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JOURNAL OF CROSS-CULTURAL IMAGE STUDIES |  
REVUE D'ÉTUDES INTERCULTURELLES DE L'IMAGE

Publication details, including open access policy  
and instructions for contributors:

<http://imagination.csj.ualberta.ca>

## Location and Dislocation

Editorial Team: Brent Ryan Bellamy, Daniel Laforest, Andriko Lozowy,  
Tara Milbrandt, Carrie Smith-Prei, Sheena Wilson

September 6, 2017

To cite this article:

Veel, Kristin. "Uncertain Architectures: Performing Shelter and Vulnerability."  
*Imaginations* 8:2 (2017): Web (date accessed) 30-41. DOI: 10.17742/IMAGE.  
LD.8.2.4

To link to this article:

<http://dx.doi.org/10.17742/IMAGE.LD.8.2.4>



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# UNCERTAIN ARCHITECTURES: PERFORMING SHELTER AND EXPOSURE

KRISTIN VEEL

## Abstract

*Originally housed in generic industrial buildings, data centres have become sites of architectural feats and playgrounds for architects in recent years. These buildings testify to a changed role of how we think of these repositories for data and their position in our society. Through a reading of the Bahnhof data centre Pionen in Stockholm from 2008 and the design schematic for a Data Tower in Iceland, this article examines how the data centre as an architectural and infrastructural edifice facilitates data storage and access, focusing on how security is articulated in the architectural vocabulary through negotiations of visibility. By intermingling images of these sites with textual vignette-like reflections, this article uses the architecture of the data centre to address how the design of dynamic data archives embodies cultural imaginaries of uncertainty through the tropes of shelter and exposure. [/column]*

## Résumé

*Initialement hébergés dans des bâtiments industriels génériques, les centres de données sont devenus récemment des merveilles d'architecture et des terrains de jeux pour les « starchitects ». Ces bâtiments témoignent d'un changement de rôle dans la façon dont nous pensons à ces entrepôts de données et à leur position dans notre société. Grâce à une lecture du centre de données Bahnhof Pionen à Stockholm à partir de 2008 et au schéma de conception d'une tour de données en Islande, cet article examine comment le centre de données, en tant qu'édifice architectural et infrastructure, facilite le stockage et l'accès aux données, en mettant l'accent sur la façon dont la sécurité est articulée dans le vocabulaire architectural à travers les négociations de visibilité. En entremêlant les images de ces sites avec des réflexions textuelles semblables à des vignettes, cet article utilise l'architecture du centre de données pour aborder comment l'élaboration de centre de données dynamiques incarne des imaginaires culturels d'incertitude à travers les tropes d'abris et d'exposition. [/column]*

## Storage and Access

Data centres are the buildings that house the servers that enable our online communication, thereby constituting the physical residences that allows for the ubiquitous integration of digital technology into our everyday lives. As anchoring points for the data deluge that envelops us, they can be regarded as the contemporary architectural form of the repository archives and libraries in which Western culture has stored information for centuries. In this sense, data centres may also be regarded as spatial containers for our current engagement with time, offering not only storages of the past, but gesturing towards the temporal regime of a broad present (see Gumbrecht; Ernst; Cox and Lund): in the data centre the past and the future intermingle in the dynamic accumulation of data, which can be operationalized for predictive and pre-emptive purposes in an even more tangible way than their physical antecedents. While predictive data analytics are marketed as tools for certainty and security, the temporal regime of simultaneity of which they are part also marks a move towards uncertainty as a fundamental condition that engages in a re-negotiation of what is considered visible and what is invisible.<sup>1</sup> The aim here is to unfold how this uncertainty takes architectural form through architectural and discursive analysis of blueprints, architectural renderings, and photographs of the Bahnhof data centre *Pionen* in Stockholm from 2008 and the design entry for a *Data Tower* in Iceland, which came in third in the magazine *eVolo*'s 2016 Skyscraper Competition.



Figure 1

As facilities for storage and access, data centres have different spatial affordances than traditional archives. As opposed to archives containing books, images, or objects, data centres store the servers that house the data, which can be extracted and rendered remotely in different formats and through a range of different interfaces. Admission to the storage facilities is therefore not necessarily granted in order to access material and the materialisation of data can be regarded as more fleeting and modular than the physical archive. Nonetheless, as this special issue on the geographies of global data makes clear, information infrastructures partake in natural, social, and political geographies in new and noteworthy ways. While they are containers for ephemeral data, they are also the epicentres of power and control, and their physical location has extensive implications for information ownership as well as environmental consequences (Hogan and Shepard; Hogan).

Looking at the diverse architecture of this new generation of data centres—which are increasingly custom-built and the result of prestigious design competitions—conveys important information about how contemporary culture imagines and projects the function of these data hubs. The architectural vocabulary and the narratives these sites exert about data storage and access provides us with insight into how security (understood as spectrum of issues ranging from equipment conditions to privacy)



Figure 2

takes architectural form. In recent years, the architecture of data centres has gathered interest among a wider audience, evidenced by Douglas Alger's coffee-table book *The Art of the Datacenter* (2012), *Wired*-correspondent Andrew Blume's bestseller *Tubes: A Journey to the Centre of the Internet* (2012), and the documentary project *The People's Cloud* (2016). This article considers the materiality of infrastructure and how we may go about reading the cultural implications of these structures, following the work of scholars such as Mél Hogan, Jennifer Holt and Patrick Vonderau, Peter Jakobsson and Frederik Stiernstedt, Shannon Mattern, Lisa Parks, and Tung-Hui Hu.

The two architectural structures on which this article focuses appear at first sight to be opposites—one convex and one concave structure: *Pionen—White Mountain*, built in 2008, 30 metres below ground in an old nuclear bunker carved out of the mountain in Stockholm, houses the facilities for the Swedish internet service provider, Bahnhof.

The design for a *Data Tower* in Iceland, which came in third in the magazine *eVolo's* 2016 Skyscraper competition, shoots out of the ground. Yet its height, designed to be adaptable to shifting storage needs, and its modular structure made out of server boxes that can



move in and out of the building, make for an appearance that is as flexible and in flux as the content it contains.

Figure 3

In what follows, I shall focus on these two data centres—one built and one imagined—as architectural, infrastructural imaginaries that, in different ways, encapsulate a reflection on the cultural imagination of data access and storage as linked to uncertainty in the 21<sup>st</sup> century. These reflections take their starting point in a series of illustrations from the design proposal of the *Data Tower* by the two architects, Valeria Mercuri and Marco Merletti, and Åke E:son Lindman's photos of *Pionen* for Albert France-Lanord Architects. Weaving between these images, my work also re-narrates the buildings, thus providing a representational architecture in and of itself that shares with these buildings an engagement with the future in which we live through imagining it.

### Security as Shelter and Exposure

The equipment housed in a data centre makes specific demands on its surroundings in terms of resilience with respect to natural disasters and equipment failure. In particular, data servers are required to be kept cool, which means it is more



was built in the 1970s to protect government functions from nuclear attacks. Thirty metres below ground and sheltered behind a 40-cm-thick metal door, it has 1200 square metres of space for its server halls and offices. Dynamite blew out 4000 cubic metres of extra space, and it took them around two and a half years to turn the atomic shelter into a data centre. The shelter uses outside air cooling rather than geothermal cooling (drilling into the mountain and using the coolness of the ground) to avoid heating the mountain that surrounds it. Backup power generators repurposed from second-hand diesel engines from German submarines secure the stability of this site. In the event of a system failure, a submarine sound horn alerts the surroundings (see *Albert France-Lanord (A)rchitects; Bahnhof; "Pionen"; McMillan*).

In this way the atmosphere resonates with Cold War connotations, and the design of the data centre itself, by the architects Albert France-Lanord, has been heavily inspired by James Bond and sci-fi film sets. The interior decoration evokes spaceships and notions of self-sufficiency—for instance, in the way fountains, greenhouses, and a fish tank have been installed in the depths of the cave to create a sense of the intermingling of nature, technology, and humans (see Fortin; Schrijver; Sanders).

As an internet service provider, Bahnhof works mainly with what is called “colocation”; they provide space for the servers and networking equipment of different companies, particularly desirable for companies with midsize IT needs for which it is not profitable to invest heavily in the technological logistics that support their work (“Colocation”). Bahnhof thus makes a living from providing a physical storage facility

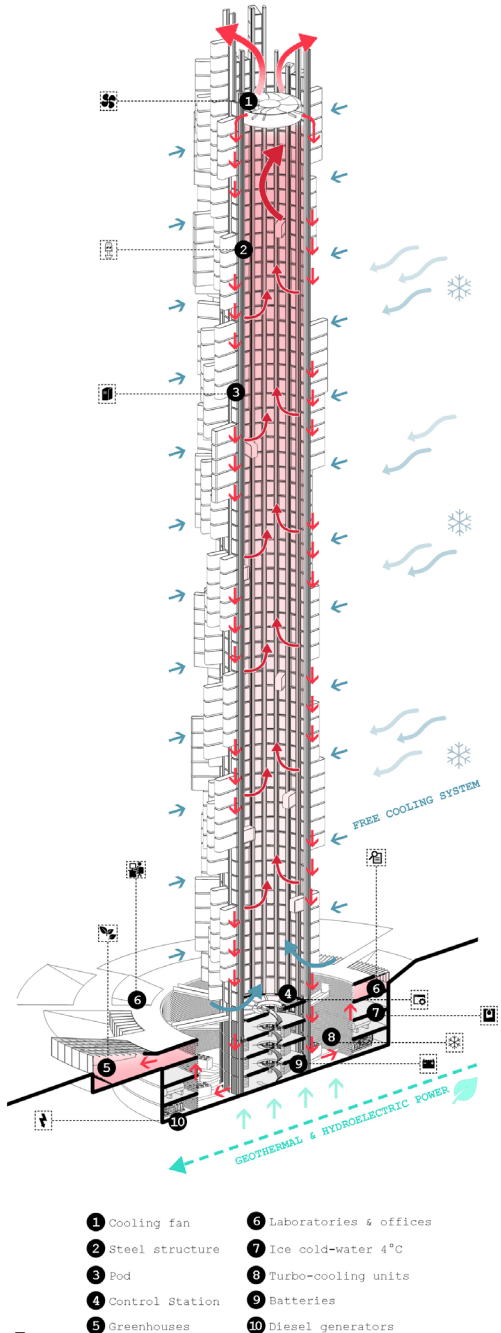
that offers security and stability in terms of power supplies as well as flexibility in terms of facilitating different types of customers and their equipment. Since this data centre is essentially an extension of a nuclear bomb shelter, the site was already constructed with security issues in mind, and the vocabulary of a self-contained world-within-a-world in its sci-fi interior decoration enhances this feeling.

On constructing the Bahnhof data centre *Pionen*, Albert France-Lanord Architects stated: “It has been very exciting to work with a space which at first didn’t offer one square angle: the rock. The main room is not a traditional space limited by surfaces but defined by the emptiness inside a mass.” (“Pionen”) This notion of “emptiness inside a mass” is an evocative metaphor for thinking about digital storage space. The concept of data is often discussed in relation to the trope of the *black box*, the archetype of which is, of course, the flight recorder. Entering common language from engineering and cybernetics in the second half of the 20<sup>th</sup> century, the black box is a trope for something about which we can only know the input and the output. In Bruno Latour’s words, it describes “an expression from the sociology of science that refers to the way scientific and technical work is made invisible by its own success” (304). In the case of *Pionen*, we may say that the whole data centre is, in a sense, black-boxed—to the many pedestrians making their way above ground past wooden houses and an old church, *Pionen* is emptiness inside a mass.

The logic of a site such as *Pionen* hinges on the particular configuration of access and storage that it provides. Storing the servers 30 metres underground evokes a Cold War log-



Figure 6



ic of containment and of invisibility as connoting security, with which the interior inspired by the self-contained spaceship is in dialogue. Yet significantly, the architecture revolves not only around the fundamental needs of securing a stable environment for the servers but also making the resources housed here easily available for distribution and consumption. Unlike the original nuclear bunker—the submarine or the spaceship—the *raison d'être* of the data centre lies in the connectivity it provides to the surrounding world. This gives rise to a series of architectural paradoxes, as we shall see when we in the next section return to how visibility is negotiated in the interior of this building.

First, however, we shall turn to the projected 65-story *Data Tower*. Here the notion of emptiness inside a mass takes on another meaning. *Data Tower* is envisioned as a tall vertical structure that elevates the servers rather than burying them in the ground. The design is modelled on an enormous, 3D motherboard with a cylindrical shape, inspired by Volkswagen’s Car Towers in Wolfsburg and the Apple Mac Pro Tower. All the hardware components are fastened on the external façade, while the inside is left as an empty void that has a double function: it is the main air duct of the cooling system and the space in which the pods can be moved to the ground floor for maintenance and upgrade. It is imagined to function as a giant chimney that heats the laboratories and greenhouses located in the basement as well as the surrounding neighbourhood.

The *Data Tower* demonstrates the same logic of self-sufficiency and attention to the heat the servers produce that we saw with Bahnhof’s bunker. Yet while the bunker struc-

Figure 7

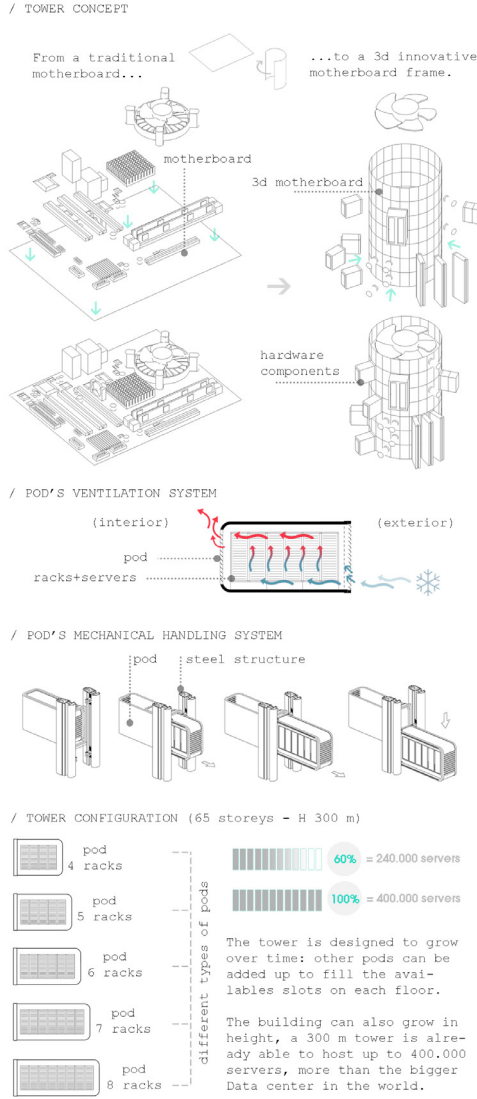


Figure 8

ture encapsulates the servers, they almost leap from the surface of the tower. Here, security takes a different form: rather than sheltering, it exposes its contents to the surroundings. Flexibility and connectivity are privileged over the sense of protection that comes from the hidden cave structure. The motherboard as an architectural model allows for modular thinking, which makes the façade adaptable to the needs at a given time. Thus, the height of the tower is not fixed but adaptable. In this way, the building allows for much more plasticity than is possible in Bahnhof's bunker, which is much more difficult to expand at a later stage.

Thus, in different ways, the two buildings give form to data storage in a way that emphasizes that this content should be *simultaneously* secure and also remain flexible in terms of access. The bunker foregrounds the security aspects as an issue of protection and shelter while the tower makes for a much more exposed edifice that exhibits extreme flexibility and vulnerability. Turning now to look closer at the notion of *visibility*—a concept that has saturated most public institutions and private corporations in the 21<sup>st</sup> century—allows us to explore this constellation of shelter and exposure more and examine the relation between security and flexibility that we see at work in these buildings.

### Visibility

Transparent glass facades have dominated much contemporary high – to mid-rise urban architecture since the 1990s, reflecting the architectural articulation of ongoing negotiations of visibility and invisibility in a contemporary culture

dominated by increasing surveillance (Steiner and Veel). Architecture historian Anthony Vidler, among others, has argued that glass (as a material which is only transparent under very specific light conditions) is often used as a political or ideological statement to *signify* transparency rather than necessarily embody it. Transparency can therefore be considered an ideological condition (Vidler 217-18). So, I argue, is security, and data centres are a particular type of building in which we can observe visibility perform a negotiation of security issues in built form.

On a first reading, *Pionen* and the *Data Tower* may seem to embody a transition in thinking about institutions and visibility—an architectural equivalent of the Gilles Deleuze's distinction between disciplinary societies and societies of control ("Postscript on the Societies of Control"). Here Deleuze uses the imagery of the serpent and the mole as a way of articulating a shift from Michel Foucault's disciplinary societies, which involved an individual passing through one contained environment after another (the family, the school, the factory, the hospital, the prison). These institutions are embodied in distinct physical and architecturally recognisable settings in which the panoptic principle of a centralised gaze can easily be implemented and stand in opposition to control: "Enclosures are *molds*, distinct castings, but controls are a *modulation*, like a self-deforming cast that will continuously change from one moment to the other, or like a sieve whose mesh will transmute from point to point" (Deleuze 4). Applying this perspective, the two data centres can be read as representing these two different (albeit connected) regimes, with *Pionen* representing a notion of enclosure and

containment while the projected *Data Tower* embodies flexibility, flow, and modulation.

In the *Data Tower*, the server-filled pods are outside the tower. They are lifted up to their spots automatically and taken down when needed. The inside void is a chimney that exhausts hot air or recycles it for heating. *Data Tower* thus exposes what it stores on its façade—in that sense, performing complete visibility where everything is there for us to see, server after server, gigabyte after gigabyte. There is nothing at the centre to expose but hot air. Whereas *Pionen*, as we have seen, embodies storage as shelter, the modular flexibility in the *Data Tower*, exposed to the Icelandic climate, makes a statement about flow, distribution, and connectivity that is linked to its use of visibility. The façade has been turned into an adaptable surface that can adjust the density and height of the tower according to what is needed at any given time. By design, it asserts a distributed and modular sense of the data it stores. Although there is a control station at the bottom of the building that can check the status of each server and, via a mechanical handling system, bring any pod to the ground, it is embedded seamlessly in the surroundings. It is not an elevated, panoptic control tower that provides a bird's-eye overview. Thus, it is not a building that promises protection, security, and centralised control the way we are used to thinking about them in panoptic terms. Rather, it is a building that seems attuned to a conception of security that is equally modular and operates with modes of uncertainty as an unavoidable condition.

However, if we return to *Pionen* and look at its interior, visibility is here also articulated rather ambiguously, and its en-





Figure 9

agement with disciplinary modes of visibility is in fact often tongue-in-cheek. While the site at first glance maintains an aura of security and containment as an underground location that distinguishes itself markedly from the wooden houses above ground, thus marketing itself by its impenetrability and obfuscation, it also engages with visibility as a negotiable stance dependent on point of view. For instance, in its central meeting room it emulates the control tower of a traditional industrial infrastructure: the airport, the ship, the panopticon prison. Overview and visibility here connote safety and control.

Yet the allusions to sci-fi films throughout the interior of the building bring attention to the choreographed performativity of these security structures. This emphasis on the performativity of the site makes it all the more apparent that all there is to survey and control from this platform is the impenetrable white server boxes. The glass encapsulation thus comes to appear more as a theatrical instalment that may bestow a sense of power upon the people on the bridge but in turn makes them part of the décor on the same level as the 2600-litre saltwater fish tank we saw earlier. The people likely to sit in this room know only too well that monitoring takes place elsewhere and, for the most part, is not even conducted by humans. A cyberattack or a systemic error would not be visible by looking at the white boxes. Most likely, it would not even be visible from observing the people working in this environment. Significantly, the server boxes are white, not black, which may be read as a comment on the fact that, while full visibility is granted from this platform, there is nothing to see.<sup>2</sup> Visibility does not always render the inner workings more transparent.

### Uncertain Architectures

The playful engagement with 20<sup>th</sup>-century security connotations in *Pionen* can thus be regarded as pointing to the possibility of a subversive space emerging out of the cultural imaginaries of the Cold War. The founder and CEO of Bahnhof, Jon Karlung, is an active voice in Swedish public discourse on cybersecurity. He is famous for housing Wikileaks in 2010 as well for taping and releasing conversations with the Swedish intelligence services when they tried to persuade Bahnhof to release information on their customers' emails and phone calls in 2013 ("Bahnhof"). In a similar manner to the building's take on visibility, also security can be seen as a question of point of view: from whose gaze should the stored data be protected? The prying eyes of competitors or government agencies? It can be argued that the ambiguous engagement with visibility in the architecture of *Pionen* gestures towards what is called "bulletproof hosting"—i.e., web-hosting firms that do not meddle too much with what their customers upload and distribute and can provide offshore sanctuaries, for instance, from US jurisdiction.<sup>3</sup> Most service providers have terms of service that enable them to suspend a hosting account if complaints are made, either for ethical reasons or for the practical reason of reducing the risk of anti-spam filters blocking their IP subnet. However, a "bulletproof" host allows a content provider to bypass the laws regulating internet content and service in its own country of operation, which was the case with the Wikileaks servers. In this way, *Pionen* embodies an "aesthetics of the secret" that, according to cultural theorist Clare Birchall, may provide a way for coping with the surveillance regimes that current data-tracking possibilities may facilitate:



Figure 10

*Instead of acts of publicity such as legal marches or online petitions, the “datariat” might need to meet the pervasive protocols of inequitable dataveillance employed by the securitised state with opacity. A right to opacity in this context would mean the demand not to be reduced to and understood as data as defined by the state. Though we have to acknowledge the attendant risks of non-progressive and criminal activity made possible by the “dark” web, it is nevertheless here that the right to opacity might be asserted. (45)*

Another approach would be that of complete openness—embracing the exposure and vulnerability that comes with the tracking of movement and predictive analytics that is enabled with big data analysis. As early as 2001, surveillance studies scholar David Lyon described how data move freely between different sectors of society, resulting in information from

discrete realms spilling into other contexts. Private life, work life, and shopping should be understood as what he calls “leaky containers” (Lyon 37-48). More recently, media theorist Wendy Chun has made the point that leakiness should

not be regarded as a fault. Rather, computer devices are leaky and promiscuous by default, “Networks work—they allow us to communicate—by exposing users, by making

*Thus, rather than fighting for a privacy that is no privacy, what if we rather embraced our role as collective characters in public? What if, rather than accepting the*



Figure 11

users vulnerable, so to that there can be a ‘we,’ however inoperable, to begin with” (379). However, according to Chun this may in fact be employed as a mode of resistance:

*reduction of trust to corporate security, we embraced Nissenbaum’s argument that trust entails the ability to take risks? (375)*

These two different strategies provide a more nuanced framework for understanding the way in which *Pionen* and the *Data Tower* embody security as architectures that respond to conditions of uncertainty by way of a negotiation of visibility. *Pionen* maintains an aura of security

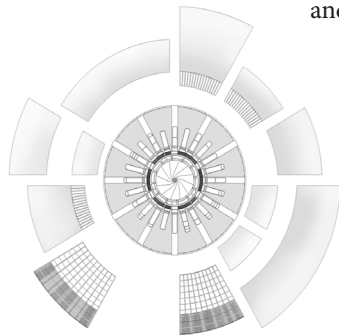


Figure 12

and containment while it exposes visibility as a negotiable stance and a performative gesture that may obfuscate as much as reveal. The *Data Tower*, on the other hand, is essentially a leaking and exposed architecture, its visual impression that of flux and movement. The façade appears porous and membrane-like with pods containing servers flowing up and down the 65 stories, either sucked into the building for maintenance or protruding into the cold Icelandic air. The pods will not all be inside or outside the tower at the same time; some will always be exposed to the weather. As Chun points out, just as there will always be leaks with networked media, there will always be a part of our private data that is exposed. As soon as we interact with the machines that store our data, we make ourselves vulnerable. This is the nature of these archival machines, and it is the narrative that a building such as the *Data Tower* projects.

### The Architecture of Data

Through architectural and discursive analysis of blueprints, architectural renderings, and photographs, this text has aimed to illuminate how uncertainty takes architectural form as a negotiation of visibility that reveals different ways of giving built form to contemporary notions of security and privacy. When juxtaposed *Pionen* and the *Data Tower* gesture towards a temporal regime of a broad present in which past, present, and future intermingle in data structures used in equal measure to preserve our past and predict our future. *Pionen* playfully integrates the retro appeal of Cold War rhetoric in a way that subverts the sincerity with which it employs the bunker as an imaginary for security as shelter and containment. *Pionen* thus plays with imaginaries of the future that date back to action and sci-fi films of the 1970s and 1980s and uses this imagery as smokescreens to securitize through obfuscation. While *Pionen* is bound not only by its physical encapsulation inside a mountain but also by the fact that it is an actual, physical building, the *Data Tower* is still an imaginary construct. The *Data Tower* remains in the fictional realm until it is built and can, as such, be read as our own time's projection of the future. It faces uncertainty through an act of exposure and an embrace of vulnerability that, at the same time, also gestures toward an "aesthetics of the secret" in Birchall's terms. The server pods are no more revealing of their insides than the white boxes in *Pionen*, and the exposure the tower exhibits may be regarded as equally performative as *Pionen's* shelter. It is a tower without a centre; it carries its content on its surface, making the world aware of what it contains while at the same time displaying in material terms the invisibility of that content. It is empti-

ness inside a mass of connectivity, and herein lies its imaginative force.

### Image Notes

Figure 1: Inside the *Data Tower*, architectural rendering, Valeria Mercuri and Marco Merletti

Figure 2: Servers in *Pionen*, photo: Åke E:son Lindman

Figure 3: Viewed from the outside, *Data Tower*, architectural rendering, Valeria Mercuri and Marco Merletti

Figure 4: *Pionen*, drawing, Albert France-Lanord Architects

Figure 5: Generators, *Pionen*, photo: Åke E:son Lindman

Figure 6: Fishtank, *Pionen*, photo: Åke E:son Lindman

Figure 7: Cross-sectional view, *Data Tower*, drawing, Valeria Mercuri and Marco Merletti

Figure 8: The tower explained, *Data Tower*, drawing, Valeria Mercuri and Marco Merletti

Figure 9: Meeting room, *Pionen*, photo: Åke E:son Lindman

Figure 10: View over the servers, *Pionen*, photo: Åke E:son Lindman

Figure 11: Landscape view, *Data Tower*, architectural rendering, Valeria Mercuri and Marco Merletti

Figure 12: *Data Tower*, drawing, Valeria Mercuri and Marco Merletti

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## Notes

- 1 This article comes out of work on the research project *Uncertain Archives* ([www.uncertainarchives.dk](http://www.uncertainarchives.dk)).
- 2 In contrast to the black box's focus on input and output rather than the inner workings, the white box (also called glass box or transparent box in software development) is a system where the inner logic is transparent and accessible.
- 3 Yet another way in which geography is important to the positioning of the data centre while also obfuscating transparency.