

A Healthy Research Ecosystem: Diversity by Design

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Abstract

Diversity supports the well-being of any healthy and productive ecosystem. The scholarly research enterprise is no different in this regard. Diversity needs to be designed into the research ecosystem and the interactions across the community. We call the community to refocus its efforts on building a vibrant habitat by supporting diversity and inclusivity.



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PROLOGUE

Many of the points raised in the recent posting, [Openness is Inclusivity](#), resonated with us. Although it was focused on a single organization, we agree with the sentiment. Some of the examples were apt, and it inspired us to discuss fundamental questions surrounding our work: What does it mean to support “open science”? Is this issue not relevant to the entire research enterprise? At this point in the evolution of our discipline, what responsibilities do we all have to our community? What future are we trying to build, and are we on track? Below are some initial thoughts.

THE HEALTH OF THE RESEARCH ENTERPRISE

Healthy ecosystems evolve holistically. They have context and history. They result from millions of chance interactions, extrinsic and intrinsic to their respective environments. Local changes can modify how the entire system operates in certain conditions.

The research enterprise that we work in is itself an ecosystem. It contains such diverse populations as researchers, funders, publishers, research institutions. It also includes a whole tranche of tool builders from large technology and service providers to individual app makers. Increasingly it stretches beyond the traditional system and includes lay groups such as citizen scientists, patient advocacy groups, etc. Between these parties, there are numerous complex interactions, each of which enable the research enterprise in a very specific way.

A robust ecosystem is productive and resilient. The inhabitants are able to self-organize, expand, change functions and traits, coevolve with others through competition and cooperation, adapt to changes in the local habitat or at large, merge with others, and undergo speciation, etc. Diversity undergirds all of these functions: increases yield and total resource capture, increases stability, decreases disease prevalence, and increases sustainability, etc. Diversity is essential to the health of an ecosystem over time.

We believe that our research ecosystem needs the same heterogeneity, a myriad of players to support all its myriad functions. It needs to be inclusive and open to the community, welcoming the participation of a diverse set of players (publishers, data centers, suppliers, etc.). Our ecosystem encompasses mission-driven and commercial enterprises. And like the work of research itself, it needs to be inclusive of all disciplines, geography, institutions and stakeholder groups. The mic should be available to a single individual's voice as much as to a behemoth. The research ecosystem has public space (e.g., [Scholarly Commons](#)) shared by all. It has [foundational infrastructure](#), separate from any single

habitat, that is **community-governed, sustainable, and trusted as part of the scholarly commons**. It also contains private spaces for parties to freely build and grow in its own way.

DIVERSITY BY DESIGN

An important point that we feel should not be lost in this discussion is that diversity is not given by default. As with many enterprises, it suffers from the “winner take all” tendency. Monocultures and monopolies are unhealthy for numerous reasons, the least of which is that they are fragile environments often “Too Big to Fail” and unresponsive to change. Or they absorb all perspectives and functionalities into a single offering, eliminating all other options for users.

Any party, commercial or nonprofit, that dominates the system has the capability of exerting power in vast excess to its accountability, that it has sufficient capital to buy anything or undercut anyone. If a single organization dominates research communications, then what future is there for research that doesn't align with its mission? The same does apply for technology platforms in the conduct and dissemination of research. If we end up with a monopoly, that is not just failing to serve the needs of the community but is also too big to fail, the ecosystem will become too fragile and ultimately not survive.

Ecosystem design and management takes an overtly integrative and holistic perspective. An organism mindset is one that thinks of an organization as a bounded entity, complete unto itself. But an ecosystem mindset understands that solutions to key challenges largely lie outside of the organization so we must locate and interact with them to thrive. Framed as such, we can model scholarly communications and move away from discrete, isolated approaches to resource management.

There may be no way to directly manipulate an ecosystem to systematically achieve specific results. But with all systems, principles of design can be applied to its management and maintenance. What are critical components for cultivating diversity? What are impediments to this? We will explore the fundamentals of designing a healthy research ecosystem in a follow-up piece.

As with all metaphors, our ecosystem model has its limits. The emphasis on restoration and conservation in diversity may not represent our wish for scholarly research (and communications) to grow and proliferate. Furthermore, while we're not exclusively focused on a single species per se, but rather the entire system in the ecological view, we cannot lose sight that researchers are at the core of our ecosystem. Proper ecosystem management is one that contributes positively to the health of both ecosystems and human beings.

Likewise, both the global enterprise and the local stands to gain in this model - both organizations and individual researchers. We can apply pressures and incentives, but interventions to the system itself is very unlikely to bring about the direct changes we seek. It will take time and coordinated action on many fronts to see results. But if we ground our efforts in a set of solid design principles that promote diversity and inclusivity, we have a far better chance achieving long-term, systematic change for the health of the entire ecosystem.

In the end, the health of the research ecosystem is everyone's responsibility. It needs to be supported by all of us; in all our interactions, no matter our role. While we know the **Openness** piece singled out a single organization, we would like to use this as an opportunity to (re)focus all of our efforts on building a diverse, vibrant ecosystem.

The authors are writing in a personal capacity. None of the above should be taken as the view or position of any of our respective employers or other organizations.