The Four Building Blocks To Run A Successful Cyberinfrastructure Project

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Introduction

It is critical to develop a comprehensive assessment tool to quantitatively measure organizational capacity in cyberinfrastructure projects, because with a baseline measurement, projects can identify growth opportunities to strengthen their ability to carry out their mission. This allows organizations to perform at a higher level and therefore be more innovative and leaders in big data industries. However, to achieve that goal, the key elements to run a successful cyber infrastructure project need to be identified. Therefore, we pose the research question, "What are the building blocks to run a successful cyber infrastructure project?" In order to answer this research question, we analyzed 20 interviews with individuals/experts who have extensive experience in the cyberinfrastructure field to understand the dimensions and capacities of cyberinfrastructure projects. Analysis resulted in four common themes of funding, collaboration, data management, and shared ideology as the main building blocks that define a project's capacity. These elements are critical for the success and growth of cyberinfrastructure organizations in general.

Literature Review

When examining the literature associated with capacity building in cyberinfrastructure, there are a few foundational elements that make up a strong organization. McKinsey and company (2001) stressed the importance of building organizational capacity with the 'Capacity Building Framework for Nonprofits' they developed arguing that it was, "...vital to the long-term health and effectiveness of nonprofit institutions." This principle is equally applicable to cyberinfrastructure projects, because of the fragile nature of cyberinfrastructure and the need for a solid foundation to build upon. Having this knowledge validates the importance of our research and the assessment tool we developed for fostering strong cyberinfrastructure capacity.

Methodology

This poster illustrates the findings and common needs within an organization to run a successful cyberinfrastructure project. The data was collected from 20 individuals who oversee and work directly within. Our information was gathered from a series of interview questions and most elaborated and informative through what is needed to run CI. This poster shows the building blocks that were commonly shared throughout the interviewees answers while all having different organizations, roles, and no knowledge of previous answers.

Findings

Four elements were found to be the building blocks to run a successful cyberinfrastructure project:

Funding

Funding is essential for any cyber infrastructure project because it is the starting point which allows resources to be allotted. Funding creates opportunity for time, brainpower, and physical necessities to carry out a project.

"But I do think that all these things are interconnected and interdependent and that, you know, there is no point in cyberinfrastructure if you don't have the funding or the people to sustain it, or the objects that are part and parcel of it." (Data Management Coordinator, TX, 3/7/17)

"So, a lot of the gain with cyberinfrastructure isn't just today's thing, but how you're positioning for tomorrow. You may put in 100 GB today and nobody uses it to 100 GB. But because you did it, because you can write that in your grant, because that makes you able to do things that you, as a researcher, may not be able to do, therefore - or may not have been able to do if it didn't exist - therefore, you may get funding which will now enable you to do it." (Technologist &Educator)

"As long as the funding is here we're in perfectly good shape. You know, we've been fairly well funded. I think that's the key is that if you have core visions for important needs, you can usually find funding out there in order to support them." (Technologist, MA, 4/5/17)

Collaboration

Collaboration between members of a group is a universal theme in successful organizations because through collaboration comes communication and greater understanding. Collaboration also encourages individuals to feel like they are working for a greater purpose and motivates individuals to keep pushing for new information.

"It's really that balance of, you know, working well with people in this disperse group as long as you have a common – you know, you have common goals and deadlines and so on and so forth that you can coordinate with." (Technologist, MA, 4/5/17))

"The long play is you start out with finding people that you like and you work with that do good work, and you respect and enjoy, and you grow old with them. Because, if you have a small circle of people that do that, those people tend - they won't always stay where you're at, but if you can maintain those relationships, they'll rise in stature over their careers. And over ten years, fifteen years - which sounds like a while, but it's not in terms of these projects that last three to five years - that's like three life cycles. Over that period of time, they're going to make their way up into a leadership position. And then it becomes very, very easy to matriculate your ideas, your technology out because you have those relationships in place and they have mechanisms to diffuse those through their organizations, their connections, their relationships. It goes both ways. You've got to be willing to be a champion for other people as well." (Technologist &Administrator, TX)

Data Management

There are many components of Data Management, however without these tools cyber infrastructure would be disorganized and hard to understand from an outside perspective. It is important to use software to maintain organization and management over data projects at every point in a project.

"But in the context of research data management, it's a collection of tools, some of which we provide. It's the sort of high-speed, robust networking infrastructure that exists through Internet and other providers. And it's sort of the endpoint – the storage systems and the devices that are connected to that network." (Technologist &Administrator, IL, 7/19/16)

"...The behavioral practices that I think about are around data management. So for example, storage of backup, ensuring that your data are documented with descriptive and technical metadata, file naming conventions." (Data Management Coordinator, TX, 3/7/17)

"Over the past seven or eight years we've built out a software as a service for research data management. So in that sense, it's cyberinfrastructure for researchers. And it's fairly widely used in the US and internationally. And my role primarily is working with users to get them to adopt the technology and deploy it more broadly within their institution. And also to make the project self-sustaining, because it's currently funded in large part by grants. But we've also started instituting a pay-to-use model, a freemium model. So those are my sort of dual roles. It's really working with the customers and potential customers and users at large and focusing on sustainability." (Technologist &Administrator, IL, 7/19/16)

Shared Ideology

Shared Ideology clear understanding to all individuals working on a project the goals and the language needed to explain to outsiders about a project. Cyber Infrastructure projects can be confusing to many, so levels of shared ideology is the foundation for easier understanding.

"I mean I think the ideology is that we want to be able to support science and hopefully by providing infrastructure that scientists can use and try to make it easier on them that we can help them be a small part of advancing science." (Technologist, CA, 11/10/16))

"If you're missing the ideologies, the unified [lay] theory of CI, if you're missing that, again, things don't quite work together as seamlessly as it could. So that really degrades the overall CI sphere." (Liaison &Educator, WY, 7/24/17)

"So I'm thinking what would be something—so one thing that could be, say not there would be the ideology, but as we experience that it will be difficult to get a group practicing or participating in cyber infrastructure if there's not some shared ideology, so that's why I also think that ideology is something that will be important to be included." (Administrator & Scientist-Developer, AZ, 10/5/16)

"...the community is not super inviting to new, new and different ways to do things… So my ideology for this is basically give everybody their driver's training class, you know, to try to figure out how to drive on the road to learn the ways." (Administrator & Technologist, TX, 6/15/16)

Conclusion

This study set out to discover what the building blocks are to run a successful cyberinfrastructure project. Findings revealed four core elements which individuals, teams, and institutions need in order to do so. These building blocks include funding, collaboration, data management, and shared ideology. Deep analysis of transcripts from twenty individuals provided a multitude of elements which can aid teams to run a successful cyberinfrastructure project beyond our preliminary list of four, but the ones chosen proved to be the most essential. Collectively, these interdependent elements work in harmony to allow for the success and growth of cyberinfrastructure in general.

References

McKinsey & Company. Effective Capacity Building in Nonprofit Organizations. Venture Philanthropy Partners. , 2001.

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