

STEP 1. Identify Challenges

Read the Future Scene carefully and generate ideas for challenges, concerns, and possible related problems. Choose the 16 most important challenges and write them in the space provided

1	On Ganymede, there are hydro-farms that provide the inhabitants with nutritious food. This may be a challenge, since according to lunarponics.org, they would need to specifically mimic the soil and nutrients that are on Earth for the food, and if they cannot, they may be left without proper nourishment.
2	In 2045, Blair Legrand's business is launching hoverpods that utilize magnets with Ganymede's natural iron core. This may be a challenge for the corporation, because if these hoverpods malfunction, it may reflect badly upon the company.
3	In the future scene, the settlement utilizes Photosynthesis hubs to supply oxygen. This may be a challenge for the settlement on Ganymede because according to Science Daily, when plants absorb energy from sunlight to photosynthesize, the "extra" energy reacts with oxygen in plant cells to produce harmful oxygen species. This could create a negative effect on the photosynthesis hubs and the oxygen they produce for the settlement.
4	According to research, changes in gravity can take a serious toll on the human body. In 2045, in Ganymede, although their time on the newly formed planet has been fairly short, some colonists have already suffered vision loss and other ailments as a result of low gravity. This may be a challenge because the colonists may not have stayed on the planet long enough to gauge the long-term effects that this change in gravity could have on the human body, and they may suffer even more serious consequences in the near future.
5	In the future scene, there are six settlements on the planet Ganymede. This may be a challenge for the inhabitants, because there may not be a way for all the settlements to be interconnected and commune with each other, especially if they come from different places and speak different languages.
6	In the future scene, some members of Ganymede grieve from losing family members from when the GanyShuttle flew to close to Jupiter. This may be a challenge for the family members of those on board the GanyShuttle, because if they are grieving about losing that relationship, then they may no longer make new relationships in fear of losing them and being emotionally hurt even more.
7	In 2045, mankind has created a brand-new civilization on the planet Ganymede. This may be a challenge for the citizens, because the planet may be rather stark and lack calming or pleasing colors, as opposed to Earth's many natural wonders.
8	In the future scene, registered citizens age 12 and up are allowed to vote in the planet's first presidential election. This may be a challenge for the government of Ganymede because the young children may not know enough about what their planet truly needs, and it may result in the wrong person being elected to office.
9	On Ganymede, a completely new civilization is being created independent of Earth. This may be a challenge for the civilization, because there may be complications in creating a justice system for a brand new society on a different planet.
10	In 2045, some citizens of Ganymede are concerned about radiation exposure. New illnesses are arising due to radiation. This may be a challenge for the Ganymede civilization because according to BBC news, it is extremely difficult to treat high radiation exposure. It may be hard to protect the citizens from the new radiation illnesses that are arising.

11 In the future scene, Ganymede settlement uses Nuclear Fission technology to provide energy to the settlement. This may be a challenge because according to research, most budgets for nuclear fission technology are in the billions. Since Ganymede is using so much of this type of energy, they may not have the monetary means for other important needs during their terraforming process.

12 In 2045, the voting age in the Ganymede settlement is 12 or older in Earth years. This may be a challenge because since the voting age is so young, they may not be as educated on the important processes that are happening in Ganymede, such as terraforming, to be able to pick a suitable choice for a president.

13 In 2045, in Ganymede, the inhabitants of Ganymede are using hoverpods to travel swiftly around the planet. This may be a challenge for the Ganymeders, because if these hoverpods were to fail in transporting people or materials, the Ganymeders may not be able to support all its inhabitants effectively in order to keep the colony going.

14 In the future scene, Ganymede needs everyone living their to do their fair share of work in order to maintain a good quality of life. This may be a challenge for the Ganymeders, because if they were to become overwhelmed with work, they may develop chronic stress, which according to WebMD, can cause many mental disorders including depression, anxiety, and personality disorders.

15 The scientific community has done something that has never been done before in the history of man kind with the creation of the new planet, Ganymede. This may be a challenge for the scientific community, because they may face some backlash from some environmentalists who believe that it is immoral to create a new planet to live on when we can't take care of the one that we've been on for thousands of years.

16 In the future scene, the planet of Ganymede is still fairly new, and there are many tasks that must be completed to establish themselves as a colony. This may be a challenge for the citizens of Ganymede, because they may be so consumed by the work that they have to do to keep the new society afloat, they may not have any time to enjoy themselves, which could lead to long-term stress-related issues.

STEP 2. Identify the Underlying Problem

Using the challenges listed in Step 1, identify a problem of major importance to the Future Scene situation. Write your Underlying Problem making sure your question clearly explains the action that will be taken and the desired results/goal of that action.

Based on challenge 1

In 2045, when the colonists face some serious flaws in their society's infrastructure that may leave them ill-prepared to face the challenges that terraforming a new planet may bring, how might we increase the sustainability of Ganymede, so that the new colony may thrive in 2045 and beyond?

STEP 3. Develop Solutions

Generate solution ideas to the Underlying Problem in Step 2. Choose the 16 most effective solutions and write the elaborated ideas in the space provided.

1 MakerBot will create the "3-D Suit." This will be a spacesuit for the citizens made of 3-D printed aerogel and demron. Demron is a material meant to block radiation, and according to astronomy.com Discover, a mere two centimeters of aerogel can block up to 60% of UV radiation. This spacesuit will be customizable and available in a wide array of colors and designs tailored to the aesthetic preferences of the colonists. This will help sustain the society by protecting them against the radiation causing them to become ill.

2 The newly formed government of Ganymede will introduce some mandatory regulations on the usage of resources in the new planet. These regulations will include timers on water usage, rationing the amount of food distributed per day, and curfews for leaving lights on indoors to save energy. This will benefit Ganymede by ensuring that their resources are used as efficiently as possible, and nothing ever goes to waste.

3 NASA will create the "Lunar Greenhouse." This will be a hydroponic greenhouse that is set underneath the surface of the planet to help protect against radiation. Nanotubes will be put inside of the food products planted here, which will allow them to have increased detection of nutrients to preform photosynthesis and grow. The roots of the plants will dangle in nutrient-rich solutions reminiscent of the ones of Earth. This way, the colonists will be able to have a more effective way of growing food for themselves and their colony.

4 According to research, in order for a population to have a strong resilience to diseases, they need to have a genetic diversity population of at least 10,000 people. 23 and Me will work with Ganymede to compile a list of potential candidates of different cultural backgrounds that would be willing to move to the new planet. This will increase Ganymede's population and make their population more genetically diverse, which will make them more resilient, should an infectious disease ever breakout across the colony.

5 SpaceX will work alongside the Ganymede civilization to create the "PlanetaryProtector". The "PlanetaryProtector" is a high pressure magnetic shield that orbits around the Ganymede planet. It deflects any harmful outside agents, such as meteors or asteroids that could harm the atmosphere and create damage to the settlement, using a strong magnetic force that creates friction between the shield and the agent. It ensures that the terraformed atmosphere is unceasing and continues to protect the citizens of Ganymede.

6 Apple will create the "Celestial Phone." This will be a phone that allows the user to talk with a virtual assistant embedded in its programming. It will analyze the issues reported to it and using an interconnected system, see what complaints are issued the most among the inhabitants. It will then set up a virtual meet where the colonists can discuss how to best fix any issues or contact people in power. By allowing a wide spread way of communing, citizens and officials will be able to fix problems and sustain the colony together.

7 Lions Club International and the Ganymeders will collaborate to create the "TalkTime." The TalkTime is a weekly meeting that the Ganymeders can choose to attend. This meeting will allow the Ganymeders to discuss and talk about the things that are happening in the colony. They can talk about problems that they are having and potential solutions that could fix the problems. TalkTime will allow the citizens of Ganymede to fix problems and have healthy social interactions while doing it.

8 JAXA will create the "TerraLearn". The "TerraLearn" is a mobile game that can be used by the colonists of Ganymede. Since the voting age is 12 in Earth years, these young adults need to know the basics of terraforming and how it has affected their settlement. "TerraLearn" uses fun interactive games to teach the user about different ways of terraforming, the pros and cons, and what would work on Ganymede. This prepares the user with the information and education they need for important things such as voting for a president for their settlement. It ensures the Ganymede continues to have educated and enthusiastic colonists that know what's best for Ganymede.

9 The US Department of Justice will create the Interstellar Incarceration. This will be a facility that will be placed in each settlement, where all of the colonists that are found guilty of minor felonies and misdemeanors will be transported to. Instead of going through traditional incarceration and being cut off from society, these convicts will be given a second chance at returning to society by being placed in charge of the general upkeep of the settlements. They'll be given the janitorial duties, garbage pickup, and the other behind the scenes professions that keep a community running smoothly. After their sentence has ended, they'll slowly be reintegrated back into society and be given a second chance at life. This will benefit Ganymede by providing them with a long-term solution for the upkeep of the settlements, while also giving citizens who have broken the law a chance at redemption.

10 The colony of Ganymede will enter a collaboration with the European Space Agency to create a corporation called "Logi-Watcher" This will be a company of Ganymede that is concerned with the logistics of the colony. The company will be charged with the creation of new technologies to fix complications, such as the atmosphere and temperature. It will be funded by the ESA to help them with the logistics. The creation of a new corporation will help to sustain the colony by allowing it to be solely focused on fixing problems.

11 Liquidia Technologies will work with the Ganymede settlement to modify their Photosynthesis hubs to create a more sustainable and safe way of creating oxygen. They will use a new method called the "PlanetPlant Method". This method utilizes plant nanobionic technology, which modifies the organelles of a plant so that they are better fit for certain environments. The "PlanetPlant Method" will modify the plants so that they have less chloroplasts. This way they won't absorb as much sunlight, giving less of a chance to create a negative oxygen reaction. This will create a more feasible and safe way to obtain oxygen from the photosynthesis hubs.

12 The United States Federal Gov't will enter in a collaboration with the Ganymede Government to create the "TerraBudget". The "TerraBudget" is a program the utilizes the citizens that are not physically fit to work long hours to do short-term research on different methods of terraforming and how cost efficient they are. They find methods that may be more favorable for the Ganymede settlement based on how costly they are. Once the research is done, they turn it in to the Ganymede Gov't and then they earn money for it. With the "TerraBudget", the Ganymede settlement is able to sustainably spend their money, and not physically fit to work citizens are able to earn a salary for short-term work.

13 Caleb Scharf will work with the Ganymede settlement to create the "CitizenTerraSurvey". The "CitizenTerraSurvey" is a monthly survey that is given to each citizen that is of voting age. This survey addresses different topics such as new terraforming methods that the Ganymede settlement may be tackling, or how the citizens feel about current methods such as the photosynthesis hubs. This survey allows the citizens to express their beliefs on these topics and how the settlement should go forward. This creates a supportable way for the citizens to feel heard and a part of their growing planet.

14 HyperLoop One will create the "HyperTunnel 1". The HyperTunnel 1 is an electric train that can travel at very fast speeds. It does this by creating a vacuum in the tunnel that the train will travel through, which majorly decreases air friction. The HyperTunnel 1 will have a very aerodynamic design and will be made out of titanium, allowing it to be durable but lightweight. The HyperTunnel 1 will allow the Ganymeders to have a safe, fast, and reliable mean of transportation.

15 The American Psychological Association will create the "TerraThera." This will be a VR headset that lets you envision ways to terraform. It will collect this visual data on a database to have ideas on how to terraform the planet. It will also be shooting blue light at you to calm you and let your mind work better while you use it. This sustain the the colony by allowing there to be a constant stream of new ideas to help with its maintenance.

Planet Fitness and Blue Origins will collaborate to create the "EnerGym." The EnerGym is a portable gym that will be assembled on Ganymede. This gym is special because the equipment will harness the energy used to move it and recycle it so it can be used by the colony. The pads in the equipment will be made out of cooling cloth so the user can have a better experience. This will allow the Ganymeders to stay fit and healthy.

STEP 4. Generate Criteria

Generate criteria to determine which solution idea does the best job of solving the Underlying Problem and/or addressing the Future Scene situation. Select the 5 most important criteria for measuring solution ideas and write them in the spaces provided.

1	Because there are still risks with using nuclear fission-generated technology, and ocean-based electrical transmission, which solution will be the most humane for the Ganymede citizens?
2	Since the Ganymede civilization is based upon the principles of equity, compassion, and openness, which solution will be the most reliable for the Ganymede settlement?
3	Because some of the citizens of Ganymede do not have the physical fitness to work long hours, which solution will be the most cost-efficient for all of the citizens of the Ganymede settlement?
4	Since the colonists of the Ganymede settlement face some serious flaws in their society's infrastructure that may leave them ill-prepared to face the challenges that terraforming a new planet may bring, which solution will be the most sustainable for the Ganymede settlement?
5	Because there are many challenges arising due to the high exposure of radiation to the Ganymede settlement, which solution will be the quickest to implement for the Ganymede civilization?

STEP 5. Apply Criteria to Solutions

From the solution ideas written in Step 3, select the 8 ideas with the most potential to solve the Underlying Problem and list them on the grid. Use each criterion to rank the solutions on a scale from 1 (poorest) to 8 (best). The numerical ranking for one important criterion may be doubled.

Rank solutions.

#	Solution	Criteria					Total
		1	2	3	4	5	
1	MakerBot will create the "3-D Suit." This will be a spacesuit for the citizens made of 3-D printed aerogel and demron. Demron is a material meant to block radiation, and according to astronomy.com Discover, a mere two centimeters of aerogel can block up to 60% of UV radiation. This spacesuit will be customizable and available in a wide array of colors and designs tailored to the aesthetic preferences of the colonists. This will help sustain the society by protecting them against the radiation causing them to become ill.	6	2	7	4	2	21

2	<p>NASA will create the "Lunar Greenhouse." This will be a hydroponic greenhouse that is set underneath the surface of the planet to help protect against radiation. Nanotubes will be put inside of the food products planted here, which will allow them to have increased detection of nutrients to preform photosynthesis and grow. The roots of the plants will dangle in nutrient-rich solutions reminiscent of the ones of Earth. This way, the colonists will be able to have a more effective way of growing food for themselves and their colony.</p>	<p>7 5 8 6 4</p>	<p>30</p>
3	<p>SpaceX will work alongside the Ganymede civilization to create the "PlanetaryProtector". The "PlanetaryProtector" is a high pressure magnetic shield that orbits around the Ganymede planet. It deflects any harmful outside agents, such as meteors or asteroids that could harm the atmosphere and create damage to the settlement, using a strong magnetic force that creates friction between the shield and the agent. It ensures that the terraformed atmosphere is unceasing and continues to protect the citizens of Ganymede.</p>	<p>3 4 1 7 6</p>	<p>21</p>
4	<p>Liquidia Technologies will work with the Ganymede settlement to modify their Photosynthesis hubs to create a more sustainable and safe way of creating oxygen. They will use a new method called the "PlanetPlant Method". This method utilizes plant nanobionic technology, which modifies the organelles of a plant so that they are better fit for certain environments. The "PlanetPlant Method" will modify the plants so that they have less chloroplasts. This way they won't absorb as much sunlight, giving less of a chance to create a negative oxygen reaction. This will create a more feasible and safe way to obtain oxygen from the photosynthesis hubs.</p>	<p>1 7 4 8 3</p>	<p>23</p>
5	<p>According to research, in order for a population to have a strong resilience to diseases, they need to have a genetic diversity population of at least 10,000 people. 23 and Me will work with Ganymede to compile a list of potential candidates of different cultural backgrounds that would be willing to move to the new planet. This will increase Ganymede's population and make their population more genetically diverse, which will make them more resilient, should an infectious disease ever breakout across the colony.</p>	<p>5 3 6 3 8</p>	<p>25</p>
6	<p>Apple will create the "Celestial Phone." This will be a phone that allows the user to talk with a virtual assistant embedded in its programming. It will analyze the issues reported to it and using an interconnected system, see what complaints are issued the most among the inhabitants. It will then set up a virtual meet where the colonists can discuss how to best fix any issues or contact people in power. By allowing a wide spread way of communing, citizens and officials will be able to fix problems and sustain the colony together.</p>	<p>8 1 3 5 1</p>	<p>18</p>

7	<p>The newly formed government of Ganymede will introduce some mandatory regulations on the usage of resources in the new planet. These regulations will include timers on water usage, rationing the amount of food distributed per day, and curfews for leaving lights on indoors to save energy. This will benefit Ganymede by ensuring that their resources are used as efficiently as possible, and nothing ever goes to waste.</p>	<p>4 8</p>	
8	<p>The US Department of Justice will create the Interstellar Incarceration. This will be a facility that will be placed in each settlement, where all of the colonists that are found guilty of minor felonies and misdemeanors will be transported to. Instead of going through traditional incarceration and being cut off from society, these convicts will be given a second chance at returning to society by being placed in charge of the general upkeep of the settlements. They'll be given the janitorial duties, garbage pickup, and the other behind the scenes professions that keep a community running smoothly. After their sentence has ended, they'll slowly be reintegrated back into society and be given a second chance at life. This will benefit Ganymede by providing them with a long-term solution for the upkeep of the settlements, while also giving citizens who have broken the law a chance at redemption.</p>	<p>2 6 5 2 7</p>	<p>22</p>

STEP 6. Develop Action Plan

Develop your top-scoring solution idea into an Action Plan. Thoroughly explain how the Underlying Problem is solved, how the plan will be implemented, and how the Future Scene will be affected.

HoloWeb System: Connected

Chat Room SSBC: Online

Hello, Ganymede officials! We've heard of the recent developments with your colony, and we've been putting forth our best ideas to help sustain it. We believe we have found one that truly outshines the others, however. We call it the Lunar Greenhouse. This is a hydroponic greenhouse that lets the plants dangle in nutrient-rich water that mimics the soil on Earth. The crops are also imbedded with nanotubes to help them detect needed nutrients and carbon dioxide and take them for photosynthesis.

We have been receiving some concerns about the fact that we are changing the composition of the crops that are planted. However, the nanotubes do not alter the crops substantially. They simply enhance what was already existing in the plant without changing the base composition of the plants. This shows that our solution will be humane for the citizens and provide them with a food source.

We would not be presenting you with this solution if we were not absolutely certain about its reliability. There was the challenge of having the appropriate sort of soil for the crops. However, the Lunar Greenhouse uses bioremediation, which can fix soil that would otherwise not be suitable. As such, the Lunar Greenhouse will be a reliable, long-term source for the colony since they do not have to be concerned with not having proper soil for the plants. Additionally, we are providing you with a free test batch of plants to determine how well they work on another planet. Therefore, we can allow you to see for yourself the reliability of the greenhouse.

The implementation of the Lunar Greenhouse will be charged at about \$2,500, and for each new batch of crops we will charge \$55. However, if we see that the colony is in need of help, we will provide them with the crops for free. Therefore they will be the most cost-efficient. Our goal is to help these colonists, not to gain profit from our ideas!

In addition, our Lunar Greenhouse will be the quickest to implement. Once we install the greenhouses on the Ganymede settlements, we will be able to put the crops in. The food is already ready to be installed with the nanotubes, so as soon as the Lunar Greenhouse is implemented, it will be ready for use. We also have the holo-prints for the greenhouse already planned and attached in a document that we will be forwarding to you once our meeting ends!

Finally, we have made certain that this will be the most sustainable solution. As aforementioned, we already have ways to ascertain that the soil is appropriate for the crops. The implementation of the Lunar Greenhouse will be sustainable by allowing them a long-term food source as we will keep providing them with crops. Since the greenhouse will be underground, we do not need to be concerned with constant upkeep, as being underground will help protect against radiation. The greenhouse itself will be made out of aerogel, which will further help it be protected from radiation and increase its sustainability.

We truly appreciate you taking the time to consider our solution today! We believe that the Lunar Greenhouse will greatly benefit the settlements on Ganymede and hope that you will approve it. All the best!

Chat SSBC has been ended.

Export