

Infrastructure is Invisible / Infrastructure is Law : OpenAIRE blog

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*TL;DR: As both Geoffrey Bilder and Martin Heidegger tell us, infrastructure is usually invisible and we only notice it when something goes wrong. This is profoundly problematic for scholarly communications, since infrastructure is also law – it shapes thoughts and actions. Luckily, moments of breakdown (like the SSRN sell-off) help illuminate problems with the system and call on us to change what is broken.***INTRO**



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“Infrastructure, when it’s working, you don’t notice it.... [I]deally you’re not concerned about it at all – it’s just there. You take it for granted. It’s only when you travel to someplace like this [Brussels] and you realise you left your bloody plug [adaptor] and you can’t get [something] working – that’s when you start noticing infrastructure, when it fails or when it’s incompatible”. Geoffrey Bilder, [OpenCon2015](#)

I’ve heard Geoff Bilder say this a couple of times now and it always really resonates – not just because it’s patently true, but because the phenomenon he’s describing plays a prominent role in the work of one of my favourite philosophers (Heidegger) and is really important to the developing field of philosophy of technology. And as I’ve thought about it more, I increasingly suspect that setting out a bit of that background might help shed some light on some of the problems we face in really thinking about scholarly infrastructure, as well as help us appreciate the opportunities we currently have at hand. At the very least, I hope it’ll offer some interesting context for Bilder’s observations. So here goes. We’ll start with a bit of Heidegger on hammering.

INFRASTRUCTURE IS INVISIBLE



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In his major work *Being & Time*, Martin Heidegger wants to get us away from thinking that we are (usually/mostly) rational cognitive agents who stand over and against semantic objects of knowledge (a theory of subject-object dualism that he blames on Descartes and that he thinks has led philosophy off track for

centuries). So he asks us to put ourselves in the place of an experienced carpenter hammering nails. What is the hammer to the carpenter at that moment? It's certainly not a rational object of study – the carpenter probably isn't even thinking about the hammer at all, so much as the nail he's about to hit, or the larger task he's working on, or something else completely. Our tools, in use, "withdraw" from our perception. As I type these words right now, I am not concerned with the laptop computer or word processing software I am using as distinct objects of reflection (as things "vorhanden" or "present-at-hand," in Heidegger's terms). Rather, in the act of writing, these tools withdraw into the background of the larger project I am engaged in (writing a blog post to try to organize and share some ideas), as things that are just "ready-to-hand" ("zuhanden") as Heidegger puts it. It is a "peculiarity of what is proximally ready-to-hand," says Heidegger, that "it must, as it were, withdraw in order to be ready-to-hand quite authentically" (Heidegger 1962: 99). Hammering well requires us to not be thinking about the hammer, but about the nails, or the job at hand, or something else. I'm a pretty bad guitarist, but I play best when I don't think and just play.

And for Heidegger – just like for Bilder – it is only when the equipment malfunctions, is missing, or in some other way "unready-to-hand," that the tool itself becomes conspicuous and the object of reflection. In its obstinacy the object announces itself and we realise the depth of its invisible role in our everyday lives: "the context of equipment is lit up, not as something never seen before, but as a totality constantly sighted beforehand in circumspection. With this totality, however, the world announces itself" (Heidegger 1962: 105). It is at this moment of breakdown—say, when the laptop suddenly crashes—that I really grasp the way in which it forms part of a meaningful whole. This "totality" is the contextual field of involvements in which our equipment has its relative meaning, the meaningful whole in which "it can be this equipment that it is" (97). In our everyday lives, our tools are not the objectified, "present-to-hand" things of philosophical or scientific investigation. The laptop computer I am using to write these words, for example, is not some neutral thing to which I endow value, but is a familiar tool which has a role in my activities and a meaning which is inextricably linked to the larger context of my everyday life, my projects, values and concerns. Often, concerned as I am with writing, I'm not conscious of that. When the "blue screen of death" (to give an example we MS Windows users will readily understand) pops up, I suddenly am.

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A problem has been detected and Windows has been shut down to prevent damage
to your computer.

The problem seems to be caused by the following file: SPQMDCON.SYS
PAGE_FAULT_IN_NONPAGED_AREA

If this is the first time you've seen this Stop error screen,
restart your computer. If this screen appears again, follow
these steps:

Check to make sure any new hardware or software is properly installed.
If this is a new installation, ask your hardware or software manufacturer
for any Windows updates you might need.

If problems continue, disable or remove any newly installed hardware
or software. Disable BIOS memory options such as caching or shadowing.
If you need to use safe Mode to remove or disable components, restart
your computer, press F8 to select Advanced Startup options, and then
select safe Mode.

Technical information:

*** STOP: 0x00000050 (0xFD3094C7, 0x00000001, 0xFBFE7617, 0x00000000)
*** SPQMDCON.SYS - Address FBFE7617 base at FBFE5000, DateStamp 3d6dd67c
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By definition, if infrastructure is doing its job you usually won't notice it. As Geoff Bilder has said (again, at OpenCon2015), "this is an important characteristic of infrastructure but it's part of what makes it so boring. If it's actually functioning we don't think about it and we only get annoyed about it when it's not."

INFRASTRUCTURE IS NOT IMPERSONAL

This paradox – that infrastructure can be so near or so ever-present and yet is rarely fully perceived and reflected upon is profoundly problematic. For it often makes us blind to the nature of the tools we use, to their significance and the central role they play in our existential engagement with the world. By “existential engagement” I mean here that our tools are not just objects for experience, but *means of experience*. The “withdrawal” of tools is thanks to our cognitive architecture. Neuropsychology strongly suggests that there are distinct brain systems responsible for representing (1) semantic information about the tools we use, and (2) the skills needed to use them. When we are *using* tools fluently, it becomes difficult to say where we stop and the technology starts – sometimes literally (as where tool use [blurs the boundaries of the body-schema](#), for instance). As the philosopher/cognitive scientist Andy Clark says, we have a “special character, as human beings, to be forever driven to create, co-opt, annex, and exploit nonbiological props and scaffoldings ... *to exploit deep neural plasticity in order to become one with our best and most reliable tools*” (Clark 2003: 6-7).



Living, as we do, with these tools as part of the everyday fabric of our lives, we come to unthinkingly trust them as extensions of ourselves. That we invest this trust, relying on our technologies in the most immediate and intimate ways (ways often more than just analogous to that in which we rely on our bodies), means that it is usually difficult to react rationally when things break down. This is why we experience such shock, panic and pain when the “blue screen of death” appears on our computer screen, for instance. Or, to bring us back to scholarly infrastructure, it is why people can feel the [sale of SSRN to Elsevier](#) to be such a visceral betrayal. For SSRN's users, SSRN was not just an impersonal place to share documents – it was an everyday hang-out where communities dwelled online, a trusted interface to the literature and people that compose their disciplines.

Such moments of breakdown can be illuminative. Casting off the fog of the everyday, they allow us to see our tools anew and to appreciate how integral they are to our lives. They can also be cathartic occasions for reappraisal, for rethinking the nature of this invisible infrastructure in which we usually unthinkingly invest our trust. We must seize such moments constructively. The “blue screen of death,” for example, is a reminder to practice good research data management in the future (and maybe think about switching to LINUX or Apple). SSRN's sell-off, as I've said [elsewhere](#), is an opportunity to reassess the role of such platforms in the research endeavor and to discuss anew the kinds of governance safeguards we should demand from them. Such reflection is crucial, because although it is boring or often invisible, infrastructure pays a constitutive role in scientific discourse, which is to say: infrastructure is law.

INFRASTRUCTURE IS LAW



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Infrastructure's invisibility means we often don't realize that it shapes our actions. The ends of our actions are not logically independent of our means of realizing them and our conceptions of those ends can themselves be influenced by the technologies available. The particular conflux of infrastructure with which we live lays down a pattern for our lives and inclines us to some ways of acting rather than others. Over time, dominant patterns of usage can appear as a result. Churchill said of architecture: "we shape our buildings and afterwards our buildings shape us". The same is true of our digital architecture. As Lawrence Lessig's says "Code is Law":

"This code, or architecture, sets the terms on which life in cyberspace is experienced. It determines how easy it is to protect privacy, or how easy it is to censor speech. It determines whether access to information is general or whether information is zoned. It affects who sees what, or what is monitored. In a host of ways that one cannot begin to see unless one begins to understand the nature of this code, the code of cyberspace regulates.... The code regulates. It implements values, or not. It enables freedoms, or disables them. It protects privacy, or promotes monitoring." Lawrence Lessig, [Code is Law](#)

The fundamental architecture of scholarly communications has the same prescriptive force as Lessig's code. It sets the terms on which knowledge is created and shared. It dictates who is allowed to take part in the scientific enterprise and who excluded. It sets forth what information is collected, for which purposes. It affects what is monitored, by what metrics and how opaque or transparent that process can be. In all these ways and more, the invisible infrastructure of scholarly communications orders the what, when, why how and who of scholarship. It implements values – it cannot do otherwise (Lessig being wrong in suggesting that code can ever be value-neutral). Infrastructure is law. Knowing this, it can be no less than a sin that we allow our scholarly communication infrastructure to have its values determined by rent-seeking legacy publishers out to protect their 40% profit margins and billions in revenues. Science must be set free to use digital networked technologies to their full potential, to bring research fully into the 21st century to better address society's grand challenges like climate change or food security. And nothing else.

Infrastructure is law, but of course laws are not inviolable. Just as people are shaped by technology, so people shape technology – both are constitutive and emergent, cause and effect. Infrastructural laws will change as activism and advocacy – whether progressive or conservative – wins through. They will evolve as users will take up new services, or don't. Where injustice is felt too grand, there may even be acts of civil disobedience (and some argue Sci-hub belongs to this category). But although we are far from powerless, the sad truth is that busy lives and competing priorities often lead most down the line of least resistance. The invisible infrastructure sets pathways for action, encouraging researchers to "go with the flow". They often do.



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Going with the flow can be the only reason that journal impact factor persists as a metric for research quality. By now we know that the glamour journals – Nature, Science, Cell – are not bywords for excellence. The relative handful of impactful papers they publish are always packaged with a very long-tail list of rarely cited works. Yet still young researchers clamour to run the gauntlet of 90% rejection rates to get that golden badge for their CV, that trophy that will anoint their career in the eyes of their superiors. Going against the grain in this system takes bravery and stamina. So most don't. They don't publish in novel, progressive avenues – just as they don't don't share data, publish peer reviews, pre-register trials or keep open notebooks. And they won't, unless we find ways to reward such behavior – through making people aware of the inherent benefits in open science, but also through changing the infrastructural laws for the better. Moments of breakdown like the SSRN sell-off can be pivotal in this mission.

BREAKDOWN IS OPPORTUNITY

It is not hyperbole to say that for the last 20 years or so, scholarly communications in general has been afflicted by a chronic, drawn-out breakdown of the kind highlighted by Heidegger. The refusal of the traditional-publishing oligarchy to come properly to terms with the Internet's potential – alongside their active obfuscation and the millions spent in lobbying to retain the current system in which they reap huge profits by selling content gifted to them by researchers (to which they add scant value in overall terms) back to the institutions that fund those researchers – has been scholarly communication's "blue screen of death". The breakdown of trust has been absolute. But this breakdown has also been the occasion for a fundamental rethinking of the role of scholarly communications in research. From the Open Access movement has blossomed a wider Open Science agenda that seeks to bring transparency and inclusion to all areas of scholarship – to rethink science and scholarly communication from the ground up. We must use this opportunity to its fullest, because the transitory light that this breakdown shines on the infrastructure of scholarly communication offers the real chance to achieve fundamental structural change – to fundamentally alter the infrastructural laws so they work for the benefit of scholarship in general.

Note: This post represents the author's personal views, not necessarily those of OpenAIRE. **References**
 Clark, Andy (2003), *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence* (Oxford: Oxford University Press).

Heidegger, Martin (1962), *Being and Time*, trans. John Macquarrie and Edward Robinson (Oxford: Basil Blackwell).

