From paper mill to Google data center

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This article is a chapter from Radiated Book where the idea was sparked when Elio di Rupo, then prime minister of Belgium, was about to sign a collaboration agreement between Mundaneum archive and Google. The book is an endeavor of many artists and activists in order to build resistance against corporate take-over information and cultural provision.

From Paper Mill to Google Data Center

Every second of every day, billions of people around the world are googling, mapping, liking, tweeting, reading, writing, watching, communicating, and working over the Internet. According to Cisco, global Internet traffic will surpass one zettabyte – nearly a trillion gigabytes! – in 2016, which equates to 667 trillion feature-length films. Internet traffic is expected to double by 2019 as the internet ever increasingly weaves itself into the very fabric of many people’s daily lives.

Internet search giant Google – since August, 2015 a subsidiary of Alphabet Inc. – is one of the major conduits of our social activities on the Web. It processes over 3.3 billion searches each and every day, 105 billion searches per month or 1.3 trillion per year, and is responsible for over 88% Internet search activity around the globe. Predicating its business on people’s everyday information activity – search – in 2015, Google generated $74.54 billion dollars, equivalent to or more than the GDP of some countries. The vast majority of Google’s revenue – $67.39 billion dollars – from advertising on its various platforms including Google search, YouTube, AdSense products, Chrome OS, Android etc.; the company is rapidly expanding its business to other sectors like cloud services, health, education, self-driving cars, internet of things, life sciences, and the like. Google’s lucrative internet business does not only generate profits. As Google’s chief economist Hal Varian states:

…it also generates torrents of data about users’ tastes and habits, data that Google then sifts and processes in order to predict future consumer behavior, find ways to improve its products, and sell more ads. This is the heart and soul of Googlenomics. It’s a system of constant self-analysis: a data-fueled feedback loop that defines not only Google’s future but the future of anyone who does business online.

Google’s business model is emblematic of the “new economy” which is primarily built around data and information. The “new economy” – the term popularized in the 1990s during the first dot-com boom – is often distinguished by the mainstream discourse from the

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2 Ibid.
traditional industrial economy that demands large-scale investment of physical capital and produces material goods and instead emphasizes the unique nature of information and purports to be less resource-intensive. Originating in the 1960s, post-industrial theorists asserted the emergence of the “new” economy, claiming that the increase of highly-skilled information workers, widespread application of information technologies, along with the decrease of manual labor, would bring a new mode of production and fundamental changes in exploitative capitalist social relations.9

Has the “new” economy challenged capitalist social relations and transcended the material world? Google and other Internet companies have been investing heavily in industrial-scale real estate around the world and continue to build large-scale physical infrastructure in the way of data centers where the world’s bits and bytes are stored, processed and delivered. The term “tube” or “cloud” or “weightless” often gives us a façade that our newly marketed social and cultural activities over the Internet – the “new economy” – transcend the physical realm and occur in the vapors of the Internet; far from this perception, however, every bit of information in the “new economy” is transmitted through and located in physical space, on very real and very large infrastructure.

There is much boosterism and celebration that the “new economy” holds the keys to individual freedom, liberty and democratic participation and will free labor from exploitation; however, the material/physical base that supports the economy and our everyday lives tells a very different story. This paper presents an integral piece of the physical infrastructure behind the “new economy” and the space embedded in that infrastructure in order to elucidate that the “new economy” does not occur in an abstract place but rather is manifested in the concrete material world, one deeply embedded in capitalist development which reproduces structural inequality on a global scale. Specifically, the analysis will focus on Google’s growing large-scale data center infrastructure that is restructuring and reconfiguring previously declining industrial cities and towns as new production places within the US and around the world.

Today, data centers are found in nearly every sector of the economy: financial services, media, high-tech, education, retail, medical, government etc. The study of the development of data centers in each of these sectors could be separate projects in and of themselves; however, for this project, I will only look at Google as a window into the “new” economy, the company which has led the way in the internet sector in building out and linking up data centers as it expands its territory of profit.10

Data Centres in Context

The concepts of “spatial fix” by the critical geographer David Harvey11 and “digital capitalism” by historian of telecommunication and information Dan Schiller12 are useful to contextualize and place the emergence of large-scale data centers within capitalist

11 David Harvey, Spaces of capital: towards a critical geography (New York: Routledge, 2001)
12 Dan Schiller, Digital capitalism networking the global market system (Cambridge, Mass: MIT Press, 1999).
development. Harvey illustrates the notion of spatial fix to explicate and situate the geographical dynamics and crisis tendency of capitalism with over-accumulation and under-consumption. Harvey’s spatial fix has dual meanings. One meaning is that it is necessary for capital to have a fixed space – physical infrastructure (transportation, communications, highways, power etc.) as well as a built environment – in order to facilitate capital’s geographical expansion. The other meaning is a fix or solution for capitalists’ crisis through geographical expansion and reorganization of space as capital searches for new markets and temporarily relocates to more profitable space – new accumulation sites and territories. This temporal spatial fix will lead capital to leave behind existing physical infrastructure and built environments as it shifts to new temporal fixed spaces in order to cultivate new markets.

Building on Harvey’s work, Schiller introduced the concept of digital capitalism in response to the 1970’s crisis of capitalism in which information became that “spatial-temporal fix” or “pole of growth.” To renew capitalist crisis from the worst economic downturn of the 1970s, a massive amount of information and communication technologies were introduced across the length and breadth of economic sectors as capitalism shifted to a more information-intensive economy – digital capitalism. Today digital capitalism grips every sector, as it has expanded and extended beyond information industries and reorganized the entire economy from manufacturing production to agriculture to finance to science to education to arts and health and impacts every iota of people’s social lives. Google’s data centers are physical fabrication of this changing global political economy that is increasingly moving toward information as they are restructuring of our space and embody political and economic struggles contesting different interests. Current growth of large-scale data centers by Internet companies and their reoccupation of industrial towns needs to be situated within the context of the development of digital capitalism.

From Manufacturing Factory to Data Factory

Large-scale data centers – sometimes called “server farms” in an oddly quaint allusion to the pre-industrial agrarian society – are centralized facilities that primarily contain large numbers of servers and computer equipment used for data processing, data storage, and high-speed telecommunications. In a sense, data centers are similar to the capitalist factory system; but instead of a linear process of input of raw materials to output of material goods for mass consumption, they input mass data in order to facilitate and expand the endless cycle of commodification – an Ouroboros-like machine. As the factory system enables the production of more goods at a lower cost through automation and control of labor to maximize profit, data centers have been developed to process large quantities of bits and bytes as fast as possible and at as low a cost as possible through automation and centralization. The data center is a hyper-automated digital factory system that enables the operation of hundreds of thousands of servers through centralization in order to conduct business around the clock and around the globe. Compared to traditional industrial factories that produce material goods and generally employ entire towns if not cities, large-scale data centers each generally employ fewer than 100 full-time employees – most of these employees are either engineers or security guards. In a way, data centers are the ultimate automated factory. Moreover, the

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owner of a traditional factory needs to acquire/purchase/extract raw materials to produce commodities; however, much of the raw data for a data center are freely drawn from the labor and everyday activities of Internet users without a direct cost to the data center. The factory system is to industrial capitalism what data centers are becoming to digital capitalism.

**The Growth of Google’s Data Factories**

Today, there is a growing arms race among leading Internet companies – Google, Microsoft, Amazon, Facebook, IBM – in building out large-scale data centers around the globe. Among these companies, Google has so far been leading in terms of scale and capital investment. In 2014, the company spent $11 billion for real estate purchases, production equipment, and data center construction, compared to Amazon which spent $4.9 billion and Facebook with $1.8 billion in the same year.

Until 2002, Google rented only one collocation facility in Santa Clara, California to house about 300 servers. However, by 2003 the company had started to purchase entire collocation buildings that were cheaply available due to overexpansion during the dot.com era. Google soon began to design and build its own data centers containing thousands of custom-built servers as Google expanded its services and global market and responded to competitive pressures. Initially, Google was highly secretive about its data center locations and related technologies; a former Google employee called this Google’s “Manhattan project.” However, in 2012, Google began to open up its data centers. While this seems like Google’s change of heart and wants to be more transparent about their data centers to the public, it is in reality more about Google’s self-serving public relations onslaught to show how its cloud infrastructure is superior to Google’s competitors and to secure future cloud clients.

As of 2016, Google has data centers in 14 locations around the globe – eight in Americas, two in Asia and four in Europe – with an unknown number of collocated centers – ones in which space, servers, and infrastructure are shared with other companies – in undisclosed locations. The sheer size of Google’s data centers is reflected in its server chip consumption. In all, Google supposedly accounts for 5% of all server chips sold in the world, and it is even affecting the price of chips as the company is one of biggest chip buyers. Google’s recent allying with Qualcomm for its new chip has become a threat to Intel – Google has been the largest customer of the world’s largest chip maker for quite some time. According to Steven Levy, Google admitted that, “it is the largest computing manufacturer in the world – making its own servers requires it to build more units every year than the industry giants

19 Ibid.
Moreover, Google has been amassing cheap “dark fibre” – fibre optic cables that were laid down during the 1990s dot.com boom by now-defunct telecom firms betting on increased internet traffic – constructing Google’s fibre optic cables in the US, and investing in building massive undersea cables to maintain its dominance and expand its markets by controlling Internet infrastructure.

With its own customized servers, software, and global internet infrastructure, Google is building a massive data center network infrastructure and linking them together, delivering its service at unprecedented speeds around the clock and around the world. According to one report, Google’s global network of data centers, with a capacity to deliver 1-petabit-per-second bandwidth, is powerful enough to read all of the scanned books in the Library of Congress in a fraction of a second. New York Times columnist Pascal Zachary once reported:

…I believe that the physical network is Google’s “secret sauce,” its premier competitive advantage. While a brilliant lone wolf can conceive of a dazzling algorithm, only a super wealthy and well-managed organization can run what is arguably the most valuable computer network on the planet. Without the computer network, Google is nothing.

Where then is Google’s secret sauce physically located? Despite its massiveness, Google’s data center infrastructure and locations have been invisible to millions of everyday Google users around the globe – users assume that Google is ubiquitous, the largest cloud in the ‘net.’ However, this infrastructure is no longer unnoticed since the infrastructure needed to support the “new economy” is beginning to occupy and transform our landscapes and building a new fixed network of global digital production space.

New Network of Digital Production Space: Restructuring Industrial cities

While Google’s data traffic and exchange extends well beyond geographic boundaries, its physical plants are fixed in places where digital goods and services are processed and

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24 Levy, In the Plex, 181.
25 In 2013, Wall Street Journal reported that Google controls more than 100,000 miles of routes around the world which was considered bigger than US-based telecom company Sprint. See Drew FitzGerald and Spencer E. Ante, “Tech Firms Push to Control Web's Pipes,” Wall Street Journal, December 13, 2016, http://www.wsj.com/articles/SB1000142405270230417370457926236188583936
26 Google is offering its gigabit-speed fiber optic Internet service in 10 US cities. Since Internet service is a precondition of Google’s myriad Internet businesses, Google’s strategy is to control the pipes rather than relying on telecom firms. See Mike Wehner, “Google Fiber is succeeding and cable companies are starting to feel the pressure,” Business Insider, April 15, 2015, http://www.businessinsider.com/google-fiber-is-succeeding-and-cable-companies-are-starting-to-feel-the-pressure-2015-4; Ethan Baron, “Google Fiber coming to San Francisco first,” San Jose Mercury News, February 26, 2016, http://www.mercurynews.com/business/ci_29556617/sorry-san-jose-google-fiber-coming-san-francisco.
produced. For the production of material goods, access to cheap labor has long been one of the primary criteria for companies to select their places of production; but for data centers, a large quantity of cheap labor is not as important since they require only a small number of employees. The common characteristics necessary for data center sites have so far been: good fiber-optic infrastructure; cheap and reliable power sources for cooling and running servers, geographical diversity for redundancy and speed, cheap land, and locations close to target markets. Today, if one finds geographical areas in the world with some combination of these factors, there will likely be data centers there or in the planning stages for the near future.

Given these criteria, there has been an emerging trend of reconfiguration and conversion to data centers of former industrial sites such as paper mills, printing plants, steel plants, textile mills, auto plants, aluminum plants and coal plants. In the United States, and in particular rust belt regions of the upper Northeast, Great Lakes and Midwest regions – previously hubs of manufacturing industries and heart lands of both industrial capitalism and labor movements – are turning (or attempting to turn) into hotspots for large-scale data centers for Internet companies. These cities are the remains of past crises of industrial capitalism as well as of long labor struggles.

The reasons that former industrial sites in the US and other parts of the world are attractive for data center conversion is that, starting in the 1970s, many factories had closed or moved their operations overseas in search of ever-cheaper labor and concomitantly weak or nonexistent labor laws, leaving behind solid physical plants and industrial infrastructures of power, water and cooling systems once used to drive industrial machines and production lines and now perfectly fit for data center development. Especially, finding cheap energy is crucial for companies like Google since data center energy costs are a major expenditure.

Moreover, many communities surrounding former industrial sites have struggled and become distressed with increasing poverty, high unemployment and little labor power. Thus, under the guise of “economic development,” many state and local governments have been eager to lure data centers by offering lavish subsidies for IT companies. For at least the last five years, state after state has legislated tax breaks for data centers and about a dozen states have created customized incentives programs for data center operations. State incentives range from full or partial exemptions of sales/use taxes on equipment, construction materials, and in some cases purchases of electricity and backup fuel. This kind of corporate-centric economic development is far from the construction of democratic cities that prioritize social needs and collective interests, and reflects the environmental and long-term sustainability of communities; but rather the goal is to, “create a good business climate and therefore to

optimize conditions for capital accumulation no matter what the consequences for employment or social and environmental well-being.35

Google’s first large-scale data center site is located in one of these struggling former industrial towns. In 2006, Google opened its first data center in The Dalles – now nicknamed Googleville – a town of a little over 15,000 located alongside the Columbia River and about 80 miles east of Portland, Oregon. It is an ideal site in the sense that it is close to a major metropolitan corridor (Seattle-Tacoma-Portland) to serve business interests and large urban population centers; yet, cheap land, little organized labor, and the promise of cheap electrical power from the Bonneville Power Administration, a federal governmental agency, as well as a 15-year property tax exemption. In addition, The Dalles had already built a fiber-optic loop as part of its economic development hoping to attract the IT industry.36

Not long ago, the residents of The Dalles and communities up and down the Columbia River gorge relied on the aluminum industry, an industry which required massive amounts of – in this case hydroelectric – power. Energy makes up 40 percent of the cost of aluminum production37 and was boosted by the war economies of World War II and the Korean war as aluminum was used for various war products, especially aircraft. However, starting in 1980, aluminum smelter plants began to close and move out of the area, laid off their workers and left their installed infrastructure behind.

Since then, The Dalles, like other industrial towns, has suffered from high unemployment, poverty, aging population and budget-strapped schools, etc. Thus, the decision for Google to build a data center the size of two football fields (68,680-square-foot storage buildings) in order to take advantage of the preinstalled fiber optic infrastructure, relatively cheap hydropower from the Dalles Dam, and tax benefits was presented as the new hope for the distressed town and a large employment opportunity for the town’s population. 38

There was much community excitement that Google’s arrival would mean an economic revival for the struggling city and a better life for the poor, but no one could discuss about it at the time of negotiations with Google because local officials involved in negotiations had all signed nondisclosure agreements (NDAs);39 they were required not to mention Google in any way but were instead instructed to refer to the project as “Project 02.”40 Google insisted that the information it shared with representatives of The Dalles not be subject to public records disclosures.41 While public subsidies were a necessary precondition of building the

data center, there were no transparency or open public debates on alternative visions of development that reflects collective community interests.

Google’s highly anticipated data center in The Dalles opened in 2006, but it “opened” only in the sense that it became operational. To this day, Google’s data center site is off-limits to the community and is well-guarded, including multiple CCTV cameras which survey the grounds around the clock. Google might boast of its corporate culture as “open” and “non-hierarchical” but this does not extend to the data centers within the community where Google benefits as it extracts resources. Not only was the building process secretive, but access to the data center itself is highly restricted. Data centers are well secured with several guards, gates and checkpoints. Google’s data center has reshaped the landscape into a pseudo-militarized zone as it is not far off from a top-secret military compound – access denied.

This kind of landscape is reproduced in other parts of the US as well. New data center hubs have begun to emerge in other rural communities; one of them is in southwestern North Carolina where the leading tech giants – Google, Facebook, Apple, Disney and American Express – have built data centers in close proximity to each other. The cluster of data centers is referred to as the “NC Data Center Corridor,” a neologism used to market the area.

At one time, the southwestern part of North Carolina had heavy concentration of highly labor-intensive textiles and furniture industries that exploited the region’s cheap labor supply and where workers fought long and hard for better working conditions and wages. However, over the last 25 years, factories have closed and slowly moved out of the area and been relocated to Asia and Latin America. As a result – and mirroring the situation in The Dalles – the area has suffered a series of layoffs, chronically high unemployment rates and poverty, but now is being rebranded as a center of the “new economy” geared toward attracting high-tech industries. For many towns, abandoned manufacturing plants are no longer an eyesore but rather are becoming major selling points to the IT industry. Rich Miller, editor of Data Center Knowledge, stated, “one of the things that’s driving the competitiveness of our area is the power capacity built for manufacturers in the past 50 years.”

In 2008, Google opened a $600 million data center in Lenoir, NC, a town in Caldwell County (population 18,228). Lenoir was once known as the furniture capital of the South but lost 1,120 jobs in 2006. More than 300,000 furniture jobs moved away from the United States during 2000 as factories relocate to China for cheaper labor and operational costs. In order

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42 Ibid.
46 “2010 Decennial Census from the US Census Bureau,” http://factfinder.census.gov/bkmk/cf/1.0/en/place/Lenoir city, North Carolina/POPULATION/DECENNIAL_CNT.
to lure Google, Caldwell County and the City of Lenoir gave Google a 100 percent waiver on business property taxes, an 80 percent waiver on real estate property taxes over the next 30 years, and various other incentives. Former NC Governor Mike Easley announced that, “this company will provide hundreds of good-paying, knowledge-based jobs that North Carolina’s citizens want,” yet, he addressed neither the cost of attracting Google for taxpayers – including those laid-off factory workers – nor the environmental impact of the data center. In 2013, Google expanded its operation in Lenoir with an additional $600 million investment, and as of 2015, it has 250 employees in its 220-plus acre data center site.

The company continues its crusade of giving “hope” to distressed communities and now “saving” the environment from the old coal-fueled industrial economy. Google’s latest project in the US is in Widows Creek, Alabama where the company is converting a coal burning power plant commissioned in 1952 – which has been polluting the area for years – to its 14th data center powered by renewable power. Shifting from coal to renewable energy seems to demonstrate how Google has gone “green” and is being a different kind of corporation that cares for the environment. However, this is a highly calculated business decision given that relying on renewable energy is more economical over the long term than coal – which is more volatile as commodity prices greatly fluctuate. Google is gobbling up renewable energy deals around the world to procure cheap energy and power its data centers. However, Google’s “green” public relations also camouflage environmental damages that are brought by the data center’s enormous power consumption, e-waste from hardware, rare earth mining and the environmental damage over the entire supply chain.

The trend of reoccupation of industrial sites by data centers is not confined to the US. Google’s Internet business operates across territories and more than 50% of its revenues come from outside the US. As Google’s domestic search market share has stabilized at around 60% share, the company has aggressively moved to build data centers around the world for its global expansion. One of Google’s most ambitious data center projects outside the US was in Hamina, Finland where Google converted a paper mill to a data center. In 2008, Stora Enso, the Finnish paper maker, in which the Finnish Government held 16% of the company’s shares and controlled 34% of the company, shut down its Summa paper mill on the site close to the city of Hamina in Southeastern Finland despite workers’ resistance.
against the closure.\textsuperscript{55} The company shed 985 jobs including 485 from the Summa plant.\textsuperscript{56} Shortly after closing the plant, Stora Enso sold the 53 year-old paper mill site to Google for roughly $52 million which included 410 acres of land and the paper mill and its infrastructure itself.

Whitewashing the workers’ struggles, the \textit{Helsinki Times} reported that, “everyone was excited about Google coming to Finland. The news that the Internet giant had bought the old Stora Enso mill in Hamina for a data centre was great news for a community stunned by job losses and a slowing economy.”\textsuperscript{57} However, the local elites recognized that jobs created by Google would not drastically affect the city’s unemployment rate or alleviate the economic plight for many people in the community, so they justified their decision by arguing that connecting Google’s logo to the city’s image would result in increased investments in the area.\textsuperscript{58} The facility had roughly 125 full-time employees when Google announced its Hamina operation’s expansion in 2013.\textsuperscript{59} The data center is monitored by Google’s customary CCTV cameras and motion detectors; even Google staff only have access to the server halls after passing biometric authentication using iris recognition scanners.\textsuperscript{60}

Like Google’s other data centers, Google’s decision to build a data center in Hamina is not merely because of favorable existing infrastructure or natural resources. The location of Hamina as its first Nordic data center is vital and strategic in terms of extending Google’s reach into geographically dispersed markets, speed and management of data traffic. Hamina is located close to the border with Russia and the area has long been known for good Internet connectivity via Scandinavian telecommunications giant TeliaSonera, whose services and international connections run right through the area of Hamina and reach into Russia as well as to Sweden and Western Europe.\textsuperscript{61} Eastern Europe has a growing Internet market and Russia is one of the few countries where Google does not dominate the search market. Yandex, Russia’s native language search engine, controls the Russian search market with over 60\% share.\textsuperscript{62} By locating its infrastructure in Hamina, Google is establishing its strategic global digital production beach-head for both the Nordic and Russian markets.

\textsuperscript{61} Ibid.
As Google is trying to maintain its global dominance and expand its business, the company has continued to build out its data center operations on European soil. Besides Finland, Google has built data centers in Dublin, Ireland, and St. Ghislain and Mons in Belgium, which respectively had expanded their operations after their initial construction. However, the stories of each of these data centers is similar: aluminum smelting plant town The Dalles, Oregon and Lenoir North Carolina in the US, paper mill town Hamina, Finland, coal-mining town Ghislain–Mons, Belgium and a warehouse converted data center in Dublin, Ireland. Each of these were once industrial production sites and/or sites for the extraction of environmental resources turned into data centers creating temporal production spaces to accelerate digital capitalism. Google’s latest venture in Europe is in a seaport town of Eemshaven, Netherlands which hosts several power stations as well as the transatlantic fiber-optic cable which links the US and Europe.

To many struggling communities around the world, the building of Google’s large-scale data centers has been presented by the company and by political elites as an opportunity to participate in the “new economy” – as well as a veiled threat of being left behind from the “new economy” – as if this would magically lead to the creation of prosperity and equality. In reality, these cities and towns are being reorganized and reoccupied for corporate interests, re-integrated into sites of capital accumulation and re-emerged as new networks of production for capitalist development.

**Conclusion**

Is the current physical landscape that supports the “new economy” outside of capitalist social relations? Does the process of the redevelopment of struggling former industrial cites by building Google data centers under the slogan of participation in the “new economy” really meet social needs, and express democratic values? The “new economy” is boasted about as if it is radically different from past industrial capitalist development, the solution to myriad social problems that hold the potential for growth outside of the capitalist realm; however, the “new economy” operates deeply within the logic of capitalist development – constant technological innovation, relocation and reconstruction of new physical production places to link geographically dispersed markets, reduction of labor costs, removal of obstacles that hinder its growth and continuous expansion and growth. Google’s purely market-driven data centers illustrate that the “new economy” built on data and information does not bypass physical infrastructures and physical places for the production and distribution of digital commodities. Rather, it is firmly anchored in the physical world and establishes new infrastructures on top of existing industrial ones and a new network of production places to meet the needs of the processes of digital commodities at the expense of environmental, labor and social well-being.

We celebrate the democratic possibilities of the “networked information economy” providing for alternative space free from capitalist practices; however, it is vital to recognize that this “new economy” in which we put our hopes is supported by, built on, and firmly planted in our material world. The question that we need to ask ourselves is: given that our communities and physical infrastructures continue to be configured to assist the reproduction of the social relations of capitalism, how far can our “new economy” deliver on the democracy and social justice for which we all strive?