



# Understanding Adoption Factors of Cyberinfrastructure During Early Exposure

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COM329-01, Fall 2018 – Chapman University; Orange, CA

## Introduction

Cyberinfrastructure (CI) consists of many different systems such as computing systems, data storage, data repositories and more. They are all linked by high speed networks to help share large capacities of information within organizations. However, before such a technology will be adopted by users, it first needs to meet some existing needs.

First, before a technology can be developed, used, and tested, there has to be a preexisting problem the development of the technology will solve. The “marketplace” as interviewees of this study called it, is the place in which the initial need is identified. From that market, developers worked with users to distinguish a technology that would meet the initial need. Second, any type of development feedback is key to help developers perfect their tool. Third, technological tools are often in a beta-phase, developed, tested, re-developed, and re-tested. That means, the technology being adopted is simply a prototype, and never a finished product. Yet, why are users adopting such technologies-in-progress?

The above arguments led us to ask the research question, “What factors draw potential and new users towards cyberinfrastructure adoption in early exposure?” With analysis of interview transcripts with CI experts, this poster examines the themes in which influenced new users towards cyberinfrastructure in early exposure.

## Literature Review

Cyberinfrastructure is rapidly advancing science, and changing its conduct. However, the lack of understanding results in cyberinfrastructures breaking down, as the tensions between the various holders leads to collapse. When cyberinfrastructures fail, science is impeded and so it is critical that we attain a fuller understanding of how we can better design cyberinfrastructures that will endure. Cyberinfrastructures are huge, complex and multifaceted organizations, often embedded in and across many differing social, organizational and technological forms.

## Methodology

This poster examines 20 interviews conducted with domain scientists and computational technologists. Participants were from across the United States. Interviews were conducted either by telephone or in person.

## Findings

Throughout the analyzation of the transcripts, three common themes were found to draw users towards cyberinfrastructure adoption:

| Innovation   | Customization   | Convenience   |
|--|---|---|
| <p>Within many organizations, there are blocks that hold stakeholders from being able to contribute in the way in which they would like to. Many CI adopters have stated that cyberinfrastructure has allowed them to innovate their own solution to this with the use of CI. The tool allows them to do things that would have not been able to be accomplished such as data mining, research, and more. Because CI is customizable to their own needs, this technology cannot be found anywhere else and so is vital for the own organization’s use. Overall, CI has increased the levels of contribution, while also lower the levels of remedial work. We can identify that early adopters have been able to innovate new levels of work in their organizations that wouldn’t have been possible without CI.</p> | <p>The attractiveness of customization comes from its flexibility and ability to solve various problems. Without CI, many employees would have to manually work out their problems without the help from a organized system. In an interview with Xiao Zhu, Zhu mentioned how cyberinfrastructure was a tool that helped perform research better. Along with working with the research side of things, Zhu is also an HPC professional. This allows them to work with both sides of cyberinfrastructure and customize it to work best for their needs. Being from both sides, Zhu can approach the better ways of cyberinfrastructure. Zhu can also utilize this to convince more people to use the systems, which is part of their job. Cyberinfrastructure can be utilized for various occupations and organizations.</p> | <p>Cyberinfrastructure allows organizations to create solutions and innovative work with convenience and ease. This is something employees would not be able to achieve as easily without the system. Interview with Richard Knepper referenced the convenience cyber infrastructure has for an organization. Knepper says he did not want to buy statistical software of his own, and he realized he could just run it on the central system. He explains that this was quite cheap and easy to do. In an interview with Greg Newby, he explains how cyberinfrastructure is convenient and easy to direct. He receives satisfaction from the machine doing what it is instructed to do. It was a tool of convenience as you can plan, direct, and see the results of the machine’s work.</p> |

| Innovation Quote  | Customization Quote  | Convenience Quote   |
|---|--|---|
| <p>“I think what's attractive is not so much the hardware, but the capability or capacity to bring a lot of different data together to make it accessible. I think the work related to cyberinfrastructure in terms of data discovery, access, and making data [interoptimal]. Those aspects, I think, are very transformational, certainly in the earth sciences.”<br/>– Participant 8</p> | <p>“Definitely helped my research better. I can approach in more ways the probably better CIs and then we can probably talk to people to convince more people to use the systems. So that’s another metric I have to hit.”<br/>- Participant 3</p> | <p>“I really liked the information sharing aspect of things. And maybe from my library background, I also really liked the ability to gain access to information and correlate different sources of information that might not be so easy to do if one had to do it completely in this physical world.”<br/>-Participant 16</p> |

## Conclusion

Based on the analysis of 20 interviews, we concluded that the development of new users towards cyberinfrastructure adoption in early exposure involves assessing users’ initial needs, customization of CI, and receiving feedback. With the research conducted this far, it is apparent that users are drawn to the adoption of cyberinfrastructure by its innovative capabilities, the customization available, and the convenience of implementing their own system. Each organization is unique and situations may be influenced by internal and external variables.