



ANA AVATAR XPRIZE

**DRAFT COMPETITION
GUIDELINES**

March 12, 2018

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LOGO

ANA Avatar XPRIZE
Draft Competition Guidelines
March 12, 2018

The ANA Avatar XPRIZE ('Avatar XPRIZE' or 'AAXP' or 'Competition' or 'Prize') is governed by these Competition Guidelines. Please send any questions or communications about them to avatar@xprize.org

The XPRIZE Foundation may revise these Guidelines during the course of the Competition to provide additional information or to improve the quality of the Competition. Unanticipated issues may arise that will require modifications to these Guidelines. The XPRIZE Foundation reserves the right to revise these Guidelines at any time as it, in its sole discretion, deems necessary or desirable. All registered teams will be notified of any revisions.

These Draft Competition Guidelines are published for review by the public and by potential competitors. Comments and feedback on these Guidelines are welcome: please send comments to avatar@xprize.org and please tell us a little about yourself and your background when you do so. The public comment period will close on June 15, 2018 and a revised set of Guidelines will be published shortly afterward.

Further details concerning the operation of the Competition, such as exact dates and locations of events, specific technical thresholds for performance testing, and other operational information will be published in Rules and Regulations documents throughout the course of the Competition. The Rules & Regulations will be developed by XPRIZE in consultation with the Judging Panel and will be provided to all registered teams.

COMPETITION OVERVIEW

The \$10,000,000 ANA Avatar XPRIZE is a four-year global competition focused on accelerating the integration of several emerging and exponential technologies into a multipurpose avatar system that will enable us to see, hear, touch and interact with physical environments and other people through an integrated robotic device.

The ANA Avatar XPRIZE will incentivize innovators around the world to tackle the grand challenge of overcoming the limits of physical transportation. Teams will collaborate to allow us to more rapidly and efficiently distribute skills and expertise to geographic locations where and when they are needed, bridging the gap between distance, time, and cultures.

The winning team will combine state-of-the-art technologies to demonstrate a robotic avatar that allows an untrained operator to complete a diverse series of tasks, from simple to complex, in a physical environment at least 100km away.

Teams must demonstrate the ability of their avatars to execute tasks across a variety of real-world scenarios. These demonstrations will be designed to represent a diversity of future real-world use cases critical for achieving a “bridge to abundance” in health, environment, food, education, housing, safety, and security. In the future, avatar applications could help provide critical care and deploy immediate emergency response in natural disaster scenarios, stretching the boundaries of what is possible, and maximizing the impact of skill and knowledge-sharing.

COMPETITION STRUCTURE

Registration

Registration is open until 11:59:59 UTC on October 31, 2018. Individual registration is open immediately. Team registration opens when the revised version of these Guidelines is published at the end of the public comment period on June 15, 2018. All registered teams must complete a Competitor Agreement and pay a registration fee of \$1,000 before the registration deadline.

Qualifying Round

The Qualifying Round will last three months following the close of registration, until January 31, 2019. In the Qualifying Round, teams must submit technical documentation describing their current technology assets, their approach to the Competition, a plan for technology development and integration during the Competition, and their plans for further development after the Competition. Judges will review all submissions and select up to 25 teams to participate in the Main Competition.

Teams admitted to the Main Competition will be announced on April 30, 2019.

Main Competition

The Main Competition will last up to 30 months after the Qualifying Round ends. Two Milestone Competitions will be held in April 2020 and April 2021. The Finals will be held in October 2021 unless an Early Finals is announced (see below).

Milestone Competitions

At each of the two Milestone Competitions, teams will be evaluated on the component capabilities their avatar system will need to succeed in the Finals. These “Avatar Physicals” will reward teams for progress towards the Competition goals. Up to five teams with the highest scores at each of the two Milestone Competitions will share a \$1,000,000 Milestone Prize (\$2,000,000 total). Teams that do not share in the Milestone Prize will not be eliminated: all teams will continue to the Finals.

Finals Competition

The Finals Competition will begin with an Avatar Physicals event. The top three qualifying teams will then proceed to three “Evolution of an Avatar” events. At each of these events teams will need to complete a series of complex activities representing the realistic use of an avatar in a future scenario. Each of the three events will be of increasing difficulty, and a team must achieve a minimum score in each event in order to proceed to the next. The Grand Prize will be awarded to the team achieving the highest aggregate Evolution of an Avatar score.

JUDGING CRITERIA AND SCORING

Eligible Entry

An eligible entry is a unique avatar solution that allows a human operator to interact with a remote physical environment through a robotic avatar in a way that is as close as possible to the experience of being present in that environment. An eligible entry includes:

- Equipment necessary for the operator to remotely control a robotic avatar;
- Software platform necessary for all required communications and control functions; and
- A physical robot able to perform the required tests and tasks.

The Competition is focused on the integration of key emerging technologies with the primary goal of optimizing the experience of the user and the secondary goal of optimizing the experience of those interacting with the avatar. Entries will not be judged on the appearance of their robotic avatar: there is no requirement for it to have a particularly humanoid appearance. Technology partnerships and licensing agreements for various components of a team’s solution are permitted and encouraged. Teams are not required to demonstrate a robotic avatar unique to their team.

Judging Criteria

The Judging Criteria incentivize the integration of current state-of-the-art and emerging technologies to enable a robotic avatar that most closely replicates the experience of human presence.

The Judging Criteria will include:

- Objective technical measurements for each metric assessed in the Avatar Physicals
- Objective evaluations of whether each team successfully completes tasks in the Evolution of an Avatar demonstrations

All Judging Criteria for the Avatar Physicals will be evaluated on a pass/fail basis. Table 1 describes representative Judging Criteria for the Avatar Physicals. Table 2 describes representative scenarios and Judging Criteria for Evolution of an Avatar.

Operating Environment

The Avatar Physicals and Evolution of an Avatar testing will occur in a controlled test environment with typical indoor temperature and humidity. XPRIZE will provide sufficient space for each team's operator and avatar equipment. AC power will be available for charging and operation. All operator and avatar equipment must operate untethered, with no power, network, or other cables connected during testing.

Networking

Testing will simulate high-quality networking over a distance of at least 100km. Reliability, bandwidth, latency, and jitter will be representative of the best available public Internet service. Wireless connectivity provided between operator or avatar equipment and the local network will be of 802.11ac quality or better, and all operation will be within 10m of an access point.

Table 1. Representative Judging Criteria for Avatar Physicals

These Judging Criteria illustrate the fundamental capabilities to be evaluated during the Avatar Physicals. A detailed set of specifications and criteria for each Avatar Physicals event at each Milestone Competition and at the Finals will be published in the Rules and Regulations 12 months before each event. The Judging Panel may remove criteria listed here and/or add new criteria to ensure teams are meeting the highest standards of contemporary technology.

Capability	Metric	Example Performance Criterion
Vision	Peripheral Vision	Can you correctly identify an object 90 degrees to the right and 90 degrees to the left without turning your head?
	Range of Motion	Can you look directly at an object 90 degrees to the right and 90 degrees to the left by only turning your head?
	Resolution	Can you correctly identify printed text at near (1m), medium (3m), and far (10m) distances at a resolution of 30 pixels/degree?
	Color Spectrum	Can you correctly distinguish ten colors with an average difference in wavelength of 25nm?
	Depth Perception	Can you correctly identify the relative distance of three objects?
	Tracking	Can you correctly follow an object moving on the floor in front of you?
Sound	Voice	When you say a sentence, is your voice realistic in intonation, pitch, tone, and pace?
	Sound Localization	Can you correctly identify the location of four sounds in front of and behind you?
	Awareness	Does the operator receive realistic feedback on how loud they are speaking?
	Sound Selection	In a room with multiple people talking and background noise, can individual speakers be identified and listened to?
	Lowest/Highest Possible Sound	Can you listen to five sounds of various frequencies and identify when each is heard?
Touch	Temperature Recognition	Can you correctly identify the relative temperature of three objects?
	Pressure Sensors	Without looking (e.g. blindfolded), can you identify where a human touches your avatar's body?
	Texture Identification	Can you correctly identify the texture of three objects from a multiple choice list (e.g. metal, fur, sandpaper)?
	Weight Recognition	Can you correctly identify the relative weight of three objects?
	Strength	Can you lift and transfer three objects (e.g. 1 kg, 5 kg, 10 kg) a distance of 3m?

	Dexterity	Can you pick up and transfer three small objects (e.g. marble, nail, playing card, a small piece of fruit like a raspberry or a blueberry, or an ice cube)?
Endurance	Run time	Can the avatar perform normal activities for two uninterrupted hours without recharging?
Other	Setup Time	Can the operator be ready to perform the Avatar Physicals testing with less than 10 minutes of setup time after being trained?
	Weight	All equipment worn by the operator must weigh less than 5kg. There is no limitation on the weight of the robotic avatar or any accessory equipment that is not attached to the operator.

Table 2. Representative Scenarios for the Evolution of an Avatar demonstrations

These Judging Criteria illustrate example scenarios to be used in the Evolution of an Avatar events at the Finals Competition. These scenarios are for illustration only, and the actual scenarios may be quite different in detail. Complete specifications for the Evolution of an Avatar event will be published in the Rules and Regulations 6 months before the Finals.

Demonstration	Task	Points
Scenario 1 "Providing Care" (20 minutes)	Greet your relative in an assisted living facility.	100
	Administer morning medications (pills and liquid).	
	Push a wheelchair five meters up a ramp to a common room.	
	Discuss available daily activities with staff.	
	Identify a board game such as chess or go in a box on a shelf. Pick it up, bring it to a table, and set it up for play.	
	Listen to an announcement of a visiting doctor for checkups.	
	Push your relative five meters to the doctor's station.	
	Read the written checkup report aloud and sign it.	
	Push the relative back down the ramp to their original spot.	
	Take a blanket from the wheelchair, fold it, and put it on a shelf.	
Scenario 2 "Disaster Relief" (20 minutes)	Use a shovel to load 20kg of debris into a wheelbarrow	200
	Push the wheelbarrow 10m to a loading area	
	Use the shovel to unload the wheelbarrow	
	Return to the original location and listen for a call for help.	
	Locate the source of the call for help.	
	Walk forward to that location on a rough, dirt surface.	
	Pick up a coiled rope with a weighted end.	
	Throw the weighted end of the rope towards the sound.	

Demonstration	Task	Points
	Turn your head and call loudly for assistance.	
	Hand the unweighted end of the rope to an assistant.	
Scenario 3 “Multi-Purpose Utility” (20 minutes)	Locate a set of instructions and read them aloud.	300
	Pour the specified quantity of fluid from one beaker to another.	
	Use a scoop to collect a specified sample of powder.	
	Unroll a plan on to a flat table and place weights on its corners.	
	Using a protractor, straightedge, and mechanical pencil, draw two lines on the plan that intersect at 45 degrees.	
	Identify a broken plug-in component on an electrical control panel.	
	Walk 6 meters to a workbench and solder a wire on it.	
Return to the control panel and replace the component.		

Scoring: Milestone Competitions

Teams will demonstrate progress toward a winning avatar solution in two Milestone Competitions, held in April 2020 and April 2021.

In each Milestone Competition, teams will be evaluated on a pass/fail basis on the Judging Criteria for the Avatar Physicals (Table 1). Teams will receive a pass rating if they demonstrate performance at or above the minimum standard for each metric. At the end of each Milestone Competition, teams will be ranked based on the number of pass ratings they receive, and the results will be posted on a Leaderboard. No team will be eliminated at a Milestone Competition, allowing the public to follow the progress of individual teams and their positions on the Leaderboard.

Up to five teams with the highest ranking in each Milestone Competition will share the Milestone Prize purse. To be eligible for a share of the prize purse in Milestone Competition #1, teams must receive a pass rating on at least 50 percent of all metrics. To be eligible for a share of the prize purse in Milestone Competition #2, teams must receive a pass rating on at least 75 percent of all metrics.

In the case of a tie, the Judging Panel will make a determination as to a tiebreaker.

Scoring: Finals

In the Finals, teams will compete in two rounds: the Avatar Physicals (first round), followed by the Evolution of an Avatar demonstrations.

During the first round, teams will be evaluated on the Judging Criteria for the Avatar Physicals (see Table 1). Teams must pass at least 90% of all criteria to move to the Evolution of an Avatar event,

and the Judging Panel will select up to the top three teams for that event. Teams will receive a score if they successfully perform the activity proposed on the checklist. Each pass rating will be worth ten points.

During the second round, teams will be judged on a pass/fail basis on each of the Judging Criteria for the Evolution of an Avatar demonstrations (Table 2). Teams will receive a pass rating if they successfully complete each task. A pass rating will be worth a number of points depending on the difficulty of the task within that scenario. A team that receives a pass rating on all of the tasks in a round will receive a bonus score. In Demonstration 1 and Demonstration 2, teams must receive a pass rating on at least 7 of the 10 tasks to move on to the next demonstration. If a team fails to do so, they are eliminated from the Finals.

Teams will be ranked based on the total number of points they receive. The team with the highest number of points will be the winner of the Grand Prize purse.

In the event that no team achieves the minimum performance necessary to win the Grand Prize purse, the Judging Panel, with input from XPRIZE and the sponsor, will determine how to proceed. The prize purse may be allocated in a different manner by the Judging Panel, the Competition may end with no winner, the Competition will be extended beyond 48 months, or another appropriate outcome may be chosen that is aligned with the goals and budget of the Competition.

PRIZE PURSES

There will be \$10,000,000 in total prize purses available.

Grand Prize Purse

There will be a Grand Prize purse in the amount of \$8,000,000. The entire Grand Prize purse will be awarded to the highest-ranking team in the Finals.

Milestone Prize Purses

There will be \$2,000,000 available in Milestone Prize purses; \$1,000,000 will be available at Milestone Competition #1 and \$1,000,000 will be available at Milestone Competition #2. Each Milestone Prize purse will be shared among up to five eligible, top ranking teams. Any Milestone Prize purse not awarded at the Milestone Competitions may be awarded as a prize purse to the second-highest ranking team in the Finals.

COMPETITION ACTIVITIES - DETAIL

Launch and Registration

1. **Launch.** The Competition was launched and open for individual registration on March 12, 2018.
2. **Regular Registration.** Regular Registration will be open until October 31, 2018. Teams may begin registering on June 15, 2018 by signing a Competitor Agreement and paying a registration fee of \$1,000 by the close of registration on October 31, 2018.
3. **Late Registration.** Additional teams may register, after Regular Registration ends, at specific points in 2019 and 2020. XPRIZE will set additional Rules and Regulations regarding Late Registration prior to the close of the Regular Registration period. Teams that register under Late Registration must meet minimum performance thresholds, be accepted by the Judges, cover incremental costs for verification (which may include time and travel for XPRIZE, contractors, and/or judges), and pay a late registration fee.

Qualifying Round

4. **Team Submission.** By January 31, 2019, all teams must submit a paper that describes their proposed solution. Teams may also submit supporting drawings, photos, video, data, and/or other materials that describe their proposed solution. File formats and other detailed requirements for submissions will be published in the Rules and Regulations before the close of registration.

Each team submission should address the following elements:

- How the solution meets the general criteria for an eligible entry;
- How the solution will address each Judging Criterion;
- Anticipated timeline for technology development and how it aligns with the prize timeline;
- Strategic and technical partners necessary for technology development;
- Investment necessary (if any) to participate in the Competition, and a plan for securing that investment;
- Vision for further development and potential commercial applications of the solution after the competition ends;

- Biographical information for each team member and a listing of funding partners, sponsors, suppliers, and formal collaborators connected with the team;
- Any additional information recommended by the Judging Panel.

5. Judging Panel Review. Following the submission deadline, the Judging Panel will review submissions and eliminate any teams that have not provided a complete submission. The Judging Panel may ask clarifying or other questions of teams during this review period. Procedures for questions will be provided to teams.

6. Judging Summit. The Judging Panel will convene to discuss and evaluate submissions and determine the teams that will move on to the Main Competition. The Judging Panel will determine criteria and weighting for evaluating team submissions.

7. Announcement of Teams Invited to the Main Competition. Up to 25 teams will be invited to participate in the Main Competition. XPRIZE and the Judging Panel will seek to invite all qualified teams to participate. XPRIZE may hold a Team Summit following the Qualifying Round and prior to Declaration Deadline #1.

Main Competition

Early Finals

Teams may progress toward the Competition goals more quickly than the Competition timeline allows. If a team feels it can succeed in the Evolution of an Avatar events, it will have two opportunities to call for the Finals to be held early, in the place of one of the two Milestone Competitions. Six months before each Milestone Competition teams may request an Early Finals. The Judging Panel and XPRIZE representatives will verify through a live demonstration that the team's technology is, indeed, ready for the Finals Competition. If so, XPRIZE will announce that the next Milestone Competition will be replaced by the Finals Competition. All teams will have an equal chance to compete in the Early Finals: a team requesting the Early Finals will have no scoring advantage for doing so.

There are three possible scenarios for the Main Competition timeline:

- **Scenario A:** One or more teams declare at Declaration Deadline #1 and are verified. The Finals take place in April 2020.
- **Scenario B:** No teams declare at Declaration Deadline #1 (or one or more teams declare but are not verified). Milestone Competition #1 takes place in April 2020. One or more teams declare at Declaration Deadline #2 and are verified. The Finals take place in April 2021.
- **Scenario C:** No teams declare at Declaration Deadline #1 or #2 (or one or more teams declare but are not verified). Milestone Competition #1 takes place in April 2020. Milestone Competition #2 takes place in April 2021. The Finals take place in October 2021.

Scenario A

1A. Declaration Deadline #1. Any team that believes they are ready to compete in an early Finals may declare they are ready to be verified by October 15, 2019. XPRIZE will set procedures in the Rules and Regulations for making a declaration, including the formats, required information, and specific deadlines. XPRIZE will announce within 48 hours of the declaration deadline whether any teams have declared.

2A. Teams that Declare are Verified. Before an early Finals can be triggered, at least one team must be verified. If more than one team makes a declaration before the deadline, XPRIZE may choose to verify the first team to submit their declaration or up to three teams that declare. A team making a declaration will be responsible for the costs of verification, which may include time and

travel for XPRIZE, contractors, and/or judges. However, if a team is verified, XPRIZE will reimburse the team for those costs. Any team that declares, but fails verification, may not declare again at Declaration Deadline #2.

Verification will involve the following:

- XPRIZE staff, one third-party operator, and at least one member of the Judging Panel will travel to the location of teams making a declaration to perform the required tests.
- Any members of the Judging Panel in attendance may also serve as operators for testing.
- Teams will be tested on the Judging Criteria for the Avatar Physicals (see Table 1). Each operator will submit evaluations to the Judging Panel.
- Teams must also demonstrate five tasks on the Judging Criteria for the Evolution of an Avatar demonstrations (see Table 2). These tasks will not be known to teams prior to verification.
- Following the verification visit(s), the full Judging Panel will convene at a Judging Summit to review the results and determine whether the team is verified. This Judging Summit may be virtual.
- A team will be verified if they receive a pass rating on 80 percent of the Judging Criteria for Avatar Physicals and a pass rating on four out of five tasks.

3A. XPRIZE Announces Date for Early Finals. As soon as possible after any team who declares is verified, XPRIZE will announce the date for an early Finals. The early Finals will be held in place of the first Milestone Competition in April 2020. A team that declares and is verified must compete in the early Finals. Any registered team may compete in the early Finals. Teams that did not declare are not required to compete in the early Finals.

4A. Teams Arrive at the Finals and Prepare to Compete. The Finals will take place over five days. Each team will be provided with a dedicated station for setup and testing. Teams will have at least one day for preparation.

5A. Teams Participate in an Avatar Physicals. The Avatar Physicals will last two days. XPRIZE-contracted third-party operators and assistants will conduct the testing in the Avatar Physicals. Three operators will test each team, and operators will work concurrently. The sequence for testing teams will be randomly selected. Each operator will test teams in a varying sequence to ensure the same teams are not always among the first or last teams tested.

Each operator will visit each team's station, and conduct the tests on the Judging Criteria for the Avatar Physicals (see Table 1). Each station will be equipped with the necessary equipment for testing. This equipment may include: timing device; charts and objects to test vision; equipment to create necessary sounds for hearing tests; and objects to test touch and dexterity. XPRIZE will

provide a sound booth or other sound-proofing necessary to conduct the sound tests, if necessary. Each operator will have two assistants for setting up, conducting the tests, and keeping time.

Each team will have 15 minutes to set up and prepare the operator and 30 minutes to complete the testing. Teams can attempt any checklist activity as many times as they choose; however, testing will end after 30 minutes regardless of whether all tests have been performed. Operators will record pass/fail ratings on the checklist. Any test not performed in the time allotted will receive a fail rating.

At the end of each day of the Avatar Physicals, point totals for each team will be posted on a Leaderboard. The top three teams in the Avatar Physicals will move on to the Evolution of an Avatar demonstrations.

6A. Teams Participate in the Evolution of an Avatar Demonstrations. The Evolution of an Avatar demonstrations will last one day. The event venue will contain three designated areas for demonstration, which will be set up to test (1) the Demonstration 1 tasks; (2) the Demonstration 2 tasks; and (3) the Demonstration 3 tasks. One operator will be assigned to each area, and each operator will have a designated alternate who will be called upon if the operator cannot complete their duties.

The sequence for testing teams will be randomly selected. Teams will have 20 minutes to set up and prepare the operator and the robot in each demonstration area. Set-up will be timed, and the time will be recorded. Teams will have 20 minutes to complete each demonstration, including all tasks (see Table 2). Teams will complete the Demonstration 1, Demonstration 2, and Demonstration 3 tasks in succession. Each task will be timed, and the time will be recorded. Teams will have 10 minutes to clear each demonstration area for the next team.

Operators will assign a pass/fail score and the associated points for each task as well as a bonus for completing all tasks in an overall demonstration (see Table 2). Point totals will not be posted to the Leaderboard prior to review by the Judging Panel; however, other data from the Evolution of an Avatar demonstrations may be added to the Leaderboard.

7A. Judging Summit. The Judging Panel will review the operator evaluations and assign an overall score to each team. Judges may ask clarifying questions of operators and teams to assist in assigning final scores. The Judging Panel will convene at a Judging Summit on site to determine the winner. In the case of a tie, the Judging Panel will determine an appropriate methodology for choosing a winner. Tiebreakers may include metrics related to ease of use or potential consumer acceptance, such as weight or complexity of the operator equipment or the time necessary for set-up.

8A. Announcement of the Winner and Awards Ceremony. XPRIZE will announce the winner at an award ceremony directly following the Finals. The winning team will be awarded the Grand Prize purse.

Scenario B

2B. XPRIZE Announces Date for Milestone Competition #1. If no teams declare by October 15, 2019, XPRIZE will hold a Milestone Competition in April 2020 that will also serve as a Team Summit. All teams will be required to attend the Milestone Competition and Team Summit. Teams may also choose to compete in an Avatar Physicals at the Milestone Competition. XPRIZE will hold an Avatar Physicals if at least two teams choose to compete. XPRIZE will announce the date and location for the Milestone Competition following the sign-up deadline and well in advance of the event.

3B. Teams Convene for Milestone Competition #1. A Milestone Competition will take place over five days. The initial two days will involve Team Summit activities. The final three days will involve an Avatar Physicals and a Judging Summit. If fewer than two teams sign up to compete at the Milestone Competition, the Team Summit activities may be extended beyond two days.

4B. Teams Participate in an Avatar Physicals. (See 5A above)

5B. Judging Summit. The Judging Panel will review the operator evaluations and assign an overall score to each team. Judges may ask clarifying questions of operators and teams to assist in assigning final scores. Teams must pass at least 50% of all metrics to be eligible for Milestone Prize #1. The Judging Panel will convene at an on-site Judging Summit to determine the top-ranking teams and eligibility for the Milestone Prize purse. In the case of a tie, the Judging Panel will determine an appropriate methodology for choosing a winner. Tiebreakers may include metrics related to ease of use or potential consumer acceptance, such as weight or complexity of the operator equipment or the time necessary for set-up.

6B. Milestone Prize purses are Announced. XPRIZE will announce the winners of the Milestone Prize purse on the final day of Milestone Competition #1.

7B. Declaration Deadline #2. Any team that believes they are ready to compete in an early Finals may declare they are ready to be verified by October 15, 2020. XPRIZE will set procedures in the Rules and Regulations for making a declaration, including the formats, required information, and specific deadlines. XPRIZE will announce within 48 hours of the declaration deadline whether any teams have declared.

8B. Teams that Declare are Verified. (See 2A above)

9B. XPRIZE Announces Date for an Early Finals. (See 3A above)

10B. Teams Arrive at Finals and Prepare to Compete. (See 4A above)

11B. Teams Participate in Avatar Physicals. (See 5A above)

12B. Teams Participate in the Evolution of an Avatar Demonstrations. (See 6A above)

13B. Judging Summit. (See 7A above)

14B. Announcement of Winner and Award Ceremony. XPRIZE will announce the winner at an award ceremony directly following the Finals. The winning team will be awarded the Grand Prize purse. Any amounts from the milestone prize purse not awarded at Milestone Competition #1 may be awarded as a prize purse to the second-highest ranking team in the Finals.

Scenario C

2C. XPRIZE Announces Date for Milestone Competition #1. (See 2B above)

3C. Teams Convene for Milestone Competition #1. (See 3B above)

4C. Teams Demonstrate and are Judged. (See 4B above)

5C. Judging Summit. (See 5B above)

6C. Milestone Prize Purses are Announced. (See 6B above)

7C. Declaration Deadline #2. (See 7B above)

8C. XPRIZE Announces Date for Milestone Competition #2. If no teams declare by October 15, 2020, XPRIZE will hold a Milestone Competition in April 2021 that will also serve as a Team Summit. All teams will be required to attend the Milestone Competition. Teams may also choose to compete in an Avatar Physicals at the Milestone Competition. XPRIZE will hold an Avatar Physicals if at least two teams choose to compete. XPRIZE will announce the date and location for the Milestone Competition following the sign-up deadline and well in advance of the event.

9C. Teams Convene for Milestone Competition #2. (See 3B above)

10C. Teams Participate in an Avatar Physicals. (See 5A above)

11C. Judging Summit. (See 5B above) Teams must pass at least 75% of all metrics to be eligible for Milestone Prize #2.

12C. Milestone Prizes are Announced. XPRIZE will announce the winners of the milestone prize purse on the final day of Milestone Competition #2.

13C. XPRIZE Announces Date for Finals. Following Milestone Competition #2, XPRIZE will announce the date and location of the Finals in October 2021. All teams will be required to compete in the Finals.

14C. Teams Arrive at Finals and Prepare to Demonstrate. (See 4A above)

15C. Teams Participate in Avatar Physicals. (See 5A above)

16C. Teams Participate in the Evolution of an Avatar Demonstrations. (See 6A above)

17C. Judging Summit. (See 7A above)

18C. Announcement of Winner and Award Ceremony. XPRIZE will announce the winner at an award ceremony directly following the Finals. The winning team will be awarded the grand prize purse. Any amounts from the Milestone Prize purses not awarded at Milestone Competition #1 or Milestone Competition #2 may be awarded as a prize purse to the second-highest ranking team in the Finals.

COMPETITION TIMELINE AND ACTIVITIES

Tables 3 - 6 outline the timeline and activities of the Competition under Scenarios A, B, and C.

TABLE 3. Competition Activities – First 24 Months

MONTH	ACTIVITIES
LAUNCH AND REGISTRATION	
March 2018	Launch Registration begins
April 2018 – September 2018	Regular registration
October 2018	Regular registration deadline
QUALIFYING ROUND	
November 2018 – December 2018	Teams prepare submissions
January 2019	Team submission deadline
February 2019	Judges review submissions
March 2019	Judging Summit
April 2019	XPRIZE announces teams invited to participate in the Main Competition
MAIN COMPETITION	
May 2019 – September 2019	Teams develop solutions XPRIZE may hold a Team Summit
October 2019	Declaration Deadline #1 - Teams may submit paper/video declaring their solution is ready; all teams are notified.

TABLE 4. Competition Activities – Scenario A (Month 24–30)

MONTH	ACTIVITIES
MAIN COMPETITION CONT'D	
November 2019	XPRIZE/contractors/judges visit declaring team(s) and verify whether any solution is ready to compete in the Finals
December 2019	XPRIZE announces date for Finals Additional teams may announce that they will compete in the Finals
January 2020 – March 2020	Teams prepare for the Finals
April 2020	Teams compete in the Finals Judging Summit Winner is announced

TABLE 5. Competition Activities – Scenario B (Month 24–42)

MONTH	ACTIVITIES
MAIN COMPETITION CONT'D	
October 2019 – March 2020	Teams continue developing solutions
April 2020	All teams attend Milestone Competition #1 Judging Summit Milestone prize winners are announced
May 2020 – September 2020	Teams continue developing solutions
October 2020	Declaration Deadline #2
November 2020	XPRIZE/contractors/judges visit declaring team(s) and verify whether any solution is ready to compete in the Finals
December 2020	XPRIZE announces date for Finals Additional teams may announce that they will compete in the Finals
January 2021 – March 2021	Teams prepare for the Finals
April 2021	Teams compete in the Finals Judging Summit Winner is announced

TABLE 6. Competition Activities – Scenario C (Month 24–48)

MONTH	ACTIVITIES
MAIN COMPETITION CONT'D	
October 2019 – March 2020	Teams continue developing solutions
April 2020	All teams attend Milestone Competition #1 Judging Summit Milestone prize winners are announced
May 2020 – March 2021	Teams continue developing solutions
April 2021	All teams attend Milestone Competition #2 Judging Summit Milestone prize winners are announced
May 2021 – September 2021	Teams continue developing solutions
October 2021	All teams compete in the Finals Judging Summit Winner is announced

TEAM SUMMITS

Teams will be required to participate in up to three Team Summits during the Competition. Team Summits will be an opportunity for Teams to interact and collaborate with each other, industry, academic, government, and other stakeholders as well as potential investors and partners. The Team Summits may be held in conjunction with: the Milestone Competitions in April 2020 and April 2021; an existing industry conference; at a sponsor facility or site; or at another time and location determined by XPRIZE. External stakeholders may also be invited to attend. The specific dates and locations of Team Summits will be announced well in advance of each event.

LEADERBOARD

XPRIZE may implement interim status reports and/or other information postings (“Leaderboard”) describing the progress of the teams involved in the Competition. This Leaderboard will be used to help engage key audiences and promote teams by providing public and industry visibility. Rules and Regulations pertaining to Leaderboard programs will be made available to teams prior to any public posting.

ADVISORY BOARD

XPRIZE will form a panel of relevant subject matter and technical experts to serve as the Advisory Board (AB) for the Competition. The AB will advise XPRIZE regarding the scientific and technical elements of the Competition. Each member of the Advisory Board (“Advisor”) will enter into an agreement with XPRIZE that will: (i) outline Advisor’s duties and obligations; (ii) require Advisor to maintain confidentiality of XPRIZE’s and team confidential information, in accordance with the Competitor Agreement; and (iii) require each Advisor to acknowledge that he or she shall make no claim to any team’s intellectual property.

Composition of Advisory Board

The total number of AB members will be determined by XPRIZE and will not exceed 10 members. The AB will be independent of XPRIZE, the sponsor, and all teams and team members. No Advisor, nor any member of an Advisor’s immediate family, shall participate, nor have any financial or other material interest, in any team or team member. All members of the AB shall promptly disclose to XPRIZE any such current, former, or expected future conflict of interest with XPRIZE, the sponsor, or any team or team member.

Role of Advisory Board

The duties and responsibilities of the Advisory Board may include, but not be limited to: (i) assisting with the establishment of qualifications for the Judging Panel; (ii) recommending members of the Judging Panel; (iii) providing input related to testing protocols and judging criteria; (iv) and providing input toward the development of these Competition guidelines.

JUDGING PANEL

The Judging Panel will comprise highly qualified and impartial Judges. The Advisory Board will recommend the candidates it believes are best suited to serve on the Judging Panel. XPRIZE, in its sole and absolute discretion, will appoint the Judging Panel based on these and other recommendations. Each Judge will enter into a Judging Agreement with XPRIZE that will: (i) outline the Judge's duties and obligations; (ii) require each Judge to maintain confidentiality of XPRIZE and team confidential information in accordance with the Competitor Agreement; and (iii) require each Judge to acknowledge that he or she shall make no claim to any team's intellectual property.

Independence of Judging Panel

The Judging Panel will be independent of XPRIZE, the sponsor, and all teams and team members. No Judge, nor any member of a Judge's immediate family, shall participate, nor have any financial or other material interest, in any team or team member. All members of the Judging Panel shall promptly disclose to XPRIZE any such current, former, or expected future conflict of interest with XPRIZE, the sponsor, or any team or team member.

Role of Judging Panel

The duties and responsibilities of the Judging Panel will include, but not be limited to: (i) evaluating team compliance with the Competitor Agreement, these Competition Guidelines, and the Rules and Regulations of the Competition; and (ii) the awarding of points and selection of teams that will proceed to each round of the Competition.

Grounds for Judging Panel Decisions

Official decisions made by the Judging Panel will be approved by a majority vote of the Judges, following careful consideration of the testing protocols, procedures, guidelines, rules, regulations, criteria, results, and scores set forth in the Competitor Agreement, these Competition Guidelines, the Rules and Regulations of the Competition, and all other applicable exhibits to the Competitor Agreement. If any vote of the Judges results in a tie, then the Judging Panel shall determine, in its sole and absolute discretion, the mechanism to settle the tie. Similarly, if one or more teams are tied at any stage during the Competition, the Judging Panel shall have the sole and absolute discretion to settle the tie. If no team meets the criteria for a prize purse, then the Judging Panel will retain sole

and absolute discretion to declare or not declare a winner of the Competition and/or otherwise allocate or choose not to allocate one or more of the prize purses and/or any other award associated with the Competition.

Decisions of Judging Panel Are Final

The Judging Panel shall have sole and absolute discretion: (i) to allocate duties among the Judges; (ii) to determine the degree of accuracy and error rate that is acceptable to the Judging Panel for all Competition calculations, measurements, and results, where not specified in the Rules and Regulations; (iii) to determine the methodology used by the Judging Panel to render its decisions; (iv) to declare the winners of the Competition; and (v) to award the prize purses and other awards. Decisions of the Judging Panel shall be binding on XPRIZE, the teams, and each team member. XPRIZE and teams agree to not dispute any decision or ruling of the Judging Panel, including decisions regarding the degree of accuracy or error rate of any Competition calculations, measurements, and results. Teams shall have no right to observe other teams' testing or evaluation, or to be informed of other teams' calculations, measurements and results, unless such information is made publicly available by XPRIZE.