are drawn, in what ways are the challenges that web-based digital maps and their creators/maintainers face at all different from those faced by leaders and maintainers of other interactive, public digital initiatives?

Initial discussions with the Advisory Group immediately surfaced the complexity of defining the sorts of maps the group felt were most at risk, most in need of support, and most worthy of that support.

What is a Map?

The Summit, therefore, opened with a lively discussion of **"What is a map?"** intended to define what sort of projects are under consideration when we consider "web-based digital maps." The room was divided into four teams, and each was asked to consider the same six projects, all of which are web-based, and involve maps.[6] The teams had time to explore the projects and discuss which felt more or less relevant to this context. The following key points of discussion emerged:

- **The distinction between "digital" and "web-based"; and static versus interactive.** The group felt strongly that while there are many artifacts online that are certainly maps, some are essentially images of static objects, such as a digitized image of a physical map. While still very important to consider the sustainability of these digital items, our focus in this project is not on collections of images, but on a more narrowly defined type of map, one that includes some interactive element.

- **The degree and type of interactivity.** There was discussion to refine what people felt was important about interactivity in a map. Among the things participants noted included:
    - A zoom functionality
    - An ability to use filtering to view a set of data points (points of interest) layered onto a map

- **The function of the map itself:** Or, is "raw" data ever really raw? Some participants felt that certain large-scale geo-sciences maps were not in scope here, because they were more about the presentation and analysis of complex data and complex collection methods typical in the geosciences. This was countered by others who argued that if the map permitted users to query the data to assist real-time decision-making, for example, or otherwise manipulate the data to respond to different queries, then it would be in scope.

- **Contribution to scholarship:** Because the group was not solely interested in mapping for mapping's sake, but in its applications in both scholarship and its applications to broader audiences, making sure the mapping project was offering a contribution to scholarship was important. There were several ways in which that could be the case:
    - A major dataset, being used by scholars, who query the mapping project, as a means of formulating new questions or of analyzing data, to pursue questions they may have.
    - A map as a representation of a scholar's argument
    - A map that permits real-time decision-making, through use not just of a tile layer and points of interest, but of simulations or algorithms.
        - And further, a mapping project that may capture queries or real-time mapping data in a way that can be queried retrospectively, in order for scholars to understand past events.

Finally, while some mapping projects were initially ruled "out of scope" for having interfaces that appeared to be quite dated further discussion suggested that even older projects may well contain valuable data sets that could still be useful to other projects or other scholars and were

[6] The projects reviewed were chosen to illustrate different types, formats, and functions of mapping projects. They included eBird, Digital Attack Map, AfricaMap, Mapping Gothic France, Coastal Emergency Risks Assessment (CERA), and Placing Segregation.

the result of either original scholarship or extensive work to create, therefore being difficult to recreate, if lost.

Survey of Mapping Projects

Given such a broad definition, Summit participants realized that there might be many initiatives in higher education and cultural heritage in a wide range of disciplines that face a similar set of challenges. Following the Summit, we designed and launched a simple data gathering instrument to attempt to gain a firmer sense of the scale and diversity of projects.[7]

The inventory was shared broadly by the Summit participants and resulted in information about 89 web-based digital mapping projects. Most of the projects were in the Humanities (58%), followed by projects supporting Policy or Decision Support (16%), Social Sciences (12%), Natural Sciences (4%), Other (7%), Education (1%), and Information or Data Science (1%). Support for the projects was largely through grants from public funders or host institution support. The single biggest sustainability concern for the projects was Documentation of coding/programming for providing interactivity or deployment. It is worth noting that maps are not just for cartographers, geographers, or geoscientists, any more. This growing emphasis on mapping technologies throughout the disciplines is evident in this inventory.

[7] For the survey questions and findings, see Appendix VI.

Findings from the Summit

Participants of the Summit spent time both elaborating the many challenges facing web-based digital mapping projects, and developing concepts that might address those challenges.

Challenges

While the original impetus for this Summit was the need to support faculty building digital mapping projects, it quickly became clear that beyond defining which type of mapping projects were in scope, determining the type of challenge they posed, and to whom, would lead to very different approaches to solutions.

To that end, with the Advisory Group, and during the Summit, we discussed some of those categories of challenges.

- **Technical and intellectual elements of a web-based digital mapping project.**
    - The mapping project may have value in any of its component parts - from the case tile layer, to the code used to create the map's functionality, to the data layer(s) that it draws from or otherwise incorporates to create visualizations. While some aspects - like the tile layer - may at first seem to be generic or just the geographic 'wallpaper' common to many maps - in a humanities project, the tile layer itself may not be a standard geographic representation, but something hand-crafted, an intellectual work.
- **The aim or intention of the project/project leaders**
    - As with many digital initiatives, whether the project is built with the intention of providing value to a community, or to the general public - as opposed to being the work of one scholar for a very narrow research question - suggests a different set of concerns. A public mapping project, being used for real-time decision-making, for example, will have a higher burden for reliability and 24/7 access than a map created to illustrate a scholarly argument and a higher burden for sound governance and succession planning, beyond one grant or the career of any single investigator.
- **The role of the stakeholder and relationship to the project.** While researchers and those building the mapping projects were the original stakeholders this Summit envisioned, it is clear that different groups have a real interest in making sure that projects like this are built to last, and in a way that offers greatest impact over time.

To that end, participants considered challenges from a range of viewpoints, representing four different user/stakeholder groups we felt were likely to have very different issues at stake. The

groups addressed the challenges of sustaining digital mapping projects from the point of view of: researchers/faculty; librarians and library staff; tech and preservation specialists; and funders/senior administrators.

Researchers and Faculty

Many participants in the Summit were indeed faculty researchers with direct experience with and responsibility for web-based digital mapping projects. The challenges they face are often quite similar to those for other (non map-related) digital initiatives. These include:

- Challenges with managing multiple data formats
- Lack of (reliable, ongoing) funding to keep projects going
- Decision-making concerning what should be preserved
- Risks of having all project knowledge in just a few people (or one person)

Librarians and Library Staff

If scholars who build the mapping projects are often the first stakeholder to confront sustainability challenges, librarians and library staff are often the people scholars turn to when problems arise. As such, it is important to have a sense of the problem of digital map sustainability from the point of view of those who may be a first point of contact for scholars building projects like this. In addition, some better resourced institutions may have libraries whose staff have undertaken map-related projects, as well.

- How should librarians decide, not only the projects, but what components of the project we should collect as part of the decision making process?
- What role can librarians play in educating project leaders about the best options - or sustainability risks - they have when developing a new digital mapping project?
- How can libraries know - or estimate more accurately - the costs for fully supporting complex projects like web-based digital maps, so that they can set aside funds for sustainability?
- How can libraries mitigate challenges given what is often a high degree of “uniqueness” in the technology stack, so this does not cause problems for preservation and shared solutions?
- How to define what version or elements of digital mapping project to preserve (and what exactly it means to preserve them).
- How to deal with the problem of streaming data (when data used in mapping projects is not built into the project, but is called upon from an external source)?
- Thinking of the web-based-digital-mapping project collection in a similar manner as collection specific librarians. What we collect now, people will use in future research so the projects selected for preservation should have long term value. As a comparison, libraries do not only collect books produced by the same institution.

Tech and Preservation Specialists

There are a host of issues that are specific to the technical stability and long term preservation and access of mapping projects.

- Maintaining living systems, so that the code is updated, features are added as needed, and security is regularly addressed.
- Staffing and retention, to mitigate risk tied to having single points of failure; succession planning that imagines an organization beyond the term of its founders, and developing suitable skill sets to meet demands.
- Standards, so that software and date are designed and managed in a way that is compatible with current best practice.
- Double-edged sword of benefits of broadly available commercial offerings - a rising challenge
- Because it attracts many more users - but may not have involved preservation or any guarantee of long-term access.

Funders and Institutional Administrators

Funders and senior administrators at higher education institutions have a slightly different take on the sustainability of web-based digital mapping projects. As key investors - whether via grants, or by enabling staff to spend time working on these projects - funders and administrators may see challenges in the ways projects are structured technologically or organizationally, that put the project's sustainability at risk. Administrators may experience the challenges facing PIs, when projects fail to grow, or lose access to a key mapping element, due to restrictive licenses, or the change in status of a privately held company.

- A key challenge for funders is to clarify whose responsibility it is to keep a project stable, growing, going forward. We know grantees responded to funder mandates around innovation and growth, so there is a disincentive to spend time just keeping things going.

- Institutions may not be sufficiently aware of the commitments they have taken on - meaning, that in order to obtain a huge grant, people in the institution have agreed (at some level) to contribute time, may have agreed to contribute other things in-kind. Does anyone track these commitments? Is there enough thinking around how long these commitments are intended to last?

- How can funders permit grantees to include funds for making projects sustainable? Does this mean more funding and investment up front? Funding or plans for preservation? Access to staff skilled in business strategy or preservation? Once the grant is awarded, the PIs no longer have the time or possibly skill set to take on these other tasks.

- How can maps be a special case, which might permit institutions to offer opportunities across campus to others working on similarly structured projects? Or offering opportunities to other scholars to work with “cool stuff” with our collections?

- To what extent can universities or institutions make best practice a requirement for creating mapping projects?

- Importance at the funder and institutional level to have clarity on the duration and expectations around a project - is this a three-year experiment, or expected to be built to last?

- Funders and institutions could work more closely to fund projects that are more closely aligned with institutional goals (as a hedge to be sure institutions are likely to want to keep investing in them).

- Can funding incentivize use of platforms and technologies that are more sustainable? If a program requires applicants to provide more extensive sustainability plans and documentation of institutional co-investment for projects that use technologies other than those sustainable technologies, it could point developers to more sustainable models or help develop support for sustaining a broader array of technology.

Towards Solutions

During the Summit, the discussion concerning the challenges faced by key users and stakeholders (researchers, librarians, tech staff, and funders/admins) led to a group discussion concerning the types of solutions that might best address their concerns. Everyone agreed that interactive maps are useful in presenting findings to large audiences, and that interactivity extended the scholarly value of a map enabling deeper participation by users. The facilitator grouped the types of solutions into four broad areas:

- **Best practice**: a range of types of guidance intended to help others in the field
- **Infrastructure and tools**: the notion that there might be aspects of the technology of map building and support that could be developed or managed by the academic community in the service of making it easier to create and support web-based mapping projects
- **Advocacy**: since “mapping” is still a field that is coming into maturity; there is a need for good data on its current and potential impact. This strand is not intended to be about developing marketing campaigns for maps, but rather to determine how to best measure the scope and impact of mapping projects.
- **Cross-institutional network**: How can institutions come together to share expertise and capacity for supporting mapping-related projects, at whatever stage support is needed, from project inception to preservation?

During and following the Summit, participants developed these ideas to suggest approaches they felt were the most immediately useful and most impactful. Below are descriptions of each of the four areas. In addition, two of the topics - best practice and infrastructure - inspired the most enthusiasm. In Appendix IV and V, we include fuller discussions of these two topics, which we believe are worth taking forward in a future phase of work enabled by a no-cost extension on this grant.

Best Practice and Guidance

While some sustainability challenges facing those who build web-based digital mapping projects are similar to the challenges of any digital initiative, others require more specific guidance, and the group felt that there were many forms this guidance could take, including:

- **Case studies:** Objectively reported observations of other mapping projects, defining the technologies used, preservation strategies employed, and impacts measured.
- **Guidance narratives:** Self-reported documentation by the PI and project team, outlining decisions made and steps taken for the maintenance and preservation of such a project from its earliest days. This would be valuable for the project team and for leaders of other projects.
- **Decision-making tree:** This would outline the key decision points that project leaders face when building and supporting mapping projects, including issues

concerning IP and licensing, working with third party content, and potential revenue sources.

Infrastructure and tools

There is a strong case to be made that mapping initiatives, if beholden to commercial platforms as a fundamental element in building or support, are at risk. The academic sector is in a position to consider approaches to building and/or maintaining the shared infrastructure and tools that can support mapping projects. The sector needs reliable, shared, modular components for mapping projects, and that entails reasonable assurance that the system will persist and be developed in ways that are driven by sector needs and, should that platform be deprecated, assurance that data will be portable to future systems. Commercial systems are widely used, but their persistence and development is tied to specific revenue goals outside the control of the sector, and data portability is not assured.

These needs are not unique to digital mapping, however, mapping may serve as a compelling use case for building the type of shared infrastructure (store, compute, etc) that is more generally needed for digital projects. That larger problem is difficult because of both scope (the amount of resources) and complexity (the number of and interrelations between resources). Digital mapping may be a good test case since it limits scope while still being sufficiently complex to prove viability in other domains.

Advocacy and “making the case”

While participants at the Summit all felt deeply that supporting web-based mapping projects was both urgent and a specific case, they also were aware that more data is needed in order to properly quantify the scale and scope of the works at risk, as well as the potential value and impact of digital mapping projects. To “make the case” for the significance of supporting web-based digital maps, it would be important to effectively assess: (1) long-term support for web-based digital mapping projects; (2) the risk involved if solutions are not found to support existing works and build ‘more sustainable’ new works; and (3) the significant value that is specific to “web-based digital mapping projects’ that is fundamentally different from the value of other types of digital scholarly outputs.

A cross-institutional network

This approach suggests that a community-wide solution could serve to both coordinate and share guidance and to create a network of institutions to coordinate provision of service. A similar model might be something like the Digital Curation Network, where resources are locally owned/managed, but coordinated at a central point, or the Program for Cooperative Cataloging (PCC).

For this solution to advance, we would want to probe interest in community engagement at a larger, more coordinated scale. The types of approaches such a cross-institutional body might address would be development of standards and practices, identifying special skills and capacity at different institutions, and a framework or model for how to allocate those resources to projects/people/institutions who need them. Down the road, a solution could also certainly include decisions to build shared tools or platforms, but the main thrust of this solution was to convene a group of stakeholders and to begin assessing the strengths/capacities of its members (eg data management, preservation)

Recommendations and Next Steps

The Summit brought together people working in academic, library, and cultural heritage settings, all of whom had direct experience either building or working with those who build or manage web-based digital mapping projects. The Summit confirmed the significance of the challenge to this particular class of digital initiative, and helped to make progress toward understanding what sort of action might be called for.

To some extent, web-based digital mapping projects suffer from the same suite of sustainability challenges faced by all digital initiatives that begin life as scholarly projects or innovative experiments that are run by people whose full-time jobs and responsibilities lie elsewhere. These challenges, and a range of solutions proposed to help remedy them, have been discussed, and continue to be debated. The Summit participants observed that digital mapping is notable for being both a hard problem in digital curation and a bounded problem. Because of this, solutions to sustainability problems in digital mapping should transfer and scale well to other areas of digital preservation, and solutions should also be obtainable, because the problem has a scope.

That said, Summit participants were able to zero in on a four very specific areas: guidance, infrastructure, advocacy, and institutional partnerships. We have chosen to focus on two areas - guidance and infrastructure - because they offer the opportunity for immediate action. In the appendices, these areas are more fully discussed and advocacy and institutional partnerships are integrated into those areas. We will explore the guidance and infrastructure area during January with a no-cost extension on this grant.

- **Best practice and sharing of guidance.** There are challenges specific to mapping projects that, if better understood, would help those building new projects to better future-proof them. The working group on “best practice and guidance” outlined a first set of suggestions for sustainability at the concept, build, maintenance stages of a mapping project. In addition, the working group made suggestions for developing self-assessment tools, improving documentation of decision-making when developing mapping projects and the code that drives them, and developing objective “sustainability case studies” specifically of mapping projects.

- **A plan for building shared infrastructure or tools** across academic/cultural sector. A concrete next step would be to convene the “infrastructure” team to develop a workplan for identifying shared infrastructure or tools that would be most impactful for the academic and cultural sectors. Specifically, a plan to either acquire, support, or build the most valuable elements, so that they are made available for use by the academic community, in a way that is transparent, affordable, and includes plans for long-term preservation and access.

The Summit made clear that the specificities of mapping projects, including the potential for impact, offers a strong argument for deeper coordination and action within the academic and cultural sectors, in ensure that the tools and building blocks are more easily available, that the methods used are more transparent for the sake for reproducibility and scholarship, and that the underlying infrastructure is more reliable and future-proofed, for the benefit of increasing and sharing knowledge.

Appendices

I. Summit Invitation

We are writing to invite you to serve on an Advisory Group for a recently funded Mellon grant *Towards and Understanding of the Sustainability of Web-Based Digital Mapping Projects* The 10-month grant will enable us to investigate the sustainability and preservation issues associated with web-based digital mapping projects. The proposed approach is to convene a cohort of scholars and preservationists within a concentrated period of time to identify the pressing issues related to the preservation and sustainability of web-based digital mapping projects and outline a set of guidelines for planning projects at every stage of their lifecycle. We propose this work will be organized by an Advisory Group and consultant, with the participation of a Task Force.

Your participation is a vital part of the success of this project. We hope you will participate with us at several key milestones in this work:

- To review and refine the methodology of landscape work, leading up to the Summit.
- To help in setting the agenda for the Summit, based on data gathered.
- To participate in a 3-day meeting: the planning session and the 2-day Summit.
- To assist in the drafting of the final report and recommendations.

We will be in touch shortly to start scheduling a first call. Even more pressing is to choose dates for the Summit. Our three options are:

- May 1-3
- May 29-31
- June 5-7

Please let me know by reply email which dates might be possible for you. We will begin the first day of the summit at noon, enabling the possibility of travel the morning of the first day.

We also want to take this opportunity to introduce you to Nancy Maron from Bluesky to Blueprint, who will be working on this grant with us.

We are happy to speak by phone if you have any questions and we can share the full text of the grant if that would be helpful.

All best,
Barbara Rockenbach & Rob Cartolano

II. Summit Attendees

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Rob Cartolano
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Chris Crosby
Project Co-I & Manager, OpenTopography

Alex Gil
Digital Scholarship Librarian, Columbia University Libraries

Jen Green
Dean, Barnard Library

Justin Matthew Joque
Visualization Librarian, University of Michigan

Laura Kurgan
Associate Professor of Architecture, Planning and Preservation, Director of the Visual Studies Sequence in the Faculty of Architecture, Planning and Preservation, Columbia University

Nancy Maron
Consultant and facilitator; President, Bluesky to Blueprint, LLC

Randy Meech
CEO StreetCred Labs, founder Mapzen

Christopher Miller
Library Applications & GIS Specialist, Massachusetts Institute of Technology

Dan Miller
Staff Associate in the Faculty of Architecture, Planning and Preservation, Columbia University

Jacob Nadal
Director of Preservation, Library of Congress

Mark Newton
Director of Digital Scholarship, Columbia University Libraries

Julie Sweetkind-Singer
Assistant Director of Geospatial and Cartographic Data, Stanford University

Dean Rehberger
Director of MATRIX, Associate Professor of History, Michigan State University

Erin Robinson
Executive Director, ESIP

Barbara Rockenbach
Associate University Librarian for Research & Learning, Columbia University Libraries

Jeremy Morse
Director, Publishing Technology, University of Michigan

Moacir P. de Sa Pereira
Research Data Librarian, Columbia University Libraries

Juan Saldarriaga
Associate Research Scholar in the Faculty of Journalism, Columbia University

Ammon Shepherd
Digital Humanities Developer, University of Virginia

Madeleine Thompson
Director, Library & Archives, Wildlife Conservation Society

Jeremiah Trinidad-Christensen
Head, Research Data Services, Columbia University Libraries

Greg Yetman
Senior Staff Associate in the Center for International Earth Science Information Network, Columbia University

III. Summit Agenda

Towards an Understanding of Web-based Digital Mapping Projects
Two-Day Summit
Butler Library, Columbia University
Thursday Butler 523/Friday Butler 203
May 30-31, 2019

Dinner Thursday night: Le Monde, https://lemondenyc.com/
Hotel: Lucerne, 201 West 79th Street: https://www.thelucernehotel.com/
Butler Library: https://library.columbia.edu/locations/butler/directions.html

Contacts:

Barbara Rockenbach (917) 238-1160
Nancy Maron (914) 882-8596
Rob Cartolano (917) 273-9136

Goals of the Summit:

- To define the problem: Sustainability & preservation challenges specific to web-based digital mapping projects
- To define the types of solutions that are needed and scale/shape of solution
- To prioritize the actors/stakeholders for whom these are problems
- To bring together stakeholders to address these issues from multiple points of view.

Deliverables of the summit:

- A framework or outline that will address the topics to cover in the final paper.
- Expand the inventory of mapping projects; determine what data to capture
- Expand the inventory of relevant software/platforms that support mapping projects

AGENDA: May 30 Defining the Problem

9:00 Breakfast, registration
9:30 Welcome. Introductions. Goals

9:45 **What is a Map?**
Working in small groups, we'll take look at a bunch of map-like projects to come up with a clearer sense of what sort of digital mapping projects are in or out of scope.

10:45 Break

11:00 **Sustainability and preservation challenges and risks**
We'll review survey results and discuss what "sustainability" means for digital mapping projects in particular.

12:30 Lunch

1:30 **Defining the Problem(s)**
Participants will work in small teams to articulate the types of challenges or risks, based on role: researcher/PI; library; funder; technologist; preservationist.

3:00 Break

3:30 **Defining the Problem(s)**
Full group shareback

4:30 Prep for Day Two: Towards solutions

5:00 Day Concludes
5:30 Dinner at Le Monde

AGENDA: May 31: Towards Solutions and Recommendations

8:30 Breakfast, registration

9:00 Welcome. Recap of Day 1. Plan for Day 2.

9:15 Randy Meech, CEO StreetCred Labs, founder, Mapzen

10:00 **Towards Solutions**
Small groups meet to outline approaches to different types of solutions

11:00 **Towards Solutions**
Teams report to full group on progress

12:00 **Next Steps** (working lunch, required)
Discussion of next steps and how we will stay in touch, post-Summit.

1:00 [End of Summit]

IV. SOLUTION BRIEF: INFRASTRUCTURE

Providing federated services that allow guidance to be put into action

Editors: Barbara Rockenbach and Nancy Maron
Participants: Laura Kurgan, Jake Nadal, Erin Engle, Aaron Cope, Greg Yetman, Juan Francisco Saldarriaga, Chris Miller

Statement of Need

Given the risk inherent in building with and relying upon private sector infrastructure for so many mapping projects, it is time for the academic sector to consider which elements of mapping tools and infrastructure might be beneficial to build and maintain. The sector needs reliable, shared, modular components for mapping projects, with reasonable assurance that the system will persist and be developed in ways that are driven by sector needs and, should that platform be deprecated, assurance that data will be portable to future systems. Commercial systems are widely used, but their persistence and development are tied to specific revenue goals outside the control of the sector, and data portability is not assured.

These needs are not unique to digital mapping; however, mapping may serve as a compelling use case for building the type of shared infrastructure (store, compute, etc.) that is more generally needed for digital projects. That larger problem is difficult because of both scope (the amount of resources) and complexity (the number of and interrelations between resources). Digital mapping may be a way in since it limits scope while still being sufficiently complex to prove viability in other domains.

Goals

At the Task Force Summit in May 2019, the working group on Infrastructure began to explore the benefits of shared infrastructure related to digital mapping projects. While other working groups are developing plans for recommendations that concern how and where launched projects might be hosted and “finished” projects might be archived, the infrastructure group is most concerned with identifying ways to make available the tools and data needed to develop, maintain, and grow active web-based digital mapping projects.

The aim of this area is to outline some possible directions for shared work/data/infrastructure in such a way that insures that the data/software is always accessible to the scholarly community and others.

Approach

Two approaches in particular offer immediate and impactful paths forward for this work:

- ***A strategic convening***, with the goal of identifying specific areas of constructive collaboration - specific aspects of the digital mapping infrastructure that are most ripe for academic governance and support - by bringing together a group of people expert in the technologies, content, and market needs related to digital mapping in the academic and cultural sectors.

- ***Pilot collaborations***, to permit first collaborations to move forward, as a means of testing key issues concerning partnerships, governance, and general enthusiasm of the academic and cultural sectors for this initiative.

Sections below offer a rough outline of the aims and resource needs for each of the approaches.

Strategic Convening
This would consist of a two-day on-site conference, bringing together key decision-makers to draft plans for deeper collaboration concerning shared services and infrastructure for digital mapping projects. Unlike the first Task Force Summit, this would focus specifically on technical solutions, as opposed to best practice. Those invited would represent the following stakeholder groups:

- experts who can talk in depth about existing mapping software, data, and technologies. We would aim to gather the greatest expertise, including from the private sector.
- Library administrators, whose institutions are in a position to support a shared initiative, whether by funding or contribution of developer/support time
- Practitioners from the academic and cultural space with deep experience in building mapping projects

The agenda for this meeting would involve:

- Review & discussion of landscape of projects and definition of who collaboration would most serve (audience/stakeholders) and the aims and potential impact of a shared solution
- Governance: Review of potential models for collaboration, including outlining who would manage the new initiative, funding sources, and a review of examples in the field.
- Draft of a roadmap, suggesting the right order of operations for elements to build, acquire, or otherwise manage.
- Identification of 2-3 models to take forward, with suggested funding for planning and implementation.

Pilot Collaborations
Two ideas emerged from the Task Force Summit, both of which, would offer immediate benefits to the academic/cultural community while providing a means of testing and refining the frameworks for how further collaborations could be supported.

Shared Tile Layer.

Every mapping project requires a tile layer - the images that represent the visual backdrop, the 'basemap' against which other data layers are displayed. Many projects make use of images (in JPG format), where the tile layer is pre-rendered; some, like Mapzen's vector tiles, are dynamic, generated on demand. Today, there are already some openly available solutions for accessing a tile layer, such as Open Street Maps (openstreetmaps.org).

Having a shared tile layer, available freely to all academic users, would offer a first means of moving away from reliance on commercial vendors. It might offer opportunity for experimentation in innovative ways to render the tile layer more efficiently. And could help to create a repository for those tile layers that are not strictly geographic representations.

Academic/cultural impact. The value for the academic community extends beyond the concern for long-term access. Rather, while the most common basemaps may offer traditional geospatial context, in the academic and cultural sectors, there have been many other innovative uses of mapping technologies, that take "map" as a starting point or metaphor to understand other questions:

- Museum, cultural sector. Pinpointing layers of varnish on an antique piece of furniture; details on a painting or sculpture; spaces in a room or building.
- Physiology, Neuroscience: mapping the body or specific areas, including the brain
- Cultural spaces: "invented" geographies, where tile layers represent fictional landscapes, such as those described in novels or fantasy fiction.

Community Points of Interest.

Just as every map has a tile layer, digital maps then layer that basemap with data points that are relevant to whatever topic is at hand. For a project like eBird, that might consist of bird sighting observations. For a GPS program, it might include information on where gas stations are located.

Academic/cultural impact. The notion of points of interest is often commercially driven - gas stations or restaurants along a driving route, for example - but for the academic/cultural sector, these data layers can signify substantial scholarly work, whether the data was created through original research or derived from existing datasets to address a new research question.

Some examples of this might include:

- POI related to locations visited by characters in a novel
- Buildings or public spaces that are relevant to a specific scholarly argument, political event/movement, or cultural moment

The notion of points of interest (POI) - as a work of scholarly impact - could be quite valuable to record, preserve, and share. This can represent original scholarly analysis and synthesis, and yet is a type of labor that has been difficult to capture, evaluate, attribute. And therefore, those who create them rarely benefit from this work in terms of building a professional portfolio for promotion and tenure.

A pilot for capturing points of interest data, specific to the academic and cultural sectors would provide an excellent test bed for ways to not only capture the data, but to develop means for its governance, evaluation and reuse.

V. SOLUTION BRIEF: BEST PRACTICE AND GUIDANCE
For leaders of Web-Based Digital Mapping Projects

Editors: Moacir P.de Sa Pereira and Jeremiah Trinidad-Christensen
Participants: Dan Miller, Jeremy Morse, Ammon Shepherd, Dean Rehberger

Statement of Need
While some sustainability challenges facing those who build web-based digital mapping projects are similar to the challenges of any digital initiative, others require more specific guidance, and the group felt that there were many forms this guidance could take, including:

- **Case studies:** Objectively reported articles, analyzing a range of mapping projects, defining the technologies used, preservation strategies employed, and impacts measured. The benefit of mapping case studies would be to demonstrate the variety of ways in which "mapping" technologies are being used in everything from humanities to geosciences to neuroscience; to illustrate technology approaches to dealing with the mapping components, including tile layers and documentation of data sets used; strategies for managing internal versus external data sources; approaches to public versus more restricted uses of the mapping programs; and approaches to driving usage and securing reliable forms of financial and non-financial support.
- **Guidance narratives:** Self-reported documentation by the PI and project team, outlining decisions made and steps taken for the maintenance and preservation of such a project from its earliest days. This would be valuable for the project team and for leaders of other projects.
- **Roadmap for people starting new projects.** Design choices, user experience choices, narrative and argument choices are documented during project production. Alternative platforms for each technological layer.
- **Decision-making tree:** This would outline the key forks in the road that project leaders face when making decisions about how to build and support mapping projects, including issues concerning IP and licensing, working with third party content and potential revenue sources.
- **The Web-Based Digital Mapping Lifecycle**, demonstrating different paths throughout project creation.

Guidance Narrative - a concept statement

In particular, the group spent time outlining what Guidance Narrative might look like. The benefits to a project team in capturing this level of documentation at the outset of a project, and updating it as work progresses and assumptions change: it would help establish expectations, set benchmarks, and capture institutional decision-making in real time.

But, if widely adopted, this would also provide valuable information for onboarding new members, for others seeking to learn more about the project, and for administrators considering

additional funding or support for the project. In that the guidance narrative would also be a means of documenting the contributions others have made to the work, this would be a key step towards proper attribution for work that creates and supports scholarship.

Description

The guidance narrative is a document that tells the story of the project. It should be an expected product attached to any web-based digital mapping project, just as, say, an "About" page or a list of collaborators is expected.

A guidance narrative would feature:

- **Timeline of events**. This timeline is a living document that demonstrates what the team anticipated in terms of deadlines and what the team actually delivered. The timeline can be broken into smaller chunks, such as planning, implementation, being live, decaying, and preservation.
- **Team description**. The narrative should describe every team member involved in the project, including when they joined and left, how much they contributed, and what their particular responsibilities and skills were. This helps future projects understand (or at least hopefully not underestimate) their staffing needs. Furthermore, it helps expose the labor of team members that can often end up hidden.
- **Technology stack and history**. The narrative should describe the technologies used at the various stages of the project, from what technologies helped or hurt in discovery and aggregation, through deploying the project, through the project's decay and ruins.
- **Sustainability/Decay/Ruin plan**. As with the above, and in resonance with the Socio-Technical Sustainability Roadmap, this plan blends the timeline with the team expectations and the technology stacks needed throughout the various stages of the project.
- **Thorough Description of the Minimum Project**. This narrative should include a description that would allow other practitioners to rebuild the project without ever having seen it or its source code. This description can include data codebooks, user stories, wire frames, accessibility strategies, and the like. Additionally, this description indicates what sections of the most-functional version of the project can be sacrificed in order to aid in preserving the project.
- **Suggested Table of Contents.**
    - 0. Introduction
    - 1. Proposal narrative
    - 2. Phase I (discovery and acquisition)
        - Staffing (team description)
        - Timeline
        - Changes
        - Technology stack
        - Consulted comparable projects (and their narrative guides)
    - 3. Phase II (Implementation)

        - Staffing… etc.
    - 4. Phase III (Release)
        - Staffing… etc.
    - 5. Sustainability/Decay/Ruin plan
    - 6. Phase IV (Sunset)
        - Staffing… etc.
    - Description of Minimum Project
    - Appendices:
        - (Redacted) Meeting minutes
        - Git commit history
        - Project Management Tasks (GitHub/etc. issues)

VI. Web-based Digital Mapping Project Inventory – beginning on the following page

Default Report

Web-Based Digital Mapping Projects Inventory

November 25, 2019 8:42 AM MST

Q1 - What is the name of the web-based digital mapping project?

What is the name of the web-based digital mapping project?
Recovering NYC's Nineteenth-Century Spanish-Language Press
Palestine Open Maps
Borderlands Archives Cartography
The Texas Freedom Colonies Project
Contemporary Chinese Village Gazetteer Data
Guantanamo Public Memory Project
akaKurdistan
Linguistic Landscapes of Leipzig
Placing Segregation
Digital Cartographies of Spanish Detective Fiction
Mapping Racial Trauma
Mapping Absence in Shakespeare
Mapping Islamophobia
Digital Atlas of the Roman Empire
Alonso S. Perales Correspondence
Visual Bibliography of Hispanic Periodicals in the US
Are We Good Neighbors?: Mapping Discrimination Against Mexican Americans in 1940s Texas
Survey of Small Historical Societies, Libraries and Museums for Hispanic Materials and Their Management
World Historical Gazetteer
Purdue Campus Facilities and Buildings Historic Database

What is the name of the web-based digital mapping project?

AustKin

Mapping Print; Charting Enlightenment (The French book trade in enlightenment Europe)

Glossopticon

Atlas of Southern Memory

Mapping the Movida

Envisioning California's Delta As it Was

Conflict Culture Research network

OpenTopography

Minnesota Historical Aerial Photographs Online

Map Warper

it doesn't have a name yet

French Book Trade in Enlightenment Europe

United Fronteras

Borderlands Archives Cartography

CHANGE Viewer (retired)

NPL Site Viewer (retired)

Haiti Interactive Map Tool

Jamaica Bay Water Quality DVAT

Hudson River Flood Impact DSS

AdaptMap

GMIS/HBASE DVAT

POPGRID viewer

SEDAC PES Viewer

SEDAC Hazards Mapper

What is the name of the web-based digital mapping project?

SEDAC Map Viewer

Chronotopic Cartographies for Literature

The Chinese Deathscape: Grave Reform in Modern China

ORBIS: The Stanford Geospatial Network Model of the Roman World

Stories from The Land: Indigenous Place Names in Canada

Canada's Commemorative Map

Pompeii Bibliography and Mapping Project

Geodisy - Geospatial Discovery for Open Canadian Research Data

A Continent Divided

Pleiades

Cigarette Citadels

Authorial London

Mapping Jewish Communities of the Byzantine Empire

Sanborn Maps of Milwaukee

Gaihozu: Japanese Imperial Maps

Welikia

Digital Mapping of Literature

Portable Antiquities Scheme

Pelagios

Digital Periegesis

Hestia

Borderlands Archives Cartography

The Gabii Project

Soul Liberty

What is the name of the web-based digital mapping project?

Music On The Move
True Size
Footprints
test

Q2 - What is the URL for the project?

What is the URL for the project?
C19latinonyc.org
palopenmaps.org
https://www.bacartography.org/
https://tamu.maps.arcgis.com/apps/MapSeries/index.html?appid=48f89e0f870c4400a990682a09cf919f
Contemporary Chinese Village Gazetteer Data
https://gitmomemory.org/
https://www.akakurdistan.com/
https://zenodo.org/record/835491#.XbsoX-gvOzw
https://dsps.lib.uiowa.edu/placingsegregation/
http://iowadigitalbridges.com/about/projects/nick-phillips-digital-cartographies-of-spanish-detective-fiction/
https://absentshakespeare.sites.grinnell.edu/
https://absentshakespeare.sites.grinnell.edu/
https://mappingislamophobia.org/
https://dare.ht.lu.se
not available yet
not public yet
https://arcg.is/1C1bbv
https://artepublicopress.com/museum-survey/
http://dev.whgazetteer.org
http://collections.lib.purdue.edu/campus
http://austkin.net/
http://fbtee.uws.edu.au/stn/interface/

What is the URL for the project?

https://glossopticon.com/

https://www.atlasofsouthernmemory.com/

mappingthemovida.com

http://westcenter.stanford.edu/projects/delta/map/index.html

n/a

https://opentopography.org/

https://apps.lib.umn.edu/mhapo/

http://maps.nypl.org/warper/

it doesn't have a url yet

http://fbtee.uws.edu.au/stn/interface/

https://unitedfronteras.github.io/

https://www.bacartography.org/

http://www.ciesin.columbia.edu/gcce/

https://sedac.ciesin.columbia.edu/data/collection/superfund/superfund-mapper

http://haiti.ciesin.columbia.edu/haiti_mapclient/

http://www.ciesin.columbia.edu/jbwq/

http://www.ciesin.columbia.edu/hudson-river-flood-map/

http://adaptmap.info/jamaicabay/

https://sedac.ciesin.columbia.edu/mapping/gmis-hbase/explore-view/

https://sedac.ciesin.columbia.edu/mapping/popgrid/

https://sedac.ciesin.columbia.edu/mapping/popest/pes-v3/

https://sedac.ciesin.columbia.edu/mapping/hazards/

https://sedac.ciesin.columbia.edu/mapping/viewer/

https://www.lancaster.ac.uk/chronotopic-cartographies/

What is the URL for the project?

https://chinesedeathscape.supdigital.org/

http://orbis.stanford.edu/

http://maps.canada.ca/journal/content-en.html?lang=en&appid=0e585399e9474ccf932104a239d90652&appidalt=11756f2e3c454acdb214f950cf1e2f7d

http://maps.canada.ca/journal/content-en.html?appid=3f3247733f244707bb77cd94a3c5ff2f&appidalt=255b1d3aaba446e5b2406977db503f22&locale=fr?utm_url&utm_source=canada-ca_commemorative-map

http://digitalhumanities.umass.edu/pbmp/

http://geo.frdr.ca/ [not yet configured]

https://library.uta.edu/usmexicowar/index.php

https://pleiades.stoa.org

https://web.stanford.edu/group/tobaccoprv/cgi-bin/map/

authorial.stanford.edu

byzantinejewry.net

http://webgis.uwm.edu/agsl/sanborn/

https://stanford.maps.arcgis.com/apps/PublicGallery/index.html?appid=1ed3022fc7884690a2f137bce9dfe4fe

https://welikia.org/explore/mannahatta-map/

https://editio.github.io/mapping.literature/

Https://finds.org.uk

https://pelagios.org/

http://periegesis.org/

https://hestia.open.ac.uk/

https://www.bacartography.org/

https://sites.lsa.umich.edu/gabiiproject/

Not yet published

Not yet published

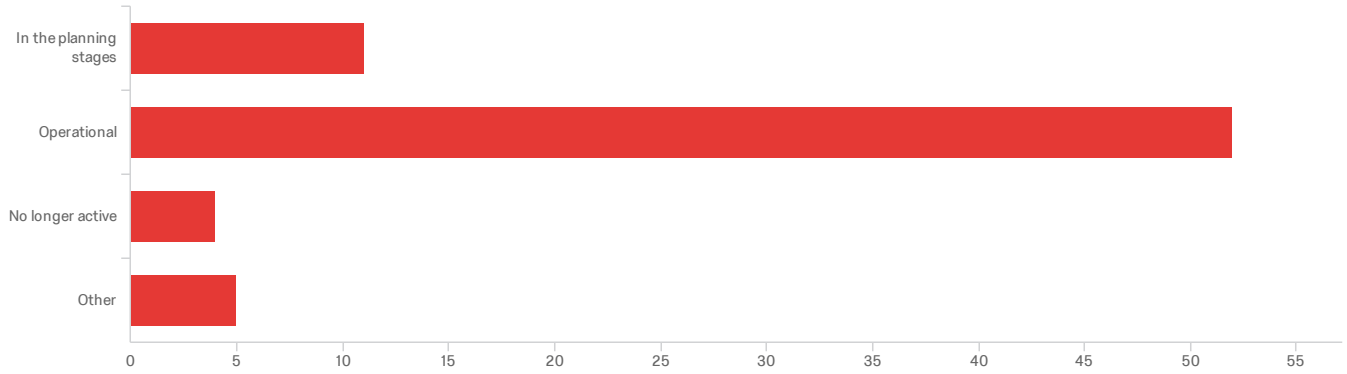
What is the URL for the project?

https://thetruesize.com/#?
borders=1~!MTQ5MDQwNzY.NjA2NDM3MA*Mjk3MjY1MzQ(Nzc2NTU5NQ~!CONTIGUOUS_US*MTAwMjQwNzU.MjUwMjM1MTc(MTc1)MA~!IN*NTI2NDA1MQ.N

Footprints.ccnmtl.columbia.edu

test

Q3 - The project is



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	The project is - Selected Choice	1.00	4.00	2.04	0.70	0.48	72

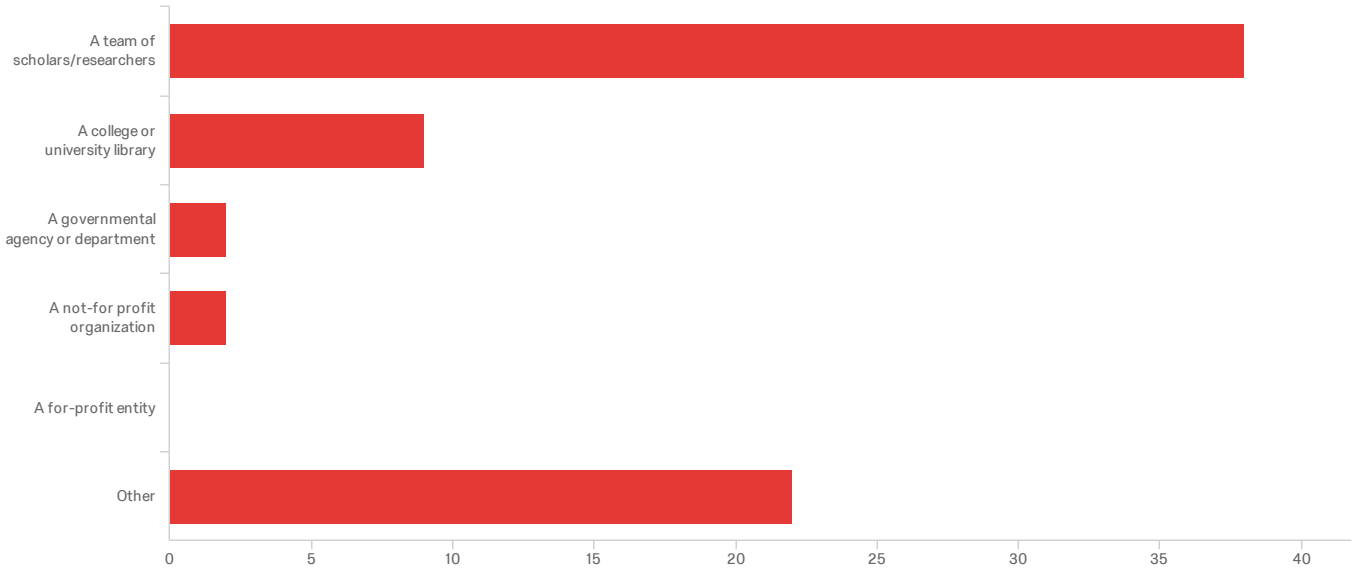
#	Field		Choice Count
1	In the planning stages	15.28%	11
2	Operational	72.22%	52
3	No longer active	5.56%	4
4	Other	6.94%	5
			72

Showing rows 1 - 5 of 5

Q3_4_TEXT - Other

Other
In process, close to completion
Operational but out of date/not being updated anymore.
Operational but lacks funding for upkeep
Not Working
Operational and still growing

Q4 - The project is primarily being built or run by



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	The project is primarily being built or run by - Selected Choice	1.00	6.00	2.77	2.21	4.89	73

#	Field		Choice Count
1	A team of scholars/researchers	52.05%	38
2	A college or university library	12.33%	9
3	A governmental agency or department	2.74%	2
4	A not-for profit organization	2.74%	2
5	A for-profit entity	0.00%	0
6	Other	30.14%	22
			73

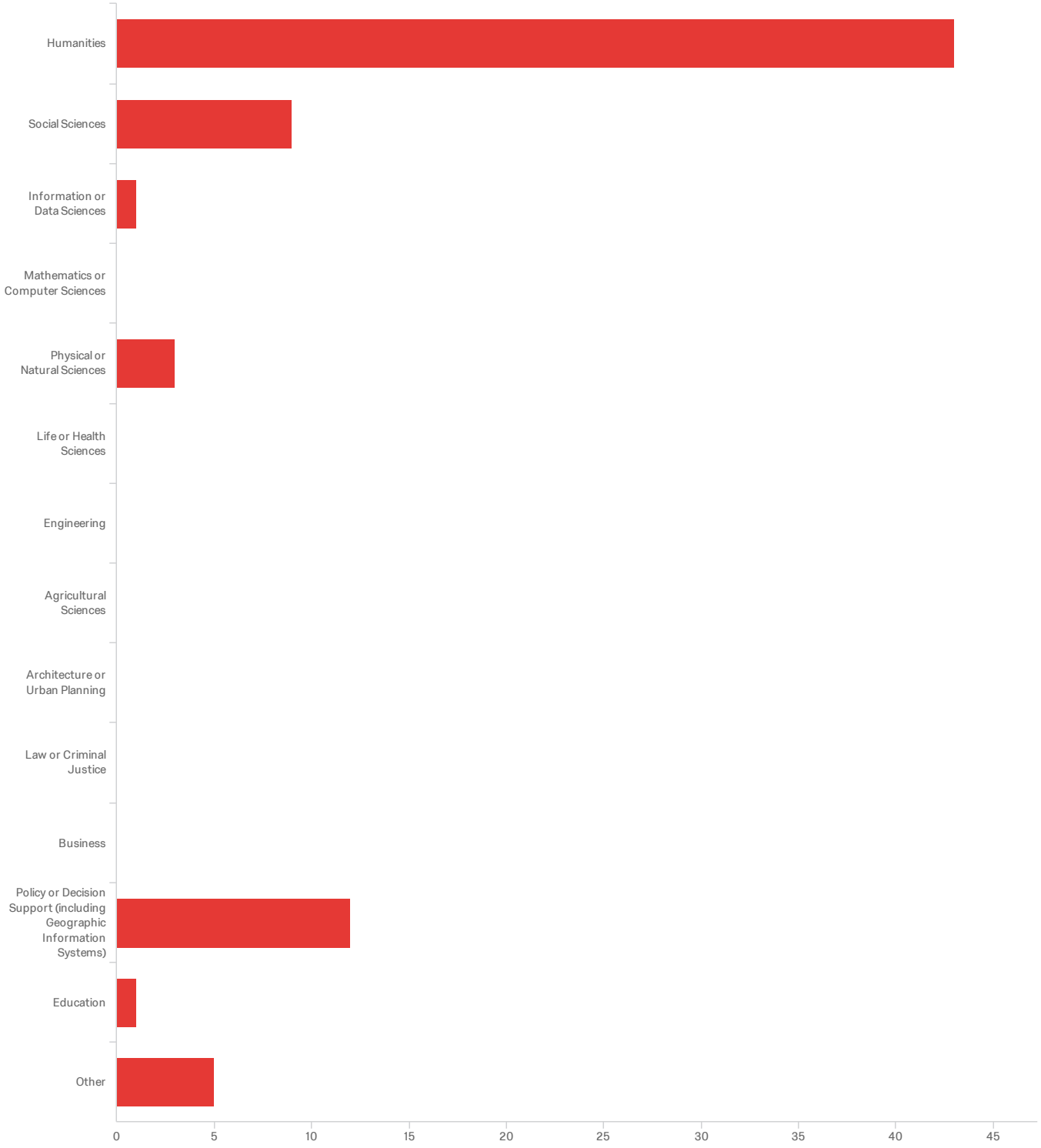
Showing rows 1 - 7 of 7

Q4_6_TEXT - Other

Other
A team of scholars/researchers/librarian

Other
A team of scholars/researchers/students at a not-for-profit organization
A single scholar/researcher at a not-for profit organization
A team of scholars/researchers/students at a not-for-profit organization
Individual scholar (graduate student) at university with some university resources
One scholar
Academic/researcher team + non-profit team.
Public Library staff
i am developing a web based mapping application for publication but probably not profit
Two graduate students
University-based data archive
University-based data archive
University-based data archive
University-based data archive
University-based data archive
A team of scholars AND the University Library
BOTH a team of scholars and a library
Primary development at University of British Columbia Library, but with support from several libraries and non-profits across Canada
Scholars/researchers/and a university library
Museum
https://www.jrtechnical.com/

Q5 - Check one



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Check one - Selected Choice	1.00	14.00	4.14	4.90	23.98	74

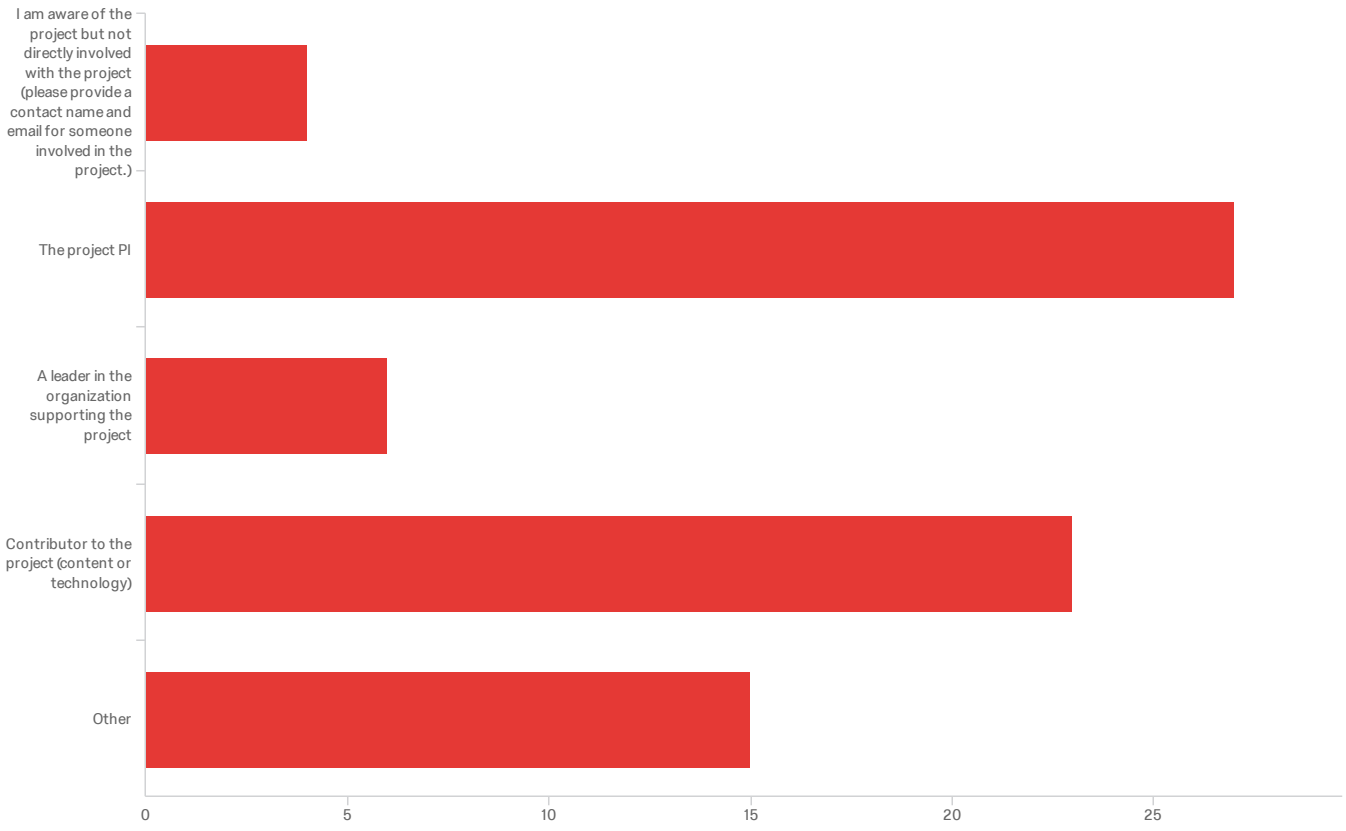
#	Field		Choice Count
1	Humanities	58.11%	43
2	Social Sciences	12.16%	9
3	Information or Data Sciences	1.35%	1
4	Mathematics or Computer Sciences	0.00%	0
5	Physical or Natural Sciences	4.05%	3
6	Life or Health Sciences	0.00%	0
7	Engineering	0.00%	0
8	Agricultural Sciences	0.00%	0
9	Architecture or Urban Planning	0.00%	0
10	Law or Criminal Justice	0.00%	0
11	Business	0.00%	0
12	Policy or Decision Support (including Geographic Information Systems)	16.22%	12
13	Education	1.35%	1
14	Other	6.76%	5
			74

Showing rows 1 - 15 of 15

Q5_14_TEXT - Other

Other
it has multiple parts to it. From the Urban Planning perspective on folding in to Policy,Preservation,digital Humanites
Interdisciplinary, including Social Sciences, Data Sciences and GIS
All
No focus - just open data from Canadian research output
Information Discovery

Q6 - Please describe your role in the project



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please describe your role in the project - Selected Choice	1.00	5.00	3.24	1.27	1.62	75

#	Field		Choice Count
1	I am aware of the project but not directly involved with the project (please provide a contact name and email for someone involved in the project.)	5.33%	4
2	The project PI	36.00%	27
3	A leader in the organization supporting the project	8.00%	6
4	Contributor to the project (content or technology)	30.67%	23
5	Other	20.00%	15
			75

Showing rows 1 - 6 of 6

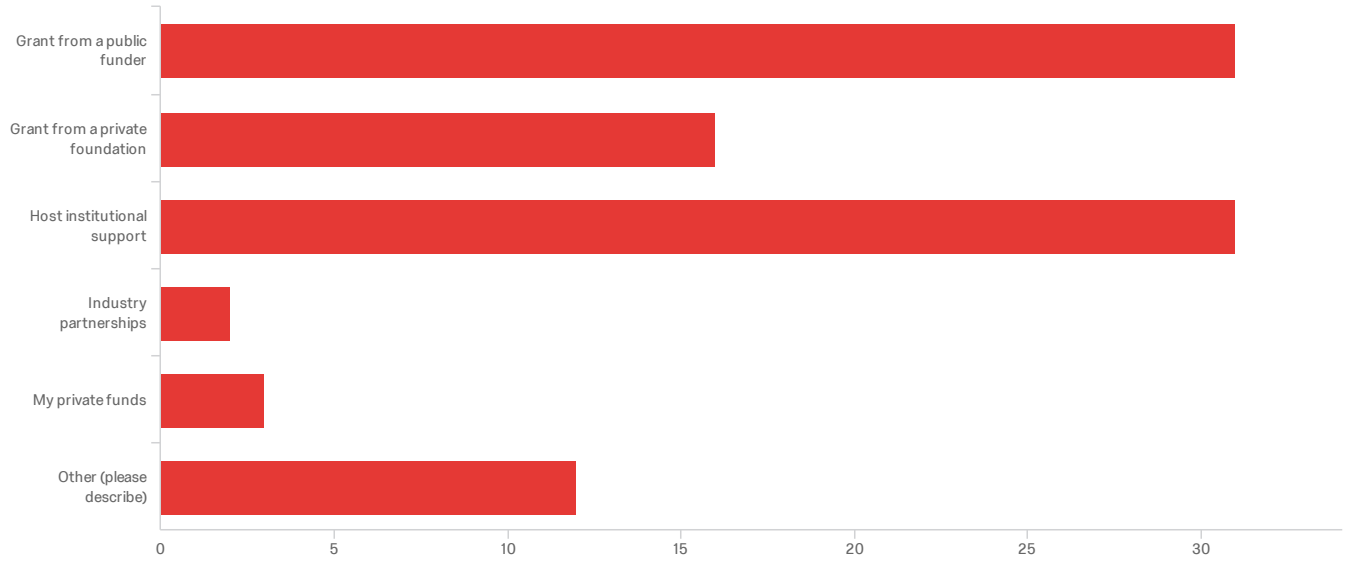
Q6_1_TEXT - I am aware of the project but not directly involved with the project (pleas...

I am aware of the project but not directly involved with the project (pleas...
https://twitter.com/jamestalmage
test
test

Q6_5_TEXT - Other

Other
Content Manager & Atlas
Art Director/Producer
Designer/Producer
I am a PI on the second iteration of the project, which is not yet live
i came up with the idea but haven't moved past very early stage work
Co-founder
Research Associate (coding)
Co-PI
co-investigator
I'm Director of the Library and Archives at the organization supporting the project. Eric Sanderson (esanderson@wcs.org) and Kim Fisher (kfisher@wcs.org) are the project PIs.
I was tech lead and developer until 2015 (12 years)
Technology lead for the publisher of the project
Technology lead for the publisher of the project
Technology lead for the publisher of the project
Project co-director

Q7 - The project is funded by (please check all that apply)



#	Field	Choice Count	
1	Grant from a public funder	32.63%	31
2	Grant from a private foundation	16.84%	16
3	Host institutional support	32.63%	31
4	Industry partnerships	2.11%	2
5	My private funds	3.16%	3
6	Other (please describe)	12.63%	12
			95

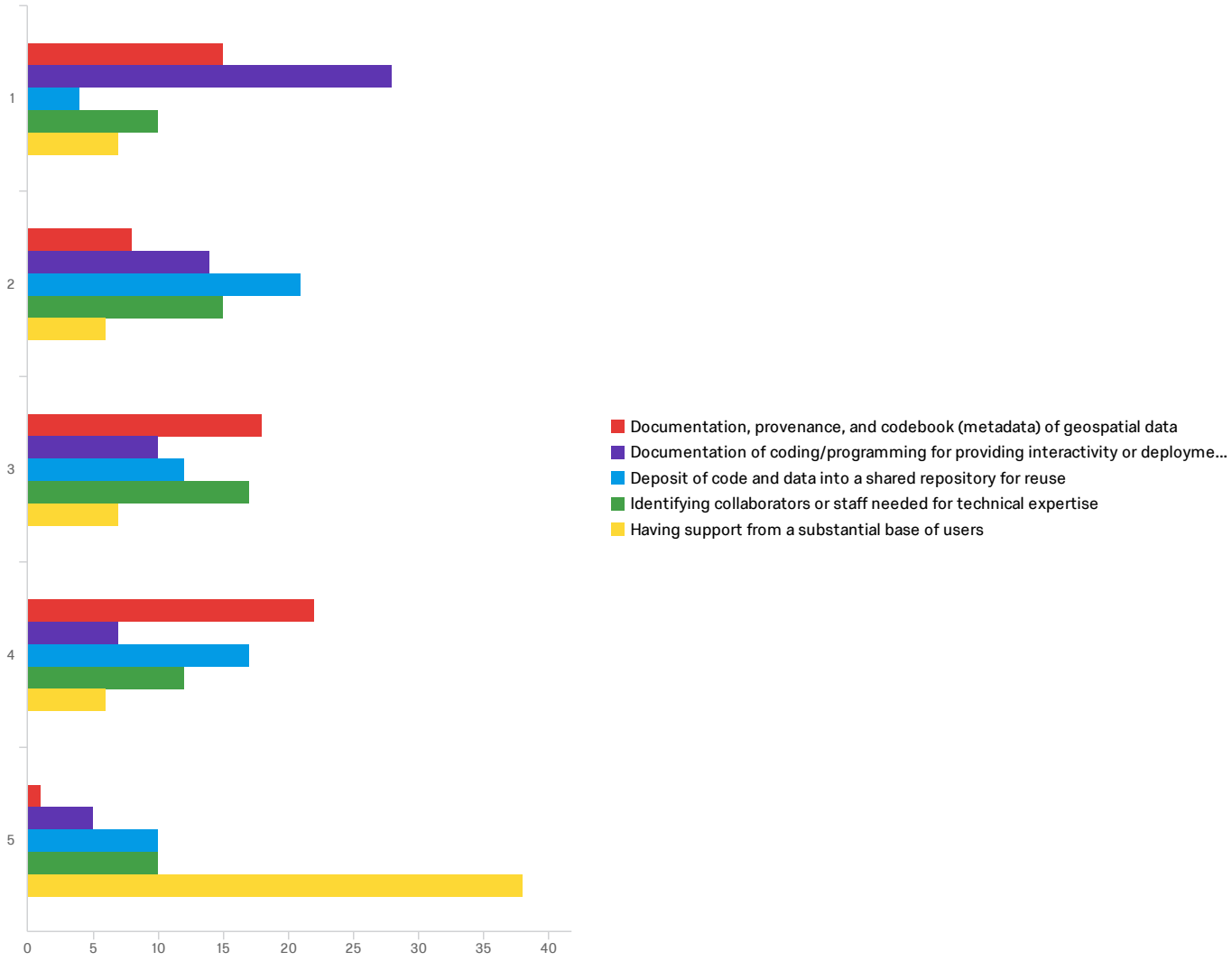
Showing rows 1 - 7 of 7

Q7_6_TEXT - Other (please describe)

Other (please describe)
it was built at a DH Summer School in Leipzig
None
No grant funds
No grant funding
No funding

Other (please describe)
Donor gift fund
Ourselves
Ourselves
Government of Canada programme
Government of Canada programme
Part of computational research staff position responsibilities
Institutional support of the collaborators; some personal funds

Q8 - Please rank the top 3 concerns you have for the long-term viability of the web-based digital mapping project



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Documentation, provenance, and codebook (metadata) of geospatial data	1.00	5.00	2.78	1.19	1.42	64
2	Documentation of coding/programming for providing interactivity or deployment	1.00	5.00	2.17	1.31	1.70	64
3	Deposit of code and data into a shared repository for reuse	1.00	5.00	3.13	1.21	1.45	64
4	Identifying collaborators or staff needed for technical expertise	1.00	5.00	2.95	1.29	1.67	64
5	Having support from a substantial base of users	1.00	5.00	3.97	1.44	2.06	64

#	Field	1		2		3		4		5		Total
1	Documentation, provenance, and codebook (metadata) of geospatial data	23.44%	15	12.50%	8	28.13%	18	34.38%	22	1.56%	1	64
2	Documentation of coding/programming for providing interactivity or deployment	43.75%	28	21.88%	14	15.63%	10	10.94%	7	7.81%	5	64
3	Deposit of code and data into a shared repository for reuse	6.25%	4	32.81%	21	18.75%	12	26.56%	17	15.63%	10	64
4	Identifying collaborators or staff needed for technical expertise	15.63%	10	23.44%	15	26.56%	17	18.75%	12	15.63%	10	64
5	Having support from a substantial base of users	10.94%	7	9.38%	6	10.94%	7	9.38%	6	59.38%	38	64

Showing rows 1 - 5 of 5

Q10 - We will be issuing a summary of the Web-Based Mapping Summit that was held in May at Columbia University. The summary will include recommendations about the preservation and sustainability of web-based digital mapping projects. We are planning a follow-up meeting in 2020. To stay informed about this and future work on this topic, please provide your contact information here:

Name	Title	Institution	Email	Project name
Kelley Kreitz	Assistant Professor of English	Pace University	Kkreitz@pace.edu	Recovering NYC's Nineteenth-Century Spanish-Language Press
Majd Al-Shihabi	N/A	N/A	hi@majdal.cc	Palestine Open Maps
Tyrene Calvesbert	Content Manager & Atlas	Texas A&M University	tcalvesbert@arch.tamu.edu	The Texas Freedom Colonies Project
Boris	Michev	University of Pittsburgh	bom17@pitt.edu	Contemporary Chinese Village Gazetteer Data Map
Alison Cornyn	Director	Picture Projects	acorn@picture-projects.com	various
Dr. Megan C. MacDonald	Assistant Professor	American University in Cairo	mgn.macdonald@gmail.com	Linguistic Landscapes of Leipzig
Robert Shepard	Assistant Professor	University of Nebraska	rshepard2@unl.edu	Placing Segregation
Katherine Walden	Digital Liberal Arts Specialist	Grinnell College	waldenka@grinnell.edu	Digital Cartographies of Spanish Detective Fiction
Katherine Walden	Digital Liberal Arts Specialist	Grinnell College	waldenka@grinnell.edu	Mapping Racial Trauma
Katherine Walden	Digital Liberal Arts Specialist	Grinnell College	waldenka@grinnell.edu	Mapping Absence in Shakespeare

Name	Title	Institution	Email	Project name
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Rachel Hendery	Dr	Western Sydney University	r.hendery@westernsydney.edu.au	Mapping Print; charting Enlightenment
Rachel M Hendery	Dr	Western Sydney University	r.hendery@westernsydney.edu.au	Glossopticon
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Katie McDonough	Senior Research Associate	The Alan Turing Institute	kmcdonough@turing.ac.uk	Living with Machines
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Glen Worthey	DH Librarian	Stanford University	gworthey@stanford.edu	Chinese Deathscape
Glen Worthey	DH Librarian	Stanford University	gworthey@stanford.edu	ORBIS
Sarah Bannon	Toponymy Analyst	Geographical Names Board of Canada Secretariat; Natural Resources of Canada	sarah.bannon@canada.ca	Stories from The Land: Indigenous Place Names in Canada
Sarah Bannon	Toponymy Anaylst	Geographical Names Board of Canada Secretariat; Natural Resources Canada	sarah.bannon@canada.ca	Canada's Commemorative Map

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claudia engel	academic technology specialist	stanford university	cengel@stanford.edu	Cigarette Citadels Map
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Madeleine Thompson	Library and Archives Director	Wildlife Conservation Society	mthompson@wcs.org	N/A
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Elton Barker	Reader in Classical Studies	The Open University	elton.barker@open.ac.uk	Hestia
Sylvia Fernández	Ph.D. Candidate	University of Houston	sferna109@gmail.com	Borderlands Archives Cartography
Jeremy Morse	Director of Publishing Technology	University of Michigan Library and Press	jgmorse@umich.edu	Fulcrum

Name	Title	Institution	Email	Project name
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Michelle Chesner	NEA Librarian for Jewish Studies	Columbia University	Mc3395@columbia.edu	Footprints

End of Report