# **Closing the Gap: Aligning Developers' Expectations and Users' Practices in Cloud Computing Infrastructure**

Tamanna Motahar<sup>1</sup>, Johanna Cohoon, Kazi Sinthia Kabir, & Jason Wiese

Developers of Cloud Infrastructure for Computing Platform (CICP), a national cyberinfrastructure system for scientific computing, encounter different user practices than what they hope for. How can we change this?

Users build clouds for free with CICP nodes. Developers expect users to: 1) Return nodes immediately after they finish working with them; 2) Not reserve nodes in excess.

# We observed examples of anti-normative behavior:



### This behavior is often learned locally from:

1) Research labs: New users learn lab practices from PIs, professors, advisors, and labmates.

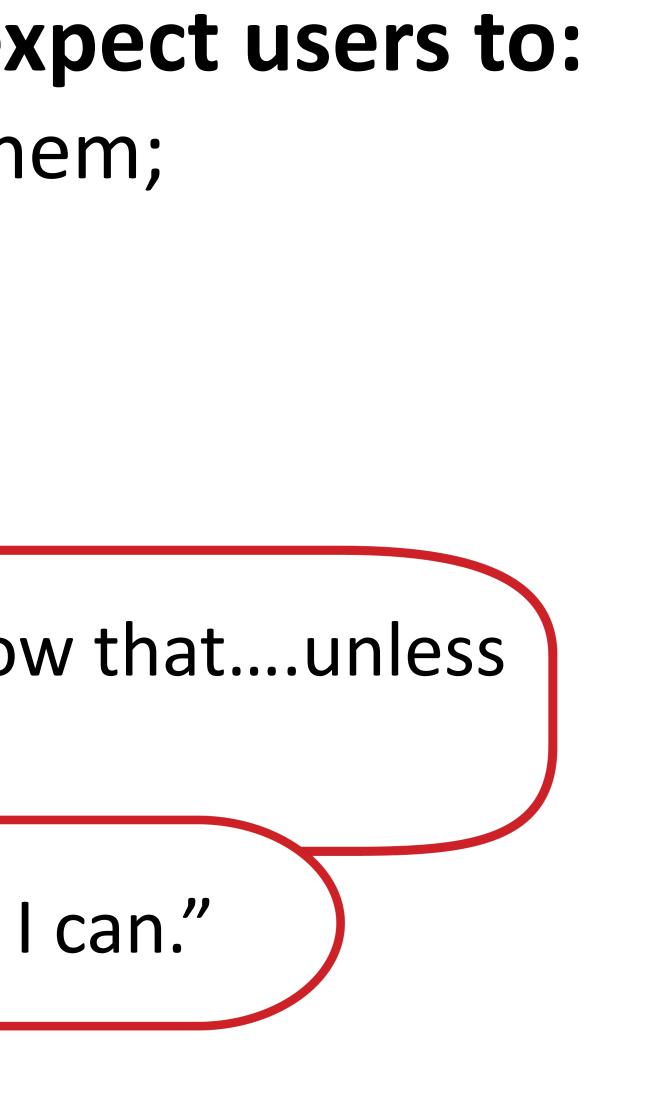
2) Classrooms: Students follow course instructions to learn CICP; the course instructor is the primary learning resource. 3) Other similar systems: Some users applied their knowledge of similar systems they were familiar with, continuing their practices on CICP.

## Results obtained through observation and 15 semi-structured user interviews.

Sowe, S. K., Stamelos, I., & Angelis, L. (2008). Understanding knowledge sharing activities in free/open source software projects: An empirical study. Journal of Systems and Software, 81(3), 431–446. https://doi.org/10.1016/j.jss.2007.03.086 Steinhardt, S. B., & Jackson, S. J. (2015). Anticipation Work: Cultivating Vision in Collective Practice. Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing, 443–453. <u>https://doi.org/10.1145/267513</u>3.2675298

"[We] try to have that node until the end because we know that....unless the paper is submitted, we know that we might need it."

"[I] push in as many reservations as I can."



# The literature and our data suggest solutions:

Clear standards can be used to align user behavior with developers' expectations.

Establish standards through docs, mailing-list content, key actors, classroom instructions, and in contrast to other systems.

- Train the trainer

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### <sup>1</sup>tamanna.motahar@utah.edu

- Conclude emails with behavioral reminders - Identify key actors at sign up - Highlight system differences