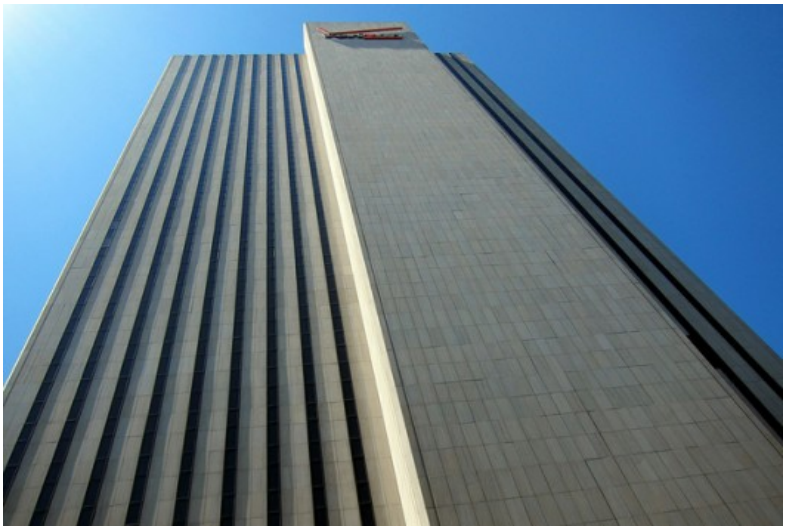
Data Centers: Anti-Monuments of the Digital Age



375 Pearl, originally built in 1975 as a Telephone Communications building, was bought in 2011 to be repurposed as a Data Centers. The intimidating, unbroken facade is typical of a Data Center. Photo via Flickr CC User wallyg.

Your Macbook Air has come at a price. And I'm not talking about the $1,000 bucks you shelled out to buy it.

I'm talking about the cost of *lightness.* Because the dirty secret of the "Cloud" – that nebulous place where your data goes to live, thus freeing up your technological devices from all that weight – is its very physical counterpart.

Data Centers. Giant, whirring, power-guzzling behemoths of data storage – made of cables, servers, routers, tubes, coolers, and wires. As your devices get thinner, the insatiably hungry cloud, the data centers, get thicker.

So why are you struggling to picture one in your mind? Why do we have no idea what they look like? What they do? Where they *are?* Because Data Centers have been hidden away and, although carefully planned, intentionally "undesigned." The goal is to make the architecture so technologically efficient, that the architecture *becomes* the machinery, and the machinery the architecture. In the words of author Andrew Blum, Data Centers are "anti-monuments" that "declare their own unimportance."

But if architecture is the expression of our society's values and beliefs, then what does this architectural obliteration mean? That we are willfully ignoring the process that creates the data we daily consume. As long as the internet works, who cares where it came from (or at what cost — and there is a considerable cost)?

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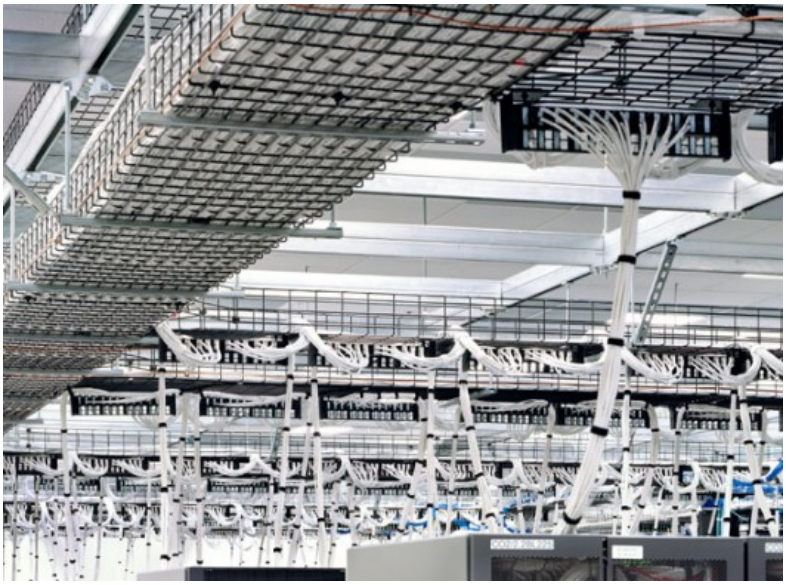
So can design change our alienated relationship to our data? *Should it?* And if so, how?

The Data Center: An Introduction



One of Microsoft's data centers is a 500,000-square-foot facility that was built on a bean field in Quincy, Wash., in 2006. Photo © Simon Norfolk for The New York Times

Tukwila is less a building than a machine for computing. "You look at a typical building, [...] and the mechanical and electrical infrastructure is probably below 10 percent of the upfront costs. Whereas here it's 82 percent of the costs." Little thought is given to exterior appearances; even the word "architecture" in the context of a data center can be confusing: it could refer to the building, the network or the software running on the servers. [1]

This description of Microsoft's Data Center in Tukwila, Washingington, via its then-general manager Michael Manos, in conversation with *New York Times* reporter Tom Vanderbilt, sets up the Data Center as the hybrid creature it is: an architectural machine. There are many reasons for this amalgamation, but let's begin with the most intrinsic to the Data Center: power.

Energy

Data Centers require a never-ending, unimaginably large flow of electricity. To put it in perspective: if the Data Centers in the "Cloud" made up a country, that country would be among the top 5 energy users *in the world.* By 2020, this consumption is expected to multiply fifty times over. [2]

Unfortunately, most companies in the Cloud are still getting that electricity from traditional "dirty" sources of power; instead of finding ways to decrease energy consumption as a whole (by investing in renewable energy sources, for example), many have focused on making their use of energy as efficient as possible – which has led Data Centers to become the infrastructure of the data itself. [3]

Security

Another key concern is security. Data Centers often store highly sensitive information – and I don't just mean the photos you share on Facebook. Think: every financial transaction on the Stock exchange or email sent by a Government employee resides, in some form or other, in a Data Center. Moreover, there's also the motivation of keeping a Data Center's cutting-edge design secret from the competition.

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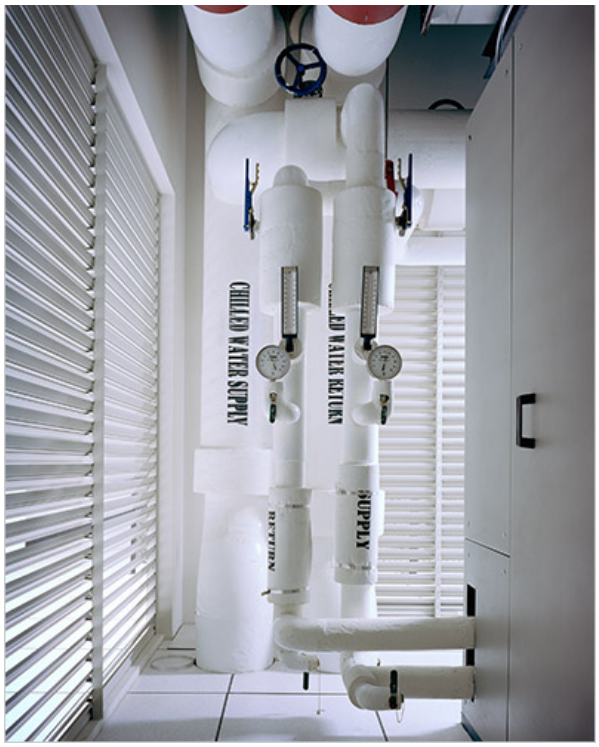

Chilled water is an essential part of the system to reduce heat from the servers. It has historically taken nearly as much wattage to cool the servers as it does to run them.
Photo © Simon Norfolk for The New York Times

The Data Center Pionen – White Mountain, designed by Albert France-Lanord Architects ,is housed in a former 1,200 sqm Cold War bunker (originally a World War II bunker); an amazing location 30 meters down under the granite rocks of the Vita Berg Park in Stockholm. The Center, which houses two of Wikileaks servers, shows the lengths some clients will go to keep their data secure.

To both ends, many Data Centers resemble warehouses turned high-security military facilities (and in some cases they actually *were*) [4]. Restricted barriers, security cameras, biometric devices that scan your irises – when Andrew Blum, author of *Tubes: A Journey to the Center of the Internet*, visited Google's Data Center in The Dalles, Oregon, he likened it

to a prison, and couldn't even get past the cafeteria.

The Site

The need for both s[NEW]y and energy-efficiency has led Cloud companies to place their telecommunications infrastructures, and, increasingly, in naturally cool environments (eliminating the need for coolers to offset the heat these centers produce). Tax incentives and proximity to endusers are also key considerations. [5]

05 JUL 2012
by Vanessa Quirk
Editorial Infrastructure Data Center Facebook technology

But while cold, isolated locations make a lot of sense for Data Centers as they exist today, they weren't always hidden away. In the 60s, IBM mainframes were located in a privileged spot in corporate headquarters: the "glasshouse." Kenneth Brill, founder of data-center research and consulting group, the Uptime Institute, explains: "It was located near the executive suite. Here you'd spent $15 to 30 million on this thing — the executives wanted to show it off." [1]

As this historical episode shows, Data Center design and site aren't fixed – they depend on human priority. And while the current model is rather entrenched, that doesn't mean it isn't due for a change.

Facebook's latest Data Center, in Prineville Oregon, designed by Sheehan Partners.
. ©2011 Alan Brandt info@alanbrandtphoto.com

Glasshouses

Data Center design is at a crossroads. There are some companies, such as HP, who are betting that modular data centers (shipping containers filled with servers) are the way of the

future. Comparably low cost, fast to set up, energy-efficient, and easy to cool, these containers eliminate the need for architecture at all.

But Facebook has also spearheaded a new trend in Data Center Design: transparency. For their last center in Prineville, Oregon, Facebook made the plans public. As Blum blogged: "Believing in the efficiency and innovation of the building's design—and the environmental benefits of extending that to other parts of the Internet's infrastructure—Facebook has published all the plans, all the way from the custom-designed motherboards to the unusual swamp cooler-like system that keeps the building cool. Architecture always expresses the ideals of an organization. In Facebook's case, this meshes with Mark Zuckberg's founding vision of making the world more open and connected."

Facebook's latest Data Center, in Prineville Oregon. ©2011 Alan Brandt info@alanbrandtphoto.com

Facebook has also pledged to rely more on renewable energy sources (their next center will be in Sweden, the leading supplier of renewable energy). But the design doesn't just embrace environmental innovation; as Blum points out, it crystallizes Facebook's vision of openness by creating a space that is approachable. There are no scary unbroken facades here. Prineville boasts large windows, welcoming colors, natural materials, local memorabilia – a human environment for man and machine.

As more and more private companies get into the Data Center game (Amazon, eBay, and Walmart are already big players), a company's Data Center design could become increasingly important. Perhaps Data Centers will eventually go back to their roots, becoming integrated into our cities, transparent and proud "glasshouses."

Lets hope that they do. Because without design, the design that bridges the man to the machine, the Data Center remains an impenetrable fortress, separating us from a technology that we use daily (and that daily damages the earth). Design can turn these"anti-monuments" back into glasshouses – architecture that gives us a peek into our own digital age.

References

[1] Vanderbilt, Tom. “Data Center Overload.” *The New York Times.* June 8, 2009. <http://www.nytimes.com/2009/06/14/magazine/14search-t.html?_r=1&pagewanted=all>.

[2] Greenpeace. “Why Clouds Aren’t Green” *CLOG: Data Space.* Ed. Kyle May. 2012. <http://www.archdaily.com/248456/data-space-clog/>

[3] Corbo, Stefano. “Data Centers and Physical Spaces: Tracking the Invisible.” *CLOG: Data Space.* Ed. Kyle May. 2012. <http://www.archdaily.com/248456/data-space-clog/>

[4]Graham, Stephan. “Data Archipelagos.” *CLOG: Data Space.* Ed. Kyle May. 2012. <http://www.archdaily.com/248456/data-space-clog/>

[5] “How Green Is Your Cloud?” *Greenpeace.* April 2012. <http://www.greenpeace.org/international/Global/international/publications/climate/2012/iCoal/HowCleanisYourCloud.pdf>

Cite:

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8 comments

Charlie +1

Le-Corbusier would love to design one of these architectural machines.
I personally don’t think these have to be in cities. They don’t require many workers, so it would almost be like an abandoned building, reducing the density in the area. Might as well stick it next to the power station. Its a big deal if they lose power.

Reply

Jon Rozenbergs 0

Interesting post, although, this isn’t the first time we’ve seen this typology. Many cities in the Midwest host grain silos that are enormous machines dressed-up as buildings. In fact, Le Corbusier other early modernists were sketching grain silos and comparing them to classical temples when they asserted the machine aesthetic. While many grain silos have been destroyed because our grain production has decreased (and because they are deemed too ugly to keep), those which remain offer a unique and local form of urban space. Further, those which aren’t being used have been co-opted by the general public because of their weird, in-between nature that isn’t codified for use or behavior like other parts of the city.
If these buildings are required by our society, then we have to work with them as designers; however, because they are part of a legacy, we can learn from past examples, and thereby meaningfully

incorporate these infrastructural buildings into the typologies of our era.

Reply

JK 0

Corbu designed machines for living. These are not that.

Reply

Chris 0

Nice article it makes people think.
But i have to point out that Sweden is not “the leading supplier of renewable emery”. They are based on Nuclear power, hydroelectric, and fossile fuel plants. The hydroelectric is clean, however that’s only 44% of the energy production. They are far from leading.

Reply

kevin +1

Ms. Quirk,
I am glad that someone is finally talking about such unseen infrastructures of our contemporary life instead of obsessing over surfaces and tessellations.
At the same time, I think it’s important to keep in mind that the discussion about aesthetics of these buildings are perhaps the least important aspects of data centers. As a matter of fact, I’d HIGHLY disagree with your position that data centers exhibit “architectural obliteration.”
There is design in data centers. As a matter of fact, there is A LOT of design involved! It’s just not the “high-design” of aesthetics ArchDaily or any other design blogs usually like to feature.
Furthermore, I dispute your statement at the end of the article which states, “…Data Centers will eventually go back to their roots, becoming integrated into our cities, transparent and proud “glasshouses.”
Data centers are already a large part of the built environment. They are housed in older buildings such as the Verizon tower you have featured at the top of your article or this building (http://datacenterpractice.com/new-york/the-future-of-manhattan-data-centers-part-1-111-eighth-avenue/), also in Manhattan which houses Google’s servers. Yes, there will be that 1% of the time when companies would use some of these data centers strategically located in and around cities as a “showcase piece” but they’d merely be a novelty data center.
Majority of the data centers, will continue to be integrated into our cities and landscapes without much pomp and circumstance. With the advent of shipping-container data centers or even AOL’s refrigerator sized data centers, coupled with the benefits of a distributed model of data centers, integration of data centers into the built environment will be as ubiquitous as power lines cellphone towers or street signs.
On that note, your notion that they’d be turned into glasshouses is rather misinformed and/or idealistic as the companies who own these facilities and the tech companies which rent out server spaces from them would prefer a closed space, the climate of which can easily be regulated.
I understand that these articles are meant to be introductory pieces meant to inform the masses of these spatial phenomena worth noting. But it’s also very important to not ignore the issues which make the data centers the way they are and not fetishize over peripheral issues like “scary unbroken facades.”

Reply

Antoine 0

“In a deep, icy Norwegian fjord, an abandoned mine may help solve the energy problems of the Internet…”
http://www.onearth.org/article/how-cool-is-that
And the video : http://youtu.be/C7McaM7ioAg

Reply

John Nickles 0

It’s amazing how these nondescript data centers often go unnoticed by motorists or pedestrians even when they are located in the heart of a large city.

Reply

john doe 0

Like the way we don’t really notice manholes, lightposts, electrical lines, and a myriad of other common place things in our built environment? :)

Reply

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