

Prepared for



WEMEDICS

Strategic Foresight and Innovation

OCAD University

The Future(s) of Psychological Well-being In Space

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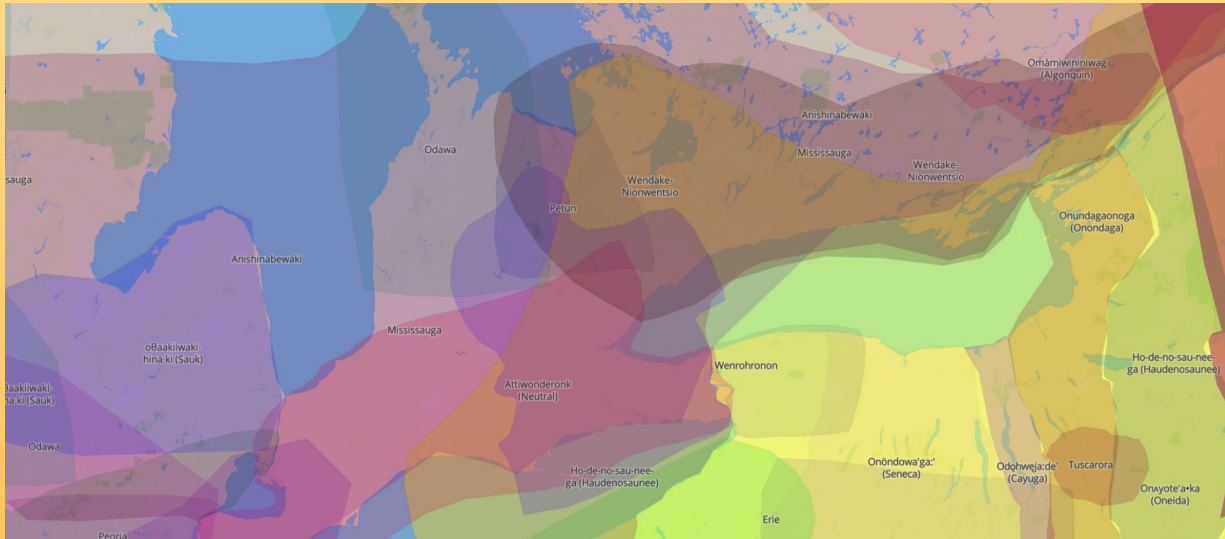
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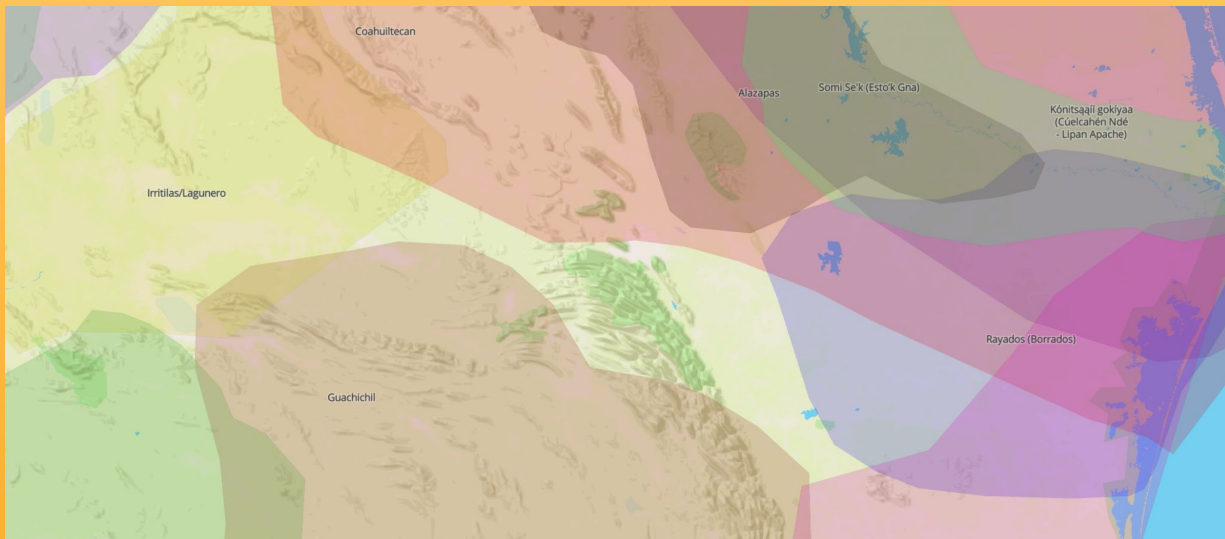
April 2021



Land Acknowledgment



NativeLand. (n.d.). [Contour Map] [Native lands of Toronto, ON, Canada]. NativeLand. <https://native-land.ca/>



NativeLand. (n.d.). [Contour Map] [Native lands of Monterrey, NLE, Mexico]. NativeLand. <https://native-land.ca/>

This Land Acknowledgment is an act of reconciliation, honouring the land and Indigenous presence which dates back over 10,000 years (*Land Acknowledgement*, 2018). Giving thanks, respect and honoring the land and ancestors was and continues to be a common practice within Indigenous communities. As we look into the futures of wellbeing, we must recognize, acknowledge, respect, and include the futures of all peoples. We would like to acknowledge the lands on which this work was created. Our team resides in North America, from Monterrey, Nuevo León, Mexico to Central Canada. We are brought together through OCAD U, located in Toronto, on the lands of the Mississaugas of the Anishinaabe, the Haudenosaunee Confederacy, and the Wendat. We also recognize the enduring presence of all First Nations, Métis, and the Inuit peoples.

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Intel. (January 21, 2021) [Photograph-Illustration] [Face recognition on female].

<https://www.lifewire.com/how-realsense-id-wont-trade-security-for-convenience-5095729>

About This Dossier

This dossier presents futures of psychological well-being and strategies to navigate these new worlds for the fictional organization, **Wemedics**. Created as part of OCAD University's Master of Design in Strategic Foresight and Innovation, we combined foresight and strategy to develop relevant pathways with which the organization can move forward. Our team looked at the wellness industry with a specific focus on emerging trends and drivers to explore potential opportunities in outer space. This report includes relevant insights from our foresight scanning process, an exploration into different future scenarios, strategic options, and, finally, guidance on the best next steps for the future of Wemedics. The understanding of potential futures will assist Wemedics in managing the intersection of space and mental health as a leader in the industry.

Our Team



Carrie Emblem

Carrie is an aspiring Design Strategist. She completed her BFA at Queens University and is interested in how visual language can be used to strengthen our communication with one another. She is a determined and curious person who enjoys learning different methods and tactics to create a better tomorrow.



Danielle Lim

Danielle is an experienced marketer with and has led a spectrum of strategies, from traditional to digital marketing. She has worked in non-profit, arts and culture, tech education, and food/CPG. She is also a photographer and illustrator who loves data analytics. She graduated from UBC with a Bachelor of Commerce.



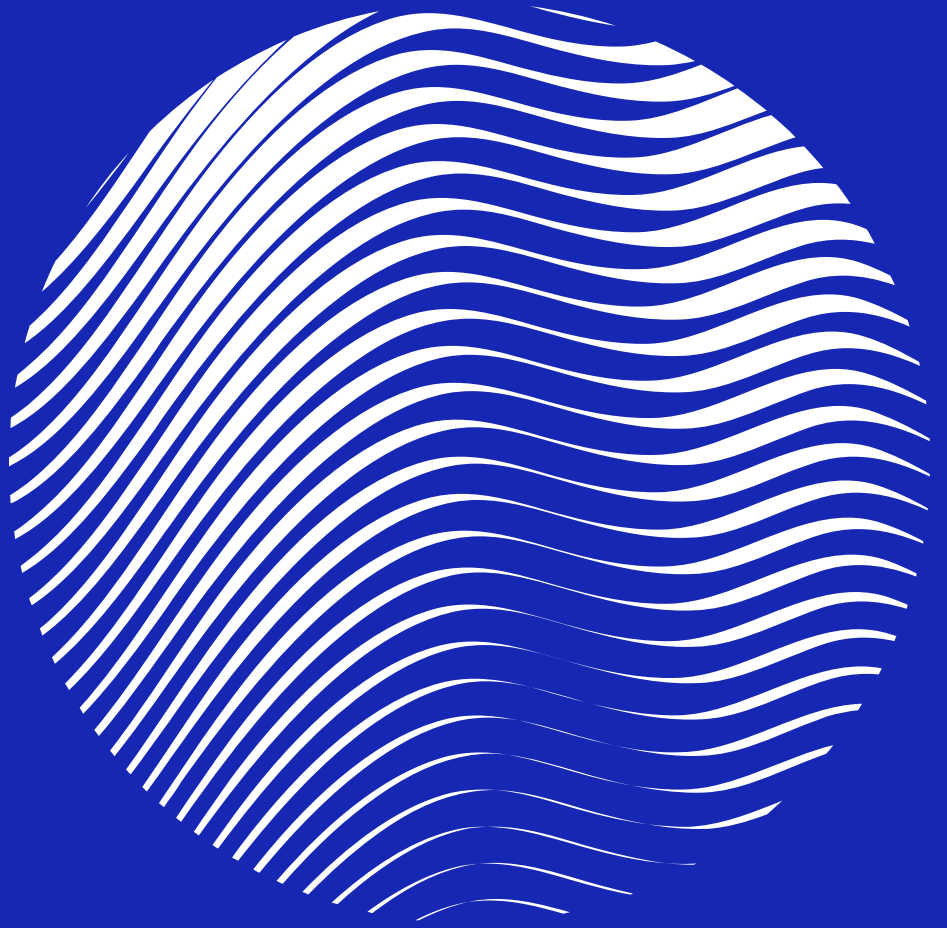
Eva Ng

Eva is a strategic designer who is well-rounded in “all things design”. She enjoys setting up railway, criteria, guidelines, coaching design practices, and facilitating workshops. Teaching courses are also her interest. She is currently enjoying the rides between UX, organizations, and social innovations.



Alejandra Farías

Alejandra is an Industrial Designer with experience in product innovation. She enjoys navigating the entire product development process, from trend research, to 3D modeling and prototyping. Graduated with honors from ITESM University in Mexico, she is now studying a Masters program in Strategic Foresight and Innovation.



Background

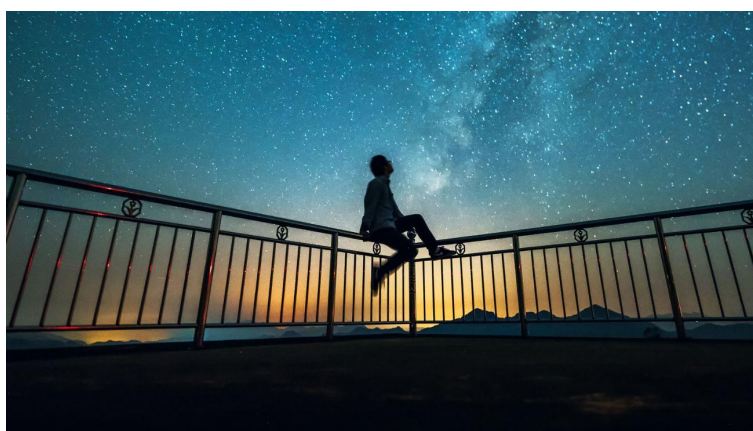
Background

Well-being, also known as wellness, is the subjective state of being comfortable, healthy, or happy. It has a multi-dimensional meaning as it can include mental health, physical health, social dynamics, social economics, spirit, and intellect, of an individual. Well-being can be accurately measured through fields of neuroscience, psychology, and measurement theory (*Well-Being Concepts*, 2018). Positive well-being has many health, job, and family-related benefits. For instance, individuals experiencing higher levels of well-being face increased longevity and lower risks of illness and disease.

Acknowledging the importance of positive wellness and the elements it is influenced by, whether as an individual or community, helps us collectively design a world that improves the quality of our lifestyles (“What Does Wellbeing Actually Mean?,” 2018). Mental health is one of the biggest contributors to one's well-being, but can often be neglected, mainly because it is not always prioritized nor talked about. Remote environments such as space, military deployments, expeditions to polar regions, and jobs on oil rigs are often areas where mental health treatment is deficient. Workers in these environments experience tight living quarters and have limited personal access with loved ones.



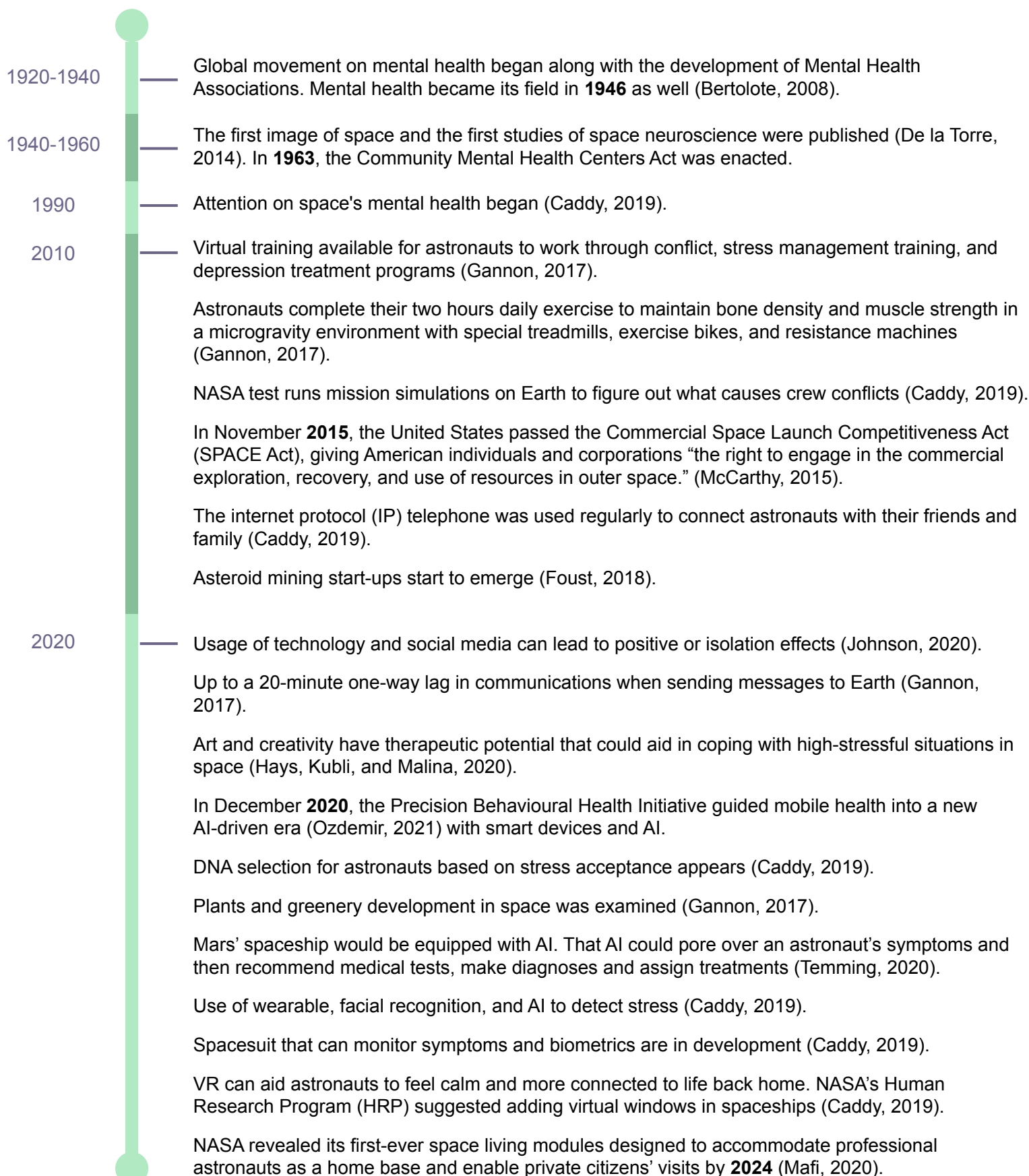
ScreenBeauty. (May 24, 2018) [Photograph] [Man gazing at sea].
<https://screenbeauty.com/info/guy-sea-back-152487.html>



Getty Images. (July 18, 2018) [Photograph] [Figure looking into space].
<https://www.nbcnews.com/mach/science/are-we-truly-alone-cosmos-new-study-casts-doubt-rise-ncna891286>

With the ongoing interest and commercialization of space, exploration, and the potential settlements beyond Earth, it is critical to think about the psychological well-being of astronauts and space visitors. For instance, being removed from society and transported into a harsh, new physical environment takes a heavy toll on our minds. Astronauts encounter increased stress, loneliness, sleep disruption, and interpersonal conflicts with teammates as a result. Changing their physical environment with the addition of confined spaces, radiation, and microgravity have been linked to psychological conditions and illnesses such as depression, anxiety, fatigue, and restlessness (Kanas, 2016).

Timeline





Scanning: Drivers and Trends

Drivers

1

Population Growth

The world's total population will continue to grow despite the growth rate slowing down (Roser, Ritchie, & Ortiz-Ospina, 2019), thus requiring more resources and energy. This may influence patterns of consumerism, and prompt scientists, politicians, and technology to support quality of life.

2

Self Optimization

Consumers seek to become healthier and better functioning individuals by constantly measuring themselves by tracking their health and device data. Not to seek perfection, but optimization and self-realization. The attitude towards wellness, previously driven by the state, is shifting to a more self-conscious approach.

3

Acceleration of Technology

Increased competition in the tech industry, reduced production costs, and rapid innovation, technology is evolving at an exponential rate. This can be attributed to Moore's Law, which states that the number of resistors in a microchip doubles every two years, resulting in not only smaller and more powerful chips, but also cheaper.

4

Hyper Connectivity

The increase in the use of sophisticated wireless systems and networks is improving not only person-to-person communication but person-to-machine and machine-to-machine communications. This leads societies to establish connections anytime, anywhere.

5

Space Exploration

The increasing investment in space exploration and commercialization of space travel has opened public-private partnerships in the US for a new space tourism market, creating opportunities to offer personalized experiences for entertainment and wellness in orbit.

Trends



Humanized Robots

technological

social

Maturity: **Developing**



As smart, virtual assistants such as Amazon's Alexa have gained traction in the market, at Consumer Electronics Show (CES) a range of robot companions have also gathered great interest. Taking a great leap into the future, robots are past industrial and automation jobs and now gaining a presence in the home. With the use of Machine Learning and AI, tech companies are increasingly betting on improving human-computer interactions, which are predicted to get progressively smarter, and closer to genuine human interactions.

Booming Wellness Market

social

economical

Maturity: **Developing**



With an excess of workload, products, and media, people are increasingly valuing their wellness, demanding novel approaches to the overall health of body and mind. Wellness-conscious consumers seek a more measured and long-term approach that helps them balance their lives and achieve happiness. As such, the number of people searching for anti-anxiety products is projected to grow 24% over the next 12 months in the US (Health and Wellness Futures, 2019). Which is perceived in the increase in CBD oils, anti-anxiety bracelets, and hugging vests, among other products.

Images:

[Photograph of a humanoid robot and a child]. (n.d.) Medium. <https://medium.com/omnidya-ai/things-you-can-do-with-humanoid-robots-besides-date-them-1cabd0a3329d>
 [Photograph of an elder woman eating an apple]. (n.d.) Bestlife. <https://bestlifeonline.com/healthier-woman/>

Trends



AI Ethics & Regulations

technological

political

Maturity: **Developing**



Ethics around artificial intelligence (AI) has been a recurrent discussion due to the relative ease in which it can be used in unethical ways, with *Deepfake* videos as a clear example. As a result, there has been an increase in regulations to ensure ethical, fair, and legal use of AI. Some of these address the transparency in which its algorithm operates; legal, and moral accountability should it break the law; and data privacy, as AI uses a large amount of data to learn and work. A recent discussion about it emerged in 2020 with the Covid-19 pandemic, as consumers had to shift most of their personal and professional lives online.

Destigmatization of Mental Health

social

values

Maturity: **Emerging**



Consumers seek a wellness experience through full integration of their physical, mental, and emotional health. A HealthPartners Institute survey (Stigma[...], n.d.) shows that there has been a decrease in stigma and negative assumptions about mental illness; while 73% of US consumers who have experienced a mental health disorder have self-diagnosed. This shows how adults need a new framework for processing emotions and mental health concerns, encouraging people to talk about mental illness, and creating a positive attitude towards mental health.

Images:

[Photograph of a robot arm reaching a laptop]. (n.d.) LawyersWeekly. <https://www.lawyersweekly.com.au/biglaw/27176-human-rights-commission-proposes-new-ai-legislation>

[Photograph of a man talking on a cellphone]. (n.d.) Deakin. <https://blogs.deakin.edu.au/deakinlife/2020/05/04/where-to-go-for-mental-health-support/>

Foresight Trends (Towards 2041)



Out of This World Luxury

technological

economical

Maturity: **Emerging**

The proliferation of public-private partnerships in the US. is opening the doors to a new space tourism market. Emerging companies are looking to deliver experiences ranging from a couple of hours up the stratosphere to over a week in the Earth's orbit. Given the exorbitant start-up and operating costs related to space travel, these new companies are setting their eyes on the world's elite by offering luxury experiences priced at an upwards of \$10 million per ticket (Baroud, 2021).

Friendly Robo-nauts

social

technological

Maturity: **Emerging**



Consumers seek a wellness experience through full integration of their physical, mental, and emotional health. A HealthPartners Institute survey (Stigma[...], n.d.) shows that there has been a decrease in stigma and negative assumptions about mental illness; while 73% of US consumers who have experienced a mental health disorder have self-diagnosed. This shows how adults need a new framework for processing emotions and mental health concerns, encouraging people to talk about mental illness, and creating a positive attitude towards mental health (Chopra, 2021).

Images:

Orion Span. (n.d.). [Rendering of Aurora Station]. CNN. <https://www.cnn.com/travel/article/aurora-station-luxury-space-hotel/index.html>
[Photo of Kibo Robot Project]. (n.d.). Kino Robo Project. <https://kibo-robot.jp/wp-content/uploads/2019/07/2.jpg>

Foresight Trends (Towards 2041)



Staying Grounded in Outer Space

social

technological

Maturity: **Emerging**

A prolonged journey in a zero-gravity environment without the support of loved ones can lead to increased feelings of loneliness and isolation. Losing touch with people when they are vulnerable is one of the biggest obstacles health systems face in preventing suicide (Oaklander, 2019). The advancement of artificial intelligence in smart wearable devices has the potential to help regulate mental health to ensure space travelers remain stimulated and safe (Emblem, 2021).

Love, to the Moon and Back

social

technological

Maturity: **Emerging**

The increase of longer space missions, added to the promise of future space settlements, has shifted the focus of space agencies on their explorer's mental health. While the longest mission recorded lasted 438 consecutive days, future missions are expected to last years. The great impact that isolation and long term separation from family, partner and friends has on human psychology in space, as well as on their overall performance, has been recorded numerous times. Additionally, telecommunications technology is predicted to soon be able to connect people in a novel, hyper-realistic and multisensory way with the help of this digital spaces and haptic technology (Farías, 2021).

Images:

NASA. (9 Sept. 2016). [NASA's astronaut Jeff Williams takes a space "selfie"]

[Photograph]. NASA. https://www.nasa.gov/mission_pages/station/research/news/wklysumm_week_of_29aug16.html

Chupina, Yuliia. (n.d). Emotional girl in VR glasses [Photograph]. Shutterstock. www.shutterstock.com/image-photo/emotional-girl-virtual-reality-glasses-studio-1758099857

Khabirov, Darmir. (n.d.). African American man in VR glasses [Photograph]. Shutterstock.

www.shutterstock.com/image-photo/african-american-man-vr-glasses-playing-1275745447

The Foresight Process

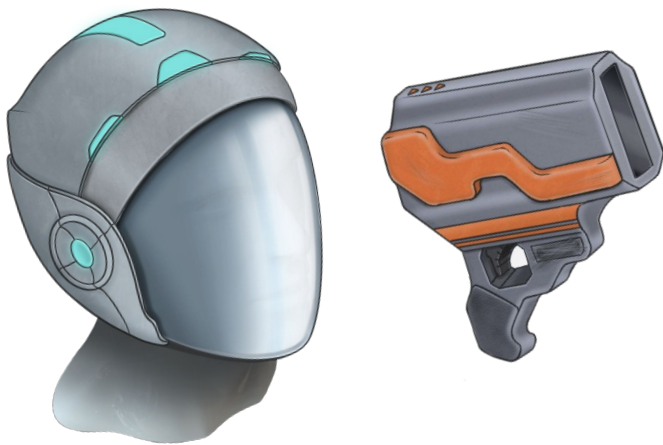


The Foresight Process

As Jim Dator states, understanding and applying the theories and methods of future studies will enable individuals to anticipate the futures more practically (Dator, 2019). These “images of the future” change according to events and perceptions. To be useful, foresight needs to be linked to strategic planning and administration to assist in day-to-day decision-making.

Scenario planning is a method used to develop stories of alternative futures that are both plausible and provocative. There are multiple techniques used to develop such scenarios. The development of multiple scenarios is based on different interpretations and fundamental assumptions of the way the world is headed through emerging trends and drivers.

The following four scenarios were developed to evaluate the psychological well-being in North America and the outer space environment. The understanding of potential futures can assist anyone, particularly strategists, interested in the future outlook of outer space and mental health.



Illustrations by
Alejandra Farias Fornes



[Woman with Facial Recognition Technology] [Photograph]. (2020). Canadian Lawyer. <https://www.canadianlawyermag.com/practice-areas/privacy-and-data/privacy-and-civil-rights-advocates-urge-federal-government-to-ban-facial-recognition-surveillance/331524>

Artifacts

As a team, we were introduced to the game *The Thing From the Future*, created by Stuart Candy and Jeff Watson. This imaginative game challenged us to work collaboratively and creatively to describe objects from a range of alternative futures (Lab, 2014). The artifacts we designed are objects held by the scenario’s main character during a check-in or security procedure in each scenario. These items are deeply important to the characters and always kept on their person. They evoke feelings of comfort, protection, and security. There are three artifacts per scenario to provide additional context and provide a more visual and tangible experience for the reader.

Scenario Development

We used the 2X2 framework with inspiration from The 4 Generic Archetypes. The Four Generic Archetypes provided a better understanding of what was happening in the broader environment than using the 2x2 alone. Combining the two frameworks gave us a more wholesome look to inform potential changes, patterns, and directions. There were noticeable overlaps in ideas between the two frameworks, as shown below:

Archetypes	The Four 2X2 Quadrants
Continued Growth	Individual x Tech Acceptance
Collapse	Individual x Tech Rejection
Discipline	Institutional x Tech Rejection
Transformative/Spiritual Transcendence	Institutional x Tech Acceptance

The two axes of the 2x2 were Institutional/Individual and Technological Acceptance/Rejection. These are high-impact forces and remain uncertain.

Institutional/Individual

In North America, individualism and the free market are dominant forces in how we conduct day-to-day activities. Within well-being, this can be observed as individual choice, personalization, and abundance of options. Individual or community-based care has shown success, but some have also been undertreated. On the other side of the spectrum, institutionalized medicine and care have been a dominant system before deinstitutionalization in the 1950s. Mental health was mainly in the care of government facilities, hospitals, rehabilitation centers, restricted to the domain of clinical psychiatry. While they were accessible, they were often underfunded and patients were poorly treated (Bertoletti, 2008). There is tension between these two forces, each with its pros and cons.

Technological

The role of technology and who controls it is an ongoing debate since its inception. Technological acceptance in society is defined as the technology being net positive, the human and machine relationship becoming closer and welcomed, and more day-to-day dependence on technology. Despite the benefits of technology, there are intentional and unintentional negative consequences. There are growing concerns about the ethics of AI, data privacy, safety, and the loss of human agency. This will impact how technologies will be adopted and regulated in the future (Funk et al., 2018).

Acceptance/Rejection

See Appendix A for the full scenario development methodology.

2 x 2 Scenarios Overview

Tech Acceptance

The Big Bang on Techno-Health

Continued Growth

2041 is cyber; technology and emotions are closely intertwined; Trust in AI, automation, robotics, and data has become accepted; technology drives the economy and consumption, as well as the poverty gap between those who have access to technology and those who do not.

Individual

Zen-Tech

Exploria

Transformative/Spiritual Transcendence

Zen-Tech Exploria is a transformative and big data-driven environment that invites and thrives in new dynamic ways of living. There is a strong self-wellness presence. Technological advances and the dominance of outer space foster major changes in health care, international relations, and energy sectors of the world.

Institutional

Timor Collapse

Machina

After a catastrophic AI-related event in one of the first settlements in space where 30 people lost their lives, back on Earth, anxiety, and uncertainty leads to a collapse of the space market. While the government and the company owning the settlement try to calm the population, a radical movement grows fueled by conspiracy theories, feeding into society's division about the dangers of technology and space missions.

Cloud Disciplined

State

In this scenario, the US Government (CDC and NIMH) is the primary provider of standardized mental health services for space travellers and workers. While their services are mandatory and accessible, they are not suitable for every person. Incidents of misdiagnosis and nationwide blackouts spur technological distrust amongst citizens. Innovation is slow and requires high stakeholder engagement.

Tech Rejection

Scenario Overview

	The Big Bang on Techno-Health	Zen-Tech Exploria	Timor Machina	Cloud State
Trends	<ul style="list-style-type: none"> • Destigmatization of mental health • Humanized robots • Out of this world luxury • Friendly robo-nauts • Love, to the moon and back 	<ul style="list-style-type: none"> • Booming wellness market • Destigmatization of mental health • Space travel • Utilization of asteroid mining • Friendly robo-nauts • Human modification 	<ul style="list-style-type: none"> • Destigmatization of mental health • Ethics and AI • Information overload • Fake news and conspiracy theories • Rise of social movements 	<ul style="list-style-type: none"> • Destigmatization of mental health • Ethics and AI • Closing digital divide • Universal health care expansion
Population	Increasing - steadily increasing	Post-human - life expectancy increases	Decreasing - delay in this life milestone	Controlled growth - balanced
Energy	Exploitation - Earth's resources overused	Abundant - new discoveries of energy	Unregulated - diversified	Regulated - monitored
Economy	High growth - free market	Booming - new sectors created and STEM increases	Localized - support of local businesses	Stagnant - less innovation
Environment	Conquered - global warming increases, more waste from production levels from overconsumption	Artificial - an equilibrium between technology and mother nature.	Valued - embracing natural world	Monitored - cautious attempts to control nature
Technology	Trusted - widely used	Opportunistic - novel	Distrusted - varied	Distrusted - not widely used
Governance	Democratic - capitalist	Social democracy -decentralization	Laissez-faire	Paternalistic but democratic
Society	Connected - technology enables hyper connected	Collective - respectful and acknowledges diversity	Divided - individualistic	Civically engaged - apprehensive
Mental Health	Democratized - plentiful of treatments available	Universal health care - new space medicines and treatments	Unstable - spike in mental health occurs from crisis	Standardized - good for most, very bad for some

Foresight Scenarios and Artifacts



The Big Bang on Techno-Health

By Eva Ng

Individual Tech Acceptance	

Space's mental health for astronauts start being aware by NASA, ESA, and space agencies all over the world in the 1990s (Caddy, 2019), as well as World Health Organization acknowledging mental health in its 2001 report on the World Health Day (Bertolete, 2008), the knowledge and practice of mental health mature following The Adoption Curve framework (Invest Aura, n.d.). Overall, in 2041, high awareness of mental health in space continues due to previous field developments and is assisted by technological drivers like data collection and on-Earth simulation research done in the 2020s (Gannon, 2017; Caddy, 2019).

In 2041, there is also a wide variety of mental health services, yet they are different in quality and with different certification standards. The government works closely with the technology industry to spur business activity through incentives, tax breaks, and small business support. They aim to enforce industry regulations, minimum protection guidelines, and measures, as well as clear laws to penalize violators. The private sector continues its trend to heavily invest in mental health as well as space assets, such as satellites, space travel, and space-related products and services (Mafi, 2020; Baroud, 2021).

Within the mental health sector, key innovations in the works include Mixed Reality (XR), wearable AI, and data management for space (Gannon, 2017; Caddy, 2019; Temming, 2020). For example, these new gadgets are inspired by such researches:

- Virtual worlds that can transport users into different environments with friends or by themselves (Gannon, 2017)
- Facial recognition sensor to detect stress response and biometric variables (Caddy, 2019)
- AI that is used to analyze astronaut's symptoms, recommend medical tests, make diagnoses and assign treatments (Temming, 2020), and
- Wireless networked space suits that help one to adapt to biometric changes for stress relief (Caddy, 2019)



CNN. (2021). *Space hotel* [image]. Retrieved from <http://edition.cnn.com/travel/article/voyager-station-space-hotel-scn/index.html?gallery=0>

The Big Bang on Techno-Health

New gadgets increase in volume and waste, including package waste. The year 2041 becomes a data-driven and materialistic society, where there is an extreme increase in pollution, accelerating climate change leading to people wearing masks and purchasing filters.

Data collection and its use become standard because the exposure and growth of data security and personally identifiable information (PII) have created familiarity over the last few decades (Grimes, 2019). As a consequence, the increase in AI automation, data usage, and robot companions is welcomed. Internet-of-things, mixed reality and communicative and health diagnosing wearables are now in maturity.

As space becomes popular with economic value, space continues to be a place many countries want to visit, discover, and further exploit economically, scientifically, and territorial-wise. This causes a barrier to entry, discriminating and excluding those with less economic means, and exacerbates the poverty gap by denying opportunities of the lower-income individuals and countries. Many people are arguing that budgets should be reduced and distributed elsewhere in the government to create balance, but the governments are acting slow. Since space is experiencing high competition by private investors, individual consumption patterns are influenced by these related private advertisers to persuade purchasing health gadgets. Many stock investors and financial advisors are also advocating for investments in space (Daily, 2021).



[Video of Facebook VR wristband powered via 'brain signals'] (2021).
Retrieved from https://www.youtube.com/watch?v=SVfn2mXi_Oc

The Big Bang on Techno-Health



Pellegrini, E. (2020). [Photo of blue light shining on an astronaut].
Unsplash. https://unsplash.com/photos/_OqYgRKQckA

On the other hand, the internet and communications are enhanced by “mega-constellations” (O’Callaghan, n.d.). As a consequence, there is an increase in hyperconnectivity through AR social media all over the world including space. Being hyperconnected has shown mixed results. It provides a connection with loved ones, but it poses dangers, such as being always “on” - always connected and communicating through the internet. (Johnson, 2020) Thus, radiation consumption can be perceived as high. The argument around the always “on” with AR social media typically around mental health and purpose. The positive or negative experience of AR social media depends on one’s social life, and the purpose of AR social media is also debatable - is it the proper agent for mental relief or does it create technology fatigue?

In summary, technology’s rapid evolution is a strong driver with many trends associated with it. The emergent properties of this technology driver are technology adoption, government involvement, economic and internet investment in space, pollution and climate change, free-market and poverty gap, and a vast amount of techno-psychological gadgets in the personal market, in comparison to slow communication and nearly no mature techno-psychological options in 2021 (Gannon, 2017).

Day-in-the-life

The Big Bang on Techno-Health

Joe is a state-of-the-art IT technician with Boeing who expanded its business into space travel and spacecraft production. Joe is pleased to work for Boeing as space is the hottest economy sector many companies are investing in. There is also a lot of R&D work in emotional health for space. A new space hotel just opened a month ago as well. Joe is excited to be part of space and expecting space is going to get busy.

Joe got a call from Boeing telling him the AI emotion sensor at one of Mars' mission spacecraft supporting NASA's bio examination is experiencing errors, causing teamwork and emotional distress among the astronauts. He is missioned to go to Mars fixing the AI algorithms and other data and robotic maintenance for NASA.

Joe geared up and pages one of his astronaut friends on the Moon telling him about his upcoming mission and his plan to visit him on the Moon before traveling to Mars. Before his trip, he made sure he brought his personalized spacesuit with VR and medical testing capability to help to cope with long-term isolation and loneliness in space. With better internet communication in space, he also makes sure he has technology, such as an AI watch and robot pet, that can talk, connect and communicate back to Earth as a backup in case similar equipment on the spacecraft is occupied for mission communication with the ground crew.

To prepare, Joe made sure he has his legal and health records, including his DNA details, are in-check with Boeing and NASA, then finished his body scanning with a new robotic scanner. He then undergoes virtual and in-person interpersonal mission training, as well as duty briefing before the launch date. Spacecraft launching is more frequent than 2021, offering Joe flexibility with dates.

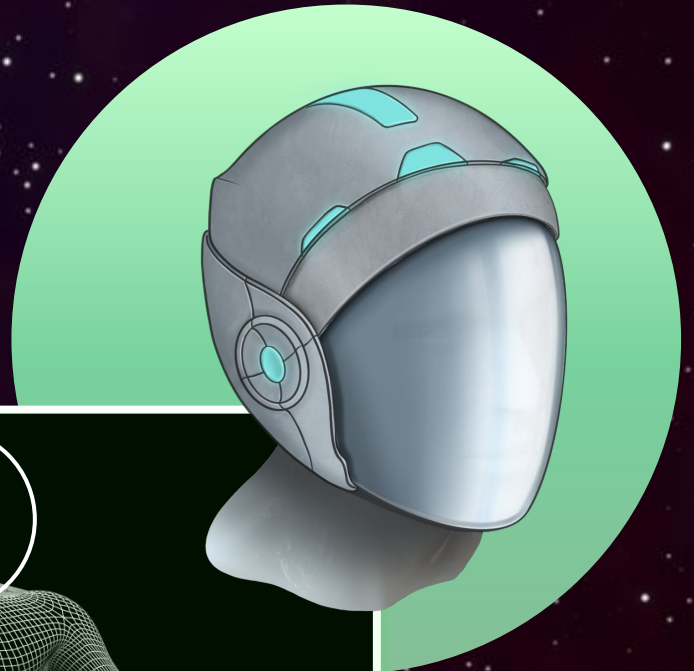


Joe is visiting his friend on the Moon after he is all ready. His friend is completing his two-year mission at Moon's long-term habitat to collect human and animal cell data under zero gravity and high radiation. During his visit, Joe decides to show his friend some of his new techno-psychological gadgets and chats about the new psychological guideline update on Earth by the scientific sector to the government. He then heads for his Mars mission. During his mission on Mars, he fixes the AI algorithms, double checks all the data equipment as well as robot and AI maintenance in the spacecraft because data security is one of Boeing and NASA's top priorities. Data hacking is securely prevented during his shift. As he fixes and maintains the technical assets in the spacecraft, he experiences collaborative teamwork and psychological improvement among the astronauts. While he is off duty, he uses social media to connect with his friends and family on Earth, which also maintains the mental health of his loved ones on Earth.

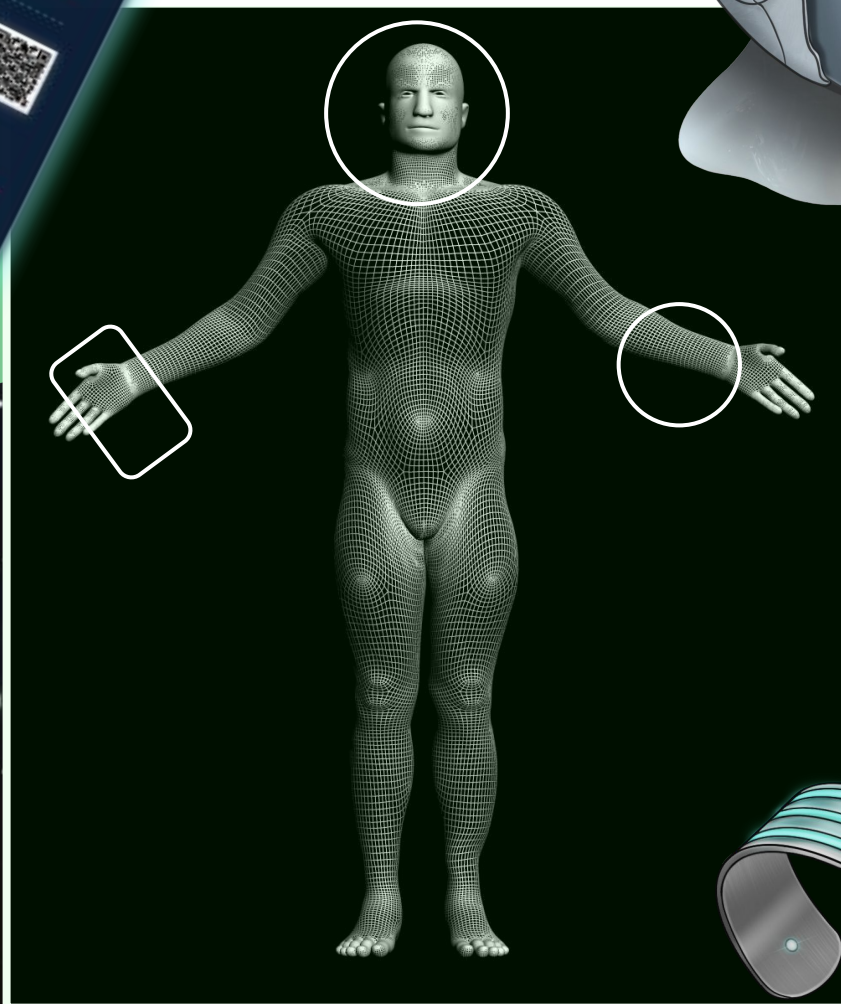
The Big Bang on Techno-Health Artifacts



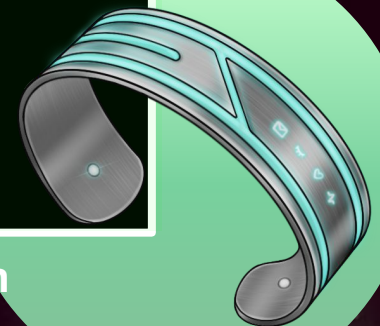
Boarding Pass



AR Spacesuit
Helmet



Name: Joe, Boeing IT Technician



AI Bracelet

The Big Bang on Techno-Health Artifacts

Checkpoint: Moon habitat hotel, Mars' mission spacecraft, and out in the space

Artifact 1: AI Bracelet

With greater data acceptance, upon arrival at any Moon habitat hotel, its network will automatically connect to the AI bracelet and scans the person's biometric measures to ensure customers are arriving in a good condition. Once scanned, the hotel will print a report from a nearby robot based on the analysis. The hotel will approve the customer or deny and send the customer to see a physician before check-in for an enhanced check-up. The AI bracelet will continue to connect with the hotel network to ensure health conditions throughout the stay. The AI bracelet also performs as a bio-sensor border security tracker, connected to the universal space network, to help enact basic territory ground rules with facial recognition, voice detection, and a motion sensor that the United Nations - the current space governance - defined.



Artifact 2: Boarding Pass

A boarding pass is required to board any NASA's mission spacecraft on Mars. This boarding pass is equipped with extraordinary technology. It includes all personal information, health data, DNA sample, and location data, as anti-rich protests are constantly happening on Earth due to social division within this high-end technology-led world. Satellites are all around the orbit to support these technological changes. As arriving in the spacecraft with the boarding pass, passing requires a voice validation. The AI-enabled spacecraft will also ask questions, scan, and signal the spacecraft's crew to either defend or welcome.



Artifact 3: AR Spacesuit Helmet

Space trips and technological equipment are expensive. Most space workers won't visit family on Earth for two to three years. During downtime, they can take a walk or two in space. The AR spacesuit helmet features hooks to clip onto the hotel or spacecraft's exterior, so human does not drift away. The spacesuit also has a biometric sensor that scans health conditions and adjusts the temperature accordingly. It also diagnoses symptoms and suggests actions. Its helmet glass has an AR feature for playing a game or two out in the space, taking pictures to send to friends, and allowing one to listen to music with AR graphics and arts. It is a functional and therapy spacesuit.



Zen-Tech Exploria

By Carrie Emblem

	Institutional Tech Acceptance

In 2041, global interconnections have never been stronger as a result of social, mobile, cloud, and smart technologies. Mega-constellations (jumbo satellites), invested by SpaceX and Amazon continue to enhance the internet signal on Earth and in space (Ng, 2021). Major institutions such as the Canadian Institutes of Health Research (CIHR) and the Canadian Space Agency are more tech-savvy which has led to an increase in collaborative health projects. Over the last five years, these institutions have been working on projects such as designing solutions to combat the psychological and physiological risks involved in spaceflight hazards known as RIDGE (Radiation, Isolation, Distance, Gravity, Environment) (NASA, 2021).

The growing space sector in the world's economy has transformed the job market. New jobs such as space art therapists and space mental health counselors have appeared to assist with crew performances. This is of primary importance because the ineffective performance of crew members can be threatening to space missions. It was discovered that under stress, cognitive-perceptual motor performances deteriorate (De la Torre, 2014).

In 2020, advancing artistic activities was advised to boost creativity, innovation, and novel scientific discoveries in space (Hays et al., 2020). To provide more comfort, Robo-nauts, which are emotionally intelligent AI bots, are functionally and socially part of space crews for long-term missions in space and luxury travel (Chopra, 2021 et Baroud, 2021). These Robo-nauts, which are beautiful by design and very human-like, are also found on Earth in assisted living and long-term care homes. The discoveries on earth help with medical practices with aging. Life expectancy increases. Society begins worshipping novel ideas of human advancement through human modification.

Zen-Tech Exploria

In Zen-Tech Exploria, the majority of government agencies are decentralized and practice socialism with the focus of maximizing the individual experience of deep transcendence. Zen-Tech Exploria values mental health deeply and the initiatives around this topic area are community-driven. The development of the wellness economy has helped eradicate stigma towards mental health and there was a large movement towards incorporating Ayurveda, an alternative medicine system with a balance in bodily systems and uses diet, herbal treatment, and yogic breathing. Providing widespread support, even for those out of Earth's orbit, has been achieved through AI mood trackers and the assistance of Robo-nauts. This is the result of the success of smartwatches and other sensing IoT gadgets being able to accurately detect behavioural changes and help individuals better manage their mental health back in 2020 (Ozdemir, 2021). The accumulated software is publicly funded code that is centralized by the government but available to view when requested.



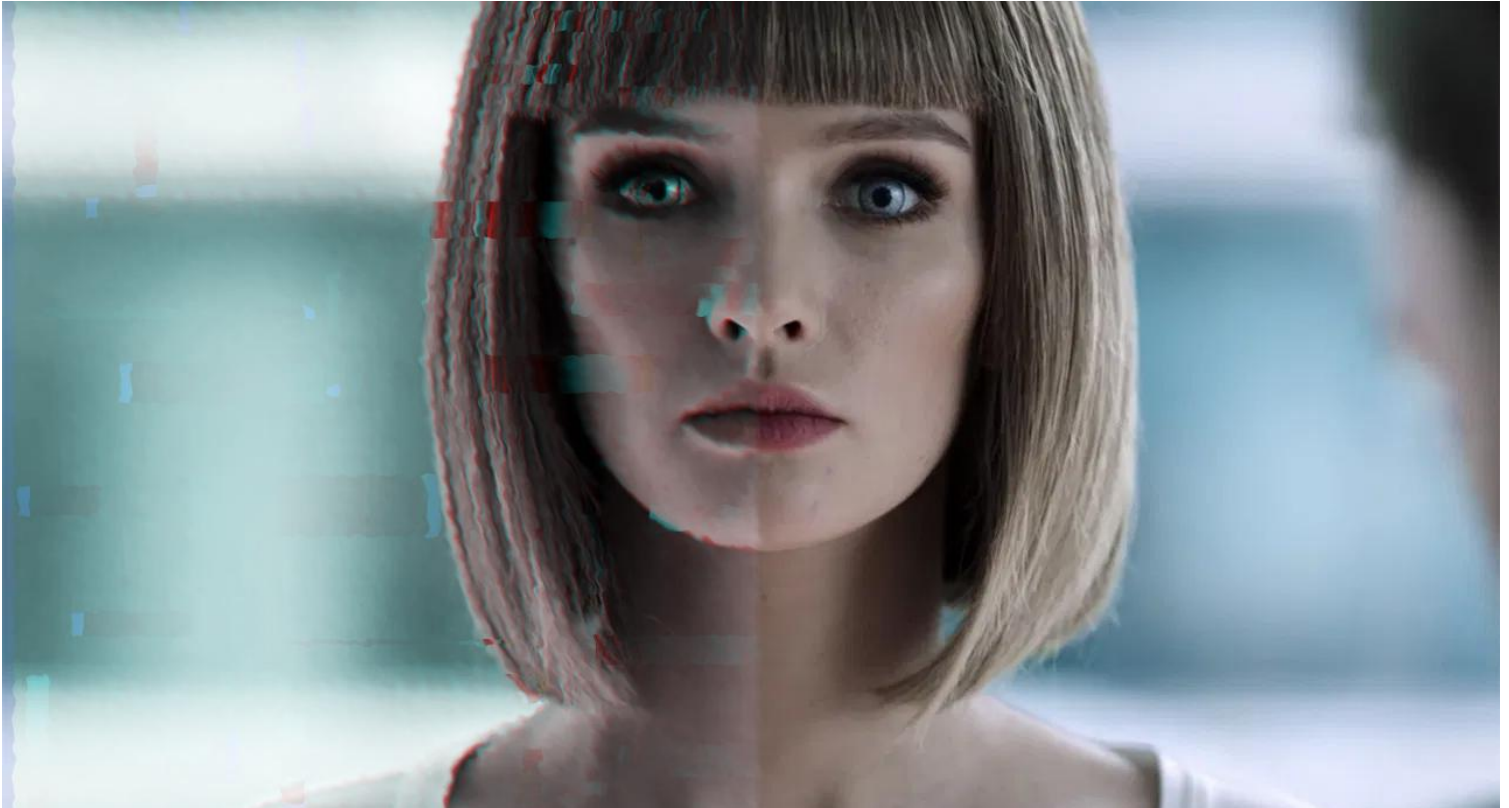
TEAL Architects. (n.d) ([Animated Illustration] [Rural Scape].
<http://tealarchitects.com/project/strip-weave-urban-renewal/>



Masters, David. (March 27, 2019) [Photograph] [You Are Evolution].
<http://davidmmasters.com/tag/infinite-possibility/>

In this high-tech future, the majority of countries commit to investing in all types of technologies to improve day-to-day living. For instance, geostationary satellites continue delivering critical insights concerning the environment, climate change, and sustainability goals (Onoda and Young, 2017). In this world, companies have also been exploiting the full potential of space mineral resources (SMR) through asteroid mining that has rapidly matured over the last ten years. There are group metals in asteroids such as iron as well as rare precious group metals like palladium. Palladium's catalytic properties include converting pollutants such as hydrocarbons and carbon monoxide to water and carbon dioxide (Grace, 2019). Even though there has been a discovery of alternative energy sources in space, the earth is still being cared for. There is a great balance between tech and nature, with rejuvenated architecture.

Zen Tech Exploria



[Still from TV show Better Than Us] (2018) IMDB. <https://www.imdb.com/title/tt8285216/mediaviewer/rm216044801/>

There is a paradigm shift. On a societal level, to ensure transformation's sustainability, the majority must welcome an open-minded culture that promotes creativity and risk-taking (Fischer et al., 2020). This way of thinking led to many initiatives that pushed the boundaries. Alternative food sourcing, for instance, is occurring as it was discovered that crops can be cultivated in LED-lit tunnels, hydroponics, aeroponics, and green-houses (Choi, 2019). This progressive mindset welcomes new initiatives such as redesigning correctional facilities, human modification, and transportation routes. The majority experience good mental health with the widespread support of AI technologies and Robot-nauts. There is a growing tendency to be satisfied with technological solutions for every kind of problem.

Although the digital divide is closing, some people do not trust technology and try to live off the radar, which is quite challenging seeing how most goods and services are digital-only.



Magellan. (November 23, 2020) [Animated Illustration] [Transcendent experiences]. <https://www.magellantv.com/articles/science-drugs-death-and-deities-whats-behind-transcendent-experiences>



Day-in-the-life Zen-Tech Exploria

Asher Lam, the 30-year-old long-term policy analyst for the Canadian Ministry of Health, awoke in his comfy bed from the flash of light that jetted across the main window of the spaceship. Seeing how it was his first time in space, he was quite surprised by how comfortable he felt. He had been orbiting in space for three days as part of a team-building work conference. Asher and his team of six had partaken in numerous recreational activities, such as asteroid excursions, yoga, and paint nights. He had been documenting his experience through his Exposa a hologram social media platform with hashtags such as #Earthdetox, #traquilityfoundinspace, and #LiveinSpace.

Joelle, his Robot-naut for the duration of his stay was very good about maximizing his individual experience. She was also drop-dead gorgeous. With her chic haircut, long lashes, and soft angel face, one could almost mistake her as human. Joelle made sure Asher was able to have a private room for his therapy appointment with Joan, a psychotherapist back on Earth, who had been treating Asher for two years for mild anxiety.

Joelle would entertain the remaining guests, turn on the white noise machine and avoid any upcoming turbulence along the pathway of the spaceship to ensure Asher had a good session. His wrist began to vibrate, and soon even Joan's hologram appeared effortlessly. The high-quality connection and hyperrealism made it feel like Joan was in the room with him. Asher was at ease and drew out an exhale. For several years, Asher's work specialty was on the development of the wellness economy.

He was testing his pilot program regarding self-wellness specifically through Ayurveda, an alternative medicine system with a balance in bodily systems and uses diet, herbal treatment, and yogic breathing. He smiled as he tested his WIFI signal for all of his communications, AI mood trackers, and his tech devices. The signal was as clear as ever. He thought to himself, "Everything is according to plan." What Asher had continuously believed was that anything and everything can be controlled by data. Data does not lie. Ezra Conwell, Asher's oldest cousin, suddenly appeared in front of his eyes. He was a non-believer and they were inseparable as kids but their difference in opinion created a massive falling out. Asher wanted to show that self-care with the addition of advanced technology led to everyone reaching their full potential, yet Erza would simply take no part in it. Asher hadn't seen Erza or his brother Dax for years. Asher knew that there would be some backlash for those who were tired of relations mediated so completely by technology. It was strange that it could alter family dynamics.

Within two days, Asher would be returning to Earth and preparing his speech for the upcoming 2041 Data Dominates (DD) conference held in Geneva but broadcasted all over the world. He would report that his team-building conference was a success and when on the mission, Craig Jones, one of his colleagues, was given the medical diagnosis of having an unrecognized case of Bipolar disorder. This was based on his AI mood tracker that was uber-sensitive to internal signals that could be missed by a regular doctor. These professional diagnoses could provide in-depth treatment and details about the recommended medication. It was the way of the world and Asher stood proudly behind it.

Zen-Tech Exploria Artifacts



Sodalite crystal



Trexploria ID



Robo-naut Joelle's ID

Name: Asher Lam, Policy Analyst,
Canadian Ministry of Health

Zen-Tech Exploria Artifacts

Checkpoint: Boarding the Nellaunch 3000 spacecraft for a team-building retreat in space

Artifact 1: Trexploria ID

Asher Lam is a 30-year-old long-term policy analyst for the Canadian Ministry of Health and carries the Trexploria ID. This personal ID allows him to enter government buildings, enter any health or wellness center in the world, and is linked to his social media hologram platform which is called Exposa. It is made of a special property that has a boomerang effect and is proven to never get lost. It holds information that tracks your commitment towards helping environmental initiatives. All cards are swiped annually to check how well people are doing. Asher takes control of his life into his own hands.



Artifact 2: Joelle's Robo-naut ID

Robo-nauts assist in maximizing your personal life by promoting emotional, social, and personal support. They excel at responding to non-verbal cues and reading situations. What is interesting is that they are customizable. Asher answered a short survey indicating his needs and aesthetic preferences for Joelle. Joelle can accurately detect behavioural changes and help Asher better manage his mental health by providing yoga breathing exercises, and fun distractions that help to mitigate the risk of a mental health crisis. Joelle is also capable of filling in for registered massage therapists.



Artifact 3: Sodalite Crystal

In Zen-Tech Exploria, there was a large movement towards incorporating Ayurveda, an alternative medicine system with a balance in bodily systems and uses diet, herbal treatment, and yogic breathing. Many have taken to carrying crystals everywhere they go. People find that uses them in their yoga practice extremely relaxing. The Sodalite Crystal brings calmness and order to the mind and helps prevent panic attacks. It also fights radiation damage by soaking up electromagnetic smog (Sodalite Healing Properties, n.d.). Asher never goes anywhere without it.



Timor Machina

By Alejandra Farías Fornés

Individual Tech Rejection	

The world has gone through exponential technological advances, but they have not been accepted by the majority of society. The unregulated use and overuse of technology have frustrated people too much that many have boycotted it all together. Some sectors of the population have embraced a more traditional balanced life within the hyperconnectivity that is driven in the urban areas. These civilians are concerned with long-term sustainability whereas the private sectors are geared towards profit-seeking ventures and short-term sustainability.

It is a divided society as some are willing to embrace hyperconnectivity whereas others opt for intentional communes in rural areas. The market is governed by an invisible hand, with little involvement from the government. People are choosing to have kids later or not at all because of the uncertainty and civil unrest. Those living a more traditional life are more likely to experience financial difficulty and are concerned about raising a family in those conditions.



Timor Machina

The intentions behind the Companies that combined multiple technologies such as cloud, machine learning, artificial intelligence (AI), and blockchain, at the beginning of 2020, have a strong competitive advantage. They facilitate the automation process and extend the use of applications into new markets, especially in the aerospace sector (PCW, 2020). Being a hub for investments and start-ups in this area, the United States is leading a new space revolution after they discover important innovations related to machine learning and AI.

After a decade of numerous successful space missions, the first American space colony was established in Earth's orbit with a capacity of 80 people known as Terralia, Boeing's privately-owned settlement in 2041. Reliability and dependency in these settlements are high, mainly supported by AI technologies that regulate and monitor all aspects of life support, from oxygen to resources such as food and water. After almost six fruitful years with minimal outside intervention and with the second colony under construction, the worst scenario occurs: "a terrible and unexpected AI malfunction," according to the first government reports, in which oxygen levels dropped unexpectedly without being detected or reported back to Earth.

At least 36 people lost their lives before a support team that was doing maintenance work outside the establishment detects the anomaly and sets off an alarm, overriding the automatic control and calling for help to Earth and the nearest space control center in orbit.



[Photograph of protestors in Greece] (2021). The Guardian.
<https://www.theguardian.com/world/2021/mar/10/greek-pm-app-eals-for-peace-after-police-brutality-ignites-riots>

Panic circulated on Earth, where communication with the colony was lost for seven minutes but was thought to be part of maintenance work, only to find the real situation in all media platforms a few minutes later.

Many conflicting sources of media alter the views of its civilians. Independent media outlets reported through unconfirmed sources that the central intelligence machine in the colony had deliberately altered the oxygen levels and concealed the situation. Although Boeing rejected the allegations, a general mistrust of the AI that handled most space operations besides Terralia soared. People who survived in space are terrified and many experiencing panic attacks, but the Mental Health Program is mostly conducted through AI-operated platforms. Many are rushing to find the means to get back to Earth as they are feeling unsafe. The space market collapses due to the crisis while insecurity about these intelligent systems transcends their suspicions to earth.

Timor Machina



[Still from TV show *Altered Carbon*] (2018). IMDB. <https://www.imdb.com/title/tt2261227/mediaviewer/rm2833928448/>

Conspiracy theories pointing to an AI rebellion, which have been embedded in society for decades, start gaining attention, and people are increasingly divided between those who believe this event was an orchestrated event by an intelligent machine, those who believe it was a terrorist cyber-attack, and those who believe this was just a very unfortunate accident. After three months, investigative authorities concluded it was nothing more than a tragic mishap after routine maintenance work in their software, while deploying compensation packages which include emotional support robots, to the families of those directly or indirectly affected (Lowrey, 2020).

Some media is brushing off Boeing's official statements as seemingly unrelated. Yet minor accidents

accidents started to gain attention, all related to the use of AI in smart homes and self-driving cars, feeding into conspiracy theories. People are demanding further investigations while calling to stop using AI altogether. As tension rises, the U.S Government is unable to cope with the widespread panic and anxiety. Many call to withdraw from tech dependency and extremist groups incite a revolution, vandalizing power towers and buildings. The elite capitalists hide from city riots and the frantic middle class urges government intervention; however, their response is insufficient. Many opt to retreat to rural and remote areas, aiming to cut off and find some kind of normalcy. The question remains whether this was a deliberate, intelligent attack or nothing more than a terrible accident.

Day-in-the-life

Timor Machina

Dax received the news that his brother had died in space three months ago. His mother called him on that day to let him know, as he did not usually engage in social networks and enjoyed digital detox on a regular basis, living on the outskirts of the city with limited access to technology. Today, Dax is not the same, he is depressed but he is not aware of this. His brother Ezra was the person closest to him and they had spoken only two days before the accident. Ezra had insisted that he go to Terralia with him and take his mother for all to live in the space settlement.

Dax used to work as a self-driving car technician but lost his job when a boom of industrial AI robots turned it into a fully automated industry. He was unable to keep a steady job for two years, given most of these jobs were now done faster and more efficiently by robots. His brother could get him a new job in orbit, but they argued over the technology-ridden lifestyle in space.



[Still from TV show *Äkta Människor*] (2012). Moviezine.
<https://www.moviezine.se/nyheter/william-hurt-i-akta-manniskor-remaken>

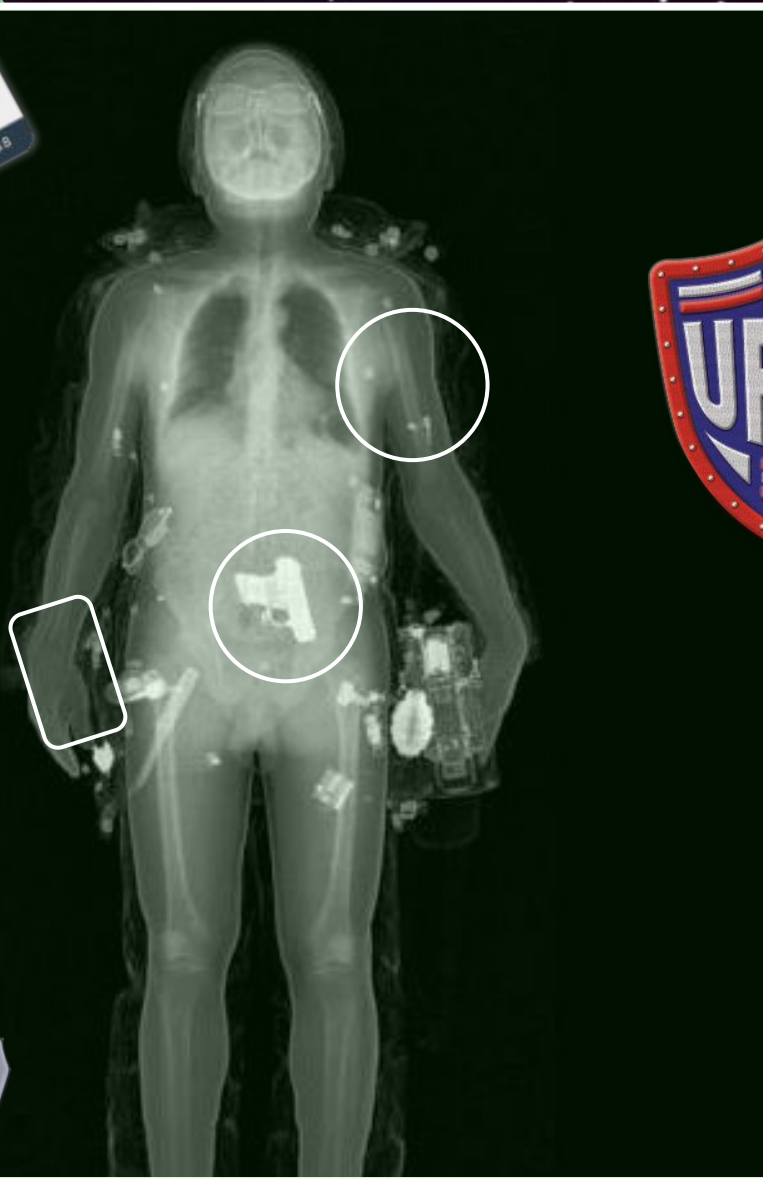
His home was on Earth and he had never been a fan of space anyway. He was even treated for Astrophobia when he was younger. For the first time since the tragic day, Dax decided to leave his house. He agreed to meet with an old friend, which he has not seen since college, and who called him upon finding out what happened. He called to offer his condolences and support, but also insisted on talking about his group. Dax finally arrived at his friend's apartment, having crossed several security checkpoints in the city. Since the night before, there had been a new series of riots, vandalizing state and personal robots. His friend, Ryan, had always been a bit of a loner, but he was a good friend and they had kept in touch.

Ryan regrets what happened to his brother but soon begins to tell him that this has not been an isolated case. A few days ago, a couple almost died due to a heating failure in their smart home not far from his place but was kept a secret by the city. His 'group', UFARM (United Front Against Robots and Machines), has been watching all these events closely. He tells him how these smart machines are the problem and are getting *too smart*. He offers Dax to join the group. Dax realized UFARM was probably involved in last night's riots. He politely thanks him for his support but insists there's too much in his mind right now and needs to go home to process what he heard. On his way back, he reminisced about his mother's emotional support robot and can't help but think that there might be some danger with it. Boeing offered these robots as support for post-traumatic stress suffered from the tragedy. Dax's mental state is worse than ever and struggles to find some sleep. He is restless, unsure, and afraid.

Timor Machina Artifacts



Expired ID card



United Front Against Machines (UFAM) patch



Buzzbuster: Robot Dismantling Gun

Name: Ryan K. Dallas, Anti-tech Activist

Timor Machina Artifacts

Checkpoint: Police security check during riots in Washington, DC, following Boeing's space settlement tragedy where an AI malfunction leads to the death of at least 30 people.

Artifact 1: Expired National ID card

Ryan K. Dallas carries his ID mainly for security purposes, as he knows it is the only document, he needs to prove his citizenship and demand his legal rights. Ryan has always been a loner, but he has been detained after his involvement in the recent riots happening around the city alongside a controversial organization.



Artifact 2: UFAM Patch

The patch portrays the logo of United Front Against Machines (UFAM), a far-right, nationalist organization with a general aversion towards artificial intelligence and machines. The group is known for speaking up against robots and AI ridding people of their jobs and protecting the public from robots with heavy surveillance. They have been publicly involved in the riots and other events regarding the dismantling of city robots.



Artifact 3: Buzzbuster gun

The Buzzbuster is, in simple terms, a tech dismantling gun. As the successor of the Dronekiller, its technology has evolved not only to disable drones, but it can disrupt robots, cameras, and even permanently damage computers and smart gadgets. As such, its use is restricted for military use only. This confiscated device has a scratched serial number, so its provenance cannot be traced.



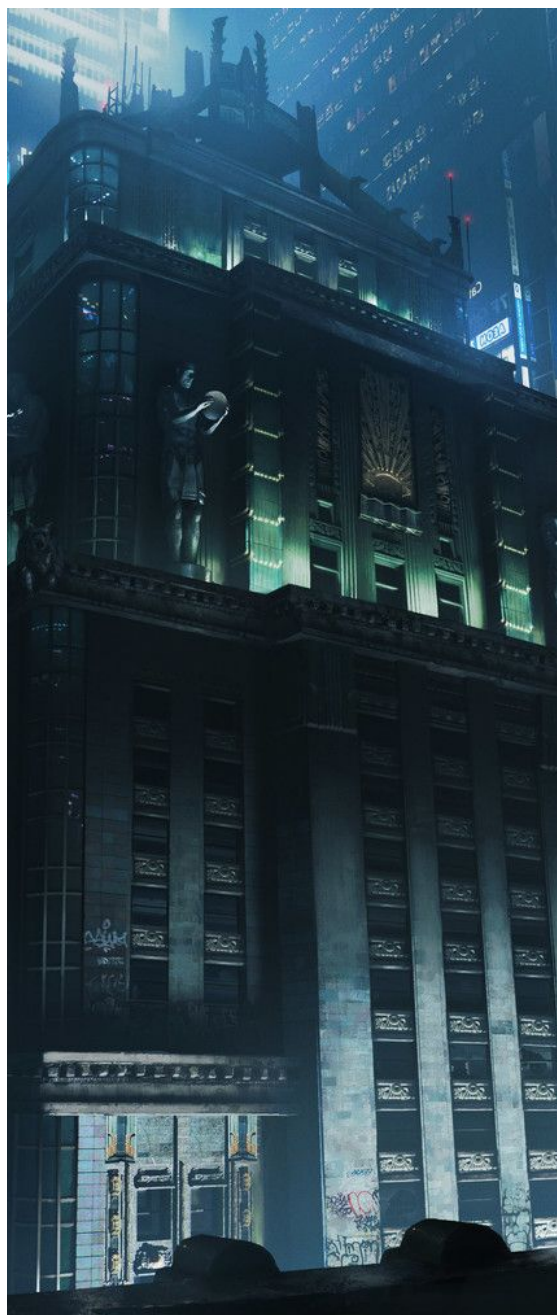
Cloud State

By Danielle Lim

	Institutional Tech Rejection

The US Government makes slight advancements in technology regulation and innovation. It has opened its own innovation research lab founded on well-known scientific research within the Department of Health and Human Services, a collaborative project by CDC and NIMH. The severity of mental health issues in space and the normalization of mental health encourage the government to expand access to mental health resources as seen with the numerous mobile app programs for veterans by the US Department of Defense developed 2016 onwards (Armstrong et al., 2017). This is achieved through the proliferation and success of the Affordable Care Act, which offers a public option, a government-run health plan (Sarlin, 2021). This new oversight limits the use of space AI companions, apps, robot-councillors, and mood monitoring systems. Government services are pushed to citizens' personal devices, which all are required, and can be accessed through the lab's online marketplace, diminishing the digital divide. The services available are approved according to government standards, with society's interests in mind.

Cloud State



Vasquez, C. A. (2017). *Cyberpunk Cityscape* [Illustration]. Artstation.
<https://www.artstation.com/artwork/JWne0>

People fear the human-machine relationship, as there are more noticeable negative impacts. In the past, insurance premiums have increased because of AI misreading a few pixels on health scans, AI misdiagnosing patients and struggling with incomplete data, and hospitals manipulating technology to increase payouts (Metz & Smith, 2019). Privacy, surveillance, big data, and hacking are also concerns, as data is centralized in a government-controlled cloud. Public attitudes shift to distrust of technological solutions. In 2015, Chapman University Survey on American Fears showed technology-related fears and government data-tracking in the top five fears (Walter, 2020). Misinformation and disinformation proliferate online solidifying these attitudes.

Technological third-party audits are required for new innovations. There is more criticism towards any new initiatives. Mental health continues to be politicized and is a public relations issue for the CDC and NIMH. Citizens become more engaged in public discourse and hold institutions accountable. This is not unique to mental health, but across industries, as government technologies are pervasive, including monitoring smart cities, communications, and consumption.

Health care technologies need large, diverse datasets, which is challenging. The variety of mental health issues and individual circumstances are vast (Taulli, 2021). Collecting appropriate data is costly and time-intensive, creating a high barrier to entry. With many people skeptical of technology, they may opt out, which exacerbates the data issue and ability for institutions to provide wide, effective coverage.



[Woman with Facial Recognition Technology] [Photograph]. (2020). Canadian Lawyer. <https://www.canadianlawyermag.com/practice-areas/privacy-and-data/privacy-and-civil-rights-advocates-urge-federal-government-to-ban-facial-recognition-surveillance/331524>

Cloud State

As mental health services are highly regulated and primarily operated by institutions and the government, there are few options. The government owns 80% of the services and private companies require federal CDC approval. The government needs funding from taxpayers to continue operations and can be a contentious point during elections. However, the need for public health care now has become a bipartisan issue. In advance of rolling out new government mental health technologies, there are year-long meetings, public consultations, and testing.

Those in need may have to wait. The blanket mental health system is not perfect; many gain access, but a few suffer. Some may be misdiagnosed, mistreated, or refuse all treatments. A growing group rejects national roll-out campaigns of health services and medications. The government sees a dropping rate of adoption of their public health care. This can be fatal for those with severe mental health issues.

In Cloud State, citizen and government agendas clash and limit each other's progress. The two groups need to hold many conversations to better understand each other. These accessible and reliable mental health services are extremely important especially for those travelling in space. While the innovation lab is growing, it does not have the adequate means to make a meaningful impact.

Day-in-the-life Cloud State

Longtime public servant, Dr. Tamana Wen-Dhia is the Executive Director of MoonMinds at the NIMH, which is a component of the US Department of Health and Human Services. For the last 15 years, the Department has been working on internalizing and distributing mental health services. This came during the transition to expand health care under the Affordable Care Act, which had the support of the people and came at a timely moment as chronic diseases were on the rise. MoonMinds launched six years ago as the country's space mental health hub. It was Dr. Wen-Dhia's baby. The reception was generally positive, but it did not launch without a hitch, especially with a new microchip release last year. She faced a few, but severe complaints. She had spent most of her life dedicated to ensuring privacy, hosting town halls across the country, and changing regulations so consumers are safer. She firmly believes in innovation but has had trouble convincing the government to increase her already limited budget. At times, she even has trouble gaining full support from her colleagues. Her morning is consumed with responding to her secured message centre, answering requests for international talks, and sitting on policy advisory boards, including an upcoming invitation by Canada. She was tired.

That afternoon, time seemed to have paused. Her colleague, Dr. Sommer Yahr, shares a report on her urgent newsfeed. *The United People's Press*, "Low Earth Orbit: Senior Misdiagnosed By MoonMinds Microchip Dies." She is in disbelief, as her team conducted years of testing, more than required.

Her relationship with the press was rapidly going downhill and worsened by other technological

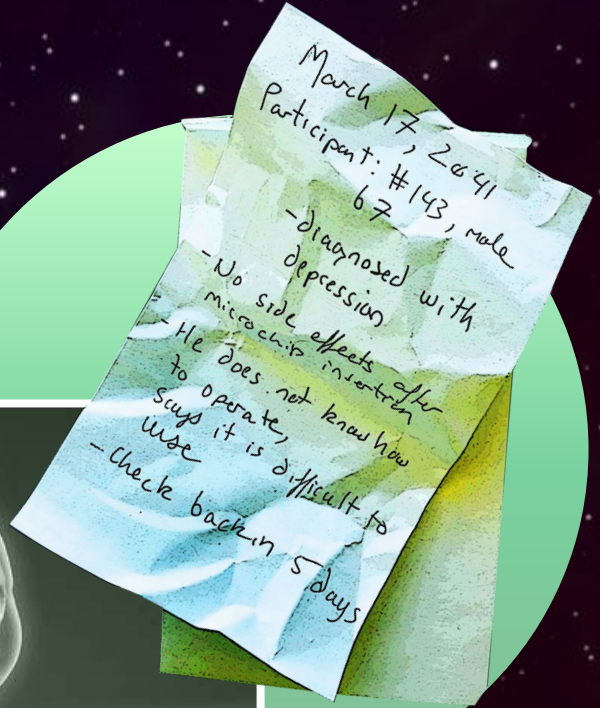


Maricic. M. (n.d.). [Photograph of Microphones at Press Conference]. The Balanced Careers. EyeEm, Getty Images. <https://www.thebalancecareers.com/how-to-organize-a-successful-media-event-39185>

malfunctions in other industries and space colonies. They were always sensationalizing edge cases. The Chief of the Department summons her and tells her she needs to prepare for a press conference immediately, all while shaking his head. Meanwhile, her microchip vibrates and tells her that her adrenaline is soaring and prompts a list of standard medications.

By the time Dr. Wen-Dhia makes it to the press room, the surge of people abandoning their MoonMinds has reached 42% of the population. She did not want this to be another failed project. As she faces an audience of the world's biggest media outlets and anti-tech extremists, she wanted to scream, "If they just knew the thousands of people they've helped. Depression rates have decreased. PTSD recoveries are longer lasting. All Americans are covered! If they could just trust me." Instead, she just sweats, and her wrist continues to vibrate.

Cloud State Artifacts



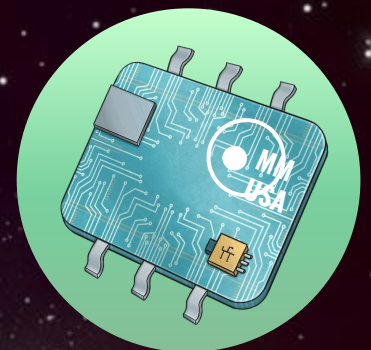
Dr. Wen-Dhia's Notes



USA Medicaid Card



Name: Dr. Tamana Wen-Dhia
Executive Director, MoonMinds,
US Government



MoonMinds Microchip Prototype

Cloud State Artifacts

Checkpoint: Entry into the head office of MoonMinds, National Institute of Mental Health, Bethesda, Maryland, United States.

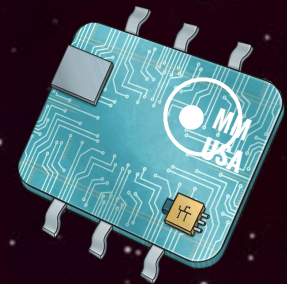
Artifact 1: USA Medicaid Card

Dr. Wen-Dhia carries her Medicaid card everywhere she goes for access to all federal health services, including mental health. Coverage also includes approved space travel. The card has a thin microchip that can be scanned by personal devices, diagnostic tools, and physicians. This is one of the very first cards of its kind made, as Dr. Wen-Dhia helped lead the transition to universal health care in the United States insuring the most Americans in history.



Artifact 2: MoonMinds Microchip Prototype

This is Dr. Wen-Dhia's prototype of her microchip that would be implanted in all willing citizens to monitor their mental and emotional health. Data is sent to a centralized cloud. It is not the most cutting edge but is a reliable technology that is currently being approved.



Artifact 3: Dr. Wen-Dhia's Notes

Traditionally hand-written notes on paper. This is Dr. Wen-Dhia's go-to method for note-taking. She has jotted down notes from a reluctant MoonMinds microchip participant in the third round of tests. Notes say:

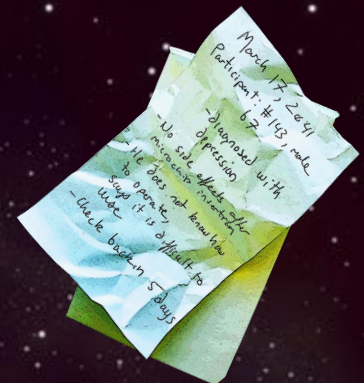
Mar 17, 2041

Participant #143, male, 67, diagnosed with depression

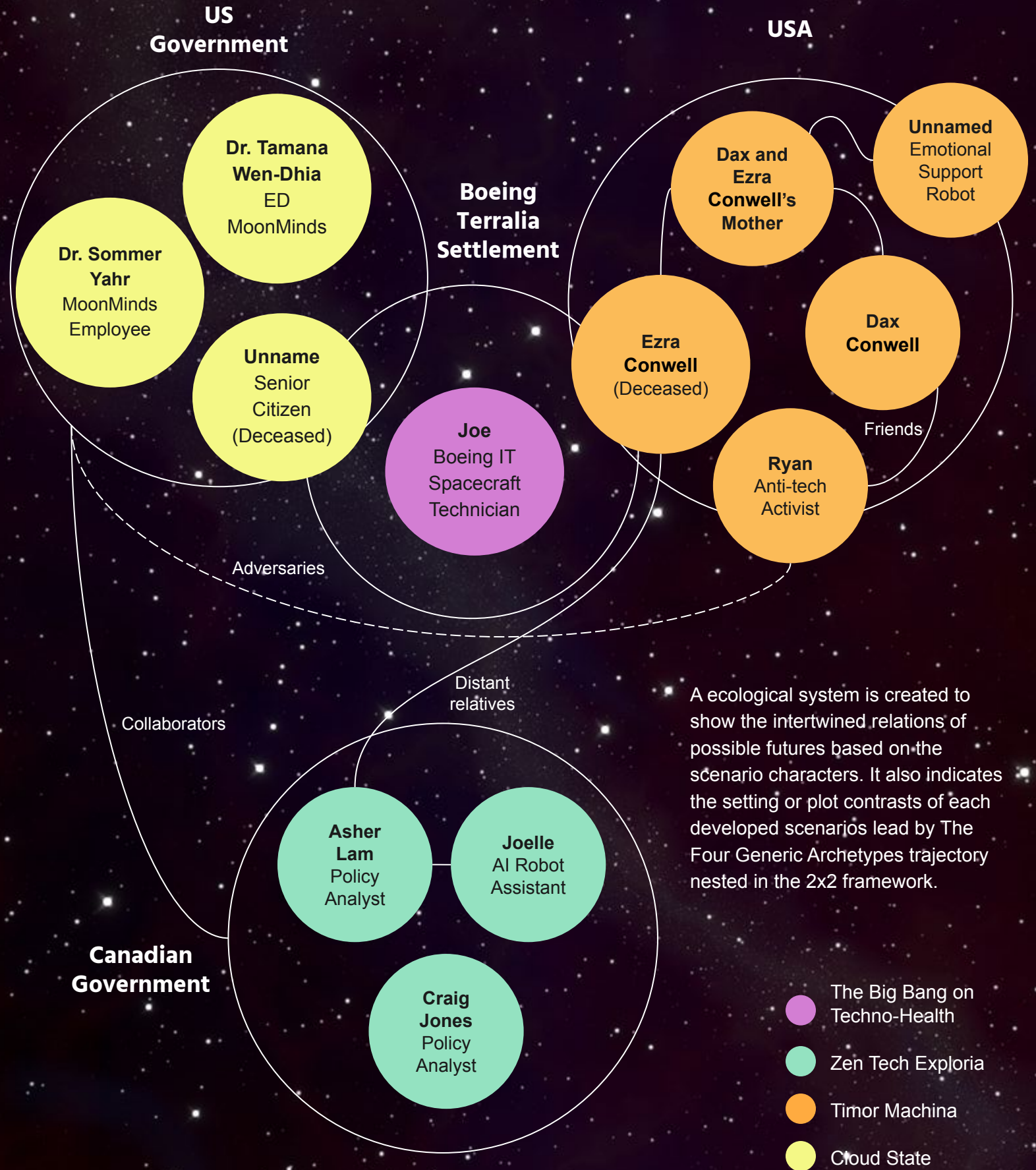
No side effects after microchip insertion

He does not know how to operate, says it is difficult to use

Check back in 5 days



Scenario Universes: Character Map



A ecological system is created to show the intertwined relations of possible futures based on the scenario characters. It also indicates the setting or plot contrasts of each developed scenarios lead by The Four Generic Archetypes trajectory nested in the 2x2 framework.

- The Big Bang on Techno-Health
- Zen Tech Exploria
- Timor Machina
- Cloud State

Wemedics



Company profile



Wemedics is a private biotech company that designs and commercializes biomedical wearable devices. Wemedics seeks to understand and improve human cognitive states with the use of artificial intelligence. The company operates in the North American market with two main brands: Wemedics WeHealth B2B and Wemedics WeCare B2C.

Core Competencies:

- Culture of innovation
- Library of knowledge (data collection & analysis)
- Highly skilled developers, engineers, and designers
- Agility and resourcefulness
- Strong medical advisory board

Their Products:



WEHEALTH™

Wearable Smartwatch monitor

- 24hr patient monitoring
- Biometric and emotion tracking
- B2B Targeted at hospitals or clinics
- Ideal for outpatients and long-term care



WECARE™

Wearable Smartclip monitor

- Connects to mobile devices
- App offers detailed analytics
- B2C Targeted at Individuals
- Discrete but powerful and accurate

Mission

To empower people to take their mental health into their own hands.

Vision

To be #1 in emotion AI by developing high-quality products that evaluate a broad spectrum of health and emotional conditions, enabling individuals with actionable information to monitor, understand, and improve their wellbeing.

Values

- Innovative mindset
- People
- Inclusion
- Contribution

Images:

[Photo of Embrace PPlus Smart Watch]. (n.d.). Empatica. <https://www.empatica.com/embraceplus/>
Jung, Scott. (June 29, 2018). [FOCI Wearable]. [Photograph]. Medgadget Inc.

<https://www.medgadget.com/2018/06/a-brief-look-at-foci-the-wearable-that-helps-you-stay-calm-and-focused.html>

Overview

Opportunities

- The affective computing market is expected to reach a value of \$123.3 billion USD by 2026 (*Worldwide Affective Computing Industry to 2026, 2020*)
- Growing concerns of mental health, especially due to COVID-19
- Growing/untapped European and Asian markets
- Great potential use of Emotion AI across industries, including space
- Growing trends:
 - Booming wellness market
 - Destigmatization of mental health
 - Humanized robots
 - New energy sources
 - Space exploration
 - Decreasing cost of technology
 - Population growth

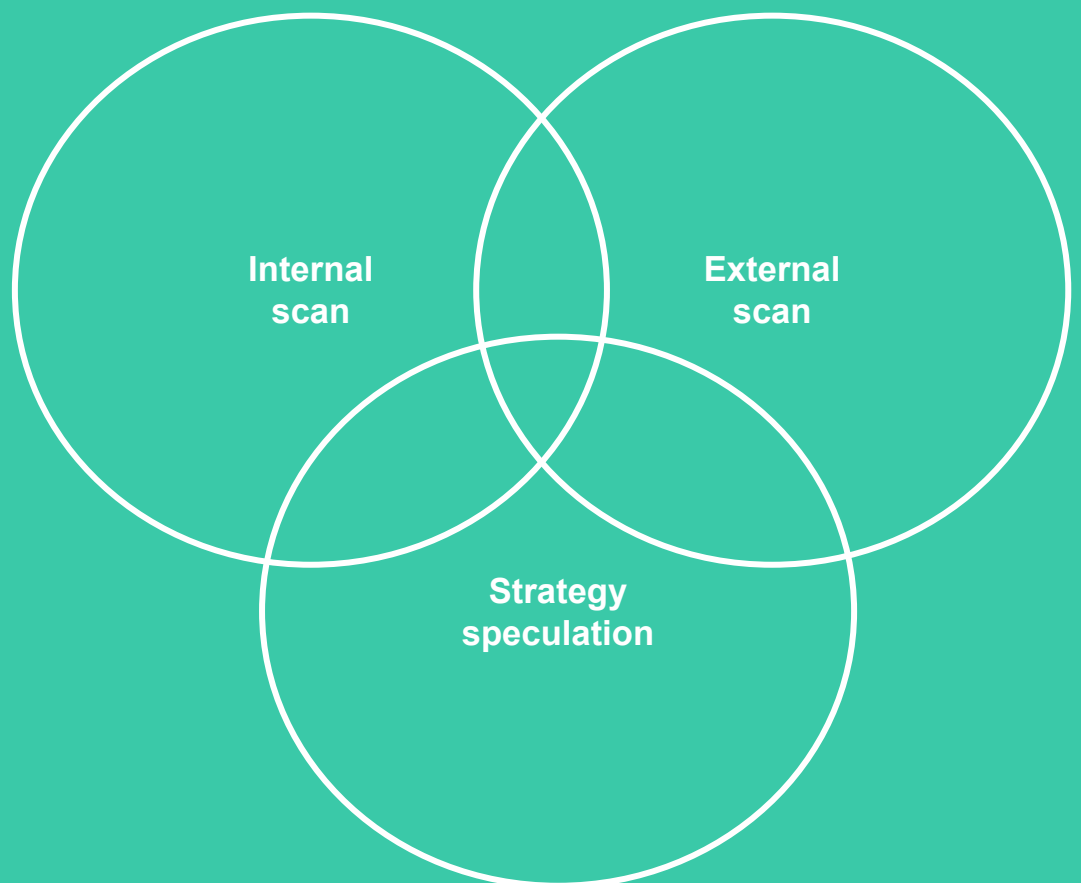
Challenges

- Small team, limited finances
- Core business is software for health care only
- North American brand awareness only. COVID hindering international travel/trade shows
- Competitive market, many imitators Large, diverse data sets needed for develop AI, especially important for emotions and geographic or cultural differences (MZ, 2020)
- Regulatory approval in health care affects time to market
- Large research investment needed for AI applications in other industries
- Growing Trends:
 - AI/Tech regulations
 - Public fear of facial recognition and AI due to potential discrimination (MZ, 2020)

As noted in their mission, vision, and values, Wemedics aims to stay at the top and have a widespread impact. It has shown initial success in the health care market in North America, but still has several contenders and has a lot to prove. Its technology was used by NASA in 2011 to monitor astronauts' vitals and mental health, and although the space market is not yet one of its main revenue drivers, Wemedics wants to keep the space industry on its radar. Their revenues are growing, but they require much more to expand and to reinvest, as such, decisions can be costly. They have to be very intentional, yet take on risks. While they are agile and have many competitive advantages, they cannot stretch themselves too thin when selecting future opportunities. Prioritizing which opportunities and trends to capture is paramount.

The affective computing industry is rapidly growing across industries and globally. There is enormous potential, but it is currently not widely used. Consumer education and awareness are needed to pave the way. Many overlapping trends may amplify or hinder Wemedics, such as tech regulations and the booming wellness industry. They need to constantly scan to ensure their products are relevant.

Strategic Options



Developing Strategic Options

To generate a variety of strategic options, we used Zanoni, Vernizzi, and D'Anna's *Nine Types of Strategic Options* framework (2014) as our framework.

Nine Types of Strategic Options

Impact on the Business Model	Change	Attacking	Relaunch	Aggression
	Optimization	Active Waiting	Active Defense	Optimization
	Conservation	Waiting	Defense	Waiting
		Follower	Leader in the Segment	Leader in the Market

Firm's Initial Competitive State

As stated by Stephen J. Kline and Nathan Rosenberg, innovation is the correlation between the amount of change vs. the degree of uncertainty (Kline & Rosenberg, 2009). The first step was to distinguish the known and unknown variables and the unique position of each square in the matrix. We established the correct context by listing the appropriate relevant trends and strategies that would be suitable for each one. For example, the position "Aggression" found at the intersection of Leader in the Market and Optimization, Wemedics would be considering ambitious business changes such as new radical products, vertical integration, new industries, and insistent headhunting. The relevant space trends for this section include asteroid mining, humanized robots, human modification, and the potential of space exploration (**Refer to Appendix C for the overlay of trends and strategies**).

The second step was to create descriptions per strategic option based on the trends and insights we gathered. This action provided clarity and accentuated the tradeoffs of each strategic option. The third step was to take the nine types of strategic options and evaluate them individually based on selected criteria, as shown on the next page. The exact positionality poses a major influence on its strategy. The results with the higher total scores would indicate that they had a better strategic fit and should be future explored.

Evaluating Strategic Options

We evaluated each one strategic option based on eight criteria and questions seen below based on a 1 to 5 scale with 1 being not applicable and 5 being very applicable. **Refer to full evaluation chart in the Appendix D and the full set of nine strategies in Appendix E.**

Criteria	Question(s)
Financial Feasibility	Is the strategic option justified from an economic point of view? For this investment, what kind of financial return will we receive? Is this strategic option possible and attractive to us?
Mission/Vision/Values	Does this strategic option align with what Wemedics stands for and aspires to be?
Safety	How much risk is involved? Can Wemedics handle something like this?
Core Competencies	Does this strategic option utilize the existing core competencies of Wemedics? Or will there need to be other investments?
Resource capacity	Can the skilled staff and research teams, data library, buildings, and equipment of Wemedics handle this option?
Stakeholder fit	If we were stakeholders of Wemedics would we be impressed by this strategy? Do we support this?
Achievable within 5 years	---
Takes advantage of trends	Does this strategic option utilize space trends?

Top Strategic Options: Overview

1 Strategy: Safe Bet

Type: Defense

To maintain their position as #1 in the market, the company acquires patents. They are protecting their value proposition by promoting data privacy features and investing in customer service for current customers.

Low effort.

2 Strategy: Big Fish

Type: Active Defense

The company aims to dominate the current healthcare market segment and satisfy as much demand as possible through brand building, increasing advertisement, and sales activities. They keep updated and respond to the current social/market events to stay on-trend.

Medium to high effort.

3 Strategy: Golden Roots

Type: Waiting

Incremental upgrades to current products are made. They research other industries for possible entry and distribution. They focus on the history, past success of their products, keeping their original integrity.

Low effort.

4 Strategy: Bridging Out

Type: Optimization

Company partners with industry leaders to improve manufacturing and operational processes. They focus on core competencies and outsource skills they lack. Through partnerships, they can enter new markets (i.e. connecting with complementary devices/services, such as surveillance technology).

Medium effort.

1 Outlier: Lighthouse

Type: Active Waiting

The company plays it moderately safe. They focus on current products, internal training, and customer service to maintain current customers. They are vigilant and allocate some budget in R&D, prototyping, and improving current products.

Medium effort.

2 Outlier: Black Expansion

Type: Aggression

The company partners with key organizations in emerging markets and are more experimental. Product development is vertically integrated, and they aggressively headhunt for talent. They create new brands and enter new markets. Asteroid mining is explored for its special materials for production.

High effort.

Strategy 1: Safe Bet

Leader in Segment x Conservation, “Defense”



The company makes concrete efforts to remain a top leader of AI wearables in health care by expanding its patent portfolio, assuring the protection and privacy of user data, and actively working to improve its customer service.

This approach is a great strategy as it requires a low effort but has a high impact, concentrating their spending on intellectual property that can be exploited in the future, while trying to protect its reputation and quelling growing concerns before they become a problem.

Key Trends and Drivers:

- Fake news and concerns around data privacy
- Increasing regulations (to avoid/ or adjust product development)
- Decreasing cost of technology development

Activities:

- Review and address customer feedback
- Focus on building trust for the long-term
- Train employees regarding data privacy
- Invest in PR promoting efforts on protecting customer data
- Define a budget for patent portfolio management
- Assess current patents; “Know what you own, and why you own it.”
- Identify licensing opportunities for their patents
- Double down on current markets
- Invest in improving their current software

Capacity to Implement:

- Fairly easy to implement, as it doubles down on current strategy and plays it relatively safe, within their territory
- No big investments so it stays very financially feasible

Signposts for Readiness:

- Medium-high customer satisfaction
- Competitors launching similar products
- Great reception for their last launch
- Companies reach out with licensing opportunities

Risks:

- By playing it safe, they might let down their stakeholders who are expecting more innovation and tangible results
- Not playing on their full potential and core competencies might make them miss on opportunities to innovate or improve product line and competitors come up with a product launch
- Losing leadership position and competitive advantage

Core Competencies/Resources:

- Team of engineers, developers, researchers
- Knowledge bank and creation
- Patent portfolio

Measures of Success:

- Healthier customer relationships
- Customer reviews and satisfaction improvement
- Preventing competitors from exploiting similar products by appealing on copyrights

0-5 years

6+ years

Improve customer relationships and current products; increase number of patents

Turn patents into new products or licensing opportunities; increase customer base

Strategy 2: Big Fish

Leader in Segment x Optimization,
“Active Defense”



The company aims to dominate the current segment and satisfy as much of the demand as possible, through advertising, brand building, and sales. PR campaigns focus on the benefits of affective computing in the B2C market. They exploit revenues through reselling data and maintain data ownership via their own cloud computing. Revenues from the core market fund exploration into new domains. They keep an eye on growing trends. They align themselves with space agencies and gain NASA as a client again. This strategy is a good fit, as the industry is changing quickly, and being reactive to trends and changes is vital. They need to be aware of and thwart new entrants.

Key Trends and Drivers:

- Booming wellness market
- Increasing regulations (to avoid/adjust product development)
- Space exploration
- Population growth

Activities:

- Advertising/PR to earn public trust
- Health/tech trade shows
- Brand building
- Align with reputable brands
- Research and test markets
- Grow user/product research teams
- Feedback trends into product development
- Consult with space institutes

Capacity to Implement:

- Easy to implement with current resources
- Requires high ad budget, outsourcing to an ad agency

Signposts for Readiness:

- New events/tradeshows for wellness, tech, space exploration
- Market gap opening that Wemedics can fill
- The public has a positive association with affective computing/AI

Risks:

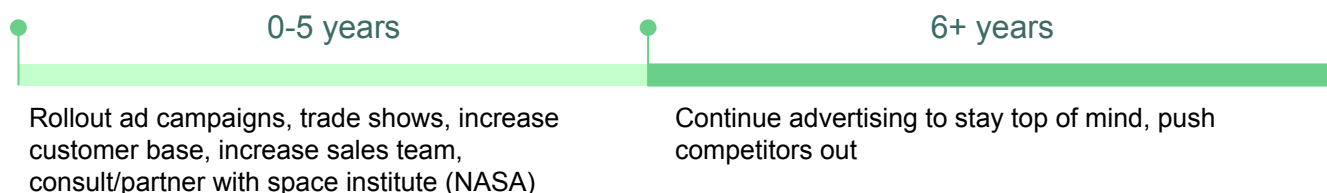
- The strategy does not aggressively take advantage of non-industry trends
- Advertising and marketing are costly. Results are not guaranteed and may take years to see returns.
- Competitors can easily copy this strategy

Core Competencies/Resources:

- Highly skilled team and network
- Highly knowledgeable, brand reputation
- A loyal base of current customers

Measures of Success:

- Saturate health care segment
- Customer engagement is high
- #1 brand in affective computing
- MVPs for space and other industries



Strategy 3: Golden Roots

Leader in the Market x Conservation, “Waiting”



The Golden Roots strategy focuses on leveraging its existing business model and technical competencies through routine innovation. This strategy can be easily implemented within the existing market ground that Wemedics is part of. It requires a low effort and is expected to have a low impact. Its main focus is promoting the heritage of Wemedics and making incremental upgrades to existing products. Wemedics is spending time and resources investigating possible markets where their existing products could be of value.

Supporting Drivers and Trends are:

- AI Tech Boom
- Affective computing is growing as a hot topic
- Customers want to see more evidence and data to trust brands
- Data privacy

Activities:

- Working on relational competencies such as reputation and brand name.
- Acquiring legal protection such as patents and copyrights
- Attending trade shows and biotech conventions to promote their current products and network to foster new connections.
- Increasing its absorptive capacity by horizon scanning, spotting weak signals, and designating research teams to identify different markets Wemedics products can serve.
- Strengthen data infrastructure and cloud storage, potentially looking into cloud computing in the future

Capacity to Implement:

- Fairly easy to implement as the Golden Roots strategy is a continuation of Wemedics' current operations apart from approaching different markets with its current products.

Core Competencies/Resources:

- Library of Knowledge
- Research teams
- Wemedics purchased a developer kit from Affectiva's partner iMotions, which has provided Wemedics with more insight into customer analytics, social robotics, and human behavioral research (*Solutions*, n.d.).

Measures of Success/Goals:

- # of contracts
- ROI - Growth margins based on incremental advancements on current products
- Total sales
- # of testimonials from customers
- Click-through rate (CTR)
- Customer retention

Strategy 3: Golden Roots

Leader in the Market x Conservation, “Waiting”

Signposts for Readiness:

- Contains the resources already
- Able to have the research team look into other industries such as the up-and-coming space industry

Risks:

- Missing potential windows of opportunities by prioritizing maintenance of current operations over experimentation
- Losing relevance and losing its “fit” to purpose as it becomes stagnant in the market. This may result in losing its leadership position in the market.
- Stakeholders may want to see more intervention to make their investments worthwhile

Core Competencies/Resources:

- Library of Knowledge
- Research teams
- Wemedics purchased a developer kit from Affectiva’s partner iMotions, which has provided Wemedics with more insight into customer analytics, social robotics, and human behavioral research (*Solutions*, n.d.)

Measures of Success/Goals:

- # of contracts
- ROI - Growth margins based on incremental advancements on current products
- Total sales
- # of testimonials from customers
- Click-through rate (CTR)
- Customer retention



Strategy 4: Bridging Out

Leader in Market x Optimization, “Optimization”



This is a semi-aggressive strategy. As a leader in the affective computing market owning both B2B and B2C products, it will continue its data, computing, agility, and medical strength. To grow and sustain in optimization, Wemedics will partner with external manufactures through signed contracts to control scope, quality, and price. Any additional needed capability will also obtain through outsourcing to optimize internal processing. Wemedics will also partner with vast technology providers, telecom, and Operation System like iOS and Android to extend connectivity with other complementary devices out in the market to get ready to enter into new markets like senior homes, exotic cars (for drivers), smart houses, and outer space.

Key Trends and Drivers are:

- Technology acceptance in personal wellness and technology devices
- Potential growth of new entrance due to cost of tech is decreasing
- AI/Tech regulation, and data privacy are on the rise

Activities:

- Continue internal library of knowledge and innovative culture
- Maintain functioning reward and performance mechanism with quarterly reviews
- Develop good relationships with partners and Quality Control process
- Market research to understand its current strength and brand recognition in the health care market before testing and differentiating itself in the market of senior home, exotic car (for drivers), smart house, and or space

Capacity to Implement:

- Strong leadership team with a track record of steady growth
- Strong affective computing team
- Existing process and performance tracking system providing knowledge and insights on internal bandwidth and what needs to be partnered or outsourced
- Strong and long-serving talent pool who understand the company, its products, and its customers

Signposts for Readiness:

- Good reviews in the current health care market
- Growing technology and mental health demands in the senior home, exotic car (for drivers), smart house, and space markets
- Good financial standing

Strategy 4: Bridging Out

Leader in Market x Optimization, "Optimization"

Risks:

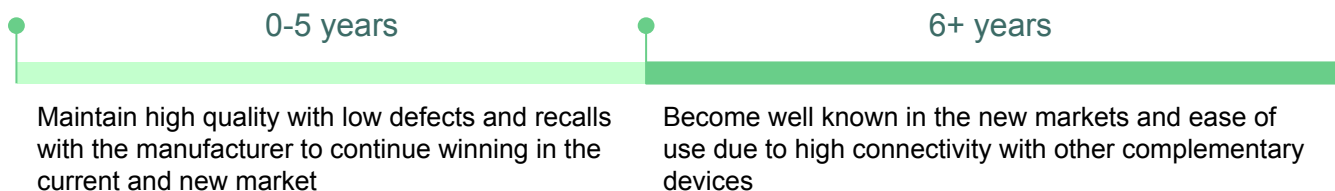
- Bargaining Power of Suppliers increase if Wemedics relies heavily on external suppliers while new entrants and competition in the market become high
- Manufacturers did not deliver quality causing brand reputation and costly recalls
- Costly partnership with technology providers, telecom, and operation system with minimal return

Measures of Success:

- Number of long terms productive employees
- Rate of employee engagement
- Number of defects and recalls on launched products
- Number of sales and market growth in new markets
- Return on Investment with technology providers, telecom and operation system partnership

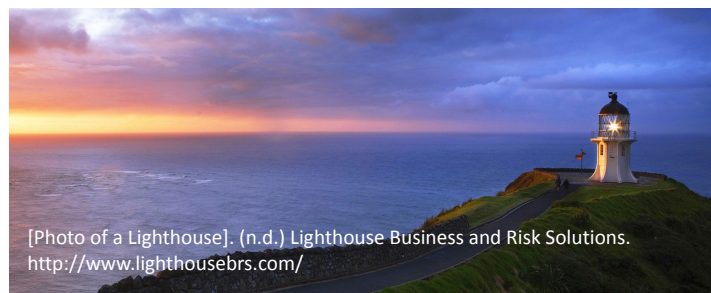
Core Competencies/Resources:

- Team of engineers, developers, and designers
- Knowledge bank
- Smart partnering, outsourcing, and legal leadership



Outlier Strategy 1: Lighthouse

Follower x Optimization, “Active Waiting”



This moderately safe strategy allows Wemedics to grow and build organizational resiliency while exploring new terrain. Some stakeholders are risk-averse and so this provides a good balance. They focus on current products, internal training, and customer service to maintain customers. These are all internal functions Wemedics has high control over, as so is highly feasible. They are vigilant and allocate some budget in R&D and improving current products. They watch competitors' performance in markets (ex. CIMON, Robonauts) and partner with space institutions, so Wemedics learns from their experience.

Key Trends and Drivers are:

- Booming wellness market
- Destigmatization of mental health

Activities:

- Moderate R&D investment
- Look into products for new markets
- Watch new space health products fair
- Upgrade current products
- User feedback/testing
- Upsell current customers
- 24/7 customer service, dedicated account manager
- Cross-department training to build knowledge
- Copyrights
- Upskill employees

Capacity to Implement:

- Focus on internal operations, highly controllable
- Change management is crucial
- Need to stay vigilant and act quickly if needed

Signposts for Readiness:

- Increasing customer retention
- Open information management system in place
- Ability to act quickly and incorporate feedback
- Cohesive and transparent team culture

Risks:

- Fewer innovative products created
- Have to play catch up
- Strategy is reactive to external events
- Competitors may race ahead
- The ability to learn from competitors is not successful

Core Competencies/Resources:

- Team of engineers, developers, and researchers
- Knowledge bank and creation
- Small and nimble

Measures of Success:

- Number of prototypes made from R&D
- Positive feedback of product upgrades
- Growth of current product sales
- Upselling customers, customer retention
- Increase NPS

0-5 years

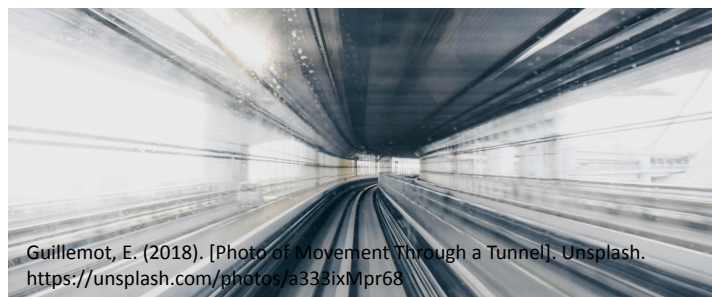
6+ years

Increase budget for R&D, hire customer service team, cross-functional teams set up, adaptable product development process=

Increase customer base and LTV, new iterations of products launched (especially for new markets), solidify partnerships with NASA and universities

Outlier Strategy 2: Black Expansion

Leader in Market x Change, "Aggression"



It is high risk to pursue this as the next five years' strategic goal. Yet, it has a long-term potential with the need to develop additional capability and monetary investment. Black Expansion is a strategy to partner with emerging markets' stakeholders, such as NASA and ESA with more R&D and experimental approaches for advanced mental health products. It will also employ a fully vertical integration approach - owning manufacturers - to ensure engineering efforts are flawlessly produced and retain any intellectual properties. It will aggressively headhunt for talents to create new brands and products to enter the growing and untapped European, Asian, and space markets. It will also explore asteroid mining for new and special materials.

Key Trends and Drivers are:

- Growing concerns of mental health and exacerbated during COVID-19 opening up huge potential and appetite
- Indication of the market potential in Emotion AI across diverse industries, including space
- Asteroid mining for new materials is also raising

Activities:

- Continue building strong talent, R&D, patents (intellectual properties), affective computing, and reputation to win noticeable partnerships
- Start building out innovation strategy, capability, and high experimental culture to support radical partnerships and radical innovations
- Start building a fully vertical integration structure through capability building and structures integration, as well as talent hunting to manage and ensure intent, outcome, and execution aligned in the vertical structure

Capacity to Implement:

- Track record of patents and success
- Strong product quality adhered to mental health regulations
- Strong brand reputation in the market

Signposts for readiness:

- A strong leadership team that supports radical innovations
- NASA and or ESA look for partners especially for the space economy in the personal market

Risks:

- High cost in investing headhunted talents, experimental culture, radical innovations, and a vertical integration structure without a long term and tracking plan and it takes time before an obvious monetary return
- The threat of substitutes by emerging markets' stakeholders, such as NASA and ESA

Core Competencies/Resources:

- Strong leadership team
- Existing library of knowledge and R&D practices
- Existing innovative culture
- Steady staffs

Measures of Success:

- Continue signals of product and market success
- Continue profits and strong partnerships
- On track change management if and when this strategy is being executed

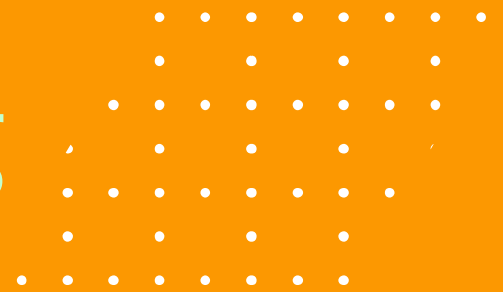
0-5 years

6+ years

Continue building out talent pool, patents, market share, and brand for future possibilities

Revisit this strategy to see if the company and the environment are suitable to expand significantly

Windtunnelling and Future Recommendations



Windtunnelling

To test the robustness of each strategy, we conducted Windtunnelling. Windtunnelling is a great method to use to build strategic preparedness. This is where the business idea is confronted with the developed scenarios to test whether it is the right formula to face the future (van der Heijden, n.d.) The options will fare differently across the different scenarios.

Evaluation

	TechnoHealth					Zen Tech					Timor Machina					Cloud State					Total
	F	S	R	C	=	F	S	R	C	=	F	S	R	C	=	F	S	R	C	=	
1. Safe Bet	2	2.5	3	1.5	9	2	2.5	2	1.5	8	1.5	2	2.5	2	8	2	2.5	2.5	2	9	34
2. Big Fish	2.5	2.5	2.5	2	9.5	2.5	2.5	2.5	2	9.5	1	2.5	2	2	7.5	1.5	2.5	2	2.5	8.5	34.5
3. Golden Roots	2	1.5	2.5	1.5	7.5	2	1.5	3	1	7.5	2	2	2.5	1.5	8	2.5	3	2.5	2.5	10.5	33.5
4. Bridging Out	2.5	3	1.5	3	10	2.5	3	2	3	10.5	1.5	1	1	2.5	6	1.5	2.5	1.5	3	8.5	35
Outlier 1 Lighthouse	2	2	2.5	1	7.5	1.5	1.5	3	1	7	1.5	1	1	1.5	5	1.5	1.5	2.5	1.5	7	26.5
Outlier 2 Expansion	2.5	2.5	1.5	3	9.5	2	2.5	2	3	9.5	1	2	0.5	2.5	6	2	2.5	1.5	2.5	8.5	33.5

F= Financial Fit S= Strategic Fit R= Low Risk C= Cultural Fit

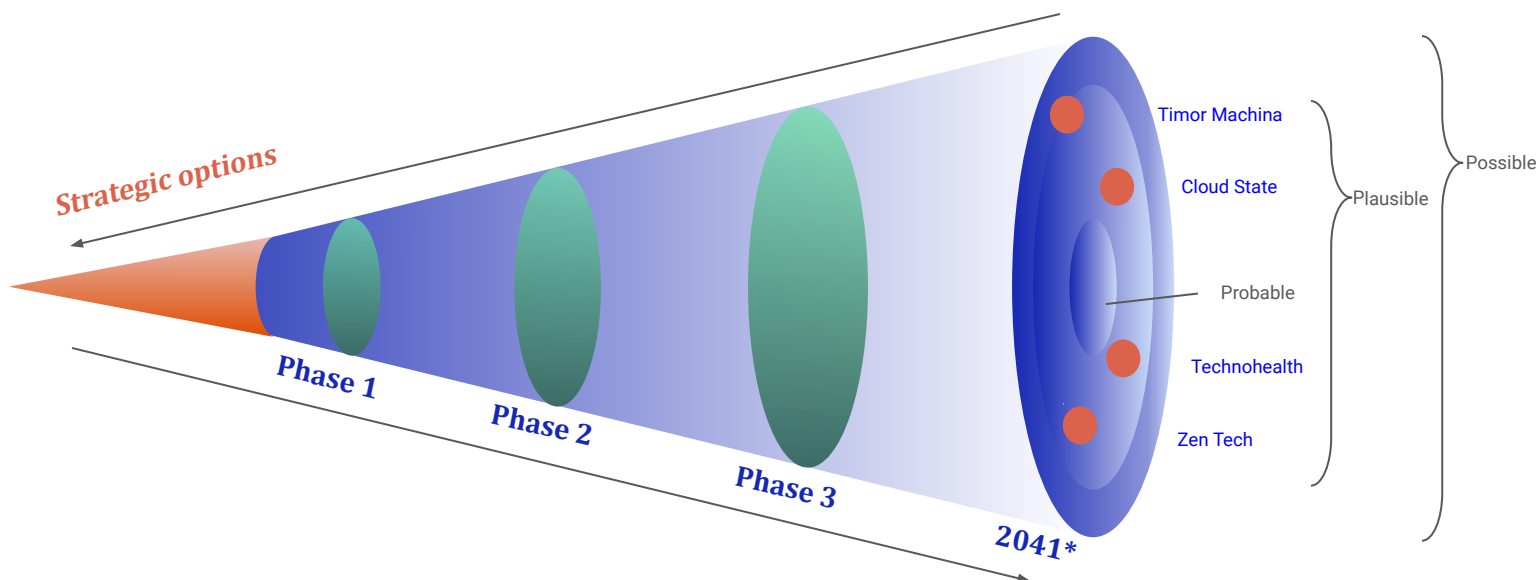
This table shows our windtunnelling evaluations. Each row represents a strategy and each column contains the criteria we evaluated per scenario. Our criteria included financial fit, strategic fit, risk, and cultural fit. We determined Bridging Out, a semi-aggressive strategy would be the best strategic option to perform well in all four scenarios. The runner-up was Big Fish, which aims to dominate the current segment and focus on the benefits of affective computing targeting the B2C/private market. The strategy that came in third was Safe Bet, which makes concrete efforts to remain a top leader of AI wearables in health care. Highlighted in the totals for each scenario is the strategy that performed the best for that scenario.

Evaluation Criteria

In the windtunnelling evaluation, we used four criteria: financial fit, strategic fit, level of risk, and cultural fit. These four criteria represent alignment with Wemedics' mission, their staff, financial and operational feasibility, and amount of risk Wemedics is willing to take on. We wanted to ensure Wemedics' internal integrity and ability to grow were respected in our final recommendation. Below shows the grading system based on a three point system, one being least fit and three being the best fit.

	Financial Fit	Strategic Fit	Low Risk	Culture
1	Break-even or less. Lacks profit to reinvest.	Does not have the capabilities or resources.	Faces multiple risks. Puts future and current assets in danger (ex. public reception, finances, brand, IP, opportunities).	Goes against Mission, Vision, and Values. No team buy-in. Requires hiring and re-training staff.
2	Growth up to 150%.	Capable of executing strategy. Aligns with goals and business model.	Faces one or two risks.	Unable to fully achieve Mission, Vision, and Values. Moderate team buy-in.
3	Exponential growth 150%+. Revenues far outweigh cost to implement. Leader in the market.	Beyond capable of executing strategy. Additional resources on hand.	No or minimal risks.	Achieves Mission, Vision, and Values (provide accessible mental health products, #1 brand in market, ethical). Full team buy-in.

Recommendations



The Cone of Plausibility serves as a graphical illustration of the relationship between the present moment in time and the certainty of our knowledge about future events (*The Cone of Plausibility Can Assist Your Strategic Planning Process*, 2019). This tool helps to situate Wemedics and what future scenarios may lie ahead. To understand the future context in greater detail, we looked forward, as well as backcasted from 2041 to the present. Within the Cone of Plausibility, we looked for directionality of The Four Generic Archetypes along with drivers and emerging trends.

In reviewing our windtunnelling results, we suggest a combination of flexible and multiple coverage strategy over the next 20 years. The combination of strategies we have chosen had the top final scores and is a mix of high and low effort, which will not overburden Wemedic's capacity. Regardless of the scenario we find ourselves in, the strategic option Bridging Out performs well and suits Wemedic's internal capabilities. This strategy has growth potential and succeeds in technology-driven scenarios such as The Big Bang on Techno-Health and Zen-Tech Exploria. These two scenarios are more likely to occur. Their trends and signals are strong in the near future, as they represent elements of continued growth. As such, Bridging Out is the most suitable and profitable in the short to medium term.

The scenarios, Timor Machina and Cloud State are less likely to happen. If they do, their maturity is most likely to be in the mid to long-term. It is uncertain if a data and technological collapse would happen. We will continue to scan for signposts of these scenarios emerging, which will trigger Wemedics to transition to the Big Fish and Safe Bet strategies. We have time to prepare for those scenarios by implementing low-medium effort strategies such as Big Fish and Safe Bet. As technological distrust rises, customers may grow hesitant about new technological products. So maintaining Wemedic's familiar products and loyal customers is key, which these two strategies centre. This combination of strategies leverages both the B2B and B2C markets and maintains future options, no matter the scenario.

Strategic Pathway

This three-phased flexible, multiple strategic plan reflects our Cone of Plausibility mentioned earlier as Big Bang on Techno-Health and Zen-Tech Exploria are likely to occur as they have express trends and signals of the continuation of our current state. Timor Machina and Cloud State are more likely to occur in the distant future and less possible. Each phase should overlap to ease the transition as signposts begin to appear.

	Phase 1: Bridging Out	Phase 2: Big Fish	Phase 3: Safe Bet
Summary	<ul style="list-style-type: none"> Expand products, test new markets Grow base products to fund new research/products Outsourcing, networking Build on core capacities, retain staff 	<ul style="list-style-type: none"> Exploit current market segment Advertising, address customer concerns Earn trust, win over hesitant customers 	<ul style="list-style-type: none"> Existing products are at the core Customer service, lock in customers Stakeholder engagement Protect brands/patents
Signposts	<ul style="list-style-type: none"> Continuation of free market Cost of tech dropping Continued digitization of life Destigmatization of mental health 	<ul style="list-style-type: none"> Data regulations Data breaches/hacking Tech giants breaking up Tech products being recalled 	<ul style="list-style-type: none"> Rejection of tech Return to more traditional tech Public criticisms of tech companies
Transition	<ul style="list-style-type: none"> Train and prepare staff for change Innovation to prepare for different scenarios 	<ul style="list-style-type: none"> Hold on to current customers and diversify customer base Follow changing regulations closely Conduct user research 	—
Measures of Success	<ul style="list-style-type: none"> B2C sales increase Interest from institutions/B2B sales 	<ul style="list-style-type: none"> Customer/brand recognition Positive brand associations 	<ul style="list-style-type: none"> Lock in long term government contracts Use of their original products

Phase 1: Bridging Out

For the upcoming first five years, we suggest starting with Bridging Out, the semi-aggressive strategy. Wemedics should set up a network of partners and suppliers so that they can be leveraged in the future. Areas that Wemedics can outsource are manufacturing, sales, and customer service (primarily B2C). Shifting responsibilities will allow them to build upon their core capacities. Plan to attain research grants and maintain healthy relationships with your stakeholders/suppliers.

Recommendations

Main signals that validate this strategy include continued digitization of life, decreasing costs of tech, and destigmatization of mental health. Measures of success for this strategy include B2C increase and interest from institutions/B2B sales. Internally, Wemedics need to maintain good employee retention through having attractive positions and non-compete agreements.

We expect elements of, the scenarios, Zen-Tech Exploria and The Big Bang on Techno-Health, to appear here. They are supportive of big out-of-the-box ideas, innovation, risk-taking, and have a culture of adventure. Wemedics should take advantage of this playful arena and expand on their ideas, test new markets. They will continue to grow their base products and use their sales to fund new research and products.

Phase 2: Big Fish

When signposts such as the break down of tech giants and an increase in data regulations occur, Wemedics should adopt the Big Fish strategy. This is a fairly ambitious strategy, but builds in a safety net, as it focuses on a familiar terrain. Wemedics aims to lead the segment through advertising and ensuring its products are top of mind. They will focus on well-performing product features and address any customer concerns that may arise in the tech-averse scenarios, Timor Machina and Cloud State, such as data privacy. This will earn customer and investor trust, and may even win over hesitant customers. Measures of Success for this strategy include customer/brand recognition and positive brand association such as trust.

Phase 3: Safe Bet

Finally, Wemedics should move to Safe Bet, within 10 to 20 years if signposts, such as the return to more traditional technologies and public criticisms of tech companies, begin to arise.

This strategy will continue nurturing customers to lock them in, through high-quality after-sales customer service. As attitudes regarding technology shift, Wemedics will need to increase their level of stakeholder engagement to ensure relevant feedback and track customer, government, and partner sentiment. They will build off of their long-standing brand reputation and protect their IP/patents. A diverse clientele will help buffer against extreme losses. If the future of well-being is institutional, their B2B products may be suitable for government clients. Measures of Success include long-term government contracts and the use of their original products.

Conclusion

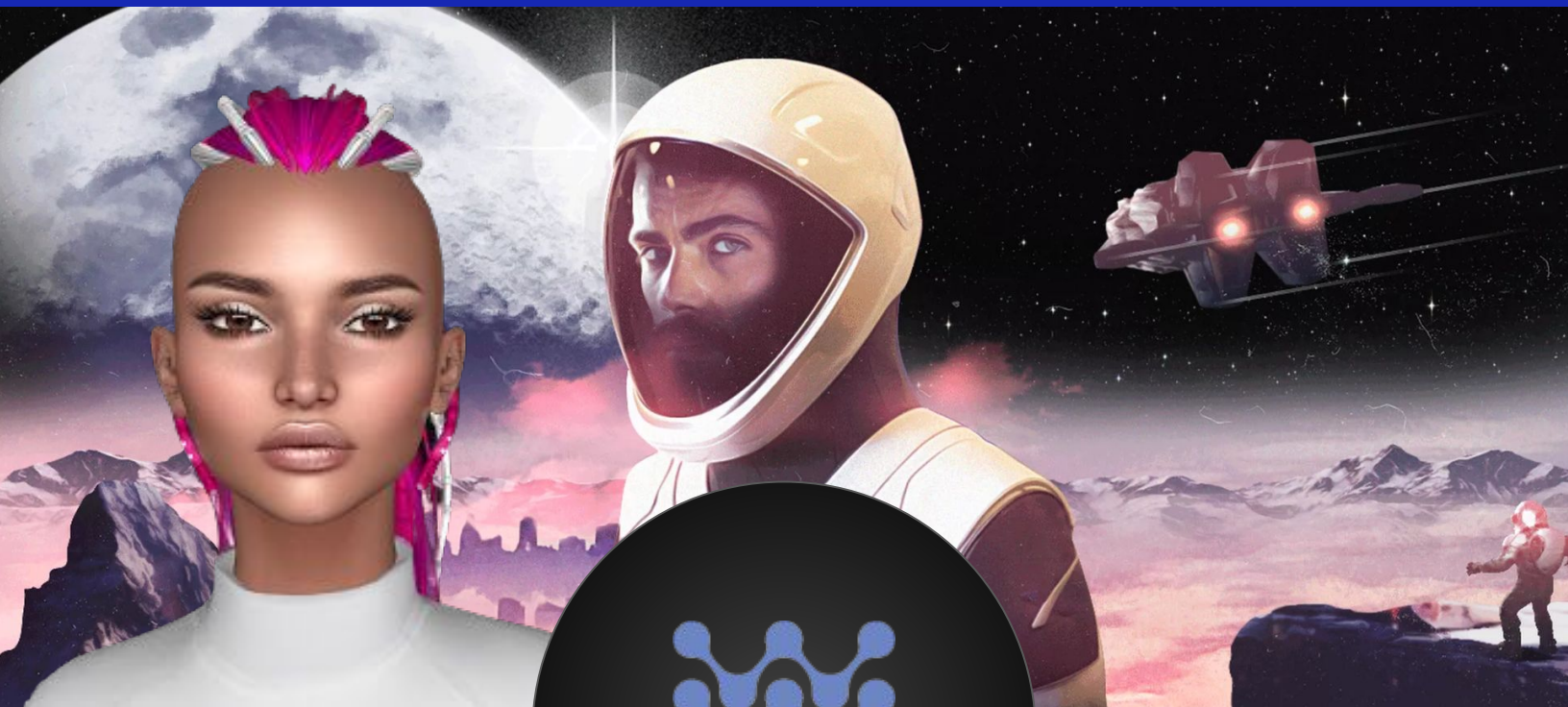
Conclusion

Well-being is a complex concept and there is no indication that this will change in the future, yet, thanks to advances in technology, medicine, and research, maintaining positive well-being is becoming more and more achievable for everyone through computers, gadgets, and other tools. With the growing destigmatization of mental health along with increasing advances in the industry, such as Emotion AI, Wemedics is presented with an opportunity to intervene and position itself as a company that values and seeks to highlight the importance of psychological well-being and allow anyone to take their mental health into their hands.

As Wemedics is in a privileged position to be a leader in the market, we recommend taking advantage and carry out a short and long-term strategy. They must be consciously and aware of trends and emerging drivers that may affect the development of the industry and the company positively or negatively, knowing how to identify them and adapt their strategy. Through scanning, our team identified some windows of opportunity for Wemedics, such as space exploration. Bearing in mind that it is a little-explored territory but with incredible growth potential and current efforts in this area are focused on making it more accessible, some gaps are being neglected for the moment. The harsh, zero-gravity environment of space challenges one's physical and psychological wellbeing especially when required to stay in space for long periods. As William Gibson states "*The future is already here – it's just not evenly distributed*" (Chatterton & Newmarch, 2017). Being extra attentive about one's surroundings and inner conflicts will put Wemedics ahead in the competition.

To develop a foresight scenario planning, and with the influence of Jim Dator's Generic Archetypes, our team created a set of four scenarios to provide alternative futures of 2041 which could allow Wemedics to anticipate and respond to different futures. The Cone of Plausibility conveyed how these scenarios related to possible, plausible, preferred futures that a biotech company such as Wemedics could face. The recognition of signals and trends of each unique scenario enabled Wemedics' success by broadening its knowledge about alternative futures. To ensure Wemedics is prepared to respond strategically to the alternative futures, our consulting team performed windtunnelling and participated in a strategic conversation among foresight and business stakeholders. This enabled long-range strategies that Wemedics can use despite the future scenario it finds itself in.

Finally, our consulting team strongly recommends that Wemedics continues to work on their scanning to review and assess their strategies and matrix annually for business success, especially wary for emerging fields, like AI and space. The maintenance of one's wellbeing is important for everyone no matter their race, gender, culture, age, ethnicity, or sexual orientation, so it is no longer a fad to embrace wellness as an ideal state. As Wemedics' mission is to empower people to take their psychological well-being into their own hands, they should devote the time and resources to reach as many diverse stakeholders and customers as possible for it will create a better, more desirable future approach to wellness.



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Strategic Options and Windtunnelling

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Appendix

Appendix A: Scenario Development

Our Process

1. We began with individual desk research under an undirected viewing approach for a broad scan of signals, trends, and drivers related to our topic – psychological wellbeing within The Future(s) of Space.
2. We reviewed our signals, trends, and drivers using the STEEPV (+Event) framework to deepen our understanding of the contexts and potential influences presented.
3. We then practiced multiple foresight scenario-making methodologies, including 2X2, The Four Generic Archetypes, Causal Layered Analysis, and the Manoa method.
4. We decided to use the 2X2 framework with inspiration from The 4 Generic Archetypes. While the 2x2 is “well-promoted in Foresight literature and appears to need less interpretation” (Curry & Schultz, 2009, p.42), which provided us clarity and distinctions, The Four Generic Archetypes provided a better understanding of what was happening in the broader environment than using the 2x2 alone. Combining the two frameworks gave us a more wholesome look to inform potential changes, patterns, and directions. There were noticeable overlaps in ideas between the two frameworks, as shown below:

Archetypes	The Four 2X2 Quadrants
Continued Growth	Individual x Tech Acceptance
Collapse	Individual x Tech Rejection
Discipline	Institutional x Tech Rejection
Transformative/Spiritual Transcendence	Institutional x Tech Acceptance

Appendix A: Scenario Development

5. The two axes our group selected were Institutional/Individual and Technological Acceptance/Rejection. These are high-impact forces and remain uncertain.

Institutional/Individual

In North America, individualism and the free market are valued and are dominant forces in how we conduct day-to-day activities. Within well-being, this can be observed as having many options, personalized medicine, and the individual having a large influence in their health care. Individual or community-based care has shown success, but some have also been undertreated. On the other side of the spectrum, institutionalized medicine and care have been a dominant system before deinstitutionalization in the 1950s. Mental health was mainly in the care of government facilities, hospitals, rehabilitation centers, restricted to the domain of clinical psychiatry. While they were accessible, they were often underfunded, and patients were poorly treated. In the early 2000s, placing mental health in the hands of the community and de-stigmatization of mental health became more apparent as proclaimed by the WHO (Bertolete, 2008). There is tension between these two forces, each with its own pros and cons.

Technological Acceptance/Rejection

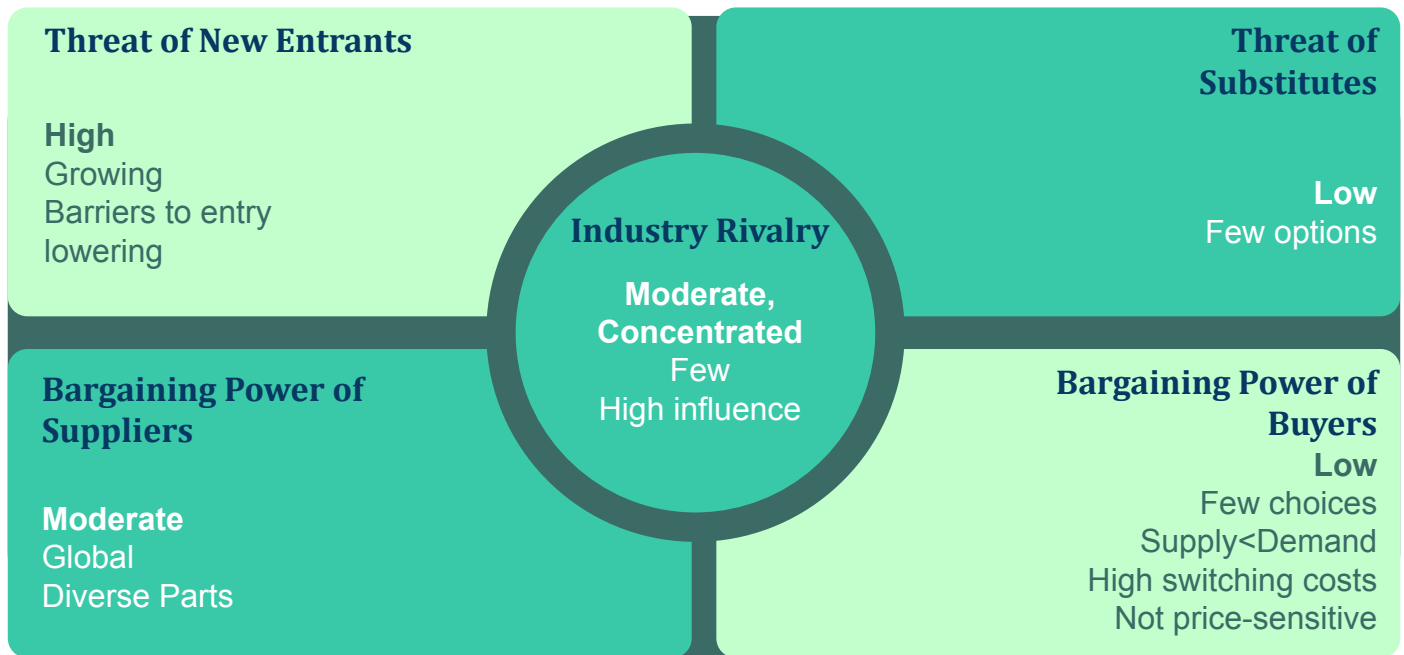
The role of technology in humanity and who controls it is an ongoing debate existing since its inception. Technological acceptance in society is defined as the technology being net positive, the human and machine relationship becoming closer and welcomed, and more day-to-day dependence on technology. Despite the benefits of technology, there are intentional and unintentional negative consequences. There are growing concerns about the ethics of AI, data privacy, safety, and the loss of human agency. This will impact how technologies will be adopted and regulated in the future (Funk et al., 2018).

6. We then outlined the potential elements in each scenario, including what a day-in-the-life of each would look like. Elements include setting, place, characters, organizations, plot, and theme.

7. Through iteration, we further identified drivers, trends, and critical uncertainties then distinguished our four scenarios toward possible, probable, and or plausible futures.

Appendix B: Porter's Five Forces

Understanding the Landscape



Appendix C: Forming of Strategic Options

- Original strategy
- New strategic acts.
- Trends & drivers

Change	Restructuring management	Stop using external SDK	Buy out companies	booming wellness market	products version 2.0	Expanding into international markets	Humanized robots	New, radical products	Humanized robots	Intense head-hunting	Expanding into international markets
	extreme imitation	Continue expanding capital and funding streams	Destigmatization of Mental Health	consider refinancing	Fake news & conspiracy theories	Destigmatization of Mental Health	intl' ventures on same markets	vertical integration	Space exploration	Destigmatization of Mental Health	new industries
Optimization	more R&D	Destigmatization of Mental Health	save \$\$, reduce costs	Social movements around bias & polarization	more PR & advertising for sales	fund research to gain insights on new markets	AI/Tech regulations & data privacy on the rise	Internal growth and culture	improve manufacturing and operations	Cost of tech decreasing	
	booming wellness market	improve current products & cust. service	focus on training	more investment in current products	booming wellness market	entering trade shows competitions	outsourcing	Surveillance & Big Jumbo satellites	partnering with industry leader		
Conservation	focus on regional growth instead of international expansion	improving customer relationships	Cost of tech decreasing	save \$\$, reduce costs	Fake news & conspiracy theories	double down on current markets	Cost of tech decreasing	market sustention	booming wellness market	Expand to different industries	
	Downsizing	Trade offs (i.e. new business ventures)	AI/Tech regulations & data privacy on the rise	Lock in customers	Social movements around bias & polarization	AI/Tech regulations & data privacy on the rise	Patent exclusivity	great focus on their heritage	Destigmatization of Mental Health	dominate sales of current products	incremental upgrades
Follower			Leader in the segment				Leader in the market				

Appendix D: Strategy Evaluation

1	Not applicable
2	Not as applicable
3	Neutral
4	Applicable
5	Very applicable

Strategy selection criteria

Strategy	Financial feasibility	M/V/V	Low Risk	Core comp.	Resource capacity	Stakeholder fit	Achievable in 5 years	Plays on trends	Total
Follower x Conservation (Waiting)	5	1	5	1	4	2	5	1	24
Follower x Optimization (Active Waiting)	3	3	4	3	3	2	5	2	25
Follower x Change (Attacking)	2.5	4	3.5	4	2	4	4	2	25
Leader in a Segment x Conservation (Defense)	4	3	5	2	4	3	5	3	29
Leader in a Segment x Optimization (Active Defense)	3	4	4.5	4	3	4.5	4	4	31
Leader in the Segment x Change (Relaunch)	1.5	5	1	5	2	4.5	2.5	5	26.5
Leader in Market x Conservation (Waiting)	5	3	5	3	4	3.5	5	2.5	31
Leader in Market x Optimization (Optimization)	3.5	4	3	5	3.5	5	3.5	2	29.5
Leader in Market x Change (Aggression)	1.5	5	1.5	3.5	2.5	4.5	2	5	25.5

Appendix E: Full Strategic Options Descriptions

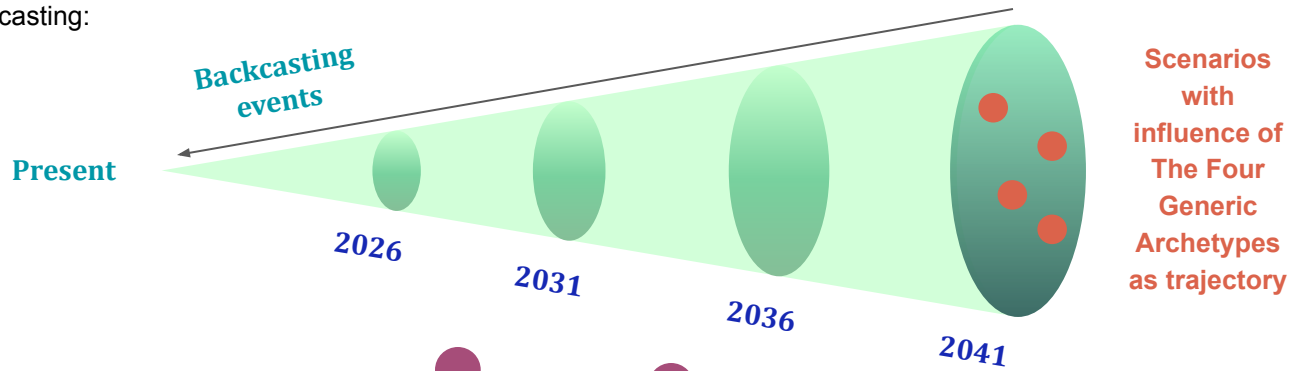
Best fit strategies

Outlier strategies

Strategy Name	Strategy Type	Description
—	Follower x Conservation (Waiting)	The company plays it very safe by focusing on downsizing and waiting on market leader to make the first move, and see what data regulations come into place. Low effort.
1.Lighthouse	Follower x Optimization (Active Waiting)	The company plays it moderately safe. They focus on current products, internal training, and customer service to maintain current customers. They are vigilant and allocate some budget in R&D, prototyping, and improving current products. Medium effort.
—	Follower x Change (Attacking)	The company acts more aggressively by buying out companies and imitating their competitors products and marketing. They also headhunt for better talent. They are no longer using Affectiva's tools/AI and develop confidence in their products. They use patents and copyrights to protect their assets. Medium to high effort.
1.Safe Bet	Leader in a Segment x Conservation (Defense)	To maintain their position as #1 in the market, the company acquires patents. They are protect their value proposition by promoting data privacy features and investing in customer service for current customers. Low effort.
2. Big Fish	Leader in the Segment x Optimization (Active Defense)	The company aims to dominate the current market segment (adult mental health) and satisfy as much of the demand as possible, through increasing advertising, brand building, and sales activities. They use profits from their core market to fund research into new markets and trends, such as space. Medium to high effort.
—	Leader in the Segment x Change (Relaunch)	The company develops improved versions and new products within the same brands, such as launching within adjacent industries: smart homes, humanized robots, space exploration, and settling people's nervousness surrounding surveillance/fake news. They also venture internationally and take on a variety of clients. High effort.
3. Golden Roots	Leader in Market x Conservation (Waiting)	Incremental upgrades to current products are made. They research other industries for possible entry and distribution. They focus on the history, past success of their products, keeping their original integrity. Low effort.
4. Bridging Out	Leader in Market x Optimization (Optimization)	The company partners with industry leaders to improve manufacturing and operational processes. They focus on core competencies and outsource skills they lack. Through partnerships, they are able to enter new markets (i.e. connecting with other complementary devices/services, such as surveillance technology). Medium effort.
2. Black Expansion	Leader in Market x Change (Aggression)	The company partners with key organizations in emerging markets and are more experimental. Product development is vertically integrated and they aggressively headhunt for talent. They create new brands and enter new markets. Asteroid mining is explored for its special materials for production. High effort.

Appendix F

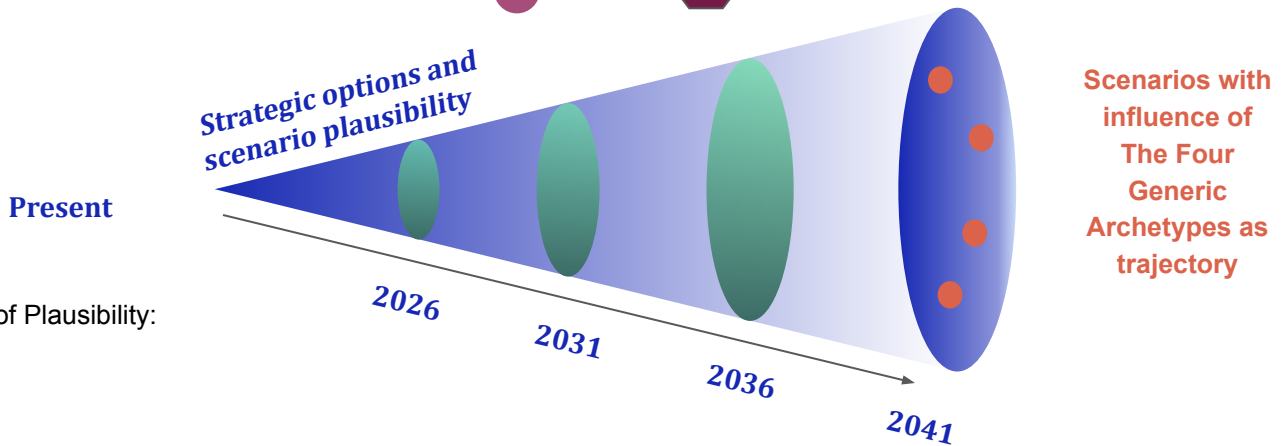
Backcasting:



Drivers/
Emerging trends

Scenarios with influence of The Four Generic Archetypes as trajectory

Cone of Plausibility:



Strategic options and scenario plausibility

Scenarios with influence of The Four Generic Archetypes as trajectory

When combining the backcasting technique, to understand the greater future context, and the Cone of Plausibility tool to look for directionality with The Four Generic Archetypes along with drivers and emerging trends, we found that the affective computing market and the emerging space market are **critical uncertainties**. This will require Wemedics to employ a high agility operation to revisit and switch strategic options and tactics annually. This is a flexible and adaptive approach requiring constant leadership attention and timely reactions to threats and changing signals. Thus, requires higher investment and higher operation cost for Wemedics than compared to 3 phases recommendation mentioned previously.