

The problem of invisibility as an Infrastructural goal, or
Failing to arrive by trying to be there

Knowledge Infrastructures Thought Piece

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In talking with cyberinfrastructure types I hear them talk about a desire to produce invisible infrastructure (seamless, transparent, invisible, “cycles on tap”) because they perceive (and the literature argues) that our best infrastructures are that way. In fact the invisibility of infrastructure is probably the thing that infrastructural researchers and practitioners share the most.

However, descriptions of successful infrastructures are descriptions of an endpoint, not a strategy for achieving that end point. While it is true, and useful, to say that electricity, as an infrastructure, is largely invisible to its users, it is far from true to think that those building that infrastructure, especially in the early days, ever wanted it to be that way. In fact, as Marvin (1988) and others have shown, electricity in its early days was a gaudy, showy affair, built to impress and explicitly demonstrate. The route to invisibility was anything but invisible. Literally.¹

Thinking in these terms, then, brings the demonstrability of nascent infrastructures to the fore. In the early days, at least, including where cyberinfrastructure is today, the challenge is one of diffusion. And whichever way one looks at it, diffusion means demonstration and visibility (e.g., Rogers, 1995 [1962]).

Of course producers of cyberinfrastructure appear to want their infrastructure to be invisible to their users, but visible to their funders. Thus they focus on accounting systems (like Open Science Grid’s Gratia), showing the usage of their machines or their software (including problematic citation counts). What the focus on seamlessness and invisibility invokes at the user end is that they don’t think about how their users make their use of infrastructure visible to other potential users. That is they don’t think about designing demonstrability into their infrastructure, in fact they perceive its absence as something close to a design goal.

So how does one build demonstrability into any nascent infrastructure? In some cases it could be as simple as standard citation or branding requirements (akin to the “Built with a Mac” badge displayed on some websites, or the dreaded “Intel Inside” sticker on laptops). It could be more functional/subtle, including a consistent style for graphs created with particular infrastructure components (graphing software has an advantage here, any high-energy physicist can tell you

¹ Which is, I suppose, almost too cute, even for a thought piece.

which graphs were drawn with the ROOT framework). It could include required methods boilerplate (a table showing CPU hours consumed on HPC?). As in work I'm doing with Jim Herbsleb, funded through the NSF SciSIP program, it could include software that reports on its own use. In fact this is a design project all of its own: what makes for an appropriate demonstration of the use of an infrastructure to other potential users.

This thinking could also be built into grant proposals: if you aren't designing and building for diffusion you aren't building infrastructure you are just writing software.

First, though, perhaps we need to be conscious that when we talk about invisibility as a characteristic of infrastructure, we ought to emphasize that it's an endpoint characteristic. It's something achieved without trying to achieve it. Or rather, infrastructure projects that try to be invisible are unlikely to become infrastructure.