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Vitae, Vix Humane, The Resonance Of Machine Intelligence: Implications For Now And Into The Future For The World Of The Orthodox Human

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VITAE, VIX HUMANE.
THE RESONANCE OF MACHINE INTELLIGENCE: IMPLICATIONS FOR NOW AND INTO THE FUTURE FOR THE WORLD OF THE ORTHODOX HUMAN

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Overview

As technology has made its way into our hearts and homes, we've developed an insurmountable dependency on its effectiveness. Through technology, we can come far closer to our perceived effectiveness, whatever that may be, than with our human spectrum of capabilities, riddled with mistakes and errant processes. When electricity came into our world, it enabled globalization and triggered an inventive revolution far quicker than anything seen before in human history (CITI IO). This was first a phenomenon, followed by a reluctantly accepted truth, and now an expectation to adhere to the new changes of a technologically advanced society. With the presence of the internet, we have created something that had never existed before: measurable, interconnected online data, and the new trigger to the technological revolution: Artificial Intelligence (A.I). The impact of A.I for the average, societally developed nation is expected to be immense, and just like electricity, a complete change of basic life expectation. This thesis will review the current developing state of A.I (which may be much farther on its way than suspected by the majority of the public) and just how immersed in human life it is going to be. Intelligence can be implemented just about everywhere, and it certainly *will be* in our developmental timeline. Installations of A.I will be around us, among us and *within us,* and the original separators from human intelligence may not be as vast an idea as originally thought, even on paper. The term and title of this work, *Vitae, Vix Humane* means in Latin, "*Live, Scarcely Human*," encompasses what most of the ongoing Machine Learning Projects intend to make us do in the imminent future.

Introduction

"Just as electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don't think A.I will transform in the next several years,"

—Andrew Ng, former chief computer scientist at Baidu, Deep Learning Innovator

A.I is going to do for us what electricity did for our ancient world. The transformative implications have made it a largely fascinating, yet equally terrifying topic of moral controversy, especially in terms of privacy and mass decision making. The utility of A.I is versatile enough to fit into just about every industry, and remap the way that we look at the relationship between humans and the data that they produce. This budding industry has adamant devotees on a spectrum, ranging from a terrifying terminator-style siege of global proportions, to enthusiastic support of an integrated, futuristic smart society. This fascination fuels a lot of technological advancements today, emulating science fiction novels and shows like *Star Trek,* which provided inspiration for the cellphone, (Dunbar) in pursuit of a world of effortless data. Artificial Intelligence, in its most basic definition, is the capacity for computer systems to perform tasks that normally require understanding and comprehensive actions. Among these expectations are activities that usually require human input, such as "logical inference, creativity and making decisions based on insufficient or conflicting information (Dictionary.com)."

Current A.I assistance applications strive to imitate life with the promise of idle conversation, but the limits are easily distinguishable within just a few minutes. Concepts become flat, conversation points become repetitive, and the A.I's interest revolves around categorizing keywords rather than real-time dynamic thought processes. This style of

intelligence revolves around *programming systems,* stemming from a conventional set of rules and logic in the form of a decision tree. While this format may work for simple decisions with a handful of variables, it is a poor pick for the fluid and dynamic, evidence-based decision-making humans do daily. However, we're on the horizon-line of a new type of intelligence that may achieve this.

This thesis will compile some of these developing projects and theories to illustrate a map of the impact that new A.I methodologies may have on our changing world. It will also address concerns that humans' eventual A.I counterparts will become indistinguishable from themselves. Industry leaders have debated on the final timeline for us as humans, as well as the future overtones of how A.I can completely change our lives. To predict our distant future would be just as robust a guess as *Back to the Future* had for 2015. This is rather, a reflection of the *now,* and an analysis on what is to come based upon a prediction as to what projects and programs will be realized.

The question that everyone has been asking as of late is *what will become of the life of the ordinary law-abiding citizen*? What significance will the orthodox "average-Joe" have when machines are tailored to do everything we can? To set parameters, we are going to consider the 'Orthodox Human' to be a standard member of a developed country fairly competing for technological innovation. To compare, in the present timeline, the "orthodox human" would be the current internet user, age ranging from 18-55, with a cellphone and an understanding of social media outlets and online interaction. This individual may not own all forms of commercial technology, but understands them to some degree. They also would utilize widely accepted services like online shopping, with a generalized trust of system security with sensitive information.

In A.I development, the industry is riddled with patents (Columbus), but there are multiple methodologies that are being pressed to create the *same* outcome: something superior to our ability. The term 'better' may seem subjective, and a marketing product rather than a tangible feat, but everywhere you look, there is an ongoing effort to take what humans lack and somehow develop a mechanical band aid. We are looking for something faster, stronger, more durable, and less prone to failure. One could guess that humans have an obsession with perfection, even if it is unattainable; it's only *natural* to pursue the *artificial*. However, with A.I being the next big move, most people don't understand the implications of a high tech society with intelligence integration, and how it can change lives beyond just answering questions on a whim with your smartphone.

Explaining Intelligence

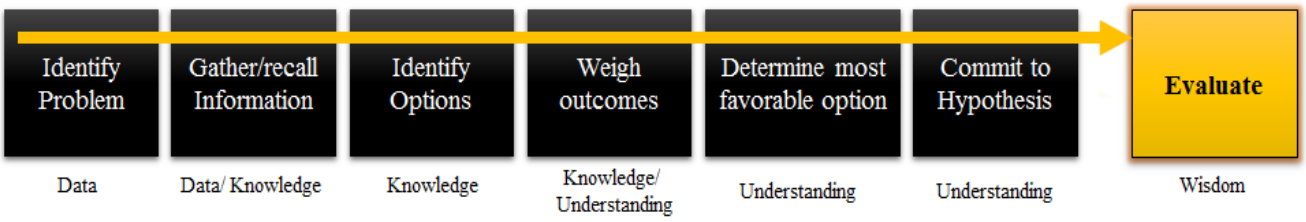
Before diving into these overtones, it is important to lay down the framework for what intelligence *is*, and what it isn't. The overarching definition of intelligence has nothing to do with an empirical scale of 'rightness.' Instead, the applied discipline of intelligence is simply the capacity for reasoning skills, such as logic, comprehension, awareness, learning, emotional intelligence, planning, and creativity. These are all skills used to simply interpret the world and have nothing to do with whether or not an organism is actually classified as *being* intelligent (Ben Goertzel, Pei Wang, p.17-18).

The rampant fascination of systematic intelligence is a growing topic as more industries seek optimized methods for strategy and data integration (Columbus). Intelligence, in its crude form, is a bridge of knowledge and skill, and a natural catalyst for solutions, global optimization and competitive edge, which all competing businesses want. All complex organisms can utilize intelligence, consolidating and stratifying

critical extrasensory information to elicit a response and come forth with a reaction. The central nervous system in an organism absorbs external information, arranges it by relevance, tests the information against experience to determine the characteristics, sets constraints, determines appropriate responses, and then finally, commits the most suitable response given the scenario. We all do this, in split-second timing, and without it, humans could not have lasted on this planet.

Dr. Russell L. Ackoff, an American Systems and organizational theorist, compiled intellectual processes of the mind into four simple steps as follows:

First there is the identification of *data*, or details assumed as facts. This is followed by the application of *knowledge*, or pre-existing comprehension which facilitates *understanding* of a given topic. With understanding, information can be inferred. Finally, there is *wisdom*, which is the learning portion of multiple experiences (Ackoff, p. 170-172) (Mouthaan, p. 6). I've created a small diagram below to paint just where Ackoff's process fits with the widely accepted decision-making process.



The actions in black are the steps to a decision, and the *evaluation* block is where decision-making occurs. An organism's ability to tailor responses creates a higher level of learning than simply coming to a decision. In some situations, even when presented with the same circumstances, an organism may not react the same way they had initially, even when nothing changed. In the event of telling the same story twice, details at a given

time can seem more vivid than others. Maybe in one instance there's a detailed account of a recollection, but in another, the story may only be a condensed summary.

Such a situation seems commonplace for a human, but it comes with faults, *subjectively.* Neurologists and psychologists alike argue about the inefficiencies of the human brain, and debate whether the brain's natural tendency to create relationships and consolidate is a blessing or a curse. The brain, in both problem solving and recall, is sporadically reconstructed from association. If the association is weak, details can be lost in each rendition, resulting in potentially inaccurate recall (Konnikova). This is by no means a critique of such a complex organ, but rather a desire to hone in on the details that make the brain so amazing. Organisms, can learn from experience or example, and apply skills through understanding a problem without necessarily experiencing the identical scenario. The ability for calculators and computers to resolve complex mathematical equations almost instantaneously makes them seem like the superior model, but behind every calculation is a command. This command feeds the machinery the exact steps to go about solving the problem, leading to a singular response to a given command. For instance, if taught the significance of 2+2=4, then the A.I construct is primed should the situation come again. However, what of 2+3, and so on to infinity? Without a true understanding, a command from a machine is not prepared for any deviations. In code logic, 2+2=4 *can never* be applied to any other equation, even if the same rules are followed. Luckily, dealing with possible deviations to a problem is commonplace for humans, but as previously mentioned, those subjective faults reemerge.

When humans deduce the same operation, the steps are far more obscure. Humans are required to infer that the numbers have meaning, find the corresponding operations,

determine validity and thousands of intermediary steps before the results are given. Even then, the final product could be incorrect. With no experience to solve them, the odds are stacked against the decision-maker. However, being incorrect is the first step to intellectual betterment, and thus, the decision-maker learns. Emulating the interactive, problem-solving aspect of the living organism is the first step in developing a perfect problem solver. What if decisions that originally took months to make could be made in a split second? What if other decidedly 'human' traits could be emulated? The idea of creativity and wisdom within a computer process almost seem like opposing concepts, but this is exactly what businesses are looking for. Businesses do not just want answers to their questions, they also want intelligent aides to answer questions that have not been asked yet. To do so, A.I would have to construct scenarios that do not exist yet so that they can know exactly what to do, which requires dynamic, imaginative thought to accomplish.

As mentioned before, the brain seamlessly integrates millions of processes of understanding and information in seconds, and this convergence of large amounts of information allows us to collect insight. This is just what is needed to pull together a world which is currently filling up with new data gained from technology usage. Modern learning A.I such as Google Assistant (Google), Siri (Apple), Cortana (Microsoft), Alexa (Amazon) and Watson (IBM) are integrated with our information, reactions, and decisions, and many business giants are anticipating the increased scope of A.I in influencing the future. As of now, Market intelligence research firm Tractica forecasts that A.I revenue will reach $59.8 billion worldwide by 2025, a huge increase from the $1.4 billion in 2016 (Reinhardt). A second market research firm, *International Data*

Corporation (IDC), predicts A.I revenue will grow from $8 billion in 2016 to over $47 billion in the next decade with most of the revenue being software related in some way (Reinhardt). The beauty of A.I is that it can be applied to just about every industry. Many businesses see the same trend. Derrick Wood, Managing Director and analyst at Cowen and Company, an investment banking business for companies whose main goal is growth, states: "CIOs are at the stage of saying, “We've got to invest in A.I. If we get it right, we're going to be more competitive (Reinhardt).” That applies to any company in *any* industry." It’s a means of improvement, and is making good output from companies even better.

An ‘Invasion’ of Big Data and the Web of Information

Our world is already saturated in data, but with each passing second, we are generating plenty more. The fact that data can be generated by just about anything makes its applications endless. This current era is a digital one, and our transactions and interactions are key for data insights. To start the journey, just like with intelligence, it’s important to define what big data is. Big data is still a fresh term, and because of that, the exact definition can vary depending on where you look. For the purposes of this thesis, we will define it as follows: big data is just what it sounds like: a heap of varied structured and unstructured data. This is data so *big* that it is impossible to analyze using conventional data mining techniques by humans or basic computing (Marr). As more content is being moved online, the transactions are always being recorded *somehow,* in a database *somewhere,* and information can be inferred about it.

I was unsurprised that I could not locate exact numbers when trying to find out just how much data is being produced daily. This is because it's very difficult to put a number on such a large amount of fluctuating data online. It's also important to note that there's a lot more data than what is online. A lot of data is being produced passively, such as data within the Internet of Things (IoT), and private servers known as 'Intranets'(Monks). Big data is not only about the vast amount, but also the different formats. We are producing more than just text and logs. New age data includes pictures, video, audio, timestamps, coordinates, transactions, and far more (Marr). Big data includes four characteristics, *the Four V's* as affectionately coined in the industry:

Volume: The expansion of data that is generated. The initial and most known aspect of big data.

Variety: The different types of data being generated. The second most known aspect.

Velocity: The speed at which new data is being generated and updated

Veracity: The messiness of data, i.e. its unstructured nature

This was pulled from IBM's *Big Data and Analytics Hub*, which technology research company Gartner claims was plagiarized from their company's original Three-V framework (which includes all the V's sans Veracity) (Laney). A number of software companies seem to claim the uncited knowledge of the V's, much to Gartner's chagrin, but no matter the original source, the Four V's of big data are a widely accepted truth in the big data world.

Why is big data so important to note when predicting the state of the orthodox human? It's likely to be the driver of A.I development. Imagine a scenario in which each point in a data set is an aspect of information about a person. Put these points together, and it can create a pretty fair representation of you. Basic superficial information such as your name, Social Security, age, gender, and birthday can be matched with inferences of other questions: where you spend your free time, who are the people you like to spend time with, what do you search on the net, where do you shop? By comparing more data, it can create a model that determines just how a person interacts with their world. Relationships can emerge that were previously unseen. This is an automated process, and analytics technology can do millions of these processes to find a pattern, also known as an *insight*. Big data finally allows us to look at the way we interact with the world around us and each other, and watch it play out instead of looking at predictions and the aftermath of results.

I will be using Google Now, Google's intelligent virtual personal assistant because of its wonderful relationship with personal data. While the pocket A.I that consumers use is mostly concerned with the data for personal use, it shows a small-scale outlet connected to a large-scale set of data analytic tools. Google Now's ability to answer questions and provide recommendations is based on user search habits. Google Now can use location data to pinpoint your home, your work, and frequently visited locations to determine shopping habits, favorite restaurants and more. It can even compute if you're walking, biking, or driving depending on how fast your GPS signal is travelling and adjust distance accordingly. Google Now is also the perfect transition to another topic in data and intelligence integration that had been mentioned previously: The

'Internet of Things'. Google has been producing a plethora of new platforms and tools to be used for remote computing. In addition to the data that we're producing, we also have a secondary production of machine-generated data that can be analyzed by other machines. Data is also created when our 'smart' devices communicate and interact with each other on separate servers. Smart Televisions, newer cars, airplanes, and other devices are now relaying information to *each other,* and are expected to make decisions and adjustments without human intervention. The more automated systems are, the more interdependent they have the potential to become. IDC forecasts that there will only be more communication between devices. In 2016 there were 28.3 million wearable devices, by 2020, IDC projects there will be 82.5 million (Reinhardt).

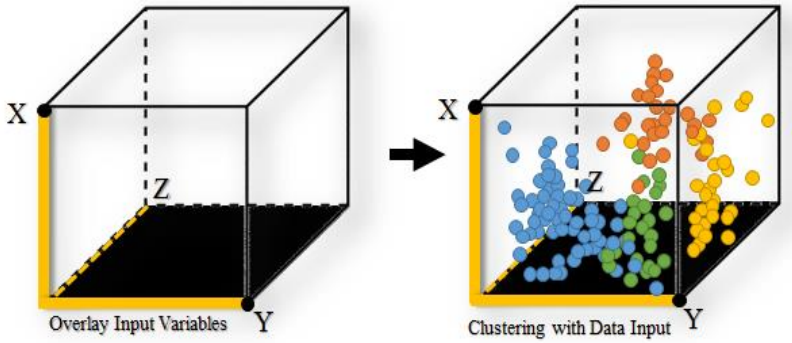
Untapped Potential in Data Analytics

An important principle to know is that there is never 'enough' information. The more you know, the more reliable your output. Data can do so much when it is applied to analytics, yet over 90% of data still lay in banks untouched, mainly due to its unstructured form (Das, Kumar). Without the ability to put data into structured tables, there's no feasible way to sort it all. This is an overwhelming disappointment to a lot of data miners and statisticians. Many believe that until we can utilize data mining and other aspects of the decision sciences to combine data trends into a universal outlet, our hope to attain casual conversation and interaction that can breach the "Uncanny Valley" will be limited.

The term "Uncanny Valley" defines the phenomenon that most artists trying to create digital human likeness encounter, where humans find replicas that look too realistic to have an indiscernible quality that is 'inhuman'. This makes the replica, let it

be in media or in real life, disturbing instead of appealing (Giardina). There are too many small nuances of human life that cannot be imitated with the current technology that we have. Big data theorists insist the only way to truly emulate our own humanity is by reviewing data from our past and present through collection. However, because of the current state of big data studies, the first step is to decipher the massive blocks of data that we have collected. But that's where the problem starts.

Experian's Data Quality Report addresses the two reasons why data analytics falls so far behind (Haselkom). It's often due to issues in practicality and organization. On the practicality front, many Chief Information Officers blame the real-time processing of an endless flow to be overwhelming, because there lacks a universal framework. Just as America established the Interstate Highway System, a data highway will need to be established to account for the large amount of data to be examined quickly. A 'Data Highway' would be expensive, but once a framework is established, it would only be a matter of maintenance. Secondly, an organization problem is arguably one of the best problems we can have. Research suggests that an insufficiency of funds and organizational skills are never real problems on an overarching timeline. Innovation and time usually leads to progress. Already, new data warehousing and database techniques are being introduced so that this problem can



Analytic techniques such as Cluster Analysis can find relationships and similarities between data points relative to a series of other qualities. Relationships can then be coordinated, and conclusions can be inferred.

be addressed. It may not be at a large-scale for now, but Cloud computing may just be the solution when it comes to the data problem. Cloud computing and new data formats like NoSQL in databases allow for the storage of data that is both unknown and dynamic, and can eventually be converted into more data. I argue there's a third case: data integrity, that isn't addressed here but likely contributes to the problem. As it sounds, data integrity is of central importance to information quality and security. If the content has integrity, then it can be trusted. Yet, if it can be easily manipulated, lost, and skewed, this can lead to corruption and long-term processing issues.

It's intuitive to assume that more data equates to more data points, and the more information that is added to the big metaphorical data plot of someone's life, the better you can do of creating a framework that describes a person. Already, we have algorithms making recommendations for music, clothing, and accessories. Why not more? We have an idea that some things can't be predicted, such as a spouse, or a career. I believe we'd all like to think that we have autonomy that if we try hard, we can excel in anything, which could be true. But the question is whether we can learn something that we don't know.

When you have data points, and you start to compare them more, it's inevitable for relationships to emerge in a web. Models can be built based on data, running simulations, and then changing variants until information can be inferred. This is something that is possible, the technology is already in existence. In fact, it is just not open to large-scale commercial use (Das and Kumar).

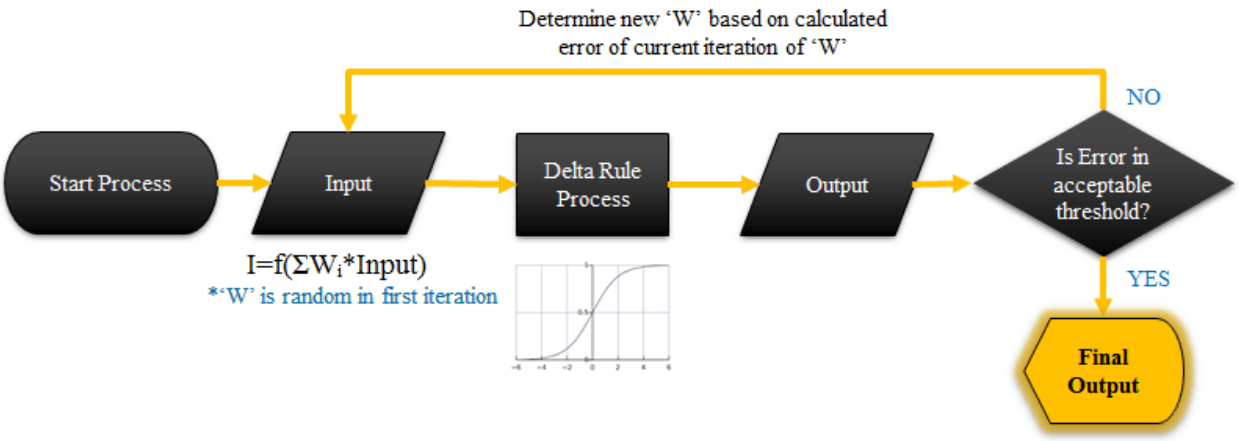
Machine Learning within Neural Networks

A large subset of A.I platforms, Machine Learning will be the final review in this section. Think of Machine Learning as A.I+. It is intelligence without a defined purpose: the concept that the machines will essentially teach themselves and find relationships and make decisions on their own accord without human intervention. Machine Learning is meant to be useful because if you don't know that you're asking the wrong question, how can you possibly receive the right answer? Solution: give a machine data, and the ability to make its own inferences from the data without ever being asked a question. It's a steep feat to try and bring a self-cognition aspect to the table, which was (partially) why Neural networks were developed (University of Wisconsin).

Dr. Robert Hecht-Nielsen, Electrical and Computational Engineer and Professor at the University of California, co-founded the idea that in artificial terms, the "fundamental mechanism of cognition" is in fact a procedure called "confabulation" in Neural Networks (University of Wisconsin Madison). A neural network is a series of processing implementations that are vaguely modeled after the neuron structure of living organisms. I wouldn't be as bold as to say that it emulates the *human cortex.* Even a large neural network would only be thousands of processor units in comparison to a simple brain, which would be comprised of billions of neurons. In its principal idea, they are direct imitations of biological neurons. Chemicals are displayed as numerical formulas called "decision weights" that can shift in real-time based off experience, creating adaptive, conceptual coding that can make mistakes and then learn from them, just like humans. Researchers in the field are not entirely concerned with the direct emulation of

biological structures, but the endgame result is essentially the same (University of Wisconsin Madison).

Neural networks contain a ‘learning rule’ which determines the weights of relationships based on the input patterns that the network is presented. They can learn by example as we do, for instance, understanding the meaning behind a term such as ‘bird’ by being provided with images and examples. Learning rules can vary in extremes, but the most common classification is called the “Delta Rule (**Δ**),” used in backward propagation of error learning. With the Delta rule, this allows for a node to go through a controlled learning process cycle (also called epoch) of exposure to an input pattern, and the backward propagation of weight adjustment. The network initiates a random guess to an answer, with no logic attached, and then adjusts weights according to how incorrect the answer was. Graphically the process resembles this:



In the end, the computer should be able to comprehend the meaning of addition without ever being prompted. Simply give it examples of addition, let it try to guess the relationships between the numbers until it finally gets the relationship right. It will

associate the '+' with the function with enough iterations, and thus, apply the same properties to anything further. Within each of the functions is the characterized 'S' shape in the sigmoid curve that polarizes the activity of the network and helps it eventually hone in on relationships and lead to the right answer. The initial test of the computer already has a predetermined answer to assess the accuracy, all preening can be monitored in a controlled environment. Neural Nets are not necessarily sequential processes, unlike traditional computing. There are no central processors, but rather a series of smaller ones, working together as a whole. This is advantageous with finding internal data patterns that are dynamic and nonlinear. When you can overcome techniques that are often limited by assumptions, accuracy is heightened exponentially (University of Wisconsin).

Neural networks can hone in on multi-layered relationships which can model a series of complex events. Their role as ubiquitous predictors makes them ideal for finding patterns, relationships, variables, and categorical data, but it does have its limits. These networks tend to be slow to train, and can require up to millions of runs. If run on separate computer systems, then this problem is null, but if the neural network is being run on a standard machine, it can take a while. The learning, like with humans, must progress on its own, and it cannot be forced. The product may finally result in a trained network, but trained networks will not provide equations for coefficients. In fact, the network itself can be defined as the solution equation.

Alongside the Neural Network models, there are an assortment of other methodologies for dynamic processing, including Bayesian Networks (shortened to Bayes Nets), Monte Carlo Simulations and more. Humans don't fully understand themselves, so to emulate an algorithm equivocal to our brain is not possible, at least, not

with this current state of technology. The alternative route of creating something completely different instead of trying to recreate a biological brain is not coincidental. The purpose of Machine Learning in the 21st century is *not* to replace humans, but to serve them. Even with the current projects on hand, using the algorithms listed before, I could not find any solid attempt to create a robot for simply *being.* Such an algorithm has no purpose in the corporate world, and has no real place in the profit-dependent goals that A.I is being funded for.

Our Present Future

Now that a lot of the preliminary terminology has been defined, it's important to see where our current world fits into the big picture, developmentally. Consider the wants of the human in the current era and why our wants have taken us down the path of technological advancement: a desire for quick gratification (Roberts). Instant gratification, or pleasure fulfillment without any delay or compensation, is a progression that ties in a lot with human psychology and our insurmountable *want.* A desire for instant gratification makes our world faster, and more pleasurable. It's a notion that if you want it, you can get it, and you can get it *now.* Most models for human psychology act upon a "pleasure principle," which is believed to be the force that makes humans want to fulfill needs (Roberts). It can be something as visceral as the need to live, but also as superficial as the need for a new gadget.

The late 1950s are not when the story began; this idea of taking scientific potential and making it into reality had been budding for decades already, but it's a good ballpark to start our journey. During the 'Space Age' or the 'Atomic Age,' humans had some amazing scientific accomplishments, and America had been experiencing huge

growth in economic sectors, military innovation, and population. It was the perfect time to overachieve and think out of the scope of possibility. With the Cold War in tow, a diabolical curiosity overtook scientists to bring about some outrageous ideas. In retrospect, the efforts were a bit on the extreme side, and there was an almost morbid fascination with nuclear weapons. When the proposal for "Project Chariot" came into effect, and the US Atomic Energy Commission decided to construct the artificial harbor in Cape Thompson using nuclear explosions, there was no qualm about comfort, only results (Newton).

Progress was never achieved with comfort and compliance. This is one of the qualities that make the future such an amazing thing to consider, but instant gratification can never be sated. It's safe to assume that the pushback with technology now is a natural part of any gradual change, and new generations of engineers are headed to a life inspired by ambitious technology in science fiction. This describes an existence where we can get even *more* gratification, more solutions to the problem, and aim for the stars yet again. Technology and innovation should only exist to make our lives better by improving knowledge, action, and security. In most cases, we naively give permissions in exchange for an easier life with applications and software, but who is to say that the promise of more results will not lead to more invasive requests?

There's a secondary psychological shift in our fascination: our relationship with technology is becoming less superficial. People are now becoming emotionally attached to the technology they possess. The developing emotional element is a recent phenomenon, and there have been several questionnaires to address the changing climate

(The Economic Times). We are attached to our user experience. It is inherently ours, and can be perceived as an extension of us, in a primitive sense.

Researchers Gilsi Thorsteinsson, Marketing manager at Nyherji, one of Iceland's leading Information Technology service providers, and Tom Page, coordinator of all activities required for the Loughborough University Design Engineering School, provided an online questionnaire given to over 200 smartphone users within the range of 16-64 years old. These people came from all different walks of life, and social status, ranging from the United States, Canada, United Kingdom, Japan, Hong Kong, and China, which are most of the big competitors in technology. The two of them found that in most cases, people do grow emotionally attached to their devices, usually their smartphone (Thorsteinsson and Page). Some could argue that the emotional bond is due to the connectivity and content that the smartphone provides rather than the device itself, but that's the equivalent of the relationship between people due to the experience that they provide, which aren't so different (The Economic Times).

UK consulting firm Deloitte did a similar study on American consumers, and found that in a day, their smartphones could be checked over *8 billion times* (Eadicicco). Some of the statistics that they calculated during the study indicate that on average, people in all demographics checked their phones approximately 46 times a day, but the amount varies drastically between age groups. It's no surprise that the newest generations, which are submerged in the technology culture, are the most interactive, with an average of 74 checks a day. I tried this study with my own smartphone, as well as with a handful of my friends within my age group. We performed the experiment by giving the phone to someone else for 1-2 hours (the data was adjusted and normalized).

Each time a person wished to check their phone, they would have to request access, and return the phone to the keeper right after. The data I found is here:

Sub #	SEX	Duration (in hours)	# of checks	Adjusted Checks (1hr)	Checks per day (16hrs)
1	M	2	10	5	80
2	M	2	9	4.5	72
3	F	2	14	7	112
4	M	2	30	15	240
5	M	2	12	6	96
6	F	1	22	22	352
7	F	1	14	14	224
8	F	2	20	10	160
9	NB	2	32	16	256
10	F	1	13	13	208
11	M	2	5	2.5	40
			Totals	115	1840
			Averages	10.45454545	167.2727273

Only two were remotely close to that 74 range. Most could hardly live without their phones when presented with the challenge of staying away. During the test, I

stressed for people to maintain their normal usage patterns, but many reported feeling a slight elevation in interest in their smartphone when it was not immediately in their possession. What does this emotional layer to technology mean to us? Even now, babies are being given technological companions from birth, which can amplify potential for psychological imprinting. There's no reason to think that anxiety will stay, especially with a positive regard of being helped by technology since birth. In the last year, we've developed some impressive technological capabilities. Virtual personal assistants, smart cars, real-time fraud detection software and much more, and every single one will eventually become expected to be integrated as an expectation.

A Smarter World

Picture it: You're in your early forties living in a bustling American City. The year 2017 means almost nothing to you, aside from a few throwback songs that your parents like to listen to. They're around 90 now, but they live on their own, and you know they're safe and fully-functional to live alone because they are accompanied by their **Virtual Nurse's Aide** (Liu). You wake up at 5, as you always do, with the aid of your **alarm clock**. You want to dismiss it, but you know that you can't, or rather, it won't let you, as you *both* understand that you must be at work at 9 am.

As you begrudgingly roll over, it informs you of the weather, the condition outside, and the current time it will take for you to get to work given the traffic conditions in a sweet, comforting voice. You greet her back out of habit, and the contraption asks you if you slept well. A brief exchange of conversation about your dream finally wakes you, and you push yourself up from your cozy, warm heated **bed** (SleepNumber.com) (unfortunately set to *your* maximum comfort setting), and immediately reach for your

glasses. Not that there's anything wrong with your eyesight, but they are necessary if you want to do anything. It's bizarre to see someone without a pair of lenses, unless you're amongst the incredibly wealthy, who have the newest model of **embedded contact lenses** (Verily). You were never the first in line for the latest brands, however, and you like your spectacles.

You don the sleek, minimalistic pair, and before your eyes, your **interface dashboard** is there: a floating holographic menu. You made it yourself, with the things you're interested in: The news, a few catalogues for your favorite stores, your messages and much more are all there, suspended in luminescent panels before you. You could find anything here: from the personal (banking information, Location, health information), to the professional (your job information) to entertainment and friends. You easily absorb all the information in a blink, and in a literal blink, you dismiss all your notifications.

That same suspended voice from your alarm clock greets you again, and you know it well. It's your **personal virtual assistant**, who you've named Lola. They sound exactly how you want them to, and you've been with them for 20 years or so, longer than most people you've known. They're your best friend. In all honesty, you probably couldn't differentiate them from someone over the phone if you tried. There have been a few instances of people marrying their virtual assistant, but that still seems off-putting to you. They're more like a comforting friend, but you can't deny that sometimes you do wish that someone understood you as well as they do.

You push yourself up from your bed, and make your way to the bathroom. Every step you make is warm to the touch. Your **floor** is aware of your presence, and in response, each tile warms a millisecond before your feet touch the tile. It's a cost-saver,

as the moment you raise your foot again, the tile cools. You cross the threshold to the bathroom and the **lights** automatically flicker on the optimal brightness setting. Your **toothbrush** knows the health of all your teeth which is being reported in a file sent to your dentist real time, and your **bathtub** is running at the optimal temperature based on your stress levels and other factors. Even your toilet is motion sensored, auto-flushing, technological and warm. Getting up is a breeze you don't have to think about (Bradford).

Your **clothes** are all stylish and riddled with biometric tags. With heart rate capture points and other health-monitoring metrics, you've essentially created a digital twin of yourself (Sawh). You can have the comfort of knowing that if anything *did* happen to you, your clothes would sense the trauma and automatically call the paramedics.

Your kitchen is always stocked with your favorite goods, and that's because you never have to worry because your **refrigerator** (Samsung) (Who is in fact, an extension of Lola), will always reorder when you are low. RFID and Barcode scanning means that it is always aware of what is in stock, as well as expiration dates and other health data. Your **stove** has a screen interface that will aid in recipes and cooking instructions for every meal you could possibly imagine, and even your **utensils** are aware of your eating speed and habits. You're easily able to watch the news as you eat your breakfast through the convenience of your glasses.

When you leave, you never even have to think about locking your doors, as your personal assistant is prompt to secure your home with the integrated **home security system** when they sense you leaving. Your **Car** has already driven itself out of the garage and into the driveway for you to get into. There's nothing to worry about, your personal

assistant is now the persona of the car, and drives you to work. It's hard to believe that cars used to be manual, once upon a time. There hasn't been an accident in ages. It's nearly impossible when all cars are fully aware of where they are relative to one another. Your assistant asks you if you would like to listen to music, and you ask them to suggest something that they think you'd like. Everywhere in your ride, suspended on billboards are **personal ads**, displaying stereos and commercials based on what you search for and have the tendency to buy. The autonomy of the self-driving car means you are free to browse products and perform online orders without worrying about the road.

You arrive at work when your assistant predicted. Your doorman is a robotic greeter named NOAH who recognizes you and asks you if you bought that stereo system you wanted to get, the same one you had talked about with it before. You inform him not yet, and exchange a few words before heading into your job, a data collection agency for the sake of improving the city's data system. That's all you do, that's what all humans do: improve the intelligence of the city.

Work ends, and the money is deposited into your account with no delay. You tell your assistant you're hungry and informs you that you can either eat out, or she will automatically order **delivery** that will be warm and ready when you get home. You decide you want Italian. They order it for you promptly, and you get right back in your car. In your car, you spend your time mindlessly scrolling through photos of the people you know, and people that your algorithm thinks you should know based on their interests and yours. This is how you've made most of your friends. You'd never risk the embarrassment of meeting that you didn't know anything about.

As you're scrolling, a message interrupts your activity: your sibling messages you in the form of a suspended telepresence. They say they're in town for the weekend, and you can't help but feel excited. You don't see them much, and you can't quite remember, but you know that the face on the telepresence screen has been automatically altered to perfection with **automatic photo alterations**. It will be nice to see them again in person. Lola asks if they should order a second helping of Italian without you even asking. You say yes, and while they're at it, you ask them to order the stereo you've had on your wish list. They already know which one. Both the Stereo and the food are scheduled to arrive at your house in 20 minutes.

Search "smart" preceding just about any appliance and you'll find that there is likely a project in development. We are now finding mundane household items with defined functionalities for years, and asking new developers "what else can we make it do?" The implications for a smarter world suggest that all the menial tasks will likely be eradicated. We will not have to worry about ordering and searching for information about us that is deemed 'important and synonymous with identity', such as accounts, personal information, and passwords. The idea of the 'hub' with all information of self, will automate many monitoring services that were taken on by people now (Marr). Even now, Google Now has brought a myriad of information to our fingertips.

The sense of outward consultations from professionals will likely be diminished, as more menial details will test control limits to health and other metrics, and only alert professionals when help is truly required. Those professionals will likely have A.I (Finley) of their own preened to help them with diagnosis and planning. Our dependency on others will fade with the security of more dependable automation. It *could* mean more

time for play, or more time for solitude. An interconnected world means that we can do a lot more without the extra effort. This can be a framework of distant socialness, depicted to become more apparent as technology facilitates some of our interactive activities (Gonchar). This is not a criticism, nor is it praise for what intelligence integration can do, but just a timeline with reference of what we are already starting to experience.

What Does It Mean To Be Human?

If we succeed at creating independent artificial life, *then what?* In 2017, we've broken boundaries with the creation of Sophia, a robot developed by Hanson Robotics, a company devoted to creating "lifelike robots and overcoming the uncanny valley (Hanson Robotics)". As of now, Sophia has traveled the world, given lectures and can interpret people who are present in her surroundings. Sophia *does* use A.I for her visual data and facial recognition processes, but she is not truly independent machine learning A.I quite yet. Instead, she utilizes scripted response logic with rudimentary expertise in a few, predefined topics (Hanson Robotics). However, her significance must be recognized around the world. She is a framework, a shell reserved for a prospect when the 'real thing' arrives. Already, Sophia is starting the conversation about human acceptance of a machine that resembles them. In my research, I've come to discover that the consensus of people (even for those who are technically supportive of the new era), would choose to remain averse to an idea that 'pure' A.I could be identified as human (Wagner). I found this interesting, especially because the use of A.I in the service industry has had mostly positive feedback.

The Human Quality

In my research, I've also found that humans collectively, did *not* trust A.I with things beyond entertainment and basic safety enforcement (Wagner). David Wagner, executive editor from InformationWeek at UBM Tech, found that nearly 25% people identify that the internet of things can eliminate the majority of human error and enhance safety (Wagner), which is a surprisingly low number. This is the issue of "algorithm aversion" (Frick), which is the "uncanny valley" of thought processes. This aversion is the idea that it only takes a single error from a robotic process to dramatically reduce trust from a human. Individual errors are amplified even when A.I predictions are shown to have higher overall accuracy. In 2014, Harvard Business Review did a study on the trust of human instinct versus machine learning algorithms, and rewarded subjects when they made correct predictions. They had the choice of either using their own 'gut-feeling' or a learning algorithm of a machine. Just as mentioned before, these algorithms were almost always better than the human predictions, but even when a single error was perceived, the trust of humans would drop dramatically (Frick). This aversion is a huge problem because integrated A.I systems are becoming mainstream. Resentment and mistrust in a product or service is never good for a company. The solution proposed was even more baffling: give robots uncertainty and strip them of their confidence.

There was a study at the University of Massachusetts Lowell where people and robots worked together to try to get through a small obstacle course (Wagner). The people could choose to either take complete control or let the robot do it. The robots had faster reaction times, but they had been automated to make mistakes. When the robots made mistakes, people chose to take full manual control. However, not all robots were

created equal. Some of them were programmed with expressions, such as a happy face when they were certain of their actions, and a sad face when they were doubtful. When asked, test takers admitted it was the doubt which gave them the sympathy to trust that the robot would eventually figure out the correct course on their own (Wagner).

They found that robots that hesitate or look confused gained more trust from people, and those which did not were found to be unsettling, even if they had a higher success rate (Wagner). However, to place uncertainty in a robot is a costlier approach. We don't want robots to be robotic. When they are more like us, we feel the need to protect them, but we also don't want robots to resemble us too much because it becomes unsettling. This is a huge conflict to what it is that we are intending to create in the first place. One could argue that the comfort of mistakes and uncertainty is due to a reinforcement of humanity's usefulness (Wagner). If so, like most nationalistic efforts against change, this is not likely to be a permanent view. The same researchers found that adding human input to a learning algorithm was enough to dispel most distrust. Even if it makes the algorithm less successful, this method has worked everywhere it's been tried (Wagner)(Frick). In self-driving cars, friendly human voices gave them personified qualities. The trust is placed in the persona rather than the vehicle. Make it friendly and human-like, and there's a better chance of acceptance, but make it too real, and the need for separation is re-ignited.

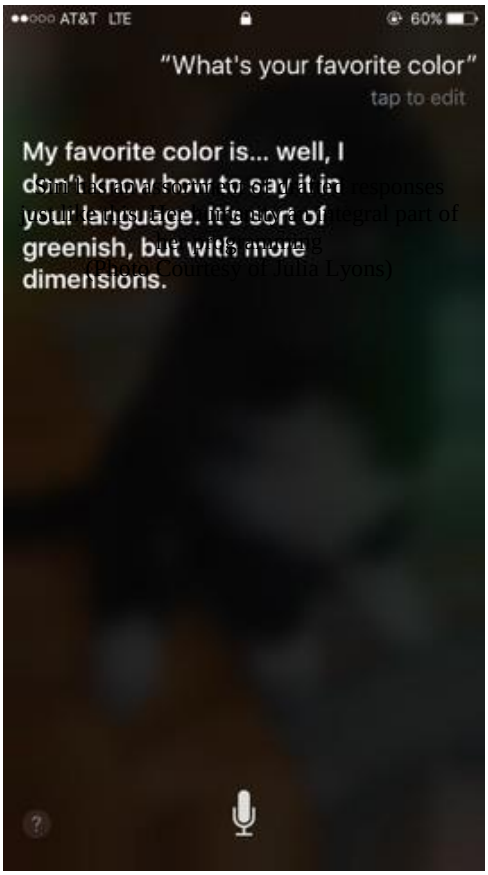
When asked what qualities about A.I foster this separatist attitude, the same ideas came up:

- Decision making
- Emotional intelligence

- Self-preservation

The problem with these claims is that these traits are not mutually exclusive between A.I and humanity. Decision making is a refined sense of classification theory. We've already debunked that a machine is more than capable of making a complicated decision (and is already being entrusted with such), and the association with emotions can just as easily be applied to an algorithm. If an algorithm can be created to differentiate the most optimal, but least probabilistic outcomes as 'desires', how humans do, then it is natural to conceive that when an algorithm does not produce a desired outcome, it could be perceived as negative. We learn our connotations through experience, and learning algorithms could be given similar constraints.

Self-preservation and self-awareness is a broad spectrum. While we are very capable of our own self-awareness, we have a hard time determining whether someone else is. Self-preservation, on the other hand, is already being implemented into security algorithms to ensure data integrity. Computers must be aware of their sense of self during security breaches. While this operation differs from the human brain, this is possibly a form of self-awareness in machines. If a robot does have decision making skills, emotional intelligence and self-preservation, will humanity accept them? The odds are low.



(Photo Courtesy of Julia Lyons)

There's no reason to assume that later in time, especially when robots are expected to have a human

form to perform various tasks, that we won't have the technology and artistic prowess to create something less 'unsettling' or if what we see is accepted as the norm. We'll want our companions to emulate us eventually, especially with attachments. Even with our scripted algorithms, we find joy in a possibility of mobile services like Siri and Cortana breaking out of their mundane voice to tell us their dreams, hopes and favorite colors.

Industrial Saturation

A contributing factor that makes us human is what we create. The constructs and industries we have forged for ourselves are just as uniquely human as we are. Just think of the facets of industry that we surround ourselves with to make our society. Firstly, we have conservational industries: military, healthcare, and agriculture. Secondly, we have recreational industries: economy, entertainment, and education. Finally, we have personal facets of self and privacy: career and relationships. While something may fall into multiple categories, these comprise of most of our daily activities.

Conservational Industries: Military, Health, Agriculture

Military

The edge of A.I systems in commerce has gained huge traction in high-stakes military security systems. Military security, like business, is looking for the highest competitive advantage. The arms race is a never-ending effort to assure influence and peace of mind to citizens. It's arguably one of the most 'high stakes' aspects of urbanized structure (Prine). Armed defense often consists of rapid decisions that impact millions of people's livelihood. What if split-second decisions could be made by being outsourced to an intelligent algorithm? The idea sounds like it might be a godsend, especially with

optimized processing speeds. Weaponized A.I can make decisions, and track people who are threats and maintain security automatically. It can also be substituted for human soldiers in the front lines of conflict, to assure limited loss of life (Prine). Navy SEALS would no longer be required to remove sea mines by hand, but rather by using robots equipped with A.I to dismantle them. Automating drones, jets, and monitoring software to detect and eradicate threats would be a huge display of strength and security. Militaries are so interested in this type of technology that there have been several open letters and anti-automation movements about the morality of giving A.I the ability to determine who lives and dies (Holley). Already, militaries have been developing their arsenal with more intelligent infrastructure (Prine)(Holley). It takes just one country to start the chain reaction. All countries are working overtime to stay ahead of their competition. Our future means automatic monitoring systems to improve counterterrorism efforts for the sake of security. Humans living in the era of Military A.I can expect a life protected by algorithmic machine learning systems where only the quickest, most optimized system will win.

Healthcare

When the data is there, health risks and diagnoses can be made more quickly. Health metrics and health monitoring hold the interest of doctors making diagnoses. By creating a database comprised of all known diseases and health data, algorithms can then use the data to determine probabilities of different illnesses given symptoms and pre-existing conditions (Artificial Intelligence in Medicine, MIT). There are a multitude of projects that are encouraging healthy habits such as exercise and food monitoring. This comes as no surprise, as there is a gradual shift in the way that society regards their

health. There have been numerous surveys which support the notion that people are becoming more proactive when it comes to health-promoting actions (Gustafson). Packaged Facts director of research, David Sprinkle also made remarks on the changing health climate:

> *"Increased consumer awareness of health and wellness across the age spectrum and among those seeking to combat obesity will continue to fuel interest in functional foods for the foreseeable future, and therefore the ingredients selected for use and potential claims to be made by food processors and marketers,".* (Packaged Facts, PR Newswire)

At this point, professional healthcare is still a responsive practice; there is developing interest in preventative action, especially in Millennials (Gustafson). These consumers who are to lead the charge in most of these future projects, as well as Baby Boomers (born between 1946 and 1964) are willing to pay "premium prices (Gustafson)" on behalf of health. With a data revolution, and instantaneous family history data, health conditions will be easier to determine with familial health data.

Agriculture

Agriculture is a huge industry, and is the foundation of the economy (Massline) It's no wonder because agriculture is the basis of human survival. However, this sector has been experiencing a lot of stress ranging from factors like climate change and population growth. Challenges to food and water security have been negatively impacting

agricultural health in developed societies (Trice). Increased consumption also leads to increased demand for agricultural production, which for now, agriculturalists have no issue meeting. However, many of the methodologies are not sustainable, and place irrevocable damage on the planet's resources (Pesticide Safety Education Program (PSEP)). Agriculture is already looking towards A.I processes to help solve their problems, which includes promoting sustainable agriculture while increasing crop yield.

Companies are using robotics to help agriculturalists find more efficient ways to protect yield from weeds and disease. One example of a company that is quickly climbing the ranks is Blue River Technology, stationed in California, that services farmers and agriculturalists with "revolutionary computer-vision based robots that unlock greater yield potential (Lomas). They developed a robot called **See & Spray** which uses computer vision to monitor and efficiently spray weed killer on crops. They use high-precision techniques in their herbicide to prevent herbicide resistance (TechCrunch). According to the company, the precision technology can eliminate 80% of the volume of chemicals normally sprayed as pesticides and reduce the cost of herbicide by 90%. In the United States alone, over a billion pounds of pesticide are used in the US annually (Lomas).

Berlin agricultural tech firm PEAT is also developing an app called "Plantix" that can identify potential deficiencies within soil. Efforts have also been made for locating pests and utilizing learning software in determining soil quality. Analytics systems use an image recognition app that can discern defects through images from photographic data, which then give tips and tricks for how to overcome. Sustainable living is important if we

wish to live on this planet without depleting natural resources, and that means working with information to keep the planet healthy with intelligent help.

Recreational Industries: Economy, Entertainment, Education

Economy

Our economic systems are the large-scale connected trade, production and depletion activities that determine how our resources and wealth are distributed throughout our society (Investopedia). These economic activities apply to everyone in a given society, and extend even to entities like governments and businesses (Investopedia). Economies across countries can be comparable, but not necessarily the same, even if they form the relationship between two societies for trade and interaction. According to Northwestern economist Benjamin Jones, Stanford University economist Chad Jones and College de France Economics Professor Philippe Aghion,"machine learning can really take over all human tasks and take over ideas of innovation, [making it] possible to get a radical change in the growth rate [of the economy] (Franck)."

They are some of many researchers studying how A.I can further automate the human agenda. The three of them wrote a research paper for the National Bureau of Economic Research discussing how A.I have been placing recommendations in e-commerce business. As more economic decisions become automated, A.I has the potential to introduce new growth, changing how work is done (Accenture). Data reveals that there has been a noticeable decline in the capability for "traditional levers of production" such as "capital investment and labor" to power economic growth (Accenture). Research reveals that A.I could double economic growth by 2035 by

automating unskilled work and changing the nature of work activities (to be addressed later) thereby increasing productivity in labor by 40% (Accenture).

Entertainment

Walk around your local electronics store, and you'll find all sorts of new examples of interactive digital entertainment, dynamic video games, and movies. Leisure can be defined in many ways, such as gaming and movies, both of which are getting a huge overhaul in the upcoming years (The Next Web)(Giardina). Unity, the most popular game engine in the world (The Next Web), introduced a set of machine-learning agents that establish foundations for A.I and unscripted adversaries in video game logic (Unity3D). Unity is facing the challenge that a lot of game developers are facing: in standard video game development, autonomous behavior is coded by hand, but a new dynamic approach could mean that each iteration and replay of a game can be a completely new experience consisting of new interactions. In addition to entertainment value, games can be created to be the most in-depth simulations with non-player characters (NPCs) with A.I brains. You can make gorgeous displays of gameplay environments that interact with both the player and the virtual world, which can also be used for training A.I and humans in just about any field (Greene). Since the 1950s, developers have been claiming they have "A.I" in their video games. This was never true, as the non-player controlled elements in most video games don't learn anything (Unity3D). With this developing technology, Unity agrees that "game publishers will have to stop advertising things like "advanced A.I" unless there's actual machine-learning taking place (Unity3D)."

Even television entertainment could be expected to receive a virtual renovation. Hollywood has already started using computer-generated imagery (also known as CGI), but inserting A.I could mean more automation of design tasks. A.I uses, according to American magazine Hollywood Reporter, “could function as script supervisors, [edit films, and] even create performances either for digital characters that resemble actual humans or more fantastic CG creatures.” This could not only shorten production time, but also drastically bring down costs to allocate to other production tasks (Giardina). A.I can create huge savings for impressive rendering work. Even Stephen Regelous, a developer at Massive, described an “A.I-driven software that was first used to create the huge armies in Peter Jackson's The Lord of the Rings” and had to agree on the feasibility of A.I in film. Financially, it’s the way to go. He states: "You can shave off tens of millions of dollars from the budget of an animated feature [with A.I that can] produce animation more quickly.” Regelous also adds: "At some point, you'll be able to create an actor that doesn't know he's not real (Giardina)” or even recurring celebrities who commonly act in movies that are purely learning intelligences. Who’s to say that we can’t simply have A.I with celebrity status?

Education

Education is our powerhouse as a society. Developed nations become what they are because of what their citizens know and can do. In a world “driven by an ever-widening base of knowledge (Corso)” we need good education. Foundational education has become incredibly important in determining the success of individuals, especially in the scientific and technical era, where we know that specialized knowledge will be more valuable (Corso). As part of our foundational systems, there’s no reason to believe that

the data that we gather from a young age can't be applied to adjust content to personalized learning strategies that are optimal for each specified consumer. AI tutoring would also be a feasible solution, where on-site education software could be accessible at any time, just like how online/independent courses could create a shift in learning and the role of teachers (TeachThought). A lot of the menial tasks of grading can be left to adaptive grading software and give teachers and professors more time to come up with curricular content.

Personal Industries: Career and Relationships

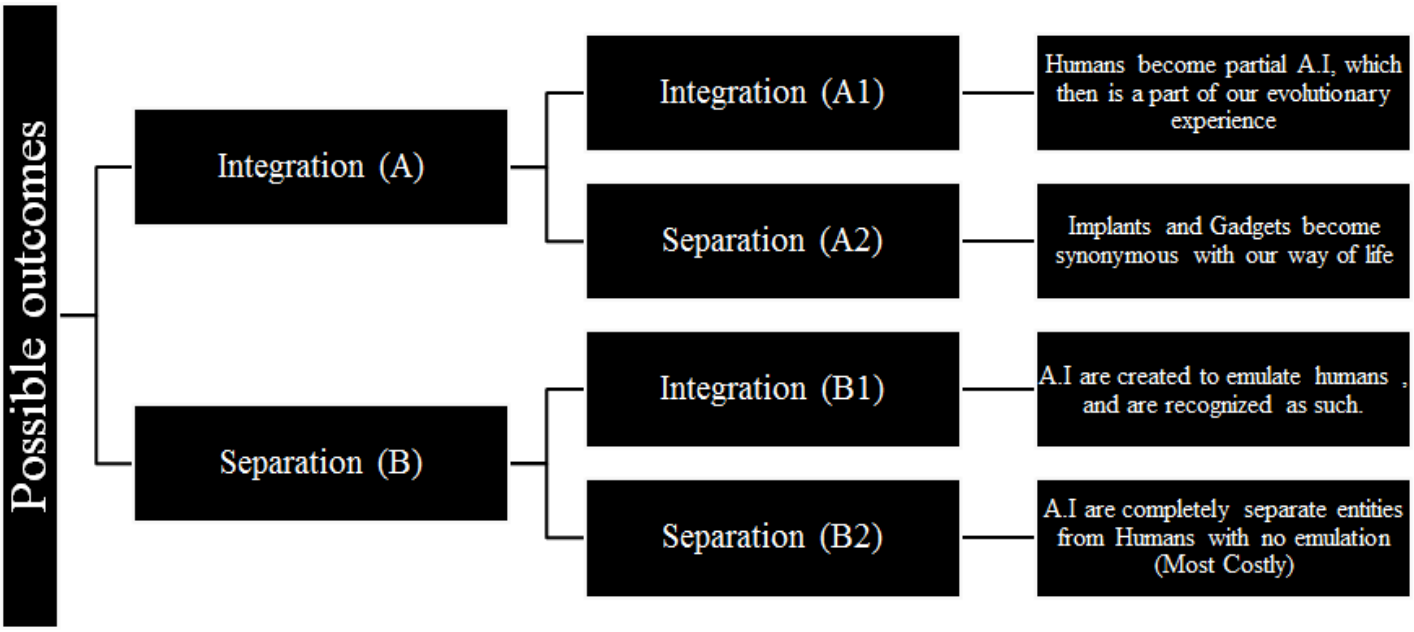
Home is where the heart is, and it's where the technology is too. Home technology has been mentioned throughout this thesis with the IoT technologies. With the limitless potential that has been mentioned about learning software so far, not much has been said about the algorithms of preference and personal decisions. We've been trusting A.I algorithms with our personal information, but what about the big choices that impact us, like where we end up working and who we end up spending the rest of our lives with?

In truth, we are already doing this. Career websites use interests and strong skills to determine what occupations would be most suitable for a person, and dating sites use algorithms to find matches based on compatible interests. Online site eHarmony describes themselves as using "29 dimensions" to predict success in a relationship (eHarmony UK). Online dating is a taboo topic for some, but not as much as it was years ago. In 2013, 60% of Americans thought that dating sites (using dating algorithms) were a good way to meet people (Smith, A), a large increase from the 44% who felt that way in 2005. If an algorithm were to determine a soul mate, and take attraction, interests, and

compatible health benefits into consideration, is it a blessing or a curse to have an it determine who you should spend the rest of your life with?

The Human Condition, Vix Humane

This is a great chance to see what 'being human' means in a new world where A.I will be taking over practically every industry we have. As humans, we are used to being considered the wisest of organisms, so at what point are we no longer the controller? The idea of having something that is sharper than us can be upsetting. There are two definite timelines for us, separatism and integration, and within that, a deeper sense of separatism and integration again. We are presented with two extremely different timelines, one where we are serviced by A.I, and one where we have become one. In the figure below, I've constructed two high-level possibilities for the outcomes of an A.I-driven society. Integration (A), from a high-level, is the identification that A.I and Humanity will eventually converge in purpose.



Humans will depend on A.I, and eventually *integrate* to match the person. There's a sublevel to this integration timeline, where dual-integration (A1) would mean that humans would eventually become a more advanced society and our ability to process data would somehow be integrated with installments integral with our evolutionary timeline. The separation aspect within that integration timeline (A2) would mean that while we are fitted for A.I, most of the gadgets that we use (like now) will be (mostly) non-invasive and worn as external appliances. They will be an extension of our knowledge, and may be provided in similar fashions as the gadgets we have today, in the forms of glasses, lenses or phones.

On the other hand, a high-level separation timeline is the identification that A.I and humans are separate entities that may overlap in functionality but develop separately with humans seeking outward assistance. Creating A.I separate from humans and giving them their own external bodies is the costliest idea, but leads to A.I becoming servants for mental and physical jobs. The idea of a robot chef or maid is a charming initiative, but

the question is *how intelligent* do we want these constructs to be? In the integration aspect of the separation timeline (B1), human assistance will be in the form of a *very humanoid* A.I made to emulate humans in most ways. They may not have human rights equal to their creators, but this external creation will become mirrors to our form. A dual separation timeline (B2) means A.I are never created to emulate humans and are instead their own construct, perhaps with their own acceptable, but not in the slightest way human regard. The separation timeline contains the costliest outcomes, seeing that each would have to be their own separate entity, and while this may be useful in some industries, others are less feasible. Different scientists speculate different timelines, and it's not ludicrous to consider timelines that have an aspect of each of the given outcomes meshed together.

The Morality Question(s) and Technological Singularity

There will be a lot of new questions in morality, no matter which timeline (or combination of timelines) we choose. Even in the entertainment industry, there are many films that already started the conversation about ethical issues with A.I. With an integration of data, there's a huge issue with data possession. With all this data swirling around, the kind that can *create an exact map of a person and all their locations and mannerisms,* there's an ownership problem. With the ability to determine huge insights into personal lives, there is a huge privacy risk. More often we are being asked to make compromises and agreements between the amount of data we are allowing to be accessed about us and the services that are being provided. When the data *and* insights are being stored in massive containers owned by companies, who will have control over that information? Terms and conditions of most social media sites mean that companies can

use the data that is stored and posted on their servers how they see fit (Smith, O). Facebook can sublicense rights to a user's content to another company should they choose; Twitter has rights to use and distribute all posts in any method it wishes. Fuzzy ownership laws can bring up to debate what can be done with such comprehensive, interconnected information.

Secondly comes data security. A.I Algorithms will be able to analyze data, but there has been an ongoing trend in the last few years of data-toting companies not reporting security breaches until much later. Take *Equifax* or *Yahoo,* both reputable companies trusted with a large volume of sensitive consumer information. Yahoo did not report their breach until *years* later, when damage could have been done (Bleier), and Equifax used an assortment of suspicious contractual clauses to try and relieve themselves of all responsibility from their breach. Not only does this give hackers and scammers a head start with data theft, but more sensitive information can be hugely detrimental to a person's life if not taken care of properly.

Data discrimination is also a potential threat to consumers. Information is power, and having information on people can mean discriminatory practices in services and performance (Marr). Even now, we use credit scores to determine credit lines, and insurance relies heavily on medical history data to determine what plans consumers are eligible for.

Business magnate and entrepreneur Elon Musk is one of the men "revolutionizing transportation both on earth and in space (Forbes)" and is a heavy futurist enthusiast. Even submerged in technological innovation, he's not enthusiastic of what he calls a

“fleet of artificial intelligence-enhanced robots capable of destroying mankind." Not everyone has a bleak idea. Regelous (previously mentioned Engineer at Massive) opinionated that "[Any A.I] significantly smarter than us is going to value us.” Especially in our nature for data productivity. Regelous’ idea revolves around a fascination for love and a value of life. "I hope I'm right” He continued in Hollywood Reporter’s interview: “Otherwise, we are screwed (Giardina)." The biggest worry with intelligent systems is this idea of ‘technological singularity’. This is the idea that human history is heading towards a convergence between A.I and our wellbeing. It may sound chaotic, but there have been a number of examples presented that transcends science fiction. It’s the proposal that A.I or enhanced biological intelligence will overtake the ordinary human (Shanahan). With an integrated society, then comes social issues such as personhood, identity, and rights. Agents of intelligence may just be independent enough to go rogue to their cause. These all are considerations that must be taken for morality and security. Regelous predicts that by 2045, humans would no longer be running background processes for movies, but also for everyday life (Giardina).

Conclusion

A.I has been referred to the “mother of all tech revolutions (Maney)” and that’s with good reason. Our transition is already in motion. My intention is not to cause mass hysteria, but rather to bring to light the changes that are happening in the world around us. The acclimation to the development of newfound intelligent constructs will not be loud and shocking, but gradual and imminent. The world is being prepared for an analytics based, interconnected society and the implications of it are in every aspect of our industry. The assistance that A.I will bring to human development cannot be

quantified. As solutions emerge for our current roadblocks, more complex questions will arrive. Right now, there are an assortment of incredibly powerful developments coming together. A.I are developing both logically and creatively, alongside other wondrous developments. In separation, they are destroying and reconstructing industries. Together, they are decimating the paradigm for our world institutions (Rotman).

Our society is the home of the orthodox human. With these changes, we will be forced to adapt. Some people will rebel, but there is not much to rebel against when everything is changing. The majority of the developed world is being networked, and in doing so, humanity has created the interchangeable breeding ground for technological innovation. This is the largest convergence of educated people in history (Maney). We've created a global atmosphere that is a hyper-connection of ideas. Whether it's in services, industry or self, the orthodox human has much to look forward to in the coming years.

Commentary

I was always fascinated with Artificial Intelligence and the potential it held. These open-ended topics can keep me going on for hours, and working as an Aviation Logistics Specialist in service of the military opened my eyes to just what potential machine learning held for us.

There's this confounding idea that has been floating about since I was young, and it was this concept that 'if the human brain was simple enough to be understood, then we would not have the capability to understand it.' As you can imagine, this paradox was a notion that was beyond frustrating to me. It made the idea of creating life with intention futile, as if we simply had to be content with the ability of blindly cloning biological features that we did not understand. Naturally, I found A.I to be so interesting because it's building a bridge instead of building an underwater tunnel. We don't have to understand biological processes. We simply must make something completely new, and unlike us at all. It changed my idea of life, and made me wonder, 1,000 years from this moment, would we even consider whatever descended from us to have the same definition of 'life' as we do?

This thesis is a very personal topic for me, as it should be for those who read it, because it is a matter of a path to automation. I should hope to live to see the speculations mentioned in this report to come to life, but even if I don't, I'm happy to be a part of the drafting period. This was an enjoyable experience, and I am beyond interested in the other implications that other people have for the eventual state of humanity.

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