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The City Within and the Architecture Around:

Architecture of Tomorrow's City

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"The third revolution, which it seems to me we are on the verge of, is the revolution of transplantations…In the future, just as the geographic world was colonized by means of transportation or communication, we will have the possibility of colonization of the human body by technology. That which favors the equipping of territories, of cities, in particular, threatens to apply to the human body, as if we had the city in the body and not the city around the body."
Paul Virilio [i]

Transportation and communication are the two revolutionary precursors that predate what Paul Virilio would characterize as the third above transplantations. Advancements in these two precursors are synonymous with increased speed and collapsing of distances as goods, people and information travel faster. These revolutions have even extended beyond our terrestrial territory, producing an escape velocity that enabled Voyager 1, launched 35 years ago, to recently leave our solar system into interstellar space.

The progression of velocity and collapsing of distance is responsible for both the growth and demise of cities as trade routes reorganize, new methods of travel emerge (trains, planes & automobiles) and communication technologies advance (from horses with satchels to Marconi and wifi). These advancements redefine our relationships to our territories as distance between destinations shrinks and goods, information, and our bodies move at greater speeds. Architectural forms and typologies develop to respond to and accommodate these new methods of transportation—train stations and warehouses grew to mammoth proportions, post office centers grew in size to accommodate an increase in mail volume after paper catalogs became popular, and server centers were built with their own intricate cooling infrastructures. The rate of speed appears to continue to progress in both communication and transportation today as corporations like Amazon and Walmart advance their shipping options from 'standard', 'two day', 'overnight' to 'same day'.

Virilio's observation of this third revolution, however, places speed as a smaller player in this scenario. Cities and towns that once required static spatial interiors to accommodate services and goods are now accommodating them beyond city limits; these goods are stored in bulk until purchased through online services and delivered to your doorstep. With the human body as the site of technological 'transplantation', the vehicles of communication and movement are internalized and 'colonized' within. The role of architecture as a form for the body to occupy and interface with speed and available goods and services is now in question. Architecture once reflected velocity, housing goods and services that entered and exited a city. What, then, is the mandate of architectural space when vehicles of communication and service are internalized to the human body?

The arch of such a broad topic goes beyond any singular analysis, and coming to a consensus regarding what ultimately defines a city is extraordinarily difficult. Is it the presence of cultural institutions that foster the arts, or the infrastructural frameworks for industry and trade? Is it the public commons of parks, plazas and social interactions? Or is it perhaps just a point of population density? Each of these points are incomplete as individual considerations, and the list itself could never be comprehensive. New York, Houston and Lagos each have unique characteristics, yet each is a major urban center in the twenty first century. The architecture of

cities is a collection of the parts that are thought to define the city itself, housing those objects and information moving through a defined geographic territory. When the body becomes the epicenter of interaction (which information moves through), what becomes the role of the geographic territory, the city and the architecture that creates the city?

The Urbanized Body

The 'colonization' of the human body by technology that monitors, reports, and--one would imagine--actuates responses, such as insulin pumps or pacemakers that help give the heart a steady rhythm, has been progressing over an extended time line. This 'colonization' is most familiar in the form of a physical appendage, which is visible to even the most medically untrained eye as a means to correct a perceived deficiency either from birth or traumatic event. Appendages such as eyeglasses, hearing aids, or even a cane have moved beyond the outer envelope of our epidermis and into our bodies in the form of contact lenses, Lasik surgery, ocular implants, and titanium pins in our bones. In each of the cases mentioned above, such an action was funded, researched and ethically cleared for action under the guise of correcting a physiological flaw or damaged sensory perception in hopes of returning function to the stasis of 'average' (average sight, hearing etc.). But having originated under the authority of improving health and saving lives, these solutions eventually progress technologically, ethically and philosophically into new territories that require doctors and researchers to refrain from providing sensory perception that exceeds what is deemed 'average'. When should an intervention halt the inevitable progression from correcting an individual's eyesight in order to bring it back to a collectively agreed upon average, when it might be beneficial to provide eye sight that is better than 20/20 – to go beyond the 'visible' spectrum and into the ultra violet or infrared? Why stop with the amplification of existing human sensory perception when we can incorporate sensory abilities of other species such as sonar and electromagnetic navigation? Impeding on the curiosity of humanity is to go against what brought humanity to the skill sets to correct the deficiencies in the first place.

What began as an application of appendages to the human body that corrected perceived physical shortcomings has now seen massive funding research resulting in products for market consumption: devices to be worn to monitor and report vital signs in search of optimal health. Recently, Google's spin-off company Verily Life Sciences has begun mass trials to determine if its 'smart devices', like watches that monitor heart-rate, sleep patterns, and a range of other bodily functions can be combined with genetic testing to improve overall health and predict future medical emergencies. [ii]

As technological devices shrink in size, they can be momentarily forgotten by those individuals wearing them, even more so when they are ingested or surgically absorbed into the body. Biomaterials scientist Albert Swiston refers to one form of these devices as 'ingestibles'. These move through the digestive system and are capable of providing information about the health of soldiers or astronauts that experience extreme environmental conditions or trauma patients without having to make contact with the skin.[iii] With successful implantation, the user is rarely reminded of their existence; and as these devices 'colonize' the human body from within, those individuals casually observing the body from the outside would fail to even recognize their presence. And though the distinction between appendage and internalization is worth further discussion, it is the approach to health that is of critical important here.

An increased bandwidth of sensory perception not only amplifies and extends the range of information available for making decisions about the surrounding environments, but also affects the materials architects can manipulate and design with that those enhanced senses can perceive. What I would like to highlight here is a shift in medical care from repair and optimization of body function to a state of continual monitoring and reporting. The monitoring of the body's physiological (and one would assume eventual physiological /emotional state) provides architects with a source of reliable information, one that hasn't existed prior beyond today's collection of large data groups. As we'll see, this perpetual feedback loop transcends the body and includes the incorporation of the context itself that the body moves within. A communication and dialogue between the body and the context it is situated within also serves to collapse the distinction between the two.

From Vitruvius to Leonardo de Vinci's representation of the Vitruvian Man and well beyond, architects have worked with metrics to quantify and synthesize knowledge that can be represented to inform the shaping of material form to define spaces for that body to occupy. Increased knowledge about how the body perceives and responds to color, temperature and sound have each been reflected in the spaces that the architectural discipline has sought to advance.

If biological and technological advancements before were applied to the human body to repair deficiencies and injury, one could say this offered the possibility of a more 'shared' spatial experience. As the body is often judged on criteria of accepted norms, sensory perceptions related to sight, hearing, or mobility, each requires a manipulation of either body or site to make a public space capable of being experienced and shared equally. The 'repair' associated with increased medical knowledge and technology offers the opportunity for spatial environments to be experienced by all and offer shared public space. When this is not possible, then physical space is manipulated to meet standards of accessibility (ADA accessibility). As individuals choose to exceed our sensorial averages through wearables and bioengineering, shared space has the potential to fragment.

The continuous monitoring and reporting of the colonized bodies and their environmental contexts only serves to intensify that fragmentation as individuals choose from a commercially available spectrum of urbanized body. Unlike the repair or correction of an individual's trauma or deficiency that has near consensus for moral good, the 'colonization' or urbanization of the body as it relates to monitoring and reporting will likely play out altogether differently, with some choosing to engage this internal urbanization on a sliding gradient of integration. This will occur based on a range of criteria, such as socioeconomic situation, religion, and community engagement.

When information resources are increasingly accessible to the body, the city is no longer solely around the body as physical context but also 'in' the body; then we're discussing the urbanization of the body. What specifically does it mean to have an urbanized body, and can we think of bodies--either as singular states chosen by individuals or phased over a duration of time--as urban, suburban and rural? Designing to meet a perceived bodily 'average' (according to proportion, ergonomics, and sensory perception) will shift to acknowledging a spectrum of body function; the urban, suburban and rural bodies will move amongst each other at all times. This will be discussed further in the next section.

As the body absorbs communication directly from additional bodies without the need for a physically defined space to mediate that activity (cell phones vs. phone booths) and that same body can be monitored and responded to by its environmental context (traffic on roads is

monitored by the movement of cell phones on highways, lights in offices are turned on remotely by fob key sensors we carry with us) then it can be said that our bodies are in a dialogue with their spatial context.

Our handheld devices, wrist watches in direct contact with our bodies, and medical devices that sit below the surface of our skin belong to a growing list of devices embedded with sensors that reinforce a dialogue between objects and bodies. Often referred to as the 'internet of things' or (IOT), these devices--everything from baby monitors, coffee machines, running shoes and ingestible medical devices--not only track and sense the variables requested, but they also communicate with each other: your coffee maker with you toaster, your phone with your baby monitor, and your surgically installed insulin pump with you doctor.

Precision is not a novel concept in architecture. Precision is demanded in many variations: the translation of architectural intentions and representation into material form, as well as the demands and expectations of those that finance the work or regulations (codes and zoning) that demand compliance. Precision is expected in operation as well. This includes energy consumption, organizational flexibility, and the expected behavior of individuals using the space. Some requirements appear more like expectations while others are articulated deliverables. Expectations that can be represented and articulated with drawings and calculation (dimensions, material choices and cost) are seen as 'articulated deliverables' to be executed and judged against for success or failure. Expectations as they pertain to user behavior are often seen as on the periphery of architectural control. This form of precision is intentional and goal oriented but difficult to guarantee and deliver.

The colonization of the body--or more precisely, the colonization as it pertains to health monitoring and reporting--opens the potential for collecting metrics related to bodies' physiological responses that can inform environmental decision making. Even the entry-level watches today are capable of monitoring and recording an individual's heart rate, information that can be extrapolated to determine the wearer's response to specific designed spaces or interactions with environments. Such a fundamental data set provides information about an individual's response beyond that of the watch's initially specified goal of monitoring health and exercise. Couple this information with current GPS technologies, and user location can continually be monitored to determines an individual's choice of path of travel or time spent in particular locations. This precision related to monitoring and reporting of the body is often perceived as subjective and experiential. Subjective experiences of the body in spaces are increasingly capable of being quantified and therefore appropriated by the architect for design decisions.

As the body is increasingly urbanized, internalizing access to information and services related to communication, health and commerce, the built environment that the body moves through is required to take on new responsibilities and shapes. In other words, opportunities are available for architect's to reimagine not only the architectural form that the human body moves within and around, but the fundamental dialogue between architectural shapes and the human body's engagement of those shapes. Both are open for design and the two are capable of being 'tuned' to one another like never before.

Tuning

"The large brain is at once directly and indirectly both a pro-duct and an expression of climate and ecology: it emerged as a response to an increasingly hot and dry environment and in tandem with the evolution of a novel and biologically unique cooling system. " Sanford Kwinter [iv]

Density is a measurement of accumulation in regards to our cities, going beyond physical mass of buildings. It can also measure information and resources. The 'usefulness' of that density is related to the proximity of the human body to the accumulation. In terms of environments, this is broadly categorized as urban, suburban or rural. In this example, density is geographically static, and it is the body that transitions between, in, and around. But when density of information and the accumulation of resources is transferred to the body, what are the implications to the geographic locales and the architecture shapes that defines them?

When both the human body and the environment it is located within are engaged, (the fist through a colonization of technologies and the second, a willful manipulation of both local micro-climates and global climates) a negotiation occurs that implies a degree of impact on both. When this is done intentionally through design, it could be said that the two are 'tuned' to one another. In such an approach, architecture would not be seen as a third party built to mediate between the body and its environmental context; instead, architectural design would be the design of a context where two parties (body and environment) to be more actively tuned to one another.

Street lighting is clear example of such a tuning. The light emitted from the overhead lighting structure along streets or park walkways does not replicate the energy spectrums of the sun. Instead, this light we see is specifically produced to respond the spectrum of visible light our human eyes can perceive. This wavelength is roughly 400-700 nanometers. Anything smaller than 400 nm and the wavelength reaches into the ultraviolet range, more than 700 and the wavelength is in the ultraviolet. Both are beyond the wavelength spectrum that our eyes can perceive. You could therefore state that street lighting is tuned specifically to the human body. In this specific example, the tuning is a one-way, the material is tuned to the body; the two are not simultaneously open for manipulation. The second important point to be made about street lighting is that it is often dismissed as infrastructural, or simply as a utilitarian safety requirement, when in fact it would be more accurate to characterize street lighting as architecture. After all, street lighting has all the hallmarks of architecture. It has a discernable form produced by the light, it has an interior, and it provides resources for activities against the darkness of night.

As the body continues to absorb or 'colonize' with resources of communication and information, the static artifact of architectural form (and the resources nested within those forms) are no longer moored in place. They instead follow the body as it moves, and the environmental locales that the body locates for itself are free for experimentation and new actions.

The architectural act of 'tuning' the body and the environment through technological 'colonization' of the body and environmental manipulation is an action on two subjects (body and environment). Through the lens of the architectural discipline, this can be seen as a design decision. This however is not unique. Evolution is a tuning of a species to its context, though in most cases, the two are not acted upon simultaneously. It is an evolutionary progression responsible for the human body as it stands prior to technological colonization.

Alexander von Humbolt and his 1807 book 'On the Geography of Plants' is seen as the first to make the correlation between plant species and the surrounding context of climate, latitude, altitude, soil, geology etc. This is seen as a precursor to what is referred to now as environments.[v] Von Humbolt identifies the importance of the environmental variables that inform plant species

and are responsible for plant species variation (leaf size, width etc.) in geographic locales with variables differences.

In regards to the human body, Sanford Kwinter looks to the nervous system as a site of social, political and 'psychedelic innovation as he places the brain against the 'larger backdrop of environmental history'. Kwinter characterizes this as 'neruroecology' saying sensory input is not 'immaterial'- it is the environment itself, and it is the "becoming brain.[vi] Kwinter states that the development of the human brain and nervous system is as much a response to the predatory species and populations hunting and placing pressure upon humans as to the climatic variables that the human body experienced. Humans, both in body and mind, grew to respond to the actions and traits of multiple predatory species as well as to their climatic context. As Kwinter reminds us, we as humans are not *within* nature / environment, we are the environment.

The processes of our brains and the sensory responses of our nervous systems can be seen as continually evolving, as it is clear we defer to artificial processing powers and external data storage devices. Computers process calculations faster than our minds are capable of doing, and we store our memories in photographs, writings and videos on external storage devices capable of being recalled when needed. A 'colonized' body simply ties those calculations and storage more directly to the physical body.

Increased speed and storage are but two examples of extending existing human processes. Our cities today respond to and make decisions that inform our behaviors: the timing of traffic lights and street lights appear as simple actions we seldom question. Advancements in artificial intelligence that do more than move cars, integrating them into an 'internet of things' that includes network appliances, vehicles, buildings, and cameras which together are able to process ever larger data sets. Is it uncomfortable to realize the colonized bodies are potentially part of that increasing data set connected to the Internet of things?

Kwinter's 'neuroecology' illustrates the nervous system's evolution in response to both climatic variables as well as the behavior of species in a shared environment. Humans today are responsible for the evolution on the two sides, both the enhanced brainpower and the behaviors of the environment we locate ourselves within. The pursuit of an absolute control of global environments is in no way the intended focus here, but the distinction between the two could be difficult to discern at times. However, it could also be seen as negligent for the discipline as well as lost opportunity for having a voice of leadership in a topic so heavily tied to climate change, effecting an overwhelming percentage of humanity.

Our options for responding to this crisis are not limited to a single action or disciplinary approach. This isn't purely a technological or political problem to be fixed. Architecture has a role to play, and it is potentially much more critical than is often assumed--not only in delivering of 'responsible' construction, but in shaping the discourse and possibly even reframing the problem itself.

Humanity has shaped this planet: it has changed the chemical composition of the atmosphere, and it has eradicated plant, animal and insect species. It has also had a geologic influence as we mine to remove hydrocarbons that fuel our civilizations, and then replace them with our own form of geology (known as concrete) which has become so prevalent in construction that more than half of all the concrete ever used was produced in the past 20 years.[vii] Let's not forget the fact that our global communication revolution that has produced a veil of satellites and space debris, orbiting the outer edges of our planet.

But the manipulation of the planet goes beyond examples of eradication and pollution of both known and unmapped territories: it also includes the introduction of new synthetic and hybridized species of plants, animals, and insects as well as assemblages of metals, silicon and software that have sparked debate about artificial intelligence and the potential spark of a new consciousness.

There's no shortage of discourse in regards to the influence humans have had on shaping earth. A new term, the Anthropocene, is probably the most succinct way to describe this current epoch we find ourselves not only belonging to, but responsible for creating. As Kwinter reminds us, we as humans are not distinct from the "nature we are located *within* and should instead be seen as *being* that 'nature'".

The urbanized body can at once reinforce the argument that the body is distinct from its environmental context as it is populated with technologies that can quickly be pointed to as artificial and man-made. A populated urban environment that seems to reciprocate in integration of such technologies would, however, only serve to highlight shared similarities of the body and environment. The progression forward would appear to some to be a technological question, one that requires a better understanding of human biology, environmental science, computer science and artificial intelligence, to name just a few relevant fields. Technology alone would lead to some glaring omissions that any architect, landscape architect or planner would quickly point out. The distinction I would like to make here, however, is that the broader architectural and planning discipline can best influence this progression not only in serving to implement advancements, but also in shaping the call for them in the first place. This is a distinction that Arnulf Grubler, who studies the major transitions of energy and technology, would characterize as 'pulling' versus 'pushing' our futures.

Pulling Ahead

Historically speaking, energy transitions (wood to coal, coal to oil, oil to renewables) take decades, if not a centuries, to occur. This is the focus of the work of Arnulf Grubler as he traces the technological and societal developments related to these transitions. More specifically he makes the distinction between attempts to 'push' these transitions as opposed to 'pulling' them.[viii]

'Pushing' occurs through regulation, policy and mandates by governing agencies. This differs from 'pulling', which doesn't negate these agencies but is much more closely related to services or visions that entice consumers, users, or public to engage. These modes of 'pulling' and 'pushing' may be identified through the work of Arnulf Grubler as they pertain to energy and technological transitions, but they are also analogous to the architectural profession.

Providing visions of alternate futures is something that architecture has been rather good at in the past. There are many examples of thoughtful models of potential futures that play out current trends in technology, politics and sociology in an attempt to skew those trends into a specific and often plausible option. A good example of this mode of approach would be the architect Cedric Price and his Fun Palace project, which he initiated with Joan Littlewood. This was a project without a client or even a site in the beginning. He would go on to intertwine a wide range of contemporary discourse and theories including cybernetics, information theory and even theater into a socially interactive public space.[ix] He collaborated with people like the cybernetician Gordon Pask and Norbert Wiener. And though the project was never built, it had immense influence. You could say it acted as a form of inspiration and set the groundwork for many

architects future work. No doubt it even informed the research of his collaborators. This is because it was more than a design exercise that saw its way into a few architecture publications:, it was a project that was in development for close to a decade and included not only a large, diverse collaborative team but also engaged politicians, developers and financers. The 'Fun Palace' pulled our profession forward, and did the same for anyone that took the time to understand its social objectives. Norman Bell Geddes's vision for the General Motors Pavilion at the 1939 World's Fair did the same for our collective imagination, as did dozens of projects by Archigram. The value of these projects exists in being able to influence expectations.

This is particularly important today as we face a plethora of uncertainties, from the climatic changes of our planet to the biology of our human bodies, as well as questions about how technologies such as AI and augmented reality will mediate between the two (our planet and our bodies). As Stanislaw Lem said, "There are no answers, only choices." And unfortunately, most conversations related to these topics revolve around the belief that our problems have answers. These are massive issues that need to be addressed on multiple fronts. Technological solutions are only one of those fronts. Focusing on these problems solely through the lens of a search for a technological solution gives the impression that we have a problem that can be fixed. And when a problem is believed to be fixable, it is assumed that solution gives us something that looks like it did prior to the problem. This is a very important conversation to have because as long as people see our environmental situation as problem that can be fixed, they will always carry in their minds images of a past that they believe we can return to. What would better would be to provide alternative imagery of a future that is both optimistic and is able to carry with it the potential for change. These images and scenarios (not intending to be predictive, but instead plausible) would work to stretch the imagination and prepare us for what alternate lifestyles could be.

The urbanized body and role of architectural shapes that engage that body are at the center of this discussion. That same intentional manipulation and 'colonization' of the body has already been playing itself out on a global scale of our environments. The geographic locales we define as urban centers have always engaged their environmental contexts, both internally—referring to the context within specified borders, the parks and public spaces—and externally, directly beyond those borders. The role of parks, shared public spaces and 'commons' has the potential to become increasingly critical for cities that require flexibility and open dialogue with diverse human bodies of varying 'density'.

The architect is in the position to play a substantial role in 'pulling' a very complex and multifaceted discussion forward, one that integrates technology, ethics, and policy, as well as how and where these exchanges will occur between the body and the environment. The site of this engagement is therefore of critical importance. Not only in the activities and programs on that site but in its ability to place at the foreground the messiness associated with privacy and ethics of technologies and public use. It's only by engaging a conversation with the public about appropriate uses of an array of topics intersected here (individual data, artificial intelligence, energy uses, climate change) that progress can be made. Without this transparency, public confidence will be eroded. Therefore, this work belongs in our urban public spaces, not in private buildings.

A 2014 poll commissioned by the Royal Statistical Society found that "32% of respondents had low levels of trust in Internet companies in general but 54% had low trust in them to use personal data appropriately".[x] There are likely several reasons for such polling. One is clearly the existence of examples that demonstrate such mishandling of personal data, including the recent

ruling by the UK Information Commissioner's Office against the operator of three London hospitals for breaking civil law when it gave health data to Google's London-based subsidiary DeepMind. DeepMind was seeking to develop a software application that could check for signs of acute kidney injuries.[xi] And this isn't an isolated event. Any consumer that wears a watch or wristband to track their health or sleeping habits must question what is to become of that data. In particular, if that company were to fail, such data would make for a wonderful golden parachute, packaged and sold to competitors to reimburse early investors. The second reason for such polling results must in some way be attributed to omission of public conversation. This is in part due to a lack of transparency by the corporations developing the technologies, but also a lack of accountability by the users. The current prevalence of technology in user lifestyles makes it difficult to identify a site for evaluation. Exercise, healthcare, business and social media are each intertwined within our daily activates, making it difficult to recuse ourselves when competiveness, health and safety are advertised to demand their use.

To best nurture debate and dialogue, a defined public architectural territory is best suited to push experimentation while maintaining transparency. Public parks (or at least a subset of them) are best suited for this. The public park has an origin in the English 'commons', which represented a combination of natural and cultural resources accessible to all within society. Though both definitions of natural and cultural resources continue to evolve, the physical locale of the public commons, or 'park', still carries within it the potential to synthesis debate and common good. Defining a territorial locale simultaneously demarcates where actions are occurring (which can otherwise be very difficult to know) while opening the throttle for more ambitious experimentation and revisions. Most importantly for the architectural discipline, it provides a site to give shape and exercise our expertise in aesthetics and spatial organization.

Without determining the specifics for any particular design, key attributes can be extrapolated that can help outline opportunities and potential limitations. It's important to remember in discourse of this nature that architects weren't responsible for the technological development of concrete, iron, steel, glass or plastics; however, it was architecture that re-appropriated these technological advancements, exploiting their unique proclivities to produce novel spaces and shapes that coincided with cultural pressures of their day. In many respects, this current trajectory is no different than previous epochs of disciplinary action. The variables associated with aesthetics, spatial organization and social pressures might be unique to today, though the disciplinary procedures of architecture remain rather constant. This is to say, architecture has managed to demonstrate in the past an ability to synthesize disparate technological advancements in materials and productions with current social pressures in order to produce unique physical forms and space that become emblematic of the times. This is probably most clearly demonstrated in late nineteenth-century by the Crystal Place, or perhaps the Grand Palais des Champs-Élysées. These are architectural projects that synthesized the national pride of two countries that wanted to display not only the mass production of domestic products, but the vegetative collections from their global colonies that required new artificial interior spaces, made possible from new smelting techniques of iron and larger plates of glass. Architecture can make the case that it is in the best position to synthesize and test these current technological and social pressures.

What, then, might architects look towards specifically today as we address aesthetic and spatial implications of an urbanized body and manipulated climate?

Malleable Space

There is a clear lineage within architecture interested in movable, flexible space. This can be seen

in kinetic structures that physically move to change their shape, or large 'open plan' structures in which interior wall partitions can be easily installed and removed as flexibility demands (Mies van der Rohe's National Gallery in Berlin). As the earlier street lighting example demonstrates, energy systems on the exterior quickly experience entropy, dissipating into their surroundings. This is usually seen as a limitation, but that same street light is easily manipulated in its color and intensity and is able to be turned on/off or made stronger/weaker when needed. This simple example of street lighting can be carried further with sound, temperature and electromagnetic fields. Malleability of space translates to flexibility for creating and removing material presence, and this is a quality that is unique to this future architecture.

Updatable Materials
When such a large percentage of the architecture's shape comes from the energy released to produce exterior microclimates and sensorial receptors receiving information from the human body, it is the small technological devices such as the light bulb or wearable in the architectural system that can be easily updated. As technological solutions advance in relation to efficiencies and performance of these devices, they become more easily updatable. A shift from high-pressure sodium street lighting to LED is an example in which it is the light bulb alone that is updatable. Tesla vehicles regularly receive software updates that 'add new features and functionality' to their cars.[xii] These include improved autopilot controls, as well as improved battery life. Architectural forms constructed from stone, steel and glass can appear static not only in shape but in their ability to keep pace with technological advancements.

Evolving Social Experience
Many of the emerging trends from this discourse are simply previous discriminatory practices revisited. When it comes to public parks and spaces in cities, two of the last hurdles to democratize public spaces are seen to be access to public transportation and the ADA (American's with Disabilities Act). Both are seen as critical in making public space accessible to all. In these examples, the same public space is technically accessible to all, but as some of us may have experienced while riding a city train that plunges below ground, not everyone maintains their network provider and therefore, access to the Internet or communication. Much like two individuals might today have different access to Internet connection based on separate cellular providers and equipment, individual access and ability to perceive sensory information will vary along socio-economic status, technological demographics and health, making the same public space unique among multiple user groups.

Ethical / Moral Dilemmas
Ethical and moral issues inevitably arise when willful manipulation of a global climate and human physiology; it is through these first spatial scenarios that potential out comes can most completely be explored.

New Conversations about Environmental Change
This work seeks to give energy a public face that excites and inspires a progressive discussion about our inevitably changing environments and the role architecture can play.

Conclusion

The 'colonization' of the body that Virilio describes sets a tone of reluctant observation and weariness to what appears to be an inevitable evolution of human experience. The engineering and commercialization of technologies initially appears to be the main orchestrators of our future,

leaving the rest of us to be on alert and skeptical of this ongoing evolution. I hope that this discussion illustrates that there is a potential for meaningful dialogue and direction of this evolution; and that it is best served by the architectural discipline. The role of the architect isn't to directly develop alternate technologies, pass legislation, or to hold corporations accountable to ethic violations, but instead to orchestrate spatial and territorial sites in which these issues can be foreshadowed and demonstrated. By amplifying and engaging this discourse through the core strengths of the architectural discipline--defining material boundaries, organizing spatial relationships, and exploring new shape aesthetics all while placing user experience at the center of the conversation--architecture can fold in and act as a epicenter for much broader dialogue and experimentation.

Incorporating growing pressures in technology and evolving understandings of nature and the human body are not new tasks for the architectural discipline. However, the speed of that development and implementation, as well as the scale of the potential ramifications could be argued as a unique period in time.

The biological and chemical recipe that we've come to think we know here on earth is of course not consistent across the vast spectrum of environments across the planet's surface, or even below it. With a history of four plus billions of year, our current history can also only ever be seen a snapshot in time. Increasing our bandwidth of imagination and acceptance of what a responsible, healthy future looks like here on our planet will require something more than technological solutions to fix a problem: it will require a set of elastic expectations, nurtured by imagery and social scenarios in regards to what the twenty first century will bring.

The current cultural 'image', for a lack of better word, of a healthy Earth and what that looks like, is simplistic and quite frankly stunted. This is because the image that many people carry along with them of what a responsible future for Earth's looks like, is based on what they assume it looked like in the recent past. This is understandable to some extent, assuming you can point to a period in time in our past in which that ideal environment and current collection of global cultural achievements coexisted (the instant global communication, billions of humans, a food supply to feed them all, to name a few). Our current cultural achievements and the resulting global environment are difficult to untangle from each other at this point.

The relationship between the human body and the global environment is a continuous dialogue. It should not be seen as resolvable or capable of reaching an ideal final state. Just as no architecture is capable of characterizing anything more than the pressures and opportunities of its day, it is important to remember that the current dialogue of environment and body is elastic and will likely never reach a point of consensus or equilibrium. Architectural design is therefore a necessary medium and site to continue to nurture that discourse and conversation.

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[i] Paul Virillio, 'The Virilio Reader', Edited by James Der Derian, pp. 19-20

[ii] "The DeepMind Debacle Demands Dialogue on Data", Nature, International Weekly Journal of Science, Hetan Shah, accessed August 28th, 2017 https://www.nature.com/news/the-deepmind-debacle-demands-dialogue-on-data-1.22330

[iii] "A Tiny Pill Monitors Vital Signs From Deep Inside the Body", Rae Ellen Bichell, accessed August 28, 2017, http://www.npr.org/sections/health-shots/2015/11/18/455953304/a-tiny-pill-monitors-vital-signs-from-deep-inside-the-body

[iv] Sanford Kwinter, "'Neuroecology: Noted Toward a Synthesis," in *The Psychopathologies of Congnitive Capitalism: Part Two* (AC Books, 2017) 327

[v] Ibid., 328.

[vi] Ibid.

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