

The Data Center as Technological Wilderness

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Fig. 1: The techno-organic jungle as it comes into being in Marvel's *Black Panther*, Vol. 2, #4, October 1988 (image reproduced under Fair Use Licence).

The Techno-organic Jungle

Released in July 1966, Marvel's *Fantastic Four* Vol. 1, #52, was the first to introduce comic book fans to the Black Panther and the 'techno-organic jungle' that surrounds the fictional African country of Wakanda (Figures 1 & 2). The techno-organic jungle was created when the Black Panther successfully merged vibranium technology with the organics of the Wakandan jungle, producing a benevolent virus that spread through the forest, fusing 'nature' and 'machine'. Lest we hastily celebrate this ontological fusion as a proto-vision of 'natureculture' hybridity (Haraway, 2003; Fuentes, 2010), what exactly remains 'organic' of this newly ontologized jungle is open to question. While the resultant microclimate is referred to as 'techno-organic', on closer examination it seems that vibranium has completely consumed the jungle.¹ Tree branches have become 'delicately constructed wires', flowers are now 'highly complex buttons and dials', while boulders 'hum with the sturdy pulse of computer dynamos'. As the *Fantastic Four* venture through this machinic forest in their spacecraft they remark, 'It's truly a jungle... but like nothing ever spawned by nature. It's a man-made jungle!' After a short while the superhero team become unsettled by the apparent absence of the human or nonhuman beings who built this mechajungle:

‘Stay together... all of you!’ Mister Fantastic commands, ‘Whoever created this electronic nightmare has kept it a secret for some deadly reason!’ Indexical of intelligent – and potentially hostile – lifeforms, the techno-organic jungle is haunted by the absence of its creator(s).

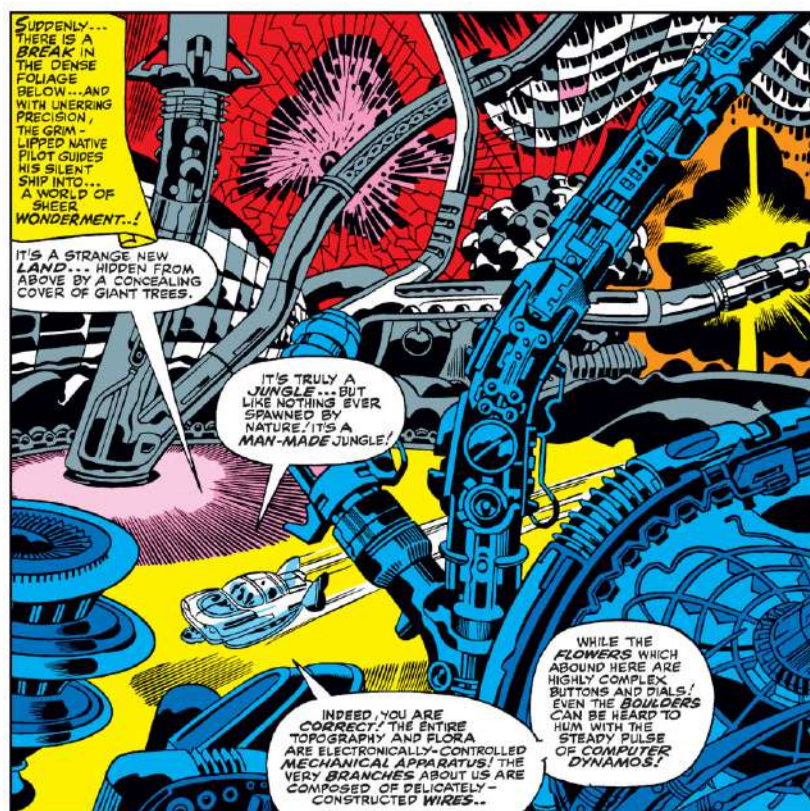


Fig. 2: The Fantastic Four cautiously traverse the techno-organic jungle in Marvel's *Fantastic Four*, Vol. 1, #52, July 1966 (image reproduced under Fair Use Licence).

A similarly haunting technological environment can be found today in the photographs, videos and artist renderings of data center interiors that circulate in the mass media. Images of data centers persistently focus on their futuristic furnishings and the high-tech IT equipment they contain, rather than the people that work in these buildings. Viewers encounter empty corridors bathed in blue neon, low-angle shots of mountainous-looking server cabinets and corridors canopied with snake-thick cables. Much like the techno-organic jungle encountered by the Fantastic Four, the lifeforms that operate and maintain these technological ghost towns of cables, computers and cooling equipment are often curiously and uncannily absent.



Fig. 3: The image of the empty corridor lined with servers has become the stock image of the data center (image reproduced under Fair Use Licence).

The omission of the human has become a major component in the ‘visual economy’ (Poole, 1997) of the data center industry. These widely-circulated images of technified emptiness have played a pivotal role in calibrating public perceptions of data centers as highly automated, machinic spaces devoid of human beings. In this experimental essay, I draw from my field research conducted in the data center industry to explore how this representational strategy relates to emic and etic fantasies and futures of human-free security, automation and data objectivity. While these depopulated datacenterscapes may lead viewers to imagine data centers are asocial, posthuman spaces, the facilities where I conducted fieldwork were inhabited by many different people, coming and going on a daily basis and staffed 24/7/365.²

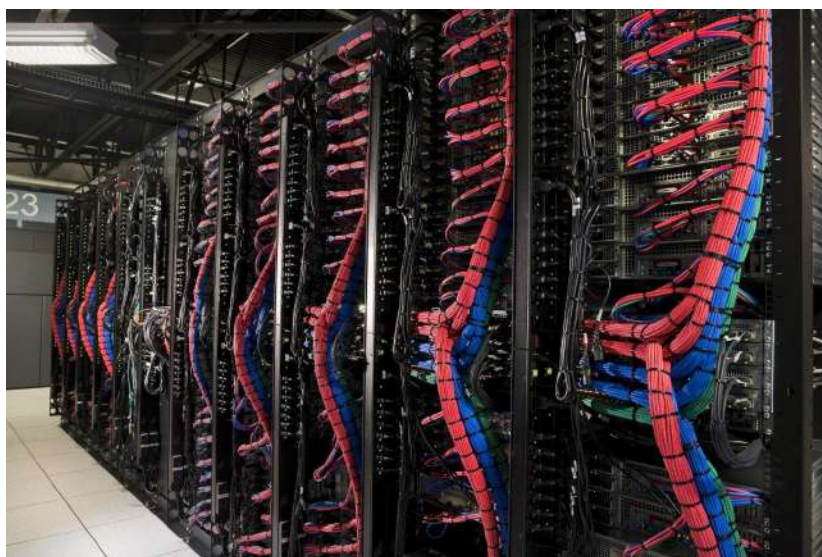


Fig. 4: Cables hang from servers like plastic-coated vines in an IT jungle (image used with permission from IBM).

This essay begins by bringing the infrastructure fiction of the depopulated data center into comparative critical relation with another visual tradition that regularly erases the human: wilderness landscape photography. While the concept of wilderness, with its associations of untamed and untouched natural land is distant from the symmetrical, sterile, and ordered environments of the data center (that is, until you see a ‘cable salad’), these spaces share productive resonances as different modes of staging and enacting human disappearance. Scholarship in geography, anthropology and art history has extensively analyzed how the idea of wilderness often ideologically encapsulates the fantasy of a ‘pure nature’ uncorrupted by human presence, implying a larger order shaped by God, nature or other nonhuman hand (Schama, 1995; Adams, 2003; Garland, 2008; Igoe, 2010).³ Approaching the data center interior through the analytic of wilderness, I extend insights from this body of work into a new domain and suggest that the representational regime of erasing the human stages the data center as a nonhuman ‘pure machine’.

Through this experimental juxtaposition I ask: What fantasies are encoded in images of the depopulated data center? How do these self-constructed and highly stylized images relate to the day-to-day realities of operating and maintaining the data center? What role does this visual performance of human absence play in the larger ‘infrastructure fiction’ (Raven, 2013) of the data center as a futuristic, posthuman space? And, in what ways might this aesthetic strategy relate to ideologies of cloud computing and big data analytics as a machine of insight?



Fig. 5: Human beings are nowhere to be seen in the many artist renderings of server rooms found on stock photography websites like Getty Images and Shutterstock. Such visualizations are widely reproduced in the popular press to illustrate news coverage about data centers and are returned by any basic Google search for ‘data center’ (image from Shutterstock, reproduced under Fair Use Licence).

A growing body of anthropological literature has begun to approach infrastructures not only as technical, material objects but also as imaginative, ideological and fantastical entities (Humphrey, 2005; Larkin, 2013; Nielsen & Pedersen, 2015, Harvey & Knox, 2015). If data centers are ‘arenas of fantasy and desire’ (Vonderau, 2017), how might visual images be mobilized by operators of infrastructure as a ‘technology’ (Sneath et al. 2009) for channeling particular imaginations? Cultural theorists have long recognized that infrastructures, media texts and other objects of material culture do not transmit a singular, unidirectional message, but rather, are excessive polysemous sites around and through which a multiplicity of ‘imaginative-fantastic meanings’ (Humphrey, 2005: 43) congeal and converge. In the context of this analysis, the omission of human beings from images of cloud infrastructure may be seen as an attempt to manage or direct this ‘apparent superfluity of meaning’ (Buchli, 1999: 7). I thus approach the image of the depopulated data center as a form of ‘structured polysemy’ (Dyer, 1998: 3), that is, as an image that is staged or structured so ‘that some meanings and affects are foregrounded and others are masked or displaced’ (Ibid). Visual images produced and released by data centers are thus valuable ethnographic objects that provide an insight into how the

industry narrates itself and attempts to govern the conditions of imaginative possibility through visual media.



Fig. 6: A rack of servers rises from the jungle depths of the data center floor like a technological tree trunk (image by Victor Grigas/Wikimedia Foundation, CC BY-SA 3.0).

The Depopulated Data Center

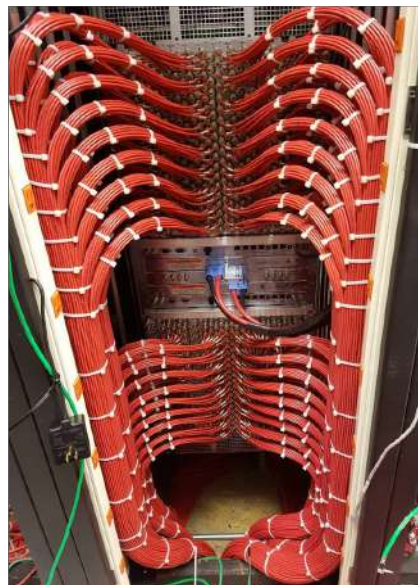
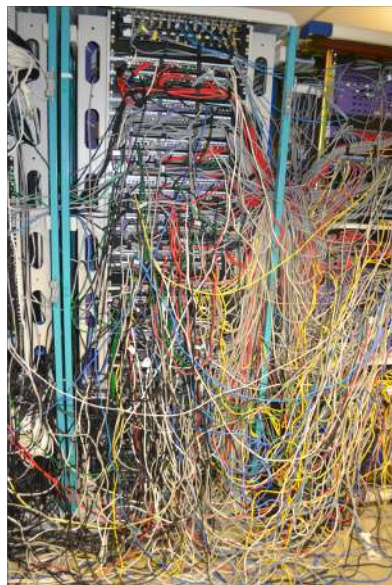
While data centers may once have existed on the peripheries of popular imagination, images of these architectural curiosities increasingly saturate the global mediasphere. Most cloud operators and big tech companies feature high-resolution photographs and videos of their data centers on their websites and in the printed literature and other promotional media they circulate at trade shows and marketing events. Such images capture the data center and its mundane service equipment from angles that make it look exhilarating and futuristic: sweeping panoramas of server halls (Fig. 7), suggestive close-ups of pre-action mist systems, glossy centerspreads of girthy industrial piping, and titillating glamour shots of CRAC units (Fig. 8). Of course, data center interiors are not always so well manicured. One need only glance at the online image threads devoted to ‘cable salads’ or ‘server room spaghetti’ for a sneak peak at the messier side of data center maintenance (Fig. 9).



Fig. 7: A panoramic shot from the data center designer Prior1/SwissTE (image reproduced under Fair Use Licence).



Fig. 8: An advertisement for a 'CyberAir' computer room air conditioning (CRAC) unit by Stulz (image reproduced under Fair Use Licence).



Figures 9 & 10: 'Cable salad' and 'server room spaghetti' are emic terms used in the data center industry to describe messy, unorganised cabling (Fig. 9). Cable salads arise in contrast to the art of cable management, where wild and unruly tangles of cables are tamed by human mastery (Fig. 10). Data center technicians post photos of triumphant cable domestication on

message boards, Reddit threads and image feeds dedicated to ‘cable porn’ (images courtesy of Imgur).

Neon remains a key signifier of the future in the data center industry. Data center equipment is often photographed with the lights off to emphasize the sci-fi-looking lightning - either from the flickering LED’s of servers (Fig. 11) or from specially installed neon lighting rigs (Fig. 12). Amidst these technological futurescapes, traces of human life are rarely to be found. The spaces in the data center associated with human activity, such as the offices, waiting areas, water closets, meeting rooms, kitchenettes, and cleaning cupboards, are persistently absent from these image collections.⁴ The end result is an image of a technological landscape emptied of people and any obvious signs of human presence: a mechanized world of techno-wilderness.

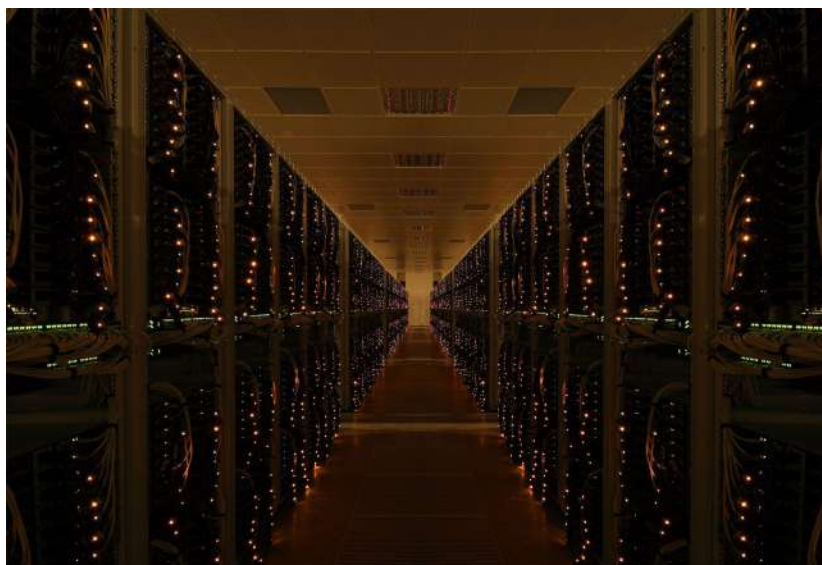


Fig. 11: Dark data: cloud computing equipment is often photographed with the lights off to emphasize the futuristic aesthetics of the server aisles (image reproduced under Fair Use Licence).



Fig. 12: Neon lighting effects in Equinix's SV5 data center in San Jose, California, give the facility a science fictional look (image reproduced under Fair Use Licence).

In a certain sense, the experimental analogy I am drawing between wilderness and the excessively technologized data center interior echoes common metaphorical conceits with which we already collectively imagine, approach and apprehend internet infrastructure. As a number of critical commentators have observed, the bucolic terminology that describes internet processes – the media ‘streams’, computing ‘clouds’ and data ‘lakes’ and ‘logs’ that form ‘IT ecologies’ – readily invites comparison between information technology and natural landscapes on a daily basis (Cegłowski, 2015; Hogan, 2015). To this extent, the radical pairing of nature and technology seems to have lost the poetic and political vitality it once possessed in the 1960s, when counterculture poets like Richard Brautigan (1967) were envisioning cybernetic landscapes ‘where deer stroll peacefully / past computers / as if they were flowers’.⁵ Brautigan’s techno-utopian vision is at once realized and devitalized in the widely-circulated photograph of the Google data center in Council Bluffs, Iowa, featuring a family of deer grazing outside (Fig. 13), a coincidental relation that also reminds us of the countercultural origins of many of these large tech companies.



Fig. 13: Google's Council Bluffs Data Center in Iowa, 'where deer stroll peacefully / past computers / as if they were flowers' (Brautigan, 1967) (image used with permission from Google).

In the context of an increasingly destabilized climate and with growing public awareness of the carbon footprint of cloud computing, many of the big tech companies have engaged in marketing campaigns to green their public image, often by releasing glossy photographs of their data centers set amidst natural landscapes (Fig. 14). Within such images, as media studies scholars Jennifer Holt and Patrick Vonderau (2015: 76) have observed, 'the data centers are visible but rendered practically inconsequential by the surrounding spectacle of natural vistas'. Digital renderings released during data center building projects similarly visualize the data center within wilderness (Figures 15 & 16).



Fig. 14: Green hills rise behind Google's Oregon data center (image used with permission from Google).



Fig. 15: A digital visualisation of Facebook's data center in Newton County, Georgia, released during the planning phase in 2018 as part of the development's promotional materials (image from Facebook's Newton Data Center Facebook page, reproduced under Fair Use Licence).



Fig. 16: This artist rendering of the Kolos data center in Ballangen, Norway - ostensibly the world's largest data center - was featured in an August 2017 press release (image from the Canadian Architecture Firm HDR, reproduced under Fair Use Licence).

Today, the rhetorical technique of bringing nature and technology into poetic and political relation has thus become banalized not only at the level of everyday language but also as part of these corporate marketing and imaging strategies.

While data center exteriors are being visually embedded within wild landscapes, their interiors are being subjected to another form of 'wilding' through the visual elision of the people that work inside these buildings. Anthropologists, geographers and art historians have extensively analysed the relationship between images and imaginations of wilderness, and the ideological operation of visually erasing the human that occurs

in practices of wilderness photography (Fig. 17) and certain traditions of landscape painting (primarily paintings of North America in the nineteenth and early-twentieth centuries [see Fig. 18, and Schama, 1995]).⁶



Fig. 17: Ansel Adams' *The Tetons and the Snake River*, 1942 (Wikimedia Commons).



Fig. 18: Albert Bierstadt's *Valley of Yosemite*, 1864 (Wikimedia Commons).

Human beings often do not play a part in Western social imaginations of 'pristine wilderness'. Rather, wilderness describes 'those ever more restricted spaces of a pure nature not corrupted by human presence' (Danowski & Viveiros de

Castro, 2017: 23). As the geographer William Mark Adams (2003: 34) has suggested, ‘Wilderness is valuable precisely because it is imagined as being free of human influence, uninhabited.’ Photographers and painters of wild landscapes have thus often sought to eliminate any traces of human life – indigenous or otherwise – in order to strategically frame the land according to the gazes and fantasies of Western viewers, tourists, environmentalists and conservationists (Burnett & Kang’ethe, 1994; Cronon, 1995; Langton, 1998; Jacoby, 2001; Garland, 2008; Beinart & McKeown, 2009; Igoe, 2010). This optical elision is often indexical of a more violent, physical elimination of indigenous lifeways from wild landscapes – in the form of relocating indigenous populations from areas newly designated as ‘national parks’ or zoned off for bureaucratically-defined ‘wilderness use’ (Luke, 2004: 108). This scholarship thus draws our attention to the ideologies encoded in the imaginal production and consumption of wilderness. Of course, while images and imaginations of natural wilderness and technological wilderness may share a recurring feature in the form of the absent human, the social, economic and political conditions underlying and driving these elisions are very different. With this in mind, we might ask: ‘what fantasies may the visual erasure of workers in images of data centers serve?’

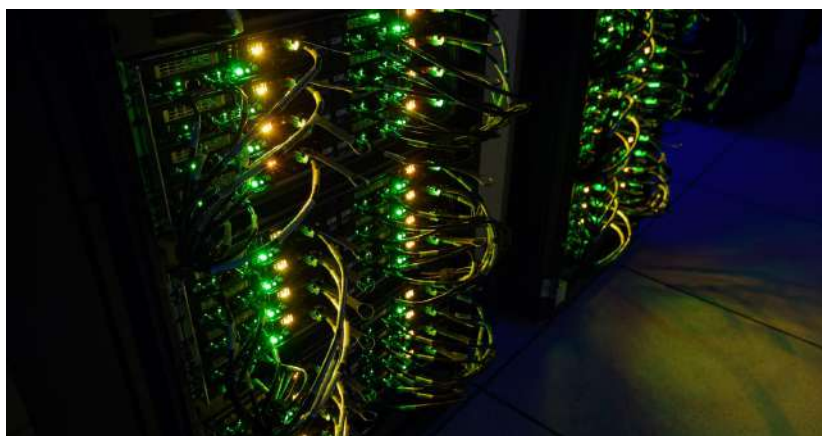


Fig. 19: The data center’s native foliage: Shoots of network cabling burst out from the backs of servers while their LED lights flicker in the dark like fiber-optic flora (image from Wong 2018, reproduced under Fair Use Licence).

Human-free Security

During my fieldwork I met Mark, a data center photographer. In one of our discussions about his work he explained to me that, ‘most data center briefs specify that they don’t want their

workers in the photographs’. When I asked him why, he told me that the presence of employees ‘ruins the vibe’, adding that, ‘if you’ve got a nice photo of a sci-fi-looking space, you don’t want some bloke there fixing a server in his jeans.’ Mark described how, during on-site photoshoots, he had to continuously disrupt technicians, engineers and maintenance workers by asking them if they could momentarily move out of the shot. Interviewing George Bersci, the CEO of Secura, a cloud service provider that operates a number of data centers distributed across the UK, he explained to me further that the logic driving this representational strategy was, ‘simple really, the top cause of data center downtime is human error so the less human these buildings can be made to look, the more safe and secure they appear’. Bersci’s comment is reflective of a general sentiment within the data center industry that persistently positions human rather than machine error as the primary threat to data centers. Assertions that fall along the lines of ‘humans are the easiest thing to hack’ or ‘people are the weakest link in data center security’, are frequently encountered in industry discourse and reflect a specific brand of ‘automation bias’ (the trusting of machines over humans). For Bersci, the vision of the depopulated data center was thus tied to fabricating a specific image of security based on an active turn away from, and a faltering trust in, everything human. Here, the performative staging of a nonhuman spectacle plays an important part in the visual production of data center security. A conversation I had with Ryan Wakefield, the Chief Technology Officer at Gigatex Data Centers in London, was telling in this regard. Echoing Bersci, he explained that the reason employees don’t feature in their imagery is because, ‘People are to blame for most data center outages... it’s not the humans that our clients are interested in, they want to see that we have well-maintained, up-to-date equipment and people look dangerously out of place in this high-tech context.’ He further qualified this with the speculation that, ‘it’s only a matter of time before unmanned data centers become the norm’.

In Wakefield’s figuration, human beings are framed not only as security threats but as a form of dangerous matter out of place – the classic anthropological definition of ‘pollution’ (Douglas, 1966). Wakefield’s reflection seemingly suggests that data center workers – at least in their current low-tech wetware or ‘meat’ (Land, 1995) forms – appear anachronistic against the backdrop of this cutting-edge techno-wilderness. Such a vision is reminiscent of the philosopher Günther Anders’ (1956) claim that ‘the further technology advances, the more it impresses on us that the human, as it is born, is obsolete, useless and embarrassing’ (Müller, 2016: 11). What are we embarrassed

about? Anders asks, and answers simply: that we were born and not manufactured (see Müller, 2016: 30).

As antiquated beings incongruent with this technologically-advanced landscape, Wakefield brings peoples' out-of-placeness into imaginative relation with the inevitable development of unmanned data centers, which seem to offer increased levels of security by virtue of their distance from human involvement. Throughout my study among data center professionals, I found that the speculated replacement of the cloud workforce through processes of automation or robotization was often celebrated, not only for offering increased levels of security but as a sign of technological progress and a necessary precondition for actualizing long-promised futures of automation.⁷



Fig. 20: Sublime server cabinets in the GE Appliances and Lighting data center in Louisville, Kentucky (image reproduced under Fair Use Licence).

Automated Futures

Visions of machinic automation have played an important role in modernist narratives of progress, and are often seen to have their roots in Francis Bacon's (1561-1626) ambition for technology to relieve humanity from the inconveniences of life. For Bacon, arguably the intellectual founder of progressive technology, self-operating automatons promised a future age of automation where masterly machines would run everything in the background while human beings lived in leisure (Mattie, 2014). In science fiction there is a long tradition of depicting these leisure society futures as dystopias, from E.M. Forster's 1909 novella *The Machine Stops* to Disney's 2008 film *WALL·E*. The industrial automation of the factory and

workplace has also long fueled dystopian fears of joblessness and deskilling, as well as utopian celebrations of liberation from the drudgery of repetitive tasks and, finally, the ‘end of work’. The rise of the so-called ‘data economy’ is now producing similarly heterotopian visions of automated work futures (Brynjolfsson & McAfee, 2014; Head, 2014; Srnicek & Williams, 2015; Stiegler, 2016). The fantasy of the ‘autopia’ (Urry, 2016: 125) continues today in the form of the self-driving car (Eriksson et al. 2018), the autonomous drone (Sutherland, 2015), algorithmic automation (Striphas, 2015; Seaver, 2017; Lowrie, 2018), automated national security (Amoore 2018: 6) and, of course, the automated data center - as testified by the visionary hypes and hopes surrounding the speculated emergence of ‘intelligent’ data centers that promise to be fully run by AI-enabled self-organising systems (Gartner, 2017).

At the same time, however, the liberating virtues of data center automation are presently thwarted by a glaring problem in the middle of this futurological vision: these buildings are, for the most part, thoroughly reliant on myriad forms of human labor – or ‘humachine’ (Luke, 2004) labor – to function.⁸ Architects, construction contractors, cleaners, facility managers, disaster recovery officers, maintenance workers, security guards, service technicians, sales teams and secretaries, are just some of the people that are essential to running the data center. While there may be a growing number of unmanned data centers (known as ‘lights-out’ or ‘dark’ data centers), at the moment the industry is unable to completely remove humans from the loop, with these facilities still requiring regular human assessment and servicing to ensure their continued operation – a constant reminder for many of those with whom I conducted fieldwork that we have not quite arrived in the foretold automated future yet. As such, among a number of my interlocutors the presence of human beings was frequently positioned not only as a security threat but as indexical of a failure to actualize the future. Here, the future is less a temporal category and more a bundle of mediatised signifiers waiting to be realized. An example of the current failure to realize this automated futurity that I regularly encountered was that of the Amazon.com fulfilment center, another high-tech environment that nevertheless relies on human labor to pick and pack customer orders. ‘It was actually kind of disappointing to see how old-school Amazon are in their warehouses’, Wakefield lamented during an interview, ‘that such a pioneering tech company still have to rely on workers, it was more like Argos than Amazon’.⁹ In the communication studies scholar Vincent Mosco’s (2014) analysis of the political economy of cloud

computing, he similarly provides the example of Amazon's reliance on a largely human workforce as somehow indexical of a failure to perform their high-tech identity:

While a great deal of its labor process can be automated and lodged in the cloud, Amazon still requires a large workforce in the developed world to efficiently locate and distribute its products. So in spite of the company's high-tech image, Amazon workers at a typical warehouse walk between seven and fifteen miles every day. (Mosco, 2014: 169)

Mosco's analysis does important work in beginning to address the human labor underpinning cloud computing (see also Rossiter 2016). But here, much like Wakefield, he narrates a vision of a high-tech future against which humans appear as an anachronistic remainder of an outmoded, analogue past that somehow subverts the 'high-tech image' that the tech industry perpetuates. With the high-tech future figured as a form of 'progress without people' (Noble, 1995), images of depopulated data centers might be understood more as visual enactments of this future.



Fig. 21: Automated Landscapes: 115,000 square feet of neon-soaked technological wilderness in Google's Council Bluffs data center, Iowa (image used with permission from Google).

Data Objectivity

The depopulated datacenterscape remakes the fantasy of an unpeopled 'pure nature' that we find in wilderness photography into a fantasy of an unpeopled 'pure machine'. Integral to creating both of these ideologically-charged versions of

wilderness is the ‘suppression of knowledge’ about ‘the extent and scope of human occupation’ occurring in these spaces (Adams, 2003: 35). Pictured as uncontaminated by human presence, the image of the depopulated data center intersects with powerful imaginations and ideologies of knowledge generated from Big Data sets as somehow free from the contaminating agency of human beings.



Fig. 22: The Data Center as Pure Machine (image by Author).

The promise of voluminous datasets to usher in a ‘golden era of insight’ (Microsoft, 2013) is firmly rooted in nineteenth-century technoscientific fantasies of ‘mechanical objectivity’ (Daston & Galison, 2007). New and ever more efficient mechanical technologies, like the camera, were epistemically valued for the machinic view of the world they offered, supposedly devoid of the mediating presence of human subjectivity. Photographs were ‘images impressed by nature’s hand’ (Tucker, 2005: 4). They ‘were “obtained” or “taken” like natural specimens found in the wilderness’ (Ibid), whereas hand-drawn pictures (which had previously been the primary visual tool of scientists) were ‘willed into existence’ through the labor of the human. Like the language of early photography, data is similarly ‘captured’, ‘harvested’ or ‘mined’ and is frequently described as being able to ‘speak for itself’. Such rhetoric positions data as a raw or natural resource that is simply extracted from the world, rather than something that is generated by sociotechnical systems (Gitelman, 2013).

Just as Victorian scientists enlisted cameras, polygraphs and a host of other self-registering machines in a fanatical effort to generate data that was ‘certified free of human interference’ (Daston and Galison, 1992: 81), images of de-peopled data

centers stage, perform and certify the Big Data machine as free from human interference. The promise (or epistemic virtue) of ‘big’ datasets stored in the cloud, both in terms of end-user privacy and in terms of the scientific or security knowledge generated, lies in the conviction that the storage and interpretation of data is an ‘automatic process... that is not observed by human eyes’ (Amoore, 2018: 19). As such, the ‘aesthetics of disappearance’ (Virilio, 1991) we find in the image of the depopulated data center might be seen to feed into and further fuel fantasies of data-based knowledge as objective, and the facilities that store and manage data as pure machines uncontaminated by human bias, error or prying.

Conclusion: Nonhuman Worlds?

While the complete absence of human beings has become a recurring feature in images and imaginations of the data center, photographs and videos of the de-peopled data center are carefully crafted visions of a machinic ‘world without us’ (Weisman, 2008). This visual economy of (dis)appearances (to paraphrase Tsing, 2000) is designed to provide a decidedly nonhuman point of view. As the visual trope of the techno-wilderness continues to circulate within the mass media, the fantasy of the automatic cloud shows no sign of slowing down. At the same time, the ethnography presented here makes no pretense to be fully representative. Indeed, photos and videos released by Google, for example, often feature talking heads of their ethnically and gender diverse facility operators precisely to make the giant tech monolith appear *more* human, friendly, and transparent. Here the ‘service technician’ becomes the techno-wilderness equivalent of the ‘noble savage’ (Fig. 23). While Google’s images are largely the exception rather than the rule, they nevertheless illustrate how powerful ideologies are structured around human presence and absence in the visual economy of the data center industry.



Fig. 23: The Noble Technician (image used with permission from Google).

The strangely depopulated, science fictional worlds that data centers stage have certainly captured the popular imagination, as testified by the proliferating array of news articles, magazine essays, artworks and studies now investigating and visualizing data centers. Even in photo or video exposés that critically interrogate the material and political realities of industrial-scale data storage, this stylistic trait is often reproduced, with the workers rarely featuring. While a rich and nuanced body of work is emerging that critically interrogates the cloud, data centers are persistently approached as ‘infrastructure’ or ‘architecture’, but rarely – if ever – as workplaces. Articles tracing genealogies of the data center as a building type frequently describe them as the new ‘factories’, but the labor they are often thought to contain is not that of the factory worker, but the ‘virtual’ labor (and ‘playbor’) of distant end-users or algorithms (Terranova, 2000; Boellstorff, 2008; Ritzer and Jurgenson, 2010; Fuchs and Seignani, 2013; Irani, 2015; Ekbja & Nardi, 2017). Data centers certainly employ a relatively small workforce in proportion to their size. Yet extensive focus on the novel forms of digital labor enabled by cloud platforms has left aside the labor of those tasked with ensuring the uninterrupted continuity of ‘platform capitalism’ itself (Srnicek, 2017).¹⁰

In recent years, many fields within the social sciences, arts and humanities have developed an interest in infrastructures, object-oriented ontologies, new forms of materialism and non-human/more-than-human worlds. As self-styled nonhuman worlds, data centers seemingly provide a ready-made site for theoretical perspectives that aim to decenter the human by

foregrounding the agency of nonhuman and multispecies actants. There is certainly a need to attend to the centrality of objects and materials in the politics of cloud infrastructure, and emerging studies have done important work in bringing the materiality of the cloud into critical relation with questions of the environment, data surveillance and geopolitics. But the emphasis on object-centerdness, which is often positioned as a departure from anthropocentric historical materialism (and which often focuses on material infrastructure so as to challenge the problematic immateriality and virtuality of the cloud conceit), means that analyses of the cloud could end up inadvertently reproducing yet another techno-wilderness image of the data center as a machinic world without us. This means that fiber-optic cables, cooling equipment and natural resources will be seen as the linchpin of digital capitalism, overlooking the role of those who build and service data centers and who strive to keep them fully operational at all hours of the day and night, under pressure to eliminate the possibility of IT failure or data loss. As media scholar Tung-Hui Hu (2015: 18) has observed, ‘though the histories of labor and telecommunications have been intertwined from the start, the former tends to drop out of its telling, and infrastructure has come to exclusively stand for computer machinery’. Of course, locating or emplacing the human in the cloud is not always possible, and raises important questions about data centers as field-sites and, more generally, the openness of the data center industry to social science research. But this industry is by no means closed off within the walls of its data centers. Throughout my fieldwork I was invited by my interlocutors to attend the multitude of conferences, trade shows, training courses, awards ceremonies and other events that make up the global data center industry and these proved to be valuable ethnographic sites (Fig 24).



Fig. 24: There are people in the cloud: during my fieldwork I was invited to the 2015 Data Center Dynamics EMEA awards show in London (image by Author).

To follow the representational strategies of the data center industry and write human beings completely out of analyses of the cloud would be, for the moment at least, premature. At the same time, the lingering presence of people should not foreclose the analytical possibilities of engaging seriously with concepts, technologies and visions of automation. Whether or not the fiction of the de-peopled data center ever becomes a reality, the current prevalence of human beings in the cloud should not blind us to the possibilities of the drastically diminished role they might play in the not-too-distant future. For the time being, however, humans seem to inhabit an analytical blind-spot, erased not only by the cloud metaphor and the representational strategies of data center marketing departments, but also potentially by current theoretical perspectives. Knowledge production is equally subject to obsolescence, as old conceptual apparatuses are sometimes discarded with the introduction of new ones (Navaro-Yashin, 2009). But what might we learn by retaining within the frame of analysis the old, the outdated, the human, in our explorations of these new, high-tech worlds? Could we adopt the cautious approach of the Fantastic Four as they venture through the techno-organic jungle, and view these vacant technoscapes not as posthuman terrains of mechanically objective automation but as highly suspicious sites haunted by an absent human presence?

Notes

1. The colonization of jungle organics by vibranium technology is not unlike the prophesied ‘grey goo’ problem of nanotech dystopianism (Thacker, 2004: 175). It also calls mind the scene in *The Matrix* (1999), when the body of the protagonist, Neo (played by Keanu Reeves) is consumed by liquid metal as he wakes up from the virtual reality that is the Matrix.

2. The material presented in this essay is drawn from fieldwork and interviews with data center practitioners over a fifteen-month period between 2015 and 2017. All names and identifying details have been changed to protect the privacy of research participants.

3. I thank Anonymous Reviewer #2 for this point.

4. Many data centers also have shower rooms. Some even have beds (or ‘sleeping pods’ in data center nomenclature) – in an exceptional case, the London-based data center Interxion installed sleeping pods so its staff could remain on site during the 2012 Olympic Games (see Miller 2012).

5. Such fantasies of techno-organic fusion found rearticulation in the machine-human hybridism that the emancipatory figure of the cyborg later came to offer (Haraway, 1991). More recently, the emergence of the Anthropocene as a geobiopolitical analytic is proving a fruitful frame for breaking down problematic dualisms between the technological and the ecological (Haraway, 2003; Descola, 2013; Masco, 2018).

6. Alternatively, some early photographers would intentionally include Indigenous people in their images as stock ‘noble savages’. This will be discussed in relation to data center imagery later in the article. The nineteenth-century photographer, Eadweard Muybridge, for example, famously included Native Americans in his photographs of Yosemite. I am grateful to David Zeitlyn for this point.

7. Anthropologist Ian Lowrie (2018) similarly remarks of his fieldwork amidst data scientists in Moscow that ‘the technicians of global information capitalism are busily and happily laying the groundwork for the outsourcing of many social, cultural, and economic processes to computing machines’.

8. Hamid Ekbria and Bonnie Nardi (2017) have coined the phrase ‘heteromation’ to refer to the distributed, precarious,

invisible and low-cost (or free) labor arising from human beings' participatory interactions with computer-mediated networks. While their discussion predominantly focuses on the new forms of digital labor arising from the computerization of the economy (e.g. the extraction of value from social media interactions and user-created content, and the emergence of microwork systems such as Amazon Mechanical Turk and CrowdFlower), their concept nevertheless draws attention to the human-machine labor that works 'behind the screens' to produce the illusion of automation, rather than automation proper.

9. Argos is a UK retailer established in the 1970s where customers order from an in-store catalogue and warehouse packers in the back collect the orders.

10. Here we might also be reminded of the 'invisible technicians' of seventeenth-century England that labored behind the scenes in the workplaces where scientific knowledge was produced (see Shapin 1995). In Robert Boyle's choreographed air-pump experiments at Gresham College, scenography separated the visible work performed by natural philosophers from the labor of the technicians and other 'lowly mechanics' who built and maintained much of the equipment and thereby ensured the successful conducting of experiments (Shapin and Schaffer 1985).

Acknowledgements

This essay is a modified version of a paper presented at the workshop *Investigating Data Centers: Socio-Technical Assemblages of the Cloud*, hosted by the Department of Social Anthropology at Stockholm University (30 November - 1 December 2017). I thank the discussants at the workshop, as well as two anonymous reviewers, for their informative comments. Another version of this essay was also presented at the Oxford Internet Institute as part of the Oxford Digital Ethnography Group's (OxDEG) seminar series and I would like to thank the attendees for their valuable feedback. Funding for the research described in this essay was carried out with the assistance of a Sutasoma Award from the Royal Anthropological Institute.

References

- Adams, W.M. (2003) 'Nature and the Colonial Mind', *Decolonising Nature: Strategies for Conservation in a Post-colonial Era*. William Mark Adams and Martin Mulligan (eds). Sterling, Virginia and London, England: Earthscan Publications Ltd, 16-50.
- Amoore, L. (2018) 'Cloud Geographies: Computing, Data, Sovereignty', *Progress in Human Geography* 42(2): 4-24.
- Anders, G. (2016) [1956] 'The Obsolescence of Human Beings, Volume 1: On the Soul in the Age of the Second Industrial Revolution'. *Prometheanism: Technology, Digital Culture and Human Obsolescence*. Trans. C.J. Müller. London: Rowman and Littlefield International, Ltd.
- Beinart, W. & K. McKeown. (2009) 'Wildlife Media and Representations of Africa, 1950s to the 1970s', *Environmental History* 14(July): 429-452.
- Boellstorff, T. (2008) *Coming of Age in Second Life: An Anthropologist Explores the Virtually Human*. Princeton and Oxford: Princeton University Press.
- Brautigan, R. (1967) *All Watched Over by Machines of Loving Grace*. San Francisco: The Communication Company.
- Brynjolfsson, E. & A. McAfee. (2014) *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies*. New York and London: W.W. Norton & Company.
- Buchli, V. (1999) *An Archaeology of Socialism*. Oxford: Berg.
- Burnett, G.W. & K. wa Kang'ethe. (1994) 'Wilderness and the Bantu Mind', *Environmental Ethics* 16: 145-160.
- Cegłowski, M. (2015) 'Haunted by Data'. 1 October. Available at: http://idlewords.com/talks/haunted_by_data.htm.
- Cronon, W. (1995) 'The Trouble with Wilderness: Or, Getting Back to the Wrong Nature', *Uncommon Ground: Toward Reinventing Nature*. William Cronon (ed). New York: W.W. Norton and Co., 69-90

Danowski, D. & E. Viveiros de Castro. (2017) *The Ends of the World*. Trans. R. Nunes. Malden, Massachusetts and Cambridge, England: Polity Press.

Daston, L. & P. Galison. (2007) *Objectivity*. New York: Zone Books.

———. (1992) 'The Image of Objectivity', *Representations* 40 (Special Issue: Seeing Science) (Autumn): 81-128.

Descola, P. (2013) *Beyond Nature and Culture*. Trans. J. Lloyd. Chicago and London: The University of Chicago Press.

Douglas, M. (1966) *Purity and Danger, an Analysis of the Concepts of Pollution and Taboo*. London: Routledge.

Dyer, R. (1998) [1979] *Stars*. London: BFI Publishing.

Ekbia, H.R., & B.A. Nardi. (2017) *Heteromation and Other Stories of Computing and Capitalism*. Cambridge, Massachusetts & London, England: The MIT Press.

Eriksson, L., S. McConacchie, T. Cohen & J. Stilgoe. (2018) 'Autonomous Vehicles: What Can Social Science Offer?' *Catapult Transport Systems*. Available at: <https://bit.ly/2N5SCUi>.

Forster, E.M. (1997) [1909] *The Machine Stops and Other Stories*. Rod Mengham (ed). London: André Deutsch.

Fuchs, C., & S. Seignani. (2013) 'What Is Digital Labour? What Is Digital Work? What's Their Difference? And Why Do These Questions Matter for Understanding Social Media?' *tripleC: Communication, Capitalism & Critique* 11(2): 237-293.

Fuentes, A. (2010) 'Naturalcultural Encounters in Bali: Monkeys, Temples, Tourists, and Ethnoprimateology', *Cultural Anthropology* 25: 600-624.

Garland, E. (2008), 'The Elephant in the Room: Confronting the Colonial Character of Wildlife Conservation in Africa'. *African Studies Review* 51(3): 51-74.

Gartner. (2017) 'Prepare for the Intelligent Data Center'. 19 October. Available at: <https://www.gartner.com/smarterwithgartner/prepare-for-the-intelligent-data-center/>.

Gitelman, L. (2013) *Raw Data is an Oxymoron*. Cambridge, Massachusetts and London, England: The MIT Press.

Haraway, D. J. (1991) *Simians, Cyborgs and Women: The Reinvention of Nature*. New York: Routledge.

Haraway, D. J. (2003) *The Companion Species Manifesto: Dogs, People, and Significant Otherness*. Vol. 1. Chicago: Prickly Paradigm Press.

Harvey, P. and H. Knox. (2015) *Roads: An Anthropology of Infrastructure and Expertise*. Cornell. Ithaca, New York: Cornell University Press.

Head, S. (2014) *Mindless: Why Smarter Machines are Making Dumber Humans*. New York: Basic Books.

Hogan, M. (2015) 'Data Flows and Water Woes: The Utah Data Center', *Big Data and Society* (July-December): 1-12.

Holt, J. and P. Vonderau. (2015) "'Where the Internet Lives': Data Centers as Cloud Infrastructure', *Signal Traffic: Critical Studies of Media Infrastructures*. Lisa Parks and Nicole Starosielski (eds). Urbana, Chicago, and Springfield: University of Illinois Press, 71-93.

Hu, T. (2015) *A Prehistory of the Cloud*. Cambridge, Massachusetts: The MIT Press.

Humphrey, C. (2005) 'Ideology in Infrastructure: Architecture and Soviet Imagination', *The Journal of the Royal Anthropological Institute* 11: 39-58.

Igoe, J. (2010) 'The Spectacle of Nature in the Global Economy of Appearances: Anthropological Engagements with the Spectacular Mediations of Transnational Conservation', *Critique of Anthropology* 30(4): 375-397.

Irani, L. (2015) 'Justice for "Data Janitors"', *Public Books*. 15 January. Available at: <http://www.publicbooks.org/justice-for-data-janitors/>.

Jacoby, K. (2001) *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation*. University of California Press, Berkeley.

Land, N. (1995) 'Meat (or How to Kill Oedipus in Cyberspace)', *Body and Society* 1(3-4): 191-204.

Langton, M. (1998) 'Burning Questions: Emerging Environmental Issues for Indigenous Peoples in Northern Australia', *Center for Indigenous Natural and Cultural Resource Management*. Northern Territories University, Darwin.

Larkin, B. (2013) 'The Politics and Poetics of Infrastructure', *Annual Review of Anthropology* 43: 327-343.

Lowrie, I. (2018) 'Algorithms and Automation: An Introduction', *Cultural Anthropology* 33(3): 349-359.

Luke, T. (2004) 'The Co-Existence of Cyborgs, Humachines and Environments in Postmodernity: Getting Over the End of Nature', *The Cybercities Reader*. Stephen Graham (ed). London and New York: Routledge, 106-110.

Masco, J. (2018) 'The Six Extinctions: Visualizing Planetary Ecological Crisis Today', *After Extinction*. Richard Grusin (ed). Minneapolis and London: University of Minnesota Press, 71-106.

Mattei, S. (2014) 'WALL·E on the Problem of Technology', *Perspectives on Political Science* 43(1): 12-20.

Microsoft. (2013) 'A "Golden Era" of Insight: Big Data's Bright Future'. 15 February. Available at: <https://news.microsoft.com/2013/02/15/a-golden-era-of-insight-big-datas-bright-future/>.

Miller, R. (2012) 'Interxion Readies Staff "Sleeping Pods" for Olympics.' 12 April. Available at: <https://www.datacenterknowledge.com/archives/2012/04/12/interxion-readies-staff-sleeping-pods-for-olympics>.

Mosco, V. (2014) *To the Cloud: Big Data in a Turbulent World*. London and New York: Routledge.

Müller, C.J. (2016) *Prometheanism: Technology, Digital Culture and Human Obsolescence*. London: Rowman and Littlefield International, Ltd.

Navaro-Yashin, Y. (2009) 'Affective Spaces, Melancholic Objects: Ruination and the Production of Anthropological Knowledge', *The Journal of the Royal Anthropological Institute* 15(1): 1-18.

Nielsen, M. & M.A. Pedersen. (2015) 'Infrastructural Imaginaries: Collapsed Futures in Mozambique and Mongolia', *Reflections on Imagination: Human Capacity and Ethnographic Method*. Mark Harris and Nigal Rapport (eds). London: Routledge, 237-261.

Noble, D. (1995) *Progress Without People: New Technology, Unemployment and the Message of Resistance*. Ontario: Between the Lines.

Poole, D. (1997) *Vision, Race, and Modernity: A Visual Economy of the Andean Image World*. Princeton, New Jersey, and Chichester: Princeton University Press.

Raven, P.G. (2013) 'An Introduction to Infrastructure Fiction'. 24 June. Available at: <http://superflux.in/index.php/introduction-infrastructure-fiction-guest-post-paul-graham-raven/#>.

Rossiter, N. (2016) *Software, Infrastructure, Labour: A Media Theory of Logistical Nightmares*. London and New York: Routledge.

Ritzer, G., & N. Jurgenson. (2010) 'Production, Consumption, Prosumption: The Nature of Capitalism in the Age of the Digital "Prosumer"', *Journal of Consumer Culture* 10(1): 13-36.

Schama, S. (1995) *Landscape and Memory*. London: Harper Collins.

Seaver, N. (2017) 'Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems', *Big Data & Society* (July-December): 1-12.

Shapin, S & S. Schaffer. (1985) *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*. Princeton, New Jersey: Princeton University Press.

Shapin, S. (1995) 'Invisible Technicians: Masters, Servants, and the Making of Experimental Knowledge', *A Social History of Truth: Civility and Science in Seventeenth-Century England*. London & Chicago: University of Chicago Press, 355-407.

Sneath, D, M. Holbraad and M.A. Pedersen. (2009) 'Technologies of the Imagination: An Introduction', *Ethnos* 74(1): 5-30.

Srnicek, N., & A. Williams. (2015) *Inventing the Future: Postcapitalism and a World Without Work*. New York: Verso.

Srnicek, N. (2017) *Platform Capitalism*. Malden, Mass.: Polity.

Stiegler, B. (2016) *Automatic Society, Volume 1: The Future of Work*. Trans. D. Ross. Malden, Mass.: Polity.

Striphas, T. (2015) 'Algorithmic Culture', *European Journal of Cultural Studies* 18(4-5): 395-412.

Sutherland, D. (2015) 'Vaporents: Inhuman Orientations', Rob Coley and Dean Lockwood (eds), *Culture Machine* 16. Available at: <http://www.culturemachine.net/index.php/cm/article/view/584/588>.

Terranova, T. (2000) 'Free Labor: Producing Culture for the Digital Economy', *Social Text* 18(2): 33-58.

Thacker, E. (2004) *Biomedica*. Minneapolis and London: University of Minnesota Press.

Tsing, A. (2000) 'Inside the Economy of Appearances', *Public Culture* 12(1): 115-144.

Tucker, J. (2005) *Nature Exposed: Photography as Eyewitness in Victorian Science*. Baltimore: The John Hopkins University Press.

Urry, J. (2016) *What is the Future?* Cambridge: Polity Press.

Virilio, P. (1991) *The Aesthetics of Disappearance*. Trans. P. Beitchman. New York: Semiotext(e).

Vonderau, A. (2017) 'Technologies of Imagination: Locating the Cloud in Sweden's Global North', *Imaginations Journal of Cross Cultural Image Studies* (Location and Dislocation: Global Geographies of Digital Data) 8(2): 8-21.

Weisman, A. (2008) *The World Without Us*. London: Virgin.

Wong, W. (2018) Internet-based Networking in the Data Center: Cisco vs Juniper. 11 September. Available at: <https://www.datacenterknowledge.com/networks/intent-based-networking-data-center-cisco-vs-juniper>.