**C.Y.S.F LogBook 2024**

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Let’s jump right into it:

So this year we’re in grade nine, this is where it gets pretty serious in projects and awards. Because of this we have to create a strong project which will entail/take a lot of work to get to where we want to be. Some of the personnel criteria that I want to create for myself this year and also based on what CYSF would need for this project to be a “success”.

* Any project should have a very important reason behind to why i'm even researching this in the first place, not just to me but to the general public
* This should also have some connection to last years project, so it’s going to have to be space based, but also when it comes to me everything is so no surprise there
* Last year I did a research project, originally I had wanted to complete an innovation project because that’s just what I prefer to do, but with the remaining time left before the science fair I just had to scratch that and do a research project in hopes that I could complete an innovation project this year after some experience I would be able to do it in the best way possible
* Since this project is going to be an innovation project, I need some sort of product from my research. Last year I had a giant trifold rich in information but as a product I had a tiny book, this is kinda the thing that the judges are looking for, and I need to remember that when providing such. Mme Lam reminded me that before even coming up with such an idea like my book as a product for my research, I needed to perform the research first, this was something that I completely forgot about and now need to remember.
* For the actual concept of the project I go right to space, so for it to connect to all of these “personal criteria” I was thinking it should be about the human future. It connects to last year's project, is very important to society, is about space, a concept that judges will like, and is the perfect candidate for an innovation project. I feel pretty confident that this is the project that I will go forward with, but as always I just have to inform myself about what actually researching this will entail so that I am aware of my workload, which again with me is always going to be a lot.

This is a complete dump of information but I just always need to get my thoughts on paper before actually completing anything. So in shorter form here is the criteria and some goals that I want to achieve for this year:

Criteria:

* Innovation project
* Connects to last year’s
* Has a very important reason to the public and me for why I’m researching this in the first place
* Good product, a bit more beneficial/official since last year
* SPACE, SPACE, SPACE
* Good cites (check with ms duffy when you have all of your resources lined up)
* Diverse resources for research
* I want to check with multiple teachers to see what they think of my project, Ms. Lam, Ms. Doyle, Ms. Duffy, Ms. Pollock, and Mr. Powaschuk

Goals:

* Make it to the second round of judging
* Get gold again
* Get an award or earn a spot on team calgary

Knowing myself best I will want to have a plan for what and when I want to get things done, I can change this of course as plans change but I want to make sure that I stick to it overall

Plan:

* Create Logbook around (January)
* Come up with the basic idea of your project (January)
* Rough draft for project proposal (January)
* Touch base with Mme lam (January)
* PLAN, PLAN, PLAN (January)
* Complete basic research to see what your categories will be for your paragraphs, and what the final project will look like in general (some examples of this will be documentaries, podcasts, and videos so that they give the the idea overall and if you see any specific patterns then I would complete research in that area)
* RESEARCH, RESEARCH, RESEARCH (January - February)

Question/Problem:

Humans have advanced so much that we have reached a point where the stars don't look as unapproachable as they once were. Missions that would lead to this outcome are already being pursued, but the question that we face is it our future to face the sky? The question of the human future in general is a very relevant question that a lot of people want the answer to. Due to certain beliefs the overall idea is that humans will end up destroying the earth with pollution and greed, that we will be the end of the world. But is that really what is going to happen? - what is the human future

“The Future of Humanity”, a sentence that when spoken can have a very negative effect on a crowd. The overall consensus is that humans are destroying the earth and that the world is going to end at any moment. Is that statement valid? Are we really in such a bad state as a society where we can’t fix the hole that we’ve dug for ourselves? Is the future of humanity really as bad as we think? If so, what can we do to fix it, can we? What are our actions on survival?

What do I want to include in this project:

* The current state of the world (where are we at)
* The human future is unknown but we can predict it using science!
* If we were to stay on the earth what would that entail and how would we do that; would we change anything?
* If we were to have multiple populations in the solar system, on earth, and some on a mobile station, or cosmic body (for this part of the project I want to connect it to my past project where I talk about the artemis missions, and our work to live on other planets)
* For when I complete the research for this outcome, I will use multiple references of mobile human stations then create my own model of it, maybe multiple designs but a physical model of the best one
* If we were to completely move from the earth what would that entail and how would we do that
* Which one will we end up taking?
* Which one will be the most beneficial if we take it and why?

Hypothesis:

At the moment the Earth is not dead, and we are not near any fatal state where we should be worrying about moving humans to another planet. When facing any problem in our path, we have to look positively. There will be a very likely chance that we won’t need to leave our planet due to its end, anytime in the near future. The only circumstances that would occur is if we were to expand our population to other cosmic bodies ; such as the Moon or Mars for now. We’ll have to look forward to migrating to mars or the moon in the future partially, but right now is the best time to focus on us here on earth.

Procedure:

I will be completing research on the three possible outcomes where humanity could end in the future, what they will entail, how we will get there, and what we will do to stay there. These three possible outcomes include we will stay here on earth, split up the population and create a mobile population on a spacecraft or another celestial body, or completely move to another celestial body. As a product of my research I will propose which outcome is the most possible and the most beneficial to our society. I will also provide a prototype of my own model of what a mobile human population would look like, as multiple designs and their blueprints, as well as a prototype of the best model.

Introduction– Doomsday (is it real?)

Body- 3 options

Conclusion- choice (stay on Earth?)

Call to action- checklist, plan - individuals (recycling- 90% thrown out, people don’t know how to), donation drive, new implementation of jobs, who to contact

* Make a product
* Diagram
* Biggest contributors to pollution (problems and solutions)

Project Layout:

Intro:

* What is the problem/controversy?
* Why does it bring up so many mixed emotions in people?
* What does it affect?
* What can we do about it?

General research (jot notes):

HUMAN FUTURE : A Case for Optimism (Melody Sheep)

* Where are we going? - the stars or the dirt?
* Right now humanity is at a point where we could go either way
* rapid acceleration, and rapid changes
* No one knows which one we will end up taking but there are three broad paths that we may face; 1. collapse, 2. plateau, and 3. transcendence
* It is important to theorize the happening of these outcomes and their in-betweens so that we can prepare ourselves for the human future
* We have a big advantage when it comes to our population and its distribution. We mostly cover every corner of the earth, having such strong numbers and each separate group adapting to their niche environments leaving us with more immunity
* “Even if 99.9% of humans were eliminated in some catastrophe 8 million of us would remain”
* Because of technology and out broad diet we can adapt a lot faster
* About every 27 million years the ear faces a cyclical mass extinction which is caused by the sun passing through the asteroid dense part of our galaxy. and we are well overdue for one
* In a billion years the expansion and brightening of the sun will make the earth too hot for photosynthesis as it slowly boils away our oceans (meaning that we would lose the possibilities of life on our planet, therefore we cannot survive this if we don't adapt and transform dramatically)

Part 1. Collapse:

* Humans are familiar with extinctions, we have faced many in the pasta as we have evolved and transcended as a species, but after each one we come back stronger with more knowledge of how to face others different and similar in the future
* The biggest threat to this outcome comes from us, self destruction
* There is a 300% bigger chance of us destroying ourselves (16%) than our extinction caused by natural events (0.5)
* The four main threats to our survival are nuclear war, climate change, biotechnology, and A.I.
* “To comprehend the gravity of these possible risks, we have to theorize their worst possible outcomes”
* If we had a nuclear war the soot afterwards would cool global temperatures by 10% and would wipe out 63% of the population.
* Even though we have globally reduced the chances of there being nuclear warfare we still haven't wiped out all of the threats
* We have to take careful measures when regarding our actions that could affect the temperature of our planet
* Biotechnology gives us the resources to possibly solve topics such as food scarcity and diseases, but also could lead to have the potential to cause catastrophes such as pandemics (higher chances in damage than an entire nuclear war)
* A.I. is the one threat that we may not be able to outsmart, there are two possible outcomes; could be a very useful ally, or could evolve leaving us in its dust
* As we advance as a society there will no-doubt be more threats
* Yes if these risks do take place they will take a toll on humanity, but there are very slim chances that it will completely wipe us out
* The real question is how we will survive multiple of these disasters all-together?
* The fate of use facing the collapse is “how resilient is human civilization”
* In case for this to happen we are planning to have a “seed bank” so that if needed we still have the species of plant so that it does not go extinct

Part 2. Plateau:

* This is just a personnel mark, but now thinking about it I feel like it is very unlikely for us to stay where we are and continue in the future, in life there is always growth or death and it's unlikely that we won’t face many problems and will not have ups and downs along the way
* This would avoid collapse and transformation, although the state of us being at plateau will be temporary at best
* The advances in technology and the earth's climate will lead us into new directions (meaning we won’t stay in the same spot)
* The more we push into the future the greater the disruptions we will face
* We are due to face ice ages and supervolcanic eruptions in the next hundred years even if we cause the earth to heat up due to the use of fossil fuels
* To face these disruptions we have a couple options

1. We let nature run its course and move to other planets/celestial bodies

* Deciding to stay earthbound won’t automatically fix the future, we have to write our own ourselves
* Utopian futures are closer than we may think (moon + mars)

Part 3. Transcendence:

* To have a multi-planetary civilization will be the foundation to a long and prosperous future
* Right now we have achieved so much compared to where we started, although we need to accomplish a lot more to further advance successfully
* We are advancing so quickly and so well with technology in every way
* Worldwide the quality of life is at an all time high (if also compare it abc to there we started from)
* We always face and have a forward motion of advancement
* Although the natural perception of negative things are more known and focused on, which can blur our vision and somewhat slow us down
* The more and more we travel towards the future our path to a sustainable future appears more clear and even unstoppable
* Certain things that we are doing to help reach this outcome is the usage of solar and wind energy, the cost of both are rapidly falling, even more than we predicted
* The pursuit of A.I. and biotech advancements are pointing toward a radical enhancement
* Resources like AlphaFold and CRISPR set our potential at a higher state as similar trends emerge
* We are the healthiest, wealthiest, freest, most educated, most advanced population of humans to ever exist
* If these trends hold then abilities such as limb regeneration, immunity and elimination to all diseases, and life expansion indefinitely (this could lead us to the most radical transformation in all of our history)
* “Nasa has begun to use A.I. to design mission hardware, which outperform human designs by a factor of 3”
* As well as certain designs for biotech management such as crop sustainability
* We are currently and are on the verge of an explosion of intelligence that will evolve us astronomically into the universe and our development
* The pursuit of A.I. could lead to a super artificial intelligence far from anything humans are capable of, we could use this as a tool to help us face some future challenges and endeavors we may face
* A.I. is a critical step we make take and use if we want to advance in the transcendence rout of our future
* Expanding our usage of energy we will adapt and eventually get used to controlling more and more energy, potentially being able to control more than the earth receives leaving us to be a Type 1. civilization (this could come as soon as the year 2371 or 2370, if we continue with a 3% yearly growth, for that point it would only take us to become a Type 2. civilization meaning that we would be able to control all of the energy from the sun)
* Through the rapid increase of population, different environments, and resources there's a chance that the human population will split into multiple species
* We could also expand the existence of life on earth by slowly moving the earth away from the sun as it expands by moving the moon (the gravitational pull between the two would eventually start to pull the earth as well)
* “Our resilience will protect us; our intelligence will propel us”
* Opener: I like it, I think a quote from classical literature would be solid. I think I can find you one if you want one. My thoughts were the Divine comedy or 'A true story', two classics that brush on medieval or ancient perspectives or space and human future
* I see the three trajectories and love that. I think we could definitely tie in the three trajectories and your prediction (plateau) to the goldilocks effect

*Collapse*

* I can definitely give you historical backing on the collapse. We can have a meeting about this if you want where I present a few events and their documentation (536, Pompeii, Extinction of Homo Erectus, Sea peoples) let me know what you think!
* My guy goes hard on nuclear war, AI, Bio weapons, which is such a large geopolitical and historical web that we can't prove or defend IMO. I say for collapse we stick to what we know humans do and can prove. Climate change, tribalism, ethnocentrism, developing military industrial complex that we can prove
* I see a theme of nuclear in all three. Nuclear energy being harvested or 'abused'. Maybe we can tap into this?
* I like the argument of needing very few to survive during collapse to proceed with existence. I think that wheel of   
  1. Distribution  
  2. Adaptability  
  3. Population  
  4. Diet  
  is a good lynchpin for the collapse section
* Stressing collapse isn't the end is a good way to go; use anthropological evidence to support. My guy uses 'the black death' . I think we can find waaaaaay better examples if you want to pursue this angle (we have 6 major extinction events, after all).
* Bottleneck effect is certainly something you can use if you want
* Compound disasters is an interesting topic. Perhaps compare this to 'single event failures' in the aerospace field (happy to fill you in on this if you are not aware of single event failures)
* Uses a significant amount of speculation so some of my guy's arguments might be tough to prove
* My guy goes off about evolving into a higher species (suggesting we'll be able to perceive higher dimensions?) I wouldn't touch on that IMO
* Talks about long term survival and using the moon as storage of protection of global disaster. Corroborates your moon usage hypothesis
* More planets colonized would increase the chance of survival; could we quantify that probability wise. Would be cool if we could!

*Plateau*

* Plateau is seemingly the most comprehensive one, scientific evidence wise
* Talks of the inevitability of eruption and a changing earth landscape. Worth mentioning in a 'slow leviathan' kind of way, worth mentioning
* The sun passes through asteroid dense regions causing inevitable extinction events? That's cool (information wise). I think that's a good topic to consider mentioning
* My guy uses the interstellar cylindrical space station, hope he doesn't get sued by Christopher Nola (thoughts and prayers)
* In all seriousness I wonder if you want to mention manmade vessels for extraterrestrial living (I'll follow your lead there)
* That's all he seems to mention for plateau, the bad news is there is little information, good news is a lot of uncharted territory we can research for you to use and offer some fresh conclusions

*Transcendence*

* Talks of GDP (perhaps avoid, quagmire of debate I think)
* On average longer lifespans (can provide historical background again if you would like!)
* Diverse energies like wind and nuclear, I like those topics
* Talks of diseases and gene mutations, hints at adaptation. a little bit of a messy topic, but not untouchable
* Ok, my guy just mentioned that we could regenerate limbs in the future, I would avoid that one
* AI to design hardware, you said that they like talking about AI, could be its honorable mention since I know you don't want to focus on it
* AI superintelligence. Make me think we could get my brother's two cents on AI since he is well versed in it as a software engineer, use him as research (of course, totally up to you).
* Makes me think of Thomas More's *Utopia* could find you a quote or excerpt of that if you want some literature references
* Talks about a study saying we can reach type one civ by 2300 and type two in a couple thousand. Could we find that research?
* Talks about quadrillions of humans in this scenario. Seems like a tricky thing to prove, I would just stick to **Malthusianism** which is a much more certain science <https://en.wikipedia.org/wiki/Malthusianism#:~:text=Malthusianism%20is%20the%20theory%20that,of%20triggering%20a%20population%20decline.>

|  | [Malthusianism - Wikipedia](https://en.wikipedia.org/wiki/Malthusianism#:~:text=Malthusianism%20is%20the%20theory%20that,of%20triggering%20a%20population%20decline.)  [en.wikipedia.org](http://en.wikipedia.org/) |
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* Talks about a bunch of different species of humans, pretty cool! Could maybe connect back to early anthropology 'cave of bones style' but again, totally up to you if we want to mention that
* Types of civilizations (1,2, and 3). Could be a good reference for the project
* Conclusion of the current humanitarian goal is to focus on the world we're on. I like that conclusion and it matches with your thoughts, I think
* Moon counterweight, I think that including the Moon's role in any future outcome seems useful
* Again, closing with quotes and classical literature, I like that style (little prince quote, Interstellar?)

**The Future of us - Jay Ingram:**

*Introduction:*

* Mentions how we are already on our way to be extremely technologically advanced in the upcoming decade; nuclear fission
* Because nuclear fission does not create any carbon dioxide emissions, it would be the start to other idea tech, although it will take a couple decades to integrate the method globally
* Started working on gestation (the time the baby spends in the uterus) outside of the womb, and using stem cells (Stem cells are different from other cells in the body in three ways: They can divide and renew themselves over a long time. They are unspecialized, so they cannot do specific functions in the body. They have the potential to become specialized cells, such as muscle cells, blood cells, and brain cells)
* We started this process with mouse stem cells
* Scientists took the mouse stem cells and placed them in spinning glass vials inside an incubator to then develop an embryo. This strategy helped simulate the uterine environment with the heat/blood circulation and nutrients)
* Another great part of it is that you can see the whole process before your eyes, and that observational point of view isn’t something that would normally happen in this process, so because of this the scientists were able to observe something that they wouldn’t normally see
* They ended up being viable embryos with the basic functions for one at their stage
* This was a dramatic and big scientific breakthrough, like others that we are going to see in this book, will change the field
* Although as many science experiments there are many opinions and controversies, if we were to bring this idea to humans, there may be severe societal uproar due to possible infliction of rights
* AGAIN GUESS WHO JOINED THE PARTY?... CRISPR!
* In november 2019 a chinese scientist edited the genomes of twins while they were in the womb - this isn’t legal yet he was fined and jailed
* I have a feeling that a lot of the tech we posses isn’t and won’t be legal for a good time, but will probably become legal in the near future
* Plant and lab grown meat seems to also be rising up in popularity (chap 7)
* As humans and a more intelligent species it’s in our DNA to constantly think of the future, a topic that has come up a bit lately is what jobs will we occupy?
* Yes robots and AI have and will continue to take over jobs and that will take some getting used to, although we will have to adapt and continue because there will always be something for us to do
* As many of us know we are stepping into a new technological era where it fixes everything, although we will most likely see it more than just there.
* “Only if what I tell you appears absolutely unbelievable, have we any chance of visualizing the future as it will really happen” -Arthur C. Clarke

**PART 1: ALL ABOUT US**

*Chapter 1 - Our Future Selves*

* When we think about our future it usually revolves around the idea of what we are doing, not exactly what we look like
* Yes I’m sure you have heard about cyborgs at some point of your like, but that’s not the whole story of what will happen, the human body itself will probably change as well; not just by technology
* Based on what we’ve seen the size of the brain and head will be the BIGGEST change
* I’m sure that all of us are familiar with the diagram of the monkey walking and as he walks there are multiple stages of him that slowly change into the modern day man. In other words it is known as “The March of Progress” and this is not realistic.
* The two main factors that stand out are how the four legged “monkey” slowly starts to walk on four legs, and how the size of the head increases as this happens
* “Human evolution can no longer be conceived as anything like a straight line; instead, it is a weaving together of multiple species, some of whom lived at the same time in the same place” (we know this based on the Neanderthal DNA in our genomes)
* Say if we were to extrapolate the march into the future it seems that the head size would continue to grow at the same rate, meaning as our brain grows our head and forehead will
* After a few million years our brain size has tripled!
* Although after further research this may not be the truest statement in the end, also because of the strict environment in the womb, it would take a toll on the reproduction process and its success
* We seem to be taller as well, but this is more because of environmental impacts than genetic
* Possibly due to climate change, although even if this claim is true, we wouldn’t see it’s effects until thousands of years later
* Yes we are still evolving, just maybe not at the rate as past years (caveman era)
* “Where we are in control of our life circumstances more than the environment does is now over”
* What is evolution? In simple terms its a bunch of genetic mutations that work together and reproduce if it ends up working in the species favor
* Most of the time environmental changes are the ones that provoque genetic mutations
* Although culture also has some of an impact, is a stance that others argue
* This exhibits that certain practices highlight different abilities therefore giving it the spotlight for the process evolution, this spreads faster than biology
* Overall change is going to happen; as it does with everything, although it isn’t very visible until many many years have passed
* Certain research performed yet controversial we have found that over 700 traits that are controlled by multiple genes we caused by environmental changes over the last 20,000-30, 000 years
* If there is a gene that increase popularity simply means that the gene signifies some sort of importance, although may be unclear at certain times due to the fact that it is hard to track a trait that is controlled by multiple genes
* For example certain cases with ADHD and schizophrenia have become more common, and has not been proven that it is caused by genes although if it is then the reason and importance still remains unclear, this shouldn’t spread through the genome, although they still are
* Like Ingram states there could be some sort of underlying benefit or the two although if this is true the advantage is very unclear
* So to answer the question, “Are Humans Still Evolving?” yes we are but the reasons don't seem to connect to survival as they did in the past and caused the past evolvements
* Because we are now in control of ourselves and the environment and the environment isn’t in control of us certain genes seem to have a more negative effect
* “Our DNA is still mutating, but because we exert so much control over our environment, many mutations that might have had a negative, even fatal, effect in earlier times now seem inconsequential because of medical and social advantages” - Micheal Lynch
* He is specifically concerned with the brain because it is at the largest risk; this is my own observation but that would connect the the popularity with ADHD and schizophrenia

*Chapter 3 - Cyborgs*

* The concept seems to be edging closer and closer to humanity and the present
* If we were to support such technologies and abilities we would need certain advancements first
* For example, the exoskeleton of certain insects, we would create our own and they would be quite helpful with supporting back strength and could be integrated into certain jobs such as construction and the military
* There would be a different design for each different occupation
* Follow the idea of an industrial exoskeleton, so in other words would be something metal
* It will be something that would prevent certain medial risks when performing certain heavy labor jobs, currently being rolled out due to there having to perform multiple tests to make sure it can perform what it’s meant to
* Hugh Her believes that these exoskeletons are just the start to how cybernetics will be found in humanity such as the medical, mobility, and the neural fields
* Yes I’m sure that this will happen in some sort of measurement, although it will take a while before we get there
* If we take advantage of the capability this would alter our natural abilities and beyond
* Some people are looking in humans living in space with some of these capabilities and surviving the extraterrestrial and exotic environment
* Exactly, if we want to go through will this cybertechnics idea we can’t think of cybertechnics and our natural biology as two different things, we have to think of them together and how their elements work and interact with each other
* Yes when you think about cyborgs you result to what the movies show you, although in the real world we result to repair/reconstruct and enhance; like prosthetics
* I’m sure that out of the two, enhancement is a lot more exciting because it has a lot more outcomes for imagination
* Not very many people know, but there are cyborgs in the world already today, yes not many but still some
* For example the artist Niel Harbisson has an antenna surgically implanted into his skull to “fix” his color blindness
* It will detect the different wavelengths of colours, and luckily for him he can see the ultraviolet and infrared colours that you and me wouldn’t normally be able to see, and these wavelengths vibrate through his skull
* He described it as another eye, or another sense of his
* Kevin Warwick is another interesting example of this, he slowly developed his arm to be more and more robotic over time
* He started with a RFID (radio frequency identification) chip in his forearm then continued from there
* Electrodes were connected with the internet and then when Warwick wanted to open and close it, it would follow the command with little delay
* Although the accomplishments and promises seem to tell different stories
* He sees this to be the start of connecting someone's nervous system to another, which if that does end up happening if put in the wrong hands would be very dangerous
* The main priority for such technology is people who are disabled especially in communication, as in getting what they have to say across with typing it out
* All brain activity is electrochemical, but the patterns that we can observe don’t actually reflect what the person is thinking about
* Using MRI (magnetic resonance imaging) we can detect what movie scenes the brain may be watching/processing
* This technology isn’t great at detecting teh timing of the neural activity, it is very good at locating it
* Depending on what words are said will detect different locations in the brain
* We were able to transplant electrodes in the brain of a completely paralyzed man so that he would be able to communicate with moving his eyelids, although overtime his ability to do so eventually diminished, which could be due to the technology or if he wanted to respond or not
* Due to this incident out of others it is unclear if this technology will be reliable to complete such aid as this
* Neural Dust: dust particles which contain crystals that respond to ultrasound, and can be powered by ultrasound, and because of this there is an elimination of onboard batteries, which is SUPER helpful
* It’s really amazing how such a small thing (about the size of the tiniest grain of rice) can transmit information to its surrounding back to an external receiver by the same ultrasonic waves \*need to re-word\*
* It contains the crystal, a transistor (lil device that regulates flow of electronic signals, usually has three conductors, and acts like a switch)
* Thenthey will communicate with the interrogator which is located on the surface of the brain
* Something that would concern the public is that the possibility that it could negatively impact the body when implanted but generally they stay quite stable and are undamaged
* Neural Lace: a microscopic fishnet/mesh which has an electrode at each node that is injected by a syringe and lays on top of the brain. Over time it will bond with the tissues without any problems or chances of rejection
* This is a hot topic due to its promise in the scientific world and what that could do for us, it would be very useful to have many electrodes and that would really change the brain-computer-interface game
* Although Elon Musk says that we should learn how to interact with it to [protect ourselves from it as AI becomes more and more intelligent
* He thinks that there should be a specific layer just so that we can interact with AI
* He recently started his new company Neuralink, which is not the same to neural dust or lace at all
* Instead it is a coin sized implant weight that has 1,024 of wires that connect and disperse electrodes through the brain.
* Musk states that he thinks we could restore full body mobility, almost training during physiotherapy then afterwards remove the chip and then their body has that muscle memory and will remember how it can do the things that it did without it
* We have already seen this before with certain people and Parkinson's disease , where they have had electrodes implanted in targeted spots in the brain and were able to have better mobility, this technique is also being developed with other medical cases like OCD and depression, etc.
* Of course everything has to come with a risk, and sometimes when the patient has the implant taken out they won’t feel like themselves, or that they have lost control on themselves because they were very reliant on this technology to control them for them
* If this continues this could reach a point where people could sell people's intellect and memories off of the black market
* Right now we are developing the start of the technology that we cause us to soar and reach our full potential for what we will become in the future

*Chapter 4 - It’s in Our DNA*

* “DNA is a workbench too”
* It is set out to create revolutionary advancements in endless branches in science
* CRISPR is really going to be an important topic in this chapter, I can already tell
* How can AI manipulate DNA?
* We are all familiar with the helix of the DNA structure, this was and still is a huge breakthrough in the scientific community
* DNA is a stable center of all biological sciences, especially for in the future
* This is a great representation of the process and DNA itself but it is needed to have a 3D representation due to the constant change of new products and proteins like amino acids.
* Depending on the role of the cell the shape and how they are formed are conducted very specifically to play that role
* Depending on the architecture if it is a larger complex the chemical changes can catalyze different reactions
* A genome is the complete set of a species DNA, every single gene that we have identified
* The discovery of this has been extremely helpful when studying health, especially linking it to diseases
* There was a “Human Genome Project” that started in 1990, which was the start of us researching the almost complete set of human genes
* The advancement that we obtained from this was that we now have the ability to sequence the five odd-shaped acrocentric chromosomes, we did this by joining their arms at the tips
* By doing so combining the shot arms of those chromosomes creates the equivalent to creating an entire new one
* Pangenome is the entire set of genomes that exists insides of a species
* Companies have already achieved such capabilities, where we can find out the origin of the DNA you have in your body and who your ancestors are as well
* A majority of the DNA isn’t found inside the human genome, instead it would be found in the microbiome inside of us
* About 20,00 0 genes represent the human genome, the rest is the genes of the microbiome
* The microbiome is the biome or environment which the microorganisms live inside of us
* Microorganisms such as bacteria, fungi, and viruses
* We count this as the human genome because their existence is integral for our health
* There are thousands of these species on and in our body right now
* In John Cryans TED talk he stated this “When you go to the bathroom, you shed some of these microbes, just think: you are becoming more human” - I find amusing
* By saying this he implies that the majority of the microorganisms that we have are found in the gut due to the aid in digestion and destruction of what we are consuming
* This all weighs about 2.2 pounds
* There is evidence that the bacteria from the gut/intestine can influence the brain
* We see this both with animals and humans, although these experiments are not completely confirmed
* Using mice again in an experiment as such when placing a mouse in a sterile environment where there is no bacterial contamination, there is evidence to conclude that there is abnormalities in most parts of the brain, for example the neurotransmitters, receptors , and connections between neurons
* Also placing a pregnant mouse in similar environments, when the mother gave birth the babies were unable to respond normally to crucial things like, touch, sound, temperature
* This shows that if we substitute a pregnants mothers microbiome this will affect the offspring just as much or even more than herself
* We are not completely sure what is making this connection between the gut-brain axis, but it is most likely to be caused by the small molecules making their way to the brain, or a nervous tissue connection of tissue
* Also gut issues that accompany these conditions, doesn’t mean that they are the cause of them
* Different diets can also change the course of people's mood and health
* Certain studies conducted have proven that people who are depressed lack a couple bacterial species that others who don’t have depression do
* Certain antibiotics directed to certain harmful groups of bacteria can also have an impact on the microbiome in the gut which can impact the brian
* When a mother had drank fermented milk that also contained probiotics, she had significant changes in the brain
* It's hard to tell which ones, although pro and prebiotics seem to be some sort of cause
* Human breast milk is different than other mammals for many reasons, it contains around 200 different sugars when other mammals have around 50
* The baby cannot digest all of these sugars, but their there so that the microbiome inside the babies body is maintained to maintain the baby’s immunity and immune system
* We have developed new technology where we can choose what genes we want to put together, then assemble them
* Almost like writing a genetic message
* Although you need extreme precision when completing such task, to make sure that the gene you are taking and placing it somewhere and for it to work the way that you want it too
* In other words this technology is called CRISPR; Clustered Regularly Interspaced Short Palindromic Repeats
* “It refers to short stretches of DNA repeated over and over in a bacterium's genome
* In between these sequences there are viruses that have already attacked those bacteria, and the bacteria store these sequences already so that then they can recognize the same viruses and then defend against them
* The bacteria can counterattack using these sequences to guide the DNA-cutting enzyme so that the genes of the virus are inactivated
* As long as CRISPR is in a non cancerous environment it can cut any sequence of DNA, with such persians that has never been seen before
* CRISPR Cas9 is a 160 kilodalton protein that is used to defend against certain bacteria and DNA viruses
* Although because this technology is still new it has not been perfected and is cautioned for its usage, it opens as many ethical questions as it does opportunities
* In past cases the technology has been used illegally and that creates pushback on public acceptance of its usage, so now we are constantly making sure that it is safe when it is released and legal
* The proteins are what it’s all about; they’re the representation of the tools that the genome places so that life is sustained and have a specific complexity that DNA doesn’t. In other words they fold into complex 3-D shapes, in such tiny detail which depending on its placement will depend on if the protein works or not
* Its sequence of components such as amino acids will determine the final molecular shape
* Even a small change in the amino acid structure of a long chain can change if the protein works or not, not because of the sequence but because of the shape
* There are about 2 to the power of 100 folding possibilities for a medium size protein containing 100 amino acids, which is insane
* Right now there are many doing so in your body
* AlphaFold is a technology used to determine and predict the final shape of proteins in humans and in nature in general extremely quickly
* Meta AI has done something similar, where they had extracted DNA from the bottom of the ocean and taken a string of amino acids then it could predict what the final 3D shape would look like, this was 60x faster than AlphaFold
* Overall in this chapter that has a lot of jam packed information, it is quite interesting how we now possess the technology to merge biology and technology to modify and write out the DNA and protein sequences that we want. Right now it may not be completely legal to participate in such practices although, I have a feeling that this is just the beginning of this collaboration taking off into success. This is going to take the world by storm, yes quite a controversial set of tools that hold a lot of power, but as long as this is maintained in the right and safe hands we should be okay

*Chapter 5 - The Good Long Life*

* The are a lot of factors that come into play when it comes to old age, as many do when discussing any biological field
* There has been visible increase in the life expectancy for humans as we improve more and more, some of the inferred reasons behind this are medical care, nutrition, cleaner environment
* There hasn’t seemed to be a limit for the time a human has in their life, and because of this increase we are led to question if there ever will be
* Some people are against the extension of life because a lot fo the time we would spend those extra years “spent” and just be existing with less purpose
* Some options to this involve us changing the shape of the curve to be more horizontal that downwards which means eliminating illnesses, or the attempt to extend the human life ranging around 100 years
* Both of these approaches most likely won't be independent and will have to work together in order to reach where we want to be successfully
* Depending on what year you were born will determine the time for your life expectancy, say if you were to live in a high income country there is an additional year that is added every four years that pass, this comes down to an additional six hours every day
* Medical advancements like water chlorination, pasteurization of milk, and vaccines have increased the life expectancy of those who lived during their existence
* Cases such as the COVID-19 and HIV have slowed down the curve with a little bump in the road, but there is no question that it continues to grow and increase
* Many people have overcome their 100th birthday especially today, but there are a few who have overpassed that extraordinarily the longest living person is a women who lived to the age of 122 Jeane Calment
* I don’t think that I will cover that much on this topic specifically because in the book they give examples of who lived the longest without the explanation of why, and because of this there is no concrete information that I would like to include, and there just isn’t a point really
* There is a different life expectancy between men and women; women live longer than men, and this is due to a multitude of reasons
* The ratio is 3:1
* At the age of 65 there are about 100 women to 70 men, at the age of 80 there are about 100 women to 35 men
* This is because boys die more common than girls, at puberty because their testosterone levels increase leading them to making more rogue decisions without much thought
* Women live about 5 percent longer than men
* Women have more estrogen than testosterone, which will protect against heart disease
* Testosterone will lead to certain cancerous risks and risks in making the right decision
* The age gap the life expectancy is narrowing, and this is just a small part of the whole picture
* Chronological age is different when being compared to the biological age, meaning that your capabilities will be more reliably when detecting your age rather than the amount of years that you have lived
* Certain species tend to outlive the chances of death, a great example of this is the hydra
* They are simply bags of stem cells, they seemingly appear to be immortal
* When it is cut in half they regenerate what was amputated on both separate appendages
* The secret hear are the stem cells because this type of cell can be programmed to be any type of cell, like the lining of the gut, a tentacle, or an ovary
* We do not have the same compositions as these hydras although we can use the same strategy when regenerating organs with stem cells
* C. elegans is a roundworm that also seems to have some tricks up its sleeve when it comes to slowing the aging process,
* We isolated one of its 20,000 genes, called daf2, and worms with this mutant version of the genes they lived twice as long; two and a half weeks which is the equivalent of a 200 year old human
* Yes obviously a worm is nothing close to a human but scientists are looking at the fact that genes are crucial to aging, but in reality no gene is
* The diversity of animals match with the diversity of their life expectancy tactics
* The elimination of cancer will only extend the life expectancy by about five years, this is because the cases of other diseases will rise
* If we were to slow down the aging process it would only be by about 15 to 25 years, as the diseases of old age would be delayed along with this process
* We can also extend lives by the usage of drugs, a great candidate for this is rapamycin, it will increase life spans while reducing the chances of cancer, obesity, cognitive decline, and heart disease
* On mice it seems to show these effects even when given to the mice near the end of its life
* This drug has already been approved by the Food and Drug Administration in the US to prevent the usage of transplants because it will suppress the immune system
* Although there isn’t solid evidence that this is why patients are using such medicine or that it actually works
* Trials haven't started yet possibly because life extension may seem to be impractical and/or unnecessary
* Right now we are performing research to determine if certain substances in the blood could end up turning back the clock in the aging process when old mice receive blood transfusions from young mice
* There seems to be a big push for us to extend our lives, but why? Before I read on in the book I made a little guess of mine to why. I think that this could be because we are an intelligent species and we know that and what we are capable of. We have always possessed some sort of curiosity and eagerness to learn the unknown in competing and learning more the answer is to exist longer, and that leads to us extending our life expectancy
* People who practice anti-aging techniques like Aubrey de Grey who was the chief officer at SENS (Strategies for Engineered Negligible Senescence) believes that we are a decade or so away from see the results of the techniques that he has been promoting
* One of which are called “escape velocity”, if humans were able to gain an increase of 30% their life expectancy, will add another 25 ish years to the age of 80 then when people reach that age medicine would be developed to then give another 25 years on top of that
* Another claim that he has made is, “The first 1,000-year-old is probably only 5 to 10 years younger than the first 150-year-old”, others say the first 150-year-old is living today
* Ray Kurzweil is well known in the anti-aging community, and he thinks that we can fix the aging problem by merging with technology, this will probably happen in the future but he is too eager to wait for that to happen
* He takes around 92-100 pills a day so that his biological age is less than his chronological age
* The law of acceleration is the law that as technology progresses so does the rate of progress
* He thinks that escape velocity should happen in the next 10-15 years, but for this to happen we will need the help form nanobots
* These tiny bots are ones that travel through veins and arteries where they search for problems like tumors, this will enter the world around the 2030’s
* The next thing on Kurzweil's mind is when robotics, nanotechnology, genetics, and AI all come together and will eventually be “the norm”
* There are many things that are coming together in the end that will effect what aging will look like in the future, because one thing is certain, it won’t look the same as it does now.

**Part 2 - What Will We Eat?**

*Chapter 7 - The Issue Is Meat*

* When we consider the meat market we are considering all meat such as beef, chicken, and pork etc.
* GDP = Gross domestic product
* There is about US$36,000 animal for the cost of meat consumption to rise
* Some people predict that we will eat 50-70% more meat than now but other evidence shows otherwise and taht we will end up consuming more
* Farm animals make up 60% of the biomass of mammals on earth, we make up 36%
* All of wildlife is just 4% total
* Along with the rise of theses animals, comes with the effect that they bring to the environment; methane emissions
* Cattle emit around 220 pounds of methane/greenhouse gases, while poultry emit around 22 pounds (1 tenth)
* Cattle provide around 18% of the worlds food supply, while taking up 77% of agricultural land

Ideas for my product:

* Seed bank in norway: In case for this to happen we are planning to have a “seed bank” so that if needed we still have the species of plant so that it does not go extinct
* Bishop Ring:
* a circular megastructure that could be used to house over a billion people
* 3 million square kilometers of land (as much as india/argentina)
* Built with lightweight carbon nanotubes
* Its rotation would generate enough gravity to hold its own atmosphere
* AlphaFold Project:
* A.I. finding structures in pathogens and treatments for cancer far faster than humans could
* CRISPR:
* 10,000 diseases which are caused by mutated single celled organisms and editing tools such as this one hold the potential to cure them; possibly all of them

Resources:

<https://youtu.be/o48X3_XQ9to?si=LCAiFfSBr4jho7Q6>

Okay so During the teachers convention Mr. Powaschuk got this book. “The Future of us” by Irving Layton. I think that this will be one of the best and most important resources for my project. I briefly looked over the contents on the back of it and the inside of the cover, and it has a lot of information that I’ve seen in the melody sheep video. My plan is to read the most significant chapters, then annotate the crap out of them, take notes (online here on each chapter/part of the most important info). I’ll base most of my project off of this book as I mentioned although it’s not going to have all the information that I’m looking for so I’ll have to fill in the holes with other info after I finish the book.

Because of work loads, events, and just time working out in general I’ve had a lot less time and energy to get this done, so I am behind and have had less work done than compared to last year. Also it’s really annoying because the deadlines are a lot earlier this year due to the leap year or something. So to estimate the time that I have to get it done I need to really get on with it. I think to help with this I’m going to ask my parents to be “on me” with it so that there is less procrastination. Also with the chapters left on the book that I still have to read (9-16), annotate, and take notes on that takes a while and I ay have to put certain work aside and prioritize it because I want to have it done before Friday (March 15) and when I go to florida. So I will have to plan and spread out my work equally before then. Then I want to make sure that I have one meeting with Mme Lam/Mr. Powaschuk so that we can go over all of my drafts for the online submission to edit, and to see if anything needs to be reworded and such, as well as go over the categories for the project.

Over spring break I will be in Florida so my plan is to make sure that I have all of the paragraphs done, because that’s the biggest portion of it all. Also I will workshop the product of my research during that time, so that then after the break all I have to do is, edit the paragraphs (with teachers), complete product, find images, correct citation, get a trifold (paint it), find good resource images, print out everything (staples), set up tri fold, plan out presentation, and then so to the science fair YAYYYYY!!!!

Okay so lil update… It's March 12 and I haven’t gotten to much reading or work other than the online submissions, and because of this I will have to do more work than expected before and during the time that I will be spending in Florida. I am a little stressed out because I wanted to have the whole book done and annotated by the 15th but it looks like that won’t happen and that I will have a bigger workload this weekend. I got this and I can do this, I just have to say focused and make sure that I am stricter with workloads and getting it done in a timely manner and in general.

**Drafts for the Online Submission:**

Okay so online submission time is a go, and now it’s crunch time, I need to get this done ASAP because the deadline is Friday and it is Monday. I would’ve had this done earlier although due to time, work, and energy levels I had to prioritize and set this back. I need to get the basic project info and the Ethics form filled out at least, otherwise my project isn’t eligible for the science fair. I got this and don’t need to stress out! On Wednesday after school I will have a meeting with both of my teachers to look over these drafts and finalize the paragraph topics.

* \*Brief description of the Project:

This project explores the three main outcomes of future human existence and its ramifications based on three possible outcomes: Collapse, Plateau, Transcendence. Through each scenario, I will be examining elements of our current evolutionary trend, habitat, our means of transportation, and how technology will shape us as a human race. We cannot attain perfection in the end, however, as our place in the stars is inescapable. The question: which path in this crossroad will we take?

This project explores the three main outcomes of future human existence and its ramifications based on three possible outcomes: Collapse, Plateau, Transcendence. The question: which path in this crossroad will we take?

* \*Purpose of this Project:

The purpose of this project is informing the public in a consumable way on the most plausible outcome and how to achieve it. Due to controversies surrounding our agency in having an impact on our environment, I aim to start a clear and explicit dialogue regarding our capabilites, limits, decisions, and actions to lead to the desired outcome. Preparation for such events is key, and to do so we must explore all possible consequences.

* \*Description of experiment or research study:

This project discusses human evolution and implementation of biotechnology and artificial intelligence (AI) on the human body, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), and technological advances. This exploration will not only answer future questions, but will create new prospects. ‘’Is our existence, and by consequence, extinction destined to earth? Or have our effects on climate change compelled us to explore ascendence?’’. I am addressing these commonplace questions in modern society with reference to a plausible reality where populations will inhabit different celestial bodies or orbital stations. We have reached a new era where our fate is in the hands of us, not the environment.

* \*Problem:

Compounding and competing perspectives as well as societal and individual in the media can cause confusion to the public. This can be addressed through concise processes that can be easily communicated and understood. Investing in these topics such as cybertechnics and genetic editing, AI merging with the human mind, and the technological advancements we will reach will mold the most likely future for the homosapien species.

* \*Method:

I will be completing research in genetic engineering, the merge of technology and biology, and environmental changes in determining humanity's future. By informing ourselves of these topics, we will have the adaptability to face and overcome our future endeavors. All of these aforementioned subjects will help determine whether we stay here on the earth, have separate populations on a celestial body, orbital satellite, or completely move to a neighbour within the solar system.

* \*Research: - I’ll just add up to what I have done with the book and stuff, although I am not sure if it will accept all of that.
* Data:
* \*Conclusion:
* \*Citations:
* \*Acknowledgement:

I would like to acknowledge my incredible teachers Mr. Powaschuk and Mme. Lam for all of the support and resources they have provided me during the completion of this project. I would also like to acknowledge my family and friends who have not hesitated to help and support me through the journey process has pursued. Thank you to the Calgary Youth Science Fair and The University of Calgary for providing such an amazing opportunity for aspiring scientists to share their passions and interests with the world, leading them to more and more open doors in life. Thank you so much to all of the judges and people who put their time and work into this fair!

* Presentation:
* Attachments: