GHOST IN THE MACHINE

Architecture (people) > Data
Ghost in the Machine

authored by

Benjamin Speedy

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To those who inspired it and will not read it.

There are so many people that I have to thank for the crazy last 5 years. To everyone that made it so memorable. Much love.

p.s Thanks Mum and Dad for all the help along the way.
Forever grateful.
Reality, at first glance, is a simple thing: the television speaking to you now is real. Your body sunk into that chair in the approach to midnight, a clock ticking at the threshold of awareness: All the endless detail of a solid and material world surrounding you. These things exist. They can be measured with a yardstick, a voltameter, a weighing scale. These things are real. Then there’s the mind, half-focused on the TV, the settee, the clock. This ghostly knot of memory, idea and feeling that we call ourself also exists, though not within the measurable world our science may describe.

Consciousness is unquantifiable, a ghost in the machine, barely considered real at all, though in a sense this flickering mosaic of awareness is the only true reality that we can ever know. The Here-and-Now demands attention, is more present to us. We dismiss the inner world of our ideas as less important, although most of our immediate physical reality originated only in the mind. The TV, sofa, clock and room, the whole civilisation that contains them once were nothing save ideas. Material existence is entirely founded on a phantom realm of mind, whose nature and geography are unexplored. Before the Age of Reason was announced, humanity had polished strategies for interacting with the world of the imaginary and invisible: complicated magic-systems; sprawling pantheons of gods and spirits, images and names with which we labeled powerful inner forces so that we might better understand them. Intellect, Emotion and Unconscious thought were made divinities or demons so that we [like Faust] might better know them, deal with them, become them.

- Alan Moore
The title for this thesis – The Ghost in the Machine – is drawn from the previous extract from an interview with Alan Moore. His description of consciousness as a phantom realm of mind resonated with how I felt society understood digital information. Data holds a presence within modern day existence, responsible for almost everything from communications to economies yet its lack of physicality results in it having this ghost like presence within the modern societal machine. This is where the substance for the Ghost in the Machine was found; driven by questions of architecture and its role in representing the intangible elements of human existence.

Painted by Hieronymus Bosch in the early 1500’s – Garden of Earthly Delights – is shown opposite and previously along with Moore’s quote. I saw this thesis as an opportunity for me to challenge my norms and chose to be more playful than I would normally attempt with my work. Grey-scale presentation had become a default response during my time at architecture school, so I decided to break tradition and used my favourite painting to set the scene from the beginning for bold colour and finer detail.

“Color does not add a pleasant quality to design - it reinforces it.”
- Pierre Bonnard
In an age of electronic networks and digital communities, the ability to access the world’s knowledge from anywhere, by anyone, at anytime is the new reality. With data growing at an exponential rate, questions of its physical manifestation in the socio-environment become inescapable. As digital networks grow and develop a mounting influence on our urban and social condition, it becomes critical to develop a platform from which a tangible relationship with data in the public realm can be accomplished.

The Data Centre is an architectural typology that has recently emerged in response to the rapid consumption and production of digital information. While these data centers serve in driving global communication and economies, they operate as impenetrable objects without a common physical expression away from red and blue wires. Many adapt existing buildings and bunkers, occupy nondescript warehouses and are placed in remote sites for reasons of energy consumption and security. The current data centre typology blends in to urban contexts, sometimes disregarding humanised space entirely, justified as a response to operational constraints. The illegibility of this architectural strategy camouflages the physicalness of rapid digital data production and consumption. Giving data this ‘ghost’ like presence within the mechanisms of the modern world.

This thesis proposes the need for an architectural response aware of the changing knowledge landscape, one that recognizes that the human condition in the digital environment requires more than just a sign to Silicon Valley. Calling for an architectural restructuring of the data centre, enacting a tangible interface in the pursuit to locate the human condition within the digital expanse.
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Digital information is a means of controlling and representing human expressions and actions. It is the contemporary authority on everything; a way of communication that modern-day interactions and societal functions demand. Digital information or data as it is commonly referred, has evolved from the pen and paper as another way of storing, creating and distributing knowledge. However, Data, unlike the book, does not have the capacity to hold and require a common physical presence. This lack of physicality and its reliance on digital channels now pose potential threats to the further development of a humanized society.

The ‘book’ was the culmination of human expertise. It held all that collective humankind knew about the world and their place in it. The library is the home of the book, the place of learning and knowledge distribution, where groups or individuals could visit and develop their intellect together. Furthermore, the symbol of the civic library was a pledge to freedom of knowledge, an image firmly anchored by its trademark as an establishment for a progressive society. The architecture of the library became the physical manifestation of man’s collective stride towards the betterment of humanity, a physical entity that performs a sense of civic loyalty and ownership.

Data is the now the contemporary equivalent to the book. Enduring all the same proficiencies a book provided in a much more modern condition. Providing access to knowledge with the added facilities that our digital society encompasses; speed and flexibility with a seemingly limitless capacity. The ability to store and access information remotely has removed the need for a ‘library’ or a public place of assembly. Now you can swipe through the knowledge of the world from your couch at home. As a result, humankind lost the empirical value a civic library once provided and what was a public place of celebration had been reduced to that of a placeless hand-held digitized screen.

“In our lifetime we are going from not everyone being able to communicate to almost everyone being able to, from not everyone having access to a library to almost everyone having access to the world’s knowledge.”

- Eric Schmidt, Executive Chairman of Alphabet.
Data centres and libraries are both repositories of information. But while data centres serve in driving global communication and economies, they operate as impenetrable objects without a common physical expression away from red and blue wires. Many data centres blend into urban contexts by adapting existing buildings and bunkers or occupying nondescript warehouses. Others are placed in remote sites for reasons of energy consumption and security. The illegibility of this architectural ‘box’ camouflages what the architecture of the library celebrated: the physicality of knowledge production and consumption.

What does this change in our knowledge-setting mean for architecture? What place does architecture have in locating the human condition within our digitally saturated society?

This thesis proposes the need for an architectural response aware of the changing knowledge landscape, one that recognizes that the human condition in the digital environment requires more than just a sign to Silicon Valley. Through the linking of digital information technology to new spatial programs, experiences, and public functions, architectural space can offer an interface between the physical and digital environments. Over time this space can become a place that offers man something tangible in the pursuit to better understand digital channels; striving for a contemporary revitalization of the public emotions of grandeur, loyalty and ownership once instilled by the civic library.

"Architecture never derived its force from stability of culture, but rather from the expression of those moments when that sense of stability slipped."
The modern world is undergoing digital change at an exponential rate. Because of this global economic and communication channels have experienced unprecedented growth and development. Yet the time sensitive endeavours such as democracy have been less able to keep up. This widening gap between governing systems and social progression is bringing attention to concerns around digital identity, privacy and ownership. This thesis explores these elements of social influence and proposes the programmatic restructuring of the data centre in order to better serve a humanised civic condition.

This profound change in information accessibility has brought the library’s civic role in the digital age to question. However this thesis appreciates the civic value of the library as more than just a place to shelve books. It is understood as a place of social and political importance that has its own architectural significance, one that will not cease to endure and evolve through time. Instead of advocating for the replacement of the library, this thesis uses the past sentiment of the civic library as a precedent, one that contextualises humanity’s physical relationship with information and knowledge.

The Data Centre is an architectural typology that has recently emerged in response to the rapid uptake of digital information technology. This thesis is concerned with the relationship between humankind and our present digital environment, using the data centre as the basis from which to evolve from. The architectural research aims to create space where the intangible nature of digital information is re-imagined in a physical setting. Giving data a physical presence that invites an emotive and quantifiable human response. This is not to be confused with a singular focus towards finding an aesthetically centred ‘digital vernacular’, these formally driven aspects of the design process share in a wider programmatic and spatially motivated approach.

The following outlines the more general focuses relevant to the wider generation of this project:

1. This thesis explores an architectural response set in the present-day.
2. This thesis understands that all architecture needs to be site responsive, ensuring a transition from a space to a place over time.
3. This thesis aims to develop an energy efficient proposal. Architecture without a sustainable focus has no place in our delicate environment and its future.
PART 01: THEORETICAL SETTING
First a broad analysis of data centres’ mechanisms is engaged along with a look into its brief history. This allows for an understanding of data centres’ current design treatment and contextualises the apparent social neglect. To locate the role for architecture, an introduction of key urban and social theories concerned with the advent of digital information are explored. These findings helped direct and focus the project, something that has been a difficult task in such an information-saturated topic.

PART 02: CASE STUDIES
Case studies of both existing data centres and projects concerned with humankind’s relationship to the digital environment are explored. These are then used to contextualise the theoretical arguments previously set and reveal the architectural imperatives and challenges that define the final scope of the project.

PART 03: DESIGN
A methodological design process can now be actioned. Influenced by the research and a robust variety of case studies, the design process focuses on developing an architecture driven by qualities of site, space and program. Aiming to re-present digital information to the public through tangible space.

Starting with site setting and analysis, the process then begins to define formal drivers influenced by existing site conditions and the development of ambient space. The design aims to create spaces that materialise an interface between digital channels and the physical environment through the application of specific forms and functions. All in hope of generating spatial opportunities for the inhabitants to physically experience the presence of digital information in a public and inclusive situation, one that is not currently associated with data use.
Digital Information: A type of information that is stored using a series of ones and zeros. It requires a computer to translate this digital code into a legible analog form for man to understand.

Data: A conversational term for digital information. Although data is accurately the definition of all unorganised information, not just digital, it has become a colloquial reference to digital ethers and systems.

Data Centre: This term is used to describe a built-form concerned with housing the physical technology responsible for the generation, maintenance and storage of digital information. It is not used to define a particular architectural typology.

Cloud: A metaphor for the offsite storage and remote access to digital information. An Internet based computing that companies such as Facebook are built upon. Essentially the network services are invisible to the user, as if obscured by a cloud.
The history of the data centre is aligned with the history of computing; as computing technologies expanded and grew so did the existence of the data centre. During the 1980s, the computer industry experienced the boom of the microcomputer era thanks to the birth of the IBM Personal Computer (PC). Computers now could be installed everywhere with little thought being given to the specific environmental and operating requirements of the machines, let alone concerning their relationship with humankind.

The need for data centres became more apparent as technology was improved and the spatial needs became more specific. With the rise of the Internet and network computing in the 90’s, microcomputers (now called “servers”) started to find their places in the old computer rooms and were being called data centres. With the boom of the Internet (dot-com era) and the wide spread use of virtualisation, easily accessed offsite information became desired. The existing localized data rooms shifted offsite to become known as ‘mega data centres’, with the sole purpose of providing a perfect environment for efficient operation of digital information storage and management.

As a result, data centres are likened to a “big computer” more so than a built space. Essentially the data centre holds no social recognition further than that of the digital hardware it is charged with containing. The dismissal of a significant social residence can be attributed to the rapid development and inherent complexities of digital technology. In the early days of computing, things were much bigger, required some form of mechanical operation and as a result it was easier to have a general overview of the development. Computers today are so
complex that even specialists are only familiar with partial aspects, with computers requiring a team of specialists to master. The nature of complexity and its role in social acceptance are explored later, first it is important to understand the technical requirements of data centres and how this has attributed to its social retreat.

The following has been split in three sections: Space, Energy and Access. Each of sections covers the three major aspects of data centre design that play major roles in the function, aesthetic and location of data centres today.

**SPACE**

The spatial requirements of a data centre are summarized in the block diagram opposite (Fig.07). As you can see from the diagram, a majority of the spatial requirements of a data centre are taken up by the IT equipment and environmental control systems.¹

**IT Equipment**

The main components of a data centre are the servers that are responsible for the access, storage and distribution of digital information. Stored on racks within server cabinets of varying sizes² (dependent on the storage requirements or availability of technology) these server cabinets are then stored within the data centre shown below (Fig.06).

**Environmental Control**

IT equipment needs a maintained cool environment to prevent overheating and consequent failure³. Data centres employ various different methods of environment control ranging from fresh-air cooling (economization) to water-cooled systems. Economization uses the existing external environment to provide the required temperatures, a system than can only be employed when the data centre is sited in cold environments⁴. Although this reduces energy costs dramatically, it is a major factor in modern data centres being placed in remote inaccessible locations. A water cooled system as the name suggests, cools the servers with water.

The two systems previously explained are examples of environment systems focused around controlling the temperature of an entire room. The next environmental control system is one that is concerned with only cooling the racks and servers themselves. This system is known as in rack cooling and has a few different methods of implementation.

The first option is to take the big bulky systems required to cool an entire server room and attach much smaller units to the back of each server cabinet. Providing space saving benefits and also a more efficient model of environment control, as the system is only concerned with the server temperature and not the entire space. The next option is the use of cold plates, i.e. liquid cooled heat sink. Which through the direction of

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1. It Utility
2. Ibid. p 47
3. Ibid. p 53
4. Ibid. p 47
cold water through metal plates removes heat from the server racks. Cold plates¹ are also a safer example of water cooled systems as the likelihood of leaks is much less when compared with water cooling systems using conventional plumbing methods.

Administration and Security: Because data centres are digitally based the need for onsite human occupation is relatively limited when compared to the scale of many of these facilities. The number of people needed to run a data centre is proportional to the number of servers on site, a rough figure is 1 technician per 1000 servers². As the number of servers increases so will the need for technicians, and subsequently the need for sufficient living and working conditions (bathrooms, social spaces etc). Other than the technical systems, the next job requiring a physical presence is security, although advancements in this field have also reduced the need for people being on site. Because of this many data centres have the necessary people on call resulting in these empty, cold and generally inaccessible facilities.

**ENERGY**

Data centres consume an immense amount of electrical energy. In the United States a 2007 report found that the data centre sector accounted for 1.5% of all US electricity consumption in 2006 (61 billion kWh) totaling a cost of $4.5 billion.

These huge numbers are the reason why data centres and their design is focussed heavily around being energy efficient. The two major consumers of energy are the servers and the environment systems. The server energy use is a closed system, meaning advancements in server technology are needed to reduce their energy use. Maintaining a controlled environment however is affected by the design and location of the building. This relationship between built form and a controlled environment leads to various design outcomes, with a few outlined below:

a.) Little to no fenestration. Allows for spaces to be more easily maintained.
b.) Remote locations in cold climates. Allows for efficient fresh air cooling (far cheaper and greener than mechanical systems)
c.) If cold location unavailable. Large amounts of space dedicated to the mechanical cooling systems required.

**ACCESS**

With the successful operation of companies relying on the operation of its data services along with many data centres holding sensitive personal, corporate and government information, the security of these data centres is important. Much like environmental considerations, the need to secure data centres and their holdings plays a significant role in the site selection and design of a data centres structure and its spaces.

Security of a Data centre involves more than just limited access to the facilities internal spaces. Considerations around natural disaster responses, fire protection, and data recovery/
The current focus of data centre design is on developing the most efficient and effective model of storage and distribution. This has led to the architecture language of the data centre being driven by the functional constraints and programme requirements outlined previously. All with the purpose of getting the information from the server racks to the individual as quick and cheap as possible (both in terms of monetary and physical resource value). The following is an outline of the key factors that contribute to the design of today’s data centre. Site and Form collapse the architectural language of the data centre into direct relationships between required functions and the consequent effects. This is explored in finer detail in Part 02 of this thesis (case studies).

**SITE**

Three major factors contribute to the site location of a data centre:

1.) Availability/price of land: The need for large amounts of floor space drives many data centres out of populous urban areas where land price is high and space is limited.

2.) Securitization: The sensitive information that data centres hold is another factor for wanting to distance their location from large populations of people, in hopes of reducing security threats.

3.) Favourable climate conditions: Cold climates are considered ideal for data centre locations as it reduces the need for artificial cooling systems and brings the energy consumption down significantly.

**FORM**

Three major factors contribute to the form of a data centre:

1.) Environment control: The strict cooling requirements for internal space mean fenestration is undesirable, as a fully closed and insulated room is the most efficient space for maintaining a constant temperature.

2.) Securitization: The sensitive information that data centres hold means not only security threats from individuals are considered, but also larger threats such as terrorism and natural disasters. This leads to many data centres becoming strengthened structurally, resulting in bunker-like forms and construction methods.

3.) Size: The amount of information needing to be housed within the development plays a significant role in the form of a data centre. With the existing server racks and cabinets layout a large area of column free space is required. This leads to data centres sprawling outward becoming large non-descript factories or tall extrusions on concrete (see AT&T case study).

Considering how a data centre architecture could add something of value to society has been pushed aside in the pursuit for the most efficient model. From this research it is clear to see that data centre design considers all but one aspect of a typical architectural project; the Human. Site, environment, security, resiliency, adaptability and energy use are all major factors when implementing a new data centre. Instead of the focus being around how the design can benefit man, it is concerned purely with the computer. Essentially data centres are treated like any other piece of critical infrastructure, there to serve a wider purpose. Comparable existing examples of infrastructure include telecommunications or electrical distribution systems, each with specialized components that invariably inform a formal and spatial consequence. These examples of infrastructure have an architectural language, which, unsurprisingly is almost indistinguishable from that of a data centre (Fig 9 & 10). However, these existing infrastructural systems have defined interactions with society and the space it occupies, with the most obvious example being...
electricity and its distribution. Through a network of physical installations (power poles & lines), electrical infrastructure has a presence that is visually and tactely accessible in every modern urban context, giving place to consumption of energy. Conversely, data centres interact with the world through personal computerized devices that support no public presence and begin to breakdown the relationship between consumption and place, which once were inherently linked. Upon review it is clear that there has been an unintentional abandonment of digital information’s physical representation within the civic and social domains. Unlike electrical infrastructure, that through no direct attempt of its own, requires a physical place in modern populated areas (power lines and alike). As a result delivers a civic sense of achievement and progress. Data centres do not require the physical presence, and therefore cannot physically contribute to a larger social and civic audience. As the data centre is just a cog in the workings of the most significant influencer of our time, the Internet; it is not difficult to understand how this neglect manifested. The complexity of digital infrastructure in combination with the uptake of personal devices led to the receipt of a social ignorance. Because digital information serves a global social, political and economic need, the people of world have become unconcerned with how it works or where it comes from, only with having uninterrupted access to ‘everything’ at the swipe of a finger.
Furthermore, Castells suggests because function and power in our societies are organized in the space of flows, the domination of its logic alters the experience of places, becoming abstracted by power and increasingly separated from knowledge. This means that not only is digital information defining how our society works, but as a result it is also beginning to shape it.

The final chapter highlights information technology's influence in shaping the urban condition, warning that the contradiction between the two opposing methods of spatial organisation threaten to break down communicative channels in society. “Unless cultural, political, and physical bridges are deliberately built between these two forms of space, we may be heading toward life in parallel universes whose times cannot meet because they are warped into different dimensions of a social hyperspace.”

Castells analysis of the urban condition in the information age has reinforced the need to develop a tangible relationship between digital networks and society, between the space of flows and the space of places.

Manuel Castells’ ‘The Information Age: Economy, Society and Culture’, is an analysis of contemporary capitalism, presenting a theory of urbanism positioned in the information age that has resounding implications for architecture. Castells explores how the presence of digital ethers and the capitalist consumption of electronic information have implications for the development of a humanised society. Castells’ theory of urbanism supports the employment of architecture to develop a tangible relationship between digital information and society.

This theory of urbanism is based on the distinction between two key spatial characterisations of the information age, the “space of flows”, and the “space of places”. Castells describes the space of flows as the “material support of simultaneous social practices communicated at a distance, [involving] the production, transmission and processing of flows of information.” The space of flows is the dominant spatial manifestation of power and function in our societies; meaning the way in which society places itself within the information age is of direct response to the use and application of this digital information and technology. This thesis recognizes the ‘space of flows’ as the consumption and production of digital information.

Castells does make mention that although the space of flows is the spatial model where power and social functions are currently organized, people continue to live in the ‘space of places’, reminding us that we move physically (space of places) while staying put in our electronic connection (space of flows). Emphasizing that we carry ‘flows’ while we move across ‘places’.
CASE STUDIES

Focusing the research through analysis of existing projects concerned with the relationship between people and information.

2.01
SEATTLE PUBLIC LIBRARY

2.02
AT&T LONG LINES BUILDING

2.03
DEAD DROP

2.04
PROJECT INFLUENCE
With the advent of digital information, the role of the library in our digitally saturated society has been brought to question. A built example that addressed this change in our knowledge landscape is OMA's Seattle public library, designed within the concept of ‘Urban consolidation’. In this concept OMA reinterpreted infrastructural elements typical of the city as spatial components of the building, thus suggesting a continuation of the public realm. In this design, the classic program of the library consisting of information storage and transfer is extrapolated into an urban event space, offering the reader many spaces, places and information mediums to interact with. This approach to defining programme has lead to its expressive exterior facade. The rigid structuring of spatial elements and defined use spaces resulted in a strong geometrical form that was accentuated by its blatant wrapping of form. The diamond structural grid encasing the interior is angular and sharp, expressing the stacked and cantilevered spaces within. This honesty of form develops an intriguing aesthetic driven by its simplistic shape that is then complicated by the intricacy of the structural detail. Structure is important in the overall appeal of this work of architecture, especially in terms of it making a public work that instills a sense of civic pride and ownership.
The Seattle Central Library redefines the library as an institution no longer exclusively dedicated to the book, but as an information store where all potent forms of media—new and old—are presented equally and legibly. In an age where information can be accessed anywhere, it is the simultaneity of all media and, more importantly, the curatorship of their content that will make the library vital.

- Rem Koolhas
FIG 16.
OMA’s Seattle public library.
Image highlighting the expressive structural system that wraps the entire exterior.
Source: Archdaily.
This case study is an example of how the buildings infrastructural utility informs the articulation of shape and materials. In fact, given the rarity of human inhabitation, utility has become the sole parameter in the design of the data centre. This brutalist piece of architecture remains an enigma to many New Yorkers, without any fenestration of any kind the only exterior protrusions are for air ventilation. Due to the building’s technical nature, the height of each floor is 6 m, almost double that of the normal office building, and there is thus only 29 floors altogether which one can only begin to understand once inside the building.

I have mixed feelings towards this work of architecture. On one hand I despise this building for its total blockade of the outside world. As a result long lines has single handedly defined digital information as a ‘divine power’ that we are not worthy to greet or know. Treating digital information as a utility not worthy of understanding, only use. A prime example of how data centres refuse to address a civic need.
### Name:
AT & T Long lines building

### Location:
33 Thomas St, Manhattan, New York

### Date Built:
1974

### Architectural Style:
Brutalist

### Architect:
John Carl Warnecke

### Height:
167.5m

### Use:
Secure data storage facility.

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and instead become a physical expression that reinforce the separation between digital information and man. On the other hand I am intrigued and attracted to its fierce architectural honesty. The Long Lines Building’s consistency of function (bar the intake and exhaust of air) is translated into the severity of its uniform granite facade. The irony found in the design’s total rejection to interaction with the outside world in contrast to its site in the middle of one of the busiest cities in the world is humorous. Stubbornly devoted to the rule of its era: Form follows Function.

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![AT&T Long Lines Building](socks-studio.com)

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![AT&T Long Lines Building](socks-studio.com)

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![AT&T Long Lines Building](socks-studio.com)
This case study looks at an art movement that began in NYC in 2010. It is the work of conceptual artist Aram Bartholl, who conceived the idea during his stay at Eyebeam¹ as the artist in residence. He has a website² which provides a manifesto as follows:

Dead Drops is an anonymous, offline, peer to peer file-sharing network in public space. Anyone can access a Dead Drop and everyone may install a Dead Drop in their neighborhood/city. A Dead Drop must be public accessible. A Dead Drop inside closed buildings or private places with limited or temporary access is not a Dead Drop. A real Dead Drop mounts as read and writable mass storage drive without any custom software. Dead Drops don’t need to be synced or connected to each other. Each Dead Drop is singular in its existence. A very beautiful Dead Drop shows only the metal sheath enclosed type-A USB plug and is cemented into walls. You would hardly notice it. Dead Drops don’t need any cables or wireless technology. Your knees on the ground or a dirty jacket on the wall is what it takes share files offline. A Dead Drop is a naked piece of passively powered Universal Serial Bus technology embedded into the city, the only true public space. In an era of growing clouds and fancy new devices without access to local files we need to rethink the freedom and distribution of data.

The Dead Drops movement is on its way for change! - Aram Bartholl, Dead Drop manifesto.

¹. Eyebeam is a nonprofit studio for collaborative experiments with technology toward a more imaginative and just world. https://eyebeam.org
³. Ibid
Along with this manifesto there are instructional videos, a FAQ board and a locations map, where interested members of the public can geo-locate their own dead drops they have implemented around the world. Currently there are 1,858 dead drops counted for around the world, totaling 25,081 Gigabytes of physical public USB storage space¹.

The dead drop movement was born out of the growing concerns around data ownership and censorship in the digital environment, both topics that have become mainstream news in the wake of affairs such as Edward Snowden with Wiki Leaks. Along with providing a system of digital storage that is free from political and social censorship, the dead drop movement also delivers a situation to the user that is unlike any other digitally focused condition. Through forcing the digital consumer to get their “knees on the ground”, or put their “jacket against a wall”² in retrieval of the digital information, a dead drop challenges the lack of physical interaction between digital information and man.

The cementing of a USB stick into built form shifts the data held within the USB into the physical world. Access and use now being influenced by time and space, both of which digital information

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¹ https://deaddrops.com

1. A hole is drilled into the wall, floor, roof or anything you can find that will support a USB (pretty much anywhere.)

2. After placing the digital content on the USB, insert it into the wall so that only the ‘tongue’ is visible.

3. Fix the USB in place using quick cement or other appropriate means. Making the stick look like it is as much apart of the built form as possible.

4. Touch, Plug, Pause. INTERACT! The dead drop is now active and ready for some old fashioned physical interaction. Upload the Dead drop's location at Deaddrops.com`
by design, is inherently uninhibited by. Regardless of whether or not a user physically downloads/uploads information to that USB or just notices it in passing, the presence is enough to incite thought patterns that beg the user to question their physical relationship with digital information. Architecture is used as a vessel, bridging a connection between the physical world and digital information, allowing for a moment of pause in the boundless and persistently impatient domain of digital access. Although the placing of USB devices in public space as a viable means of digital information access and distribution is questionable and fundamentally flawed (USB sticks in themselves will most likely be swallowed up by technological advancements and rendered useless within the next decade) the proposition of facilitating a physical interaction between digital information and humankind is hugely important to the development of this thesis. Not only does it force a physical relationship between data and humankind, it uses architecture to do so. Creating a trio of interactivity that develops emotions and understandings around the physicalness of digital information.

“"I fear the day that technology will surpass our human interaction. The world will have a generation of idiots. “

- Albert Einstein
From the previous case studies there have been three major lines of influence taken into the continuation and design of this thesis project. They have been defined below in two categories: Form and Programme.

**Form:**
When looking at both the Seattle library and Long lines AT&T it was obvious to note that both projects had a very strong structural aesthetic. Long lines building holding this within its homogenous solid façade and strength of stone, and conversely in the Seattle library whose façade is made up of many glass panels but framed within a continuous deep structural grid.

**Programme:**
Coming across the dead drop movement presented interesting opportunities for the programmatic function of the new data centre. Not by implementing it as a viable means of digital storage and access, but instead by positioning it as a sculptural element throughout the design, becoming an ornament that celebrates and expresses the physicality of digital information production and consumption. (developed in part 3)
PART.03

3.01 Introduction
Project focus
Site Proposal + Analysis
3.02 Defining Programme
3.03 Form Making
3.04 Form Refining
3.05 Circulation
3.06 A Digital Touch
3.07 Ministry of Digital Information
- Plans, sections & perspectives.
3.08 Conclusion

DESIGN
A full architectural design process is engaged. From site analysis to rendered visualisations, thematic digital relationships facilitated by architecture is achieved.
INTRODUCTION

The design component of this thesis investigates the research proposition of a new data centre. Focusing on how architecture can facilitate a tangible interface between the physical and digital environments. Through the linking of digital information technology to new spatial programs, experiences, and public functions, the design aims to develop space that offers the public opportunities for a collective understanding of digital information at a civic scale, in direct opposition to the experience offered through personalized devices.

The theoretical context in which this exploration operates, comes from the urban theories introduced by Castells which called for a bridging between digital networks and physical space to better serve the future of our urban condition.

The process takes the understandings gained through the analysis of the historical and existing functions of data centres and proposes new mechanisms that are better suited to developing an inhabitant focused architecture. The design aims to utilize conditions of site, environment and technology to better serve a civic need, while taking cues from the formal case studies to create civic aesthetic values concerned with a digital expression.

Beginning with a detailed analysis of site by looking at existing site conditions through macro and micro lenses. The exploration leads to a SWOT analysis that provides a robust foundation for the programmatic and formal derivation processes that follow.

The programmatic development of the project begins by reshuffling the existing spatial programs of the data centre. Then, by exercising opportunities found in the technologies utilized by digital networks and existing conditions of site, proposes spatial uses and forms that develop tangible relations to the digital environment. After the architectural programme is confirmed the formal development of the project begins. Using the axial conditions found on site, the process develops relationships between the existing Reservoir, Museum and landform leading to the initial form finding to be of a considered and appropriate scale. This initial mass is then detailed and developed into the final work of architecture presented in plan section and perspective.
Auckland Domain is the city’s oldest park. It is spacious with a diverse range of built and natural assets placed throughout. Located on the edge of Auckland’s CBD, the domain is a large centrally located public space, providing civic amenity from recreation to event opportunities. Edged by the Auckland City Hospital and home to vast sporting grounds, the domain is a hub of activity throughout the year. The Auckland War Memorial Museum sitting at the domain’s highest point, is a main feature of the park. The domain is also host to a range of formal gardens, bush walks and the ASB tennis arena on its northern boundary.
This historic vaulted mass concrete structure on Observatory Hill to the south of the Auckland War Memorial Museum was excavated into the crater ridge of the Domain volcano between 1949 and 1952. The Domain reservoir is a 4 million gallon service reservoir that acts as a buffer reservoir for the neighboring Parnell area and parts of the Auckland CBD. It was one of three new service reservoirs that were planned for Auckland City in 1947, the others being Mt Hobson and Three Kings. Due to logistical issues and post-war steel shortages, the construction of the first two reservoirs was delayed and it became a matter of critical importance for the city's water supply that the Domain reservoir was completed with utmost urgency. As steel was scarce and geological investigations of the site indicated it was suitable, the decision was made to build the reservoir using vaulted mass concrete construction techniques. After completion, the reservoir faded from public interest and memory, unseen and unnoticed, an important yet now hidden piece of the city's infrastructure. Today its outline is only faintly visible from aerial photographs of the Domain, where the grass is stunted by shallowness of the soil above the vaulted roof. The reservoir is a unique part of Auckland's heritage, a remarkable space if only able to be experienced…

FIG 24 Opposite. Photograph of the reservoir during construction in 1951. Sourced from AK city council heritage image library.

1. A.J. Dickenson, City Engineer to the Town Clerk, 1949.

2. Timber board molds used. Important to note as this was considered and utilized in later design stages.
AUCKLAND DOMAIN RESERVOIR

Location: The Auckland Domain, Parnell, Auckland 1010

Significant neighbours: Ak Memorial Museum.

Architectural Style: N/A

Volume: 15,000 m³

General Dimensions: 10m D, 60m W, 50m L

Use: Water reservoir for parts of Parnell and the CBD.
Auckland’s war memorial museum has an interesting architectural heritage. One of New Zealand’s earliest examples of a competition driven architecture, the world wide competition drew 70 entries, with the winner being an Auckland firm, Grierson Aimer and Draffin. Opened in 1929, the architectural work also won the New Zealand’s institute of Architect’s gold medal, commanding its place in Auckland’s and New Zealand’s architectural history from its first moments in the public eye.

NATIONAL WAR MEMORIAL MUSEUM
Location: Auckland City
Significant neighbours: Auckland Hospital. CBD
Architectural Style: Neoclassical
Architect: Grierson, Aimer and Draffin
Height: 21m
Construction Material: Concrete
Photograph looking north towards Auckland museum. Authors own image.
ASB TENNIS STADIUM
AUCKLAND CITY HOSPITAL
AUCKLAND DOMAINE GARDENS AND PUBLIC ACCESS NURSERIES
EDUCATIONAL FACILITIES: Auckland medical school ACG
AUCKLAND DOMAIN cricket fields
TECH COMPANIES (VECTOR LTD)
MAIN ACCESS NODES

Source: Google maps search engine
Keywords: Data centre, Digital Storage
AUCKLAND DOMAIN
Largest area dedicated to public space in Auckland

EXISTING RECREATIONAL ZONES AND PUBLIC PARKS IN AUCKLAND CITY

NATURAL VOLCANIC CONE DIRECTS DOMAINS FOCUS AND VIEWS TOWARDS THE CITY

VIEW SHAFTS ACCESSIBLE FROM ATOP THE RESERVOIR IN FRONT OF THE MUSEUM

WHANGAREI
AUCKLAND
HAMILTON
TAURANGA
PALMERSTON NORTH
WELLINGTON
CHRISTCHURCH
DUNEDIN
INVERCARGILL

Source:
Google maps search engine.
http://www.datacentremap.com/new-zealand/
AUCKLAND DOMAIN

COMMERCIAL/INDUSTRIAL ZONED, LARGE DIGITAL FOOTPRINT

PORT OF AUCKLAND:

CBD: MOST CONCENTRATED ZONE OF DIGITAL CONSUMPTION IN NZ. DIGITAL FOOTPRINT GROWING EACH DAY

Source:
https://www.aucklandcouncil.govt.nz/geospatial/geomaps/Pages/default.aspx
1. The reservoir presents a body of water that can be used as a method of cooling for the digital infrastructure to be housed within the data centre.
2. The existing concrete structure of the reservoir presents interesting spatial opportunities. The concrete vault ceilings, textured board-formed columns and vast scale are all pre-existing elements that can be utilized to generate exciting architectural space.
3. The domain’s public use as both a space of recreation and education develops a strong opportunity to extend these spatial practices into the design of the data centre. Using the recreational trends of site to compliment the development of a passive tangible relationship to data, whilst the educational trends to endorse a more active approach.
4. Significant view shafts present from site allow for spatial mapping to generate specific visual alleys that help frame and define a space.

STRENGTHS

1. Local to CBD
2. Lies within the public domain. Existing social emotions of civic ownership and loyalty.
3. Neighbouring the Museum and hospital reinforce the space as a significant space of public place.
4. Surrounded by Main transport routes and hubs.
5. Unique placement atop the Reservoir. An existing example of a hidden piece of important infrastructural utility.
7. Significant recreational facilities and social spaces ensures exposure to foot traffic.
8. Auckland has the highest concentration of data centres in New Zealand.
9. Quality existing access nodes and routes filter throughout the site.

WEAKNESSES

1. Buildable space is limited. Much of the site is covered in native Fauna, existing built works and dedicated recreational space. The only considerable open spaces are at the front and rear of the Museum.
2. The size and height of the Museum puts pressure of the development of the data centre, too small and it will be seen as insignificant. Too big however and it will be seen as disrespectful and inconsiderate.
3. The openness of the site and ease of access presents issues around being able to provide 24/7 security without the need of personal on site.
4. The underground situation of the site is busy. With the subterraneous reservoir being metres away from the museum underground carpark and basement.

OPPORTUNITIES

1. The association between digital infrastructure (today) and public parks is contradictory, until the understanding of digital infrastructure shifts, the public will question the appropriateness of a data center within a public park.
2. The existing Museum has a long and prominent history in both the social and architectural discourse of Auckland and New Zealand. The significance of this project presents issues around whether the works of architecture will attempt to compliment or dominate one another.
3. The domain encompasses the hospital, the museum and the largest public space Auckland has to offer. Adding another highly public focused work could run the risk of over saturating the space and detracting from its appeal as a natural environment.
4. The proximity to the CBD, without actually being embedded within it, leads to potential misunderstandings that this data centre is still failing to address issues around being apart of a ‘true’ urban environment.

THREATS

1. Buildable space is limited. Much of the site is covered in native Fauna, existing built works and dedicated recreational space. The only considerable open spaces are at the front and rear of the Museum.
2. Surrounded by Main transport routes and hubs.
4. Quality existing access nodes and routes filter throughout the site.
A disconnect between people and digital information is developed because of the spatial influences that the utility driven design forces. Issues surrounding energy efficiency and security have informed the cold removed spaces and caused the isolated geo-locations.
Refocusing the architectural influence to be centred on people and their spatial needs will reverse the problems found in the previous model. The spatial requirements of data are now fitted around that of people, leading to architecture concerned with meeting the strict operational requirements of digital networks whilst still generating spaces for interaction of people. Repositioning site as a tool to engage and benefit all the varying aspects of design influence, leading to a meaningfully sited, humanised architectural design.

Data storage and its infinite list of operational requirements dictate the architectural input. As a result the spaces become utility driven, forcing the architecture of the data centre to become a barrier between society and its understanding of digital networks.
RE-ALIGNED DATA CENTRE MODEL

Now with an architectural focus around developing spaces for human interaction, the rest of the programmatic requirements can be factored into the equation. With site now being chosen to better suit human interaction, inventive solutions need to be developed to help facilitate the climate requirements for the efficient operation of the digital utilities. A ‘circle of influence’ has now become apparent in this new data centre model. Where people have been re-expressed in terms of a collective community, whose needs influence the architectural design that is responsible for the successful operation of the digital network. Which is then linked back alongside the interactions within the community.

PROGRAMME DEFINED

The existing Reservoir located on site has provided an opportunity to develop a method of temperature control for the digital infrastructure that is convenient, environmentally considerate and most importantly efficient. Simultaneously the reservoir provides the opportunity to turn the subterranean space into a bathhouse, one that utilises the heated water that results from the water-cooled server racks. This common use of resource helps define a physical vessel that can aid in locating the human condition within the digital environment.
The programme proposed for the new data centre is that of a government ministry. Serving to not only provide the necessary infrastructure for the continued growth of our digital networks, but to gather a better understanding of them along the way. Focusing on providing opportunities for education, censorship and operation, the Ministry of Digital Information fills a widening gap in the social order, addressing the civic need for a better understanding of digital networks and the effects on our socio-political climate.
FORM MAKING

3.03

Site Axis'
Initial Massing Study
Process Diagrams
The axis is perhaps the most rudimentary means of organising forms and spaces in architecture. It is a line established by connecting two points in space, from which begins to describe a visual story about the relationship between the surrounding spatial elements. An axis is presented as a linear condition, which develops qualities of direction and length whilst correspondingly promoting a sense of direction along its path.
The use of axis to develop the initial formal responses of the project is an appropriate design response for following reasons:

1: The museum is of neoclassical design and holds a very strong axial presence. As a prominent and also visually appealing neighbour to the site, it is only appropriate to acknowledge this work of architecture in the design process. Extending the axis of the museum into the site generates an axial relationship that places spatial pathways that will ensure that the strong directionality promoted by the Museum’s form is embraced. Ensuring a satisfying visual connection between old and new, laying the foundation for a stronger formal relationship.

2: Axial space planning has always been associated with civic structures, thanks to classical architecture and its place as the architectural voice of government and democracy. This bond between axial relationships and public place has long been used when creating spaces of civic importance, however it is subtle enough as to not dictate a predetermined architectural language and therefore hindering the opportunities of the design (appropriate for initial form finding).

3: The central axis of the reservoir is offset from that of the museum. This slight deviation away from the strong axial presence of the museum presents opportunities for a second spatial organising system that can begin to develop overlapped space/intersection of forms.

The following is an initial formal study, focusing around these axial relationships found on site (explained by the diagram pg 92) aiming to generate a solid platform from which the design can begin to develop, whilst ensuring a locally appropriate aesthetic is derived and adhered to.
1. Underground reservoir + Museum
2. Bringing reservoir up into public domain
3. Removal of topsoil
4. Created a new interactive edge between domain and reservoir.
1. Disconnect between reservoir + museum
2. Splitting of edge
3. Visual alley created
4. Accessible internal courtyard

Water volume extruded
1 Split of reservoir storage capacity
2 1/8 + 7/8 split
3 Develops a more accessible environment between water mass and domain
1. Remaining water volume
2. Separate into manageable volumes
3. Re-alignment
4. Exaggerates axis of previous reservoir

Axis too heavily focused on reservoir
Water volumes re-aligned with museum axis
Greater presence developed
Addition of volume for building services
1. Addition of entrance + dedicated public space
2. Edges to re-introduce visual edge of reservoir
3. Form re-sized
4. Proportions of museum considered

Two facing edge conditions

1. Addition of space for programme
2. Extension to develop edge depth
3. Scale relationship to urbanscape
1. Visual edge of reservoir expressed
2. Height reduced to allow for views to harbour
3. Scale relationship to urbanscape softened
4. Continual edge developed. Strengthens relationship between separate forms

Scale relationship softened
Three-step scale relationship symmetry
Visual alley to museum accented
Visual access to domain generated
1. Visual access to domain expanded
2. Formal changes add aesthetic interest
3. Simplifying form
4. Extension of entrance. Form mirrors domain edge.
This form finding process defined by axial conditions of site has ensured that the relationship between the proposed architecture and existing built forms is considered, in the hopes of developing an aesthetic that does not dominate site or vice versa. The form proposes a direct link between the Museum and the internal courtyard, whilst simultaneously developing lines of motion east to west connecting the domain with the neighbouring suburban condition. The terracing of form has been done to ensure that the scale of the architecture is respectful to the natural contours of the immediate site below. This process has generated a form foundation with a blank canvas, which ensures the project does not deviate in unwanted directions during detailed design.
FORM REFINING

3.04

SPATIAL APPROACH

3.04
Aesthetic Drivers
Process & Implementation
Concept & Review
Visual Mapping
Spatial Drivers

The detailed design process began with the two entrances. Facing east towards the domain and the west towards the suburban context. Because connecting with the subterranean reservoir existing on site was important, the development of the spaces was carried out (mostly) in section. This meant that a solid relationship to the ground condition was always considered in each spatially focused decision. The design process involved both digitally modelling the concepts and building physical models to test out the spatial implications.

Because this design method separated these spaces from the rest of the building’s form, it presented the potentials to deviate from the spatial constraints founded in the formal study previously undertaken. To counter this, the two design explorations of the entrance spaces were not to be treated as final spatial results. Instead these spaces and their concurrent spatial explorations were used as aesthetic spatial drivers.

Hand models of the designed spaces were assembled to develop an architectural understanding.
drivers. Much like the previous formal study, they became the aesthetic and spatial influence for the rest of the spaces throughout the entire design. Expressing structure and defining a digital presence were two major design influences for these spaces. Resulting in both designs holding a strong vertical presence, using exaggerated structural members to define civic emotions of strength and identity. The translucent nature of both spaces also ensures a public sense of ownership, using the openness of space to both invite interaction but also to allow the dense structural systems to filter light forming complex shadows that fill the large open spaces.

These two spatial designs where carried out simultaneously, focusing on presenting a strong sense of digital presence and public involvement. The following is an image walkthrough of the spaces in the rest of the design, strongly influenced by these two initial detailed design studies.
Perspective of eastern facade, depicting an aesthetic of strength through the repetition of structural form. Using the stacked server racks as a facade element. Developed from the initial detailed study of the eastern facade.
CIRCULATION
3.05
The main atrium (image opposite) serves as the circulation hub for both the digital soak house and the Ministry of Digital Information. An expansive full height space, filled with a continuous folding staircase (isolated below) connecting the different levels of the building. Stepping down into the eastern atrium of the soak house, whilst upwards into the various public educational spaces within the Ministry.
The idea of developing a tangible relationship between digital networks and people has been the recurring theme throughout this thesis. The following analyses how this thesis has proposed to generate this tangible relationship.
Setting the scene.

First it is important to present the visitor with an understanding that this is a place of digital information production and consumption. The two visualisations (opposite and below) depict the Eastern entrance from the city, which presents a stacked façade of the server racks and digital utility. Monumental in size and accentuated by a curved concrete waterfall that grounds the vertical form; emotions of technological strength and grandeur are instilled from the first step into the architectural space.

On the western side, the entrance from the domain, visitors enter into an equally compelling architectural space that uses various elements to develop a sensory stimulating experience¹. An array of vertical columns seems to disappear into the heavy grid-like structure above, both elements filtering light from the skylights above. At the centre of the space is the cooling pond, a 6m-drop below, with more server racks on display. A large cantilevered viewing platform frames the centre of the space, reinforcing the scale of digital information production and consumption.

¹ Ambient Displays: Tuning Architectural Space into an Interface between People and Digital Information. Conference Paper, 1998
Having now gained an understanding of the digital networks presence in the architectural space, the visitors are filtered into the Digital Soak house. Upon entry the space opens into the old reservoir now filled with two large steaming pools (Visualised opposite) and the same server racks seen at both entrances, now sunken below the water level. Further developing an understanding of the immense energy cycle that these digital networks require.

This development of an experience, one that takes the visitor on a journey to understand the scale and processes involved in the generation and preservation of digital networks is paramount in setting the scene for a tangible relationship. Once the visitor has understood that the generation of steam is a direct result of the presence of the digital networks and utilities, the steam becomes the physical embodiment of the relationship between data and man.
The steam is now central to the spatial experience of the entire work of architecture. The development of the inner courtyard, named Steam Park, places various chimney shaped cones open to the pools below. This creates an attractive interior lighting quality for the Soak House, and also allows the steam to be channeled and expressed above. Views of the steam rising out of the Digital Soak House are now accessible from the rest of the interior public spaces, all of which have views into the Steam Park Courtyard (Steam Park Courtyard visualised below).
The Dead Drop Park

The Dead Drop Park takes Aram Bartholl’s Dead drop art movement and utilizes it as a thought provoking ornament. Ignoring the inherent flaws as a practical system of digital information storage and celebrating its condition for a physical interaction between people data and architecture. The dead drop park takes the chimney forms expressed in the steam park and scatters them in the space between the Museum and the Stairway to the digital soak house (depicted on the following page). These forms are then embedded with many “dead drops”, generating these concrete cones with hundreds of USB heads protruding outwards.
This over saturation of dead drops on site serves the purpose of getting the visitor to question their own physical relationship with digital information. Seeing these concrete cones embedded with USBs will incite a level of curiosity within each visitor. They will understand that to access any of these USBs they will need to bring a device to that particular location and physically engage with it. However the power of this situation is in the provocation of thought, not action. The cementing of a USB stick into built form shifts the data held within the USB into the physical world. This casts various interpretations of meaning and function onto these concrete cones, turning them into mini obelisks expressing the relationship between digital networks and our physical environment.
View from the base of the stairs leading down from the museum to the Digital soak house, looking towards the Steam Park Courtyard.
Looking North towards eastern facing entrance into the main Atrium space.

M.O.D.I
ministry of digital information
Site Context
ACCESS
1. Entry 01 - Entrance from City
2. Entry 02 - Entrance from Domain
3. Entry 03 - Entrance from Museum
4. Ministry Entrance
5. Steam Park - Internal Courtyard
6. Dead Drop Park
7. Trade Entrance
View looking south from below across the Museum Library. Dead Drop peek in the background and the scene away from the small tower in the central courtyard.
1. Manager offices
2. Staff area
3. Board meeting room
4. Exhibition/Function Space
5. Rooftop deck
FIG. XX
View from above of the lower courtyard. The entrance to the Digital Soak house from the Museum.
Interior view from in the Restaurant. Full height glazing surrounded by differing timber vertical slats filters light into the space.
View from above the
Google data centre
in Council Bluffs Iowa.
FIG. XX
View from above the
Eastern entrance into
the main atrium. Highlighting
the strong axial definitions
developed in section 3.03.
View looking east facing into the domain. Showing facade of vertical panels and the terraced nature of the collection of masses.
View looking west from the chimney. Showing Dead Drop park in the east and the steam rising from the inner courtyard.
View looking north, showing the various forms of the building as a result of the axial formal study.
3.08

CONCLUSION
Architecture, People & Data

With the advent of digital technology and information, digital networks have become as fundamental to urban life as street systems' now responsible for every major livelihood function from national security to communication. Digital network's mounting influence on the current and future development of our urban and social condition creates the need for a platform where social awareness of this changing knowledge landscape can emerge, one that recognizes that the human condition in the digital environment requires more than just a sign to Silicon Valley.

With influence from Castells, this design led investigation recognised public space's authoritative role in locating man in this digitally saturated environment. Noting that a placeless hand-held digitized screen does not produce the collective emotions of ownership and identity that are crucial for the development of a humanised society.

Through the formation of a socially concerned architecture that no longer camouflages data but provides avenues for social expression and interaction, this design places digital networks "front and center" for society to experience. Repurposing the current failed architectural strategy of data centres to develop spatial situations that re-present data as a significant piece of social infrastructure, promoting civic ideals through structural expression and operational honesty. Members of the public are empowered with a sense of ownership and civic identity through the unbiased and honest presentation of the physical conditions these digital networks occupy.

Working within a framework of civic legibility, and by exploring the conflicts found in the architectural expression of the intangible through cross programming function, the architecture develops spaces that stimulate a relationship between society and the physicality of digital networks. The programming accommodates play, social activity, business, leisure, education, and escapism, while all being linked to the continual maintenance of the digital environment.

The process of this thesis expressed that architectural representation has a duty to be more than the historic aesthetic-focused typology, endorsing architecture as a meaningful pursuit of social expression, utilizing the performative capacity built space presents to people and society.

With this architectural proposition utilizing existing digital technologies of today, there are limitations surrounding the research's speculative design inquiry. The design assumptions and spatial findings meant the resulting architectural spaces has been limited to what technology is capable of now. The reason for this being a significant limitation is due to the speed at which new technology is emerging, as to say if server racks become obsolete in the next decade (entirely possible) then so will the physical expression of this architectural work. However, the theoretical intent of the project is robust and does not experience the same fragility presented by the application of present-day technological systems. Even as technology changes, the need for a well-understood relationship between the digital networks these technologies facilitate and the human condition will always be crucial for the development of a humanised society. Architecture as the facilitator of urban and social experience is the most suitable agent in the pursuit to better understand the human condition in our digital networks.
Not directly referenced in this thesis as the related work was removed. However the understandings on trust developed by Yamagishi did influence the direction of this architectural proposal.


A. J. Dickson, City Engineer, to the Town Clerk, Auckland, 19 August 1949. Auckland City Archives


Cushman & Wakefield LLP. (2016). Data Centre Risk Index. Cushman & Wakefield LLP


FIGURE 10.

FIGURE 11.

FIGURE 12.

FIGURE 13.

FIGURE 14.
The Seattle Skyline. Image from flickr.com. Web

FIGURE 15.

FIGURE 16.
OMA’s Seattle public Library. Image highlighting the expressive structural system that wraps the entire exterior. Source http://www.archdaily.com/11651/seattle-central-library-oma-lmn

FIGURE 17.

FIGURE 18.

FIGURE 19.

FIGURE 20.

FIGURE 21.
AT&T Long lines Building. Photograph. Socks-studio.com

FIGURE 22.

FIGURE 23.
View of museum and proximity to city from above. Image from Auckland city council

FIGURE 24.
Photograph of the reservoir during construction in 1951. Sourced from AK city council heritage image library Web

FIGURE 25.
Aerial photograph of the domain. Highlighting position of subterranean Reservoir. Source Bing maps.Web

FIGURE 26.
Aerial photograph of the domain. Highlighting position of Museum. Source Bing maps.Web