Time Related Issues in e-Science Projects and Computational Tool Development

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Introduction

In e-science today, researchers are given grants and a limited time frame to find answer to questions. This study examines the most prevalent and critical time-related issues that affect the success of an e-science project and its computational tool development.

Literature Review

In an article entitled, “Exploring Collaborative Rhythm: Temporal Flow and Alignment in Collaborative Scientific Work,” the issue of rhythm and time are addressed. According the study conducted the argument is presented that most studies conducted in the sciences essentially ignore the concept of time and argues the “importance of temporal alignment.” (Jackson, Ribes, Buyuktur, 2010, p. 1). The research world, in a way, revolves around two sources; time and funding. Both time and funding go hand in hand and are essential to the success of a project. The rhythm of an organization is arguably one of the most important aspects of how a project is organized. There are phenomenal rhythms (e.g. the distinctive form of time emanating from the field and objects of study themselves) and institutional rhythms (e.g. rhythms embedded in organizations and institutions, large and small, that structure and govern specific work). Both phenomenal and institutional rhythms create challenges in projects such as, “the difficulties of working with colleagues at institutions with different academic calendar (e.g.. semesters versus quarter systems).” (Jackson, Ribes, Buyuktur, 2010, p. 3). In an effort to examine time in e-Science project and computational tool development, this poster seeks to answer the research question, “What are the most prevalent and critical time-related issues that affect the success of an e-science project and its computational tool development?”

Methodology:

This poster employed the grounded theory approach (Corbin & Strauss, 1990) and analyzed 25 interviews conducted with domain scientists (e.g. bioinformatics, computational chemistry, theoretical physics) and computational technologists. Participants were from across the United States and one in the UK. Interviews were conducted either in person or by telephone. Guided by the stated research question, the co-authors performed multiple iterations of data analysis and literature integration, yielding preliminary findings presented in this poster.

Findings

- Throughout the coding process, three common themes were found within:

Maintaining a Stability in Staffing

The turnover rate of staff on a projects can be pose a set back because new staff would have to be trained to replace previous staff. Training takes time which could be over-wise used to improve the tool or assist with other needs in the project. New staff on a project can also mean that the standard of work is not as great as more tenured staff.

- “If the funding is always tight you have to depend on one person. He or she is the key person, and then if she for some reason, leaves- and it could be for family reasons, maybe her husband got a new job somewhere-then what?.... So if someone leaves, we are-we don’t have time to have someone trained.” *(Computational Scientist, CA, 7/17/2014)*
- “They're not making, we'd like them to, they're not really making a lifetime commitment to whatever it is they contribute. It be great if they did but a lot of the work is done by graduate students and in the graduate me over the job and they have a life so stuff happens. So hopefully then other people may come on board and sort of pick up the project and take it from there.” *(Senior Software Engineer, IN, 7/17/2014)*
- “...there’s also a few students we have…we have a few students that will work in and out like they’ll come in and do an internship for a quarter then leave, right now there’s another free intern though he’s not, he works like two hours a week, so it’s pretty much me and Rick.” *(Computer Science Undergraduate Student, CA/USA, 11/21/2013)*

The Life Cycle of a Project

Every project has deadlines but sometimes deadlines cause setbacks. Deadlines can affect the quality of work and research that can be produced. The cycle and time frame vary on a project goal. The less time the project gets, the less quality work will be produced. A deadline can inhibit creativity and innovation at times.

- “ I think, this is true everywhere that I have worked, it has always been a problem with the funding cycles and the length of them. Often times, if a project was funded for five years or something like that, I have just seen a lot of projects die before they had a chance to go through a lot of iterations to be successfully used in a community.” *(Computational Chemistry, TX, 4/24/2014)*
- “I would say that in my experience a number of the projects that I have seen that have been successful and have reached that critical mass have all taken around about the same length of time, which is between five and ten years from initial inception. So, it seems very unusual in my experience to have seen a computational tool in the sort of e-science cyberinfrastructure area to have achieved widespread and stable us- age, so that critical mass, in under five years.” *(Computational Physicist, UK, 11/13/2013)*
- “Likewise, if I don’t have the time to do that, and that money can mean buying my time out to do that, we can have an idea for a great collaboration in place, but it’s not going to happen.” *(Computer Scientist, IL, 7/15/2014)*

Divided Time

In the research world, many researches cannot give their undivided attention to one project. Whether they need to focus on other jobs/projects or finish their education, their time is usually limited.

- “Oh every day is different. So if I think about how I split my time, now technically 19% of my position now is faculty and that is teaching.” *(Computer Scientist, OK, 7/15/2014)*
- “...but sometimes when I have an issue he says ‘well I’ll work on that but I’ve got these other things that I’m getting paid to do.’ So in other words, there’s times that what drives the development process has to do with things like what people are getting paid to do.” *(Meteorologist/, MI, 6/20/2014)*
- “So, we want, we want people to take our tools and just do more crazy things ‘cause I have limited amount of time being a student, so I would love if someone just took like ‘Oh I worked 40 hours a week on making our tool fantastic’ and that would be awesome because I only work about ten…[R]ight now it’s me and Rick....he’s the HPC systems admin. On top of doing, you know, being my mentor and being the front runner of a lot of little projects that he seems to always be busy for and never has time for me.” *(Computer Science Undergraduate Student, CA/USA, 11/21/2013)*
- “...because they have to be excited, ‘oh I’m going to develop this tool and people will use it worldwide’ or whatever and put in extra effort and not treat it like- industry job is 9-5 and just walk out-which is not true actually, we are plugged in all the time.” *(Computational Scientist, CA, 7/17/2014)*

Conclusion

In answering the research question, “What are the most prevalent and critical time-related issues that affect the success of an e-science project and its computational tool development?”, we concluded that the turnover rate of staff does cause significant setbacks to a project, the overall structure of a cycle in the science world is indeed not conducive to creating the best tool and that the current system of research which does not allow researchers to financially only work on one project, overall hurts the quality of research. Furthermore, we found that time zones were not an issue for researchers who collaborate in different time zones.

References

Jackson, S., Ribes, D., Buyuktur, A. (2010). *Exploring Collaborative Rhythm: Temporal Flow and Alignment in Collaborative Scientific Work.* Retrieved from https://www.ideals.illinois.edu/bitstream/handle/2142/14955/JacksonRibesBuyuktur_ExploringCollaborativeRhythm.pdf?.

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