bespoke urban factory

a typology for the new consumer

acknowledgements

Well, it looks like it’s done.

Thanks to all my fans who have been there from day one. A special thanks to my friends and classmates – the reason I bounce out of bed each day. Finally, thanks to my supervisor, Daniele – for your guidance throughout the year, and for all those ridiculous conversations.

Shit it’s been good!

submission information

Bespoke Urban Factory

by André Bankier-Perry

A Research Portfolio
submitted to Victoria University of Wellington
in partial fulfilment of the requirements for the degree of
Master of Architecture (Professional)

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2018

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figure 1 | bespoke display plinth assemblies developed for final design review and exhibition: powder coated folded aluminium with timber connectors and stainless fixings

“

I've always been totally fascinated by how things are made – no matter what it is – it's just so incredibly cool! It's raw and honest and beautiful. There's something so inspiring about a factory or workroom – it oozes this limitless potential and a sense that anything can be done. Just like painting or sculpture, making is art.

”

myself – André Bankier-Perry, 2017

abstract

A change in consumer values has resulted in the traditional factory becoming outdated and out of touch. The ever-changing rapid and exponential development in high-tech manufacturing technologies is enabling humankind to realise products and efficiencies never conceived of until recently. Mass production is a thing of the past. People want options – bespoke products and services with the ease and precision of a well-articulated assembly line. The consumer wants to understand the process, production practises and effects of the choices they make.

Since the emergence of the city itself, the public marketplace has been a critical node for urban vitality and liveliness – an assemblage of skilled creative specialists liaising directly with the consumer – where the designer is the maker and the store is the workshop. With the evolution of mass production, this once unified marketplace typology has fragmented and dispersed to where manufacturing no longer lies within the consumer’s grasp. A rich historic urban architecture has been supplanted by a distant scattering of industrial

warehouses and faceless high street facades. The emergence of innovative new methods of designing and making has presented an opportunity to once again close the gap between production and the consumer interface.

Imagine a new architectural typology – an innovative urban marketplace that bridges the current disparity between production, consumerism and public space. It looks to explore the way in which architecture conveys emerging innovative technologies; the way manufacturing is displayed and perceived; and the relationships it has with those who engage with it. Using a local catalyst site, the research puts forward a solution as a socially and contextually relevant node within the city of Wellington, New Zealand. Architectural ideas are iteratively tested alongside a set of typological strategies – each informing the other. Throughout this process, the research seeks to understand and stitch together the many complex conditions in which to provide an inviting, engaging, public consumer destination. This is a high-tech marketplace of sorts – a new architecture for a new era of industry.

a forward vision

This is a precinct full of activity – where cutting edge creative artisans come together to collaborate, explore and learn. This is not a sterile place, but one filled with people. The traditional noise of the imposing industrial machine is drowned out by the inspiring chatter of collaboration and the essence of new ideas. Everything is on show for the public to experience. Products are realised in virtual space; robotics, mills and 3D printers take centre stage as living art forms. This an ever-changing demonstration of the possibilities of new age craftsmanship – a Guild of designer-makers relying not merely on manual exertion but on the efficiency, accuracy and flexibility of well-articulated futuristic cyber machines. This is not merely a production of mechanisation but one of theatrics and wonder; where the consumer becomes both audience and conductor.

Location: Wellington, New Zealand

Year: 2025

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chapter 01

framework

Chapter 01 establishes the research framework for the proposed topic. Firstly it identifies the research question, scope, aims and objectives. This chapter also outlines the research methodology, chronology and document structure moving forward. Lastly, the anticipated final output is articulated.

a change in consumer values

In contemporary society, consumers are now demanding more than ever of their products and services. While the big names in mass production scramble to keep up with the ever-changing world of fast fashion, the consumer is left wanting. The rise of social media has given the consumer a voice and a platform in which to express themselves. Individuality is now a societal norm (Deloitte, 2015). We see this in every avenue of consumerism, from fashion, to food, to entertainment. The new consumer will no longer be satisfied with cookie cutter solutions – no matter how many flavours it comes in. People want options – bespoke products and services with the ease and precision of a well-articulated assembly line. The new consumer wants to understand the process, production practises and effects of the choices they make (Schwartz, 2004). The era of the ‘conscious consumer’ is emerging, where sustainable consumption means longevity and where value is embedded in multiple aspects of every product and service (Thorpe, 2010).

emerging technologies and changing industry

The ever-changing rapid and exponential development in innovative technologies is enabling humankind to realise products and efficiencies never conceived of until recently. The game changing advent of additive manufacturing, virtual realisation and autonomous tools is redefining the traditional methods of designing and making (Siemens, 2017). No longer are bulky, expensive machines required to achieve everyday consumer goods – nor are trained technicians exclusively obliged to operate them. High-tech systems are now so much more compact, intelligent, clean and quiet. Set within the outskirts of urbanity, isolated from public engagement, the traditional factory typology is rapidly becoming outdated and out of touch.

wellington as a catalyst

Wellington, New Zealand, is a pedestrian city known for its compact nature and diverse urban fabric. Its proximity to a harbour, major port and steep bounding terrain makes it an interesting case study in which to situate a new kind of architecture. Since the demise of historic craft guilds and marketplaces, production processes have been relegated to the peripheries of urban life, positioned as far afield as Lower Hutt, Porirua and beyond (Chance et al., 1979). This research looks to target a piece of land very much embedded in the heart of the creative capital. Its proximity to both built and natural landscapes presents a unique opportunity to test the way in which the urban experience can be improved – investigating how spaces shaped by a new architectural agenda enrich the total public experience.

proposition

The design-led research proposes an innovative urban marketplace – bridging the current disparity between production, consumerism and public space. It looks to explore the way in which architecture conveys emerging innovative technologies; the way manufacturing is displayed and perceived; and the relationships it has with those who engage with it. The research puts forward a solution as a socially and contextually relevant node within an urban context, applicable to cities around the world. Throughout this process, the research seeks to understand and stitch together the many complex conditions in which to provide an inviting, engaging, public destination for the new consumer (Thorpe, 2010). This is a high-tech marketplace of sorts – a new architecture for a new era of industry.

how can the emergence
of **cutting edge**
manufacturing
technologies generate a new
marketplace
typology that integrates
production,
consumerism and
public space?

This design investigation begins with a potent and distilled statement regarding an emerging societal condition: *people want options*. This becomes the trigger for the research and design of a new model of innovative manufacturing within an urban context. Using Wellington, New Zealand as a catalyst for the experiment, a research question is developed and explored throughout the duration of the portfolio.

enforce an engaging public platform.

Developed around long-established and emerging theoretical notions of consumerism and urban design principals, a series of architectural interventions are explored and tested. The exploration and outcome of these theoretical and real-world ideas contributes to the formation of a series of fundamental typological strategies – a robust criterion for future high-tech marketplaces within similar urban contexts.

figure 2 | *universe of study* preliminary brainstorm: a device to position the research topic and understand the multitude of contributing elements and the relationships each part has with one another

research aims + objectives

This research portfolio is primarily driven by a foreseeable change in consumer demands. It is an examination of the role architecture might play in structuring this social tipping-point and a response to the fundamental relationship between designer-maker and consumer. The research aims to respond to the issues of an established diverse urban context through which an architectural intervention becomes a critical public node.

Fundamental objectives are as follows:

To imagine a future innovative creative manufacturing precinct based on fundamental notions of an historical Guild. To explore the interactive relationships between designer, maker and consumer and the role each stakeholder has in the total realisation of products

or services. To establish strong urban connections to surrounding conditions; and foster total public engagement with emerging technological processes. To define and distil a set of typological strategies informing and informed by the iterative testing of architectural ideas.

Ultimately, the research portfolio presents an architectural proposition in a world of incredible ever-changing manufacturing breakthroughs. Tied back to fundamental theory of consumer behaviour, urban principles and site specific conditions, the design investigation is a response to the traditional disconnect between maker and buyer – an effort to re-engage and immerse the *new consumer* within the total manufacturing process.

research methodology + chronology

The investigation is a direct response to the contextual and societal problems outlined. The research functions primarily through a design-led approach, whereby architectural responses emerge from the outcomes of various architectural tests, studies and explorations. Throughout the process, a succinct set of typological strategies are developed – both informing and informed by the iterative testing of design ideas. This fluid, somewhat orbicular interplay eventuates in a final tangible design proposition.

> **figure 3** | research methodology diagram

document structure

01 FRAMEWORK

The research portfolio starts by establishing a comprehensive framework upon which the architectural investigation will be founded. Notably, a robust research question and methodology are presented, in which to order and guide the research.

02 BACKGROUND + CONTEXT

Background research begins by identifying a shift in consumer values. After highlighting a need for an architectural intervention, a catalyst site is analysed to understand local and peripheral conditions. Literature and precedent reviews explore key research areas, leading to the development of a series of experiential user narratives. Fundamental typology criteria are established as a starting point for design explorations.

03 PROCESS + EXPLORATIONS

Several targeted study series explore crucial design and research areas prior to the development of holistic architectural interventions. Ideas are iteratively tested alongside typological strategies – each informing the other through an oscillatory process. Explorations are analysed and critiqued along the way.

04 DEVELOPED DESIGN PROPOSAL

Based on prior architectural iterations, a developed visual design scheme is proposed. Accompanying the design proposition is a comprehensive and distilled set of strategies applicable to prospective architectural interventions of a similar nature.

05 REFLECTION + CONCLUSIONS

The document concludes by reiterating the findings and outcomes of the research portfolio. A discussion of the research methodology and theoretical discourse identifies strengths and weaknesses, with suggestions of possible further or alternate avenues of investigation. Similarly, the final architectural intervention is also discussed. Conclusions are drawn from this feedback.

final output

chapter 02

background + context

Chapter 02 establishes the theoretical background and context upon which the research is founded. Firstly, the consumer climate is revealed as an instigator for an architectural response. This is supported through emerging statistics, alongside an analysis of industry milestones, manufacturing trends, and emerging technologies. Literature and precedent reviews are also discussed. An analysis of the chosen catalyst site and surrounding peripheries seeks to understand site specific implications.

As a result of the above research, a series of experiential user narratives are developed to hypothesise how users might interact with a final built architecture. From this analysis, a set of fundamental typology criteria are established as a starting point for the testing of ideas.

“

Empowered by social networks and their digital devices, consumers are increasingly dictating what they want, when and where they want it. They have become both critics and creators, demanding a more personalised service and expecting to be given the opportunity to shape the products and services they consume

”

Deloitte Consumer Review, 2015

“

The premise of customization isn't new — products and apparel were handmade and hand-stitched prior to the Industrial Revolution, when the cobbler and the tailor made custom shoes and clothes.

”

The Huffington Post, February 2011

industry milestones

Over the centuries the manufacturing industry has seen several major changes in the way things are produced. Such changes have been largely in direct response to evolving technologies and world events. As populations grew and built environments developed, so did the ever increasing demand for newer, more innovative and high-tech methods of production (Rappaport, 2015).

From as early as 1100 AD, specialist Craft Guilds were once the designers, makers and sellers of the majority of goods and services. The multitude of independent traders often formed a marketplace of sorts, catering for just a handful of customers at any given time. This is the most prolific and long lasting industry practice to date, continuing well into the 18th century (Chance et al., (1979).

The arrival of the First Industrial Revolution saw major changes with the advent of steam power and mechanisation—reducing manual labour while increasing production efficiencies. This was followed less than a

century later with the Second Industrial Revolution – the birth of mass production. The emergence of the assembly line was greatly assisted through the advent of electricity, whereby continuous, uninterrupted production systems became viable. The compact computer saw a shift once again in the late 1900s, with the emergence of the Third Industrial Revolution. High tech digital systems opened the door for greater manufacturing sophistication and accuracy, where goods and services were realised faster than ever for the ever-growing consumer market (Rappaport, 2015).

Most recently, the production industry has turned another corner – “Industrie 4.0”. This is the age of autonomy – where high tech systems can proactively and simultaneously think, solve and respond to any number of complex tasks – more accurately and efficiently than any trained specialist (Engineering.com, 2016b). “Industry 4.0” is considered the next major milestone in design, production and supply (German Trade and Invest, 2018).

specialist craft guilds

1100

1700

1800

1900

2000

industrial revolution 01

industrial revolution 02

industrial revolution 03

"industrie 4.0"

figure 4 | industry milestones timeline

consumer values

Studies have highlighted a notable shift in present day consumer values. The consumer is increasingly seeking a more customised buying experience whereby they no longer purchase an item off the shelf, but rather have an opportunity to shape and control the products and services they consume.

A recent Deloitte (2015) Consumer Review found in some categories more than 50 percent of consumers have an interest in purchasing customised products or services. This growing trend for greater involvement is thought to be a result of the ever-changing digital world, where the everyday person is empowered by online networks, unending connectivity and the digital devices they so frequently use (2015).

Products are no longer merely objects or items, but rather a total expression of a person's individuality. The consumer is increasingly rejecting the off-the-shelf,

mass produced norm, in favour of unique one-of-a-kind solutions for their specific needs. This growing demand for customisation is supported in recent statistics that show over 34 percent of the population believe standard products do not fulfil their requirements (Deloitte, 2015).

In many cases, the preference for personalisation in fact carries a higher weighing over cost and time, where 48 percent of people are prepared to wait longer for a customised product; and 71 percent are prepared to pay more for a bespoke product or service (Deloitte, 2015). Such figures indicate the immense positive value a well-suited product can add to an individual.

Crucially, around one-third of all consumers are interested in directly engaging in the design / making process. This is an exciting opportunity for a new era of production where the role of the designer, maker and consumer is re-imagined (Deloitte, 2015).

>
figure 5 | consumer values statistics derived from
Deloitte Consumer Review study, 2015

manufacturing trends

Over history, there have been several monumental shifts in the way things are made. As technology dramatically advanced and consumer ideals shifted, global production practises were compelled to evolve and adapt.

From as early as 1100 AD, nearly all of the world’s products were designed and produced by independent skilled artisans. Items were hand-crafted for a specific customer, tailored to meet their specific requirements (Change et al., 1979).

The 19th century innovation of mass production quickly replaced hand-made for the systemised assembly line. Continual repetitive production brought with it great efficiencies, enabling products to become cheaper and more readily accessible to the everyday consumer (Rappaport, 2015).

In recent years society has witnessed a major shake-up in how things are done – a rejection of the monotony of

mass production, to something more personal. The turn of the 21st century saw the birth of *mass personalisation*: the personalisation of products or services for a wider group or demographic. This was followed by *mass customisation*: the ability for individuals to make changes from a catalogue of predetermined variations (Strategy&, 2016). Recently, an effort to offer even greater control saw the introduction of *bespoke customisation*: the freedom to customise with fewer limitations (Drell, 2011).

And the future in which this research is proposing; *Bespoke Collaborative Production*. This a direct and personal collaborative process between designer-maker and the consumer, where high-tech cutting edge technologies facilitate possibilities and efficiencies never conceived of until now.

figure 6 | manufacturing trends timeline

emerging technology trends

At present, a number of emerging technology trends are revolutionising the way things are designed and produced. These technologies can be grouped into three critical notions: subtractive manufacturing, additive manufacturing and virtual realisation.

While forms of subtractive manufacturing have been widely used for decades, innovative new systems are presenting advanced possibilities in this field. As a result, emerging machines offer profoundly greater accuracy, flexibility and efficiency (Siemens, 2017). The introduction of 5 axis milling, Laser Microjet Cutting (LMC) and advanced robotics are critical components in realising complex manufacturing demands (GE Reports, 2016b).

Additive manufacturing is widely considered a major breakthrough in design and production processes. This method of manufacturing works by precisely and systematically building up layers of material to produce a physical three-dimensional product. Additive manufacturing primarily includes 3D printing, Direct Metal Laser Sintering (DMLS) and Binder Jetting (BJ),

alongside a number of similar mechanisms. Notably, due to their multi-axis adaptability, advanced robotic arms now commonly integrate a vast array of additive manufacturing processes (GE Reports, 2016a).

Virtual realisation encompasses an array of sophisticated digital technologies including the Internet of Things, interactive smart devices, autonomous systems, 3D scanning and augmented reality. These intelligent emerging technologies offer assistance in many areas of production, including design visualisation, calibration, process monitoring and operational maximisation (Engineering.com, 2017).

Many technology areas in fact work together as a single unified system; for example, an idea can be developed through augmented reality and interactive devices, before moving through a multitude of additive and subtractive production tools, all the while being monitored and controlled by the Internet of Things (Engineering.com, 2016a). Autonomous systems check and calibrate the final output, delivering a fully realised product directly into the hands of the consumer (Strategy&, 2017).

> figure 7 | emerging technology trends

literature review

the new consumer

A new age of consumerism is emerging where the buyer is more than ever empowered by the ability to make educated purchasing decisions. The new consumer is complex and articulate, seeking multi-faceted value and high returns in the globalised world of commodity. Schwartz (2004) notes that consumers who critically reflect on their personal needs and the longer term consequences of their decisions have a much greater ability to more clearly justify their purchasing choices (p. 75). This consumer group therefore demonstrates greater satisfaction with the value a chosen product or service brings to them.

Another key attribute of the new consumer is the notion of ‘sustainable consumption’. As defined by Stewart Walker (2006), sustainable consumption is the longevity in which a product or service continues to exist. This is by no means a new idea in the role of consumerism, but rather one that was suppressed throughout much of the 20th century – namely a result of mass production and global competition (Walker, 2006). As discussed by Ann Thorpe (2010), this embedded societal idea of disposable fast fashion is beginning to dissolve. Thorpe makes the observation that the everyday consumer seeks to ‘project their identities and social relationships’ through the products they consume (p. 10-11). She notes that by increasing product engagement and the ability to have design input, sustainable consumption will organically emerge. This is reinforced by Schwartz (2004), stating “a conscious consumer will be able to accept that perhaps none of the available alternatives

are satisfactory, and if they want the right alternative, they may have to create it” (p. 75). Schwartz explores how consumers are responding to current consumption trends, by moulding their individual choices through means of constraints such as self-reflection. Schwartz suggests that as a result, the consumer experiences “less self doubt, less of an effort to justify decisions, more satisfaction, and less second guessing of the decisions once made” (2004, p. 141). The self-imposed constraints of the new consumer present an opportunity for an architectural intervention, where the physical environment facilitates a new age of buying experiences – a better reflection of the consumer’s multi-faceted understanding of value.

With emerging innovations in production technologies, the consumer is more than ever missing out on the chance to engage with the process of making. Thorpe (2010) refers to this phenomenon as not being able to “tune into their consciousness” (p. 13). This is a factor that has progressively worsened over a number of centuries. Where the consumer could once stand face-to-face with the producer of their unique hand crafted item, the rise of the industrial revolution saw the removal of the customer from all production practices. This is further conveyed in Gruenberg’s (2002) book *Shopping: A Century of Art and Consumer Culture*, where he describes how understanding the total process becomes an important factor in determining the value of a commodity item. As a means in which to mitigate this historic loss of engagement, Thorpe suggests that

by injecting people back into the production equation, the new consumer will in turn get “enjoyment, learning and creativity” (2010, p. 13). Thorpe presents the idea of “enabling” solutions that “move the user from a passive role to an active role as co-designer” (2010, p. 11). Products capable of providing interest and excitement via systems of active participation provide a means in which the new consumer can gain greater satisfaction with their product or service. This in turn might help to bolster the consumer market – not through volume but through perceived value (Thorpe, 2010, p. 11-15). Alvin Toffler (1980) notes, “the more we shift toward advanced manufacturing, and the more we de-massify and customise production, the stronger the customer’s involvement in the production process must necessarily grow” (p. 53). Specific to a New Zealand context, Robert and Brenda Vale (2009) share similar ideas to that of Toffler. They discuss the benefits of ‘productive pastimes’, whereby engagement in production at any scale has the ability to shift society from passive consumers to active producers. Ultimately, this is a beneficial step not just in short term purchasing satisfaction, but a means to educate and up-skill the everyday public consumer (Vale, 2009, p. 318-319). The Vales also discuss this concept in architectural terms, whereby the integration of consumer and producer provides greater building resilience and longevity. The idea of a new public intervention is suggested where architecture supports the seamless integration of production engagement experiences.

Perception of quality is another key consideration in the eyes of the new consumer. Virtuani and Zucchella (2008) suggest that ever-increasing consumer awareness is forcing producers and sellers to pay much closer attention to how products and services are portrayed. With a particular emphasis on the psychological and aesthetic product image, architecture has the power to become a mediator of sorts – a means in which to amalgamate a multitude of aspects to portray the quality in which the new consumer demands (Virtuani and Zucchella, 2008).

Ultimately, the new consumer profile will always be underpinned by the notion of ‘value’. Virtuani and Zucchella (2008) emphasise that the perception of ‘value’ is by no means stable, but rather a fluid notion that shifts over time. They suggest that consumers are increasingly becoming more “selective, careful, wise and disloyal” (p. 3). The new consumer is becoming more attuned to navigating choice abundance, actively seeking purpose and intent in the products they consume. Perhaps the most notable tool for the new consumer is ‘self-reflection’, resulting in the adaptation of the perception of value. This literature review locates the new consumer as a well-educated, socially aware and ethically responsible contributor (Thorpe, 2010). The new consumer demands to once again be reintegrated into the total production process, with personal input into how things are conceived, designed, created and perceived.

literature review

the changing shape of production

The traditional factory is defined as simply a place for making things, but as consumer values shift, industrial architecture is too beginning to evolve (Rappaport, 2015). The consumer now wants to be part of the total production process, from early conception to development to final product. This is as much an architectural issue as it is a social one – where the factory and the everyday public can co-exist. Nina Rappaport (2015) proposes a new paradigm, where factories move to inhabit vertical buildings, and where the focus of production shifts towards “increased sustainability and urban integration” (p. 194).

Rappaport (2015) remarks “the new clean industrial technology, in contrast to the rusting heavy machinery of the past on its entropic trajectory, is light, ephemeral, and now nano-scaled” (p. 236). Such innovations in production present new opportunities for a future factory architecture. Historic notions of toxic fumes, hazardous machinery and deafening noise no longer hold true. Described by Leo Marx (2000) as the “machine in the garden”, this notion has now evaporated into micro-manufacturing – barely visible and remarkably safe (p. 3). Tasks that rely on the intelligence of computer programmers rather than manual skills and experience are creating a divide between skilled and unskilled workers; whereby the blue collar worker is transposing into a white collar profession. Marx describes this capitalist system as morphing into a new cycle of supply and demand, where new skills redefine a former working

class (Marx, 236). This is further enforced by Rappaport, describing a “new autonomy of making”, not of labour but an “intellectual and creative pursuit” (2015, p. 236-237). Rappaport discusses emerging possibilities of ‘making things in a smaller-scale workshop, by innovative and sophisticated machines’ (2015). Such a concept bares resemblances to notions of historic guilds and cottage industries, though of much greater precision and mechanisation. One might also begin to ask how the shrinking scale of the industrial machine might positively impact cities. With smaller scale spaces that are flexible and dynamic, there is a potential for manufacturing to be reinserted into the fabric of the urban realm (Rappaport, 2015). This is therefore an opportunity in which to reverse the trend of the isolated post-war mega factory, into a public space with frequent passive and active consumer opportunities.

Rappaport (2015) identifies the emergence of three key themes in contemporary factory architecture – flexibility, sustainability and the “spectacle” (p. 331). While the idea of daylight, fresh air and openness began to emerge much earlier in history, World War II forced a change in trajectory. Buckminster Fuller (1982) describes the practical needs of wartime manufacturing where factories were merely “sealed sheds built for speed and as basic generic wrappers for machines” (p. 331-332). Nowadays, with the ever-changing demands of the new consumer, the factory veil is being lifted to reveal maximum transparency and openness. The

architecture of the factory reflects the speed of the new economy, becoming a part of the “spectacle of commodities” dominating our society (Rappaport, 2015, p. 342). Rappaport warns that “as companies shed assets – property, people, and equipment – they are focussed on branding not producing, on the spectacle of production rather than production itself” (2015, p. 342). This in turn opens up the factory typology as somewhat of a living advertisement, where public and consumers can observe and learn. Perhaps the biggest risk of all is the danger of losing the fundamental honesty of the architecture enveloping these production processes. The spectacle of production could have the positive effect of celebrating designers and makers, yet it could also be considered just a marketing tool that traps the consumer in the company’s web. Production is incorporated into architecture as an element that fosters an obsession with automation gadgetry. In ways, the factory’s “aestheticisation” is a means to compensate for the shift from analogue machine to digital nanotechnology (Rappaport, 2015, p. 342). As Debord (2000) emphasises, “that which is being produced has become a component of the society of the spectacle” (p. 342). From an age of hardware into what might be called “an age of vapourware”, desire for watching the process of making risks becoming fetishised – a notion that requires careful deliberation if a new factory architecture is to be accepted into urban society (Dery, 1991, 50-67).

In recent years the concept of the factory tour has taken flight. Raw factory tours in many major cities have

been filled to capacity, attesting to consumer interest in understanding the total making process (Rappaport, 2015). Companies now see the value in bringing the customer to the production, capturing the consumers’ attention to forge a stronger relationship with their product. Not dissimilar to a shopping mall or marketplace, ‘unusual programmatic mixes’ might further assist to pull the everyday consumer towards production activities, creating opportunities for passive exposure (Rappaport, 2015). Rappaport suggests “new industries of the future will be catalytic enterprises that target loyal and local customers” (2015, p. 441). As a reaction to the capitalism of mass production, an emerging concept coined “glocal” is becoming the new business model. The future entrepreneur and local producer will move beyond the notion of mass production, relying on local economic interdependency and collaborative approaches for their survival (Rappaport, 2015).

This literature review identifies the need for changes to the traditional factory typology. The ever-increasing absence of bulky, inhibitive production machinery has led to a revisiting of what an industrial architecture should become. An underlying notion throughout is that of honesty – not simply in corporate terms, but that of a physical manifestation. In response to the demands of the new consumer, manufacturing is more frequently being revealed to the public – a means to express utmost transparency and value, and create opportunities for active consumer engagement.

analysis of architectural precedents

To better understand the existing relationships between design, manufacturing, consumerism and architecture, six precedents have been examined. Each precedent review delves into the underlying motives of the architectural intervention, with a specific focus on methods in which architecture may be used to bridge the divide between the art of marking and the public world beyond. Particular precedents have been examined for their programmatic applications, formal spatial arrangements, circulation strategies and viewshaft opportunities. While certain programmatic agendas differ from the specific objectives of this research topic, a number of universal principles remain in tact as a valuable learning tool.

>
figure 8 | thumbnail overview of selected architectural precedents

The Transparent Factory

Gunter Henn

Dresden, Germany
2002

figure 9 | vehicle assembly line suspended from above

figure 10 | public stair wraps around glazed vehicle showcase

figure 11 | automated lift slots completed vehicles into glazed showcase

Commonly referred to as the *Transparent Factory*, Volkswagen’s Dresden plant is as much a public spectacle as it is a working factory. A notable aesthetic throughout is the immense degree of transparency and organisation. The architecture works hard to conceal the *messiness* of a manufacturing environment by rethinking how critical factory systems might function. A notable example is the total seamless integration of conveyor systems into hardwood floors. Not only does the floor appear uncluttered, but the introduction of a warm, organic materiality breaks down the generic factory stereotype. A multitude of automated systems further implies a sense of precision, efficiency and productivity.

The relationships between vastly different spaces present a totally unique approach to factory programming. Here, public space is often positioned alongside manufacturing space – separated only by a glazed division. As seen in figure 12, the close proximity between a half-built sedan and a tiered auditorium is a dynamic and refreshing juxtaposition in which the public consumer can engage.

figure 12 | vehicle assembly line moves past glazed auditorium

Normal Factory

Hollwich Kushner

New York, United States
2014

figure 13 | minimalist store facade slotted into existing context

figure 14 | interior customer consultation space

figure 15 | 3D printers operate as part of the interior aesthetic

Normal Factory is a bespoke headphone brand, based in New York City. This is not merely an everyday retail store, but also a design and manufacturing facility. Using the latest 3D printing technologies, the store is able to offer individually customised products at a competitive price point (Echochamber, n.d.). The space operates as somewhat of a showroom, where the consumer engages directly with a designer, all the while witnessing the process of making around them.

Based on notions of minimalism and transparency, the architecture is designed to celebrate the product and processes behind it – removing unnecessary distractions to highlight the beauty of a new era of manufacturing (Bertoni, 2002). Figure 16 demonstrates an architectural method in which to add product value, through the building up of several layers of activity via glazed partitions. The consumer has the ability to not only engage with front of house activities, but also witnesses the behind-the-scenes processes that contribute to the total realisation of their final bespoke product.

figure 16 | translucent partitions reveal various stages of the making process

Van Nelle Factory

Johannes Brinkman + Leendert van der Vlugt

Rotterdam, Netherlands

1931

figure 17 | glazed bridge meets curtain wall facade

figure 18 | comfortable staff break areas flooded with natural daylight

figure 19 | critical factory machinery placed on display

Completed in 1931, this was the first large scale steel and glass factory with an architectural emphasis on worker comfort. Built in the International Style, the factory features a substantial glazed curtain wall facade, allowing maximum daylight infiltration to interior factory spaces. As described by UNESCO (2014), “it expresses the values of clarity, fluidity and the opening up of industry to the outside world”.

Notably, the building represents both modernist and functionalist notions. The arrangement of interior spaces is logical and organised, maximising production efficiencies through the integration of large glazed connecting bridges. These bridges operate not merely as functional components, but critically as a public symbol of transparency in a *new area* of manufacturing. As shown in figure 19, even the machinery is placed on show – positioned against the glazed facade as though desirable items in a shop front window. As a whole, the Van Nelle factory celebrates the beauty of simple materiality and refined functional detailing.

figure 20 | steel and glass elements present a new factory typology through the notion of openness

Machine in a Box

Luce et Studio

San Diego, United States

2013

figure 21 | exterior envelope illuminated at twilight

figure 22 | prefabricated rain screen alludes to the processes within

figure 23 | glazed sections frame views of interior spaces

As part of Nissan’s San Diego facility, Machine in a Box was built to house a critical and expensive piece of equipment: a large 5 axis milling machine. The high tech machine is used to carve prototype forms out of clay – including highly detailed full scale vehicles. The building architecture is intended to not take away from the activity occurring within, instead operating simply as a functional backdrop. The interior embraces a minimalist raw aesthetic, expressing steel moment frames, tension bracing and roof purlins in black. Exposed services, simple industrial lighting and acoustic panelling continues this aesthetic.

The exterior of the building is somewhat more expressive and suggestive of the processes occurring within. The envelope features a bespoke prefabricated rain screen – appearing as though the machine within could in fact have fabricated its own enclosure (Luce et Studio, 2018). Glazed portions give the box-like form a lightness and sense of openness to passersby. This is a simple architecture, built for optimal functionality.

figure 24 | structural elements wrap over machinery housed within

KAIT Studio / Workplace

Junya Ishigami + Associates

Kanagawa, Japan
2008

figure 25 | minimalist facade showcases various activities within

figure 26 | irregular slender structural elements create lightness

figure 27 | floor plan demonstrates clustered column arrangements

Located within the campus of a technical institute, this simple building presents a new workshop studio, implementing a unique method of dividing space. Rather than following a regular structural grid, the building instead relies on a multitude of slender column arrangements. Distributed over the building footprint, columns are dispersed in a seemingly random fashion. The irregular dispersal of structure reveals several pockets of open studio space. Other floor areas contain much tighter column groupings, where smaller breakout activities can occur. Despite the vast number of vertical elements, an overwhelming sense of transparency is maintained. The scattered arrangement of programme is somewhat reminiscent of early Craft Guild stalls, positioned in response to surrounding activities and obstructions. The informal organisational aesthetic is further continued through the differing orientations of semi-permanent furniture and fixtures. Rather than aligning with linear exterior boundaries, interior space is instead informed by more localised conditions – making sense of column irregularities.

figure 28 | interior spaces are arranged to best suit column locations: rationalising local conditions

21st Century Museum of Contemporary Art

SANAA

Kanazawa, Japan
2004

figure 29 | internal glazed courtyard surrounded by varied volumes

figure 30 | main circulation route: stair void operating as light well

figure 31 | floor plan demonstrates volume and circulation organisation

While SANAA's 21st Century Museum of Contemporary Art does not deal directly with consumerism or manufacturing, it offers valuable insights into the arrangement of space for a specific purpose. In essence, the building is a cluster of varied boxes, separated by corridors, contained in a circular envelope. While in plan, the arrangement of space seems somewhat complex and maze-like, it is in reality much simpler. Many interior spaces are at least partially glazed, allowing clear viewshafts through several adjacent volumes. This architectural strategy not only assists in navigation, but also works to build up layered and varied user experiences. As demonstrated in figure 29, several voids are also present, operating as an orientational device through the infiltration of daylight and fresh air.

The beauty of this scheme is the way in which volumes of varied proportions are allowed to pierce the main roof envelope to accommodate their programmatic demands. Similarly, staggered perimeter edges are embraced as breakout space and sitting areas.

figure 32 | exterior composition: volumes of varied scale and proportion arranged around central courtyard

catalyst site

A catalyst site located in Wellington, New Zealand has been selected for the testing of architectural ideas. Its diverse peripheries, established urban context and proximity to an array of public amenities make it a perfect location for this exciting new architectural typology. Bounded by a busy traffic route and central to pedestrian activity, the site also poses a number of unique challenges. Such provocations shall feed into typological systems and strategies in which to bolster development feasibility.

> **figure 33** | photograph of site extent and surrounding conditions (Waitangi Park in foreground)

critical nodes

A number of critical nodes are dispersed amongst the wider urban peripheries. Four fields of importance have been identified relevant to the proposed new typology: consumer destinations; production locations; urban landmarks; and education, research and government.

Currently, consumer destinations are scattered throughout central and northern portions of the CBD. The proposed typology seeks to diversify and support this arrangement through the introduction of centrally located flexible, adaptable production spaces. The proposed site shall also form a physical junction between several key surrounding education and research facilities – a landmark hub of sorts for ongoing innovation.

Many larger manufacturing precincts are presently located much farther afield, toward Lower Hut, Porirua and beyond. A crucial component of the proposed catalyst site is to pull outlying production into the city – enriching the urban fabric for an engaging and immersive consumer experience.

> **figure 34** | analysis of relevant critical nodes within Wellington city and the greater surrounding peripheries

ground + building use

An analysis of current ground and building use demonstrates the substantial diversity in activity occurring around the catalyst site. Building use is primarily commercial, retail, residential and hospitality – of which many developments are mixed use to some extent. Civic, tourism and recreational outlets are also present throughout the area: notably Te Papa (Museum of New Zealand) and several well known theatre and entertainment venues surround the site. Significantly, large portions of green space and leisure areas are located immediately north of the site – a prominent magnet for frequent pedestrian use in and around the urban location.

> **figure 35** | analysis of ground + building use bounding the existing site

people movements

An analysis of people movements maps the average hourly volumes of pedestrians and vehicles at any given time. Volumes were recorded at 70 key locations surrounding the site during weekdays and at weekends. Counts were taken three times per day: at mid-morning, noon, and at rush-hour. Final figures were derived from averaging all counts taken at each respective location.

Notably, *extra high* traffic flows are focussed directly around the perimeter of the site, functioning as a critical travel route to and from the northern CBD. High pedestrian and cyclist volumes are also demonstrated near the waterfront edge, along Courtenay Place and through the existing site itself. The proposed intervention shall investigate methods in which to navigate vehicle routes as a means to strengthen and encourage these various preexisting pedestrian connections.

> **figure 36** | analysis of current people movements through and around the existing site

experiential user narratives

To better understand how various users might experience and interact with the new marketplace typology, a series of four short stories was developed. These user narratives are essentially a series of *cute* little everyday encounters within the new environment. They work to set up a dialogue for which to better understand what the architecture might be, the ways in which people might experience the intervention, and the various roles that might occur within. These user narratives operate as both a launching point for idea testing, as well as an ongoing checkpoint for design successes.

figure 37 | overview of experiential user narratives illustrations

the passive observer

man walks to work. a new node in the urban skyline signifies a new consumer environment.

man passes a linear case of emerging technologies, performing a range of innovative tasks.

man passes a shop front window. the art of making becomes the focal point.

man passes an intelligent mixed reality mirror, articulately portraying his individuality.

man navigates functioning technological installations along his natural path of travel.

man passes exchange between consumer and designer-maker.

man continues to work; enriched by the experience of a new consumer environment.

the active observer

friends seek out new experiences. a new consumer environment interests them. they head toward the landmark.

friends approach a manufacturing display case. they stop briefly to observe the innovative processes within.

friends admire a shop front window. no longer merely finished products; here, the total art of making is on show.

friends discover a new sensory experience. blending the delights of gastronomy and technology.

an interactive advert reflects the style and interests of these fashionable friends.

friends take time to sit and converse; entertained by the ever-changing motions of innovative making.

friends migrate through the urban factory to the adjacent park.

figure 38 | experiential user narratives:
the passive observer + the active observer

the public consumer

consumer approaches the new urban factory. he has something in mind he would like to have made.

consumer enters a factory studio. more than just a store, this is a place to design, refine and manufacture.

consumer and designer-maker work hand in hand to develop a bespoke item, suited to his individual needs.

consumer virtually explores his proposed design; tweaking and perfecting.

final changes are implemented and reviewed. the design phase is complete.

consumer observes the total making process through the various stages until the point of completion.

consumer leaves the urban factory with his bespoke item in hand. he is a happy man!

the apprentice designer-maker

the urban factory is a learning space; where the apprentice is taught by the master designer-maker.

the apprentice observes the master at work; absorbing the many skills and aspects of the craft.

the apprentice works to improve their craft; practicing the techniques of design and manufacture.

the apprentice meets the consumer; realising their needs from beginning to end. the master observes the total process

the outcome is inspected and reviewed by the master.

the apprentice graduates. the apprentice is now the master.

the former apprentice and the master work side by side; continually learning and advancing their craft.

figure 39 | experiential user narratives:
the public consumer + the apprentice designer maker

fundamental typology criteria

Based on underlying objectives, literature research and experiential user narratives, a succinct set of 11 fundamental criteria has been established for the proposed intervention. This is the basis for which subsequent architectural testing and research will be founded. The 11 criteria are not completely spatial in nature, but rather describe the qualitative and experiential targets for which the new architectural typology must achieve.

At the centre of the typology is a series of factory studios. This is the catalyst for a direct relationship between designer-maker and consumer. Spatially, these environments must function both as seller and as producer – blurring the traditional boundaries between the two. Factory studios shall be supported by shared technologies, whereby several specialists can efficiently utilise a suite of high-tech machines and systems. Designer-maker learning shall facilitate the continual advancement of skills and processes.

Central to the success of the typology is the maximisation

of two key notions: *public process observation* and *public process interaction*. These notions must facilitate total exposure to cutting edge design and manufacturing tools, where everyday public have regular opportunities to passively and actively engage in the process of production. This new public interface will be further enforced via the strengthening of pedestrian connectivity throughout the site, alongside recreation and green spaces.

An events auditorium will support ongoing personal engagement, offering a unique meeting place for a range of public functions and industry gatherings. A landmark beacon will operate as a new architectural gesture within the greater urban peripheries – a reference to the future of innovation and consumerism, within an established context.

All fundamental typology criteria must be realised as a cohesive architectural intervention, fitting for its urban surroundings, with a pivotal focus on the relationship between designer-maker and consumer.

>
figure 40 | fundamental typology criteria

chapter 03

process + explorations

Chapter 03 presents the testing and development of architectural ideas. Explorations begin with a large series of form generating and massing exercises. This is followed by a major study series – exploring and analysing methods for interaction between person and technology. An investigation of methods to navigate and extend site edges is also conducted, prior to establishing a critical programme breakdown. Based on the established programme requirements, three major design scheme iterations are developed and analysed. Additional supplementary research is presented throughout this phase.

form generating exercise

Based on the established fundamental typology criteria, a series of quick-fire 60 second sketches was undertaken. Working primarily in plan, section and elevation, a multitude of formal arrangements were tested to better understand scale, mass and transparency opportunities. A significant focus was the composition of volumes as a mediator between horizontality and verticality.

I was very much curious about the interior aesthetic that might emanate as a result of the typology criteria. I began to cut through and populate the sketched volumes with suggestions of technology, machines and human inhabitation.

While earlier sketch studies dealt with forms of differing shape, language and complexity, a more pure volume ultimately prevailed: a *family* of linear, orthogonal geometries of varying character. Forms appear to float above and below the ground plane as to free up an open platform for ongoing public interactions.

>
figure 41 | quick-fire 60 second sketches exploring organisation, scale, proportion and formal language as a design launching point

figure 42 | quick-fire 60 second sketches: elevation

figure 43 | quick-fire 60 second sketches: plan

figure 44 | quick-fire 60 second sketches

figure 45 | quick-fire 60 second sketches

figure 46 | quick-fire 60 second sketches

figure 47 | quick-fire 60 second sketches

massing exercise

Based upon findings from the earlier *form generating exercise*, sketches were translated into physical, three-dimensional masses. A series of rapid modelling outputs helped establish the scale of the intervention, with an emphasis on proportionality, edge conditions and urban peripheries. People movements and interactive opportunities were also considered. A particular focus was the way in which volumes of a similar language can be manipulated to present an entirely unique personality – through the simple altering of proportion, structure and perspective.

>
figure 48 / 49 / 50 | massing studies exploring formal arrangements, based on *earlier form generating exercise*

^
figure 51 | massing studies exploring formal
 arrangements, based on *earlier form generating exercise*

^
figure 52 | massing studies exploring formal
 arrangements, based on *earlier form generating exercise*

methods for interaction between person and technology

A pivotal part of the design led research was the exploration and development of 27 tiny models. Each model is effectively a moment within a wider context, depicting various architectural methods to facilitate user engagement with technology. Models were analysed and grouped to form three unique study series: *methods for public engagement with technology*; *methods to support consumers as designers*; and *re-imagining the fitting room*. These models later become fundamental building blocks toward establishing a detailed programme breakdown and design explorations.

figure 53 | overview of major study series exploring methods for interaction between person and technology

study series 01

methods for public engagement with technology

The study series explores the methods in which architectural cues can enforce a positive connection between the public consumer and innovative emerging technologies. The physical models portray a series of *moments* that might occur within a larger designed environment. The series explores critical notions of boundary and threshold as a device of visibility, perspective and safety. Also interwoven, is a parallel exploration of how new technological processes might manifest in space. The noxious factory is a thing of the past, presenting the prospect for new relationships.

A network of staggered platforms or bridges provides the public with a series of vantage points and perspectives in which to experience technology. The nature of the bridge forms a physical threshold between consumer and production, whilst facilitating unobstructed visual connectivity. The vertical separation provides an opportunity for closer horizontal proximity, even allowing one to pass over the other.

figure 54 | methods for public engagement with technology

series 01
model 02

By varying floor heights, technology is raised up on a plinth. The vertical discrepancy of approximately one metre effectively forms a balustrade in which to define a threshold. The consumer vantage point is lowered as though looking toward a theatrical stage. The eye becomes better aligned horizontally with the item that is being manufactured. A subtle hierarchy is also given to the technology on display.

^
figure 55 | methods for public engagement with technology

series 01
model 03

Similar to model 02, a variation in floor height is articulated. In this instance, the machinery is lowered so as to create a higher vantage point for the public consumer. While no physical barrier is present, the vertical discrepancy in levels creates an informal threshold in which the viewer would not pass. This arrangement may be particularly beneficial for larger manufacturing processes that better align with the consumers' natural resting eye level.

^
figure 56 | methods for public engagement with technology

series 01
model 04

A transparent barrier distinguishes the threshold between public space and manufacturing. A corridor is effectively created to shield the public from hazardous processes, whilst allowing seamless viewing opportunities. This system further enforces the ease in which to pass from one space to another. The implementation of a physical protective partition enables the distance between consumer and technology to be substantially reduced.

^
figure 57 | methods for public engagement with technology

series 01
model 05

Placing the technology directly above the consumer offers a substantially unique vantage point. The experiential qualities become more immersive through the heightening of visual cues and physical hierarchy. A translucent or semi-permeable horizontal partition maximises visibility in which the technology can be viewed from a multitude of unorthodox perspectives. The raised platform frees space for public to seamlessly pass under.

^
figure 58 | methods for public engagement with technology

series 01
model 06

Similar to model 05, a translucent or semi-permeable platform is utilised. In this instance, the public consumer is able to pass directly over the technological processes. The implementation of a physical horizontal barrier allows the distance between consumer and manufacturing to be reduced – providing a more immersive experiential environment. Atypical sensory cues are also engaged.

figure 59 | methods for public engagement with technology

series 01
model 07

Technologies are placed on moveable support structures to accommodate both manufacturing demands and consumer engagement. Vantage points are staggered and ever-changing as to provide a more dynamic experiential environment. Similar to a cluster of trees, the consumer feels small and enclosed. A lack of defined threshold presents a greater sense of freedom for the public to explore.

figure 60 | methods for public engagement with technology

series 01
model 08

Similar to model 07, a cluster of manufacturing technologies surrounds the viewer in an ever-changing environment. Here, a bridge-like structure is implemented to raise the consumer above the ground plane and clearly define public thresholds. Similar to being within a forest canopy, the consumer becomes totally immersed in their surroundings, with a multitude of vantage points both above and below.

^
figure 61 | methods for public engagement with technology

series 01
model 09

As with model 08, a bridge-like structure is implemented. The translucent or semi-permeable qualities of the platform facilitate total immersive viewing of the manufacturing environment. Platform materiality reduces the explicitness of the defined user threshold, whilst maintaining safe boundaries between person and technology.

^
figure 62 | methods for public engagement with technology

series 01
model 10

A technological process is raised on a central stage or pedestal. The surrounding observation space is divided into several levels so as to engage the consumer through shifting perspectives. As the viewer navigates the space, their engagement with the technology builds and develops. Varied floor levels implicitly define thresholds.

^
figure 63 | methods for public engagement with technology

series 01
model 11

Similar to model 10, the consumer is able to experience a manufacturing process from a number of perspectives. In this instance, a greater hierarchy is given to the public, viewing the technology from a raised position. While no physical barrier is present, the vertical discrepancy in levels creates an informal threshold between consumer and manufacturing space.

^
figure 64 | methods for public engagement with technology

series 01
model 12

Here, the threshold is explored as the shift between horizontal and vertical. Innovative technologies are enabling manufacturing to move beyond the level plane, providing opportunities for a richer consumer experience. The freeing up of horizontal space activates greater area for public viewing and general thoroughfare. In this instance the threshold between consumer and technology becomes both explicit and invisible.

^
figure 65 | methods for public engagement with technology

series 01
model 13

As with model 12, the relationship between vertical and horizontal space is explored. A bridge-like structure elevates the consumer to achieve a more natural viewing eye line with the manufacturing processes. The ground plane is freed up to adaptively accommodate other programmatic requirements. While thresholds are more defined, a dynamic user experience is maintained.

^
figure 66 | methods for public engagement with technology

As discussed with model 12, thresholds are explored beyond the standard floor plan. The emergence of additive manufacturing technologies allow products to be realised in a multitude of unorthodox conditions. Here, the investigation places manufacturing directly over the heads of the public consumer. This offers an exciting perspective in which the viewer engagement becomes more dynamic, whilst maximising space.

^
figure 67 | methods for public engagement with technology

Manufacturing is presented as a theatrical performance. The consumer or designer-maker takes time to sit and watch the making of a real-world three-dimensional product, as they would a dance or a concert. The innovative technology is placed on a stage, where the viewer becomes immersed in the beauty of the process. As with a theatre of any kind, the threshold is between gallery and stage.

^
figure 68 | methods for public engagement with technology

study series 02

methods to support consumers as designers

The study series responds to the consumer demand for a more active and interactive roll in the total design process. The series explores how architectural environments can assist the everyday consumer to develop, visualise and understand their bespoke creations. A series of *moments* articulates a range of platforms in which total immersive public engagement can occur. Variations are offered to accommodate a broader consumer market, with respect to the diverse ways in which an untrained participant might best grasp virtual concepts.

A large format interactive screen is offered as a consumer design tool. The technology is utilised as an idea generator throughout various stages of the design process – in collaboration with the designer-maker. The device is controlled via gesture and touch commands, responding to the varied motions of the user. This interactive technology is a device for both public and semi-private use.

figure 69 | methods to support consumers as designers

series 02
model 02

Similar to model 01, the circular interactive screen offers similar benefits as a consumer design device. Gesture controlled technology responds to both motion and touch. Operated from within the circular interior, the form is ideal for collaborative group processes. This is an ergonomic layout which maximises user efficiency. The format is best suited to public or semi-private spaces.

^
figure 70 | methods to support consumers as designers

series 02
model 03

As with model 02, a circular interactive screen is presented for general public consumer use. Operated from the rounded exterior, the form is optimised for individual design tasks. The smaller device size is suited to a variety of spaces and locations – used either publicly, semi-privately or in isolation. Intuitive gesture controls make the technology accessible to a diverse consumer demographic.

^
figure 71 | methods to support consumers as designers

series 02
model 04

An interactive screen is used for both design and experiential purposes. An elevated central platform positions the consumer centrally within the arc. Influenced by gestures and motions, the user can impact display content passively as they transition through. Alternatively, the device can be used explicitly as a design aid. The unique form presents opportunities for large scale, immersive design content, adaptable for specific user needs.

^
figure 72 | methods to support consumers as designers

series 02
model 05

Located along the ground plane, the gesture controlled visualisation technology is fitting for large-scale design schemes, natively presented in a horizontal format. Consumers walk over the floor plate to locations that best suit their desired vantage point. Motion control responds to movements and adapts content accordingly.

^
figure 73 | methods to support consumers as designers

series 02
model 06

Here, an opportunity for hands-on manufacturing interaction is presented to the public. A range of small format 3D printing and milling devices can be operated by the consumer as a means in which to explore their bespoke designs. A circular environment facilitates inter-consumer collaboration, learning and problem solving. Similar arrangements can be adapted to various contexts.

^
figure 74 | methods to support consumers as designers

series 02
model 07

The investigation engages both screen and virtual reality technologies for a totally enveloping consumer environment. Suspended on a low platform, the viewer explores bespoke designs in three-dimensional virtual space. Real time design amendments are controlled via motion sensing technology – offering faster product realisation.

^
figure 75 | methods to support consumers as designers

series 02
model 08

Similar to model 07, a combination of screen and virtual reality technologies is provided for a totally immersive consumer experience. A vertically adjustable platform provides the consumer with an optimal vantage point in which to explore bespoke schemes in three-dimensional space. Gesture controls provide insitu design alteration capabilities.

figure 76 | methods to support consumers as designers

study series 03

re-imagining the fitting room

The study series seeks to redefine the potentials of the fitting room. It explores how innovative new technologies might be engaged as part of the virtual realisation of consumer-specific items. The model series proposes how digital devices might integrate into an architectural setting to support and enrich the total fitting experience.

series 03
model 01

Personal scanning devices are an exciting emerging technology for textiles, clothing and wearables. By undertaking a full or partial body scan, bespoke items are more accurately designed and refined for the specific needs of the individual. Ergonomic and anthropometric analysis is also undertaken to maximise user comfort and performance. This particular configuration functions both as a tool and as a spectacle.

series 03
model 02

Similar to model 01, the technology is used in the accurate scanning and measuring of consumer individuals. Data is digitally recorded and fed into software to optimise bespoke design output criteria. This process is widely applicable to textiles, clothing and wearables, making it a value part of bespoke collaborative production.

figure 78 | re-imagining the fitting room

series 03
model 03

Digital mirror technology is a new way of trying things on. The consumer stands in front of the digital screen and views in real time their bespoke design as though seeing a reflection. The consumer is able to virtually wear, interact with and experience an item without actually taking possession of it. This technology can be used in various configurations, both privately, semi-privately and publicly.

figure 79 | re-imagining the fitting room

series 03
model 04

Holographic imagery is another highly advanced emerging technology. Utilising artificial light, three-dimensional images are projected in space for the viewer to experience. The consumer can virtually see, interact with and experience an item before it is physically manufactured. The technology operates at a number of scales and can integrate into a range of architectural programmes.

figure 80 | re-imagining the fitting room

methods to navigate and
extend site edges

The catalyst site is notably bounded by a major three lane vehicle route containing unrelenting high traffic volumes. Such vehicle movements frequently interrupt pedestrian travel paths across the site, particularly in the North-South direction. This section investigates architectural methods in which to mitigate critical vehicle-related problem areas as a means to bolster pedestrian connectivity. The goal is not only to navigate existing edge conditions, but to blur and extend current formal boundaries into surrounding urban fabrics. Key precedents are analysed as a generator of site-specific strategy tests.

>
figure 81 | aerial view of existing site and peripheral conditions: a notable focus is the *extra high volume* three lane vehicle route bounding the site

The High Line
James Corner Field Operations + Diller Scofidio + Renfro

New York, United States
2009

figure 82 | aerial view of Highline crossing over streets below

figure 83 | elevation depicts Highline integration with street level

A repurposed rail bridge provides an alternate pedestrian route and additional recreational space over city streets. Functioning as a 2.3km long linear park, the raised platform weaves through the urban fabric, over high traffic areas and between proximate buildings. In many locations, the High Line runs directly over existing low lying interventions – exploiting and diversifying available vertical space (The High Line, 2018). The raised pedestrian network functions as a connector of critical urban nodes, raising the quality of the pedestrian experience.

Pukeahu National War Memorial Park
Wraight Athfield Landscape + Architecture

Wellington, New Zealand
2015

figure 84 | vehicle tunnel entrance alongside public green space

figure 85 | sectional view demonstrates vehicle passage under park

A small urban park straddles a main state highway in a built up setting. The considerable historic significance of the war memorial site required the implementation of an unobtrusive strategy (Wraight and Associates, 2018). By rerouting the high traffic road underneath the park, a direct physical and visual connection is achieved between new and existing monuments. By sloping the tunnel down toward the centre, the required open trench length to either side is effectively reduced. A small low speed vehicle service lane remains above ground for intermittent use only.

11th Street Bridge Park
OMA + OLIN

Washington D.C., United States
(unbuilt)

figure 86 | visualisation overlooking proposed bridge scheme

figure 87 | bridge functions as both pedestrian route and public plaza

The proposed bridge functions as both a critical urban link and a recreational destination. A number of programmes and formal interventions are dispersed over the length, partitioning open areas into smaller individualised sections – including cafe, performance venue and park. Verticality is introduced as a means to break down linear notions and set up unique pedestrian vantage points. The stacking of programmes maximises and diversifies available space (OMA, 2017).

Ribbon of Light Bridge
Michael Maltzan

Los Angeles, United States
(under construction)

figure 88 | main vehicle route passes over public green space

figure 89 | park and bridge level connected via stairs and walkways

A mixed use vehicle and pedestrian bridge spans a series of green areas and parks below. By vertically raising a critical urban corridor, larger spaces are made available for recreational purposes. The difference in elevation works to substantially reduce traffic noise, enforcing positive user experiences. Bridge access is made available via regular stair connections integrated into the architectural form. Platform height above ground works to allow direct natural sunlight to infiltrate green space below (Michael Maltzan Architecture, 2012).

Olympic Sculpture Park
Weiss/Manfredi

Seattle, United States
2007

figure 90 | aerial view of built-up public park passing over roadway

figure 91 | tiered landscape achieves seamless pedestrian crossover

A nonlinear bridge functions as a connector of green spaces to form a larger recreational park. A series of stepped and battered segments is used as a device to elevate the park above a busy vehicle roadway (Weiss / Manfredi, 2018). The skewed articulation of pedestrian pathways and ramps provides an illusion of flatness in which to improve the user experience. Wall-like partitions operate to obscure direct lines of sight with vehicles below, whilst also functioning as an acoustic baffle.

Cuyperpassage
Bentheim Crouwel

Amsterdam, Netherlands
2015

figure 92 | shared pedestrian tunnel defines space through materiality

figure 93 | sectional view depicts split-level pathway

Functioning as a critical urban connector, the shared tunnel enables safe mixed use by pedestrians and cyclists. Functions are formally defined through the raising up of walking surfaces to one side (Colossal, 2016). Programmatic cues are further enforced by visual distinctions in colour, lighting and materiality. For user safety, a linear layout provides direct unobstructed views to and from tunnel entrances. Art installations facilitate user interest along the path of travel.

figure 94 | sectional diagrams testing the suitability of various systems to extend site edges, with a critical focus on seamless pedestrian flow movements

Shown top left is a sectional elevation depicting the current site edge and surrounding road conditions. Hierarchy is given to vehicle traffic, while pedestrian movements become secondary. Signal controlled level crossings dictate intermittent pedestrian flows to and from the site, restricting natural pedestrian behaviours.

Test 01 proposes the raising of vehicle routes via a bridge-like structure to accommodate ground level pedestrian movements. While the system is effective in separating user groups, visual mass impacts user sightlines and restricts available sunlight. Proximate buildings may also be affected.

Test 02 proposes the lowering of vehicle routes into a tunnel or trench. This offers an effective means in which to visually and acoustically separate user groups. Associated toxins are also mitigated. The system offers pedestrians a seamless transition to and from neighbouring urban locations, presenting an efficient travel route. Provisions for intermittent ground level service vehicle access must be considered.

Test 03 explores the possibility of integrating a shared pedestrian / cyclist underpass. Spatial implications due to ramp length requirements are however a notable drawback. The structure impedes on both the site and surrounding contexts, reducing usable space. Visual connectivity is also problematic in several locations.

Test 04 proposes a pedestrian bridge structure spanning each roadway. While effective as a linking device, height-to-length ramp ratios greatly impact available space. User equity is another critical consideration with regard to accessibility and efficiency of use.

Test 05 presents a hybrid of sorts. While one traffic route is totally embedded (similar to test 01), the northern side is partially elevated. This strategy balances the spatial implications of achieving tunnel access, while providing a more seamless transition to pedestrian users. The mound also operates as recreational environment, optimising and diversifying available space.

critical programme breakdown

Derived from fundamental topology criteria and previous *study series*’ exercises a comprehensive programme breakdown has been established. This solidifies the way in which each critical area is intended to function, providing a well founded launching point for site organisation and spatial planning.

Crucially, all major programme areas have a central focus on public and consumer interaction and observation. This shall be strategically integrated throughout much of the intervention – fostering frequent positive engagements between designer-maker and consumer.

Various points of interaction are categorised as either *flexible*, *mobile* or *dedicated*. Similarly, entry thresholds are considered *minor*, *undefined*, *defined* or *private*. Risk and accessibility are also noted.

Prior explorations and analysis were used as a reference for the development of ancillary and support criteria in which to enforce the viability of the architectural typology. Ongoing research shall further aid in understanding specific architectural implications around emerging technologies and production systems, relative to design ideas.

>
figure 95 | itemised critical programme breakdown schedule

factory studio: small (inc. kiosk)

- a. public process observation
[study series 01: public engagement with technology]
flexible viewing points
- b. consumer process interaction
[study series 02: consumer as designer]
flexible design points
- c. consumer testing + analysing
[study series 03: the fitting room]
flexible fitting points
- d. production space
controlled public access
low risk processes
- e. entry threshold
minor / undefined
- f. point of sales + collection
mobile / flexible
- g. ancillary space
shared storage + staff area

shared technology space

- a. public process observation
[study series 01: public engagement with technology]
interspatial viewing points
- b. production space
designer-maker access only
high risk / harmful processes
large item manoeuvring
- c. entry threshold
defined + private
- d. ancillary space
dedicated storage + staff area

landmark beacon

- a. public process observation
[study series 01: public engagement with technology]
dedicated viewing points
- b. observation of wider urban realm
flexible viewing points
- c. gathering space
transient public
- d. entry threshold
defined

factory studio: medium (standard)

- a. public process observation
[study series 01: public engagement with technology]
flexible viewing points
- b. consumer process interaction
[study series 02: consumer as designer]
dedicated + flexible design points
- c. consumer testing + analysing
[study series 03: the fitting room]
dedicated fitting points
- d. production space
controlled public access
low - medium risk processes
- e. entry threshold
defined
- f. point of sales + collection
mobile / flexible
- g. ancillary space
dedicated storage + staff area

public making space

- a. public process observation
[study series 01: public engagement with technology]
flexible viewing points
- b. consumer process interaction
[study series 02: consumer as designer]
flexible design points
- c. consumer testing + analysing
[study series 03: the fitting room]
flexible fitting points
- d. production space
full public access
low risk processes
- e. entry threshold
minor / undefined
- f. point of sales + collection
mobile / flexible

events auditorium

- a. public process observation
[study series 01: public engagement with technology]
dedicated viewing points
- b. flat function space
- c. flexible seating
- d. entry threshold
undefined
- e. ancillary space
catering + audio visual

factory studio: large (oversized / heavy duty)

- a. public process observation
[study series 01: public engagement with technology]
dedicated viewing points
- b. consumer process interaction
[study series 02: consumer as designer]
dedicated design points
- c. consumer testing + analysing
[study series 03: the fitting room]
dedicated fitting points
- d. production space
designer-maker access only
high risk / unsafe processes
large item manoeuvring
- e. entry threshold
defined
- f. point of sales + collection
dedicated
- g. ancillary space
dedicated storage + staff area

public realm + support

- a. public process observation
[study series 01: public engagement with technology]
dedicated viewing points
- b. methods to navigate roads and extend site edges
- c. hard surfaces
- d. green space
- e. cafe / eatery
- f. front of house + preparation
- g. public bathrooms
- h. accessible + staff parking
- i. inwards / outwards goods + bulk storage
- j. cleaning
- k. security
- l. IT + servers

learning theatre

- a. designer-maker + public education space
restricted access
[study series 01: engagement with technology] adapted
dedicated viewing room
tiered seating
- b. entry threshold
defined

i.01

raised

design scheme iteration 01

Derived from precedent studies and early form finding exercises, design scheme 01 (i.01) proposes the idea of an architecture that frees the ground plane for an open plaza. Buildings are both floated above and submerged below ground level as a means to maintain natural pedestrian travel paths, while offering an alternative recreational civic node. Building volumes are clustered and linked by suspended bridges, serviced by clip-on volumes for amenities and vertical circulation. Smaller buildings sit at ground level, aligned with natural pedestrian travel paths.

figure 96 | i.01 marketplace context

figure 97 | i.01 plan above

figure 98 | i.01 plan ground

figure 99 | i.01 plan below

design scheme iteration 01 critical summary

i.01 tests methods in which to achieve technology visibility, while minimising ground plane obstructions. The main flaw in this scheme is the disconnect between the public consumer, designer-maker and technology. The verticality of the architecture removes informal or unplanned passive observation experiences, significantly reducing the success of the venture. By floating the majority of buildings above the ground plane, access points to factory studios are significantly reduced, limiting sales exposure. While the integration of a public plaza is advantageous to the scheme, it lacks refinement as an urban node and does not effectively work to push public toward critical activities and processes.

Another concern is the shading caused by buildings above. While effective as a rain shelter, some spaces may become dark and undesirable, requiring careful consideration moving forward. Furthermore, building geometries form an uncomfortable barrier between

urban streets and Waitangi Park. While the scheme attempts to respond to adjacent proportions and urban grain, buildings do not yet sit comfortably as a mediator between the existing streetscape and the lower landscape toward the north.

Below ground, the scheme functions as somewhat of a singular enclosed building. Four main stairwells unify the *above* and *below*. While successful as a container of large manufacturing processes, circulation and programme integration can be further improved.

Many of the aspects mentioned above do not yet satisfactorily reflect the aims and objectives of this research topic. While i.01 has proven useful in understanding the vast implications of the site and surrounding contexts, substantial refinement of the architectural proposition is required.

early strategies brainstorm

Based on the outcomes of the initial design scheme (i.01) in conjunction with earlier research, a brainstorm was compiled. The brainstorm contains a vast array of architectural ideas considered to date, many of which have not yet been tested. The strategies brainstorm operates as a visual checkpoint for future iterations moving forward. It is intended that the brainstorm continually builds and evolves throughout the design process.

> **figure 100** | early brainstorm considering architectural strategies for a new marketplace typology

i.02

graduated

design scheme iteration 02

As a progression from iteration 01, the second scheme (i.02) attempts to mitigate earlier issues of technological exposure and consumer accessibility. The scale of the total intervention is reduced, with particular focus on the northern, park-facing aspect. Here, buildings have been grounded and reduced to a single level. The intervention effectively graduates in height from North to South, forming a more natural transition between waterfront, park and city.

figure 101 | i.02 marketplace context

figure 102 | i.02 plan above

figure 103 | i.02 plan ground

figure 104 | i.02 plan below

design scheme iteration 02 critical summary

The grounding of northern buildings operates much more effectively in minimising the threshold between the public consumer and designer-maker. By reducing building heights, passers-by have greater passive and active observation opportunities for engagement with innovative technologies. Furthermore, the integration of additional ground plane programme works effectively to extend existing streetscapes (Blair Street and Allen Street) into the site – blurring site boundaries.

While southern building clusters have also been reduced in height, they continue to appear as an uncomfortable barrier between city and waterfront. Access to this building remains limited to dedicated entry points at either end. Although the exterior facade contains high ratios of transparency, the scheme continues to have an inward-facing orientation – not dissimilar to an enclosed shopping mall.

In much the same way, below ground programme is also very much inward-facing, restricting process visibility to a single side. Compounding this problem is the proportion of manufacturing spaces throughout. The squareness of these spaces makes up-close viewing difficult to achieve and requires a new strategy. While the majority of the exterior below-ground envelope is in fact transparent, much of it is not accessible by public pedestrians. By reorganising large programme and circulation routes, greater engagement opportunities are likely to manifest.

Ultimately, both schemes i.01 and i.02 do not yet satisfy the fundamental aims and objectives of the research proposition. While certain individual aspects have proven successful, each scheme falls short as a holistic solution.

A fresh approach is required moving forward.

analysis of marketplace arrangements

Prior to i.03, additional research and analysis was undertaken. Here, a wide range of marketplaces were examined for their formal and programmatic agendas. From this analysis, an informal definition of the term *marketplace* was derived, offering a fresh, refined perspective on what the proposed new architectural typology might be.

>
figure 105 | figure ground diagrams demonstrating programmatic arrangements of nine unique marketplaces of varying size and typology

Boxpark
Croydon, England
type: covered

Harbourside Market
Wellington, New Zealand
type: open air

Wakefield Market Hall
West Yorkshire, England
type: covered + enclosed

Fish Market
Bergen, Norway
type: enclosed

Santa Caterina Market
Barcelona, Spain
type: covered

Mercat Encants
Barcelona, Spain
type: open air + covered

marketplace informal definition

Having examined a number of marketplace interventions from around the world, an informal definition was derived. Ultimately, a marketplace is not in itself an architectural space or intervention, but more importantly the relationships or rules that occur within it. It is in essence a collection of *things* that work in harmony with one another. A marketplace relies on some degree of ordering as a means to become readable and understandable. This is commonly achieved through orientational devices or grids, where public consumers universally understand circulation routes. In much the same way, the architecture must establish consistent *rules* in which a person instinctively knows how to navigate the built environment. Ultimately, there is always a high degree of consistency throughout a marketplace intervention – whether consistently formal or consistently chaotic.

marketplace

/ma:kit.pleis/

noun

1. a collection of *things*, united through purpose or placement: varied and unique, but of the same family

organisational studies

Organisational studies were used as a tool in which to translate and better understand the relationships learnt from prior analysis of marketplace arrangements. The rapid modelling outputs explore methods in which to extend existing passageways, pulling people into and through the site. A key focus is the response to the three differing urban grids and how the architecture provides a logical system of organisation. These explorations become the basis for design scheme i.03 to follow.

>
figure 106 | massing studies depicting a series of arrangements, based on surrounding urban conditions and learnt marketplace principles

i.03

grounded

design scheme iteration 03

Ultimately, the proposal has been simplified – reflecting the essence of traditional marketplace arrangements, with a new fundamental focus on view shafts, transparency and accessibility. A single level of slender, freestanding buildings sits at ground level, blurring the boundary between Waitangi Park and the urban streetscape. Below ground, a similar strategy is applied, with an arrangement of long slender spaces, accessible from all sides.

^A
figure 107 | i.03 marketplace context

figure 110 | factory studios + landmark beacon

figure 111 | factory studio + observation stair

figure 112 | below ground expanse

figure 113 | tiered viewing + factory studios

design scheme iteration 03 critical summary

A number of above ground factory studio clusters are positioned to align with three existing urban grids – functioning as the mediator between the city, the waterfront and Oriental Parade. Building clusters are located to extend Blair Street and Allen Street through the site, blurring peripheral boundaries while reinforcing natural pedestrian travel paths. *Manufacture display cases* are also used as a navigational device, placed alongside major pedestrian circulation routes. The positioning of these architectural interventions requires further refinement to better improve regular passive engagement opportunities.

Centrally located public observation devices operate effectively as an intermediary between above ground and below ground interventions. The landmark beacon serves a similar function.

Two major stairways are positioned centrally (east and west), linking the above ground plaza to below ground operations. Below ground programmes have been pushed to either side, making way for a central

gathering and events auditorium. Large manufacturing spaces form an architectural barrier between site edges and primary public circulation. Notably, the high-traffic bounding road has been relocated to below ground – open to and visible from the marketplace itself. This move injects liveliness to site edges, while improving public visibility. The below ground expanse could benefit from the inclusion of smaller central programmes such as cafes, eateries or other social outlets – a means to pull people down from the plaza above. Furthermore, site edges remain awkward in places and require further refinement to instil purpose.

Architectural elements are, at this early stage, very much diagrammatic and do not yet convey specific programmatic occupation. It is also critical that the intervention does not merely become a series of museum glass boxes – instead, reflecting the hands-on, interactive nature of the proposition. The arrangement of buildings must be refined to better enhance regular passive and active user experiences to more thoroughly align with the aims and objectives of this design research.

chapter 04

developed design proposal

Chapter 04 consists of two critical parts. Part A presents a final visual design scheme; Part B presents a distilled set of typological strategies. The architectural intervention is presented through a series of images, organised in a logical progression, in which a number of crucial aspects are pinpointed and discussed. Several architectural studies are also interwoven, as a means to understand the logic behind important design decisions. Finally, 26 typological strategies are presented and analysed as a foundation for future interventions within a similar context.

04

part A

visual design scheme

responding to the wider context

The catalyst site sits at the intersection of three major urban grids: the city, the waterfront and Oriental Parade. The site is also a popular thoroughfare for frequent pedestrian movements. The proposal uses these key factors as a framework for orientating and distributing programme and circulation at ground level. Long slender building forms are distributed to align with existing surrounding conditions such as Blair Street and Allen Street. As identified earlier, the existing *extra high volume* vehicle route has been relocated below ground, prioritising pedestrian moments, while extending site boundaries. Urban design strategies are employed to pull public foot traffic into and through the site, engaging with innovative manufacturing technologies along the way.

> **figure 114** | master plan demonstrating proposed building footprints and pedestrian travel paths

▲
 figure 115 | blair st / waterfront link + small factory
 studio cluster

above ground organisation

Above ground programme primarily consists of factory studio spaces (kiosk, small, medium). Small and medium factory studios are arranged as long slender linear clusters, maximising transparency, viewshafts and passive engagement opportunities. A public making space sits centrally alongside a learning theatre – operating as minor nodes within the site. Cafes and eateries are located both centrally and to immediate site peripheries as a strategy to pull people through the plaza. A number of dedicated observation devices are dispersed throughout the ground level, offering both elevated and subterranean viewing opportunities. Most notably, the landmark beacon sits prominently at the southeast corner of the site – a new major node within an established urban context. Main stairways to the east and west provide strong connections to the below ground marketplace environment.

>
figure 116 | plan above

below ground organisation

Below ground space is primarily used for large manufacturing processes. Two large factory studios are located toward the north boundary, while a shared technology studio is positioned toward the south. The central area operates as primary circulation, doubling as a semi-private gathering or events space. Also centrally located is the main server core: the *beating heart* that drives the marketplace. Materials and bulk storage are contained at one end of the intervention, visible for public to experience. Also located below ground is a mixed reality cafe/eatery, automated stacker parking and an independent public design and visualisation area. The site is bounded by a three lane vehicle route – open to the marketplace intervention. Furthermore, public transit nodes service the marketplace along site edges, injecting pedestrian vitality and liveliness into the outer peripheries.

>
figure 117 | plan below

section across

This section demonstrates the relationship between the proposed intervention and surrounding contexts. Notably, Waitangi Park is directly adjacent to the marketplace. The section indicates the blending of site edges to achieve a considered transition between park, plaza and city. Another notable feature is the three lane vehicle route bounding the site below. The roadway works with the marketplace intervention as a means to inject an additional layer of urban vitality – particularly through the implementation of public transit nodes.

>
figure 118 | section across

- 01 main stair
- 02 amenities pod
- 03 factory studio: small
- 04 factory studio: large
- 05 shared technology space
- 06 public design + making space
- 07 server core: *the beating heart*
- 08 converse space
- 09 manufacture display case
- 10 tiered viewing
- 11 public observation stair
- 12 public transit node
- 13 vehicle tunnel
- 14 waitangi park subsurface wetland

1:350
2m

section along

This section demonstrates the arrangement of programme along the length the marketplace intervention. Notably, the slender canopy roof functions as a secondary shelter to the above ground public plaza – informally linking individual building forms. Main stairways to either end provide efficient public pedestrian access to the below ground environment. Vertical circulation is also contained within the landmark beacon tower. Dedicated public observation points provide further visual connections between marketplace levels.

> figure 119 | section along

- 01 main stair
- 02 amenities pod
- 03 factory studio: kiosk
- 04 factory studio: small
- 05 factory studio: medium
- 06 factory studio: large
- 07 server core: *the beating heart*
- 08 converse space
- 09 manufacture display case
- 10 mixed reality cafe / eatery
- 11 tiered viewing
- 12 public observation channel materials + bulk storage
- 13
- 14 parking: stackers + charging
- 15 vehicle tunnel

1:350

2m

an intermediary between city,
park and waterfront

The marketplace intervention functions as a new civic node within the surrounding urban context. Located at the intersection point between three city grids, the architecture works to find a logical arrangement of space. The marketplace also operates as a threshold of sorts between the well-established built environment to the south, and Waitangi Park to the north. The intervention blurs these once explicit boundaries through architectural cues – allowing elements to bleed into one another.

figure 120 | marketplace high elevation

canopy form studies

Canopy forms were explored as a unifier of programmes and spatial arrangements. Based on research observations around Kiwi lifestyle and shopping preferences, a decision was made to create a *semi-covered* marketplace environment. *Open-air* and *enclosed* typologies were also considered but found to be impractical for the objectives of the proposed typology. Figure 121 tests a multitude of canopy arrangements, considering rain, wind, direct and ambient daylight, relationships to surrounding conditions, and aesthetic implications.

Early iterations explored the abstraction of the traditional factory roof aesthetic, stretching, folding and reorganising it to reflect a contemporary manufacturing and retail environment (Rappaport, 2015). Iterations also tested the idea of dividing a larger canopy into smaller independent rooflines – relating to the proportion and grain of peripheral contexts. Embedded throughout each exploration is a consciousness to achieve a refined, minimalist aesthetic, reflecting functionalist notions of early factory architecture (Marcus, 1995).

>
figure 121 | canopy form studies

a factory studio archetype

To support the advancement of emerging innovative technologies, a retail, design and manufacturing space was developed – the factory studio. Notably, factory studios are clustered and interconnected, facilitating continual interdisciplinary communication and collaboration. Building forms manifest as long slender openable transparent boxes, maximising public exposure to technological processes occurring within. Slender structural elements minimise interior obstructions, while linear overhead services remain exposed – representing functionalist, adaptable attributes (Marcus, 1995).

figure 122 | medium factory studio cluster + public observation stair

factory studio form studies

A series of explorations tested the effectiveness of various factory studio architectural forms. Based on notions of minimalist and functionalist design, iterations explored key attributes including access, transparency, shelter, structure and services.

A number of iterations investigated the abstraction of the traditional factory aesthetic, with particular emphasis on the iconic industrial roofline (Rappaport, 2015). Further explorations introduced the idea of an operable envelope or facade system, responsive to changing weather conditions and processes occurring within. Various methods for concealing and revealing services were also tested as a means to reflect the significance of function and adaptability (Bertoni, 2002).

>
figure 123 | factory studio form studies

factory studio staff + storage studies

A critical part of each factory studio cluster is back-of-house staff and storage areas. It was important to examine a number of strategies in which to format these spaces, particularly in terms of spatial limitations and maintaining unobstructed viewshafts. Explorations test a number of configurations and organisational strategies which can be applied to a range of factory studio sizes and proportions.

Ultimately, two optimal solutions were discovered. Small factory studio clusters contain a shared back-of-house area, facilitating regular interdisciplinary engagement; while medium and large factory studios each contain private staff and storage facilities. All staff and storage areas are designed with slender proportions, limiting interspatial obstructions..

>
figure 124 | factory studio staff + storage studies

plaza meets technology

Integral to the marketplace intervention is a public plaza – a recreational space for public to meet, pass through, sit or play. Buildings are positioned to align with natural pedestrian travel paths whereby ongoing dynamic activity is achieved. Plaza space offers a multitude of sightlines and viewshafts into design and manufacturing environments. This relationship is further enforced by a number of street furniture installations, strategically positioned to maximise passive engagement opportunities. As seen in figure 125, dedicated observation devices are also strategically integrated, so as to entice the public consumer to explore the marketplace intervention more thoroughly.

figure 125 | learning theatre + factory studio clusters
+ public observation channel

figure 126 | tiered viewing + factory studio clusters

figure 127 | allen st / waterfront link + factory studio clusters

consumer as maker

A public design and making space celebrates the dramatic shift in the possibilities of manufacturing. Here, the everyday consumer can craft bespoke items using additive manufacturing technologies. The glazed pavilion contains a central design zone, bounded by a circular making space. Workstation heights are varied so as to accommodate a range of ergonomic preferences. The public pavilion operates as a minor node within the marketplace intervention. Its strategic positioning and transparent materiality engages passersby as a means to advertise the user-friendly nature of emerging making processes.

figure 128 | public design + making space

below the surface

Most large processes have been located below ground due to size and circulation constraints. Notable areas include large factory studios, shared technology space, bulk materials and storage, parking, gathering and events spaces. Similar to subway infrastructures, the below ground environment is somewhat of a refuge from the busyness of above ground activity. This notion is enforced by dedicated public converse space and mixed purpose furniture installations. As pictured in figure 129, a tiered viewing platform works to visually connect and unify above and below ground interventions, while working as an architectural device to create more intimate zones.

figure 129 | below ground expanse

main stair form studies

The design of vertical circulation played a critical part in establishing a successful below ground environment. A number of explorations tested various stair configurations, proportions and materiality as a means to seamlessly draw people down into the below ground expanse. Consistent with larger architectural elements throughout, a minimalist design language was employed.

Using standard building code requirements as a baseline, explorations iteratively tested tread, rise and landing ratios. Stair width and balustrade detailing were also key considerations, balancing user comfort with overall proportionality. Steel, concrete, glass and polycarbonate were primarily tested as a material palette, both singularly and in combination – reflecting driving ideas of transparency and functionalism (Encyclopaedia Britannica, 2017).

>
figure 130 | main stair form studies

figure 131 | large factory studio visualisation tube + design pod

figure 132 | large factory studio making + design pod

figure 133 | public VR design chamber + main stair + deliveries

landmark beacon

A major element within the marketplace typology is the landmark beacon. The landmark beacon operates primarily as a new navigational node within the greater urban context of Wellington city – an icon for a new era of consumerism and manufacturing. The tower houses two public observation decks: one at midpoint and one near the top. Observers have the ability to look down upon both the marketplace itself, and the surrounding cityscape. An operable facade responds to changing exterior climatic conditions and time of day – providing a dynamic, highly visible architectural intervention.

figure 134 | landmark beacon upper viewing platform

landmark beacon form studies

A number of landmark beacon forms were tested to explore scale, proportion, facade treatment and vertical circulation. It was important to propose an architectural solution that provided a positive addition to the greater urban skyline – respecting the established built environment and natural surrounding conditions. Explorations were based upon a minimalist aesthetic derived from earlier schemes (Bertoni, 2002). A central column structure provides primary gravity and lateral stability, while secondary elements are used to support the facade and observation decks. A crucial focus was the testing of various operable facade formations as a means to achieve a responsive dynamic architecture. A translucent skin was selected for its diffuse characteristics in both natural and artificial lighting environments.

>
figure 135 | landmark beacon form studies

figure 136 | new node within greater urban context

architectural detailing philosophy

As identified earlier, minimalist and functionalist design philosophies are key drivers in the development of a cohesive architectural language. This language is referenced at a number of scales, from urban planning, to building forms, to interior fixtures. Detailing is therefore an equally important aspect of the total marketplace proposal. As demonstrated in figures 137, 138, 139 and 140, detailing remains refined, slender and subtle (Bertoni, 2002).

Elements reflect historic notions of industry, using the slotted connection as a homage to the moving joints of common machines (Rappaport, 2015). As seen in figures 137 and 138, the expressed negative junction is a reference to the assemblage of parts – converging to form a final product (Marcus, 1995). The notion of flexibility is also prevalent throughout – whether explicit through mixed purpose installations (figure 140), or more subtly conveyed in studio partition connections, where detailing expresses a contingency for adjustment and adaptability (figure 139).

figure 137 | canopy column junction

figure 138 | above ground building envelope

figure 139 | studio partition detail

figure 140 | mixed purpose furniture installations

^
figure 141 | 1:500 scale model photograph:
 marketplace expanse, looking north over plaza

^
figure 142 | 1:500 scale model photograph: Waitangi
 Park approach. Natural and architectural cues guide
 pedestrians toward and through the marketplace

figure 143 | marketplace expanse

developed design proposal critical summary

The developed design proposal offers a much more considered and articulate response to the aims and objectives of the research topic. Here, the consumer becomes the primary focus – providing a multitude of options for both passive and active technological engagement. The reconsidered planning approach forms a stronger relationship with existing conditions – appropriately suited to the underlying urban agenda.

The renders communicate an architecture full of people – the everyday consumers, designers and makers that most frequently experience and interact with this new typology. Imagery conveys an illustrative collection of moments occurring throughout the architecture, where a futuristic, minimal aesthetic is softened by the organic beauty of human inhabitation.

The below-ground intervention relies heavily on the

proximity of high volume bounding vehicle routes as an activator of public space. This however may not be transposable to many other urban conditions and therefore does not fully explore the robustness of the strategy. Similarly, while above-ground continuous pedestrian circulation is notably successful in this scheme, other urban environments may require a more active approach in which to pull consumers into and through the marketplace.

The developed design proposal could benefit from additional explorations at a human scale. Here, a number of opportunities are left open for the development of bespoke detailed architectural elements that might better reflect the production processes occurring within. This investigation would work to strengthen qualities of personalisation and individuality; further referencing key values of the new consumer.

04

part B

architectural typological strategies

distilled typological strategies set

As outlined in the research methodology, the developed design proposal consists of two parts: a visual design scheme (Part A), and a distilled set of architectural typological strategies (Part B). Each part works to inform the other throughout the research portfolio in a somewhat orbicular process of discovery.

The design research process has resulted in a final distilled set of 26 architectural typological strategies. These concise strategies have been developed as fundamental guidelines for further interventions within a similar context – a foundation of sorts for future propositions.

figure 144 | typological strategies thumbnail overview

01

marketplace intervention operates as a **public plaza**: an intermediary between **urban trade**, recreational **green space** and open **waterfront**

figure 145

02

opportunities for both **passive** and **active process observation** achieved through interactive strategies

figure 146

03

pedestrian travel routes take priority over vehicular movements. **below-ground** and **low-speed service lanes** implemented to mitigate conflicts

figure 147

04

primary circulation areas designed to accommodate **secondary activities** such as **public gatherings** and **semi-private events**

figure 148

05

deliveries and storage of raw materials and **components** made visible to **public users**: showcasing the wider production value chain, contributing to the marketplace **buying experience**

figure 149

06

building clusters relate to established **city grid axes**

figure 150

07

buildings arranged to optimise **view shafts** and **layered viewing opportunities** from site peripheries

figure 151

08

above ground factory studios positioned and orientated to align with **natural pedestrian travel routes**. **architectural cues** push users closer to building thresholds

figure 152

09

factory studios composed as internally connected clusters; facilitating natural communication flows and collaborative design approaches

figure 153

10

simple slender structural elements pushed toward exterior envelope where practicable: facilitating adaptable interior environments to compensate for future ongoing technological changes

figure 154

13

long slender building forms increase perimeter viewing capacity, maximising passive and active public exposure to design and manufacturing processes

figure 157

14

high ratio transparent and permeable façade treatments maximise consumer exposure to design and manufacturing processes

figure 158

11

technological processes referenced through small scale interior and exterior architectural detailing

figure 155

12

shared staff break and storage areas reduce spatial and sightline obstructions, while fostering regular interdisciplinary designer-maker communication

figure 156

15

transparent and permeable factory studio cluster partitions build up high-energy layered and varied consumer experiences

figure 159

16

operable façades respond to climatic conditions and process requirements: contributing to a dynamic and variable marketplace architecture

figure 160

17

innovative technologies and production processes pushed toward exterior thresholds: a new take on the *shop front window display*. a reflection of changing consumer values with emphasis on the wider product value chain

figure 161

19

cafés and eateries positioned centrally on each marketplace layer and to ground level site edges: pulling people into the site to increase sales and urban vitality

figure 163

18

defined observation locations offer varied vantage points to public thoroughfare; enriching passive exposure opportunities

figure 162

20

below ground low-speed vehicle circulation integrated with marketplace intervention. continuous bounding directional movement provides additional layer of urban activity, while exposing motorists to emerging technologies

figure 164

21

below ground public transit nodes located along site edges: pushing public toward peripheries while injecting additional layer of pedestrian vitality

figure 165

23

shared technology areas maximise spatial efficiency, while facilitating interdisciplinary communication and collaboration

figure 167

22

below ground manufacturing spaces positioned and orientated along site edges: establishing an architectural barrier between centralised pedestrian circulation and outer vehicular movements

figure 166

24

high tech server core operates as a symbolic focal gesture; centrally located and publically accessible as the *beating heart* which drives the marketplace

figure 168

25

select architectural cues demonstrate professionalism and academia; referencing the high calibre of research and development undertaken within the precinct

figure 169

26

large scale architectural form used as a new node within an existing urban context. intervention works proportionally and texturally with peripheral manmade and natural landscapes

figure 170

typological strategies critical summary

Strategies work hard to be universally applicable for a range of future contexts. Each strategy has been considered for its effectiveness not only within the catalyst site but also for a broader range of possible situations. The major drawback in developing a comprehensive strategies set is the unpredictably of alternative conditions.

Notably, strategy 01 addresses the intervention as an intermediary between specific surrounding conditions. This in many cases would require modification to suit the vast array of possible site peripheries. Likewise, strategy 03 addresses the specific nature of bounding

vehicle routes and pedestrian flows – a factor that may suit a number of alternative solutions. Several strategies discuss the integration of below ground interventions and methods to activate space. While this is a highly beneficial solution for many urban contexts, certain sites may not invite a below ground intervention. Strategies may therefore require some degree of adaptation.

As a whole, the 26 strategies proposed are very much relevant to this research topic. Each strategy forms a direct relationship with the visual design scheme proposed and presents a robust foundational starting point for future marketplaces of the same typology.

chapter 05

reflection + conclusions

Chapter 05 reflects on the design-led research as a means to summarise various stages throughout. Key notions are reiterated and discussed alongside the research question and project scope. Potentials for further research are also highlighted with reference to specific avenues of future architectural exploration.

reflecting on key notions

Twentieth century industry is vastly outdated, yet it continues to dictate present day consumerism. This design-led research looks at emerging and wide spread consumer demands as a starting point for tackling the issue at hand. The research continuously juggles the dichotomy of consumer and machine in an effort to develop a harmonious architectural solution in a world of Industrie 4.0. The process uses Wellington, New Zealand as a testing ground for architectural ideas, contextually relevant to major centres around the world. Based on iterative design explorations, a new marketplace typology is ultimately proposed – combining production, consumerism and public space.

Central to unlocking the potentials of a new marketplace typology is the early analysis of emerging innovative manufacturing technologies. This research offers an insight into the removal of imposing limitations once associated with heavy, cumbersome machinery. This freeing of production, allows the consumer to once again re-engage with the total process of designing and making – a means to unlock greater value in the products and services they consume. Here, we see the emergence of a substantive tipping point in production value: where

customisation, time and cost culminate to achieve a socially viable consumer alternative.

A major stepping stone in the research process is the exploration of methods for interaction between person and technology. Here, models are developed, analysed and grouped to understand how varied interactions impact user experiences and physical space. Alongside fundamental user narratives, this investigation becomes the launching point for the development of a new architectural intervention.

A major factor in early schemes is the balancing of production space and public exposure. The design tries to employ an urban verticality of stacked programmes, yet in doing so, it sacrifices direct passive connections. As Tindall (2013) describes, ‘tall narrow buildings and spaces keep the city compact and allow for an increase in density, activity, diversity and variation’. While this is often the logical approach for an urban scheme, the proposal struggles to accommodate the inclusion of passive user engagement and technology exposure. Following this design paralysis, a new approach is employed. The idea of a vertical marketplace is rejected

in favour of prioritising passive and active consumer opportunities through ground plane relationships. The shift in design thinking once again allows the pedestrian scale to become the driver. The above ground distribution of smaller building masses provides a permeable public plaza experience, where pedestrian travel routes are bounded by high-energy production environments. The inclusion of a below ground expanse becomes a crucial strategic move, not only for the success of the marketplace itself, but for the wider urban peripheries. The relocation of above-ground vehicle routes prioritises high volume pedestrian travel paths, while increasing general engagement opportunities.

Factory architecture has always been about its contents, rather than the building itself. This holds true for the marketplace proposal, where the architecture becomes a transparent vessel for the activities occurring within. From an early stage in the design-led research, notions of functionalism and minimalism are explored. The overriding development of form is determined by practical considerations such as purpose, material and structure – distinct from the attitude that the outcome must conform to a preconceived aesthetic

(Encyclopaedia Britannica, 2013). As a respite from the potential harshness of mere functionalism, the intervention employs minimalist philosophies as a means to finesse certain architectural characteristics into a cohesive, unified formal composition. Similar to Corbusier’s (1986) philosophy that “a house is a machine for living”, the new marketplace becomes a machine for production – demonstrated through its flexibility and responsiveness to proximate activities and processes.

The architectural proposal culminates in a succinct set of 26 strategies as a fundamental guideline for future propositions of a comparable nature. Similar to a chicken or the egg scenario, it is only through means of ongoing oscillatory testing and the refinement of hunches that a final robust strategy set arises. Integral to many of these final strategies is the underpinning notion of user experience. Strategies seek to anticipate and accommodate the potentials for passive and active engagement opportunities at a range of scales and levels of detail – acknowledging the importance of the everyday consumer in the total process of urban-based designing and making.

architecture beyond the site

The design-led research portfolio culminates in a potent architectural proposition that highlights the present day issues around consumer demands in a new era of industry. The architectural intervention is fitting for its Wellington location and responsive to its peripheral contexts. As a means to better understand the implications of this new marketplace typology, the potential exists for the current research scope to be broadened. In doing so, we will gain a clearer understanding of how alternative contextual conditions might impact architectural responses – in turn, refining the proposed typological strategies set. The introduction of new sites, with fresh real-world restrictions and implications serves to foster a dialogue around production exposure opportunities. The research scope might be expanded to include the following questions:

- 1) How might this typology work in denser urban conditions such as Manhattan, New York, or Tokyo, Japan?
- 2) How might fundamental typological principles manifest as a smaller, more confined intervention?
- 3) If restricted to an above ground solution, how would large manufacturing processes be impacted and could they still be accommodated?
- 4) Can a vehicle-less public plaza be substituted for an alternative urban environment, and how might consumer behaviours be affected?

As an outcome to these supplementary topics, the proposed typology carries with it the potential to discover new avenues of opportunity – in turn serving to further refine the typological strategies set. The proposed new architectural response would therefore gain greater validity in unmasking the potentials of future production and consumerism.

The effect of this proposition serves to create better public spaces alongside a new consumer culture. It is not merely a place for commercial activity, but an extension of the everyday pedestrian experience. The proposed new marketplace typology fosters moments of discovery, where the built environment is dynamic and engaging. This is an alternative to the outdated models of present-day retail and industry – injecting true value into the total process of designing and making. Building upon established urban peripheries, this new architectural node brings with it vibrancy, activity and public awareness.

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bibliography

Bertoni, F. (2002). *Minimalist Architecture*. Basel, Switzerland: Birkhäuser Architecture.

Colossal. (2016). This New Cycle and Pedestrian Tunnel in Amsterdam Features an 80,000 Tile Mural Inspired by Cornelis Boumeester. Retrieved 2 January 2018, from <http://www.thisiscolossal.com/2016/03/cuyperpassage-pedestrian-tunnel-amsterdam/>

Corbusier, L. (1986). *Towards and New Architecture*. New York, United States

Chance, E., Colvin, C., Cooper, J., Day, C J., Hassall, T G., Jessup, M., & Selwyn, N. (1979). Craft Guilds. A History of the Country of Oxford, Volume 4(the city of oxford), 312-327. Retrieved 19 January 2018, from <http://www.british-history.ac.uk/vch/oxon/vol4/pp312-327>.

Debord, G. (2000). *Society of the Spectacle*. Michigan, United States: Black and Red.

Deloitte. (2015). The Deloitte Consumer Review. Made-to-order: The rise of mass personalisation 2015. Retrieved 18 January 2018, from <https://www2.deloitte.com/content/dam/Deloitte/ch/Documents/consumer-business/ch-en-consumer-business-made-to-order-consumer-review.pdf>

Dery, M. (1999). *The Persistence of Industrial Memory*. In A. Marras (Ed.) *Eco-Tec* (pp. 50-67). New York, United States: Princeton Architectural Press.

Drell, L. (2011). Made in the USA: The End of ‘One Size Fits All’. Retrieved 31 January 2018 from https://www.huffingtonpost.com/2011/02/17/made-in-the-usa-the-end-of-one-size-fits-all_n_912285.html

Echochamber. (n.d.). Normal Factory, New York. Retrieved 2 January 2018, from <http://echochamber.com/article/normal-factory-new-york/>

Eliason, E. (2012). 3 Reason Why Mass Customisation is the Future of Consumer Products. Retrieved 31 January 2018 from https://www.huffingtonpost.com/erik-eliason/mass-customization_b_1313875.html

Encyclopaedia Britannica. (2013). Functionalism. Retrieved 24 January 2018 from <https://www.britannica.com/art/Functionalism-architecture>

Encyclopaedia Britannica. (2017). Minimalism. Retrieved 24 January 2018 from <https://www.britannica.com/art/Minimalism>

Engineering.com. (2016a). A History of Collaborative Robots: From Intelligent Lift Assists to Cobots. Retrieved 28 January 2018 from <https://www.engineering.com/AdvancedManufacturing/ArticleID/13540/A-History-of-Collaborative-Robots-From-Intelligent-Lift-Assists-to-Cobots.aspx>

Engineering.com. (2016b). Why Automate with Industrial Robots. Retrieved 28 January 2018 from <https://www.engineering.com/AdvancedManufacturing/ArticleID/11535/Why-Automate-with-Industrial-Robots.aspx>

Engineering.com. (2017). What can Augmented Reality do for Manufacturing. Retrieved 28 January 2018 from <https://www.engineering.com/AdvancedManufacturing/ArticleID/14904/What-Can-Augmented-Reality-Do-for-Manufacturing.aspx>

Fuller, B. (1982). *Critical Path*. New York, United States: St. Martin’s Griffin.

German Trade and Invest. (2018). Industrie 4.0. Retrieved 28 January 2018 from <https://industrie4.0.gtai.de/INDUSTRIE40/Navigation/EN/industrie-4-0>

Gruenberg, C., & Hollein, M. (Eds.). (2002). *Shopping: A Century of Art and Consumer Culture*. Ostfildern, Germany: Hatje Cantz Publishers

GE Reports. (2016a). All The 3D Print That’s Fit to Pitt: New Additive Technology Center Opens Near Steel Town. Retrieved 28 January 2018 from <https://www.ge.com/reports/all-the-print-thats-fit-to-pitt-new-additive-technology-center-opens-near-steel-town/>

GE Reports. (2016b). Inside GE’s Brainy Factory Of The Future: What Happens When You Link 3D Printing And The Internet? Retrieved 28 January 2018 from <https://www.ge.com/reports/inside-ge-brainy-factory-of-the-future-what-happens-when-you-link-3d-printing-and-the-internet/>

Luce et Studio. (2018). Nissan: Machine in a Box. Retrieved 2 January 2018 from <http://lucestudio.com/work/nissan-machine-in-a-box/>

Marcus, G. (1995). *Functionalist Design: An Ongoing History*. New York, United States: Prestel Publishing.

Marx, L. (2000). *The Machine in the Garden*. New York, United States: Oxford University Press.

Michael Maltzan Architecture. (2012). *Sixth Street Viaduct*. Retrieved 31 January 2018 from <http://www.mmaltzan.com/projects/sixth-street-viaduct/>

Rappaport, N. (2015). *Vertical Urban Factory*. New York, United States: Actar Publishers.

Schwartz, B. (2004). *The Paradox of Choice: Why More is Less*. New York, United States: Harper Perennial.

Siemens. (2017a). Future of Manufacturing: Digitalisation as an Opportunity. Retrieved 19 January 2018, from <http://www.siemens.com/global/en/home/company/topic-areas/future-of-manufacturing.html>

Siemens. (2017b). Future of Manufacturing: The Need to Become a Digital Enterprise. Retrieved 28 January 2018, from <https://www.siemens.com/global/en/home/company/topic-areas/future-of-manufacturing/digital-enterprise.html>

Strategy&. (2016). 2016 Industrial Manufacturing Trends. Retrieved 28 January 2018 from <https://www.strategyand.pwc.com/trends/2016-manufacturing-trends>

Strategy&. (2017). 2017 Industrial Manufacturing Trends. Retrieved 28 January 2018 from <https://www.strategyand.pwc.com/trend/2017-industrial-manufacturing-trends>

The High Line. (2018). About the Highline: Fostering a Strong Community and Neighbourhood. Retrieved 31 January 2018 from <http://www.thehighline.org/about>

Thorpe, A. (2010). Design’s Role in Sustainable Consumption. *Design Issues*. 26(2), 3-16. Doi:10.1162/DESI_a_00001

Tindall, J. (2013). *Roger That*. (Unpublished Master Thesis). Victoria University of Wellington, New Zealand.

Toffler, A. (1980). *The Third Wave*. New York, United States: William Morrow and Company.

United Nations Educational, Scientific and Cultural Organisation. (2014). Van Nellefabriek. Retrieved 2 January 2018 from <http://whc.unesco.org/en/list/1441>

Vale, B., & Vale, R. (2009). *Time to Eat the Dog?: The Real Guide to Sustainable Living*. London, United Kingdom: Thames and Hudson Ltd

Virtuani, E., & Zucchella, A. (2008). *New Leverages in Consumer/Place Orientated Wine Branding Strategies*. 4th International Conference of the Academy of Wine Business Research, Siena.

Walker, S. (2006). *Sustainable by Design: Explorations in Theory and Practise*. London, United Kingdom: Routledge.

Weiss / Manfredi. (2018) Seattle Art Museum Olympic Sculpture Park. Retrieved 31 January 2018 form <http://www.weissmanfredi.com/project/seattle-art-museum-olympic-sculpture-park>

Wraight and Associates. (2018) Pukeahu National War Memorial Park: Wellington, New Zealand. Retrieved 31 January 2018 from <http://www.waal.co.nz/our-projects/urban/memorial-park/OMA>. (2017). 11th Street Bridge Park. Retrieved 2 January 2018, from <http://oma.eu/projects/11th-street-bridge-park>

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