Jussi Parikka

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Situated Data: On Art Methods, Cultural Institutions and Infrastructure

I It's Not Serendipity

If asked for a one line to summarize the contents of this chapter with, I would be tempted by these words from Casey Boyle: "It's not serendipity, it's the Dewey Decimal System."[1] Blurbed with the casualness of a social media update, it does however capture something rather essential about the organizing media of our knowledge systems and their historical lineages: one stumbles across data because somebody put it there in the first place. It has the same sort of revelation as Jacques Lacan's seemingly obscure note that the bunny is in the magician's hat only if you put it there in the first place.[2] Magic, serendipity, as well as all those things one is tempted to name under the broad rubric of knowledge, depend on the infrastructure that sustains them.

A more formal way of introducing this chapter would be to say that it concerns infrastructure, a central topic nowadays in media studies and digital culture studies. From submarine cables to satellites, information systems such as GPS to the logistics that underpins contemporary cultures of the circulation of things and data, the interest in materiality has taken a decisively infrastructural turn, also inspired of course by the earlier work of colleagues in Science and Technology Studies.[3] Addressing, placement, circulation, search, and retrieval must be managed by a variety of procedures and protocols, materials, and

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[1] Casey Boyle, Facebook update, September 1, 2017,
https://www.facebook.com/casey.boyle/posts/10155682505472612.
[2] Jacques Lacan, *The Seminar of Jacques Lacan: Book II, The Ego in Freud's Theory and in the Technique of Psychoanalysis* (Cambridge et. al: Cambridge University Press, 1988), p. 81.
[3] See for example Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999). Lisa Parks and Nicole Starosielski (eds.), *Signal Traffic. Critical Studies of Media Infrastructures*. Urbana, Chicago: University of Illinois Press, 2015. Shannon Mattern, *Code and Clay, Data and Dirt: Five Thousand Years of Urban Media*. Minneapolis: University of Minnesota Press, 2017.

architectures from the Dewey system to shelves, spine marks, trolleys and intellectual furniture of other material kinds too.[4] The expansion of media theoretical questions from devices to infrastructures also establishes a further connection to current discussions concerning media and logistics, platforms and digital labour. But this infrastructural angle can also find a situated focus as institutional analysis.

It is in this sense that this chapter examines cultural institutions as mediated data infrastructures. Working through the case study of the British Library, it investigates this infrastructural question through artistic methods. The project Internet of Cultural Things worked with the artist Richard Wright, known for his earlier projects in data visualization and critical media arts as part of the Mongrel-collective,[5] to unfold questions of media and infrastructure that extend much beyond the current focus on digital institutions and discourses—such as the Internet of Things. Even if this speculative, technologically focused and often corporate-led investigation of digital cultural institutions is becoming the mainstream way of understanding the infrastructural possibilities of data analytics concerning library users, holdings, and the various other relationships that define cultural institutions, we were interested in more experimental questions: how have notions of publicness already been incorporated into libraries in earlier phases of data infrastructure before the digital? In what ways was the library always already a proto-computer specialized in addressing, retrieving, and processing data (that for a long period came in the form of books and printed material)? This approach to the library connects questions developed in contemporary media theory with artistic methods, and produces an interesting installation-based entry point for the investigation of contemporary issues around automation, labour, and what sustains institutions as knowledge systems that are dependent on their material infrastructures.

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[4] Shannon Mattern, "Library as Infrastructure." *Places*, June 2014, https://placesjournal.org/article/library-as-infrastructure/.
[5] The Mongrel and later Harwood, Wright, Yokokoji-collaboration included the MediaShed "free-media" space in Southend-on-Sea, the "Cross Talk" eco-media project, and the "Tantalum Memorial" that won the transmediale 2009 award.

Obviously this enters a territory that has been of special interest to the Digital Humanities in recent years. Instead of merely treading the same footsteps, this chapter proposes to use theoretical ideas, methods, and approaches both from the artistic field — critical and historicizing investigations of data culture — and media theory, especially from work interested in logistics and automation, as well as cultural techniques of knowledge systems. In practice, this chapter will engage with the project Wright undertook as artist-in-residence at the British Library, examining the ways in which data becomes understood through infrastructural operations.[6] Furthermore, contextualizing this practice in relation to art methods about data and media infrastructural studies, this chapter will continue by discussing Wright's *Elastic System* — a data visualization and art installation that picks up a term from the nineteenth century librarian Thomas Watts and places it in current debates about data, media, and infrastructure. The *Elastic System* creates alternative imaginaries for libraries as media systems and it offers an alternative to the more corporate-led technological futures that are part and parcel of the current discourse about digital institutions. As such, it sets itself against the particular fantasies of cultural institutions' effective data management and works to trigger other sorts of questions about labour and automation than those posed in some of the more mainstream discourses that will be the focus of the next section of this chapter—albeit if, in part, as fiction.

II Fantasy Institutions

Fantasies often hold institutions together: imaginaries glue their particular bodies, machines, processes, and procedures into a mission or a purpose. The sort of language that Benedict Anderson used to demonstrate the imaginaries that maintain nationalism also works as a way to describe institutions, including cultural institutions; many of them were, in any case, already projects closely tied to that of the nation state.[7]

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[6] The project in question is the Internet of Cultural Things (AH/M010015/1, 2015-2016), which was funded by the AHRC and involved King's College London, the British Library, and the Winchester School of Art at University of Southampton.

[7] Benedict Anderson, *Imagined Communities. Reflections on the Origins and Spread of Nationalism*. Revised Edition. London and New York: Verso, 2006.

The current fantasies of cultural institutions are often painted in the grey hues of corporate infrastructures of metrics and analytics, as one can observe from even a casual look at what "cultural data" has come to mean in these contexts. These discourses and uses also become easily adaptable to the "New Public Management ethos and private sector interest":[8] nothing cultural per se, but just data about the performance of so-called cultural institutions for various forms of statistically motored governance that demand comparative measurability to be established through numbers. Techniques of automation ("never click again"), centralization, and data-driven behavioralism of user patterns that, importantly, are operational: "Actionable insight and intelligence."[9]

It would be easy to extrapolate based on this and offer a dose of speculative fiction about the "grey media" of cultural institutions.[10] Also in this version, the future media landscape of institutions is one of multiple intensive relations of data that are aggregated and analyzed in real time. Customers have access to packages that are linked to a variety of back-end analytics processes and institutional databases; besides user profiles for optimization of experience (pre-emptive building guidance based on earlier use patterns), the data handling corporation also feeds relevant input, for example to the private security company on the premises whose job it is to be alert for various security issues based on a multi-scalar risk estimation chart of suspicious movement, perspiration, and behavioral patterns: is the User a researcher after the rare manuscript collection or a homeless person loitering? Of course, there would be further potential to build up a version of this as the cultural data version of the quantified self-movement. Instead of California and fitness, it finds its killer app developers in the cultural capitals of the world. The cognitive understanding of culture spreads to a different measure: to evaluate a cultural institution not

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[8] Rob Kitchin, *The Data Revolution. Big Data, Open Data, Data Infrastructures and Their Consequences.* Los Angeles: Sage, 2014, 62.
[9] The quotes are from Dexibit company specializing in museum data and data-driven analytics. http://dexibit.com/.
[10] On grey media as part of the measures of administrative reality construction and infrastructure, see Matthew Fuller and Andrew Goffey, *Evil Media.* Cambridge, MA: The MIT Press, 2012.

merely by the way we gather information, educate ourselves, interpret the world through history books, literature, and such — the things one learned as *Bildung* as the German word signalled — but how a user population's relation to a national institution is also about the measurement of the object-traffic — item requests, tracked object transport, warehouse solutions or then the measurement of the user itself through the involuntary reactions: microbial, nerve and skin-based, heart rate and other reactions where this data becomes part of the Key Performance Indicators of the institution. The correctly balanced microbial gut level of its users defines one version of the future biotechnological public sphere of the British Library circa 2048.

Speculative design fiction aside, the various tropes, narratives, and projections about data and infrastructure lead to the question: what are cultural institutions as media institutions? This begs also to ask how to start investigating those situations of media and infrastructure from the bottom-up: from the operational situations where one encounters infrastructure at work as cultural techniques in contemporary cultural institutions and starts to unfold both its historical paths and its connections to current discussions in labor and automation. This infrastructural view starts to look at data as part of the historical build-up of technologies that are part of the media infrastructures of knowledge, or as Shannon Mattern puts it succinctly: "What ideas, values. and social responsibilities can we scaffold within the library's material systems — its walls and wires, shelves and servers?"[11] This awareness of the intellectual scaffolding leads us into questions where media becomes less about devices *per se*, and more about where they connect: library middleware,[12] infrastructures that scaffold "the public" as well as questions about how cultural institutions have for a longer period been computational machines operating with analog server farms, as Jeffrey Schnapp coined it,[13] referring especially to the library

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[11] Mattern, "Library as Infrastructure."

[12] Shannon Mattern, "Middleware: Landscapes of Library Logistics." Urban Omnibus, June 2015, https://urbanomnibus.net/2015/06/middlewhere-landscapes-of-library-logistics/. See also Johanna Drucker and Patrik Svensson, "The Why and How of Middleware." *Digital Humanities Quarterly*, vol. 10, issue 2, 2016, http://www.digitalhumanities.org/dhq/vol/10/2/000248/000248.html

[13] Jeffrey Schnapp, "Cold Storage Hots Up." Blog post, 6 January 2015, http://jeffreyschnapp.com/2015/01/06/cold-storage-goes-live/ accessed 11 January 2018. See

institutions and the off-site warehouses that have constituted one central node in data operations since the nineteenth century.

Data can be understood in terms of its volume, velocity, variety and more.[14] Data emerges as relations which internally link data points as patterns that become meaningful, not necessarily in the humanistic sense of the term, but when handled as an input for governance, marketing and management. But this mobilization of data and its relational existence in institutions, uses, and discourses must be approached in situated and context-specific ways as it extends outside a focus merely on data sets and data structures.[15] This means an interest in relations that start to define data in spatial, architectural and even geographical sense from library spaces to off-site storage depots. While the focus on data easily obfuscates the question of material, spatial sites, it is as necessary to understand that space changes in its meaning, reachability, searchability through data that governs it.[16] We can easily claim that data is everywhere, but even this elusive everywhere is also somewhere—even if infrastructures are ways to mediate between specific situations, to enable transport across this and that particular space.[17] The ways of approaching data as situated — not merely as an ephemeral cloud-based informational entity, but also as institutionally conditioned and conditioning — is what drives a sort of a critical insight to cultural data as a bundle of issues from questions about the public to its particular media and transport infrastructures.

Questions about location and the situated nature of data as a material relation can also be approached through some experimental methods that build on research in media studies. This includes the work that picks up on art methods to investigate the material realities of data and moves from celebratory

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also the Cold Storage documentary-web project:
http://www.librarybeyondthebook.org/cold_storage/.
[14] Kitchin, *The Data Revolution*.
[15] danah boyd and Kate Crawford, "Critical Questions for Big Data." *Information, Communication & Society,* 15:5, 2012, 662-679.
[16] See Louise Amoore, "Cloud Geographies: Computing, Data, Sovereignty." *Progress in Human Geography*, online first, 2016,
http://journals.sagepub.com/doi/abs/10.1177/0309132516662147.
[17] Bowker and Star, 287.

accounts of data visualization to how art methods can intervene in the business-as-usual discourses about what cultural data means.

Artistic Data Methods

Data visualization that would be an effective artistic method in intervening in institutions has to take its aim at the political aesthetic of the situation, to follow Sean Cubitt's ideas. To avoid the dangers of celebratory practices or mere meta-representation that data visualization might easily produce, Cubitt argues that "critical data visualization arts occupy a third position, carefully marking the abstraction of data from its raw appearing as natural beauty or human behaviour, in order to explore the techniques through which that abstraction is perpetrated."[18] In this vein, one can start to see a methodological possibility: practices of data visualization can become more than second-order representations or immediations of data already given (whatever the etymology of the word) and investigations into the mentioned sites and practices, techniques and situations in which the abstractions function and become operational. As such, data practices and art practices can function as ways to start to map the situations in which the ephemerality of data and its persistent real-world effectiveness, its material involvement in structuring reality, is articulated. This involves not merely pitching existing data as something to be made visible — but also turning the investigative method the other way round: how does data become data that then affords visualizations, patterns, operational procedures, management decisions and more? Through what routes, what sorts of methods of compilation, organization, transmission, transport, and access does it become the sort of thing we take as, well, data—a given?[19]

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[18] Sean Cubitt, "Data Visualization and Political Aesthetics" in *Postdigital Aesthetics. Art, Computation and Design*, edited by David M. Berry and Michael Dieter. Basingstoke: Palgrave Macmillan, 2015, 180.
[19] See also Lisa Gitelman (ed.), *"Raw Data" is an Oxymoron*. Cambridge, MA: The MIT Press, 2013.

As simple as it sounds but important to underline: artistic projects about data are not merely ornamental commentaries, pretty pictures of data worlds, "beauty of data," or other form of aesthetics as anaesthetics, but can produce ways of being involved with data. Over the past years, we have seen inspiring takes that illuminate this point. While I cannot give a full list or engage in a lengthy discussion in this text, some good examples include Paolo Cirio and Alessandro Ludovico's *Face-to-Facebook* project, a part of their *Hacking Monopology* trilogy of works that used hacktivist methods in the grey zone of partly illegal data operations. This involved stealing profiles from Facebook, and remediating them as another public layer on a different, invented platform of a dating site, detaching profiles from personal identities and playing with the idea of the persona as a datapoint that can be transported across platforms, institutional terms and conditions, and particular interfaces that map into a variety of social situations and perceived expectations. Closer to the discussion about cultural institutions, James Bridle's installation and project *Five Eyes* at the Victoria and Albert Museum brought combinatory data analytics familiar from military and surveillance contexts back to cultural data collections. As such it provides an inspiring example of engaging with the existing datasets and holdings of a cultural institution while demonstrating how data analytics produces much more than just "cultural" data. Referring to the Anglo-block of Cold War and later-era surveillance networks, *Five Eyes* produces a further layer of search and analysis on Victoria and Albert's digital objects, demonstrating the flexibility of data as material for multiple layers of operations, analytic and institutional uses, even big data apophenia.[20]

Another approach to the situated nature of data and art methods is found in Burak Arikan's work in critical mapping: using their bespoke Graph Commons platform, Arikan's work moves from the discourse of data visualization to the wider art-activist practices that engage in participatory work with collectives and workshop participants. The aim of the work that comes out, sometimes in art installations but often in a workshop-format, is partly in illuminating what

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[20] Big data apophenia is a term used by Benjamin Bratton and Hito Steyerl to refer to the paranoid drive of finding underlying patterns in data. See for example Hito Steyerl, "A Sea of Data: Apophenia and Pattern (Mis)Recognition." *E-Flux* #72, April 2016, http://www.e-flux.com/journal/72/60480/a-sea-of-data-apophenia-and-pattern-mis-recognition/.

data collecting is as a creative activity that feeds towards civic data initiatives by way of such art methods; mapping urban infrastructures and planning projects, corporate ownership ties, but also issues that relate to the archives of cultural institutions, providing a way to understand the graph as something of a central feature of data-based interactions. Art methods use, reuse, re-institutionalize data; practices such as Arikan's start to unfold an activist-inspired story of the question "what can you do with data," but also "what can you do with a cultural institution" and "what is a library good for?" Here cartography is not merely the art of mapping existing relations and creating visualization but also a form of conceptual work: to map power relations across different institutional, geographical, and other parameters, a point that is central to the work of such theorists as Rosi Braidotti.[21] Cartographies are not only representations, but ways to engage in embodied, situated, and multi-leveled movements of agency. One way to do that is to engage with infrastructure, which will be the topic of the next section.[22]

III Art of Infrastructure

Richard Wright's work as artist in residence at the British Library picked up on related questions, methods and concepts as part of the project to outline the contexts of data functions in the infrastructures of an institution. The lead questions emerging out of the residence, which included "where is the library" and "what can you do with a library," illustrated performative and situated ways of understanding the institution.[23] Wright's observations included notes about the protocols of the digital management of the library but also how the users interacted with the space in and outside the reading rooms. At the British

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[21] On Braidotti's use of cartography, see for example Rosi Braidotti, *Transpositions. On Nomadic Ethics*. Cambridge:Polity, 2006.

[22] In addition, one should also note the work librarians have done to map their institutional networks and presented them with public facing interfaces. Many thanks to Shannon Mattern for mentioning this aspect. Find a list of some relevant projects and resources collected by Mattern and online at http://www.wordsinspace.net/booksdata/fall2016/portfolio/november-15-public-facing-interfaces/. Accessed January 16, 2018.

[23] Richard Wright, "Where is the Library" Internet of Cultural Things-project blog, 8 June 2016, https://internetofculturalthings.com/2016/06/08/where-is-the-library/ and Wright, "What Can You Do With a Library?" Internet of Cultural Things-project blog, 8 June 2016 https://internetofculturalthings.com/2016/06/18/what-can-you-do-with-a-library/ .

Library, like in many other libraries, most of the books had been removed from public access to the storage:

> Up until the 1850s, the public were allowed direct access to the bookshelves. But after the Round Reading Room was constructed, Anthony Panizzi, the Principle Librarian, decided that the print collection had grown so large that it was no longer practical to allow readers to wander amongst the ailes [sic] themselves. Many of the items are still stored according to shelfmarking systems partially inherited from those days and so still reflect how they would have appeared to the public before being removed from view.[24]

The only exception that remained stands at the center of the British Library building at St. Pancras: the Royal Library of George III that, since its donation in 1828, has to be contractually always publicly available — or at least on display, as in this case of the library tower as a spectacle. Curiously, as Wright notes:

> This area in the middle of the British Library was originally designed to hold the printed catalogues and various library index cards. By the time the St. Pancras building opened in 1997 however, most of that material had been digitised and so the decision was taken to use this area to house the Kings [sic] Library instead. An object which is accessible but no longer in direct visible form was displaced by an object which is visible but no longer directly accessible.[25]

Questions of visibility and accessibility became central ways to tackle the infrastructural angle to items. Wright's work included taking his expertise in data visualization and experimental methods in electronic arts to the cultural institution and examining work that starts to look at the layers of data as it is mobilized through the infrastructure. Hence, it was meant to engage as a media art practice that demonstrated practice-based methods for involvement in those situations where data becomes an action — for example, in cultural

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[24] Wright, "Where is the Library?"
[25] Ibid.

institutions, themselves storing and collecting, distributing and safeguarding cultural data, and increasingly in infrastructures that are not of their own making. Data infrastructures of libraries and other cultural institutions often "make use of hardware (i.e., conveyor and "sortation" systems) and software (barcodes and inventories) that originated in manufacturing, retail, and shipping,"[26] emphasizing the institutional link to wider media cultural questions: whose infrastructure governs data and towards what sorts of ends?

Wright's work was to provide an account of the function of infrastructural operations as already in-situ data operations, as well as to offer alternative imaginaries of *where, what, when* is data; as a means to situate it in new ways, to offer alternative ideas and imaginaries that can then feed back to the institutional work. At the core of the project was this productive tension: the situated nature of data in a cultural institution like the British Library and the manner of how data is constantly built up in relation to extra-institutional forces: standards, formats, the inter-operationality of datasets, which also allow the circulation of data outside the confines of institutions and hence also add up to the complex levels of stacked governance where the institution's boundaries are perceived through a cartography of its data infrastructure.

Figure 1:
The Large Room, 1851
http://www.britishmuseum.org/research/collection_online/collection_object_d
etails/collection_image_gallery.aspx?partid=1&assetid=1285567001&objectid
=3498917

For Wright, and the project in which the media artist in residence was embedded, infrastructure formed a way to unfold data as operations across the institution and its habituated routines. Focusing on the British Library, while the building and its space had for a longer period acted as a hub of public citizenship, Wright's work became interested in how data structures the British Library but also how to start building processes, practices, and habits on top of the already implemented and actioned situation. Instead of merely reproducing

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[26] Shannon Mattern, "Middleware: Landscapes of Library Logistics."

the usual functions of data circulation, Wright was interested in these questions: What are the affordances of its infrastructures? "What could you use all the abilities of a modern library system for [...]?"[27]

In more detail, Wright's method contextualized itself in relation to the institutional affordances and databases such as the ABRS [Automated Book Requesting System]:

> [...] we also need to attend to the fact that such a practice forms amongst the relations between the data infrastructure, the actual conditions in which it is accessed and the significance that lives on from their pre-digital history. We have to attend to how to *situate* this born digital data in the wider context from which it takes shape and in which its affordances address themselves to a public. And we start with what we have got. It will be impossible to rewrite the software that governs the operation of a national library. So *intervention* is one key strategy here — diverting its current functioning, placing foreign bodies inside it, offering alternatives. We cannot do anything which prevents it from functioning, but we might create a situation in which people are motivated to use it in a non-functional way.[28]

Another way to phrase this would be to say that the BL functioned as an organism of data governed by protocols, actions, operations, transport, logistics, and more. Data was approached through its systematic appearance, such as through the Integrated Archives and Manuscripts System (IAMS), Anonymised Reader Records, book ordering data, the ABRS, etc., and at the same time through creatively mapping what to do with a library and its particular affordances. Data became seen as a part of those operational activities that organize the institution—governed by standards, interfaces, classifications, etc.—and hence feed into the spatial settings that themselves structure what we understand and see as the "public" side of a public institution.

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[27] Richard Wright, "The Elastic System: What Can You Do With a Library?" The Living Knowledge Blog, British Library, November 24, 2016, http://blogs.bl.uk/living-knowledge/2016/11/the-elastic-system-what-can-you-do-with-a-library.html.
[28] Wright, "What Can You Do With a Library?" The Internet of Cultural Things-project blog.

This is an especially interesting question when one starts to consider it from the point of view of data operations and datasets: all the individualized, anonymized, and aggregated data that in many ways adds up to one perspective on what the "public" means when addressed in contexts of institutional data. The interesting question became how to understand data as an action, or readiness for an action, in particular spatial, architectural, and institutional situations.[29] In Wright's artistic residency, this meant investigations into the logistics and spaces of the institution, both in central London and in Yorkshire at Boston Spa, which is where the library hosts their robotic retrieval system for the newspaper archives.

Data became seen and conceptualized as circulation across buildings, humans, interfaces, transport, and transmission systems. This circulation also included putting the observers in movement. The "infrastructure tours" at the British Library worked as a guided insight into the vertical nature of the institution and how that nature is infrastructurally connected to what the user or the public understands its function to be as an institution of knowledge. Down into the basement and underground levels, the visitors gathered for a glimpse of those spaces where the cultural institution's work includes procedures like security clearances and data obfuscation — in other words, not snapping photographs, since the books should not be identifiable by their physical location. Data addresses needed to be kept masked from the visitors who were not library staff. But multiple levels of work and structure also became visible in new ways; electricity, data, data sets, holdings, catalogues, plastic book trolleys moving across the building on the mechanical delivery system that was governed by both human work and the electronic request system with its own interfaces and standards. This also included people as agents in the partly automated retrieval systems and other parts of the library system — even as metadata, when it comes to the work of cataloguing.[30] Considering people as infrastructure is an

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[29] See Keller Easterling, "The Action is the Form," in *Sentient City: Ubiquitous Computing, Architecture and the Future of Urban Space*, edited by Mark Shepard, Cambridge, MA: The MIT Press, 2011, 155. "It does not constitute an event, but must be observed over time as a potentiality, capacity, ability, or tendency." (Ibid.)
[30] Thanks again to Shannon Mattern for this point.

idea from the urban ethnography suggested by AbdouMaliq Simone.[31] But in recent art theory similar arguments have also been elaborated that start to point to already existing practices as elaborating something important: not merely to transport art methods to cultural institutions like archives — to make administration art with other means — but to elaborate the practices of archives, libraries, and museums as this sort of grey, administrative strand of art practice that arrives in the wake of the earlier avant-garde, and in the context of conceptual art too.[32]

The project and Wright's method, in the process of observing the library staff and their systems, also transformed them. The actual operations started to form a different sense of data that is not merely digital or embedded in the datasets and their prescribed sets of possibilities, actions, and guidance. In other words, the project started to expand the question of the cultural institution as a media institution to include the interaction of multiple sorts of agency from the human to the infrastructural. Methodologically, this participant observation was a form of spatial mapping, to use Shannon Mattern's ideas. Data started to unfold as a relation in and across spaces and multiple forms of agency. To quote Mattern: "To visit the sites that are producing our networked experiences is thus an attempt to understand these new entanglements, sensations and practices, these network-associated changes — this new way of being."[33]

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[31] AbdouMaliq Simone, "People as Infrastructure: Intersecting Fragments in Johannesburg." *Public Culture*, 16(3), 2004, 407-429

[32] In recent discussions in art theory and methods, Jane Birkin from WSA has analyzed how the practices and techniques of the bureaucracy such as archives turn into art methods of description. Such an idea of not merely transporting art methods into a cultural institution, but cultivating the bureaucratic practices itself into an art method that has to do with some key modern formations of knowledge. This also resonates with discussions about performativity of art methods in such institutional settings. Birkin goes on to quotes Iversen in order to remind that this sort of a performativity is what picks up on the repetitious and laboring operations of such settings as not the art of spontaneity or self-expression, but the repetition, iteration, and other such mundane operations. See Jane Birkin, "Art, Work and Archives: Performativity and the Techniques of Production." *Archive Journal*, November 2015, http://www.archivejournal.net/essays/art-work-and-archives/. See also Benjamin H.D. Buchloh, "Conceptual Art 1962-1969: From the Aesthetic of Administration to the Critique of Institutions." *October* Vol. 55 (Winter, 1990), pp. 105-143 Hal Foster, "An Archival Impulse." *October* Vol. 110 (Autumn, 2004), pp. 3-22. Sven Spieker, *The Big Archive. Art From Bureaucracy.* Cambridge, MA: The MIT Press, 2008.

[33] Shannon Mattern, "Infrastructural Tourism." *Places*, July 2013, https://placesjournal.org/article/infrastructural-tourism/.

Can data and infrastructure be conceived as a way of being? Can such situations of data start to inform both artistic and theoretical ways of connecting experience with infrastructure? In many ways, that is what infrastructure is supposed to do silently anyway. It must offer the necessary categories, affordances, and support to interface with the library as an infrastructural organism, a data entity that feeds on those actions: digital search to the retrieval systems via human hands, electro-mechanic systems and at times, even notes on paper slips back to the user who is hailed as part of the delivery/addressing system that constitutes the institution. The screen opens up to a multiplicity of actions invisible behind the interface.[34]

Wright's artistic output devised an additional interface that was built on top of the existing British Library search and delivery systems search, and which opened a different way of understanding the search as a cultural technique that defines the institutional boundaries.[35] The *Elastic System*, a search system and an installation, was created by Wright for visual browsing at a time when most searches for knowledge take place in interfaces and search strings instead of on open shelves. The *Elastic System* parasites the searches, locations, indexes, and catalogues of items that are already included in the catalogue systems of the BL. Thus it becomes an additional layer on top of the existing data search and retrieval system. It borrows its name and main image from the nineteenth century librarian Thomas Watts, who worked at the British Museum library (the forerunner of the British Library). Watts himself might be perhaps rather unknown outside certain library studies circles, but he is revealed as the developer of what he at least himself was convinced would be a nineteenth-century revolution in data management: the elastic system. Watts's obituary,

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[34] On categories as infrastructure, see again Bowker and Star 1999.

[35] Cultural technique is used here in the sense as it has been introduced in recent 10-15 years of German media theory. Cultural techniques produce anthropological differences, such as inside/outside, sacred/profane, etc. and are as such epistemological machines or the medial conditions of what then becomes known (and one might add, felt). Siegert adds: "However, it is crucial to keep in mind that the distinctions in question are processed by media in the broadest sense of the word (for instance, doors process the distinction between inside/outside), which therefore cannot be restricted to one or the other side of the distinction. Rather, they assume the position of a mediating third, preceding first and second." Bernhard Siegert, *Cultural Techniques. Grids, Filters, Doors and Other Articulations of the Real*. Transl. Geoffrey Winthrop-Young. New York: Fordham University Press, 2015, 14.

however, did not think much of this particular innovation. His short posthumous fame in the newspaper recounts the carriage accident that took his life and that, besides his library work, he published some essays in periodicals — nothing of the sort that would mark him as a great forerunner of the twenty-first century data organization society. [36] Hence, by way of a media archaeological rediscovery, another side of Watts comes to light.

Richard Wright's system is described as follows:

> Elastic System is a database portrait of the librarian Thomas Watts. In 1838 Watts invented his innovative "elastic system" of storage in order to deal with the enormous growth of the British Library's collections.
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> The mosaic image of Watts has been generated from 4,300 books as they are currently stored in the library basements at St. Pancras, an area not normally accessible to the public. Each one is connected live to the library's electronic requesting system.
>
> The Elastic System functions allows people to visually browse part of the British Library's collections, something which has not been possible since Watts's time. When a book is requested it is removed from the "shelf" to reveal a second image underneath, an image that represents the work that goes on in the library's underground storage basements, the hidden part of the modern requesting system. [37]

Wright's *Elastic System* is a second-order take — not so much a reconstruction as a nod to an early grey innovator of indexing and search infrastructure — that points to Watts's innovation and subtly records the changes since. But it also nods just as subtly to the idea of cultural institutions as data organizations. The *Elastic System* is a playful prototype that demonstrates an historical lesson about pre-digital machines of information management — cards and catalogues — and the institutions which become such computational machines organized by these cards and catalogues, as Markus Krajewski points out. [38] Card

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[36] Thomas Watts's Obituary, *The Times*, September 10, 1869.
[37] Elastic System project description part of the temporary installation at the British Library in Autumn 2017. See also http://elasticsystem.net/.
[38] Markus Krajewski, *Paper Machines. About Cards & Catalogs, 1548-1929*. Transl. Peter Krapp. Cambridge, MA: The MIT Press, 2011.

catalogues were already imagined as universal machines for data storage and efficient management, and as such, they fulfilled the spot that computers would later occupy. As Krajewski suggests, "the possibility of rearranging its elements makes the card index a machine: if changing the position of a slip of paper and subsequently introducing it in another place means shifting other index cards, this process can be described as a chained mechanism."[39] The focus on the paper slips as the elements of flexible rearrangement was actually central for Watts's original work too and the *Elastic System* carries a particular media historical theme with it. In May 1855, in a letter addressed to the Principal Librarian of the BL, Anthony Panizzi, Watts proposes to radicalize the use of the bibliographic slips.[40] As Watts recounts, the usual four slips recorded the information about the author, the title, the place and date of imprint, and the pressmark (location); the typical use of those was primarily to organize the catalogue as per the author slip but Watts's letter proposed to speculate the benefits of separate catalogues organized by titles, by place, even by physical location of the item. The benefit was meant to be a more flexible and varied way of cataloguing and searching. This idea of an expanded notion of multiple combinatorial systems might seem not so special considering the ease of reorganizing our search with current interfaces, digital data, and Boolean search operators, but to think of this as a paper slip machine was in itself something peculiar: the librarian's version of Victorian steampunk, even. To add to the aura of Watts himself, according to legend, in his role as "Placer" he was able to remember the location of some 100,000 titles, performing the role of ideal search engine in his own living persona as part of the library system.[41] Indeed, he was hailed as "a gentleman with prodigious memory and encyclopaedic learning."[42]

Obviously, Watts and his prodigious capacities as a search engine would itself be a suitable starting point for speculative fiction about library infrastructures that would offer an alternative to the corporate versions we started with. It

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[39] Ibid., 7.
[40] Letter sourced from the British Library archives/collections.
[41] Wright, "The Elastic System: What Can You Do With a Library?".
[42] Richard Garnett, *On the System of Classifying Books on the Shelves Followed at the British Library*. Conference of Librarians, October 1877. London: Chiswick Press, 1878.

would also offer such tempting potential for speculative media theory. In many ways, it would be an opportunity to raise Watts to the status of that which Daniel Paul Schreber has occupied within media theory: as a central figure, for Friedrich Kittler, through which to understand the threshold of the discourse networks of 1800 and 1900.[43] But in Watts's case, he would become the figure that stands at the threshold of data management and searching, the key media functions of the library. With or without Watts, his idea of the Elastic System carries forward imaginaries of smoothness of information management, recombinatorics, flexibility, and innovations that have become the infrastructural enabling condition for the later digital media that runs as part of the library. Whether that machine is digital or not is in this case secondary to the elasticity of searching as a cultural technique.

Wright's version of the Elastic System includes access to only a small part of the BL's holdings that he selected and photographed, using the spine as an index of the visual sign of searchability. Despite the limitations, as practical exposition it taps into issues of the visibility of holdings that start to form a web of questions about public space, cultural data, and the historical precedents to data indexing and searching. The art installation starts to unfold this important story about the infrastructural, and data-operation-reliant nature of what counts as "public" and also what sort of operations of labor maintain such systems: sorting, cataloguing, placing, retracing, fetching, transporting, and handling, to name some of the cultural techniques that imply the labor of infrastructure. As such, it also becomes a reminder of those multiple other sorts of machines and imaginaries of data organization that are stacked as part of institutional histories before the digital.

Figure 2:

The Large Room

http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?partid=1&assetid=1285345001&objectid=3498917

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[43] See Friedrich Kittler, *Discourse Networks 1800/1900*. Transl. Michael Metteer, with Chris Cullens. Stanford: Stanford University Press, 1990.

The Elastic System becomes a way to tap into a media historical moment: the removal of items from public hands-on-access to the storage depot (both in London and at Boston Spa) and the entry of infrastructural support systems, such as book trolleys, as part of the search and delivery of holdings. This sort of replacement of items with data about items and locations is part of the particular information glut since the nineteenth century and the emergence of the delivery systems that are designed to mediate between the card indexes offering the catalogue order of the holdings and the actual physical locations — two sorts of address spaces that define the library or archival data relations as a combination of symbolic and material conditions of access. A similar theme was present in other institutions too, including in some key research libraries. In the telling words of Harvard University library services in early twentieth century, shifting items out of immediate access and into request only was a question of how to make access "less convenient and attractive,"[44] as a way to manage this informational situation and the user's relation to the system.

Museums have for a longer period functioned as media that govern the public's attention, behavior, and movements and as such, formed various surfaces, interfaces, channels, and other modes of governance.[45] The sort of aesthetic governance of what you see, in what order, in what space was part of the infrastructure of the public since the nineteenth century, as Michelle Henning has demonstrated.[46] In parallel, one can see how this formed part of the imaginary of the library too: a public space, in some ways also a spectacle of visual display even before the King's Tower at the current BL location, as the *Illustrated London News* from 1851 visualizes the British Museum Library (now the BL). The library was a place for a Victorian-era stroll into the atmosphere and space of knowledge (see Fig. 1).. It is this sort of an imaginary of public hands-on access that is also the subject of what happens offsite: the storage

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[44] Charles William Eliot quoted in the documentary *Cold Storage*. metaLAB at Harvard University, 2015, http://www.librarybeyondthebook.org/cold_storage/ accessed 11 June 2018.
[45] See also Samir Bhowmik, "Deep Time of Museum Infrastructure." *Curator: The Museum Journal*, forthcoming 2018.
[46] Michelle Henning, *Museums, Media and Cultural Theory*. Maidenhead: Open University Press, 2006.

holdings where mediation happens by way of search and request and the infrastructure that continues to maintain the retrievability for the user. Hence, one starts to pay attention to how the offsite is managed as a part of search systems and starts to form the other part of the logistical story that includes how the user of the public library needs to be kept at a distance with the mediation of the logistics systems and database services. Furthermore, the offsite itself is increasingly becoming automated, which is emblematic of a further set of changes that include a wider political economic aspect that begins to speak to questions of automation and labor as well.

IV Server Space

Automation has become one way to understand the changes in the institutional infrastructure of libraries. It is also a topic that connects particular institutional changes to a bigger picture of the transformations in work, economy, and logistics.[47] These changes also pertain to the library sector and tie in with the various sorts of real and speculative futures we started with that deal with labour costs, efficiency, and data-based management of the traffic of knowledge, items, and people. Hence, the British Library site in Boston Spa is far from being a solitary example of automation in the form of robotic retrieval facilities. Similar systems are in place in various countries from Norway to the US where humans are evacuated from the logistical library space, which functions in low-oxygen conditions and is also optimized to pack items more densely; in short, the cultural institutional site is becoming "more data-center-like in its storage logic, labor logistics, and ambience"[48], as Mattern puts it. This includes priming the space for machine-based scanning and handling of items as well as, increasingly, priming the space for machine-based entities.

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[47] See for example Nick Scrnicek, *Platform Capitalism*. Cambridge: Polity, 2016. Ned Rossiter, *Software, Infrastructure, Labour: A Media Theory of Logistical Nightmares*. London and New York: Routledge, 2016.
[48] Mattern, "Middleware: Landscapes of Library Logistics." This angle would have been one way to pitch a futuristic narrative creation about the posthuman holding retrieval systems which even after the climate change had made much of Britain uninhabitable, would continue working. Now already it was sustained in an environment of low oxygen and devoid of humans, creating an eerie sense of future logistics systems for cultural data.

The automation of library operations and services is a major topic when set as part of the far-reaching discussion about work and employment in digital culture. But it is also part of a parallel set of media theoretically interesting discussions concerning what enables this transformation in terms of the management systems of the library. The sort of work that Watts excelled at, and that became the human-embodied version of search and discovery in libraries, is here one reference point in a chain of transformations that are often referred to by way of their technological determinants (the automated library to the digital library), but which actually involve a range of techniques at the level of bodies, shelves, stacks, and many other levels of the library machine. Aptly, when the Swedish National Library in the mid-1990s completed its study of a future library set in 2045, it referred to how "robots, or 'butlers' would help students and researchers to access the archived material by retrieving it from the basement."[49] Interestingly, what remains un-investigated is that the terminology of butlers — even if automated ones — itself stands apart as a different kind of media history of the labor of service with clear gendered and class dimensions too.[50] This aspect concerning the media history of service is demonstrated by Markus Krajewski and offers a different connotation to the set of changes that also pay attention to the various levels of how cultural techniques operate in the library space. Besides the cultural techniques of library work, contemporary labor also includes multiple kinds of other aspects that put library staff at the center of often-feminized immaterial and affective labour.[51] Furthermore, service was in many ways already always automated as a technique and was reliant on protocols of behavior and responsiveness, a fact that was for a long time made visible in the computer-optimized walking routes created for human employees in the large Amazon warehouses searching for items requested for delivery.[52]

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[49] Annika Hjerpe, "Robots, Holograms and Libraries", *Scandinavian Library Quarterly*, 49:4, 2016. Available at: http://slq.nu/?article=volume-49-no-4-2016-12, accessed January 9, 2018.
[50] Markus Krajewski, *The Server. A Media History from the Baroque to the Present.* Translated and with an introduction by Ilinca Iurascu. Yale University Press, 2018, forthcoming.
[51] Thank you to Shannon Mattern for raising this point.
[52] Marcus Wohlsen, "A Rare Peek Inside Amazon's Massive Wish-Fulfilling Machine." *Wired,* 16 June 2014, https://www.wired.com/2014/06/inside-amazon-warehouse/, accessed 9 January 2018.

But of course, when it comes to technological servers, a different set of protocols enter the scene in discussions of networked systems. Indeed, here one can start to investigate the changes in place that enabled this continuing servantry at the core of the computational search-systems called libraries. This includes changes such as Machine Readable Cataloging as well as RFID systems,[53] and other developments that allow an alternative coordination system that can bypass human eyes, hands, and feet in the work. Thus Wright's seemingly obsolete implementation of a visual search system is set to open up an investigation into the transformation in this media historical sense too: from the visual component of shelf marks and book spines as part of the address system of the library to the automation of such procedures towards a "smart shelf" that becomes one component in new RFID antenna media infrastructure of knowledge.[54] Some experimental library systems have already employed ideas that are reminiscent of Watts's and Wright's elastic systems taken to the next level. Foremost of these examples would be the Sitterwerk Art Library which uses RFID tags to enable a dynamic organization of the items as part of a continuous inventory that does not require items to be placed in their original location, since the digital catalogue is constantly updated:

> The principle of serendipitous discoveries is depicted and broadened on the level of the digital catalogue: groups of books that have been brought together are documented in the database and represented graphically as a virtual shelf. This also results in the creation of new search options in the digital catalogue: in addition to conventional searches according to

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[53] David W. Lewis, *Reimagining the Academic Library.* Lanham, Maryland: Rowman & Littlefield, 2016.
[54] "Hand held RFID readers replace human eyes by using a communication device to identify the book via the RFID tags that were embedded on the books; nevertheless the task is still time consuming and the user still cannot easily interpret the RFID results to see if the books are sequenced properly. Smart shelf, on the other hand, uses many RFID antennas that are placed at many strategic locations so as to scan the RFID tags. The high infrastructure cost and implementation complexity remains a barrier for this technology to be widely adopted." Li, R., Huang, Z., Kurniawan, E. & Ho C. K., "AuRoSS: An Autonomous Robotic Shelf Scanning system", *2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, 2015, 6100.

author, keywords, etc., it has recently also become possible to search in the Sitterwerk according to the context of a book.[55]

In the Sitterwerk, the user is incorporated as part of the dynamic organization of the system. Wright's Elastic System articulates library labor in different ways. Pixel by pixel, every requested item unfolds another image under the mosaic portrait of Watts. This other image depicts the labor that takes place downstairs at the library institution's backend, representing the human staff as part of the server-based, partly automated machine of the library. This interface effect works as a way to tap into the questions where labor and bureaucratic systems are tackled by way of art methods. It also raises the wider question about automation of storage. While specific technologies such as RFIDs are making the knowledge space scannable, offsite storage deserves further attention before we move to our conclusions.

[Figure 3
The main interface image from the Elastic System: a mosaic of books and labour. Courtesy of Richard Wright.

In other words, the different national examples such as the British Library or the National Library of Norway's automated facilities are ways to further elaborate what storage means in the context of media theoretical investigations of knowledge. While digital libraries and repositories are one crucial part of the imaginary of the future library, we should pay attention to what automation and robotics mean in this projected transformation. In fact, the two — digitality and physical robotics — are tightly linked when it comes to managing storage. This connection to the digital management of space and traffic starts to unfold much more than what concerns "just libraries," and it becomes part of the discussion about the logistical turn that occupies the attention of contemporary critical scholars of capitalism, media, and labour — as has been noted above. Indeed, software governs space and allows a more extensive (e.g. higher stacks) and

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[55] "Kunstbiblithek", Sitterwerk Art Library website, http://www.sitterwerk.ch/en/art-library/dynamic-order/rfid-technik.html, accessed January 16, 2018.

intensive use of storage.[56] The British Library adopted their system in the wake of some inspiring examples from North American research libraries such as the Widener at Harvard and also the Norway National Library. The rail systems in place at such automated sites are part of the legacy of the nineteenth-century transport system for books and other items, but also a feed-forward to what constitutes part of the current logistical system binding libraries to the massive business of warehouse management, transport, and cloud service platforms. In Norway's case, the automated Repository library includes "43,500 steel boxes in racks, and between the three rack sections there are three automatic cranes on rails," but what characterizes the organization of the repository items and boxes is Automatic Storage and Retrieval System (ASRS) that is governed by the Warehouse Management System (WMS).

> Chaos storage is the main principle for storage in the ASRS,
> and is used for the books. Chaos storage means that the books
> have no permanent box in the stores, and the boxes have no
> permanent place in the stores. A book is stored in any vacant
> folder in any steel box in any of the stores. All publications,
> folders and boxes are identified by barcodes, and this enables the
> ASRS to keep track of in which folder and in which box any given
> publication is stored.[57]

As Mattern noted, the library systems increasingly resemble data-server systems where the butler or servantry as a cultural technique is not limited to the trained human skill but in addition includes the protocological data operations that link ways of seeing as scanning (barcodes, RFID) to intensifying the use of space. This space is however not mapped (only) according to the shelf arrangements in the Dewey system, but to the digital logic that uses space more effectively when read and controlled by machines. The other, more familiar,

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[56] See for example Dawn Olney, "A UK first; an automated, high-density solution for the British Library"Where shall we put it? Spotlight on collection storage issues, NPO conference, London, 2004, 4—14. Online at http://www.bl.uk/aboutus/stratpolprog/collectioncare/publications/articles/2004/, accessed January 8, 2018.
[57] Helen Sakrihei, "Using automatic storage for ILL — experiences from the National Repository Library in Norway", *Interlending & Document Supply,* Vol. 44 Issue: 1, 2016, 15.

example of this is the Amazon "Fulfillment Center" with its KIVA robots doing similar work. Aptly, the library transformation finds its counterpart in the warehouse management where robotics can help cut operating costs, reduce the amount of floor space that would be otherwise needed for human workers, and hence utilize space effectively for the management of items in, items out.[58] These are cultural techniques for the compression of space.

Amazon Wish Fulfillment Centers seem to easily allow a sort of grey logistical science fiction to emerge, considering how quickly *Wired* turned the description of one Phoenix warehouse into somewhat modern futuristic language: "Also known by the codename PHX6, the place radiates a non-human intelligence, an overarching brain dictating the most minute movements of everyone within its reach."[59] If one would still be in the futuristic mood, it would be to tempting to continue this line of thought further to discuss cultural institutions becoming mere subsets of warehouse logistics platforms and robotics, but I will leave the speculative fiction for some other occasion. Instead let us focus on what is at the back of this brain that governs both human and robotic movement: we find something that is also the parallel of what the library offsite servers have been dealing with. Hence, from Dewey to chaos storage, a different set of protocols start to govern the address space and movement inside it:

> The inventory at PHX6 is made up largely of "smalls," merchandise small enough to be stored on shelves about the size of those at a typical library, which is exactly how Amazon refers to the levels of seemingly endless metal shelving at PHX. Each shelf is divided into small cubbies, and each cubby gets a barcode and an alphanumeric ID, much like the Dewey Decimal System.[60]

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[58] Ananya Bhattacharya, "Amazon is just beginning to use robots in its warehouses and they're already making a huge difference." June 17, 2017, https://qz.com/709541/amazon-is-just-beginning-to-use-robots-in-its-warehouses-and-theyre-already-making-a-huge-difference/, accessed January 9, 2018.
[59] Wohlsen, "A Rare Peek Inside Amazon's Massive Wish-Fulfilling Machine."
[60] Ibid.

"Much like the Dewey" does not however mean the Dewey. Alternative address systems govern this space that has a financial cost attached to it. Indeed, the discussions about the poor labour conditions of Amazon workers is one indication of the sort of technical protocols that govern the financial understanding of space and logistics that are made to function primarily as the true non-human force. Indeed, as Cubitt aptly put it referring to the planetary scale corporations of digital culture, "[a]ctually existing cyborgs are huge agglomerations of technologies with human implants."[61]

One cannot avoid the sense of media historical irony that can sometimes be triggered by a mere mistyped URL. A minor mistype in the URL address for the online version of the Elastic System (www.elasticsystem.net) leads to the Amazon's Elastic File System (www.elasticsystem.com) — "simple, scalable file storage" — part of the Amazon Web Services that offers cloud platform services for a variety of customers and corporations from Netflix to Coursera. Hence the sort of elasticity that was meant to become part of the institutional set of affordances at the proto-computer address, index and search techniques of the library is nested inside the planetary-scale management of data and goods, things and their addresses that stand at the center of the operations of corporations such as Amazon. At two very different kinds of scales, the operations of an Elastic System demonstrate, besides the attractiveness of the term, also the attractiveness of how such systems of organization and management are crucially about the elasticity of the management of addressing as a cultural, media technique and the relation of addresses to physical space. Indeed, as Louise Amoore has well argued, the particular critical imaginaries of data geographies have to take into account also how data management affects the ways in which space is perceived, localized, addressed and, for example, securitized.[62]

V Conclusions

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[61] Sean Cubitt, *Finite Media. Environmental Implications of Digital Technologies.* Durham: Duke University Press, 2017, 34.

[62] Amoore, "Cloud Geographies. Computing, data, sovereignty." Can you complete this citation?

Libraries are media systems in multiple ways. This chapter has aimed to add one further angle to this discussion by way of the art installation and project that involved the artist Richard Wright. Besides an art project that deals with cultural techniques of data and search in cultural institutions, it also connects to current questions debated in media theory and digital humanities about infrastructure and agency. In this case, the British Library offered one situation to investigate both the imaginaries of the future library and the discourses of the digital management of efficiency and the production of historically situated and spatially bound ideas of how libraries function — and have functioned — as already machinic systems. These paper machines — and paper machine institutions — as Markus Krajewski, Shannon Mattern and others have shown, are already complex entities of data-management that, in engaging with themes of automation, have included the human as part of their operations. Hence, questions of labor and political economy are not far removed from the media theoretical questions concerning the conditions of existence of the library as media — not merely containing media of various sorts, but functioning as a device for addressing, searching, retrieving, transporting, communicating, and storing.

Mattern outlines well the stakes in looking at the media of cultural institutions like libraries. As she poignantly points out:

> It's hard to wrap one's head around the breadth of these distributed systems — all the far-flung truck routes, database subscriptions, interlibrary loans, and protocols. But acknowledging this complicated logistical network makes visible the labor, equipment, and expertise required to build and maintain our libraries, one of our society's few remaining intellectual and cultural commons.[63]

In other words, questions of data include also that longer backstory of various levels of procedures. Of interest in this chapter was the question of transport — both within an institution and outside it — that dealt with how items are

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[63] Shannon Mattern, "Middleware: Landscapes of Library Logistics."

addressed and located both by way of visual knowledge (shelf marks, placement, retrieval) and in the age of chaos storage and automated optimized use of scannable space. From user query and request via a digital interface through the system to the electro-mechanic conveyor belt and barcode enabled tracking to the automated robots to the transport system from Boston Spa to London via hands and digital interfaces, the data stack is an assemblage that includes labor and data management, physical transport, and information protocols. The *Elastic System* becomes a fascinating entry point to infrastructures of data in the sense which Keller Easterling notes, that infrastructure is about management and the creation of action, whether when mobilizing robotic assistants or people as infrastructure.[64] A similar emphasis is found in the activist literature of the Invisible Committee: "power no longer resides in the institutions ... power now resides in the infrastructures of this world."[65]

This chapter proposed that art methods dealing with data and cultural institutions need to investigate the infrastructures of the cultural institution as the programming of potentials of action — both human and data based. Indeed, methods — art methods and in general creative cross-disciplinary methods — are "methodological device[s] in the practice of transdisciplinary research," as Ned Rossiter puts it,[66] underlining that visualization can also still function as one useful technique in the bundle of complex methods that link data, labour, infrastructure together. This sort of inventive artistic-academic-activist work is geared both towards addressing conditions of data, and towards the invention of relevant methods, where the idea of a "substitute interface"[67] became also one central part of the operational toolbox for this project at the British Library. It was not merely a visualization of what is already determined and handed down as data, but a further layer of the existing infrastructure and an operation that then exposes the other sorts of holdings and data that travel in an institutional space that is a logistics space. One stumbles across data because somebody put it there in the first place.

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[64] Easterling, "The Action is the Form."
[65] Quoted in Rossiter, *Software, Infrastructure, Labour*, 145.
[66] Rossiter, *Software, Infrastructure, Labour*, 60.
[67] Rossiter, ibid.

Acknowledgements