Building an HPC User Documentation Process Via Layers of Writing Infrastructure

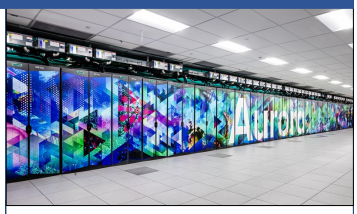
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Project Overview

We are technical communication scholars working as guest faculty researchers at Argonne Leadership Computing Facility (ALCF). We research documentation processes for HPC and are building an applied theory of writing infrastructure [2, 3, 4]. Building and maintaining user documentation that is responsive to changing user needs and technologies for very complex computing systems, such as the exascale machine Aurora, is challenging. It is a whole-facility endeavor that depends on layers of infrastructure that are built incrementally over time.

We presented our model of the ALCF documentation process [Fig. 2] at ISC-HPC 2026 [1]. Attendees were delighted to discuss documentation processes in HPC. This poster follows up on the common question: "How do we build a documentation process at our organization?"



Via ALCF staff interviews, site visits, and mining ALCF reporting documents, we mapped the complex user documentation authoring process for Aurora and built a timeline [Fig. 3] up through 2025. Timeline data is from ALCF Operational Assessment Reports 2022-2025. [6]

"User satisfaction with ALCF services remains consistently high as evidenced by survey response data." ALCF Operational Assessment Reports, 2022-2025

What is Writing Infrastructure?

Writing Infrastructure is a concept developed by the authors [2, 3, 4] that theorizes how writing, including documents and documentation processes, functions as an infrastructure for organizations to execute their mission, including building complex things, such as supercomputers. However, much of this writing is so embedded in the daily work of engineers, managers, administrators, government leaders, and scientists that it is hard to recognize as a phenomenon in its own right—hence, **writing infrastructure.** As an analogy, consider how a building's HVAC, plumbing and electrical systems operate mostly out of site but are vital to the functioning of the building and the missions of the organizations that inhabit them. If elements of the system are seen, it is only a local instance, such as an electrical outlet, not the whole system and how it is interconnected. When it comes to infrastructures of all kinds, invisibility is usually by design, because embeddedness is a key feature of what makes infrastructure effective. When it comes to **writing infrastructure**, making it visible has value for understanding how and why it works and creates opportunity to replicate and improve it.

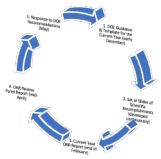
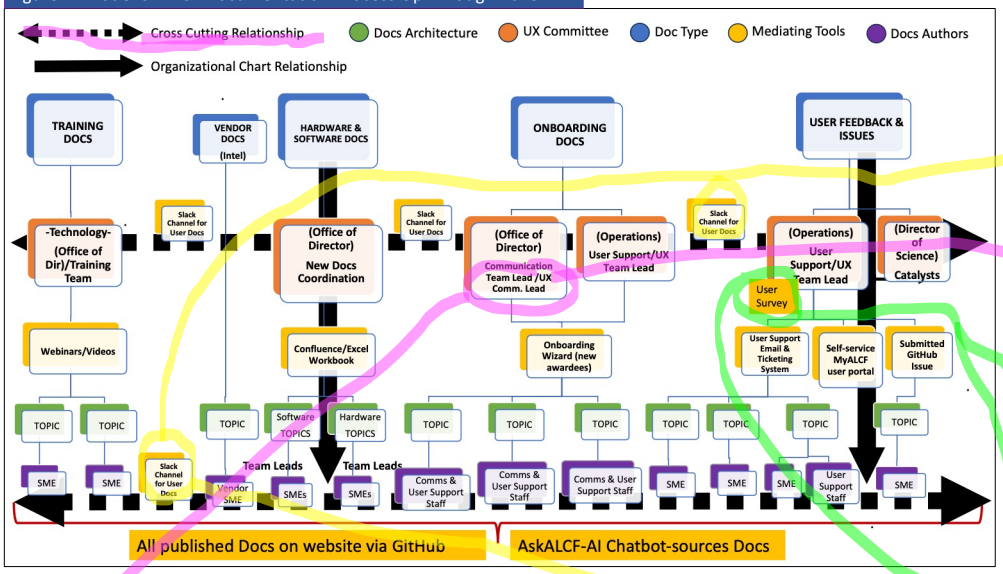


Figure 1: Genre Cycle for Annual Reporting Process

A **genre cycle** is an example of a writing infrastructure. It is a mission critical document authoring process that recurs periodically and that requires the successive coordination of multiple types of documents to complete. Mapping a **genre cycle** reveals how a complex report is actually the product of an organizationally embedded and coordinated process involving many stakeholders and document types over time. From previous research at ALCF (2014-2016) [5].

Figure 2: Model of ALCF Documentation Process Up Through 2025



Layers of Infrastructure

Diverse Doc Types: Docs include training docs, hardware & software docs, onboarding docs, online portals, AI chatbots, etc.

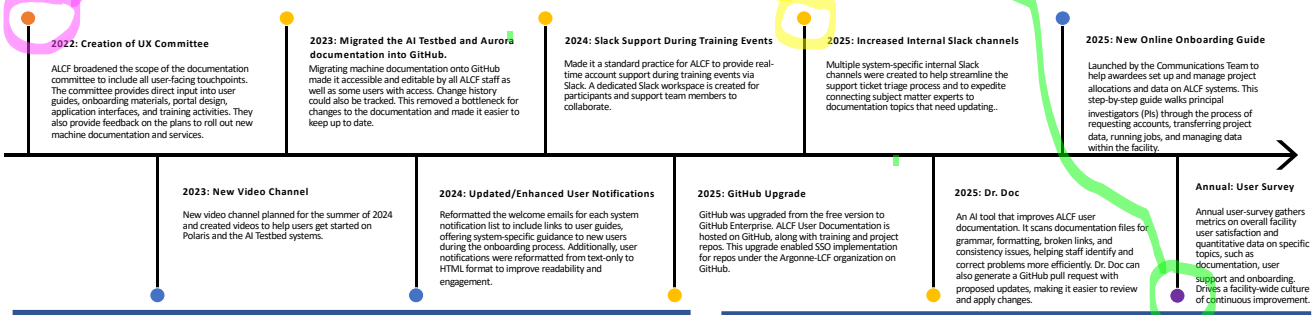
Networked Tools: Adopting networked tools, such as Slack and GitHub, enable easy collaboration across the facility.

Organizational Structure: Vertical org chart relationships and cross-cutting teams balance stability with responsiveness.

Metrics Tools: The user survey collects user feedback and promotes a user-centered culture.

Culture: Focused on users; Continuous improvement; Whole facility ownership of documentation

Figure 3: Partial Timeline for Building the Layers of Writing Infrastructure



Maintaining Responsive User Documentation in HPC

Supercomputers are not like simpler products, which require one set of user documentation that doesn't change much over the life of the product. In contrast, supercomputers are complex machines that function at the cutting edge of technology and user knowledge. Some users are also partners in developing tools and processes for the machine, requiring **a collaborative approach to documentation**. User documentation processes must be responsive to changing user needs, new technical tools and constantly updated troubleshooting solutions. A culture of **continuous improvement** is also essential.

Next Steps: Comparison Across Organizations

- Share documentation model with ALCF stakeholders and other HPC facilities.
- Compare model to documentation processes at other facilities.
- Analyze affordances and constraints of how each Lab's org structure and culture shape docs processes.

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