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SCHOOL OF CREATIVE ARTS

CLOUD MYTHOLOGIES

DEMYSTIFYING THE MATERIAL REALITIES OF DIGITAL TECHNOLOGY THROUGH THE CLOUD METAPHOR

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DECLARATION OF ORIGINALITY

This dissertation is submitted by the undersigned to the Institute of Art, Design and Technology, Dun Laoghaire in partial fulfilment of examination for the BA (Hons) in Art. It is entirely the author's own work except where noted and has not been submitted for an award from this or any other educational institute.

Signed: 

Anastassia Varabiova

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ABSTRACT

This thesis explores the leading misconceptions around digital technologies, in particular around the area of materiality. It looks at a broad definition of cloud computing and investigates the possible consequences of using the word cloud in the context of computers. It dissects the metaphor of The Cloud, and argues that it is misleading, as it obscures both the material building blocks that cloud computing relies on and the tangible harmful effects exacerbated by resource-heavy computing. Through an investigation of the marketing origins of the word cloud in the context of computing, this thesis demonstrates that there is financial motivation behind the misconception of The Cloud as immaterial. A case study of an advertisement by Amazon Cloud Services reaffirms this statement. The thesis concludes with an exploration of organisations and artworks that propose new ways of thinking about digital technologies and their materiality.

INTRODUCTION

This thesis will address the misleading use of language in the technology industry, specifically through an analysis of the metaphor employed in phrases like *The Cloud* and *cloud computing*. This cloud metaphor is used to describe a model of computing that has become increasingly common in many areas of modern life. The aim of this thesis is to propose a possible framework for challenging and questioning the usefulness of the term *cloud* in the context: what does the term obscure and reveal? Who decided to name what is a heap of wires and servers and complex global supply chains after a fluffy shape of water in the sky, and why? What kind of realities does the term *cloud computing* accurately describe and support, and what kind of realities does it deny the existence of? Who benefits from the proliferation of the term, and who suffers? Are there better, more direct and understandable ways of describing what we call the Cloud?

The word *cloud* has many meanings in English. The most common use of the word in present day is in reference to a mass of visible water vapour and ice particles in the sky. It is also commonly used in many metaphorical expressions: head in the clouds; I'm on cloud nine; every cloud has a silver lining, and so on. There is a long tradition of using some form of cloud metaphor to evoke feeling in poetry, songs, and plays. Recently, the use of the word in the context of computing and the internet has started to raise some questions. A 2011 article in *The Atlantic* called clouds "shape-shifters, literally," and the "lazy man's metaphor, a one-image-fits-all solution for your metaphor needs," (Rosen, 2011).

Chapter one begins the process of demystifying the cloud through an exploration of what the term actually refers to. *The Cloud* and *cloud computing* are common ways of describing a model of computing where data is stored and processed in a location that is geographically separate to the user, often in large scale data centres owned and managed by large corporations that offer pay-per-use hire of their services. This chapter introduces the argument that referring to this phenomenon as *a cloud* is misleading, as it perpetuates the idea of data and digital activity as

immaterial, vapourous, and inconsequential – which is far from reality. This chapter will discuss the materialities that are obscured and hidden by the fluffy and friendly word *cloud* – materialities with negative consequences that are disproportionately shouldered by locations and peoples that are, or have been, colonised.

In chapter two, I turn to semiotics as a tool for understanding why the word *cloud* is so common in the context of computing and technology. What does the proliferation of the word – and the iconic image of a fluffy white cloud – in product branding and advertisement reveal about the cloud computing industry, and about the everyday users of it? To propose an answer to this question, I will employ advertisement decoding and media analysis techniques to dissect an ad for Amazon Web Services – the Cloud Service Provider with the largest market share. This case study will allow for an examination of the use of the cloud metaphor in advertisement and product names.

The third chapter will provide some examples of how the issues of perception described so far are being addressed. The aim of this chapter is to give direction for a new way to conceptualise the cloud that is less harmful and misleading. I will discuss action being taken in the fields of art and communication towards creating more direct and explicit ways of discussing the issues raised in the previous chapters. This chapter will argue that a better vocabulary and framework are necessary for more productive conversations about an issue as complex as the material implications of digital technology and its progress. The scope and reach of this thesis is too small to attempt to totally transform reality, but the fields of Critical Data Centre Studies and New Media Materiality are plentiful and rapidly growing. This chapter presents several steps that have been taken towards imagining a more grounded and encompassing mythology for today's digitised world.

This thesis aims to demystify the metaphor of the 'cloud' and put the malleable nature of the term to the test. In his 2015 book, *A Prehistory of the Cloud,* researcher Tung Hui-Hu states that "the

cloud is both an idea and a physical and material object, and the more one learns about it, the more one realizes just how fragile it is." This thesis follows this view of the Cloud and aims to add to the existing discourse and research in the fields of technology and digital materiality. Through the structure of this thesis, the goal is to suggest a possible framework of acknowledging and dissecting the implications and consequences of an ignorant use of the term cloud in the context of computing.

Before we continue, I would like to take a moment to consider the etymological roots of the word cloud, as they might appear as counter-intuitive to some readers, but interesting in the context of this thesis. The word *cloud* comes from the Old English *clud* (related to modern word *clod*), which means "a lump of rock, a hill." The modern use of *cloud* to mean *rain-cloud* is a metaphorical extension of the word that only began to appear in English texts around 1300 CE. Etymologists suggest that this metaphorical extension from rock to clouds came about due to the latter's visual similarity to mountains and cliff faces (Harper, 2020). Today, our planet's surface is dotted with data centre buildings full of computer servers built from materials mined from the depths of the earth; buildings that together are referred to as *The Cloud* – a metaphorical extension of the word that, unexpectedly, self-references its pre-1300's meaning of "lump of earth".

CHAPTER ONE – OBSCURE

This chapter outlines the model of *cloud computing* and introduces the argument that this term is misleading and harmful when used in an advertising and branding context. Cloud computing is a model of on demand access to computing resources, over the Internet, usually with pay-per-use pricing (Susnjara, Smalley, 2024). This model enables many day-to-day uses of the Internet

and is difficult to reject as it is much more convenient and efficient than privately owned and maintained storage hardware. This chapter also provides a brief overview of a possible history of the word *cloud* in the context of networks and communications technology. Highlighting some key environmental and humanitarian crises at the heart of the electronics industry, this chapter suggests that the immaterial connotations suggested by the word *cloud* are, at the very least, inappropriate – if not intentionally misinformative.

1.1 WHAT IS *THE CLOUD*?

In August 2006, then Google CEO Eric Schmidt said the following at an industry conference:

> *"I don't think people have really understood how big this opportunity really is. It starts with the premise that the data services and architecture should be on servers. We call it cloud computing – they should be in a "cloud" somewhere," (Schmidt, 2006).*

The term *cloud* in the context of computers, usually refers to an inter-connected network of computers that is accessible through the Internet. The Oxford Advanced Learner's Dictionary (2024) states cloud computing is "a computer system in which data and software are stored mainly on a central computer, to which users have access over the Internet," and according to the Britannica encyclopaedia, it is a "method of running application software and storing related data in central computer systems and providing customers or other users access to them through the Internet," (Carr, 2024).

In layman's terms, what is called *The Cloud*, is the idea of having access to a large number of computers that are located somewhere other than the user's location, e.g. not at your home or workplace. These computers are managed by a company and can be used to store data or run a resource-heavy program, removing the need for you to buy, store, and maintain the computers yourself. This essay will proceed with this understanding of the term *cloud computing* in mind.

Using the cloud has its benefits in situations where the amount of computing power or storage needed for a task is so big that it becomes inconvenient or impractical to store and maintain the hardware needed for the task yourself. Streaming a film online, through Netflix for example, is an everyday act of using the cloud. The film is not stored on your personal computer, but on a computer (called a server) located somewhere else geographically. This server is owned and managed by someone else and is accessible to your computer through the Internet. In theory, this model is useful because it removes the need to buy and store physical copies of many films to be able to watch them – you just need a device capable of connecting to the Internet and a way of accessing the database. Many government bodies, hospitals, banks, and universities also use cloud services to store and process their data instead of using on-site data centres and servers.

It is important to note, however, that these databases of hundreds of thousands of films, hospital records, or thesis drafts still exists in a physical capacity. Coming back to the Netflix example: the films are stored physically, most likely in transistors on computer servers, held on metal server racks in large buildings known as data centres. We can imagine this as follows: when you open the Netflix app on your computer, it sends a request through the Internet network to the servers that store Netflix's software and film library. These servers are most likely stacked in a building known as a data centre, which could be located anywhere geographically in the world that has a stable Internet connection.

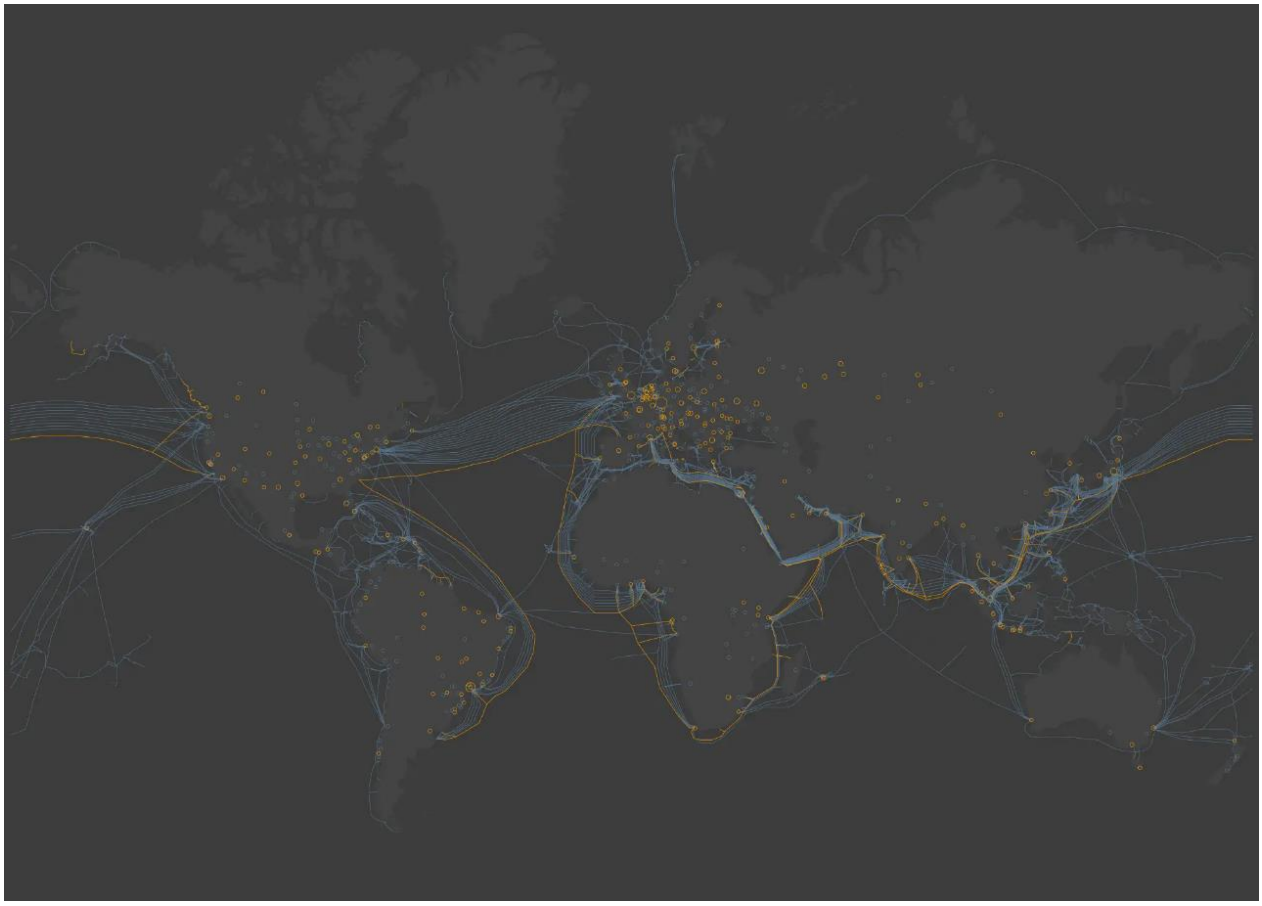

FIGURE 1 *VISUALIZING THE INTERNET (2024)*, KEVIN MCDONALD.

The 'Internet' is a network of a large number of computers located all around the world and connected to each other through a large number of underground and submarine wires (Woodford, 2006/2023). Fig. 1 shows a map of all publicly known submarine internet cables and internet exchange points – in short, it is a map of the material components that allow the internet to exist.

Apart from describing the masses of water vapour in the sky, the noun *cloud* can also mean "swarm, horde, or multitude" (Penguin Random House LLC, HarperCollins Publishers Ltd, 2005, 1997, 1991), which could potentially be where the tradition of using *cloud* to describe a multitude of wires, cables, and networks originated from. If we assume this as true, the use of the word makes sense and appears to be harmless. Why *not* describe a network as a cloud?

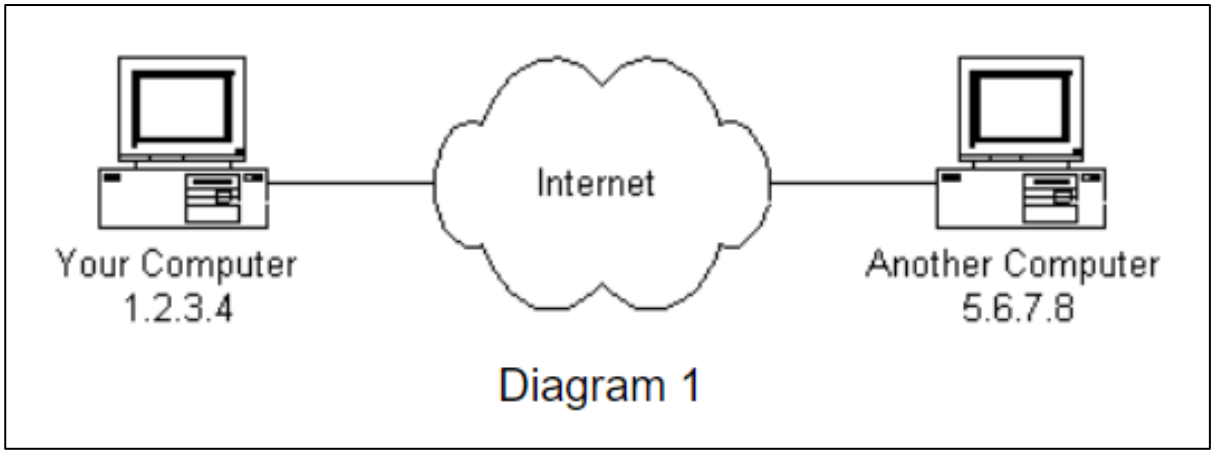

FIGURE 2: A DIAGRAM FROM A WHITEPAPER TITLED *HOW DOES THE INTERNET WORK?* (2002), RUS SCHULER.

The idea of long-distance communication and information exchange predates the Internet and computer networks as we know them now, and so does the use of 'cloud' as a metaphor for a network. Telecommunications salespeople have been using the metaphor of a cloud to sell connections to long-distance, wide-area networks since the pre-Internet days of the '70's and early '80's (Regalado, 2011). The idea of connecting multiple buildings and facilities to each other through one network of cables and wires was "revolutionary" at the time, and telecom companies would use conceptual drawings in sales pitches to describe how this would work to prospective customers. These drawings contained images of the customer's various facilities with references to the specific type of wires and cables that would connect them to the central network that was being advertised – this larger network would often be represented by a drawing of "a fluffy cloud" (Fogarty, 2012). Whether this was done to avoid revealing too much information on the telecom company's own infrastructure or to avoid confusing customers with complicated explanations is unclear, and ultimately does not matter – the metaphor stuck, and as telecom wires evolved into Internet wires, the cloud metaphor was brought along too. Fig. 2 is a diagram from a whitepaper published in 2002 by Rus Schuler, who is currently the director of Information Technology at a cybersecurity firm. The diagram shows a graphic of two desktop computers, labelled "Your Computer" and "Another Computer." The two PCs are linked to each other by a line passing through a diagram of a fluffy cloud shape, labelled "Internet." As of October 2024,

Google Trends reveals that 18 out of the 25 most searched queries related to the word ‘cloud’ on the Google search engine are related to computing. To this day, the word 'cloud' is often used when talking about computing and the internet.

1.2 UNDER THE CLOUD COVER

The verb *to cloud* means “to veil, to obscure, to make less clear,” (Collins English Dictionary, 2025). Ironically, this is precisely what the term *cloud computing* does to the definition of the product it is used to describe and market. The transfer of the fluffy, friendly connotations of the word ‘cloud’ to the word ‘computing’ disregards and obscures the inherent materiality of the hardware that sustains everything done ‘on the cloud’ – servers, cables, data centres, electronics manufacturing and assembly locations, mineral mining sites, fossil fuels burned to power all of these processes, and water used to keep all of these computers cool. Generative Artificial Intelligence relies on data centres which require a lot of energy to power and cool. It is estimated that a search driven by generative AI uses four to five times the energy of a conventional web search (Crawford, 2024).

Electronic waste in the form of discarded computer servers and monitors is another crucial byproduct of the ‘cloud.’ Data centre waste details are often not publicised, but there is reason to believe many data centres dispose of servers long before they stop being functional (Walbank, 2022). Once a new model is released, servers are deemed obsolete and discarded, even if they have only been in use one or two years. E-waste is a growing environmental and human health concern. The United States has the largest number of data centres in the world – over five thousand as of November 2023 – yet only about half of US states regulate the disposal of electronic waste (Taylor, 2024).

Discarded electronics from Europe and the United States are often shipped to landfills in economically poorer areas of the world. The people that live near or walk past these landfills are at danger of many health complications, according to a 2021 report by the World Health

Organisation. Scavenging these landfills for the precious metals and minerals in the electronics becomes a source of income for many children and women in these low-income countries, exposing them to many dangerous substances, which can lead to life-long health complications (WHO, 2021).

Even the sourcing of the raw materials required for building the 'cloud' is not without fault. A report published by Amnesty International revealed that sixteen of the world's biggest multinational companies that distribute electronics, including Apple and Samsung, used cobalt mined through child and enslaved labour (2016). This report estimates that most, if not all, electronic devices available on the market today are made using supply chains that enforce and encourage this kind of forced and entirely unethical labour.

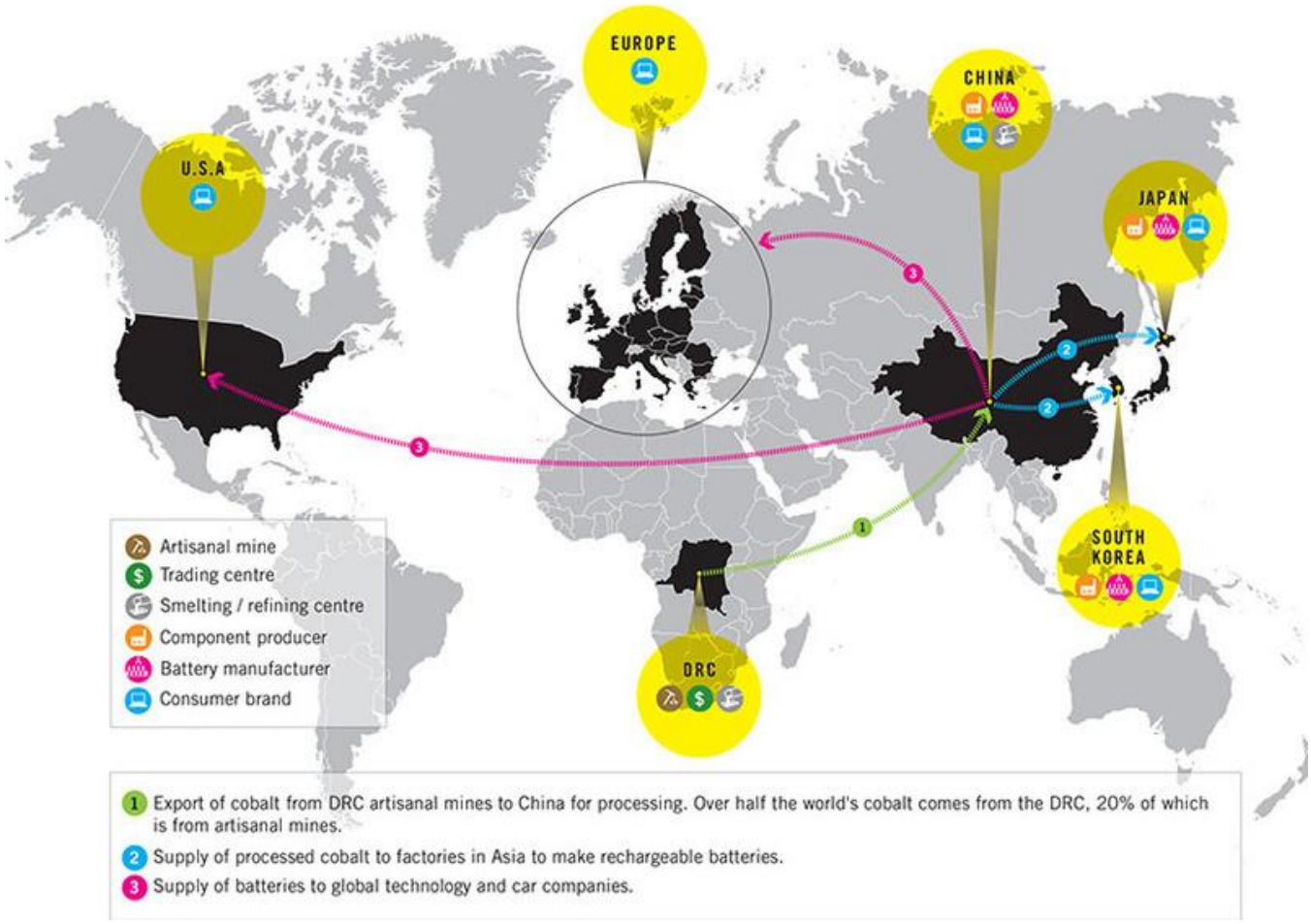

FIGURE 3: *MOVEMENT OF COBALT THROUGH TRADING ROUTES ACROSS* WORLD (2016). AMNESTY INTERNATIONAL.

Cloud computing is possible through the existence of massive data centres, which only exist at the scale that they do now as a result of a multiplicity of complex and entangled systems of extraction and inequality. Patrick Brodie (2023) calls data centres “an assemblage of environmental relations,” revealing them as a site where these systems of extraction coalesce, from the minerals drawn from the earth to build the computer servers, to the factories where they are assembled using underpaid labour, to the fossil fuels burnt to power them and the water necessary to keep them cool, to the mountains of e-waste formed once these servers are discarded. As we look at these systems, we can see that their negative consequences are disproportionately shouldered by people in the global south, amplifying “historical forms of colonization,” as noted by Paola Ricaurte (2019).

Ireland is an example of a place re-colonised through data and cloud technologies. The first transatlantic telegraph cable was laid from the Valentia Islands in Co. Kerry to Heart’s Content in Newfoundland in 1858 (Anderson et. Al, 2021), when Ireland was still ruled by the British Empire. Telegraph communication quickly became obsolete, but these cables were the foundation for the vast network of undersea cables that make up the Internet today. The first radio station in Valentia was powered through the burning of peat from the bogs surrounding the area. In the present, Ireland is covered in data centres responsible for over a fifth of the country’s electricity consumption (CSO, 2024). Demolishing these data centres and removing the tech companies that own them would undoubtably put a strain on the country’s economy and leave thousands of people unemployed.

Data centres affect Ireland not only in terms of employment and the economy, but also on a more basic level of household utilities, namely central heating. A design challenge common to most computers is managing and controlling the heat produced by computing. In 2018 The Journal reported that heat waste from one of the Amazon data centres in Dublin would be used to warm hospital wards, a university campus, and thousands of apartments in the area (Staff, 2018).

Reusing data centre heat waste may appear to be a step towards a greener future of computing and technology, but there are serious ethical implications of this development. The people inside these buildings are now reliant on the waste product of a corporation – one that is known for its nonchalant attitude towards upholding human rights legislation – for the ability to heat their homes and hospital rooms. Philosopher Paulo Friere makes the following observation in his 1970 text, 'Pedagogy of the Oppressed':

> *"In order to have the continued opportunity to express their "generosity," the oppressors must perpetuate injustice as well. An unjust social order is the permanent fount of this "generosity," which is nourished by death, despair, and poverty," (Friere, 1970).*

Amazon's 'generosity' and 'green' intentions behind donating heat to homes and hospital wards are unavoidably tainted by the fact that this heat is a byproduct of an ecological disaster-in-the-making. In order to continue providing heat, Amazon must continue to *generate* it, which it does by running computers built from minerals mined by children and powered by burning oil and natural gas. The harm necessary for this heat waste to exist in the first place is insurmountably greater than any benefit gained from the repurposing and reusing of it. Until there is major change in the ways the Cloud is built and maintained, it cannot be considered neutral or benign on a global scale.

CONCLUSION:

The word *cloud,* in the context of computing, disguises the true nature of what it is used to describe and sell. It has become a metaphor, a vague, watery version of the *out of sight, out of mind* principle. It has no semantic ties to what it pretends to describe: access to a bunch of computers owned and serviced by a third party. The immaterial hype surrounding *The Cloud* in no way reflects the lived material reality of the large number of people – many of whom are children – who are engaged in extremely dangerous mining operations; of the people working in assembly warehouses for miniscule compensation. These people disproportionately tend to be

located in places, either historically or currently, colonised. The spatial, ecological, and ethical footprints of *The Cloud* are immense and, if left unnoticed and unaddressed, will continue to pose a detriment to the planet and life on it.

This begs the question, by what parameters can an industry so reliant on child labour and the destruction of people's health and environment be considered 'immaterial' and 'weightless'? Why is 'cloud' the word used to describe what is a multitude of computers, hard-drives, ethernet wires, and submarine cables? In the following chapters, this thesis will look at the word through theories of semiotics and advertising in an effort to propose answers to these questions.

CHAPTER TWO – REVEAL

This chapter describes the realities revealed by the continued use of the cloud metaphor, particularly in the fields of advertisement and product branding. The first parts introduce some key concepts from the field of semiotics – the study of signs and meaning – to propose a possible answer to why the term began to be used in relation to computers in the first place. Using Rolan Barthes' and Joseph Campbell's definitions of *myth,* this chapter will then critically analyse the use of the cloud metaphor as a vehicle for marketing and profit making. Judith Williamson's methodologies of decoding advertisements form a base for a case study of a specific cloud service advertisement from Amazon Web Services. Through this analysis, I conclude that the continued use of the cloud metaphor in branding and advertisements of cloud computing services is undeniably intentional and motivated by profit and sales, as the positive connotations of the word "cloud" obscure the material harm caused by the product being advertised. Following the discussion of the harm caused by the cloud computing industry in chapter one, I argue that gaining a financial benefit as a result of the cloud metaphor is irresponsible and unjust.

The final part of the chapter speculates on why the metaphor has stuck around by addressing the reality that is *does* describe surprisingly well – that of the casual consumer of cloud-based services. For a layperson who might not have any interest in the workings of how online data storage works and where it goes, online actions like storing files online and running powerful programs remotely *can* feel immaterial and almost magical. I conclude the chapter with the argument that this does not negate the potential harm of continuing to rely on the cloud metaphor and that changing how we talk and think about technology is still necessary, and more importantly, possible.

2.1 THE CLOUD, THE MYTH, THE METAPHOR

Semiotics is the study of signs and communication of meaning, with origins in the work of linguist Ferdinand du Saussure and his classification of a 'sign' as the union of a 'signifier' and 'signified' (Howells, 2003; Saussure, 1916). Richard Howells provides a concise explanation of these terms in his book 'Visual Culture' (2003): "a signifier is something that stands for something else; the 'signified' is the idea of the thing that it stands for; and the 'sign' is the union of the two."

To elaborate on this, let us consider the word 'cloud' as a sign, i.e. something that carries meaning and is composed of a 'signifier' and 'signified.' The signifier is the shape of the letters 'C-L-O-U-D' when printed or displayed in this particular order. The 'signified' is the idea of a fluffy white shape in the sky that we get in our head. Let us write this as:

"C-L-O-U-D"=> "a fluffy white shape in the sky; that which that brings rain."

Saussure's view of semiotics dictates that words only mean things because we culturally and socially agree that they do, and this connection is completely arbitrary, i.e. based on chance and impulse. This model can be referred to as the 'first order' of semiotics (Howells, 2003).

Roland Barthes (1972) extended semiotics into the fields of visual analysis and popular culture, believing that "anything could be a sign" and "any material can arbitrarily be assigned with meaning." In his book 'Mythologies' (1972), Barthes' aim was to look at seemingly innocuous everyday things (photos, film, hair products, adverts etc.,) and "dismantle" them to reveal what he thought they were actually saying (Howells, 2003). Barthes' theories and observations give us permission to treat non-text objects, e.g., images, as text, in the sense that they that can *mean* something to someone. Barthes' other great contribution to the field is his idea of the 'second order' of semiotics, in which a 'sign' can evolve into a 'myth.'

In his description of the 'second order' of semiotics, Barthes identifies situations where the 'sign' – a device for carrying meaning formed as a result of the union of 'signifier' and 'signified' – can go on to be a 'signifier' for something else again. To return to our example, this is the moment that the word 'cloud' begins to signify the idea of something beyond itself, e.g., in a sample phrase: "a cloud was hanging over their heads," the word 'cloud' signifies the ideas of sadness, gloom, and a dark mood. Let us write this as:

"Cloud"=> "sadness, a dark mood, melancholy."

It is crucial to note that unlike in the first order, where all signs mean things by chance, in Barthes' second order of semiotics a myth is "never arbitrary" and always constructed with intention (Barthes, 1972). This means that the ideas of sadness and gloom that the word 'cloud' just evoked in the mind of the reader (you), were intentionally decided upon by the author (me). I have no way of knowing what the signifier "C-L-O-U-D" might mean for *you* when it stands by itself – you could be privy to an inside joke about the word – but in the context of this particular phrase, I can attempt to narrow the possibilities of what the 'signified' *could* be. Thus, I make the word "cloud" into what Barthes calls a "myth," or a "meta-language"(1972).

As the possibilities of what can be 'signified' narrow, it becomes easy to control it and to inject the sign with *intent*. As Barthes put it, "there is no myth without motivated form" (1972). Based on this understanding, we can assume that I, the author, was operating under specific motivation and intent to control the idea that you, the reader, would get in your head when I presented you with that particular word (cloud) in that particular context (was hanging over their heads). My *intent* was to generate a specific idea in the reader's mind, and the *motivation* behind this was to illustrate my point through controlling the narrative.

As mentioned in the previous chapter, it is likely that the definition of "cloud" as "a swarm, horde, or a multitude" is what led engineers and salespeople in the 70's to refer to networks as such. Applying Barthes' observations, the 'myth' we are examining in that instance looks like this:

"Cloud" => multitude (of cables and networks).

At this level, the motivation appears to be "to communicate quickly and efficiently; use shorthand for a complicated system." This is not harmful in itself. However, as of the 21st century, this is no longer the only, nor even the driving, motivating force behind the use of the word "cloud" in product names and branding of cloud computing services. Drawing on Barthes and the linguists before him, we can approach the word "cloud" in phrases like "cloud computing" and "cloud-based services" as a 'myth' and attempt to dismantle the intended 'signified' and the motivation behind it. To do this, we will first examine how the word 'cloud' – and the image commonly associated with it – is used in advertisement and product branding.

2.2 THE CLOUD IN ADVERTISING

According to an investigation by MIT Technology Review, the earliest documented references to the specific phrase "cloud computing" date to 1996, in the form of a business plan authored by George Favaloro and a handwritten note to self by Sean O'Sullivan, the two documents dated within two weeks of each other. At the time, Favaloro was a marketing executive at the company Compaq Computer and O'Sullivan was a young technologist, negotiating investment for his start-up company, NetCentric. The duo's plans referenced personal file storage and video streaming as possible "cloud-computing enabled applications" (Regalado, 2011). These services did not yet exist at the time, but are among the most popular everyday uses of the 'cloud' today – in 2020, an estimated 2.3 billion people used cloud storage systems for personal data like photos, documents and videos (Griffiths, 2024) and 40% of TV usage in the USA is spent on streaming services as of September 2024 (Nielsen, 2024).

The MIT Technology Review report concludes that it is unclear which of the two men first coined the phrase and in fact, others may have independently come up with it later, but both Favaloro and O'Sullivan "agree that 'cloud computing' was born as a marketing term" (Regalado, 2011). As such, I believe it is fair to analyse the use of "cloud" through the lens of advertising.

Williamson (1985) argues that although advertisements are public, they influence us on a private level. One of the tactics used in advertising is correlation through a referent system. For example, an ad for a new product that is meant to exude 'luxury,' e.g., a new perfume, would contain a reference to a firm and well-established symbol of 'luxury', e.g., a fur coat. The image of a fur coat is a culturally established reference to the intangible concept of 'luxury.' Through strategic placement of a fur coat in the ad for a new perfume scent, the advertiser can rely on the meaning of 'luxury' being transferred from the fur coat to the perfume through correlation. The public ad then creates a new meaning in the mind of the viewer, namely that *this new perfume is luxurious*.

This principle is seen in action in the case of the digital cloud. The associations one might have with the natural phenomenon of water vapour suspended in the sky – fluffy, ethereal, floating, heavenly – become references that are then transferred to the word 'computing' through correlation. 'Cloud computing' becomes a term that inspires awe and the feeling of immateriality. Personally, it has always evoked an image of a supercomputer that defies the laws of gravity and floats in its vapourous form high up in the sky, untethered to the ground and its material constraints – an image that is objectively a false visualisation of data infrastructure and its material presence as discussed in chapter one.

Advertisement also often works through a system of difference (Williamson, 1985). The product is advertised and gains value through what it *is not*. The 'cloud' model of computing is valuable because it stands in opposition to the traditional model of on-premises data and hardware. 'Clouds' are an exercise in the pooling of resources. For a private consumer, 'cloud storage' frees up the physical space that photo albums, DVD cases, document files, and computer hard drives

would have taken up a decade prior. For a start-up business, the 'cloud' is a cost-efficient way of running software and storing data, freeing the business from high up-front costs of building and maintaining its own data centres. The cloud model of resource pooling and system hire are what allows multi-player online games, generative AI software, and even email to exist at the scale that they do today (Susnjara, Smalley, 2024).

For an everyday Internet user, giving up the "cloud" may look like being unable to use common email services unless one stores and maintains a stack of computer servers (for example, in their shed) that is connected through privately owned and maintained cables to the stack of servers owned and maintained by anyone else they wish to send electronic messages to. A strenuous and time-consuming task that seems pointless in the face of the convenience offered by popular cloud-based services offered by companies such as Google, Microsoft, and Amazon.

2.3 HOW BUSINESSES PROBLEM-SOLVE FOR SUCCESS: AMAZON WEB SERVICES (AWS) CASE STUDY

Another theory proposed by Williamson (1985) is that of "product as currency" in advertising, where a product is pushed on two levels simultaneously – on one hand for its own sake and usefulness, on the other as currency to buy things that are intangible or hard to get: "the product … gets advertised based on … its capacity to buy something else".

Let us discuss a video advertisement posted in November 2021 on the AWS YouTube channel and the company's website: "*Get Animated | Ingram Micro Cloud | Amazon Web Services*." AWS has the largest market share of all Cloud Service Providers (Slingerland, 2024) and Ingram Micro's website (2024) unhelpfully describes itself as "the business behind the world's brands," and a "people-first technology partner."

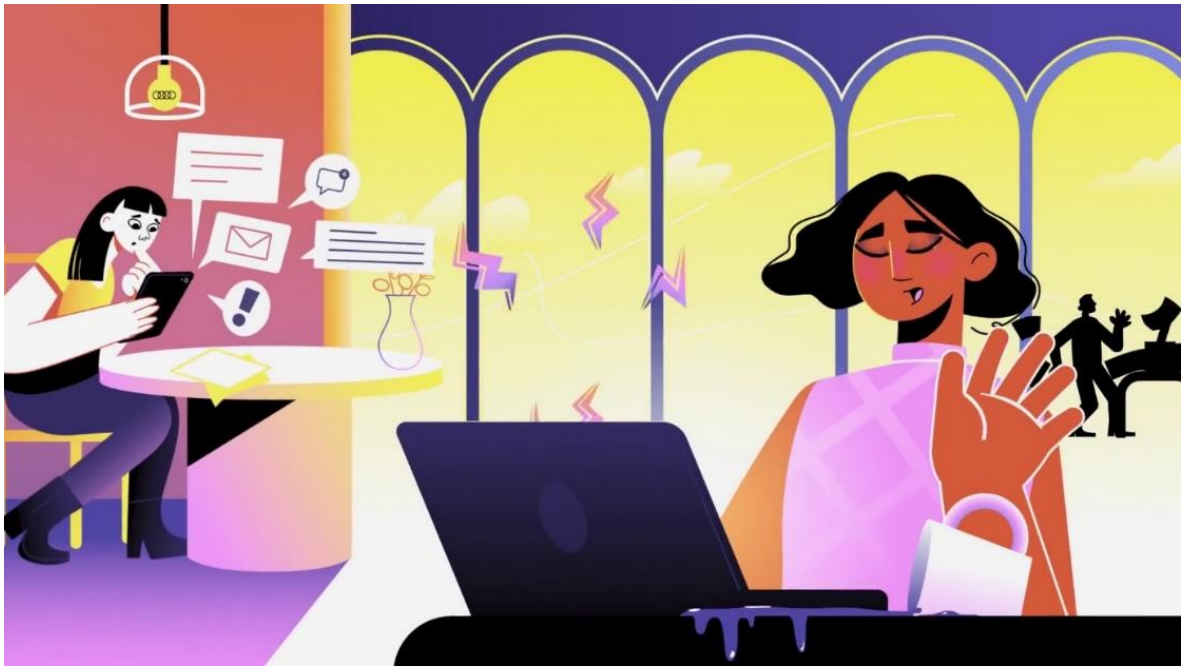

FIGURE 4: "CAFÉ SCENE." A STILL FROM *GET ANIMATED | INGRAM MICRO CLOUD | AMAZON WEB SERVICES* (2021), AMAZON WEB SERVICES. AVAILABLE ON YOUTUBE.COM

FIGURE 5 "BUBBLES OF CHAOS." A STILL FROM *GET ANIMATED | INGRAM MICRO CLOUD | AMAZON WEB SERVICES* (2021), AMAZON WEB SERVICES. AVAILABLE ON YOUTUBE.COM

FIGURE 6 "FALLING INTO THE CLOUD." A STILL FROM *GET ANIMATED | INGRAM MICRO CLOUD | AMAZON WEB SERVICES* (2021), AMAZON WEB SERVICES. AVAILABLE ON YOUTUBE.COM

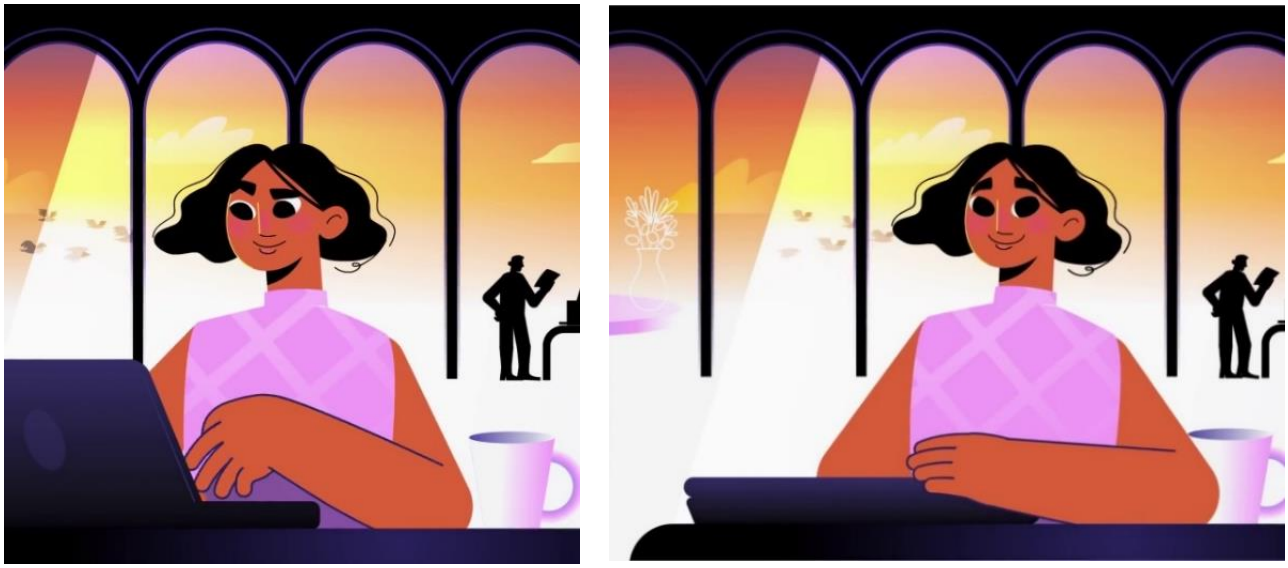

FIGURE 7 "PROBLEM SOLVED." CROPPED STILLS FROM *GET ANIMATED | INGRAM MICRO CLOUD | AMAZON WEB SERVICES* (2021), AMAZON WEB SERVICES. AVAILABLE ON YOUTUBE.COM

The 30-second-long video advertisement opens with an animated illustration of two stylised cartoon women (let us call them A and B) in a café. Woman A is sitting in front of an open laptop, and woman B is holding a mobile tablet, both of them smiling. In the blink of an eye, the laptop has a cup of coffee spilt on it and the tablet is vibrating with an overwhelming number of notifications and pings (Fig.5). Woman A appears to be upset and distressed. A cool female voice narrates, "are your business problems growing?" The word "business" is said slightly quieter than the rest of the phrase. The two women, now shown in a frazzled state with flailing limbs and distressed expressions, shrink, and are contained within bubbles of chaos and visual noise, floating around the screen. The background turns dark purple, and the sounds of buzzing, ringing, and clanging grow loud for a second. (Fig. 6).

Next, Woman A is shown falling down into an abyss, from which emerge two white fluffy clouds - that appear to consume her - with the AWS and Ingram Micro logos stamped on them (Fig. 7). "Together, Ingram Micro Cloud and AWS can help you- " – the narrator's voice takes a strange pause here – "grow by accelerating speed to market." A few sentences in the script later, the narrator reveals another thing that AWS and Ingram Micro can help you with: "find peace of mind" – another pause – "with creative financing options." The screen once again shows us the café scene from earlier with the two women. No coffee is spilled on Woman A's laptop, no overwhelming stream of pings assault the tablet of Woman B. Woman A appears to wake up from a daydream and type something on her laptop with a determined expression. She shrugs her shoulders and closes her laptop with a light smile directed at the camera. "AWS plus Ingram Micro Cloud is how businesses problem-solve for success," finishes the narrator (Fig. 8).

Williamson's "exchange-value" advertising is clearly seen in action in the ad described above. The product of 'Ingram Micro and AWS cloud services' is presumably sold for its use-value as a cloud computing and organisational system for business owners, but is also sub-textually advertised by its ability to "help you" and how it can allow you to "find peace of mind." The

exchange-value of this product is “success,” and perhaps more insidiously, “mental clarity and support.” Woman A – the protagonist meant to represent the intended consumer of the ad – appears to be in a state of panic after an accidental coffee spill, but by the end of the video, she seems completely at ease with the world and able to shrug off any stressful scenario, all thanks to AWS and Ingram Micro. As per Willaimson’s (1985) theory of the “product as currency”, this ad seems to say: ‘money can’t buy happiness’ – but the right cloud service can (and money can pay for the cloud service).

From these observations, we can conclude that the connotations of immateriality and weightlessness are incorporated into the AWS advertisement not by accident, but by a motivation to increase sales. The image of fluffy white clouds is explicitly used to represent the companies and their products, without any reference to swarms of wires or hordes of computes. This myth is not proliferated to aid in describing and understanding a network built from multitude of wires and servers, but to promote the false hype of digital immateriality, because it effectively hides and obscures the exploitative practices employed in the creation and delivery of cloud-based services – exploitative practices that could turn a potential customer away from the product if they were too obvious. Today, the term ‘cloud computing’ is presented as a descriptor of an objective part of reality, of something that ‘makes sense’ and is accepted as part of every-day life. Advertisements for cloud-based services do not explain what the ‘cloud’ is, instead they tell you why you should use and pay for *their* cloud. The use of such explicit sky-cloud metaphors in both text-based and visual advertising by Amazon Web Services – the company with the largest market share in the cloud computing industry – supports the idea that the metaphor of the ‘cloud’ must be profitable and/or benefit the company in some other way; that the proliferation of the fluffy cloud shape in product branding is an informed and intentional choice.

Williamson (1985) believes in a function of advertising beyond increasing sales, and that is its power in creating "structures of meaning," arguing that advertising can create a certain false assumption in the mind of the viewer. Recall the suggestion that "cloud computing' was born as a marketing term" (Regalado, 2011), and Eric Schmidt's 2006 speech as Google CEO: "(the servers) should be in a cloud, somewhere." Even if one could argue that the word 'cloud' in 'cloud computing' is still useful as a metaphor or shorthand term, these examples, among many others, make it clear that ease of understanding is not the motivation behind the term 'cloud' being incorporated in advertising and product branding. The intent behind the continued use of the metaphor in all of these instances is undoubtably to push the 'myth' of "cloud" as a vapourous, gaseous, shapeless object, floating in the sky, somewhere, because it is more profitable to have the consumer picture that over the uncomfortable exploitative material realities of the product.

The 'cloud' is a metaphor; an idea that works by using one word in place of another, more literal, word (Black, 1962), and draws on the connections, relations, and analogies made between two discrete things (Gustav, 1964). According to Annette N. Markham (2003), metaphors "help us make sense of unfamiliar concepts and things," at the same time structuring "the way we respond to those concepts and things." It is this ability of metaphors to shape our worldview and response to the concepts they stand in for that makes them so powerful and therefore, important to examine and decode. Accepting words and metaphors that are purpose-built for marketing can lead us into blindly subscribing to worldviews we may not agree with upon examination. Questioning descriptions of reality that seem too good to be true is a step in the direction towards a more just and honest future and the 'cloud' is one metaphor we can start to do that with.

2.4 CLOUD MYTHOLOGY – WHY WE STILL BELIEVE

In the opening pages of 'Thou Art That,' Joseph Campbell provides a definition of "mythology," which he subsequently uses to analyse western spirituality and religion:

> "... Mythology is an organisation of symbolic images and narratives, metaphorical of the possibilities of human experience and the fulfilment of a given culture at a given time."(Campbell, 2001)

The previously discussed 'myth' of the digital cloud as 'immaterial' and 'invisible' is not *entirely* baseless. There *is* a culture and human experience that this idea works as a good analogy for: the passive consumer of the cloud service. The narrative and symbolic image of a weightless cloud floating in the sky works quite well to describe the experience of sending instantaneous messages, streaming films, creating funny cat videos on gen AI platforms, and storing terabytes worth of personal photos and documents online. To the casual consumer, all of these actions *do* feel immaterial and inconsequential, and – as I have shown through analysis of the word through semiotics and advertising – this is entirely intentional and by design. The cloud myth *does* metaphorically express the possibilities of human experience of a given culture at a given time – that being the culture of technologically mediated, continuously connected societies of the post-industrial digital age. Unfortunately, as discussed earlier, this myth also supports colonial thinking and action and effectively ignores and denies the planet-wide scale of ecological, political, and human abuse that the iconified product relies on. All benefit from a myth such as this one goes to the small number of companies that own the cloud infrastructure, at the expense of quite literally everyone else on Earth.

According to Max Black, "understanding a metaphor is like deciphering a code or unravelling a riddle" (1962). Deciphering or decoding a metaphor – or in this case, a myth – is an active practice. It does not come naturally or automatically. The existence of a metaphor is defined by its invitation for us to take it literally – 'he *is* a snake' is a metaphor, 'he *is like* a snake,' is a simile,

which is much easier to notice as a *comparison* and not a substitute for reality. If we recall Eric Schmidt's 2006 speech from the beginning of this essay: "the servers should *be in a cloud, somewhere."* The audience of this kind of message is invited to imagine the computers as *literally existing in a cloud,* presumably, *in the sky*. Understanding that widespread metaphors are not literal takes effort and critical analysis – this is not easy and rarely happens organically. Misunderstandings and misinterpretations of metaphor are the root cause of many wars and conflicts that have repeated throughout human history (Campbell, 2001). It is not practical to hope that this metaphor will be questioned without any prompting.

However, this does not mean that there is nothing to be done about the mess we have found ourselves in. As highlighted at the very beginning of this essay, the words we use to describe the world around us are fluid and can change – the word 'cloud' used to mean "a lump of rock," until poets and writers started using it to describe clouds (Harper, 2020), from which came the meaning of a "swarm or horde," in reference to a group of insects or birds in the sky. This evolved to mean a "multitude" of any particular thing, which was then probably applied to tangled wires and cables by engineers, until it was co-opted for marketing. The world (and the popular way to understand it) is in constant flux, and if things are going to change anyway through the passage of time, why not take steps to make that change better? Believing that we are shaped by our circumstances often leads us to forget that we can change these circumstances ourselves (Engels, Marx, 1968) and the most effective way towards emancipation is through education that enables people to express and articulate their own choices (Friere, 1970). No reality transforms itself – dialogue about our collective actions and beliefs is what can bring change. It is through critical thinking, discussion, proposition of alternatives, and action that the status quo can be changed.

CONCLUSION

This chapter used Barthes' concept of the "second order of semiotics" and myth to dissect and analyse the possible intentions behind the use of the cloud metaphor in branding and advertisement. I addressed how *cloud computing* originated as a marketing term and discussed the implications of those origins on the contemporary use of the term through an analysis of an Amazon Web Services advertisement, using Judith Williamson's methodology of advertisement decoding. The way in which language is used, especially in the case of metaphors, can affect how we view and understand the world. Advertising and product branding wants to convince the consumer that 'clouds' are simultaneously water vapour particles in the air, buildings full of cooled metal, and personal storage systems; this use of the word has diminished and diluted its semantic richness to sell the idea of immateriality and success in business ventures to consumers through intentional use of both text-based and visual metaphors. This, in turn, has obscured and hidden the material realities of every digital and electronic technology that allows *The Cloud* to exist, as well as the harmful consequences of those material realities, all in the effort to increase sales. When technology giants continue to use the word 'cloud' and its iconic fluffy image, they unintentionally reveal their desire to control how the world is understood and lived in – this fluffy metaphor is more profitable than the enmeshed systems of abuse and extraction that enable the existence of *The Cloud*. However, this thesis argues that there is no obligation to allow this practice to continue.

If mythology is the reflection of the way a culture understands the world at a specific time, I believe that rethinking the popular mythology can be a way to re-understanding the world. Engaging with critical analysis and philosophy can change ways of thinking, which in turn, can change ways of acting and being. In the next chapter I will present some of the steps being taken by towards a more just and transparent world from a variety of fields.

CHAPTER THREE – PRACTICES OF DEMYSTIFYING AND RETHINKING

This chapter will provide examples of ways of thinking and doing that oppose and render absurd the immaterial hype surrounding *The Cloud*, while also looking at why this myth might be so difficult to question in the first place. The previous chapters have outlined the rationale for rejecting the word *cloud* as a useful metaphor – as it is used to create a false sense of immateriality in the pursuit of money and power. This chapter proposes that acknowledging the shortcomings of the cloud metaphor creates space for thinking of alternative and more direct terminology, in the aims of changing popular imaginations and attitudes towards technology. This rethinking is informed through examining existing research and action in this area, particularly through looking at ways of rendering the invisible visible and countering the popular idea of digital media as immaterial. This chapter will discuss several different approaches to taking the first step towards a more just world, from the efforts of the group *We and AI* in creating a library of honest and accessible images of artificial intelligence to the demystifying the data centre through sculptural installation, as shown by artistic collective ANNEX.

3.1 THE CLOUD AS "A LOUD, DIRTY, ANGRY STRUCTURE"

The collective ANNEX is made up of artists, architects and researchers. The group aims to reimagine the data centre and are relevant to the discussion of demystifying the Cloud. Their sculptural installation *Entanglement,* which represented Ireland at the 2021 Architectural Biennale in Venice, is a leading example of an artwork that engages with the field of data-centre studies and the multidisciplinary approach it demands. *Entanglement* (fig. 9) is a sculptural and performative installation, composed of charred, burned steel server racks arranged in a campfire shape, fitted with computers, screens, ethernet wires, fans, speakers, and Rubber Plants (Anderson et al., 2021). "A loud, dirty, angry structure," as described by one of its creators (Capener, 2022), *Entanglement* casts a grimy shadow over The Cloud and its ethereal, weightless

image in media and pop culture. Twelve chairs made of steel server racks and slate, sourced from the site of the first transatlantic telecom wire, circle the hollow structure, inviting viewers to either sit around the roaring digital campfire or walk into the centre of the flames themselves. In this dimly lit basement pavilion, ANNEX sought to make obvious how much space and material is used by the infrastructure necessary for things like the Internet to exist and function, with a particular focus on Ireland (Anderson et al., 2021).

Through *Entanglement,* ANNEX unapologetically materialise the Cloud, the data centre, and all of the physical and cultural infrastructure entanglements that the Cloud relies on. *Entanglement* was one of the first environmental media artworks I encountered in my research for this thesis. Engaging with this work via documentation, reviews, and the accompanying publication, *States of Entanglement: Data in the Irish Landscape,* radically changed my perception of digital technology and led me to the research that would become this thesis.

The members of ANNEX argue that "digital is material" and their aim is the question the role and location of data and digital technologies in our lives, environments, and futures (Anderson et al., 2021). This refers to the materiality of digital technology as discussed in chapter one. ANNEX's use of the physical components of a data centre – server racks, fans, and cables – builds a tangible and vivid image of the material insides of the seemingly immaterial Cloud. This is a direct approach to demystifying connotations of immateriality and weightlessness that are perpetuated by the word *cloud*.

Entanglement is a prime example of art that aims to dispel the mythologies surrounding digital technologies and their immateriality. Created and curated by a group composed of artists, architects, researchers, and writers, this work is an example of the multi-disciplinary approach to public communication and art-making that is necessary for the reimagining of the data centre. The digital revolution and its consequences has far-reaching consequences, and ANNEX is one example of how to organise and share ideas of new imaginations of data centres and digital

technology. According to *States of Entanglement*, the collective built on small-scale conversations and emails between people with shared interests to design and build a structure that was shown on an international stage (Anderson et al., 2021).

Entanglement reveals the digital cloud through the prism of heat, which was discussed as a key point of contention in chapter one. The screens mounted on the metal racks show thermal imaging of the pavilion, and the whirring fans that blow cold air around the space draw attention to the cooling needs of data storage artefacts through a tactile involvement of the senses. Notably, the sculpture takes its conical shape from a campfire, which ANNEX calls "the most primitive of socialising technologies," (Anderson et al., 2021). This comments on how the post-internet age of technology has influenced how we socialise: less frequently in person, around a campfire, and more frequently online. Communications related to working, socialising and family life often take place online, in the dreamlike ethereal realm of the World Wide Web. As discussed in both previous chapters, these seemingly innocuous actions have tangible consequences for a large and ever-growing number of people due to their material outputs.

During the planning of *Entanglement,* in an email to the other members of ANNEX, David Capener wrote "the campfire of our age is a hyper-scale data structure," (Anderson et al., 2021). Clicks and taps and the masses of content consumed minute to minute appear to exist in a different reality, floating somewhere in the ether, untethered by the physical world and its limitations. However, as ANNEX wittily point out in the publication accompanying the installation, these interactions have a direct and tangible manifestation: "a data centre's exhaust heat is evidence that watching a cat video has material consequences that are distributed across space," (Anderson et al., 2021).

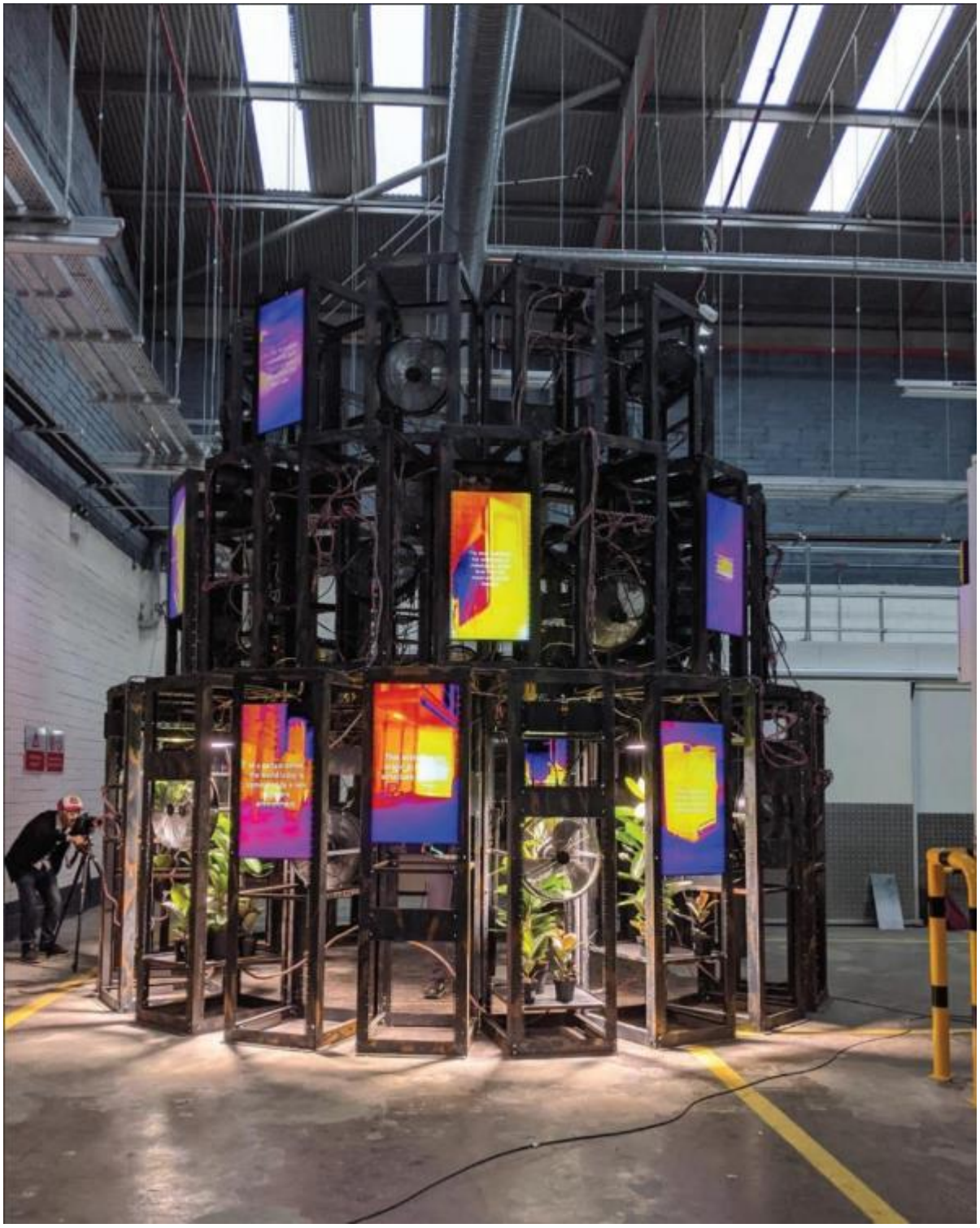

FIGURE 8: *ENTANGLEMENT* (2021), ANNEX. INSTALLATION VIEW IN THE IRISH PAVILION AT THE 2021 ARCHITECTURAL BIENNALE IN VENICE. PHOTO BY ALAN BUTLER.

3.2 A NEW NAME FOR THE TIME WE LIVE IN

While ANNEX make use of art to provide a route toward reimagining data centres and technology's impact on the planet, the question stands of how to speak and write about this phenomenon. ‘Anthropocene’ is the unofficial name proposed for the epoch in which human activity has impacted the environment enough to constitute a geological change, usually suggested as starting around 1950 (Pavid, 2024). In order for the term to be formally adopted by the International Union of Geological Science, scientists in favour must prove that humans have changed the Earth to the point that is it reflected in the layers of rock on our planet (National Geographic Society, 2023). Critical theorist Jussi Parikka, writing extensively about contemporary media culture and its “geological underpinnings,” proposes his own term for this period of time: “the anthr*obscene”* (2014). He argues that the exacerbated mining and waste-dumping practices of the last century have left an undeniable and horrifying mark upon the Earth. Parikka recognises “the unsustainable, politically ambiguous, and ethically dubious practices that maintain technological culture and its corporate networks,” and through this proposed renaming of the current geological era, appears to put a level of trust in the understanding that words can shape reality. Parikka’s new word for the time we live in reminds us of its absurdity and environmentally disastrous consequences. It also hints at the possibility of change through specific and intentional use of language.

3.3 BETTER IMAGES OF AN EMPIRE

As discussed in chapter two, intentional use of language is important for the reimagining of digital technology as possessing materiality and tangible effects on the world. Kate Crawford, drawing on over a decade of research into artificial intelligence calls AI a “promiscuous term,” that is “open to being reconfigured” (2021). She highlights how ‘artificial intelligence’ has become a nebulous, catch-all term for a variety of programmes, from facial recognition software to

language processing models. This is similar to the phenomenon observed with the term 'cloud,' as described in chapter one. Thus, I would like to discuss the work of *We and AI,* an organisation that works to improve AI literacy, as an example of an approach that could be used to improve public understanding of the Cloud as well.

We and AI is a non-profit organization that work to encourage critical thinking about AI, with the aim of enabling people to make informed decisions about living with AI. One of their goals is to bring attention to the abstract and misleading narratives that often surround AI. In an attempt to change these narratives, they run workshops and organise projects like the *Better Images of AI* library. This library is a catalogue of free-to-use images that are more accurate to the realities of AI, particularly in terms of materiality and power dynamics. The images are usually donated by artists and illustrators through open call submissions. This catalogue represents a recognition that the existing and popular images of AI proliferate a misleading idea of the technology. An online image search of the term AI brings back images of glowing blue brains and humanoid robots holding lightbulbs, which is not at all representative of what the technology actually looks like or is capable of. *Better Images of AI* aims to provide better and more accessible visualisations of the reality of AI and digital technology for use in newspaper and journal articles (The Bigger Picture AI, 2024). *We and AI* have accepted that digital technologies and their progressive forms are unavoidable, and focus on finding ways of educating people of the systems we live in, before attempting to overthrow or reject them. This is one example of an approach to change that strives to work within the existing system.

Anecdotally, in November of 2024, I attended a panel discussion hosted by Beta Festival in Dublin that was run in collaboration with a representative of *We and AI*. The focus of the panel was to discuss a Science Week initiative called *The Bigger Picture*, which had cast an open call to artists, illustrators, and students in Ireland to add to the growing *Better Images of AI* resource. Unfortunately, I found that even in a setting full of people with the best intentions, some key

misconceptions about the issues being discussed were continuously present. The vagueness and, in Kate Crawford's words, "promiscuity" of terms like 'artificial intelligence' and 'the Cloud' proved to create confusion between speakers and audience members. Even amongst themselves, speakers were not consistent with their definitions and interpretations of these words, and I found that questions posed by the audience were often misinterpreted and left unaddressed.

This is potentially a symptom of a larger issue, rather than the fault of any particular speaker at the panel. As demonstrated in chapter two, the companies that own the infrastructures of the Cloud – and by extension, AI – keep terms like these vague and unclear on purpose, as there is a financial incentive to do so. It is possible, and even likely, that these companies intentionally propagate confusion and mysticism in order to obscure any negative or harmful aspects that may cause a loss in sales. This confusion is the issue at the heart of this thesis: the technological vocabulary we currently have available is unsuitable and limiting. Recognising these limitations, and, crucially, their causes, is a step towards clearer and more effective discussion and action.

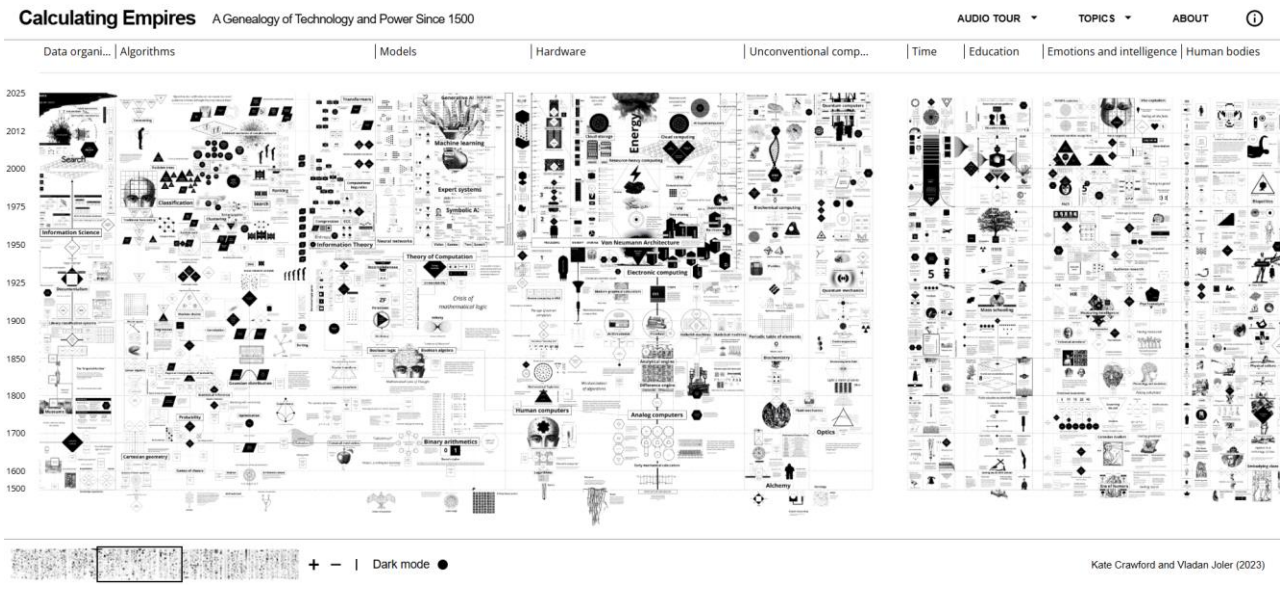

FIGURE 10: *CALCULATING EMPIRES* (2023), KATE CRAWFORD AND VLADAN JOLER. SCREENSHOT OF CALCULATINGEMPIRES.NET

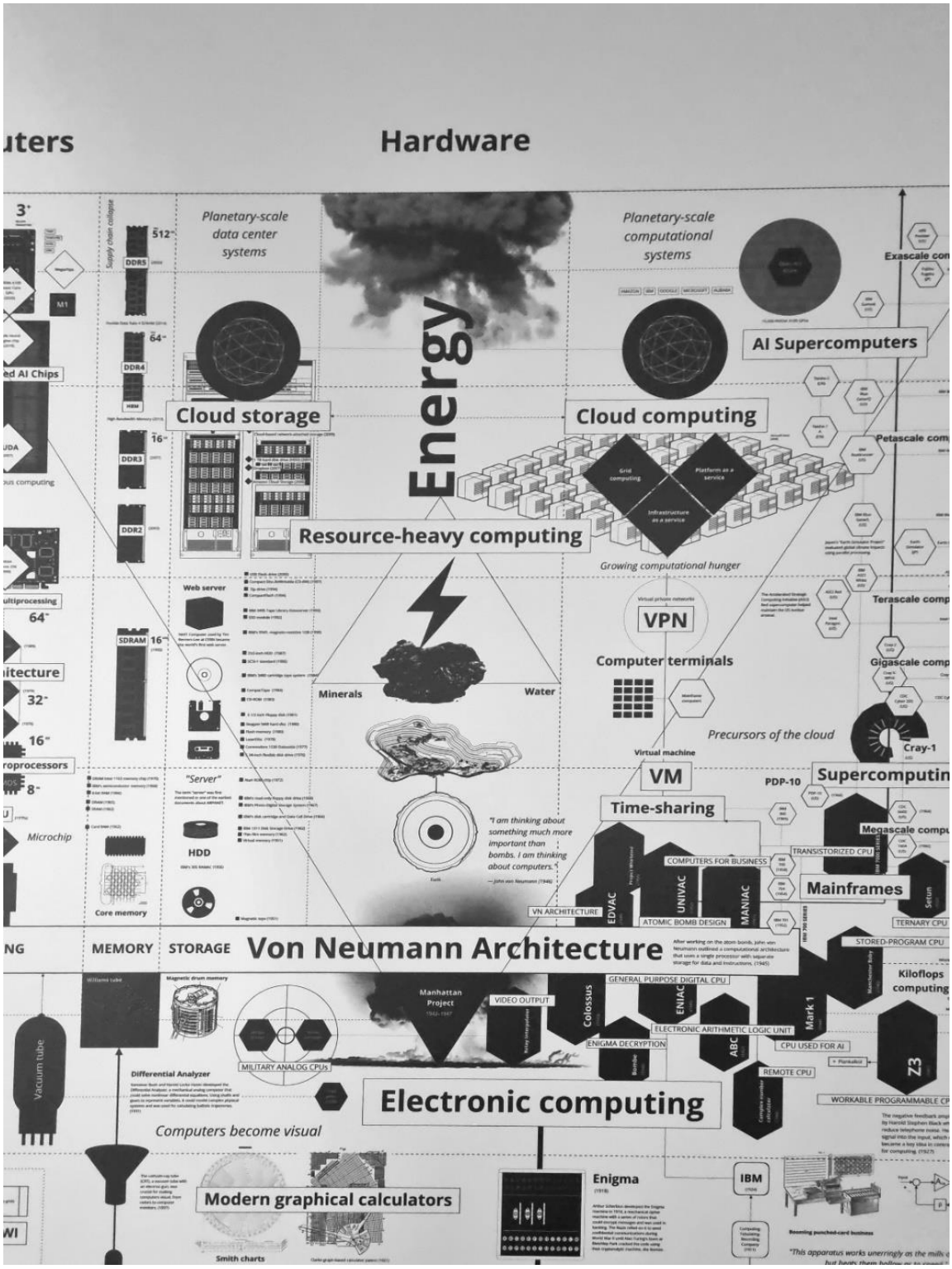

FIGURE 11: *CALCULATING EMPIRES* (2023). KATE CRAWFORD AND VLADAN JOLER. CLOSEUP OF INSTALLATION VIEW AT BETA FESTIVAL, DUBLIN, 2024. PHOTO BY ANASTASSIA VARABIOVA.

The room chosen to host the panel mentioned above included an installation of Kate Crawford and Vladan Joler's *Calculating Empires* (2023). Installed as a floor to ceiling print along the perimeter of the room, *Calculating Empires* is a large-scale visualisation of the increasingly complex and interconnected technological systems. Fig. 10 is a large section of the map as it is available online, and Fig. 11 shows an installation view of a small section of this vast genealogical map of technology and power. This smaller section succinctly describes and illustrates the hardware and material resources behind cloud computing and its predecessors through clean, monochromatic graphics and sparse text labels. When viewed in its entirety as seen in Fig. 10, *Calculating Empires* can appear to be overwhelming in its complexity and reach. This is representative of the field of technology studies, and focusing on smaller aspects of it at a time can allow for more clarity and better understanding. We can take this approach and apply it to the way we discuss issues like materiality of digital technology – focusing on one specific aspect at a time can be more productive. This has informed this thesis through my decision to focus on the cloud metaphor specifically in hopes of shaping a framework through which other aspects can be questioned and assessed. Both as an artwork and a piece of research, *Calculating Empires* is an example of the need to approach questions of technological power and development on both a large and small scale.

CONCLUSION

This chapter compiles the work of a number of critics, researchers, and artists who propose new ways of thinking about digital technology that acknowledges its cultural and material impacts. I discuss the ways in which the public communications of big tech companies can be misleading and, at times, damaging. This chapter highlights the need for more direct and explicit words that address the complexities and specificities of digital technologies and the consequences of technological progress, and points the reader in the right direction.

CONCLUSION

Through a deep analysis of material impact, semiotics, and advertisement decoding, this thesis has shown that *The Cloud* is not a vaporous, magical, or neutral computational technique that exists in the sky with no material body or consequences for the world on the ground. It is a way of handling data and computing power that simultaneously relies on tangible networks of wires and data centres and intangible systems of power and abuse. More specifically, the cloud metaphor is intentionally used in marketing this model of computing in an effort to disguise the harmful processes it both relies on and causes. This thesis focused on dissecting the misleading and misinformative qualities of the term and proposed a possible framework through which common misconceptions about digital technologies can be changed.

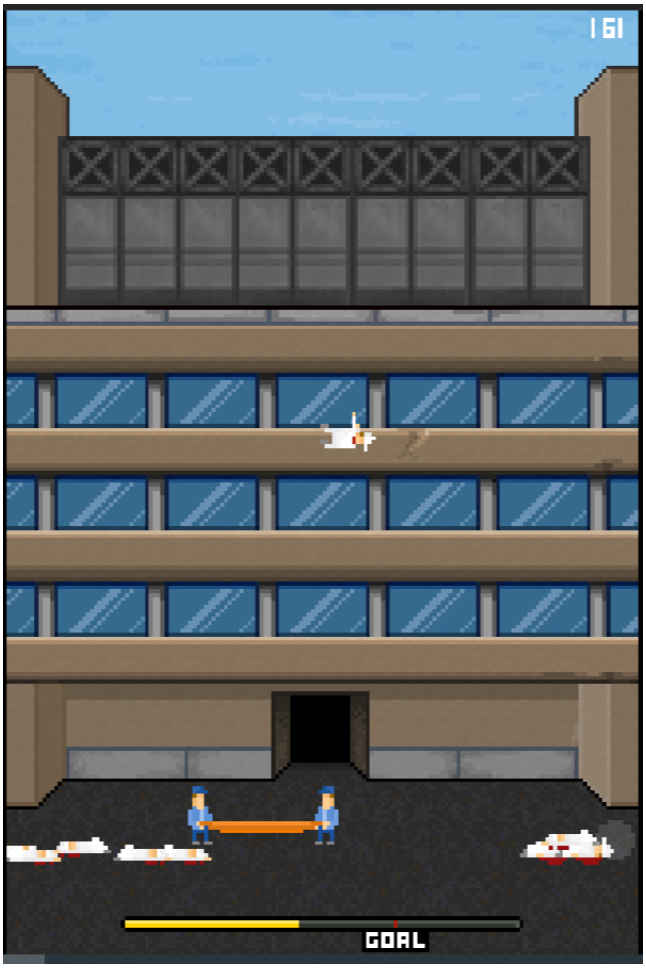

FIGURE 9 "LEVEL 2." A STILL FROM *PHONE STORY* (2011), MOLLEINDUSTRIA.

Phone Story is a video game app released by *Molleindustria* in 2011. It uses pixelated cartoon graphics and emotive narrative to reveal the many layers of abuse necessary for the creation of an iPhone (and every other electronic device). The game follows the journey of an iPhone, from the sourcing of materials to the recycling of old tech through four playable levels where the player must actively participate in order to progress to the next level. One of the levels references outsourced labour in China, through which most of the world's electronic devices are assembled in factories "as large as a city," (Molleindustria, 2011). This level involves bouncing and catching factory workers as they jump off the top of a tall building in a pong-style game mechanic as the player controls a movable "suicide-prevention net," (2011). *Phonestory* juxtaposes its cartoonish visuals and sound design with powerful and disturbing narratives based on true experiences. The app was taken down from the Apple App store only 24 hours after it was released and is only accessible now through an archived desktop version on the Phone Story website, which describes the game as "educational,"(Mollenindustria, 2011).

I came across *Phone Story* at the beginning of the process of gathering research for this thesis. My first playthrough of the game caused me a lot of distress, and for months I felt physically sick anytime I held my mobile phone in my hands or used any electronic device. As I continued investigating the material origins and consequences of digital technology, my nausea worsened. I found it difficult to accept the level of harm necessary to sustain the kind of life I was used to. Months passed, and I attended a lecture by Dr Patrick Brody, whose research on data centres was a crucial resource for this thesis. As he showed images that he had taken inside data centres and at landfills full of e-waste, I asked him how he deals with knowing all that he does. His response was simple: to avoid getting overwhelmed by everything wrong with the world, do the small things that you *can*. In this thesis, I interpret this to mean that although it is near impossible to avoid participating in the unethical systems governing the world through technology, there is

value in making informed decisions when possible. This idea has informed this body of work and is the feeling I hope carries over for any reader.

Chapter one focused on the harm obscured and hidden by the immaterial connotations of the word cloud in the context of digital technologies. It discussed the material building blocks of data centres, which are the geographical locations where cloud data storage and cloud computing takes place. This chapter delves into the detrimental nature of the power use of these data centres, the physical presence of data, the electronic waste, the extraction of resources and human right violations associated with this materiality.Chapter one concluded that there are tangible consequences to digital technology, especially at the scale of data centres and digital clouds; and often these consequences are quite harmful.

Chapter two, through an investigation and analysis of an Amazon Web Services advertisement shows that the use of the cloud metaphor is intentional, and undeniably motivated by sales and profitability. Through an investigation of the word 'cloud' through the lens of Barthes' semiotics, I speculate that one reason for the cloud metaphor's popularity and persistence could be that it accurately describes the *feeling* of immateriality for the end-user – a feeling that is deliberately amplified through the way the product is marketed.

In the third chapter I discussed some ways to challenge the notion of the digital as immaterial. From creating an open-source resource of images describing artificial intelligence and the cloud to renaming the current epoch, there are many ways to challenge the popular notion of the digital as immaterial. This chapter focuses on solutions like creating new ways to visualise AI and using more considered and honest language to describe the negative consequences of technological progress affecting land and people This chapter is not intended to be a definitive directory of the digital materialism movement, but rather a partial account of the organisations and projects that I have encountered during my research. In the introduction of her 2021 book, *An Atlas of AI,* Kate

Crawford wrote “by bringing you along on my investigations, I hope to show you how my views were formed,” an approach I have borrowed for the closing chapter.

The field of digital technology materiality is incredibly relevant at the of writing. Fossil fuels continue being burned to generate electricity and climate change related weather anomalies are increasingly more destructive. As I write the final draft, Ireland was struck by the most powerful storm in the country’s history, leaving thousands of homes without electricity for days. Friends suggested I use Chat GPT to generate summaries and make edits of my writing, to make up for the days of work I lost due to the storm – something which would go against the values expressed in this body of work. This thesis has demonstrated that it is difficult to challenge familiar and comfortable visions of reality; it is difficult to question ideas that someone has spent a lot of time and money making seem unquestionable. Specifically, this thesis discussed arguments in favour of debunking and rejecting the metaphor of the digital Cloud, as well as some ways that this is currently being done through art and science communication. More discussion and in-depth research will need to be done to propose solutions for the issues of pollution, labour, materials, and corporate control discussed in this thesis. The change necessary is systemic, and this thesis proposes the argument that the first step to that is education and dialogue. Deciphering the metaphor of the Cloud and its implications is one possible framework of understanding what is at stake and which systems these issues are consequences of.

Clouds are water vapour attracted to particles of dust and dirt in the air. “Clouds” are storage systems and buildings full of hot metal. “Cloud computing” originated as a marketing term, and corporations make money from the phrase’s misleading implications of immateriality and friendliness. Clouds can be metaphors for whatever you want them to be. They keep the Earth cool, and me up at night.

To end on a hopeful note, I would like to mention the man who proposed the current classification of sky clouds. In an essay published in 1802, British amateur meteorologist Luke Howard

proposed a possible nomenclature for the classification of different types of clouds in the sky. Included in the published version of the essay are watercolour washes of different shapes, or modulations, of clouds in the essay to illustrate his observations. Howard assigned Latin terms to categories of clouds that he observed based on their shape and altitude. *Cirrus* (meaning "curl" in Latin) was used for high-altitude thin wispy clouds that resemble feathers or tendrils, while lumpy, round shaped clouds located in the middle altitudes were named *cumulus* (meaning "pile or heap" in Latin). Fig. 14 is an image of the plate in the opening pages of Howard's essay, depicting clouds as they gather for a thunderstorm. It shows great dark clouds looming over a body of water. A tiny figure at the bottom of the image has raised arms in a gesture of exclamation at the sight. Perhaps this was meant as a representation of Howard himself, or any other keen observer of the sky and its clouds. Throughout his essay, Howard makes the case for a scientific and empirical approach to observing clouds and the changes that occur in their shape and appearance. He argued that clouds are "the countenance of the atmosphere," and are as good indicators of the causes affecting it, as a person's appearance can be of their mood or health (Howard, 1803).

Although the accuracy of judging a person's mood from their appearance has long been shown to lack scientific evidence, studying cloud formations *is* very useful for understanding weather patterns. A front of dark, heavy *nimbus* clouds approaching is reason to carry an umbrella for the day; a flock of wispy *cirrus* clouds will suggest to me that should I spend some time outdoors to enjoy the forthcoming spell of good weather. If studying clouds in the sky can reveal things that may not be obvious and help us make informed decisions, my aim is to show that studying *The Cloud* can be similarly useful. This thesis is a result of observing the tangled mess of political, geological, ecological, and ethical issues at the heart of digital technologies today and it argues that demystifying *The Cloud* is one potential step towards untangling and making sense of it all.

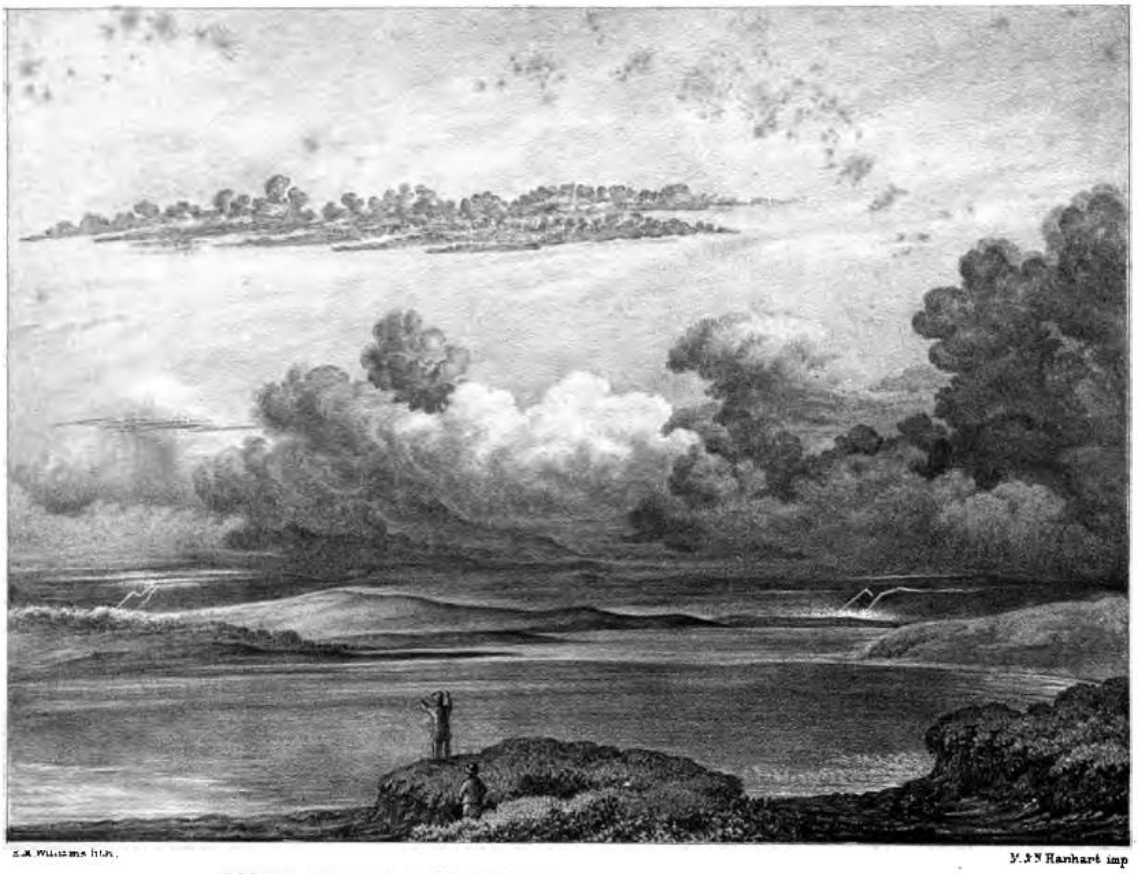

FIGURE 10: ***FORMS ASSUMED BY CLOUDS WHEN GATHERING FOR A THUNDERSTORM*** **(1849), LUKE HOWARD. A PLATE FROM** ***THE MODIFICATIONS OF CLOUDS*****(1849) BY LUKE HOWARD.**

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