AUGMENTED REALITY WINDOW

The New York Museum of Climate Catastrophe
Through Objects, Failures and Timelines

By

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A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs

Master of Architecture
In
Azrieli School of Architecture & Urbanism

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ABSTRACT

This thesis explores using architecture to create a meaningful connection of present-day actions to far-future consequences. The daily actions we perform directly impact our future environment, yet the direct connection between individual actions taken today and the consequences of those actions 50-100 years later remain invisible. As a coastal urban centre, New York City will be deeply impacted by climate catastrophe. According to the NYC Planning Group, projected flooding in NYC could be 532 million Sq. Ft., thus it is essential for people to see links between their daily behaviour and their future impacts. My desire to link the effects of climate catastrophe to real time present behaviour led to the exploration of augmented reality as an architectural instrument.

A realistic vision into the future was inspired by Bruno Latour's *Down to Earth: Politics in the New Climatic Regime* and visualizations of Latour's 'Terrestrial' and 'Out-Of-This-World' theories drive augmented narratives of a future metropolis in New York. In this thesis, augmentation connects the future to your present-day actions through the use of an Augmented Reality Window. Building upon research in Environmental Psychology, these architectural augmentations will alter behaviour and attempt to narrow the ecological attitude-behaviour gap of New Yorkers. A single person cannot change the future outcomes of climate catastrophe, but if the Augmented Reality Window and its architectural augmentations are explored at various scales, the future's negative consequences can be mitigated. Our actions today will dictate our tomorrow and this thesis investigates architectural augmentation strategies for visualizing the future and impacting individual behaviour.

ACKNOWLEDGMENTS

A big thanks to my Advisors Zach Colbert, Jill Stoner and fellow classmates

Matthew Nestico and Cassandra Sims for being encouraging
and always challenging me to push myself and my work further.

Thanks to my family who always listened to me rant about my work

A special thanks to Ramsey Matar for being my cheerleader when I got stressed, and who
was also a good technical supporter and camera man in light of COVID-19.

And a special thanks to my Dad who helped me build cabinets and frame my
Augmented Reality Window prototype, no questions asked.

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New York City is in the midst of the climate catastrophe.

The sum of our past behaviours are melting ice caps, causing sea level rise, increasing global temperature and increasing the severity of storms. The impacts of our present actions are not perceivable in daily New York City life and therefore we perpetuate simple everyday actions that have severe impacts on the future.

This thesis asks: How can architecture make climate catastrophe visible?
and how can architecture impact the daily behaviours of New Yorkers?

Augmented Reality is a tool that allows exploration of both questions. This technology specifically augments a person's real-world context and how they interact with ordinary objects of daily life with an added layer of information. Ordinary objects contain narratives and augmented reality can make those narratives visible. Each object has a story to tell about the future with physical, social, and political consequences. Overall each narrative leads us one step closer to visualizing the future impacts of our own actions and linking the coming climate catastrophe to our daily lives.

The objects in our daily lives each have a past, a present, and a future narrative and augmented reality can aid in telling these stories in concise visual ways. Meaningful visions of the future can be distilled from collections of ordinary objects, through their collective augmented narratives. This thesis explores augmented futures for New York City through the collection and curation of ordinary objects. Conceived as a distributed and itinerant museum, these objects embody future narratives in real time through a layer of architectural augmentation, constructed as a window.

There is no better way to understand the future than to be immersed in it. Through the window, future impacts of climate catastrophe are visualized and connected directly to daily behaviours and different visualizations - ranging from a *Terrestrial* timeline to an *Out-of-this-World* timeline - all the window in response to actions of the augmented reality window's user, and develop the content for the Museum of New York Climate Catastrophe. These timelines are all based on current political pulls and projects towards outcomes derived from our collective actions in response to Bruno Latour's philosophies. In *Down to Earth: Politics in the New Climatic Regime* Latour concisely explains the politics of crisis and what new forms of politics might appear if non-humans life were to gain agency equal to human agency. Latour's book ends with the question "What are you going to do about climate change?" and the Museum of New York Climate Catastrophe is my response.

A single object alone does not inform us about the impending Climate Catastrophe but by utilizing iconic objects from New York City and enhancing them with augmented reality, a story begins to unravel about how our own actions have major impacts on the future. Confronting people with awareness about how their own actions feed into the

possible failures of everyday objects grants them agency in defining their own future city.

A direct connection between a person's choices throughout the day can be implemented into a singular augmented visualization of what their future context will look like outside of their window. Studies of Environmental Psychology and Behavioural Science support that visualization of the future is impactful on behaviour and encourages positive behaviours by narrowing the behaviour-action gap. If the personal Augmented Reality Window can be successful for one person, then larger scale versions could be implemented in coffee shops, businesses' and even for corporate clients. If the visualization outside the window maintains a positive outlook, the business' and corporations can utilize it as a marketing opportunity and push these tactics further as the public can picture the future and utilize their consumer power more accordingly.

INSTRUCTIONS: USE OF AUGMENTED REALITY IN THESIS

Many of my drawings were designed with augmented reality and physical layering components. These augmentations can be seen through the lens of your phone pointed at the selected images on screen. All augmentations are present through flat images within the book and therefore if the reader does not possess a smart phone that runs either Apple's App Store or the Google Play Store, they will not miss out on content. That being said, I do strongly encourage you to follow the instructions below to experience a small portion of what augmented reality is capable of and what it means to me.

A DRAWING OR IMAGE ABOVE
THIS ICON CAN BE SCANNED
AND AUGMENTED.

A DRAWING OR IMAGE ABOVE
THIS ICON CAN BE SCANNED
AND AUGMENTED.

Download Steps

- Download "ROAR" application on the App Store or Google Play through the links providedⁱ or simply search "ROAR AR" in the App stores, the application is called ROAR Augmented Reality App.
- Once downloaded, when prompted allow the application to access your camera and video. (location access not needed)
- A demo for hand gestures might appear, simply close it and continue with your scanning.

Scanning Tips

- When scanning the image, get as close to the single image as possible to fill the screen while scanning. (landscape images scan better with your phone landscape)
- Make sure the image is in focus
- Once scanned you can move around with your phone
- Make sure the image is fully within the screen and when viewing the augmented layers try to keep the image on screen as much as possible to fully experience the augmentations.

ⁱ Google Link: https://play.google.com/store/apps/details?id=com.roar.scanner&hl=en_CA
iPhone Link: <https://apps.apple.com/ca/app/roar-augmented-reality-app/id1045561660>

THE TOOLS FOR AN AR WINDOW: TECHNOLOGY OF AUGMENTED REALITY AND SMART HOMES

Augmented Reality: the addition of computer generated output, such as images or sound, to a person's view or experience of his or her physical surroundings by means of any of various electronic devices.ⁱ

With that basic definition, the most familiar examples of current day augmented reality are through games on cell phones such as Pokémon GO! And Harry Potter Wizards Unite. These games are successful in bringing people into exploring their own urban environment by allowing them to interact with digital objects that are GPS locatedⁱⁱ. Communities are created based on these newly created digital-physical worlds to succeed collaboratively in the goals of the games. The success of these games in integrating people into their own urban context sparks the question:

How can augmented reality reach this level of success in architecture?

FIG 1: TRIMBLE HOLOLENS2 HARD HAT
[HTTPS://WWW.BUILDINGPOINTSOUTHEAST.COM/PRODUCT-SOLUTIONS/MIXED-REALITY-CONSTRUCTION-INDUSTRY/](https://www.buildingpointssoutheast.com/product-solutions/mixed-reality-construction-industry/)

Augmented reality is currently used in architecture for accuracy and construction. BIM software and 3D models use geo-location technology to bring the building model to scale in its precise real location. Augmented glasses are used between architects and contractors as seen through companies such as Trimble who are utilizing HoloLens 2 and combining them with hard hats to create the ability to see 3D models in the real world context with the hope to coordinate all building systems.

i "Augmented Reality" The Oxford English Dictionary, 2nd ed, 1989, OED Online, (<https://www-oed-com.proxy.library.carleton.ca/view/Entry/13081?redirectedFrom=augmented+reality#eid33893672>).

ii Mitchell Libby,
pokemon.php)

(https://healthcare.utah.edu/healthfeed/postings/2016/09/mental_

Numerous companies boast the same abilities and sell systems and glasses specifically for this purpose. It is fair to say augmented reality is being explored for practical situations that involve built projects and interdisciplinary collaborations but augmented reality is forgotten about when it comes to architectural design and visualizations.

Virtual realityⁱⁱⁱ (not to be confused with augmented reality) is the current technology being used in architecture for design related purposes, but even it's use in the industry is fairly shallow currently. Virtual reality is commonly used to immerse the client into the 3D render of an interior environment which allows feedback for minor changes. The Wild is an example of a company that creates a collaborative VR environment utilizing The Vive headset to be immersed in the 3D model^{iv}. I believe augmented reality can grow to be more powerful than virtual reality within architectural design because augmented reality directly engages with the current context of the user, compared to transporting the user to a distant virtual environment.

FIG 2 : THE WILD "WELCOME TO THE WILD: IMMERSIVE COLLABORATION FOR TEAMS" VIDEO STILL,
[HTTPS://WWW.YOUTUBE.COM/WATCH?V=S6nE9RNR-Mw](https://www.youtube.com/watch?v=S6nE9RNR-Mw)

Present day technology doesn't allow an augmented reality to intertwine with our own realities without the use of an interface. It also presently has limited accessibility due to the requirement of smart phones or augmented reality glasses. Within a couple of decades augmented reality will be a part of our everyday life using interfaces such as HoloLens, Google Glasses or more realistically through cybernetics. Cybernetics are already used today to maintain or imitate human possibilities as seen in examples of amputees with cybernetic limbs, and there's no doubt that technology will advance to incorporate augmented realities

FIG 3 : HYPER-REALITY FILM STILL, KEIICHI MATSUDA

into one's personal vision as depicted in Keiichi Matsuda's HYPER-REALITY video^v. The issues with waiting for this technology to be easily accessible to everyone is the pace of climate catastrophe itself, if we were to wait a decade or two to showcase this museum of climate catastrophe it would already be too late for us to save our planet.

To solve this issue of accessibility, the augmented reality will be implemented through an 'Augmented Reality Window' and will be installed throughout the context of

^v Matsuda Keiichi, HYPER-REALITY, May 19 2017, Short Film, (<https://www.youtube.com/watch?v=YJ-g02ivYzSs>).

New York city where individuals can retrofit existing apartment windows to see their own backyards augmented based on their direct actions. These personal Augmented Reality Windows work with the objects within view to create a narrative of climate catastrophe through multiple timelines (which will be addressed further in following chapters). The stories being told within the urban context through objects being augmented will inform the viewer on climate catastrophe and open their mind to the future possibilities of our actions.

FIG 4: BASE FRAME OF THE AUGMENTED REALITY WINDOW PROTOTYPE

The Augmented Reality Window will be a smart object directly connected to a single person or family. Just as our cell phones are deeply connected and react to our actions and locations, so will the Augmented Reality Window. Based on purchases, travel time, location and any other data gathered from objects such as smart-phones, watches, coffee makers, and thermostats, the augmented visualization of the window will change based on the positive or negative actions performed.

MUSEUM INSPIRATIONS

DISTRIBUTED MUSEUMS

The idea of a distributed museum is a recent phenomenon enabled by technology and geo-locationⁱ. It is very easy to geo-locate objects within a context and communicate those locations to people using the same technology. The urban context for the exhibits within a distributed museum enhances and informs the experience. Within the New York Museum of Climate Catastrophe, the context of urban New York is important to understand that climate catastrophe isn't a far off secluded threat contained within typical museum walls, but instead is a threat that will permeate through the city of New York and affect everyday life of ordinary objects and people.

FIG 5: UI150: THE ILLINOIS DISTRIBUTED MUSEUM,
<https://www.spurlock.illinois.edu/blog/ui150-the-illinois/>

ⁱ Bautista Susana, Anne Balsamo, Museumandtheweb.com, (https://www.museumsandtheweb.com/mw2011/papers/understanding_the_distributed_museum_mapping_t.html, 2012)

THE TENEMENT MUSEUM

The Tenement Museum in New York City is a museum dedicated to understanding the history and lives of those who lived in the 108 Orchard street tenementsⁱⁱ. At the end of the “Shop Life” tour is a digitally enhanced table where an ordinary object such as a wallet or brick can be placed on the table. Once the object is placed on the table, information and sound cues are projected and used to tell a story through said object. The goal with the New York Museum of Climate Catastrophe is to utilize the object to tell a narrative with the help of augmented reality. Just as the tenement museum successfully tells the history of an object, this museum will attempt to tell the future story of the selected object through the projection of augmented reality.

FIG 6: THE TENEMENT MUSEUM, POTIOM-DESIGNED TOUCH SCREEN TABLE, NEW YORK CITY
[HTTPS://WWW.TENEMENT.ORG/BLOG/NEW-MEDIA-IN-SHOP-LIFE/](https://www.tenement.org/blog/new-media-in-shop-life/)

ⁱⁱ Lower East Side Tenement Museum. 1999. Tenement Story: The History of the Tenement Museum. New York: Lower East Side Tenement Museum.

THE MUSEUM OF INNOCENCE

The Museum of Innocence in Istanbul is what inspires the mass collection of objects to showcase within this new museum. In the Museum of Innocence, objects were collected throughout the years and collaged within cabinets to create stories of the creator, Orhan Pamuk's lifeⁱⁱⁱ. These cabinet's are carefully curated and the collection of cabinets fully embodied the notion of a "cabinet of curiosity"^{iv}. As seen in the object fond images (Page 20-21), objects have been gathered throughout New York in an attempt to match the ambitious object gathering of Orhan Pamuk.

FIG 7: THE MUSEUM OF INNOCENCE, CABINETS 2-4, ISTANBUL

ⁱⁱⁱ Pamuk, Orhan. *The Innocence of Objects*, (New York, Harry N. Abrams, 2012)

^{iv} Pearce Susan, *Museums, Objects, and Collections*, (New York, Penguin Random House, 1993), 18.

The reason the Augmented Reality Window can be classified as a museum is because of the inspirations pulled from these museums as previously mentioned. When creating an Augmented Reality Window the objects within view of the window are the main exhibit of the museum. This doesn't mean that they are the only objects to create narratives within the window, but as objects enter and leave the window's view they contributed their narrative to the main exhibit. This means there is need for a larger object collection in order to maintain a believable augmented future throughout the multiple timelines. This will be seen in later chapters through a thorough object breakdown of a window installed in an apartment on the lower east side at 350 Grand Street.

FIG 8 : 350 GRAND STREET LOCATION

OBJECT CURATION

The origins of museums came from a collection of curious objects. Cabinets of Curiosities were simply rooms full of interesting collected objects. *Museum Wormiani Historia* created by Olaus Wormius is a prime, early example of how a collection of objects equals a museum when his collection was published in 1654ⁱ. His odd collection of objects inspired and taught the natural sciences of the time.

FIG 9 : MUSEUM WORMIANI HISTORIA 1655.
WELCOME COLLECTION. ATTRIBUTION 4.0 INTERNATIONAL (CC BY 4.0)

FIG 10 : MUSEUM OF INNOCENCE CABINET
<https://www.thesmartset.com/the-museum-of-innocence/>

Orhan Pamuk's Museum of Innocence is a more modern-day example of this desire to showcase ordinary collections of objects as narratives. Each curated cabinet within that museum tells a story of his own life or the lives he wrote about within his novelsⁱⁱ. Even with these two examples of curious object collections, many museums have shifted towards an institutional purpose instead of a purpose to satisfy humanity's cravings for curious objects. The goal of The Museum of New York Climate Catastrophe is to return to the origins of museums, which are the objects because objects are the foundation of any museum.

i Impey, MacGregor, Oliver, Arthur, *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe*, (Oxford University Press, Oxfordshire, 1985).

ii Pamuk Orhan, *The Museum of Innocence*, (Iletisim, Istanbul, 2008).

In this museum, the objects and context are the base and they need strong narratives in order to build an augmented reality upon. Objects for this museum have been selected through physical means, digital means as well as through iconic New York Ims. Each object has been chosen due to a New Yorkers familiarity with the object or experience as well as unique instances that can't be found in other cities. Some experiences captured within objects include taxi cabs, subway repair grates, re escapes, and time square screens. These types of objects are linked directly to present day experiences within New York and once collected the next question can be asked:

How will these experiences change in the future due to climate catastrophe?

And will they be positive or negative?

Just as previous museums have depicted the history of collected objects, it is important that The Museum of New York Climate Catastrophe can depict the future narratives of collected objects utilizing augmented reality as a tool to do so. The future narratives of these objects being visualized are the most important aspects to teach the viewer about their own action's impacts in the context of climate catastrophe across multiple timelines. Ending this chapter are drawings that show some of my methods of collecting objects (physical and through Im) as well as my collection of objects recorded throughout Manhattan and their locations on a gure ground map.

FIG 11 : CREATED METRO CARD CABINET

FIG 12 : CREATED NAIL CABINET

SCAN
FOR
AUGMENTED
REALITY

FIG 13 : VIDEO OBJECT COLLECTION METHOD 1/2

SCAN
FOR
AUGMENTED
REALITY

FIG 14 : VIDEO OBJECT COLLECTION METHOD 2/2

FIG 15 : NEW YORK CITY OBJECT MAP

NEW YORK CITY OBJECT MAP

LEGEND

THIS MAP IS A CUMULATION OF DATA GATHERED THROUGHOUT THE MUSEUM CREATION PROCESS.

OBJECTS FOUND WITHIN THE CONTEXT ARE CATEGORIZED BY TYPE OF FAILURE AND COLOURED ACCORDINGLY.

TWO AREAS OF AUGMENTATION THAT HAVE BEEN EXPLORED THROUGH PERSPECTIVE ARE NOTED IN SPECIFIC AREAS.

THE CURRENT FAILURE CATALOG EXPLORATIONS HAVE BEEN SITED BY NUMBER.

OBJECTS BROUGHT INTO THE CONTEXT ARE NOT SITED YET OR IF THEY ARE HAVE BEEN MARKED WITH THE 'INTANGIBLE' BRACKET COLOURS.

- OBJECTS
- PHYSICAL
 - INTANGIBLE
- WATER-ROTH-FLOOD
 - WIND-STORMS-ELEMENTS
 - HEAT-FIRE-SOLAR
 - SOCIAL-TIME-CHOICES
 - POLITICAL-THREATS-CHANGE
 - CURRENTLY UNKNOWN

- 1 FAILURE CATALOG CORRESPONDING PANELS
- 5 STARTING POINT OF CATALOG CORRESPONDING PANEL
- 1 AUGMENTED ZONE CORRESPONDING PERSPECTIVE VIEW

OBJECT CODEX

FAILURE CATALOG PANEL	NEW YORK CITY OBJECT MAP LOCATION
N = NO	OBJECT CODEX
Y = YES	
1-1-F(N)-A	
FRAME NUMBER	
ITEM NUMBER	
	TYPE OF OBJECTS
	ARCHITECTURAL
	ACQUIRED
	ADDITIONAL
	SOCIAL
	OUTER
	UNKNOWN
	LIFESTYLE
	M-A MEMORY

AUGMENTED REALITY WINDOW PROTOTYPE: IDEAS INTO REALITY

The Augmented Reality Window is how ideas of augmented reality, smart technologies, museums, objects and multiple timelines get translated into architecture, but can an Augmented Reality Window physically exist and truly utilize one's urban context to visualize the future?

These questions were the key in physically actioning my thesis. It was important to engage the individuals of New York with a physical item or interface that could visualize these ideas and make them easily digestible all the while showing the individual their familiar urban context. As previously noted, my goal is to make people aware that their actions feed into the possible failures of future everyday objects. The most logical way to do this was to augment one's own view of the city with the most obvious architectural element for vision, the window.

The execution of these future timeline visualizations and object narratives amalgamated into an Augmented Reality Window integrated within smart technologies. These smart technologies already exist and are present in our everyday life as smart home controls, smart-phones and location technologies, but currently data is gathered and used by companies such as Amazon and Googleⁱ for marketing purposes. Reclaiming the use of this personal data for earth's agency shows the importance of owning and utilizing one's own digital data. Every action you perform throughout your day will directly affect the view of this Augmented Reality Window that you look through. By creating a window that changes as you act throughout the day, it allows the impacts of climate catastrophe to be seen instantaneously within one's own urban context. As previously stated the technology

ⁱ Schmidt Douglas, Google Data Collection Research, (Digital Context Next), 3.

of augmented reality still has room to progress, but it is still important for me to attempt a physical creation of a working Augmented Reality Window.

Visualized below is the process work and first prototype of the Augmented Reality Window. This prototype consists of a TV framed within a window utilizing a smart-phone as the augmentation lens. This is only possible through the use of an augmented reality app called ROARⁱⁱ which originally is designed for marketing purposes. The technology simply uses an image as a sensor to gather information and then overlays the augmentation designed by the user. For demonstration purposes this window looks out onto an image of the corner view of 350 Grand Street within Manhattan and augmenting the context positively and negatively. The window works in augmenting the context and seeing this Augmented Reality Window as a working installation truly gives me hope that with further technological advancements my prototype can be a reality in the near future.

FIG 18: WINDOW FRAME REPURPOSING & FRAMING

ⁱⁱ The ROAR, ROAR, accessed November 10 2019, (<https://www.theroar.io/>)

FIG 19: TESTING TV IN WINDOW FRAME THROUGH COMPUTER ORIENTATION

FIG 20: SMART PHONE RECOGNIZING "OUTSIDE" LANDSCAPE IMAGE.

PROTOTYPE: AUGMENTED REALITY WINDOW DIAGRAM

FIG 20A: AUGMENTED REALITY WINDOW PROTOTYPE DIAGRAM

EXPLANATION LINKS:

[HTTPS://WWW.YOUTUBE.COM/WATCH?V=BkTHAq9kVT4](https://www.youtube.com/watch?v=BkTHAq9kVT4)
[HTTPS://WWW.YOUTUBE.COM/WATCH?V=Qb6FZUwhJAw&t=4s](https://www.youtube.com/watch?v=Qb6FZUwhJAw&t=4s)

FIG 21: ORIGINAL VIEW LOOKING OUT WINDOW

FIG 22: POSITIVE ACTION AUGMENTED VISUALIZATION THROUGH WINDOW: TERRESTRIAL

FIG 23: NEGATIVE ACTION AUGMENTED VISUALIZATION THROUGH WINDOW: OUT-OF-THIS-WORLD

Our futures are heavily dictated by our actions in the present: positive and negative. It is easy to be overwhelmed by the realities of climate catastrophe and hold a dystopian perspective, but it is important to know that that is not the only possibility because our actions and choices of today directly impact the future. The first step is to understand the current political and human agencies of today in order to project and visualize the impacts of the future. Inspired by *Down To Earth: Politics in the New Climatic Regime*, I created an infographic to help understand the possible larger world changes that lead to the failures within each timeline. (Page 31) The augmented view's goal is not to scare people into changing their present actions through negative visualizations, but to help them realize the future possibilities of their own actions. Two timelines that I address throughout this thesis borrow their names from the book *Down To Earth: Terrestrial* and *Out-Of-This-World*. Here I will explain these two extreme future outcomes within the scope of our current world.

*Terrestrial*ⁱ is valuing the earth over all else, economic growth isn't an important factor in any urban decision but the health and impact of the earth are priority number one. This mandatory shift of thinking eliminates capitalism and strictly focuses on the survival of our planet. The entirety of our earth is respected equally or more so than a person. If an instantaneous change occurs present-day to refocus our free world onto the earth (as suggested through activists such as Greta Thunberg) a Terrestrial or positive visualization can be achieved. In the chapter *Timeline Visualization : Terrestrial* a specific example of how this timeline will look and happen within Manhattan will be visualized and described.

ⁱ Latour, Bruno, *Down To Earth: Politics in the New Climatic Regime* (Polity Press, Cambridge, 2019)

*Out-Of-This-World*ⁱⁱ is the opposite of a *Terrestrial* vision. This timeline is the perpetuation of our lack of actions today. Denial occurs pushed and funded by capitalism to make America great again. This push makes us turn inwards on ourselves and begin to take as much as we can as quickly as we can from this earth. Self preservation trumps any value the earth requires in order for us to stay in this world. People with monetary value are the safest from the catastrophe to come because they can afford the prices of the diminishing dry land. This regression continues as prompted by funded climate change deniers in politically important places and a negative vision will occur in the future set as Out-Of-This-World. In the chapter *Timeline Visualization : Out-Of-This-World* a specific example of how this timeline will look and happen within Manhattan will be visualized and described.

To understand the difference of the timelines I created a representation through familiar movies set in New York City. Film stills have been altered slightly to represent Terrestrial, Out-Of-This-World and a Median timeline called Global & Localⁱⁱⁱ. (Page 32-34). To further understand the timelines a single location of Washington Square Park has also been examined through the multiple timelines showcasing how objects are used and altered through different timelines. (Page 35)

Although there are more than two outcomes to the future, for clarity the two extreme outcomes have been visualized and addressed within a specific window located in the lower east side of Manhattan on 350 Grand Street. The easiest way to understand the two timelines and the changes that go beyond the physical environment is through the objects within the window view.

ii Latour, Bruno, *Down To Earth: Politics in the New Climatic Regime* (Polity Press, Cambridge, 2019)

iii Ibid.,

FIG 25: TERRESTRIAL FILM ALTERATIONS

FIG 26: TERRESTRIAL INFOGRAPH SECTION

FIG 27: LOCAL & GLOBAL FILM ALTERATIONS

FIG 28: LOCAL & GLOBAL INFOGRAPH SECTION

FIG 31: WASHINGTON SQUARE PARK THROUGH TIMELINES WITH OBJECTS

TIMELINE VISUALIZATIONS

This is the view outside of an apartment at 350 Grand Street located on the lower east side on Manhattan. Throughout this chapter the objects that make up this visualization will be explored through a *Terrestrial* view and an *Out-Of-This-World* view.

FIG 32: VIEW OUTSIDE WINDOW, 350 GRAND STREET.

By the end of this section an understanding on how the urban landscape will change due to our actions through climate catastrophe will play out through the object's narratives within the *Out-Of-This-World* and *Terrestrial* timelines. You will see how architectural diagrams, QR-coded augmented reality and architectural renders come together to support the objects narrative. Once these futures are realized and believed within a real world context, the Augmented Reality Window can have further impact through incentives and environmental psychology.

TIMELINE VISUALIZATIONS: OUT-OF-THIS-WORLD

FIG 33: AUGMENTED "OUT-OF-THIS-WORLD" VIEW OUTSIDE WINDOW

"WE MUST NOT OVERLOOK A FACTOR THAT EXPLAINS THE WHOLE BUSINESS: TRUMP PRE- SIDES OVER THE COUNTRY THAT HAD THE MOST TO LOSE FROM A RETURN TO REALITY. ITS MATERIAL INFRASTRUCTURES ARE THE MOST DIFFICULT TO REORIENT QUICKLY; ITS RESPON- SIBILITIES IN THE CURRENT CLIMATIC SITUATION ARE THE MOST CRUSHING. MOST ENRAG- ING, IT POSSESSES ALL THE SCIENTIFIC, TECHNOLOGICAL, AND ORGANIZATIONAL CAPABILITIES THAT COULD HAVE LED THE "FREE WORLD" TO TAKE THE TURN TOWARDS {TERRESTRIAL}"

(BRUNO LATOUR, DOWN TO EARTH, 38)

The year is 2100 and capitalism continues to intensify and the only people who are safe from the grasps of climate change are the extremely rich. The government calls a state of emergency to evacuate the edges of Manhattan but with no financial help available for the millions required to relocate. Rent within dry land sky rockets and is inaccessible for middle to lower income individuals. This leaves many people no option but to try and survive within their new drastic environment. The dry parts of Manhattan quickly set up walls and sandbag dams to prevent water (and people) from entering the valuable dry land. The lower east side is one of the first areas to be severely impacted by the flooding.

Manhole covers that are not removed quickly pull loose trash towards themselves and prevent water drainage. Manhole covers that are removed become hazards for people walking through the water. In the beginning people would remove the covers to allow water to flow down the sewers which caused a danger of falling in and under the water making it unsafe to travel the water streets without a boat or large floating object. Once the flooding started in an attempt to save/redirect government money public garbage pick up was cancelled within any flooded zone which unfortunately escalated the negative stigmas within the area. Most public garbage cans fail their duty as garbage cans and the water level rising removes the garbage and pushes it into the street. With the streets flooded and blocked off from higher dry ground areas; vehicles cannot access the streets which means the crosswalk and traffic lights are no longer used for their intended purposes (not to mention the electrical grid was shut off in these “evacuated areas”) Instead they are now used as anchor points to tie up boats, plywood boards or adapted shopping carts. Air conditioners and plastic bags are used similarly as flood gates used in Venice to allow for dry thresholds for people still inhabiting upper levels of buildings. Working AC units are considered a luxury and are prone to theft. Fire escapes become fully public areas and allow for previous inhabitants of the ground level to have shelter out of the water. There doesn't appear to be any help on the way for these flooded areas and personal survival becomes number one priority.

FIG 34: AUGMENTED "TERRESTRIAL" VIEW OUTSIDE WINDOW

"BY REORIENTING OURSELVES TOWARD THIS THIRD ATTRACTOR, WE SHALL PERHAPS BE ABLE TO SORT OUT THE COMPONENTS THAT THE LEFT/RIGHT OPPOSITION HAD, DURING THE MODERN PERIOD THAT IS COMING TO AN END, EMBRACED, SUMMED UP, AND CONTAINED."

(BRUNO LATOUR, DOWN TO EARTH, 50)

In a radical effort to reduce fossil fuel usage and air pollution the concrete roads have been completely removed and all vehicles have been banned in Manhattan. This was done by the government in a state of emergency with the majority of Manhattan's citizens voting for the immediate and drastic change. The previously wide concrete roads are now turned into clean dirt where residents must collaborate to grow and harvest their own food. Each person has been assigned a 'garden plot' to grow food and each neighbourhood has been sectioned off based on proper human density and available food lots. The only type of farm animals allowed on the island are chickens, as the amount of beef and pork consumption was too resource-intensive.

The crosswalk and traffic lights are left in place mainly to allow easy vertical plantings through connected netting and secondly as a reminder of the vehicular age. Public garbage cans are repurposed as dirt & compost vessels as any disposable items must be compostable and any items not compostable are the responsibility of the creator (manufacturer or shop) and must be returned to the original source for reuse. The many air conditioners previously used are now illegal within Manhattan. They get repurposed as large bricks to create chicken coops. Residents must use human powered fans during the day but are allowed electric powered fans within electricity hours (from sunset to sunrise). When residents must move multiple materials or large items, old shopping carts are commonly used and are the only plastic item allowed in Manhattan after protests from the citizens to keep them for utility reasons. Empty buildings which were previously too expensive to inhabit or rent, are taken over by the local communities and switched to food storage and economy exchange hubs. Roof spaces are also optimized to be public land plots or market spaces depending on the structure of the buildings. In the skies between the existing buildings the government funded flying wind turbines can be seen and are tethered directly to lamps to supply electricity locally. This electricity is only available during evening hours. In the Bylaws all fire escapes become public space since public plazas have been converted to usable land. Some residents rebel by creating plywood board balconies which do not classify as public space. Trees are allowed to grow vertically but are trimmed strategically to allow sunlight unto the newly created garden plots. Spray paint has become illegal due to the aerosols, and the graffiti is now protected as historical art styles. The earth has gained agency equal to humans and all decisions government or otherwise are in pursuit of this agency.

TRAFFIC LIGHTS AND CROSSWALK LIGHTS

The only traffic in the streets of Manhattan are pedestrians, who no longer need the originally intended use of these lights. The failed purpose of the traffic light transforms into a structural member to hold up the netting used for vertical plantings within the street gardens.

FIG 35: TRAFFIC LIGHT QR CODE

People still living in this area on Grand Street use the traffic lights and crosswalk signs as ports for their boats or decking to climb up and into their dwellings. This area is flooded constantly and so planks and boards are tied to the traffic lights and crosswalk to create a semi regularized walking infrastructure within the water.

FIG 36: TERRESTRIAL: TRAFFIC LIGHT ELEVATION

FIG 37: OUT-OF-THIS-WORLD: TRAFFIC LIGHT ELEVATION

FIG 38: TERRESTRIAL: TRAFFIC LIGHT PLAN

FIG 39: OUT-OF-THIS-WORLD: TRAFFIC LIGHT PLAN

Throughout the time between the 2020's-2050's rolling blackouts were a concurring event due to lack of power and the increased demand within the city. This is where the power use bans originated from. In current day all power within Manhattan is generated by floating wind turbines and distributed directly to neighbourhoods. The power bans still take effect but between sunset and sunrise power is distributed to households as well as public lighting. The lamp post didn't have to be altered to run on this new electric power; only alterations to the power grid itself so that these lights have a direct connection to the floating turbines.

FIG 40: LAMP POST QR CODE

In the early days of the flooding and shortly after the New York City Waste Disposal was cancelled for this Lower East Side neighbourhood, this section of the electricity grid was turned off in fears of electrocution of people within the water near the older lampposts. During this period, many of the lamp posts were dismantled and used as steel structural members for walkways and balconies. Following civil rights movements and an evaluation from the city, the old lamp posts and basements were deemed safe to turn the power grid on. The remaining lamp post lights are very dim and few in-between and serve better as makeshift steel parts to hold up walkways.

LAMP POST ELEVATION CONTINUED
 FLYING WIND TURBINE
 RENEWABLE ENERGY PRODUCTION ONLY

FIG 41: TERRESTRIAL: LAMP POST ELEVATION 2/2

LAMP POST ELEVATION

FIG 42: TERRESTRIAL: LAMP POST ELEVATION 1/2

LAMP POST ELEVATION

UTILIZING OLD MATERIALS IN NEW WAYS

FIG 43: OUT-OF-THIS-WORLD: LAMP POST ELEVATION

All trash cans are replaced with compost bins. These are publicly accessible and used frequently for the public roadway gardens. This creates work for the community as they are responsible for keeping these bins full. The newly removed manhole covers become nesting spots for trees that require large amounts of fertilizer from compost and dirt to keep them thriving. Any plastic cans are removed from Manhattan to be used/recycled elsewhere. Original metal and cast iron cans are maintained on the island.

FIG 44: TRASH CAN QR CODE

Garbage collection is one of the first services to stop once the flooding starts. This escalates the flooding problem when the garbage overflows from the can and spills into the street becoming wet and heavy. As the water tries to drain down the street grates the garbage quickly covers it up and prevents the draining causing the water to rise in the streets further. Once someone tries to pull out the grate to allow draining, the hole quickly becomes dangerous and causes an undertow of pulling water which is dangerous for people to walk near as they might fall within.

FIG 45: TERRESTRIAL: TRASH CAN ELEVATION

FIG 46: OUT-OF-THIS-WORLD: TRASH CAN ELEVATION

FIG 47: OUT-OF-THIS-WORLD: TRASH CAN PLAN

Since banning the use of air conditioners in Manhattan, it was important to find a new use for the window air conditioners. The shape and weight of them are reminiscent of a large brick. This allows them to be easily used as shelter for chickens as well as privacy separators for residents. Of course, these ways can only be examined once the air conditioning units have their harmful chemicals removed from the units themselves and then further removed from Manhattan.

With the rise of temperature window air conditioners are becoming less of a luxury and more of a requirement for human survival. Previously, air conditioner units could be left within one's window but now, with air conditioner units being such an important part of survival any exposed air conditioner units will be stolen. To prevent theft and dangerous break ins while still allowing ventilation, a wire mesh (such as chicken wire) is attached to the building and then a plywood board is fixed over-top of the window to give the appearance of a boarded-up window. This setup might not be 100% believable due to lights and shadows, but works as an effective deterrent for thieves.

AIR CONDITIONER EXTERIOR ELEVATION

FIG 49: TERRESTRIAL: AIR CONDITIONER ELEVATION

AIR CONDITIONER EXTERIOR ELEVATION

FIG 50: OUT-OF-THIS-WORLD: AIR CONDITIONER ELEVATION

AIR CONDITIONER SECTION

FIG 51: TERRESTRIAL: AIR CONDITIONER SECTION

AIR CONDITIONER SECTION

FAKE "WINDOW" FOR AIR
CONDITIONER PROTECTION

FIG 52: OUT-OF-THIS-WORLD: AIR CONDITIONER SECTION

Since all the streets within Manhattan are turned to dirt and used to grow crops the amount of water needed for drainage has severely diminished. Also, the electricity grid is directly linked to wind turbines so access to the underground power grid isn't required within Manhattan. This allows the manhole covers to be removed and re-engineered as wind chimes to keep animals away from the growing food. Very old manholes made within the city itself are framed and preserved as historical artifacts and exhibited outside publicly within the streets.

Garbage collection is one of the first services to stop once the flooding starts. This escalates the flooding problem when the garbage overflows from the can and spills into the street becoming wet and heavy. As the water tries to drain down the street grates the garbage quickly covers it up and prevents the draining causing the water to rise in the streets further. Once someone tries to pull out the grate to allow draining, the hole quickly becomes dangerous and causes an undertow of pulling water which is dangerous for people to walk near as they might fall within.

FIG 54: TERRESTRIAL: MANHOLE RELIC

FIG 55: TERRESTRIAL: MANHOLE WIND CHIME ELEVATION

FIG 56: TERRESTRIAL: MANHOLE WIND CHIME SECTION

FIG 57: OUT-OF-THIS-WORLD: MANHOLE SECTION

Fire Escapes are now designated public space and meant to be used as additional vertical structure for the new road gardens. This previous private balcony now becomes an extension of the publicly shared road gardens. The shift of these spaces from private to public was a fight won by the governing body of Manhattan but met with protests through the addition of makeshift balconies.

Fire escapes and roof tops quickly become the only 'dry' exterior space. Many people who previously lived on ground floors found themselves camping out and living on their upstairs neighbour's fire escapes. Also due to the flooding these fire escapes become the new front door for many people's homes since the ground floor plane is flooded and entrance through the original door isn't feasible anymore. It is now common practice for people to assume the front entrance within flooded neighbourhoods are through fire escapes.

FIG 59: TERRESTRIAL: FIRE ESCAPE ELEVATION

FIG 60: OUT-OF-THIS-WORLD: FIRE ESCAPE ELEVATION

GARAGE DOORS AND STOREFRONT GATES

Any of these metal barriers are removed and recycled. The previously uninhabited space is given to the public as a storehouse and economy exchange location. Each of these locations reflect the people who live within walking distance and the values they provide. For example, people can store and exchange fruits and vegetables that they grow for other fruits that they do not grow or simply exchange food for bike repairs etc. Around the city these locations might look drastically different given the types of people and their skills at hand to exchange.

FIG 61: FIRE ESCAPE QR CODE

Garage doors and locked storefronts quickly become areas to be avoided. Many of the storefronts in the flooded areas were empty or in the midst of renovations. Once the salty water got through grates or under doors the building and cleaning materials get introduced into the water while staying in the building itself. The piles of drywall get wet and start producing mold, hanging wires get dangerously close to the rising and lower water levels and cleaning supplies further taint the water. Any gated / garage doors are deemed as 'toxic caverns'. Once the rust starts to push upwards and open these caverns, more pollution enters the streets and perpetuates the water toxicity issues.

FIG 62: TERRESTRIAL: GARAGE ELEVATION

FIG 63: OUT-OF-THIS-WORLD: GARAGE ELEVATION

FIG 64: TERRESTRIAL: GARAGE SECTION

FIG 65: OUT-OF-THIS-WORLD: GARAGE SECTION

SHOPPING CARTS

Plastic shopping carts are the only plastic objects allowed on the island of Manhattan. The only reason these plastic relics are allowed to stay within Manhattan is because of single parent protests to keep them to ease the movement of children and objects. The task of moving apartments was too difficult as a single person or single parent family and was the main driving force to keep the shopping carts. The Manhattan governing body allowed the plastic carts to stay and be “adopted” by families while the metal shopping carts have been removed and recycled into flying wind turbines.

Metal shopping carts are utilized as grates for air conditioner hidden structures. The plastic shopping carts are lighter than their metal counterparts, and are easily transformed into ‘cargo rafts’. the cart is attached to a raft with the wheel removed and placed on the bottom of the raft. This means that the cart can be used within the flooded zones and non-flooded zones when necessary. Most shops and offices are within the guarded non-flooded area and these shopping cart rafts are the easiest way to transport items from land to flooded homes.

FIG 67: TERRESTRIAL: SHOPPING CART SECTION

FIG 68: OUT-OF-THIS-WORLD: SHOPPING CART SECTION

Fire Hydrants have become a modern-day watering hole. With the roads being translated into fields access to water at the street level becomes critical for keeping up with the water demand of the public fields. Using recycled metal from water bottles previously in Manhattan, a water retrieval system and matching water cans are created to sit upon and connect to the fire hydrant. This watering ring is reminiscent of the previous water cooler socializing stereotype.

FIG 69: FIRE HYDRANT QR CODE

With the flooding preventing water flow into upstairs apartments, the realization that fire hydrants were placed on a separate water system was quickly realized when traveling to dry land for water bottles became strenuous. First turning on and off the hydrant and collecting the 'clean' water was done but caused excess flooding in the area. A system of hoses was created to attach on the open hydrant and the hoses were snaked into people's houses and utilized as drinking water. The pressure caused by multiple locked hoses sometimes back res into a person's home who was trying to access the water.

FIRE HYDRANT "WATERING HOLE" ELEVATION "OFFICE WATER COOLER"

FIG 70: TERRESTRIAL: FIRE HYDRANT ELEVATION

FIRE HYDRANT "NEW" WATER SYSTEM ELEVATION DUCT TAPE & HOSES

FIG 71: OUT-OF-THIS-WORLD: FIRE HYDRANT ELEVATION

FIG 72: TERRESTRIAL: FIRE HYDRANT PLAN

FIG 73: OUT-OF-THIS-WORLD: FIRE HYDRANT PLAN

The value of the Augmented Reality Window and its layers of objects, timelines and narratives is shown through its ability to affect people's behaviour. The Augmented Reality Window's involves both the studies of Behavioural Sustainability and Environmental Psychology as this window has the potential to have a positive environmental effect and also serve as a tool to narrow what is called the *intention-action gap* within Behavioural Sustainability.

To better understand how this window will narrow the intention-action gap of sustainable behaviour, it is key to understand the obstacles between "intentions" and "actions". In a report titled *Consuming Differently, Consuming Sustainably: Behavioural Insights for Policymaking* actioned by UNEP (United Nation Environment Programme created by Ideas42 (a not-for-profit behavioural design and consulting firm) they list the largest barriers to sustainable actions as:

1. Many "choice" in consumption are often habitual behaviours
2. Consequence of consumption are often hard to see
3. Sustainable consumption may not seem personally relevant
4. Behaviour is influenced by peers and social groups
5. It can be hard to follow through on sustainable choicesⁱ

By reading through the barriers it is clear that the Augmented Reality Window directly counters these obstacles. Simply, the personal window allows the visualization of the consequences of consumption, and makes it personally relevant as the augmented image is one's own neighbourhood. By seeing the visualization change based on continual positive behaviours people are more likely to create habitual behaviours oriented around

ⁱ United Nations Environment Programme. 2017. *Consuming Differently, Consuming Sustainably: Behavioural Insights for Policymaking*.

sustainability. Also, by having this visualization as a physical entity in one's home this makes it easier to follow through on sustainable choices because of peoples reliance on instant gratification. Once the window goes beyond a personal window and into small businesses this will promote positive sustainable behaviour influenced by peers and social groups due to the collaborative nature of a larger setting.

Regarding Environmental Psychology, the visualization of the *Terrestrial* timeline will share similar benefits to an environment full of plants, where benefits include but are not limited to, improved concentration, reduced stress levels and help with anger managementⁱⁱ. It's important to acknowledge that the *Out-Of-This-World* timeline may have the opposite effects, and to counteract that an incentive program will be introduced. An example of the type of incentivizing required for this Augmented Reality Window is shown in the narrative to follow, but is simply that a monetary incentive is offered for continual effort towards a *Terrestrial* view. A revision and change in incentive is often needed to continue progression of sustainable behavioursⁱⁱⁱ. Once the world starts to shift priorities, it will be important to further shift the incentive to one that isn't attached to a previous world's desires of solely economic growth. For examples of incentives that don't involve monetary desires looking at many video games and digital learning programs is helpful because they utilize digital points or levels to show progression. These levels or points have no meaning in the physical world but still encourage people to progress further and continue their actions because of a human desire for progression. The Augmented Reality Window visually changing and progressing emulates these visual point systems and encourage the viewer to continue their positive everyday actions and ultimately narrow the large behavioural sustainability intention-action gap while providing environmental psychology benefits.

ii Coleman Alice, *Environmental Psychology and Urban Green Space: Supporting Place-Based Conservation in Philadelphia*, (University of Pennsylvania, Pennsylvania, 2014).

iii Dayan, Peter, and Kent Berridge. 2014. Model-based and model-free Pavlovian reward learning: Revaluation, revision, and revelation. (Psychonomic Society, Inc.)

NARRATIVE STORY: AUGMENTED REALITY WINDOW

Through the objects individual narratives and through the timelines a realistic future can be imagined. To help solidify the benefits this Augmented Reality Window could achieve, it is important to understand how it works in context from the beginning to the end of its cycle. In a way, this short story serves as an open-ended conclusion to this thesis.

This story will follow a typical young New Yorker and her journey to be a sustainable steward of this earth through the Augmented Reality Window Company. It is set in a present day context before the influence of Covid-19 was able to take hold of New York City. This isn't to say that the Augmented Reality Window wouldn't serve as an important architectural invention during this pandemic because arguably one's window becomes even more valuable amid isolation conditions, but the present context in the short story represents the capitalist society America has known its entire life. Arguably, America will return to this familiar context once the pandemic has subsided and therefore the narrative story is set in the previous familiar setting.

With the events that have unfolded with Covid-19 in New York this heightens the importance of starting the Augmented Reality Window at a personal scale. Even if New Yorkers see the city as their living room, their apartment or home will always be the domicile that begins and ends their day. In times of self-isolation one's connection to the urban context is only witnessed through the window and by visualizing the positive future through one's actions, (or lack of actions in self-isolation) the continuation of this life saving behaviour can be achieved.

Narrative Story: Olivia Yorker Augmented Reality Window Installation

Installation Day: 8:00am June 20th 2020

Location: Third Floor Apartment, 350 Grand Street, Manhattan, NY.

I worry the installers would be late, but the knock on my apartment door at 8:03am gives me relief. I place my reusable coffee cup on the counter and then pull the apartment door open to greet the person behind it.

“Olivia Yorker?” the man asks.

I respond “Yes, I’m in a hurry. The window being fitted is right over here.” I make a gesture to come in and take the two steps to cross my apartment towards the cracked and worn-down window. He didn’t seem offended by my hastiness, almost like it’s a given dealing with other New Yorkers.

“Don’t worry it shouldn’t take too long with this small old window”. I think, Thank god because I need to get to work ASAP.

“I do need your cell phone, digital watch and any other Bluetooth enabled devices in your home.” It only takes me two minutes to gather all my devices, the perks of having a studio apartment, I guess. I bring him my phone, watch, coffee maker, speaker, and smart thermostat remote. In the two minutes I was gone he’s already taken out the old cracked glass from the window. A minute goes by, and I’m starting to feel awkward in the silence so I try small talk

“So, do you have one installed in your house?”

He chuckles “No, I’d prefer not to see the end of the world when I wake up everyday.”

He must not be very ecological if he thinks like that.

I rebut: “Oh, but if you make good choices like simply drinking out of a reusable cup, and recycling then the future will be bright!”

He retorts “I Don’t mean to be rude, but you actually think that reusable cups and recycling will save the future of our earth?”

Well that was rude, all I can do is shrug because I don’t want to argue this early in the morning, I’d rather sit in awkward silence. 10 minutes go by and he’s installed a screen that looks like glass in the old window. I was following and understanding all of the installation process but as soon as he pulled a tablet out and wired directly into the transparent screen, my eyes glazed over. He kept going back and forth from the window to the tablet and then to my household objects. I guess he noticed my lack of knowledge because he said:

“Just so you know, currently I’m linking your new window to it’s exterior context and to your personal objects. Think of it like another smart object in your home.”

Excitedly, I asked “When will I start seeing the future?” .

He returns “Now that the augmented window is connected to your personal objects, it will take about 24 hours to gather and use your data from throughout the day. And while we’re on that subject of data, I need your signature and information to approve accessing and using all of your digital data.” He reaches into his tool bag and pulls out a thick stack of papers. I’m not going to actually read the terms and conditions, I already have a general idea about what I’m signing up for and I pretend to skim and read and then sign the bottom of the document.

“You have technical coverage for a year so if you have an issue make sure to call the Augmented Reality Window company and I’ll come, and fix it ASAP.”

I nod to show my agreement and ask: “Just to confirm the sales promotion; if I’m able to show and continue a positive future through this window then I don’t have to pay for the installation AND I get a money bonus?” he unsuccessfully hides a chuckle, why is that idea so funny to him?

“That is the promotion.. you signed the agreement within that data contract. the Augmented Reality Window Company is very generous to people that complete their company mission.” I really don’t have time to argue with him about his negative attitude on saving this earth.

“Okay, thank you” he was right about the time though, it only took 30 minutes overall, but I need to get to my office. I watch him pack up his tablet and tool kit and usher him to the door. He stops at the door and says:

“Good luck with your future augmented reality window!” I simply nod and close the door. I look at the new window, it doesn’t look much different, only that new glass has been put in. maybe just a little frostier. In a rush to my office job, I grab my phone, and put all my smart objects back into their respective homes. I grab my keys and purse and then walk down the three flights of stairs and out the door. Crap, I forgot my coffee at home, looks like I’ll have to buy one now.

June 21st 8:30am

I'm excited to look out my new window today, that's a strange thing to be excited for but the company made their windows look so good in the sales pitch! Apart from the two coffee's I purchased I felt like I did a pretty good job being 'green' this might be the easiest way to make extra money I've done yet. I look out my worn-down wooden window and am pretty surprised about what I see. My neighbourhood is completely flooded, run down and clearly uninhabitable yet people are still treading through the water and clearly hate their lives. I'm also taken aback about how this augmented reality technology looks so real; I remember using AR technology when shopping for my couch from IKEA to see what would fit in my home, but it never looked this believable. The altered objects look real, objects are missing that are normally there and new objects appear. I opened and closed this window about 10 times just trying to pinpoint all the differences between today's context and the future context of my city. This visualization of my future is straight from the data gathered from my actions including, purchases, location, exercise, steps taken and how much energy I used at home and office... clearly, I'm not as consistently green as I thought I was. I'll keep trying, our earth deserves to be saved and I need that bonus money from the Augmented Reality Window Company to improve my home.

July 18th 8:23am

I'm frustrated as I look out my Augmented Reality Window and yet again see a flooded world in salted decay. I feel almost as miserable as the people augmented outside my window. At this point a single object being changed into a positive would be a win for me. One day I thought I saw some flowers growing but when I looked closer it was just mold growing up a fire escape. I even thought My Augmented Reality Window was broken but the stats are running through my phone and the installation guy reassured me that it's still functioning. I don't want to say he was right but, maybe I understand his negativity a little bit better now, this seems impossible. I've stopped buying drinks in single use cups, and food with excessive packaging, most of the time anyways. I've planted new plants in my house and on the roof of my building. I've changed all my purchases to green alternatives. I've almost lost all hope, maybe nothing can change the direction of our future... on the other hand I'm determined to go down fighting for this earth... and for the extra cash.

August 19th 8:15am

I see progress! Looking out the window this morning I realize how much my lifestyle needs to change to get it fully into a positive future. Right now, outside the window view my neighbourhood is only slightly flooded, some vegetation is still alive, and the street is still occupied with shops, It basically looks like an eerie decaying version of my current context. It took huge steps and a lot of personal effort to even get it to this point. If I couldn't see the future everyday I'm sure I would have given up long ago. I started a community garden on the roof, I joined political activist groups for climate initiatives, and I've changed my morning and evening routines to avoid 'to-go' drinks and food all together. All these changes in my behaviour are being captured throughout my smart objects and locations and translated into this window visualization, what crazy technology. I'm struggling to figure out what more I can do to fully change the future into a positive view, maybe the consistency of my choices will improve the future? Maybe I can push others into joining political actions and public activities? I'm determined to change this view into a positive future, partially because our earth deserves it, and partially because I can't afford to pay back the Augmented Reality Window Company for this installation.

Final Log: September 20th 8:03am

Finally, after four months of intense work and behaviour changes, my Augmented Reality Window has shown a positive future for seven days straight. It's crazy to think how naïve I was starting this process, I thought if I used public transit and stopped buying single use coffee cups that the future would be positive for me. It took breaking multiple bad habits and re-orienting my behaviour to get to this point. Looking out my window I feel hopeful for the future, but I know that alone I cannot create this future. That's why when I started community gardens and exchange programs within my building the window changed the most from a negative to a positive view. The Augmented Reality Window Company has a lot of work to do in accomplishing their mission, but if working individuals like me are willing to try it for the incentive they offer, then maybe they'll accomplish their mission. When looking at the company's website now, it shows that they're trying to expand to larger windows and into small businesses. Heck, if any of my local coffee shops installed one I would make that my permanent coffee shop. The most important part is that I continue to be active within my neighbourhood politically and sustainably, I've noticed if I get lazy the visualization starts to lean towards the negative future. It's going to be an effort everyday but I'm happy to say I'm doing my part in creating a better future.

The success of the Augmented Reality Window is reliant on people's desire to change their own behaviours. While the research of environmental psychology proves that the Augmented Reality Window has a high chance of being successful in altering people's actions, it is important to not be naïve of the realities that a single person's actions cannot change the future timelines. Through incentivising these Augmented Reality Windows and continuing to grow the scale of them is how we as a community can shift towards a positive future for this earth.

The personal Augmented Reality Window is the first step in a long process to move towards a future to sustain this earth. This is all to say that, The Augmented Reality Window is my answer to Bruno Latour's question: "What are you going to do about climate change?". Through the window I explore visualization strategies to connect the future impacts of climate catastrophe and present-day urban context to facilitate a connection of present-day actions to far-future consequences. By understanding our daily actions and how they directly impact our future environment through this Augmented Reality Window, it visualizes the previously invisible consequences. Implementing this window within the setting of New York allows for easy adaptation and implementation within other deeply impacted coastal urban centres. Augmented reality proves to be a successful vessel in allowing me to link effects of climate catastrophe to real time behaviour within the framework of architecture.

The realistic visualizations of the future inspired by Bruno Latour's book driven by the objects of New York creates a believable future metropolis right outside one's window. This believable visualization goes beyond just an architectural visualization and is a tool to make sustainable behaviour easily accessible to overcome the behaviour-action gap that is present in today's society. By creating the Augmented Reality Window prototype and seeing its potential in the built environment, the exponential scale of this singular product seems possible in the near future. A single person cannot change the future outcomes of climate catastrophe, but if the Augmented Reality Window and its architectural augmentations are explored at various scales, my hope is that the future negative consequences can be mitigated.

During my digital thesis defense, there were a few major themes that drove the delightful discussion surrounding my Augmented Reality Window. While some of these topics were touched upon within the body of my thesis, the questions and discussions that followed my thesis presentation allowed me to think further about my project and explain some perspectives that were not directly present in my thesis. Some of the main themes discussed will be expanded upon below.

ETHICS OF TECHNOLOGY AS A SOLUTION FOR CLIMATE CHANGE

During the thesis defense, one of the questions that struck me was “What is your opinion of the ethical debate of utilizing technology as a solution for climate change?” a perspective that only technological advancement will save humans and this earth aligns with the timeline I have visualized: Out-of-This-World. My argument is that the Augmented Reality Window is not a solution for climate catastrophe, but it is an aid to eliminate the gap between intentions and action to make performing sustainable behaviour more accessible. For example, if these windows were installed everywhere throughout the city, it still comes down to the user’s change in behaviour to change the future. I do not believe technology can save this world from the devastation of climate change; I believe humans will need to change our actions to combat the devastation of climate change. We do not need to change out actions alone however, and by utilizing technology such as the Augmented Reality Window changing our everyday actions to be more sustainable is more probable.

WEARABLE TECHNOLOGY INTEGRATION

The proposal of the Augmented Reality Window is rooted in visualizations to immerse the viewer into the reality of their future. So when questions came up about thinking of other sense I could engage with this window, it became apparent that the visualizations of the window could be present throughout the day of the user as well. The use of data collection in the window would already utilize external objects such as smart phone and smart watches so it's not a far stretch to use these types of external wearable technologies to further immerse the owner within this future reality. A simple example of this could be embedded within a jacket and emulate the temperature that your window visualization is within. This example target's the negative effects of climate change as temperature will rise within the urban center. Being immersed within your future visualization throughout the day will be a constant reminder to think about all of your actions and how they impact the future.

MORALITY AND THE ARCHITECTURE OF GUILT

The ideas of religion, duality and morality came up quickly within the discussion. I believe these ideas came up because of background of my critics as well as the way I framed my visualizations as "Out-of-this-world" and "Terrestrial". It presents itself as 'good' and 'bad' or 'heaven' and 'hell' and while it was not my intention to frame my visualizations with such a dual morality framework, it does speak about the fragility of our planet. The effects of climate catastrophe are near and drastic measures are required to mitigate these impacts, there are only two options that can take place and those options are that our earth thrives or dies. Influenced by Latour, I question can we all change into terrestrial beings? Or are

we going to continue down the road of Out-Of-This-World and slowly utilize all resources? Hopefully the duality of these visualizations can rouse moral questions within ourselves and encourage us (unintentionally through guilt) to hold onto a better understanding of the severity of climate change in regard to our own actions.

The central arguments within all these themes all point towards the original goal of my thesis which makes me proud of the work I have put fourth and the mutual understanding of the values imbedded within my window. I want to conclude with a big thanks to everyone who was involved in my thesis defense. The time taken to read and look through my project is much appreciated, and it led to an incredible conversation about the implications of my thesis work. All the new ideas and perspectives have given me the drive to push forward with my project. Maybe one day in the future the Augmented Reality Window will be available for purchase at a store near you, or maybe while visiting a friend in New York you'll take a look outside their window and see the future from an augmented perspective.

Some words used throughout this curated thesis have been investigated, examined and then redefined according to my studies. For ease of reference and understanding the original definitions will be placed along with the redefined words. All original definitions are referenced from the Oxford English Dictionary unless otherwise noted. ([HTTPS://WWW-OED-COM.PROXY.LIBRARY.CARLETON.CA/](https://www.oed-com.proxy.library.carleton.ca/)) All redefined terms combine etymology, present-day word definition, and thesis research to create a deeper understanding of the terms used throughout my thesis.

Augmented Reality

augment (v): transitive. To make greater in number, size, or degree; to add to, to supplement; to increase, enlarge, extend.

augmented reality (n): the addition of computer generated output, such as images or sound, to a person's view or experience of his or her physical surroundings by means of any of various electronic devices. **Abbreviated AR.**

Redefined: Augmented Reality can be broken into two main components; Projection & Knowledge. Projection not only means a literal projection onto a user's view, but also a projection into a future time and future catastrophes. Knowledge is the second component and refers to the users gain of information not tied to a digital interface and ultimately allows one to question physical vs. digital space. As long as the projection onto a user's view brings value (clarity, entertainment, knowledge, information) it can be classified as augmented reality.

Distributed Museum

Dis·trib·ute (adj): To deal out or bestow in portions or shares among a number of recipients; to allot or apportion as his share to each person of a number.

Mu·se·um (n): A building or institution in which objects of historical, scientific, artistic, or cultural interest are preserved and exhibited. Also: the collection of objects held by such an institution.

Failure

Failure: (1) A failing to occur, be performed, or be produced; an omitting to perform something due or required.

(2) A lapse, a slight fault; a failing, in firmity.

Rede ned: When an object stops performing its previous human determined purpose due to internal and external impacts.

Fonds

Fonds (n): In archival science, a fonds is a group of documents that share the same origin and that have occurred naturally as an outgrowth of the daily workings of an agency, individual, or organization.ⁱ

Global & Local

Rede ned as Timeline: One of Bruno Latour's identified political pulls within his book "Down To Earth". This is a combination of two political pulls Latour mentions which are

ⁱ "About the Archives | Queen's University Archives". archives.queensu.ca.

Global and *Local* which sit on the same timeline axis. this “middle” timeline was explored earlier in the thesis project but quickly overshadowed by Terrestrial and Out-Of-This-World visualizations. It’s projection is based on our current present-day actions and trajectory, including the NYC 2050 plan. It is demonstrated by utilizing current policy’s and city plans of what we have and to continue that timeline that tries to value the environment while still having economic growth.

Mixed Reality

Mixed Reality (n): The merging of real and virtual worlds to produce new environments and visualizations, where physical and digital objects co-exist and interact in real time. Mixed reality does not exclusively take place in either the physical or virtual world, but is a hybrid of reality and virtual reality, encompassing both augmented reality and augmented virtuality via immersive technologyⁱⁱ. Abbreviated MR.

Out-of-This-World

Rede d as Timeline: One of Bruno Latour’s identi ed political pulls within his book “Down To Earth”. As explained in his book an of cial name for this type of thinking hasn’t been solidi ed but *Out-Of-This-World* is the closest term that embodies this political pursuit. Out-Of-This-World is the opposite of a Terrestrial vision. This timeline is the perpetuation of our lack of actions today. Denial occurs pushed and funded by capitalism to make America great again. This push makes us turn inwards on ourselves and begin to take as much as we can as quickly as we can from this earth. Self preservation trumps any value the earth requires in order

ⁱⁱ Signer, Beat & Curtin, Timothy J. (2017). Tangible Holograms: Towards Mobile Physical Augmentation of Virtual Objects, 9.

for us to stay in this world. People with monetary value are the safest from the catastrophe to come because they can afford the prices of the diminishing dry land. This regression continues as prompted by funded climate change deniers in politically important places

Terrestrial

Terrestrial (n) (adj): Of or pertaining to this world, or to earth as opposed to heaven; earthly; worldly; mundane.

Rede d as Timeline: One of Bruno Latour's identified political pulls within his book "Down To Earth". As explained in his book an official name for this type of thinking hasn't been solidified but terrestrial is the closest word that embodies this political pursuit. The Terrestrial pull is about valuing the earth over all else, economic growth isn't an important factor in any urban decision but the health and impact of the earth are priority number one. This mandatory shift of thinking eliminates capitalism and strictly focuses on the survival of our planet. The entirety of our earth is respected equally or more so than a person.

Virtual Reality

Virtual Reality (n): A computer-generated simulation of a lifelike environment that can be interacted with in a seemingly real or physical way by a person, esp. by means of responsive hardware such as a visor with screen or gloves with sensors; such environments or the associated technology as a medium of activity or field of study; cyberspace. Abbreviated VR.

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