Work in the Post-Human

Giacomo Rossi

Data centers are typically portrayed as worker-less, post-human spaces. In this text, I question this image by presenting them as sites of labor.

Abbildung 1: Video still from a promotional video of the new Tecnopolo Bologna

INTRODUCTION: POST-

Built in stages between the 1870s and 1910, the Pesenti cement plant was one of the largest factories in Alzano Lombardo, a small community near Bergamo in northern Italy. By the mid-twentieth century, 400 employees worked in halls spanning over 20000 square meters. Over the years the company outgrew its original premises, production was moved to newer industrial sites and in 1966 the twelve kilns were permanently shut down.[1] Since then, it has been portrayed as a decaying cathedral in the sprawl of the urbanized region surrounding Milan.

During the 2020 Spring Semester at Martin Boesch´s studio at the *Accademia di Architettura di Mendrisio*, the task of speculatively reinventing the cement factory resulted in a proposal to transform it into a data center with laboratories for pharmaceutical research, one of the leading sectors in the region.[2] The project was developed as a group work with my colleague Caterina Zatti. It transforms the dark halls of the silos into a flexible

space for server racks, while on the existing roof a lightweight structure contains the laboratories and greenhouses. The latter provide a tropical environment for research, allowing studies on the therapeutic or cosmetic use of plants that would not normally grow in Europe. Temperatures in this space can be kept consistently above 30 degrees by recovering the excess heat produced by the data center. The project was carried out considering the technical requirements of the different spaces and involved lengthy consultations with a structural engineer and a system engineer, but it was never fully analyzed from a Humanities and Social Sciences perspective. From a sociological point of view, it is clear that our architectural proposal so far had not taken into account the different needs of the people who work in such a facility. The data center was planned as an environment for post-biological inhabitants, following the understanding of these facilities as a space where humans are only intended as visitors of a lightless, hot, ultra-efficient environment.[3]

The aim of this paper is to try and untangle the complex relationship between the supposedly post-human infrastructure and the human communities in which this infrastructure materializes. It will highlight the role of „data center people", the workers who interact with these nodes, by examining them from an ethnographic point of view. It will also reflect on the crucial role that is assigned to them in corporate marketing and its political implications. The prospect of job creation is indeed a fundamental factor in the enabling process of these infrastructural undertakings, but the role of the workers is constantly downplayed.

A starting point for this paper will be a reflection on the term „post-human". It is extremely multifaceted, since the prefix „post-" has an ambiguous meaning. In the preface to issue 236 of Arch+, the editors argue that, while „post-" is generally understood as a historical division of epochs marked by the replacement of an old power structure with a new system, in a discursive sense the prefix should indicate the increased complexity of a concept, which should lead to a stronger critical reflection. The post-humanist quest should not be to bury humanism, but rather to engage in a discussion that questions the role of humanity and its relationship with other biological and non-biological actors.[4]

Despite these considerations, the post-human is presented as dystopian replacement of humans by machines, according to Alexander R. E. Taylor, a social anthropologist based in Cambridge. As I will present in the following chapters, his papers state that such a conception is the consequence of the general trend that the IT sector follows and communicates. Data centers are presented as abstract spaces, both post-human and human-less, with the result that the workers who make these companies possible disappear from the public´s perception. I have focused on data centers as an exemplary case, but the findings often apply to any branch of the international infrastructural grid, from Amazon warehouses to car factories to high-tech greenhouses. In particular, tech corporations have developed successful online platforms that sometimes directly affect the end-users' perceptions of the urban environment, as in the case of Uber, Airbnb or Google Maps. In a conversation between Rem Koolhaas and Benjamin H. Bratton, former program director at the Strelka Institute in Moscow, Bratton argued that, compared to their apps, the less visible logistical and infrastructural network that runs our cities is an even more important product of the Silicon Valley giants.[5]

Data centers are a crucial part of our current framework, with a warehouse-like rationality: flat, windowless boxes that maximize the available surface. In Europe, facilities that store large amounts of data tend to be located in rural areas of countries that are fiscally

favorable and politically stable, with a low land and electricity costs, such as Ireland.[6] Other nodes are located in the vast urban and peri-urban areas because they require quick connection to the existing centralized power structures: data centers serving the financial markets can't be located too far from the trading floor. High-frequency traders, brokers, and the banking sector all locate as close as possible to reduce latency, or time difference, to a few milliseconds.[7] In Europe, this has led to a concentration of large data centers within 100 kilometers of established financial centers such as Frankfurt, London, Amsterdam, Paris and Dublin (the so-called FLAPD markets).[8]

In my paper, I will focus on the urban area around Milan, the region of reference for our planned computing facility in Alzano Lombardo. As the financial and commercial capital of Italy, Milan is by far the largest data center market in the country, accounting for almost 70% of the existing power capacity.[9] It is the largest emerging market in the EU,[10] with several proprietary facilities and 58 third-party colocation centers in 2022.[11] Most of this infrastructure serves local users and businesses, as taxation and high electricity costs have generally made the country uncompetitive for data centers that store information and files for EU-wide clients. Nevertheless, the Italian market is expected to grow significantly and to benefit from subsea connectivity to Africa and Asia.[12] The pandemic has boosted the adoption rate of digital services, while increased public funding is available as part of the European Union's recovery plan: the Italian government earmarked 43.5 billion euro to support the digital transition.[13] Another important factor will be the relocation to Bergamo of the servers of Euronext, the continent's leading stock exchange, which handles a quarter of all European equities deals.[14]

POST-HUMAN: A CULTIVATED IMAGE

In the popular perception, the global Internet infrastructure is often considered ‚abstract' as a direct result of the marketing strategies of data center companies.[15] According to the essays by researchers gravitating around the ETH published in *Data Centers*: edges of a wired nation, this is done for both security and commercial reasons. These papers argue that increased speed has made information transfer a highly abstract concept, an invisible process that escapes human perception. Moreover, calling the network of computation centers „the cloud" only adds another layer of abstraction. This has led to a counter-movement interested in highlighting the physical dimension of the process. „Grounding the cloud" has now become the objective of several scholars, who claim that a discussion needs to be opened up on the subject; they state that such a transformation process must begin by problematizing the representation of the digital sphere as immaterial. According to G. Pickren, it is crucial to realize that the growth of computing, like any other industry, entails physical and social changes in the landscape. To virtualize the system of extraction is simply meant to remove it from the scrutiny of public opinion.[16]

This hypothesis is expressed in several essays by the aforementioned Alexander R. E. Taylor, a social anthropologist at the Cambridge Centre for Data-Driven Discovery. His writings expose the role of the human element in data processing facilities, by conducting various ethnographic studies in the United Kingdom. His essays explore how a vast array of human workers, physical infrastructure and extracted energy and resources support these spaces. The grid inevitably materializes in the form of strategic nodes within the landscape, the built expression of which is inevitably depicted as dominated by the efficiency of machines.

According to Taylor, popular imaginaries of media technologies have always revolved around their immaterial and transcendental properties.[17] In particular, the narrative of a human-free data-center-scape builds on the nineteenth-century romantic fantasy of an unpeopled ‚pure nature', which we still find in wilderness photography and which is translated into a fantasy of an unpeopled ‚pure machine'.[18] From the paintings of Caspar David Friedrich to the exotic imagery of Henri Rousseau, who painted lush jungle scenes without ever leaving France, separation from the human realm has always had a powerful appeal. Parallels can be drawn between a starry sky and a constellation of LEDs, or a hanging vine and a tangle of cables. The image of the depopulated datacenter, depicted as uncontaminated by human presence, intersects with powerful imaginaries and ideologies of knowledge generated from Big Data, which is somehow set free from the contaminating agency of humans.[19]

This narrative is the result of a highly curated approach to costumers and consumers by the tech industry, which is eager to remove and digitize its human component in order to maintain a profile of inherent flexibility, constant progress, and round-the-clock availability. In the same way that digital work, such as moderating social media content, appears automated at the user-end, data centers are represented as automated spaces rather than workplaces. These corporate visual communications generate a vision of a technological „world without us".[20] A clear example of this rhetoric is a promotional video for the new *Tecnopolo*, a supercomputing facility in Bologna. The servers are housed in the refurbished former tobacco processing plant designed by Pierluigi Nervi in 1949, a project which we will discuss later. The video, produced for an event at the 2020 World Expo in Dubai, shows a popular Italian actor walking through a human-less facility. Only the flickering lights of the server racks illuminate the otherwise dimly lit scene. It is only later in the narration, when the footage of the construction phase is shown, that we emerge from the post-human narrative and see the workers who were employed for such an ambitious project. [21]

This image of human-less data centers is still cultivated by the vast majority of the players in the market, from small companies with a few 1000 square meter centers all located in one region to global operators with multiple 10000 square meter hyperscale facilities.

WHEN HUMANS MATTER: PR AND THE POLITICS OF JOB CREATION

The entire data center industry relied on an image of total automation until the early 2010s, when the presence of technology in the everyday life began to be questioned due to its exponential growth. Public discourse focused on large corporations, such as Alphabet (Google), Meta (Facebook) and Apple.

For example, since 2010, when the constellation of companies owned by Google had an annual revenue of 29 billion dollars, the growth trajectory has been exponential, leading the renamed Alphabet group to rake in 307 billion dollars in 2023.[22] This was coupled with sales and marketing expenses of 27.9 billion dollar in the same year.[23] The Mountain View-based company is now trying to reposition itself as an inclusive company that invests in local communities. Analyzing the website that showcases Google's own data centers, one can immediately notice that more than half of the images are categorized as ‚people'. [24] 79 images fall into this category, while 38 represent ‚technology' and 37 represent ‚spaces'. Compared to the same page in 2013, the number of images in the last two categories has doubled, while the number of images of the workers has increased almost

sixfold.[25] The company, which began publishing annual diversity reports in 2014,[26] has been very active and has produced the most diverse images, from a family of deer grazing outside a data center in Council Bluffs, Iowa, to technicians of all ethnicities. The company has adapted its strategy to the evolving market conditions and begun to share images in which the human and non-human actors are front and center, happily coexisting with the computers.

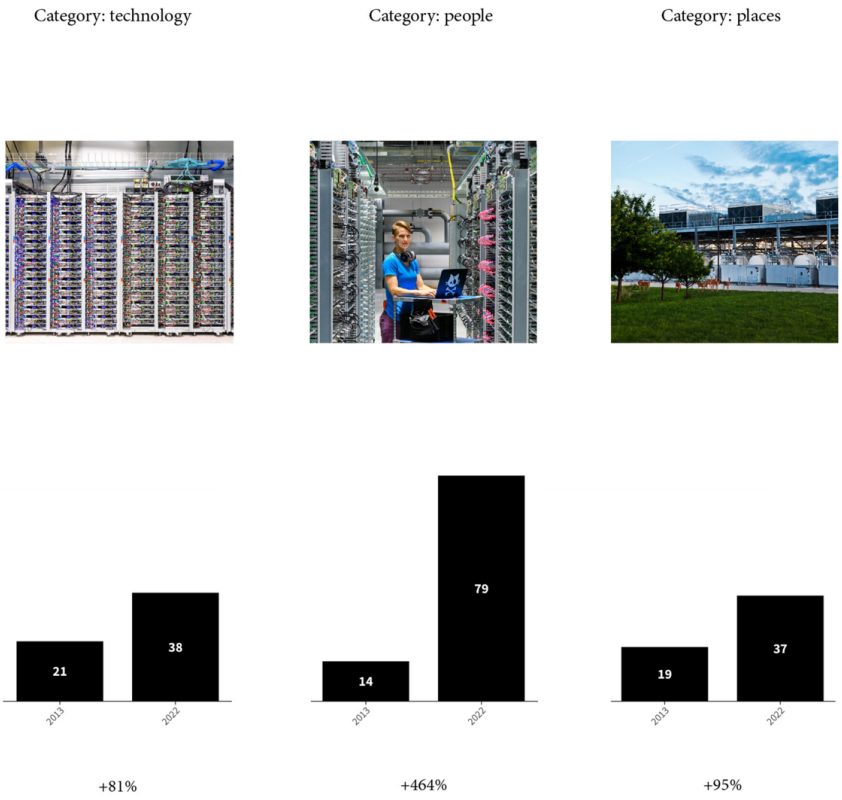

Abbildung 2: Images by category on Google's gallery about its datacenters

However, this increased focus on human workers in marketing activities does not mean that actual working conditions have improved. According to K. Jacobson and M. Hogan, data center workers are often located in deindustrialized areas with high rates of unemployment and are further separated from the work process as a physical means of production. They are located in a built environment that is materially and socially hostile to organized labor.[27] Such working conditions define workers who are unlikely to make these infrastructures visible through disruptions, strikes or acts that would immediately give materiality to the seemingly ethereal connection between them and the consumers.

We can then say that data center industry is interested in downplaying its reliance on a labor when dealing with customers and investors, while only publicizing the importance of its workers when it becomes the subject of intense public scrutiny. One particular dynamic within this pattern is the relationship between the industry and politics, both at the local and national level. Investment in new facilities requires extensive planning because of the high energy and water demands, and so political support is sought when deciding where to locate the next sprawling windowless complex.

It is in the early stages, before hitting the market and when local and national politicians are the stakeholders to please, that the importance of the workforce is emphasized in order to gain leverage. The investors behind such projects are often large multinational tech

companies that thrive on their seeming global omnipresence and detachment from any physical location outside of an idealized Silicon Valley headquarter. Thousands of kilometers separate these data centers from the places where decisions are made. This is the opposite of the direct relationship between the former cement factory in Alzano Lombardo and the Pesenti family villa. The two are only 200 meters apart, although it must be said that the strict hierarchy is quite clear: the neo-Renaissance residence, designed by Virginio Muzio in 1895, is located on a small hill and surrounded by a dense park. Nowadays, the architectural gap between the center of decision making and its peripheries is even more pronounced. While tech headquarters across the American West Coast are designed by renowned offices, the efforts of integrating new data centers in the surrounding context is minimal to none. Facilities are built through anonymous subsidiaries[28] and locations are sometimes kept secret to an extent that the list of Amazon Web Services centers was released by Wikileaks.[29]

Politicians in peripheral or economically depressed areas are lured with promises of skilled and well-paying jobs that could transform the local economy by welcoming an infrastructure touted as the „beating heart of the digital age".[30] This has led small municipalities with low electricity prices in both in the United States and Europe to offer extremely generous tax breaks to attract these facilities, but after the construction phase, the impact on the labor market is very limited.[31] A remarkable analysis has been done by J. Burrell, who has researched the historical and political conditions that allowed the development of the first data center directly owned by Facebook in the small rural community of Prineville, Oregon. This development came in 2011 to an area that had long hoped for economic revitalization and was located in a pre-existing industrial park that had been vacant ever since its conception in 1984. It was portrayed as a success story and was a major media event, leading to several such deals across the United States, often with less success. One example is an Apple facility in Waukee, Iowa, where $208 million in tax breaks resulted in only 50 permanent jobs, or $4.1 million per job. Burrell argues that when it comes to data center jobs, there is no certainty or stability when trying to project forward into the future.

Data centers have been called the factories of the information age,[32] but while the metaphor draws attention to the carbon relations of the sector, which consumes about 7% of the world´s electricity with projections of up to 13% by 2030,[33] it is a misleading phrase when analyzing the sector in terms of job creation. Compared to the factories of industrial capitalism, which were the main drivers of economic growth through job creation, these facilities typically employ a relatively small workforce in relation to their size.[34]

Data center workers are therefore trapped in an idealization and abstraction of their role in two opposite directions. On the one hand, the marketing strategies aimed towards the customers deliberately hide the workers, who are made to disappear in order to present an image of absolute efficiency based on total automation. On the other hand, the industry´s relationship with politicians and local stakeholders emphasizes the creation of highly skilled technical jobs, rhetorically linking data centers to the factories of the Industrial Revolution. As we will see in the following chapter, in some cases the rhetorical link is materialized as abandoned industrial complexes, warehouses, and fossil fuel power plants are repurposed as data centers.

COAT OF ACCEPTANCE: THE CASE OF REDEVELOPED INDUSTRIAL ESTATE

At the peak of its production, the Legler cotton factory, which is currently being transformed into Aruba SpA's data campus, employed 2500 direct workers in Ponte San Pietro (Bergamo). Currently, the IT3 data center employs about 100 people.[35] Aruba is offering the center as a colocation facility, where companies can even rent offices and run their own servers. As a result, operations are generally quite labor-intensive compared to streamlined hyperscale facilities (owned and managed by a single company). One notable hyperscale example is Google's data center in Bridgeport, Alabama, which replaced a former coal-fired power plant. During the renovation process, not only did the 150-metre smokestacks fall dramatically, but so did employment. In the early twenty-first century, far from its heyday, the coal plant still employed more than 450 workers, while current use requires 75 to 100 „highly technical" jobs.[36]

The process of redeveloping former industrial facilities to house server racks is an interesting case when analyzing the contacts between industry and local authorities. It can be read as the use of industrial infrastructure as coat of acceptance,[37] a device that deliberately conceals the content of the building through a deceptive outer appearance. The casing is a strategy to „obfuscate the origins, structure, and workings of the neoliberal project".[38] This is closely related to the design of the Pesenti factory, which itself was meant to be interpreted as a symbolic project for the community of Alzano Lombardo, an area that still retains a strong manufacturing base but has largely transitioned to a service-based economy. But the work of scholars such as Jacobson and Hogan points to an underlying problem: the industrial appearance of a retrofitted data center is not translated into the social and labor dynamics because the workforce is small and non-unionized. These repurposed buildings are designed to create a historical and empathetic connection with the local community and are therefore highly visible, but they hide their workers and prevent any meaningful interaction with the outside world through omnipresent security. If one enters the facility, it is most likely because you are supposed to maintain it. Ultimately, it can be argued that the workforce employed is limited, both in terms of massive infrastructural undertaking that data centers represent, and more importantly, in comparison to the factories that these buildings seek to replace. As Pickren pointed out, if the data center is to be considered the factory of the twenty-first century, where is the working class?[39]

IT3, Aruba SpA's aforementioned flagship cloud facility, provides an interesting insight into the dynamics of this reuse process. The Legler cotton factory, founded in 1875, was at its peak the largest employer in the town of Ponte San Pietro, Bergamo. Its history was closely linked to its territory, and the factory was the center of a network of a workers' cooperative that extended throughout the valley. It had a very special role for the community, as it is said that at least one member of every family in the town had worked in the complex.[40] For these reasons, local politicians and newspapers immediately supported the plans of the Internet company, which showed interest in the site, which had been abandoned after the factory went bankrupt in 2007. Bergamo and Ponte San Pietro were touted as „Internet capitals" and the new „digital factory" was unanimously praised. The company is certainly successful and has managed to attract prestigious customers such as Euronext. As I wrote in the introductory chapter, the continent's leading stock exchange will move there its servers, which handle a quarter of all European stock trades.[41] Despite the many achievements and announcements, the integration of the campus into the life of the community will undoubtedly be different from that of the former cotton plant. Back then, 2500 workers walked through the factory gates every day and were part of a cooperative that provided low-cost food, clothing and social housing.

Despite the comparison with a factory, the data center has a completely different dynamic. Within the global Internet network, Ponte San Pietro is just one node in the Milan metropolitan region. It is 40 kilometer away from the Milan Internet Exchange (MIX), Italy's leading interconnection platform. In its hometown, the vast campus is completely isolated, and the images intended for Aruba's customers are very clear about this.[42] IT3 is portrayed as a fortress, not as a lifeline for a post-industrial city. Data Center A, the first of the five buildings, has a total surface area of 40000 square meters and contains 10 independent data rooms of 1000 square meters each.[43] The entire perimeter is fenced, constantly monitored by CCTV and equipped with infrared sensors, while road access is provide through 3 entry points. Six layers of security are enforced by a technological apparatus and armed guards patrol the facility 24 hours a day, 365 days a year. Vehicle traffic is also strictly controlled: automatic bollards act as a barrier, while visitor and staff parking areas are separated. To enter the building, visitors must pass through double electronic doors with metal detectors and scales. A dedicated security team ‚greets' the visitors at the entrance and grants access to the offices, while the data rooms are accessible only with a badge only through several mantrap vestibules. The final layer of security is found within the data rooms, as the private cages can only be entered with a personal pin and authentication. It then becomes clear that the association of a data center with a factory is a merely rhetorical coat of acceptance, and that the comparison is far-fetched, even if the plot or the buildings are reused.

MAINTENANCE: SPACES OF A DATA CENTER

From an architectural point of view, data centers are often overlooked, but by excluding the typology from its field of action, architecture renounces participating in the definition of these essential facilities. Instead, it would have the agency to rethink the spaces and bridge the gap between the post-human and the human. In the following pages I will outline the spatial organization of a computing facility and describe how it defines a variety of activities that all fall under the category of maintenance work.

Since the whole point of a data center is to avoid downtime at all costs, meaning the time when its services are unavailable or offline, the biggest investments in the field are all aimed at developing a highly resilient infrastructure. Two identical heating, ventilation and air conditioning (HVAC) systems are built to provide redundancy, backup power generation is a must, and electrical grids are also duplicated. Support spaces for elements such as cooling units and electrical systems occupy most of the floor space. In the case of Aruba's Ponte San Pietro campus, Data Center A has a total area of 40000 square meters and contains 10000 square meters of server rooms, while three quarters of the area is dedicated to spaces such as a logistics warehouse, air conditioning units and backup installations.[44] These critical spaces are where the data center people work: the human factor is crucial in preventing downtime. Apart from expensive technical redundancies, constant availability can only be guaranteed by an continuous maintenance and monitoring by human workers.[45] For this reason, working in a data center usually coincides with maintaining it, as the vast majority of work performed in data centers today is what can best be described as maintenance work – repairing and maintaining existing technology.[46] Technicians loosely divide data center maintenance into two temporal categories: „anticipatory" and „reactive", resulting in a workplace that constantly acts as if it is in a crisis or trying to prevent one.[47] Sometimes a crisis does occur, but often it can be predicted in advance. During exceptional periods of anticipated service demand, such as the Black Friday online shopping boom, the mandate to ensure uninterrupted service

continuity leads some data centers to invest in sleep equipment for staff who may have to work around the clock. This has also been the case in other crisis situations, such as the Covid pandemic, but also cyber-attacks, when the importance of maintenance workers is clearly highlighted.

But the heightened awareness of maintenance and service workers during the pandemic lockdowns has not had a noticeable effect on data centers. This is related, as mentioned before, to the general dematerialization of the Internet infrastructure and the perception of these facilities as non-human spaces. While people were shifting to working remotely more than ever before, little was said about who was allowing video conferencing apps to handle 21 times more users than in 2019.[48] During the pandemic, data center workers in Italy were considered essential staff.[49] They were present in the facilities during the first months of 2020, when a strict lockdown was imposed on the entire population. At SuperNAP, a large data center in the south of Milan, employees took shifts overlooking the 42000 square meters server rooms to avoid the possibility of cross-contamination, while food was delivered so that five people could stay in the complex for an extended period in the event of a total lockdown.[50] In this sector, business continuity and 99.999% uptime must be maintained at all costs. The possibility of losing access to maintenance personnel was averted by bringing in beds and supplies, while uninterrupted power is provided by three independent power sources and diesel generators.

Even when not in a crisis situation, workers must be constantly on call in the event of a malfunction, and remote apps extend the workplace across multiple spatial and temporal layers, placing the worker in a constant state of activity or standby, just like the constantly running servers. The pace of work is tied to the rhythm of global consumption of goods and information, while the stage on which these acts of maintenance are performed daily is a standardized space. Since the server rack is always the primary building block for equipment layouts, a standardized floor planning approach is the norm: hot and cold aisles are alternated, floor and ceiling tiles are aligned, and maximum homogeneity is preferred.[51] At the heart of a data center are the server rooms, to which technicians are one of the few groups of people with access. They spend much of their day moving in and out of the server rooms, maintaining the computing equipment. Technicians are very mobile, contrary to the public perception of the IT industry. Most people think that IT guys spend their lives sitting at a computer desk, but according to the workers, when you work in a data center, there is a lot of physical labor.[52] Another priority is cables, which have to be kept in order, otherwise they get damaged and run the risk of potentially taking the client offline. Once or twice a week, depending on the rotation, the technicians are required to work a night shift, typically from 7 p.m. to 7 a.m. Most of the night shift is spent in the Network Operations Center, a large control room with a series of wall-mounted screens displaying power, cooling and network activity, as well as CCTV feeds. Every ninety minutes, the technician must inspect the facility. They must check that generators are working and that sensors are active to automatically detect and correct problems without the need for manual intervention (although, ironically, a staff member still needs to be on site to regularly check that auto mode is enabled).[53]

All of this takes place in a building designed primarily for machines, not people. Workers endure high temperatures and a constant noise from the ventilation system. It is incredibly loud, and technicians are required to wear earplugs, which are available from dispensers mounted on the walls throughout the server hall to prevent ear damage during the long hours. Other common accessories include large pairs of earmuffs, gloves, and steel-toed boots. In the server halls, workers are constantly re-bolting a server if it is slightly loose on

its rack. In addition, these areas are under constant pressure to automate, which means that the human component could be reduced even further. This underlying scenario results in a work environment that is more unstable and makes workers feel irrelevant, even though the industry is facing a labor shortage.[54] This results in a specific type of workplace, one with an embedded, functional hostility to labor on part of management and the environment.[55]

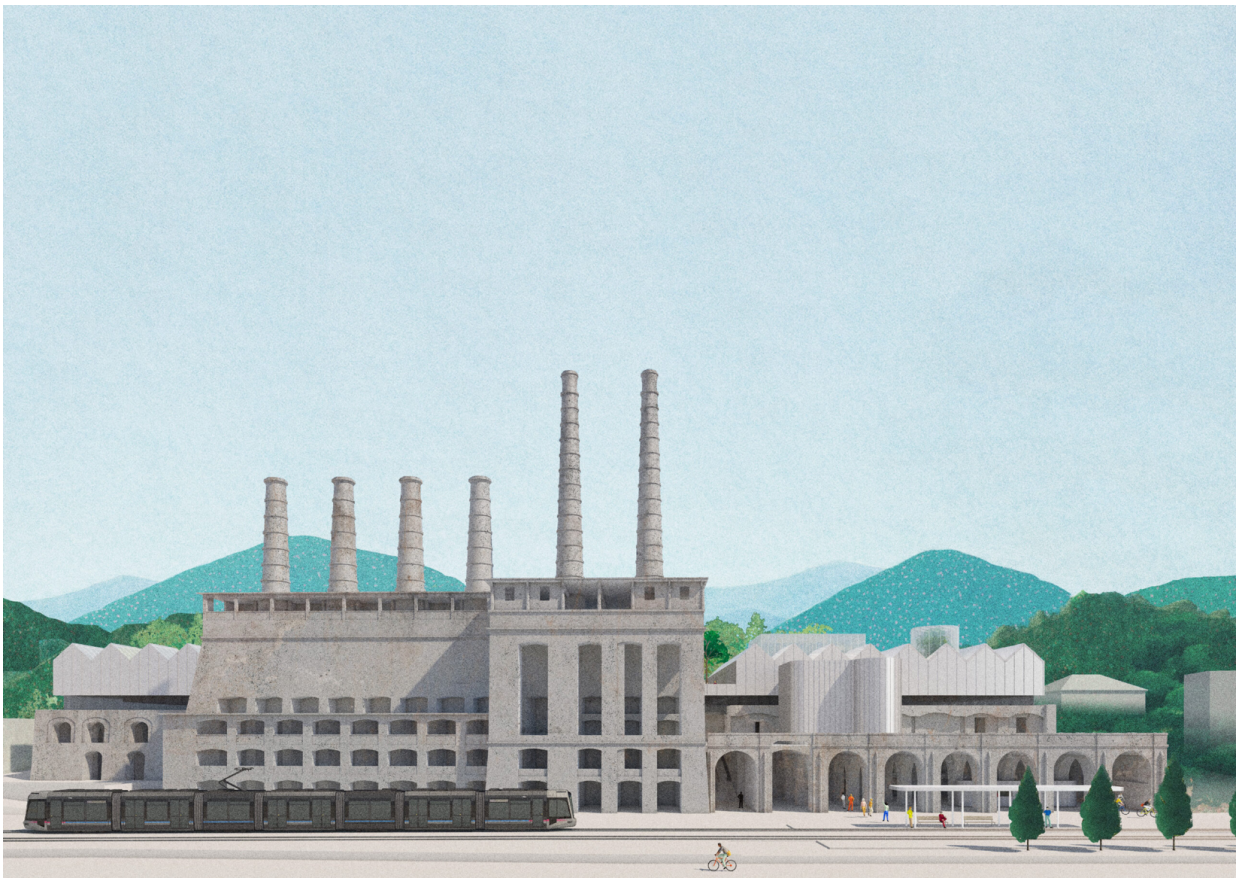

Abbildung 3: Design proposal for the redevelopment of the former Pesenti cement factory

CONCLUSION: OPEN DATA CENTRE

The data center industry is under increasing scrutiny and needs to rethink its position. It currently is quietly nestled in peripheral communities, portraying itself as disconnected from its social and environmental surroundings, and building generic warehouses that try to hide the presence of servers and high-tech equipment. It is constructing far-fetched parallels with the 19th-century industrial revolution when seeking political support, only to present an image of an human-less enterprise once the facility is on the market.

At present, data centers form an inherently global network, with end users located far away, taxes paid at a minimum, and investor and the ownership searches usually leading to distant locations. The industry should begin to question its position and consider how how it can add value to local communities, and architecture can play a critical role in such a process. The architecture of data centers now hides them in plain sight to establish a system of unquestioned power, but it has the potential to spark a discussion and reimagine infrastructure as a physical part of our interconnected society. The current status quo is designed to create a false sense of security by reducing the exposure of the buildings, workers, and extracted resources; but such a sense of security can only be temporary in communities that are becoming increasingly aware and well-organized, thanks in part to

social media and other data center-based services. Market conditions are evolving, and while circulating inclusive images of happy workers is a starting point, more effort and resources should be devoted to promoting a real inclusion, especially through local education programs.

In the case of our proposal for the Pesenti factory in Alzano, these reflections upon data centers highlight the importance of the interconnectedness of functions. It is only through the coexistence of a research lab and a computing center in the renovation of the complex that we can ensure long-term stability in the labor market. Furthermore, the north wing of the complex, which we had left untouched, could be rethought as an educational center that extends beyond the employees of the computing and research facility and opens up to the local community. It is ideally located on the north side, with direct access to the historic center of Alzano Lombardo and only partially connected to the rest of the facility, allowing the data center's security needs to be met.

Trying to push projects through without engaging with the local community often makes the latter feel they are being deliberately left out. This can lead to stronger opposition with the potential to kill a project before it can be implemented. Despite press releases praising the large investments and high-paying jobs, local resistance can block large-scale projects, such as Apple's proposed data center in Galway, Ireland, where the company has not yet built anything after purchasing the land in 2014.[56] Amazon, notoriously secretive about its computing facilities, has recently faced hostility from citizens and local politicians concerned about water and energy consumption after plans emerged for a new AWS hyperscale data center in Brétigny-sur-Orge, 28 kilometers south of Paris.[57]

Rethinking the architectural approach to developing such centers, as well as highlighting the unstable but crucial role of the data center workforce, could radically reposition the industry, finally „grounding the cloud" and changing its perception as an integral part of our communities.

Autor*in
Giacomo Rossi is an architect, researcher, curator and student based in Zurich and trained between the Accademia di Mendrisio and ETH. He is one of the co-initiators of Unmasking Space, a platform for critical student-led teaching, and is engaged with work exploring the possibilities of architecture as an agent of empowerment.

Seminar
Dieser Text entstand im Seminar Architecture beyond the Studio: Reflecting the Social Dimension of Design, Herbstsemester 2022, ETH Zürich.

Redaktionell betreut von
Bernhard Böhm, Monique Ligtenberg & Christina Tuggener

Abbildungsverzeichnis
Abbildung 1: Promotional video of the new Tecnopolo Bologna (Credit: Regione Emilia-Romagna)
Abbildung 2: Images by category on Google's gallery about its datacenters (Graphic by the author; images credits: Google)
Abbildung 3: Design proposal for the redevelopment of the former Pesenti cement factory (Credit: author and Caterina Zatti)

Literaturverzeichnis
[1] Alessandra Facchinetti: „L'ex cementificio Italcementi di Alzano Lombardo e un progetto non realizzato", https://www.bergamodascoprire.it/2018/05/06/l-ex-cementificio-italcementi-di-alzano-lombardo (6 May 2018).
[2] „Italia e Germania prime nell'Ue per produzione farmaceutica", in: Sole24Ore, https://www.ilsole24ore.com/art/fondazione-symbola-italia-prima-nell-ue-la-germania-produzione-farmaceutica-AEWvdLH (10 May 2021).

[3] Ippolito Pestellini Laparelli: „Data Architectures“, in: e-flux, https://www.e-flux.com/architecture/intelligence/310404/data-architectures (January 2020).
[4] Arno Brandlhuber, Olaf Grawert, Anh-Linh Ngo, Angelika Hinterbrandner: „Wir sind nie human gewesen“, in: Arno Brandlhuber, Olaf Grawert, Anh-Linh Ngo, Angelika Hinterbrandner (eds.), Posthumane Architektur, Arch+ 236, (2019), pp. 1-2.
[5] Benjamin H. Bratton, Rem Koolhaas: „Posthumanismus in der Architektur“, in: Arno Brandlhuber, Olaf Grawert, Anh-Linh Ngo, Angelika Hinterbrandner (eds.), Posthumane Architekur, Arch+ 236, (2019), pp. 206-211.
[6] Cushman & Wakefield: Global Data Center Market Comparison, https://cushwake.cld.bz/2024-Global-Data-Center-Market-Comparison/2/ (2024).
[7] Huw Jones, Valentina Za: „Basildon to Bergamo: Euronext Data Move Seen as Headache for Traders“, in: Reuters, https://www.reuters.com/world/europe/basildon-bergamo-euronext-data-move-seen-headache-traders-2021-04-29 (29 April 2021).
[8] Cushman & Wakefield: Global Data Center Market Comparison, https://cushwake.cld.bz/2024-Global-Data-Center-Market-Comparison/2/ (2024).
[9] Arizton Advisory & Intelligence: Italy Data Center Market – Investment Analysis & Growth Opportunities 2021-2026 (2021).
[10] Cushman & Wakefield: Global Data Center Market Comparison, https://cushwake.cld.bz/2024-Global-Data-Center-Market-Comparison/2/ (2024).
[11] Cloudscene: https://discover.cloudscene.com/market/data-centers-in-italy/all (2022); Data Center Journal: https://www.datacenterjournal.com/data-centers/italy (2022).
[12] Cushman & Wakefield: Global Data Center Market Comparison, https://cushwake.cld.bz/2024-Global-Data-Center-Market-Comparison/2/ (2024).
[13] Chiara Rossi: „Pnrr, cosa c'è per innovazione e digitalizzazione“, in: StartMag, https://www.startmag.it/innovazione/pnrr-cosa-ce-per-innovazione-e-digitalizzazione (23 April 2021).
[14] Philip Stafford: „Euronext to Pull Trading Servers out of UK after Borsa Italiana Deal“, in: Financial Times, https://www.ft.com/content/bda3bf7e-4393-4517-b311-86854572523a (29 April 2021).
[15] Renate Schubert, Ioana Marinica: „Wait, My Data Goes Where?“, in: Monika Dommann, Hannes Rickli, Max Stadler (eds.): Data Centers: edges of a wired nation, Zurich: Lars Müller (2020), pp. 310-339.
[16] Graham Pickren: „The Factories of the Past Are Turning Into the Data Centres of the Future“, in: Imaginations: Journal of Cross-Cultural Image Studies 8/2 (2018), pp. 22–29.
[17] A.R.E. Taylor: „Cloudwork: Data Centre Labour and the Maintenance of Media Infrastructure“, in: Elisabetta Costa, Patricia G. Lange, Nell Haynes, Jolynna Sinanan (eds.): The Routledge Companion to Media Anthropology, London: Routeledge (2022), pp. 213–228.
[18] A.R.E. Taylor: „The Data Center as Technological Wilderness“, in: Mél Hogan, Asta Vonderau (eds): Culture Machine 18, https://culturemachine.net/vol-18-the-nature-of-data-centers/data-center-as-techno-wilderness (2019).
[19] Ibd.

[20] A.R.E. Taylor: „Cloudwork: Data Centre Labour and the Maintenance of Media Infrastructure“, in: Elisabetta Costa, Patricia G. Lange, Nell Haynes, Jolynna Sinanan (eds.): The Routledge Companion to Media Anthropology, London: Routeledge (2022), pp. 213–228.
[21] „Data Valley: il video racconto di Stefano Accorsi, entrato nel Tecnopolo“, in: YouTube, https://youtu.be/96TfXHCWxf8?si=WQhpoJFY00MXMuRf (13 January 2022).
[22] Alphabet Corporation: n Form 10-k 2023 https://abc.xyz/assets/investor/static/pdf/20230203_alphabet_10K.pdf (2024).
[23] Ibd.
[24] https://www.google.com/intl/it/about/datacenters/gallery
[25]https://web.archive.org/web/20130106015546/http://www.google.com/about/datacenters/gallery
[26] Google: 2021 Diversity Annual Report (2021).
[27] Kate Jacobson, Mél Hogan: „Retrofitted Data Centres: a New World in the Shell of the Old“, in: Work Organisation, Labour & Globalisation 13/2 (2019), pp. 78-94.
[28] Dan Swinhoe: „Data center NIMBYism: How to Engage with Local Communities Properly During Data Center Projects“, in: Data Center Dynamics, https://www.datacenterdynamics.com/en/analysis/data-center-nimbyism-how-to-engage-with-local-communities-properly-during-data-center-projects (10 May 2021).
[29] Sebastian Moss: „WikiLeaks Publishes List of AWS Data Center Locations, Colo Providers“, in: Data Center Dynamics, https://www.datacenterdynamics.com/en/news/wikileaks-publishes-list-aws-data-center-locations-colo-providers (12 October 2018).
[30] Steven Levy: „Google Throws Open Doors to Its Top-Secret Data Center“, in: Wired, https://www.wired.com/2012/10/ff-inside-google-data-center (17 October 2012).
[31] Jenna Burrell: „On Half-Built Assemblages: Waiting for a Data Center in Prineville, Oregon“, in: Engaging Science, Technology, and Society 6 (2020), pp. 283-305. Asta Vonderau: „Technologies of Imagination: Locating the Cloud in Sweden's North.“, in: Imaginations: Journal of Cross-Cultural Image Studies 8/2 (2018), pp. 8–21. Alix Johnson: „Data Centers as Infrastructural In-Betweens“ in: American Ethnologist 46/1 (2019), pp. 75-88.
[32] Gary Cook, Jude Lee, Tamina Tsai, Ada Kong, John Deans, Brian Johnson, Elizabeth Jardim: „Clicking clean: who is winning the race to build a green internet“, Greenpeace (2017)
[33] Anders S. G. Andrae, Tomas Edler: „On Global Electricity Usage of Communication Technology: Trends to 2030“, in: Challenges 6/1 (2015), pp.117-157.
[34] A.R.E. Taylor: „Cloudwork: Data Centre Labour and the Maintenance of Media Infrastructure“, in: Elisabetta Costa, Patricia G. Lange, Nell Haynes, Jolynna Sinanan (eds.): The Routledge Companion to Media Anthropology, London: Routeledge (2022), pp. 213–228.
[35] Donatella Tiraboschi: „Aruba pronta a crescere ancora: nel campus di Ponte San Pietro, dove viaggiano i dati di mezzo mondo“, in: Corriere della Sera https://bergamo.corriere.it/notizie/economia/24_mar

zo_10/aruba-pronta-a-crescere-ancora-nel-campus-di-ponte-san-pietro-dove-viaggiano-i-dati-di-mezzo-mondo-37a9f219-15b9-48e8-bb15-8c34a4d9axlk.shtml (10 March 2024).
[36] Kate Jacobson, Mél Hogan: „Retrofitted Data Centres: a New World in the Shell of the Old“, in: Work Organisation, Labour & Globalisation 13/2 (2019), pp. 78-94.
[37] Claudia Bitzer, Linda Sjöqvist: Aether: Coat of Acceptance (Student project, ETH Zurich 2020).
[38] Kate Jacobson, Mél Hogan: „Retrofitted Data Centres: a New World in the Shell of the Old“, in: Work Organisation, Labour & Globalisation 13/2 (2019), pp. 78-94.
[39] Graham Pickren: „The Factories of the Past Are Turning Into the Data Centres of the Future“, in: Imaginations: Journal of Cross-Cultural Image Studies 8/2 (2018), pp. 22–29
[40] Giuseppe Mariggiò: „Ponte San Pietro, dai telai al data center di Aruba. L'AD Cecconi: Questa è la nostra nuova casa“, in: DataManager https://www.datamanager.it/2017/10/201710201710ponte-san-pietro-dai-telai-al-data-center-aruba-cecconi-questa-la-nostra-nuova-casa (12 October 2017).
[41] Philip Stafford: „Euronext to Pull Trading Servers out of UK after Borsa Italiana Deal“, in: Financial Times, https://www.ft.com/content/bda3bf7e-4393-4517-b311-86854572523a (29 April 2021)
[42] „Aruba Global Cloud Data Center – The largest data center campus in Italy“, in: YouTube, https://youtu.be/THzGiaGK7EU?si=VyD2Y7W_kKUTUHJR (09 October 2017).
[43] Ibd.
[44] Ibd.
[45] A.R.E. Taylor: „Cloudwork: Data Centre Labour and the Maintenance of Media Infrastructure“, in: Elisabetta Costa, Patricia G. Lange, Nell Haynes, Jolynna Sinanan (eds.): The Routledge Companion to Media Anthropology, London: Routeledge (2022), pp. 213–228.
[46] Kate Jacobson, Mél Hogan: „Retrofitted Data Centres: a New World in the Shell of the Old“, in: Work Organisation, Labour & Globalisation 13/2 (2019), pp. 78-94.
[47] A.R.E. Taylor: „Cloudwork: Data Centre Labour and the Maintenance of Media Infrastructure“, in: Elisabetta Costa, Patricia G. Lange, Nell Haynes, Jolynna Sinanan (eds.): The Routledge Companion to Media Anthropology, London: Routeledge (2022), pp. 213–228.
[48] Sensor Tower, July 2021, https://sensortower.com/blog/video-conferencing-apps-mau-growth
[49] „Coronavirus, la lista Ateco delle attività essenziali che restano aperte: l'elenco definitive“, Corriere della Sera, 22.03.2020
[50] Sebastian Moss: „Italy's coronavirus lockdown: The view from SuperNAP“, Data Center Dynamics, 12.03.2020 https://www.datacenterdynamics.com/en/analysis/italys-coronavirus-lockdown-the-view-from-supernap
[51] Neil Rasmussen, Wendy Torell: „Data Center Projects: Establishing a Floor Plan“ White Paper 144 Rev.2, Schneider Electric (2007).
[52] A.R.E. Taylor: „Cloudwork: Data Centre Labour and the Maintenance of Media Infrastructure“, in: Elisabetta Costa, Patricia G. Lange, Nell Haynes,

Jolynna Sinanan (eds.): The Routledge Companion to Media Anthropology, London: Routeledge (2022), pp. 213–228.
[53] Ibd.
[54] Rhonda Ascierto, Chris Brown, Tod Traver, Fred Dickerman, Rich Van Loo, „The people challenge: Global data center staffing forecast 2021- 2025“, in: Uptime Institute Intelligence, https://uptimeinstitute.com/uptime_assets/f7fdc06fd6dd53d60f4b3a6ea2b75f5a4ab874d6e52bd727833b29426a245d3e-staffing-forecast-2021-2025.pdf? (2021).
[55] Kate Jacobson, Mél Hogan: „Retrofitted Data Centres: a New World in the Shell of the Old“, in: Work Organisation, Labour & Globalisation 13/2 (2019), pp. 78-94.
[56] Sebastian Moss: „Irish High Court overrules planning permission extension for Apple's Galway data center“, in: Data Center Dynamics, https://www.datacenterdynamics.com/en/news/irish-high-court-overrules-planning-permission-extension-for-apples-galway-data-center (10 June 2022).
[57] Alain Piffaretti: „Essonne: le projet de data center d'Amazon retoqué par le préfet“, in: Les Echos, https://www.lesechos.fr/pme-regions/ile-de-france/essonne-le-projet-de-data-center-damazon-retoque-par-le-prefet-1322940 (11 June 2021).